# Identification guide to southern African GRASSES

An identification manual with keys, descriptions and distributions



L. Fish, A.C. Mashau, M.J. Moeaha and M.T. Nembudani

STRELITZIA 36





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SANBI
Biodiversity for Life
South African National Biodiversity Institute

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# STRELITZIA

This series has replaced *Memoirs of the Botanical Survey of South Africa* and *Annals of the Kirstenbosch Botanic Gardens* which SANBI inherited from its predecessor organisations.

The plant genus *Strelitzia* occurs naturally in the eastern parts of southern Africa. It comprises three arborescent species, known as wild bananas, and two acaulescent species, known as crane flowers or bird-of-paradise flowers. The logo of the South African National Biodiversity Institute is partly based on the striking inflorescence of *Strelitzia reginae*, a native of the Eastern Cape and KwaZulu-Natal that has become a garden favourite worldwide. It symbolises the commitment of the Institute to champion the exploration, conservation, sustainable use, appreciation and enjoyment of South Africa's exceptionally rich biodiversity for all people.

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# PREFACE

*Grasses of southern Africa* by G.E. Gibbs Russell, L. Watson, M. Koekemoer, L. Smook, N.P. Barker, H.M. Anderson & M.J. Dallwitz was published in 1990, but by 2004 there were only a few copies still available for sale. The primary purpose of the publication was to provide a means of identifying southern African grasses to genus and species levels and to provide basic information about each taxon. Southern Africa refers here to what is floristically known as the FSA (Flora of southern Africa) region and includes Namibia, Botswana, Swaziland, Lesotho and South Africa. As names of plants are subject to change, distribution records are added to, new taxa are discovered and described, or distributions of known taxa are expanded into the region, there was a need in 2004 for an updated book after the ± 14 years since the first was published.

Funding was provided by the Mellon Foundation under the African Plants Initiative umbrella for the 2005–2007 period. The funding provided equipment, money for artists and the employment of three contract workers, A.C. Mashau, M.J. Moeaha and M.T. Nembudani, to assist L. Fish (née Smook), a permanent staff member of SANBI. After 2007 work on this project was continued by L. Fish and A.C. Mashau (by then also a permanent SANBI staff member).

Although there is some change of format, this new publication uses most of the information of 1990, with additions and changes where relevant. It must be understood that this publication represents nothing more than a type of expanded checklist of the southern African grasses for 2015; a flora, or revisions of the genera, requires much more research into taxonomic relationships of the species. Throughout the book it has been pointed out where further studies are needed, and hopefully these comments will stimulate more research on the grasses of southern Africa.

## Grasses included

All grasses that are indigenous as well as those that are naturalised in southern Africa are covered in this book. There may be other naturalised species occurring that have not yet been collected, and there are also many specimens that have been collected but cannot be identified; indicating probable new species or distribution extensions of taxa from other parts of Africa.

Not included are the grasses, such as crops and garden ornamentals, grown only under cultivation in southern Africa. Usually crop species cannot live successfully out of cultivation, although there are exceptions, for example *Avena*, a genus with many weedy species. Important grain crops brought to southern Africa from other continents are maize (*Zea mays*) from central America, wheat (*Triticum aestivum*) from Europe, the Mediterranean area and western Asia, barley (*Hordeum vulgare*) from north temperate regions, oats (*Avena sativa*) from temperate parts of the Old World, rye (*Secale cereale*) from northern Eurasia, and rice (*Oryza sativa*) from tropical Asia. African grain crops that have been brought into cultivation are the millets, *Pennisetum glaucum* and *Sorghum bicolor*, both taxa that continue to hybridise with their wild relatives. Species widely grown for pasture (*Digitaria eriantha*, *Lolium temulentum*), lawns (*Cynodon dactylon, Pennisetum clandestinum*), ornamentals (*Cortaderia selloana, Pennisetum villosum*), and erosion control (*Ammophila arenaria*, *Ehrharta villosa*) are either indigenous or have become naturalised, and some of these have even become serious invaders of the natural vegetation (*Arundo donax*, *Cortaderia jubata*).

## Generic keys

The generic keys used are updated versions of those produced by L. Fish for *Seed Plants of southern Africa*: *families & genera*, O.A. Leistner (editor), *Strelitzia* 10 (2000). These dichotomous keys are not phylogenetic, as an effort was made to make them user-friendly and to allow for as quick an identification as possible. It is essential to have a certain amount of understanding of grass terminology to use all the keys in this book. In this regard the glossary and the illustrations, particularly those of the spikelet or spikelet components found throughout, will be helpful.

## Generic descriptions

The genera are in alphabetical order so that they can be easily located in the book. A taxonomic sequence was not considered, as worldwide much work is still being done on grass phylogenies, and a new and comprehensive classification is not yet available. The generic descriptions are based on literature and on data obtained from observations of specimens at PRE (National Herbarium, Pretoria). The information of the photosynthetic pathway was taken from Gibbs Russell et al. (1990). The list of references reflects where some useful information on the genus or a particular species of the genus can be found. Recent molecular work has often resulted in changes in generic or species concepts, many of which have not been taken up in this publication, but, where known, the relevant literature or alternate names have been given.

## Authors

The name of the person(s) responsible for the treatment of each genus is given at the end of the particular generic description.

## Illustrations

Following Gibbs Russell et al. (1990), where possible a habit illustration (or scanned specimen) of at least one species of a genus is provided. In addition a spikelet or a particular diagnostic feature of the spikelet of the genus is illustrated. Although most of the spikelet and a few habit illustrations were specifically done for this project, many of the drawings were prepared by a number of artists over the years and therefore may have been published elsewhere.

## Spikelet photographs

Photographs of spikelets done by M. Koekemoer for the previous publication (1990) have been included with each genus where possible.

## Quick guide to easily confused genera/species/taxa

Some taxa superficially resemble another although they may not be closely related, e.g. *Stipa dregeana* and *Festuca africana*, and keys to easily separate these have been included where relevant. Hopefully, this will help the identifier to get to the correct genus quickly without having to go through the generic keys.

## Species keys

Keys to species are totally artificial and constructed so that a species/taxon keys out as quickly as possible. The disadvantage is that often closely related (e.g. subsp.) or similar species/taxa do not key out close together or necessarily in the same couplet.

## Species type specimens

Information regarding the types (locality, collector, collector's number and nomenclatural type) was taken from literature, and the authenticity/correctness thereof was not checked. There are a few species where little or no information could be found.

## Species descriptions

Although a different format was adopted, information such as the species descriptions, flowering time, ecology, frequency, and the voucher specimen(s) for each species are taken from Gibbs Russell et al. (1990). New or additional information was added where possible. The descriptive information was obtained from original observations of specimens at PRE (and other herbaria as necessary) and from literature, especially for those where no specimens were available at PRE. Flowering time usually represents the spread of months given by the herbarium specimen label (collecting date); this information was rarely obtained during field studies. The information on economics is mainly from literature, while the illustrations quoted will assist in identification where the literature, but no reference specimens, is available.

## Distribution abbreviations

Some southern African countries and South African provinces referred to in the text are often abbreviated, especially in the species descriptions. These are: Namibia (N), Botswana (B), Swaziland (S), Lesotho (L), and South African provinces: Limpopo Province (LIM), North West Province (NW), Gauteng Province (G), Mpumalanga Province (M), Free State Province (FS), KwaZulu-Natal Province (KZN), Northern Cape Province (NC), Western Cape Province (WC), and Eastern Cape Province (EC). Other country often abbreviated: Democratic Republic of the Congo (DRC). Names of other countries are written out in full.

## Distribution maps

The maps for each species were plotted from the specimen records held in the *Specimen* component of PRECIS (the National Herbarium, Pretoria [*PRE*] Computerised *I*nformation *S*ystem) and reflects only those specimens housed in the SANBI herbaria (National Herbarium, Pretoria; Compton Herbarium, Cape Town; and KwaZulu-Natal Herbarium, Durban). Only if SANBI did not have a specimen for a specific species does the distribution reflect that of specimens from other herbaria, the information being obtained either directly from the herbarium involved or from literature. Each dot on the map represents a record(s) in a quarter degree (latitude/longitude) grid in *Specimen*-PRECIS. Quality control was done only in as much that distributions (dots on the maps) that appeared unusual and possibly incorrect were checked and removed if deemed necessary. It must be emphasised that the distribution maps only reflect the specimen collections housed at the three SANBI herbaria and therefore may not reflect the complete distribution of a given taxon. (These maps give a good indication of the gaps in the collection.)

## Anatomy vouchers

R.P. Ellis published many papers on the anatomy of southern African grasses, these publications often fo-

cusing on certain tribes or genera. Apart from those that were published, he also looked at species of many other genera. All the voucher specimens, actual mounted specimen slides, photographs (black-and-white prints) as well as the negatives of the grass leaf epidermis and transverse sections he looked at, are housed at the National Herbarium, Pretoria. As it was felt that this is a valuable but unpublished resource, anatomy vouchers are included under the relevant species. The photographs for most species include both the transverse section and the epidermis of the leaf blade. Unfortunately, the photographs could not be included in this publication.

## Terms used

The terms in this book reflect those of the authors and it is hoped that the general description of the grass plant and the glossary given will prove to be useful.

## Literature

The references do not necessarily include those of the type specimens, but will hopefully prove useful where more information is required regarding genus or species names, or descriptive and other information.

# ACKNOWLEDGEMENTS

When doing a book like this, there are many people who make it possible, and we apologise to those we may have forgotten to thank here. Our grateful thanks goes to the authors of *Grasses of southern Africa* (1990), G.E. Gibbs Russell, L. Watson, M. Koekemoer, L. Smook, N.P. Barker, H.M. Anderson & M.J. Dallwitz, because it is their hard work and dedication that forms the basis of our work, and without them it would have been much harder to produce this book. Also the authors of all the publications that were a valuable source of information on the grasses of southern African, the most important of which is *Flora Zambesiaca* 10(1–4). We are very grateful to the Mellon Foundation for providing funds to employ A.C. Mashau (June 2005 to June 2007), M.J. Moeaha (June 2005 to March 2007) and M.T. Nembudani (June 2005 to August 2006), pay the artists for the many and surely very useful new illustrations, and for the purchase of equipment such as computers and a printer. We sincerely thank G.F. Smith for obtaining this funding for us. We also thank the artist, W. Roux, for donating the plate of *Ehrharta* florets as a dedication to G.E. Gibbs Russell and who kept her prices such that there are far more illustrations than what would have otherwise been possible. Thanks to all those involved in the scanning of the many illustrations. To prevent leaving one out, only their affiliation is given; namely the API project (illustration scanning); staff of the National Herbarium, Pretoria (PRE) and members of the SANBI Publishing team (Biodiversity Information Management and Policy Advice, Pretoria). H. Steyn is thanked for always being ready to advise and help A.C. Mashau when she was converting all the distribution maps in ArcView to a format suitable for publication. The following persons helped to speed up the work and are gratefully acknowledged: T. Masupa and W. Sepheka of the National Herbarium, Pretoria, who helped produce some of the draft distribution maps; and M.J. Moeaha, who ensured that the text of the large genera that she was responsible for, but did not manage to complete before leaving SANBI, was in the format used in this book. The National Herbarium of Namibia (WIND) of the National Botanical Research Institute (NBRI) of Namibia is thanked for allowing the use of the illustrations by B. Loutit (née Pascoe). L. Henderson, of the ARC-Plant Protection Research Institute, supplied the distribution information of the alien invaders, *Cortaderia jubata*, *C. selloana* and *Arundo donax*. B. Simon (Queensland Herbarium, Brisbane, Australia) and E. Kellogg (Department of Biology, University of Missouri, St Louis, USA) are thanked for their help with the latest classification.

# INTRODUCTION TO THE GRASSES

The grass family, known as Poaceae or Gramineae, is the most important plant family in the world: in number of individuals, biomass, area covered, diversity of habitats and value to humans. Grasses occur in the tropics, in the arctic and antarctic, and in all habitats including swamps, deserts and forests, and on mountain tops and seashores. The most widespread flowering plant species, *Phragmites australis*, is a grass (Good 1974).

The family contains what is commonly known as grasses, reeds and bamboos. Although grasses were previously classified with sedges (Cyperaceae) and rushes (Juncaceae), which are similar vegetatively and also have greatly modified inflorescences, it is now known that these resemblances are superficial only.

There are about 700 genera and ± 10 000 species of grasses in the world (McCusker 2002) making the Poaceae the fifth largest plant family, ranking behind only Asteraceae, Fabaceae, Orchidaceae and Rubiaceae in number of species. The question is, how has a plant family, whose members exhibit a remarkably uniform appearance, been able to adapt so successfully to such a wide range of climates and habitats? The enormous success of the grasses may be based on a number of factors such as that they are mainly herbaceous, complete their annual growth and reproduction during favourable periods, have 'intercalary meristems' that helps protect the growing point from injury (such as defoliation by grazing animals or by fire), and that most species have long narrow vertical leaves, which allows sunlight to penetrate deep inside the leaf canopy of the whole plant. All these and the fact that they have both $C_3$ and $C_4$ photosynthesis allows for the wide climatic adaption and diversity of the family.

The cultivation of grasses, whose seeds had previously been gathered wild, was probably the first steps toward civilisation itself. Today, most of the land area under crops is occupied by the cereals: maize, wheat and rice, and by crops such as sugar cane; while in marginal climates oats, barley, rye, sorghum and the millets are planted. Where conditions are unsuitable for cultivation, livestock subsists on natural grazing. Grasses are cultivated for lawns, garden ornamentals, erosion control and especially as food for humans and animals.

## GRASS EVOLUTION

Although grasses probably started evolving at least in the late Cretaceous, precisely where and when remains uncertain. Grass macrofossils are rare, but the earliest known are spikelets and inflorescences from a Paleocene–Eocene formation in North America. The first undisputed records of Poaceae in palynoflora are in Africa, South America and India, and these are also from the Paleocene (Macphail & Hill 2002). It is interesting to speculate that the initial spilt between Laurasia (now represented by the continents North America and Eurasia, excluding India) and Gondwana (now South America, Africa, Oceania, Antarctica and India) may be reflected by the distribution of the grasses; as the Pooideae have greatly diversified in the northern hemisphere, while the other subfamilies (Bambusioideae, Panicoideae and Chloridoideae) have their greatest diversity in the tropics and on the continents that originated from the break-up of Gondwana.

Phytoliths or silica cells, also known as plant opal, are particles of silica that form in living plant cells either throughout the whole plant or in particular tissues and range in size from less than 5 to more than 250 $\mu$m. As the plant tissue decays, the phytoliths are released into the environment, and although they are mostly of limited taxonomic importance there are some types that are specific to subgroups in the Poaceae. The circular, rectangular, crescentic and elliptic phytoliths typical of the subfamily Pooideae also occur in other $C_3$ grasses in high latitudes and elevations. In semiarid to arid regions, with predominately $C_4$ grasses, the Chloridoideae saddle-shaped types occur, while in the warm moist subtropical regions the Panicoideae have phytoliths that are bilobate or cross-shaped. Under certain conditions some phytoliths can be distinguished at species level, for example in *Oryza sativa* (rice), *Hordeum* spp. (barley) and *Zea mays* (maize).

The change in dentition of grazing animals is indirect evidence of the rise in dominance of the grasses and the formation of grasslands. Herbivore fossils of the Eocene age first showed development of high-crowned teeth capable of chewing grass plants, which are abrasive because of the silica bodies in the epidermis (Stebbins 1981).

## PHOTOSYNTHESIS

The most widespread form of photosynthesis in higher plants is the *$C_3$ pathway* where the molecules of $CO_2$ are initially fixed as three-carbon chains. Here, primary assimilation of $CO_2$ from the atmosphere as well as photosynthetic reduction of carbon occurs in all the chlorophyll-bearing cells of the leaf mesophyll. This pathway occurs universally in the grass subfamilies Bambusoideae and Pooideae, and in many Panicoideae.

The *$C_4$ pathway* is the other principal form of higher plant photosynthesis and here the $CO_2$ is initially fixed

into four-carbon chains. Here, the mesophyll cells (PCA tissue) are restricted to *p*rimary *c*arbon *a*ssimilation from atmospheric $CO_2$, and the subsequent *p*hotosynthetic *c*arbon *r*eduction is confined to specialised cells (PCR tissue), which usually ensheaths the vascular bundles. In the grasses, $C_4$ photosynthesis is concentrated in the subfamilies Chloridoideae and Panicoideae. The Chloridoideae are almost exclusively $C_4$, the only known exception being *Eragrostis walteri* (Ellis 1984). Among the Panicoideae, the tribe Andropogoneae seems to be exclusively $C_4$, while the Paniceae include a large number of genera that are exclusively $C_3$ (*Oplismenus*, *Sacciolepis*) or $C_4$ (*Brachiaria, Setaria*), with a few genera where both $C_3$ and $C_4$ species occur (*Panicum*, *Alloteropsis*), and even single species (*Alloteropsis semialata*) that includes both $C_3$ and $C_4$ forms. The photosynthesis variant not yet found in grasses is *c*rassulacean *a*cid *m*etabolism (CAM), which is less common than the other variants but occurs in a wide range of succulent plants.

$C_4$ photosynthesis has been shown to be more efficient than $C_3$ photosynthesis at higher temperatures and light intensities (Bjorkman 1976). These differences are broadly reflected in the local geographical distributions and ecological ranges of the grass subfamilies, genera and species. This can be seen in the two exclusively $C_3$ subfamilies, where the Pooideae reach maximum diversity in the temperate zone, especially in the northern hemisphere, with major representation elsewhere only at high altitudes and in moist habitats, and the Bambusoideae, which, though mostly tropical, are mainly confined to humid forest shade. The two major $C_4$ subfamilies, Chloridoideae and Panicoideae, are concentrated in the tropics and subtropics, the former in drier or saline habitats (see below) whereas the latter is extensively mesic, with the $C_3$ representatives often being aquatic or shade plants.

Grasses exhibit three biochemical variants of the $C_4$ pathway that are less precisely associated with certain anatomical and ultrastructural features. Those exhibiting NADP-ME type $C_4$ photosynthesis, called 'malate formers', tend to predominate in all regions where $C_4$ grasses occur, but they reach their maximum abundance in mesic areas. This photosynthetic type most often occurs among the $C_4$ Panicoideae, of which the tribe Andropogoneae seems to be exclusively NADP-ME. The 'aspartate formers' (NAD-ME and PCK photosynthetic types), on the other hand, reach their maximum diversity in relatively arid regions. These photosynthetic types are concentrated in the Chloridoideae, where the NADP-ME type is unknown, but is also represented in the Paniceae.

## HYBRIDISATION, POLYPLOIDY AND SEXUALLY PRODUCED SEEDS

Natural hybridisation is common in grasses, and variability is much increased in populations where hybrids occur. This high level of genetic variability probably allows grasses to take advantage of new habitats as they become available (Ehrendorfer 1980). Hybrids are often nearly sterile because of chromosomal incompatibilities and because chromosomes may be present in multiple sets (polyploidy) or be 'unmatched' (aneuploidy). This near-sterility is advantageous in a variant well-adapted to a stable habitat, because eliminating the sexual process stops gene exchange and thus preserves favourable characteristics. However, it is essential that sterility must not eliminate production and dispersal of seeds. Sterile hybrids commonly set seeds through the process of apomixes, in which the ovules develop without fertilisation into seeds that carry the same genes as the parent. In this way, a favourable variant can be perpetuated for many 'generations' and the adaptations for seed dispersal in the species can continue to operate. Furthermore, the sterility resulting from the hybridisation and polyploidy is not absolute. There is always a low incidence of sexual reproduction that maintains variability. If the environment changes or if a new habitat becomes available, it is likely that yet another form will be well adapted to the new situation.

There is good reason to suppose that this ability, to hybridise and to exploit the advantages of hybrid species complexes with ranges of chromosome numbers and genomes, is ancient in grasses. The phenomenon is common in many genera—as many as 80% of grass species are of polyploid origin (De Wet 1987). In southern Africa, small genera are often represented by a widespread, extremely variable species, for example *Heteropogon contortus* and *Themeda triandra*. Some larger genera have a number of well-demarcated species with distinct, restricted distributions, which exist alongside a widespread species that hybridises with some of them and blurs the species boundaries, for example *Hyparrhenia hirta*, *Digitaria eriantha*, *Eragrostis curvula* and *Ehrharta calycina*.

## CLASSIFICATION AND NOMENCLATURE

Botanical classifications are not static, changing as new data and new interpretations result in different opinions about the relationships of plants. The family Poaceae has undergone several stages of reclassification as information from several disciplines became available and added to that of the basic morphology.

In the 19th century, spikelet structure was the main basis for the higher classification of grasses (Bentham 1883; Hackel 1896). Early classifications recognised two main subfamilies namely Panicoideae and Festucoideae. But it was evident that a classification based on spikelet characters alone contained artificial groups. As a result of parallel evolution, spikelets of similar appearance often occurred in more than one lineage. Already in the 1930s, leaf anatomy, cytology and physiology (Avdulow 1931) were correlated with spikelet structure. Later, a number of new classification systems were published based on characters such as spikelet structure, leaf blade anatomy, starch grain structure, cytology, embryo

structure, and photosynthetic physiology (Prat 1960; Stebbins & Crampton 1961; Jacques-Felix 1962; Watson et al. 1985; Clayton & Renvoize 1986; Tzvelev 1987). Clayton & Renvoize (1986) classified the grasses into five major subfamilies: Arundinoideae, Bambusoideae, Chloridoideae, Panicoideae and Pooideae) with a sixth smaller subfamily, Centrothecoideae, sometimes segregated from the Bambusoideae. They also provided diagnostic generic descriptions of all the grass genera of the world. A phenetic classification with comprehensive descriptions of all known genera was provided by Watson & Dallwitz in 1992(a). One of the most recent classifications, proposed by the Grass Phylogeny Working group (GPWG 2000, 2001), reflects the molecular work of recent times.

When a genus is reclassified, the names of its species may change, for example *Pentaschistis* and *Pentameris* have recently been classified in the same genus (Linder et al. 2010). The *International Code of Botanical Nomenclature* recommends that the older name must be used for the combined genus, so all species formerly classified in *Pentaschistis* were transferred to the older name *Pentameris*. Occasionally, a genus name must change because an older name (e.g. *Tribolium*) is found in literature and even though it has not been used for many years, this older name had to replace *Lasiochloa*. These same principles of nomenclature apply at species level, so that species names change as a result of reclassification (e.g. 'lumping' previously separate species or 'splitting' a species into two) according to the rule of priority.

A modern, up-to-date classification has still to be finalised. The following classification into subfamilies is based mainly on that given by the GPWG (2001), with some of the latest information added by B. Simon and E. Kellogg (pers. comm.).

Family: **POACEAE**

**Subfamily: Bambusoideae**

Tribe: **Bambuseae**. *Bambusa, Oxytenanthera, Thamnocalamus*

Tribe: **Olyreae**. *Olyra*

**Subfamily: Ehrhartoideae**

Tribe: **Ehrharteae**. *Ehrharta, Microlaena*

Tribe: **Oryzeae**. *Leersia, Oryza, Prosphytochloa*

**Subfamily: Pooideae**

Tribe: **Brachypodieae**. *Brachypodium*

Tribe: **Bromeae**. *Bromus*

Tribe: **Meliceae**. *Glyceria, Melica, Streblochaete*

Tribe: **Poeae**. *Agrostis, Aira, Ammophila, Anthoxanthum, Arrhenatherum, Avena, Briza, Calamagrostis, Catabrosa, Catapodium, Corynephorus, Cynosurus, Dactylis, Deschampsia, Festuca, Gastridium, Hainardia, Helictotrichon, Holcus, Koeleria, Lagurus, Lamarckia, Lolium, Lophochloa, Parapholis, Periballia, Phalaris, Poa, Polypogon, Puccinellia, Sphenopus, Vulpia*

Tribe: **Stipeae**. *Amelichloa, Austrostipa, Jarava, Nassella, Stipa*

Tribe: **Triticeae**. *Elytrigia, Hordeum, Secale, Thinopyrum*

**Subfamily: Aristidoideae**

Tribe: **Aristideae**. *Aristida*, *Sartidia*, *Stipagrostis*

**Subfamily Arundinoideae**

Tribe: **Arundineae**. *Arundo, Dregeochloa, Elytrophorus, Phragmites, Styppeiochloa*

**Subfamily: Danthonioideae**

Tribe: **Danthonieae**. *Capeochloa, Chaetobromus, Cortaderia, Elytrophorus, Geochloa, Merxmuellera, Pentameris, Pseudopentameris, Schismus, Tenaxia, Tribolium*

**Subfamily: Panicoideae**

Tribe: **Andropogoneae**. *Andropogon, Arthraxon, Bothriochloa, Chrysopogon, Cleistachne, Coelorachis, Coix, Cymbopogon, Dichanthium, Diheteropogon, Elionurus, Elymandra, Eriochrysis, Eulalia, Hackelochloa, Hemarthria, Heteropogon, Hyparrhenia, Hyperthelia, Imperata, Ischaemum, Microstegium, Miscanthus, Monocymbium, Oxyrhachis, Phacelurus, Rhytachne, Rottboellia, Schizachyrium, Sehima, Sorghastrum, Sorghum, Thelepogon, Themeda, Trachypogon, Urelytrum, Vetiveria, Vossia*

Tribe: **Arundinelleae**. *Arundinella*

Tribe: **Paniceae**. *Acroceras, Alloteropsis, Anthephora, Brachiaria, Cenchrus, Digitaria, Echinochloa, Entolasia, Eriochloa, Leucophrys, Melinis, Odontelytrum, Oplismenus, Oryzidium, Panicum, Paratheria, Paspalidium, Pennisetum, Pseudechinolaena, Sacciolepis, Setaria, Stenotaphrum, Stereochlaena, Tarigidia, Tricholaena, Urochloa*

Tribe: **Paspaleae**. *Axonopus, Megaloprotachne, Paspalum, Steinchisma*

Tribe: **Tristachydeae**. *Danthoniopsis*, *Loudetia, Trichopteryx, Tristachya*

Tribe: **Centotheceae**. *Megastachya*

**Subfamily: Chloridoideae**

Tribe: **Centropodieae**. *Centropodia, Ellisochloa*

Tribe: **Cynodonteae**. *Acrachne, Bewsia, Brachyachne, Brachychloa, Catalepis, Chloris, Coelachyrum, Craspedorhachis, Ctenium, Cynodon, Dactyloctenium, Dinebra, Eleusine, Enteropogon,*

*Eustachys, Harpochloa, Leptochloa, Lepturus, Lintonia, Microchloa, Monelytrum, Mosdenia, Odyssea, Oropetium, Perotis, Polevansia, Rendlia, Schoenefeldia, Stiburus, Tetrachne, Tetrapogon, Tragus, Trichoneura, Tripogon, Willkommia*

Tribe: **Eragrostideae**. *Cladoraphis, Diandrochloa, Enneapogon, Entoplocamia, Eragrostis, Fingerhuthia, Kaokochloa, Schmidtia*

Tribe: **Triraphideae.** *Triraphis*

Tribe: **Zoysieae**. *Pogonarthria, Spartina, Sporobolus*

**Chloridoideae Incertae Sedis:** *Leptocarydion, Lophacme*

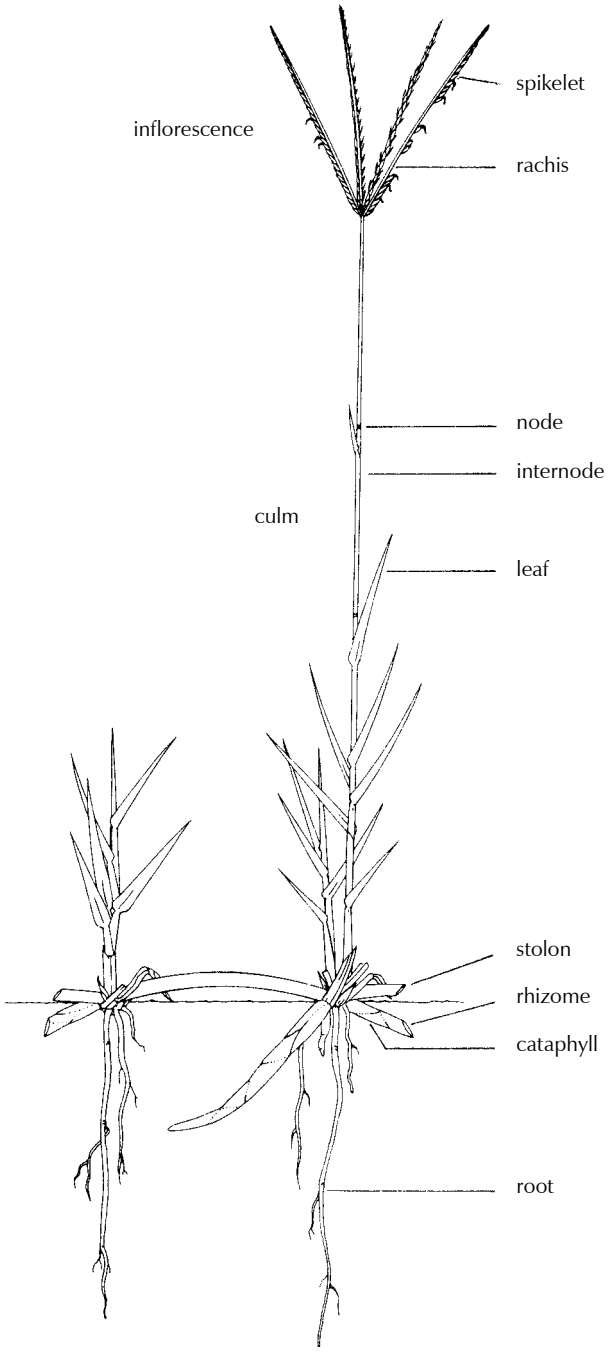



Figure 1.—An illustration of the grass plant with all the parts labelled.

# THE GRASS PLANT

Grasses may be tufted and erect, creeping with rhizomes and/or stolons, floating, climbing, scrambling or even arborescent. All these different forms are formed by the repetition of a basic construction unit, the phytomer, which consists of an internode with its associated node, leaf, bud and sometimes an adventitious root (Figure 1) (Clark & Fisher 1987).

Most grasses, except some like the bamboo, are herbaceous, flourishing during favourable periods of the year, completing their annual growth and reproduction while the weather is warm and wet, and dying back in the cold or dry seasons. Perennials survive unfavourable periods as dormant rootstocks or rhizomes, and annuals as seeds. In southern Africa, a trend can be seen in many genera where perennial species occur in mesic areas, while annuals occur in the dry west (e.g. *Heteropogon contortus*/*H. melanocarpus*; *Sehima galpinii*/*S. ischaemoides*), or where some species behave as perennials in more mesic areas and as annuals in arid areas (*Fingerhuthia africana*, *Centropodia glauca*). Even in relatively mesic areas, it has been found that a grass plant grows actively only during days when conditions are favourable for growth, such as those immediately following rain (Danckwerts 1988).

In most plants, the growing points are at the apex of the stems and branches. In grasses, the shoot apex has the usual apical meristem, but in addition, there are growing points near the base of each internode and at the base of each leaf. (Pull off a grass stem and chew it; the soft, juicy parts are at the bottom of each internode.) In both culm (stem) internodes and leaves, the youngest cells are located towards the base and the older towards the apex, as cell division, elongation and tissue maturation occurs acropetally. Therefore, the culms and the leaves grow from below rather than at the apices, so that growth is relatively protected from injury or defoliation, by grazing animals or by fire, because the actively growing part of the plant is usually not removed. The leaf sheaths are also important as they protect the immature culm tissues, help support the weight of the shoot above and shield the apical meristem that will produce the inflorescence; the overlapping layers of sheaths near the base of the plant act as a 'splint' over the weaker meristematic portions of each node. Therefore 'intercalary meristems' are a significant adaption to grazing and to fire. The herbaceous habit and the intercalary meristems have made it possible, through their co-evolution with animals, for the grasses to thrive while being eaten, and they also lack many of the various secondary chemical compounds repellent to herbivores found in many other plant families.

## Roots

Grass roots show little modification and are fibrous. Each plant has two root systems. The germinating embryo produces seminal roots, which are very soon replaced by the nodal root system arising from the

culms. Individual nodal roots may last one to several years (Clark & Fisher 1987). Some grasses have stout stilt roots found above the soil surface at the lower nodes of erect culms (*Hyparrhenia tamba*); others have decumbent culms that root at the lower nodes (*Enneapogon desvauxii*); and still others have roots arising on stolons or rhizomes (*Pennisetum clandestinum*, *Cynodon dactylon*). The root hairs of grasses are usually lost as the root matures (Renvoize 2002), but in grasses from arid areas (*Brachiaria serrata*, *Stipagrostis ciliata*) root hairs, root cap mucilage, sand grains and microorganisms often form rhizosheaths, which are protective and absorptive casings around the roots. Nitrogen-fixing bacteria can occur associated with these rhizosheaths (Wullstein et al. 1957). Mycorrhizal associations on grass roots have been found in Pooideae, Chloridoideae and Panicoideae, but not in Bambusoideae (Clark & Fisher 1987).

## Stems

In general, grasses have aerial culms, underground rhizomes and stolons that lie at the soil surface. The position of the main branching system of a species determines its appearance and the degree of protection from grazing and fire. Rhizomatous grasses branch below the surface of the soil and are extremely well-protected from fire. Stoloniferous (sward-forming) grasses branch at soil level and thrive under grazing. Tufted grasses, which include many widespread veld grasses, branch just above the soil level. Culms, rhizomes and stolons arise from lateral buds in the leaf axils.

### *Aerial culms*

The aerial culms are the most conspicuous part of the grass plant, bearing the leaves and the inflorescence, and their height, branching pattern and posture largely determine its overall appearance. Except in the woody bamboos and a few other forms (*Arundo donax, Phragmites* spp.), the culms are mostly annual, dying back every year even though the plant itself may be perennial. However, the tillers (side-shoots) may behave as biennials and flower the following year.

The posture of the culms is usually typical for a species and varies from erect through geniculate and bent at the nodes (*Digitaria sanguinalis, Eragrostis lehmanniana*), or decumbent with the lower part of the culm on the ground and the upper part erect (*Brachiaria marlothii*), to procumbent and lying flat on the ground (*Brachiaria panicoides*), or even scrambling on other plants (*Prosphytochloa prehensilis*). See Figure 2.

Culms may be branched or unbranched with the branches growing from the axils of the leaves. The culm branches or tillers may arise intravaginally, that is, the new shoots remain inside the leaf sheath and emerge from the top. Alternately, they may arise extravaginally when the new shoots rupture the leaf sheath bases. Intravaginal branching is the most common in the world, and in southern Africa extravaginal branching is rare. The advantage of intravaginal branching is that it probably gives the culms extra protection from the veld fires that are common in southern Africa. Grasses that are valuable as pasture produce a lot of herbage, and usually branch above the base (*Cenchrus ciliaris*).




Figure 2.—Typical culm positions.

A culm is jointed and made up of repeated units consisting of a usually cylindrical internode and a solid, hard, disc-shaped node. In each species the height of the culm and the number of units are characteristic.

The *internodes* are usually hollow, though they are solid in many panicoid and chloridoid grasses, sometimes becoming hollow with age (Brown et al. 1959). In some grasses the internodes may remain short until the inflorescence is developed, after which they begin to lengthen rapidly (*Harpochloa falx*), while in others the internodes elongate early (*Phragmites australis*). There are some grasses that have alternating long and short internodes (*Stenotaphrum secundatum*), while in others the lower internodes are short and lengthen upwards. As each internode matures, the tissue toward its upper end matures first, leaving an area of undeveloped tissue still capable of cell division at the base, namely the intercalary meristem.

The *nodes*, which are always solid and have a complex vascular organisation are where the buds and leaves originate. Nodes usually differ from the internodes in appearance, often being wider or narrower, and sometimes hairy with adpressed hairs (*Panicum simulans*), or with a conspicuous ring of spreading hairs (*Sorghum versicolor, Stipagrostis ciliata*), or have a darker colour (*Eragrostis obtusa*) or glands (*Eragrostis trichophora*).

## *Rhizomes*

Rhizomes are underground stems with nodes that bear scale leaves and roots, as compared to true roots, which do not have nodes. The buds of rhizomes may develop into erect leafy shoots, into stolons, or into secondary rhizomes, resulting in complicated rhizome systems (*Imperata cylindrica*).

## *Stolons*

Stolons are horizontal, above-ground stems that produce roots, leaves, and flowering shoots at their nodes (*Monelytrum luederitzianum* and some forms of *Digitaria eriantha*).

Rhizomes and stolons may occasionally intergrade (*Cynodon dactylon*). Many species have what is known as a 'rootstock', which usually consists of short stout rhizomes and knotty culm bases (*Andropogon ravus, Aristida junciformis*). Rhizomes and stolons are important in vegetative reproduction, as independent plants can be produced from their nodes. Even in species lacking these, the aerial culm branches can play a role in vegetative reproduction. A vigorous plant produces new culms towards the outside, and the centre dies out as the diameter of the tuft becomes larger, eventually causing the plant to have a ring-like appearance. Should this growth continue, it could break up into separate plants. It was found in an area in England that there were plants of *Festuca ovina* that were derived from an original clone that has an estimated age of a 1 000 years and had spread over 200 $m^2$ (Harberd 1961).

# Leaves

A typical grass leaf is made up of the sheath, which envelopes the culm, the blade or lamina, which extends above it, and the collar and ligule located at the junction between the sheath and the blade (Figure 3). Photosynthesis in a grass plant occurs mainly in the blade and sheath. Leaves are nearly always initially 2-ranked in contrast to Cyperaceae (the sedge family), which is vegetatively very similar but commonly has 3-ranked leaves. The leaves may be *basal* or *cauline*. Although most grass species have basal and culm leaves (*Cymbopogon caesius*), there are some which have only basal leaves (*Microchloa caffra*, *Cortaderia selloana*), while other species have only culm (cauline) leaves (*Pseudopentameris brachyphylla*, *Trichopteryx dregeana*). Leaves, like internodes, also have intercalary meristems and increase in length from growing points near the base. This is especially advantageous because growth continues even while the leaf apices are being grazed.

## *Sheaths*

The sheaths form part of the culm support structure, especially when the culm is young. Sheaths can be longer than the internodes, obscuring the culm from view. The sheath margins are usually not joined but rolled together around the culm; in a few genera the sheath margins are fused and tubular for much of their length (*Melica*, *Bromus*). The basal sheaths are the sheaths at the bottom of the culm (plant base), and may be variously modified. They may be persistent (*Sporobolus nebulosus*, *Ehrharta dura*), become spilt

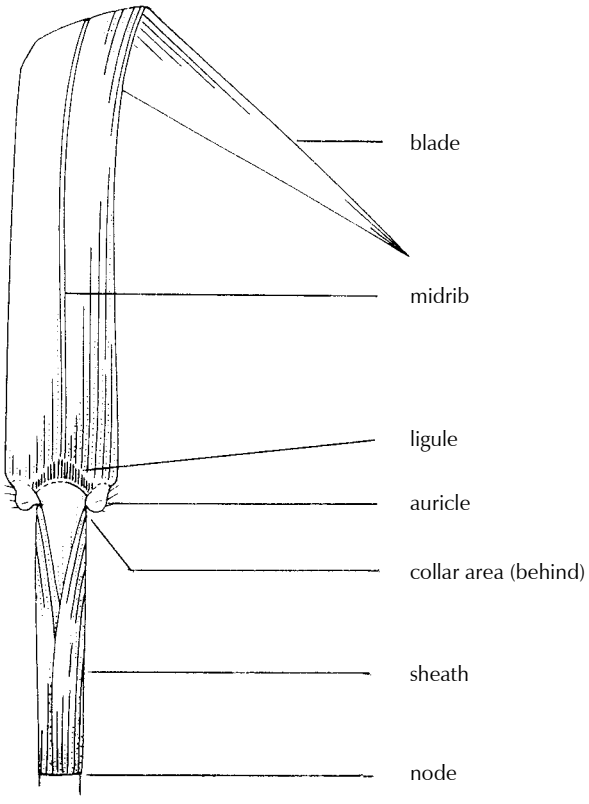



Figure 3.—Parts of a generalised grass leaf.

into fibres (*Styppeiochloa gynoglossa*, *Festuca costata*), or form a thick bulbous base around the culm (*Alloteropsis semialata* subsp. *semialata*). When basal sheaths are strongly keeled, the base of the plant has a flat, fan-like appearance (*Eustachys paspaloides*, *Heteropogon contortus*). Sometimes basal and/or upper culm leaves have reduced blades or consist of bladeless sheaths (*Ehrharta ramosa*, *Stipagrostis geminifolia*).

## Ligules

The ligule is found in the inner (adaxial) side at the leaf junction between the sheath and the blade. This structure is unique and has no homology in any other plant families (Philipson 1935). The ligule may be either an unfringed membrane (*Bromus catharticus*, *Hyparrhenia hirta*), a fringed membrane (*Cynodon dactylon*, *Digitaria tricholaenoides*), or a fringe of hairs consisting of a line of hairs (*Eustachys paspaloides*, *Fingerhuthia africana*) with all gradations between these states especially in the latter two. Occasionally the ligule may be absent or present only on the lower leaves (*Echinochloa*). Taxonomically, the ligule is very useful; for example, a grass leaf where the ligule is a fringe of hairs or fringed membrane is almost certainly non-pooid. The ligule type is generally, except often in the large genera, fairly constant for a genus. Pooid grasses generally have pale, translucent ligules (*Puccinellia*, *Helictotrichon*), while panicoid grass ligules are usually firm, papery, dry, and/or brownish (*Digitaria*, *Cymbopogon*). The function of the ligule is not clear, but is thought to obstruct the entry of water, insects and bacteria (Tsvelev 1983).

## Collars

The collar is usually hardened tissue on the outer (abaxial) side of the junction between the sheath and the blade. Infrequently there is a line of hairs (*Alloteropsis semialata*, *Tribolium curvum*) or a flap of tissue on the collar, which is called the contraligule or abaxial ligule. An abscission zone may occur on the collar, and then the blade is shed while the sheath remains on the plant (*Phragmites australis*, *Ehrharta rupestris*). Auricles are usually small appendages arising either from the sheath mouth (*Hordeum murinum*), or from the sides of the collar (*Pentameris thuarii*), or from the base of the blade (*Ehrharta microlaena*).

## Leaf blades

Leaf blades are usually long and narrow, allowing sunlight to cover a relatively large total area of surface; this results in high productivity. Short broad blades tend to be found in annuals or in habitats such as forests or watersides. The lamina may be narrowed near the base (*Sorghastrum stipoides*), or even be absent entirely consisting of the midrib only (*Miscanthus junceus*). In some grasses the lower part of the blade is narrowed into a pseudopetiole (*Brachiaria chusqueoides*). The prominence of the nerves/veins is variable with many having uniformly developed nerves. Some grasses, especially those occurring in forest, often have what is known as cross-venation; these are inconspicuous, short transverse nerves connecting the larger longitudinal nerves (*Olyra latifolia*, *Megastachya mucronata*). The base of the blade at the junction with the sheath may be straight (*Cymbopogon pospischilii*), rounded (*Perotis patens*), amplexicaul or cordate (*Cymbopogon caesius*, *Diheteropogon amplectens*), sagittate (*Setaria appendiculata*), or pseudopetiolate (*Setaria sagittifolia*). The margins and the apices or tips are variable. The margins may be thickened and undulate (*Brachiaria serrata*, *Ehrharta capensis*), pectinate with stiff hairs (*Sporobolus nitens*), or scabrid or scaberulous (*Sporobolus stapfianus*). The tips or apices may be rounded (*Chloris pycnothrix*, *Paspalidium obtusifolium*), hooded (*Heteropogon contortus*), attenuate *(Phragmites australis*) or pungent (*Phragmites mauritianus*, *Cladoraphis spinosa*).

Leaf blades are variable, they can be flat and either narrow or broad, or needle-like, or simply folded along the midrib (*Themeda triandra*, *Heteropogon contortus*), and sometimes they may be plicate and folded accordion-fashion (*Setaria megaphylla*). They may have both margins rolled in, then it is known as involute (*Leptochloa fusca*) or convolute when they are inrolled from one side, so that one margin is wrapped round the other (*Leersia hexandra*). In many grasses the leaf blades roll in times of water stress, presumably to restrict water loss from stomata on their upper surfaces. In many species the 'underside' (abaxial epidermis) is permanently exposed, and this surface may have at least as many stomata as the protected upper surface.

## Modified leaves

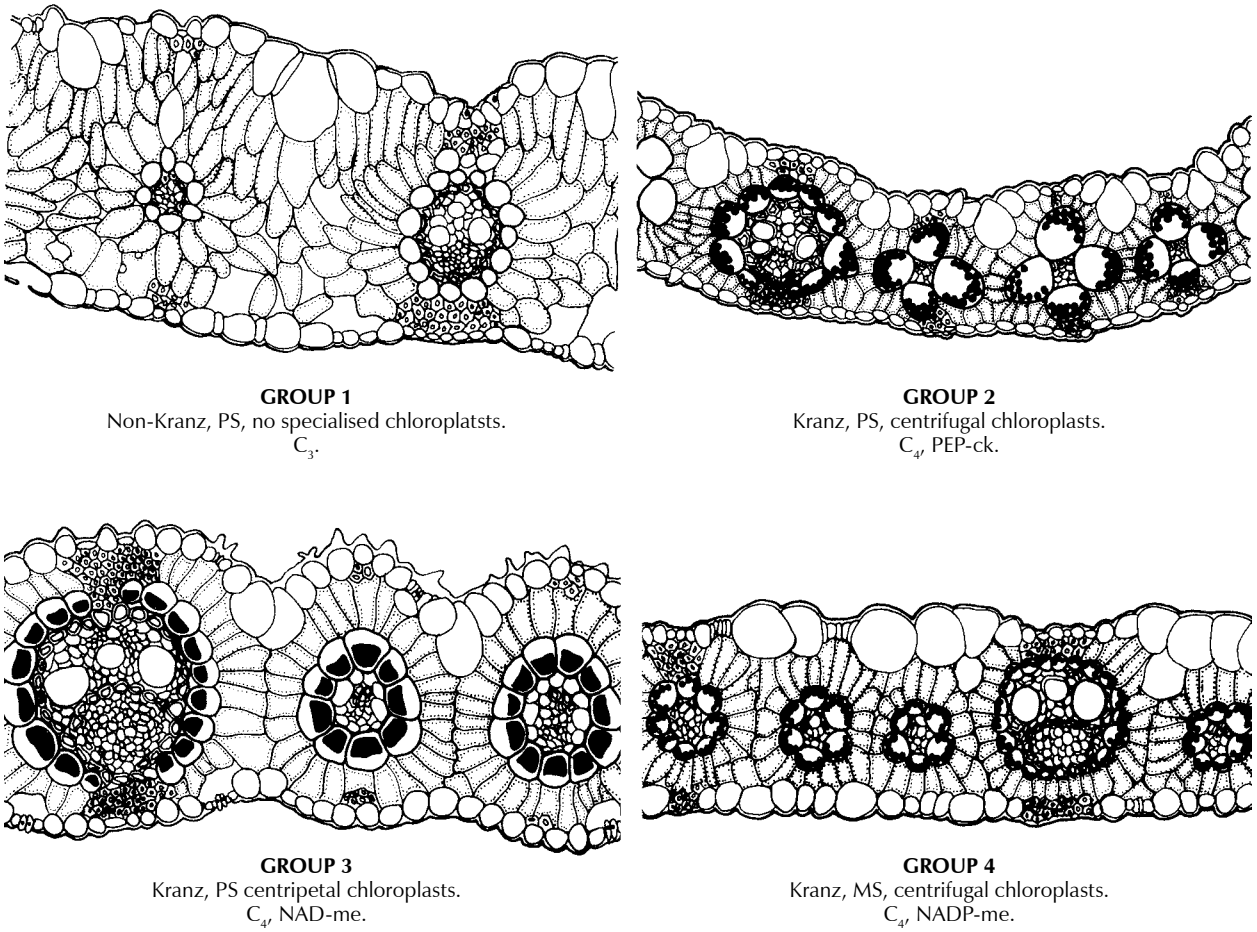
Cataphylls and prophylls are bract-like modified leaves without sheaths or blades usually found at the base of a grass plant. A prophyll is the first leaf of a new shoot and is usually 2-keeled and formed opposite the leaf that subtends the new shoot. Cataphylls, of which there may be several on a shoot, closely overlap each other are usually found on the rhizomes and stolons.

The flag leaf is the uppermost culm leaf below an inflorescence and is often somewhat different in form.

Spathes and spatheoles are reduced leaves below inflorescence branches and raceme clusters (*Monocymbium ceresiiforme*, *Themeda triandra*) in genera with much-branched and leafy inflorescences as found in the Andropogoneae.

## Leaf blade anatomy

Unlike flowers and fruits, leaf blades are available most of the time, and many of the leaf blade anatomical characters show great identificatory reliability especially at generic and higher group levels. Comparative information of leaf blade anatomical characters requires a transverse section and that of the abaxial epidermal surface. To make a simple preparation of leaf material for anatomy, see under section 'How to'.



**GROUP 1**
Non-Kranz, PS, no specialised chloroplatsts.
$C_3$.

**GROUP 2**
Kranz, PS, centrifugal chloroplasts.
$C_4$, PEP-ck.

**GROUP 3**
Kranz, PS centripetal chloroplasts.
$C_4$, NAD-me.

**GROUP 4**
Kranz, MS, centrifugal chloroplasts.
$C_4$, NADP-me.

Figure 4.—Transverse sections of leaf blades in *Panicum*, showing the different anatomical types associated with the $C_3$ and $C_4$ photosynthetic pathways (Ellis 1988).

Important anatomical characters of the *epidermis* are the presence or absence and forms of microhairs, macrohairs, prickles and papillae, types and distribution of intercostal long and short cells, form and arrangement of costal short cells, shapes of silica-bodies, and shape of stomatal complexes.

Although most grass leaf blades may look superficially similar, their anatomy varies considerably with the major anatomical characters mainly associated with differences in the location and biochemistry of photosynthetic processes.

The *transverse section* anatomical characters include the various features related to the $C_3$ and $C_4$ photosynthetic pathways, as well as those associated with the various $C_4$ types. A transverse section of a $C_4$ grass leaf blade usually exhibits a rather characteristic appearance, known as 'Kranz anatomy'. Here the specialised PCR tissue occurs around each main vascular bundle as a single, conspicuous sheath of generally starch-rich cells with abundant chloroplasts; the intervening PCA mesophyll cells commonly exhibit a degree of radiateness about the individual bundles, and an inner sheath of smaller cells (the 'mesostome sheath') is only sometimes present. $C_3$ grasses by contrast, are non-Kranz. Here the inner mesostome sheath is always present, while the outer bundle sheath cells lack or are deficient in chloroplasts and starch, and the mesophyll is usually not noticeably radiate. The Kranz/non-Kranz distinction is rather imprecise, however, and some grasses (including the common genera *Aristida* and *Arundinella*) have leaf blade tissue arrangements where its application is ambiguous or impossible. The only universally applicable, unambiguous and reliable method of anatomical assignment to $C_3$ and $C_4$ relies upon counting the number of cells separating chlorenchymatous mesophyll cells from the nearest PCR cell. In the $C_3$ leaf blade the mesophyll always has some (often many) chlorenchymatous cells separated from the nearest PCR sheath cell by two or more (often many more) comparable cells. In a $C_4$ leaf blade, no chlorenchymatous mesophyll cell is separated by more than one other similar cell from the nearest PCR cell. The important structural features include: presence (XyMS+) or absence (XyMs-) of mesostome sheath cells between the large metaxylem elements and the PCR sheath cells or primary vascular bundles; even versus uneven outlines of PCR sheaths; presence or absence of a suberised lamella in the PCR cell walls; and location (centripetal or centrifugal/peripheral) of PCR cell chloroplast (for detailed information, see Hattersley (1987) and Prendergst & Hattersley (1987)). Figure 4.

Illustrations of anatomical characters are available in several sources: Watson & Dallwitz (1988), Metcalfe (1960), and Clifford & Watson (1977). There is also a series of papers by Ellis (e.g. 1980, 1981, 1982a,b & c,

1983, 1987), which have superb leaf anatomical illustrations of southern African grasses.

## Inflorescences

The inflorescence is that part of the plant bearing the important reproduction structures, the flowers, or in grasses, the spikelets. The inflorescence terminates the culm, which in the grasses matures from the apex downwards (basipetally), and therefore the older spikelets are found towards the apex of the inflorescence and the younger spikelets towards the base. Grass inflorescences vary greatly in general form, size and shape, and there is a continuous variation between the 'inflorescence types'. There is also, as yet, no satisfactory worldwide terminology that can be applied to grass inflorescences. Inflorescence types are a poor character to use in classifications, as genera in different tribes often have similar looking inflorescences, for example, *Cynodon* (Chlorideae), *Digitaria* (Paniceae) and *Dichanthium* (Andropogoneae) all have digitate inflorescences. But it is a good character to use in identification keys, as it is such a striking feature of the grass plant.

In this book the inflorescence types used are of three basic types and variations of these.

### *The basic inflorescence types:*

*Spike*: a single unbranched central axis with sessile spikelets (*Lolium* ssp.), Figure 5A. Spikes can be 2-rowed or distichous, i.e. spikelets are arranged alternately up the axis (*Thinopyrum distichum*); or 1-sided/secund with the spikelets arranged on one side of main axis (*Microchloa caffra*); or the spikelets can be arranged right around (*Perotis patens*).

*Raceme*: a single unbranched central axis bearing pedicelled spikelets (*Urelytrum agropyroides*, *Digitaria monodactyla*). The part of the axis, or branch, from which the spikelets rise, is known as the rachis.

*Panicle*: the main axis gives rise to many branches bearing the spikelets, and these branches maybe even be branched further (*Eragrostis curvula*, *Panicum natalense*), Figure 5B. The panicle is the most common inflorescence type in the grasses. The arrangement of the branches on the main axis is often important diagnostic characters between species. Branches whorled up the axis (*Digitaria perrottetii*); or only the lowest branches whorled (*Eragrostis trichophora*); or they are single or clustered on same side of main axis (*Eragrostis lehmanniana*).

*Spike-like* or a *false spike*, where the inflorescence looks like a spike. It can consist of spikelet clusters, which are sessile or subsessile on the unbranched central axis (*Setaria sphacelata*, *Pennisetum sphacelatum*), Figure 5C. Each spikelet cluster is here actually borne on a branching system with very short internodes. In other cases, the panicles are very narrow with erect branches that are adpressed to the main axis, so that it appears like a spike (*Imperata cylindrica*, *Fingerhuthia africana*).

A number of *racemes* can also make up a single inflorescence:

- *Digitate* or *subdigitate* inflorescences have a number of racemes diverging from the same point (*Digitaria eriantha*, *Dactyloctenium australe*) or are shortly separated on the main axis (*Digitaria velutina*), Figure 5D.
- *Racemes spaced up along an elongated central axis* appearing almost like a panicle (*Bothriochloa bladhii, Brachiaria serrata*, *Paspalum dilatatum*), Figure 5E.
- A *complex leafy false panicle* where the culms are profusely branched above and the basic inflorescence unit terminating each culm branch is a raceme or cluster of racemes, which are separated by leaves, spathes and spatheoles (*Hyparrhenia*, *Cymbopogon*), Figure 5F. This type of inflorescence is found mainly in the Andropogoneae.

On the inflorescence branches, spikelets can occur singly, in pairs or in clusters of five or more. In the Andropogoneae, they are nearly always in sessile–pedicellate or short–long pairs, which are usually dissimilar. Usually one spikelet of each pair is sessile or short-pedicellate and fertile, while the other is long-pedicellate and often male or sterile (*Hyparrhenia*). Spikelet pairs are also found in some Paniceae (*Digitaria*), but here the two spikelets of the pair are similar. Triads of spikelets occur (*Tristachya, Hordeum*), and in some grasses a group of spikelets are enclosed within involucres (*Cenchrus*, *Anthephora*); these usually shed as a single structure, while triads often terminate the racemes in Andropogoneae (*Chrysopogon serrulatus*).

Pulvini, small swollen structures, are often found at the base of inflorescence branches and cause the inflorescence to open out when the stamens and stigmas are mature.

## Spikelets

Spikelet differences were used for a long time as the main characters for classification of grasses into genera, tribes, and subfamilies. Even though there has been considerable reclassification of grasses at the subfamily level based on molecular studies, anatomy, physiology and cytogenetics, spikelet differences are still the most convenient character to use in identifying genera and particularly species.

The basic spikelet has a rachilla, or central axis, which bears the two distichous glumes at the base and one or more florets above. A floret consists of the lemma and the palea, and these surrounds and protects a single delicate 'flower', that is, basically the male and female structures. Grass spikelets vary greatly in their outward appearance, but the rachilla, glumes, lemmas and paleas are usually identifiable although they exhibit

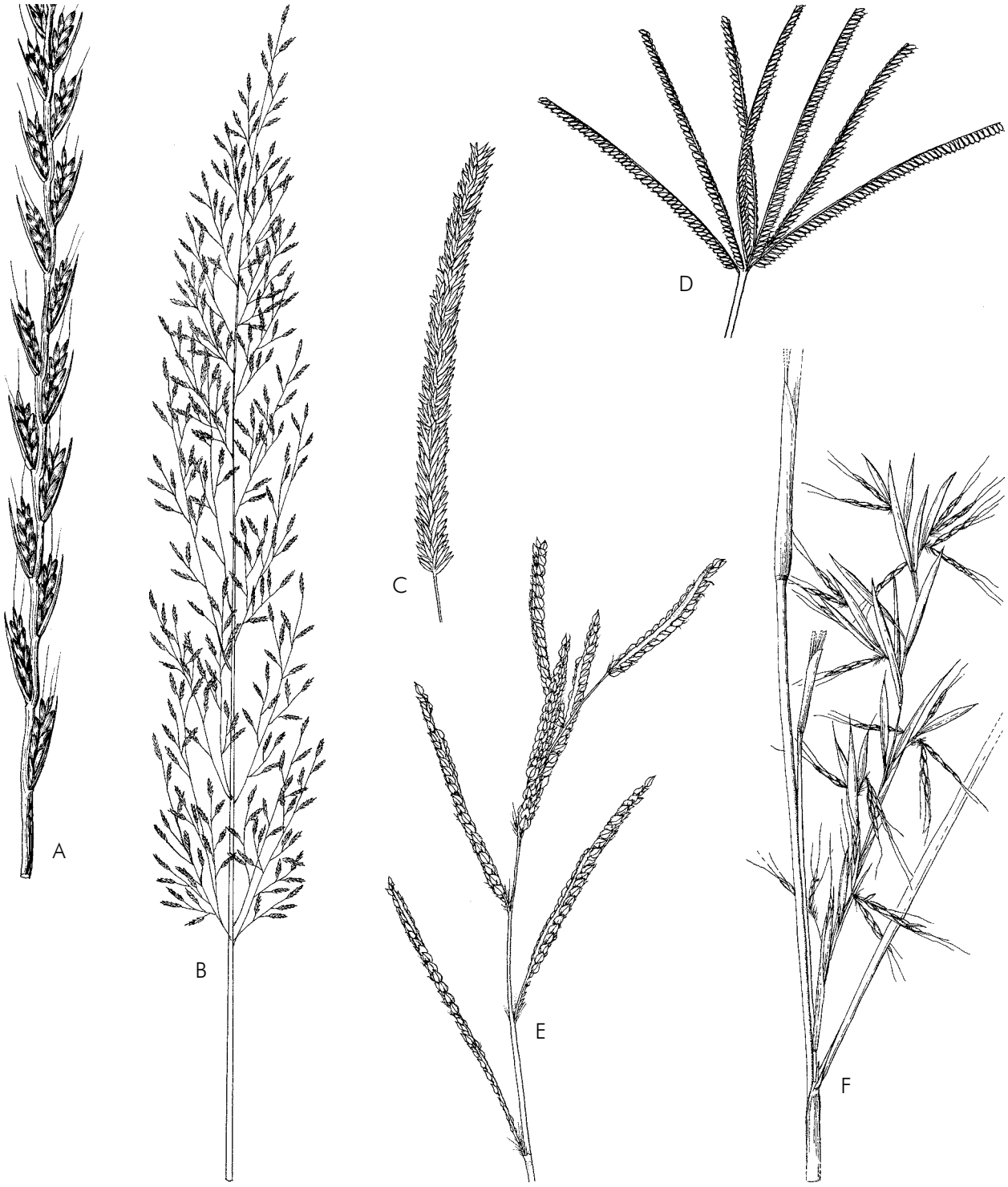



Figure 5.—A, spike; B, panicle; C, false spike; D, digitate or subdigitate inflorescence; E, racemes spaced up along an elongated central axis appearing almost like a panicle; F, complex leafy false panicle.

many modifications. The upper glume (usually) may strongly resemble the lower lemma and this is often accompanied with the reduction or even absence of the lower glume, and so careful identification of the various parts is necessary. Figure 6.

Plane of flattening is a useful character for identification. A laterally flattened spikelet is where the sides are flattened and it will lie on one side when thrown onto a flat surface, while a dorsally and/or ventrally flattened spikelet lies on its 'back' (abaxial) or 'front' (adaxial) surface (using one's own body can help understanding this: your sides, or position of your arms is lateral, while your front and back are dorsal and ventral respectively). Generally, chloridoid (*Eragrostis superba*) and pooid (*Bromus catharticus*) grasses have laterally flattened spikelets whereas panicoid grasses (*Hyparrhenia hirta*, *Panicum maximum*) have dorsally flattened spikelets. Some genera (*Aristida*, *Stipagrostis*) have nearly cylindrical spikelets.

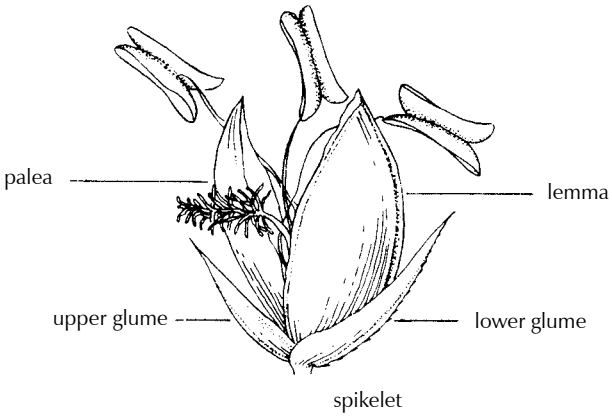



Figure 6.—Parts of a spikelet.

## Rachilla

The rachilla is the axis of the spikelet that separates the florets and is often visible, for example when the internodes are long and the florets do not overlap or the floret is orientated at an angle away from the axis. The shape, whether it extends beyond the uppermost floret, as well as the hair type and length are useful distinguishing characters between species. How the rachilla *disarticulates* at maturity is also important in grass identification. The rachilla can be jointed below the glumes (*Eragrostis superba, Polypogon* spp.); or above the glumes but below the floret(s), thus dispersing as a unit and leaving the glumes behind (*Agrostis, Ehrharta*); or jointed between florets (*Helictotrichon, Eragrostis obtusa*); or not jointed but persistent (*Eragrostis curvula*); while in some species of *Eragrostis* the lemma disarticulates separately, leaving the palea behind on the rachis. In genera where the spikelets are aggregated, the whole cluster sometimes disarticulates, sometimes together with the associated bristles (*Anthephora*, *Cenchrus*). In seed dispersal, the position of the spikelet disarticulation at maturity is of great importance because this determines which accessory structures (paleas, lemmas, rachilla segments, glumes and/or pedicels) accompany the seed when it is shed from the parent plant.

## Glumes

Glume characters are important diagnostic characters as they are usually very constant within species. There are usually two glumes at the base of the spikelet (sometimes four in the tribe Bambuseae) and are distinguished from the lemmas as they never enclose a palea or flower. Sometimes one, usually the lower (*Lolium multiflorum*, *Eriochloa stapfiana*), or both (*Oryza longistaminata*) glumes may be missing. Glumes are equal, subequal or unequal in size; some are shorter than the spikelet (*Eragrostis*) or longer (*Avena*); sometimes they are firmer than the lemmas (*Themeda*, *Heteropogon*) or the lemmas may be firmer (*Panicum*, *Digitaria*); the venation or number of nerves, and the shape, and presence or absence of awns are some of the characters useful for identification.

## Florets

*Number of florets* (Figure 7). Some genera have only a single floret in each spikelet (*Sporobolus*, *Agrostis*). There are always two florets per spikelet in the Panicoideae (*Panicum*, *Andropogon*), and there are a larger number of florets in other subfamilies—up to about 15 in *Megastachya* and over 50 in some *Eragrostis* spp.

A grass floret consists of the following structures:

### Lemma

Lemmas are always present and are taxonomically important between genera and species as, although they

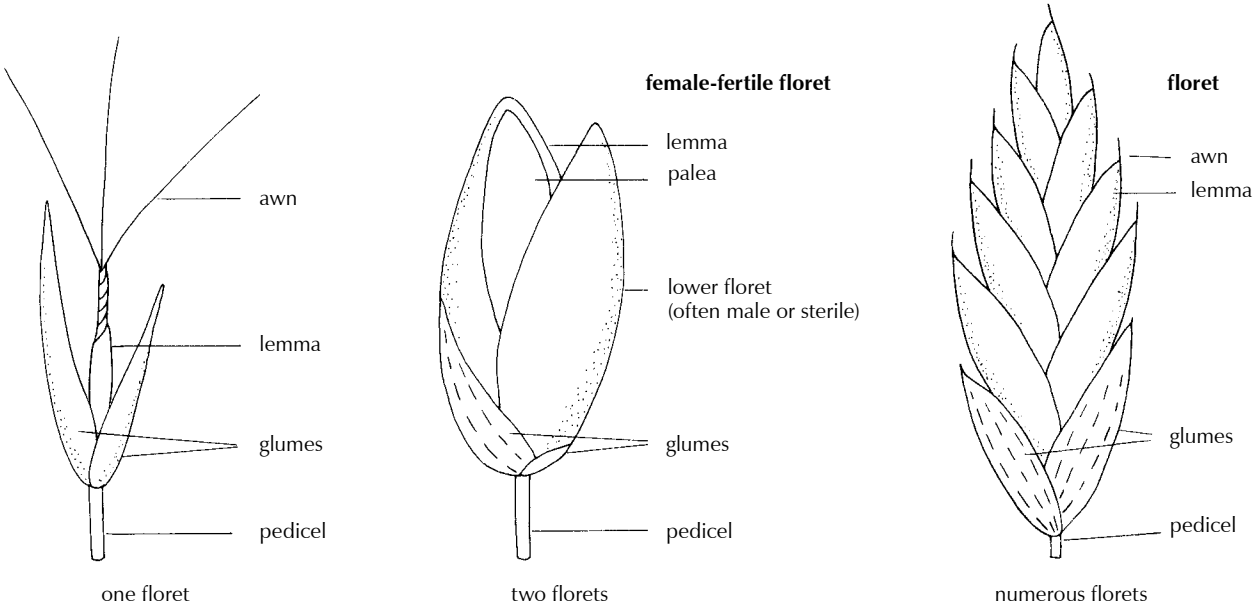



Figure 7.—Diagrams of generalised grass spikelets.

are more diverse than glumes throughout the family in general, they are very similar within a genus. Lemmas may differ in texture, shape, number of nerves, and the presence or absence and location of awns. Commonly glumes and lemmas are 1-keeled and have an odd number of nerves. In some spikelets the lemmas may be dissimilar, as in the Paniceae, where the lower sterile or male floret is usually softer than the very hard fertile floret lemma that persistently clasp the mature fruit. These hard lemmas often have an area of weakness on the back, the germination flap, which opens when the root of the germinating embryo emerges from the enclosed seed (*Brachiaria*, *Digitaria* and *Loudetia*). In some Paniceae, the way in which the lemma lies in relation to the palea is different; in the 'paspalum type' the lemma edge clasps the palea around the edges, while in the 'digitaria type' the lemma lies flat and exposed on the palea (Figure 18).

## Palea

The palea lies with its back against the rachilla, is usually smaller than the lemma, has its margins hidden inside the lemma except when the floret opens exposing the mature stamens and stigmas, and is usually 2-keeled and 2-nerved. In some species, in particular in the Paniceae, the palea may be reduced or absent and this is usually in the lower male or sterile floret (*Panicum ecklonii*).

The lemma and the palea together enclose the much-reduced flower and may continue to enclose the mature fruit, and are often modified to aid its dispersal. In genera where the glumes are relatively large and thick (*Rottboellia*, *Cymbopogon*), the lemma may be much reduced and the palea vestigial or absent. Sometimes where the glumes are absent, the palea is exposed and thickened (*Leersia hexandra*, *Oryza longistaminata*), although the interpretation of organs in oryzoid spikelets is difficult and controversial.

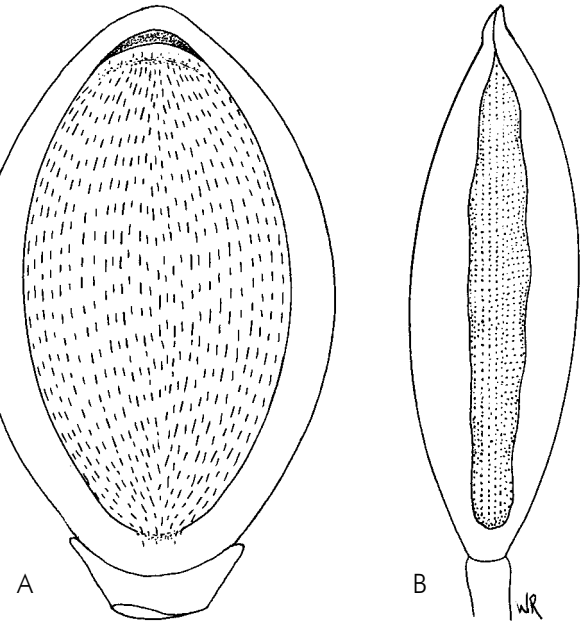



Figure 8.—Some lemma and palea combinations. A, 'paspalum type'; B, 'digitaria type'.

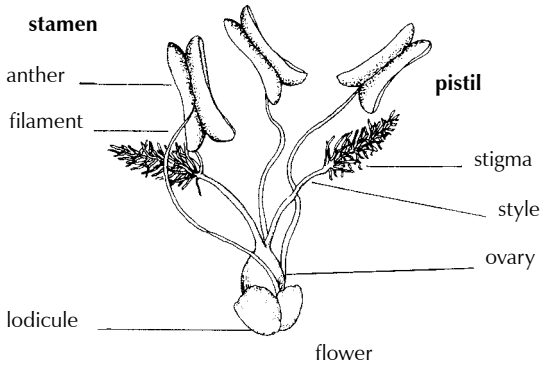



Figure 9.—The grass flower.

## Flowers

The grass flower is composed of lodicules, stamens and a pistil (Figure 9).

- *Lodicules* are small organs that lie between the lemma and the stamens. There are commonly two lodicules, but some genera may have one (*Melica*) or three (*Olyra*, *Thamnocalamus*). A recent suggestion is that the lodicules are derived from the inner perianth whorl or petals (Kellogg 2002). When the flower is mature the lodicules swell and force the lemma and palea apart, allowing the anthers and stigmas to emerge. After anthesis the lodicules lose turgidity and the lemma and palea close again around the developing fruit.

- Most grasses have three *stamens*, but sometimes there is one (sometimes in *Imperata cylindrica*), two (*Diandrochloa namaquensis*), four (*Microlaena stipoides*) or six (*Oryza longistaminata*, *Ehrharta erecta*). *Ochlandra*, a bamboo found in India, Sri Lanka and Madagascar, has as many as 120 stamens. Stamen numbers and anther size tend to be reduced in cleistogamous spikelets (*Bothriochloa insculpta*). A convenient character to separate species is anther length, which varies from about 0.1 to 14.0 mm. Pollen surface morphology is remarkably constant throughout the family so that genera or even the subfamilies cannot be distinguished on pollen surface characteristics (Watson & Bell 1975). However, subfamilies and tribes are distinguishable in terms of pollen antigens and allergens—an example of how taxonomy can exchange information with other disciplines to mutual advantage (Watson & Knox 1976). Except for a few forest-floor genera that do not occur in southern Africa, all grasses are wind pollinated.

- The *pistil* terminates the flower and has a single locule containing one ovule. The ovary is generally barrel-shaped or fusiform and usually glabrous. However, there is sometimes a tuft of hairs at its apex (*Festuca*, *Bromus* and some *Pentameris* spp.). Usually there are two styles, which are normally separate but are sometimes fused at the base (*Elymandra*, *Entoplo-*

*camia*). The stigmas are usually plumose and the stigmatic hairs vary in colour from white to purple-black, and this colour may change as the stigma ages. Rarely the stigmas are fused as in *Zea mays*, which has a single fused stigma of up to 75 mm long, the longest known for flowering plants (Clifford 1987).

The *sexuality* of the spikelets and their florets is occasionally used as an identification character in keys, but it is not an easy character to observe. A fertile floret always has a functional ovary, but stamens may or may not be present. Male or sterile spikelets are generally smaller in size, often with reduced structures, while fertile spikelets tend to be larger and their structures more specialised.

A few grasses are 'dioecious', that is, there are separate male and female plants, which have spikelets and florets of a single sex (*Cortaderia jubata*, *Festuca scabra*). A few others have spikelets of a single sex borne on different inflorescences (in *Zea mays* the tassel only has male spikelets and the cob only has fertile spikelets). Others have spikelets of different sexes within the same inflorescence (*Olyra latifolia*). For the majority of grasses, however, florets are either the same sex throughout (*Eragrostis* spp.) or of different sexuality within the same spikelet (*Panicum deustum*, *Melica racemosa*). In many of the Andropogoneae (*Hemarthria*, *Andropogon*, *Hyparrhenia*), the sessile spikelets have two florets, the lower male or sterile and the upper fertile, while the pedicellate spikelets are usually male or sterile. Thus in the sessile–pedicellate spikelet pair, which comprises a seed dispersal unit, there is only one fertile floret; this being the upper floret of the sessile spikelet.

Important in identification is the location of the reduced, sterile or male-only florets in a spikelet. They are always at the base of the spikelet (proximal) in the panicoid grasses (*Panicum*, *Andropogon*) and usually at the apex of the spikelet (distal) in the genera of the other subfamilies (*Enneapogon*, *Eustachys*), with some exceptions (*Ehrharta*, *Phalaris*). In some genera both proximal and distal sterile or male florets are present (*Phragmites*, *Entoplocamia*). The reduced florets may have awns (*Holcus*, *Ehrharta*) or hairs (*Melica*) or other modifications for seed dispersal.

In cleistogamous spikelets the lemma and palea do not open so that self-fertilisation occurs within the closed floret. Cleistogamy is not often reported for southern African grasses. *Enneapogon desvauxii* has cleistogamous spikelets in the leaf sheaths as well as ordinary (chasmogamous) inflorescences. In *Pennisetum clandestinum* the spikelets are all hidden in the leaf sheaths, but they are not cleistogamous because the stamens and the stigmas are exposed. It is thought that the pits on the lower glumes in *Bothriochloa* may restrain stamen emergence (Heslop-Harrison 1961).

### *Callus*

The callus occurs at different positions and represents modifications of different spikelet parts and therefore involves tissues of different origin. Its position depends on where the spikelet disarticulates: the base of the lemma (*Vulpia*), the base of the lemma plus part of the rachilla (*Helictotrichon*), the base of the spikelet (*Diheteropogon*), or the base of the spikelet plus part of the pedicel (*Schismus barbatus*, *Polypogon* spp.). The callus is usually hard, and the tip shape as well as the position and length of the hairs and the callus length are often diagnostic; for example the tip can be pungent (*Heteropogon contortus*), obtuse (*Aristida adscensionis*) or bifid (*Loudetia simplex*).

### *Awns*

Awns are hard appendages found either on the glumes, lemmas or rarely on the paleas. Awns can be shorter or longer than the structure where they occur. Stiff and usually unbranched, they can be straight or geniculate and often twisted, though usually only in lower section and are often extensions of the nerves, especially the central nerve or midrib. Terminal awns are found at the apex of the structure or in the sinus between lobes, and a dorsal awn is found on the back of the lemma or glume. Lemma lobes are sometimes awned, while occasionally the whole structure, usually the sterile lemmas, is reduced to awns. In some species the awn is differentiated into a basal column, which is often twisted, and an upper terminal bristle.

## Fruits, seeds and embryos

*Caryopsis* or grain is the characteristic fruit and is unique to the grasses. The pericarp, a thin adherent outer layer of the fruit, closely surrounds the one seed to form the caryopsis. Throughout the family the pericarp shows a number of variations such as berry-like (rare), achene-like where the pericarp is soft and separable from the seed (*Eleusine* and *Sporobolus*) or nut-like as in some bamboos (Sendulsky et al. 1987).

The *hilum*, on the adaxial side of the fruit, is a round (*Eragrostis*, *Panicum*) or elongated (*Ehrharta*, *Stipagrostis*) scar where the seed is attached to the pericarp. Food for the developing embryo is stored in the endosperm and is composed of starch, oils and proteins. The embryo is small relative to the volume of endosperm, and lies on the opposite side of the hilum. Differences in embryo size and structure tend to characterise subfamilies.

## Seed dispersal

Although plants are generally sessile, rooted organisms, relocation occurs at pollination and at seed dispersal. Although, in grasses, there is apparently little specialisation for wind pollination, there is a remarkable range of strategies for the transport of the seed to a favourable germination place. In most grasses it is the inflorescence branches and spikelet structures rather than the seeds and fruits that are modified for dispersal with

adaptions for transport by wind and water, by other organisms (in fur, skin feathers, clothing and digestive tracts), and even by self-propulsion. In the evolution of a large number of grass genera and species, parallel evolution of the different kinds of dispersal mechanisms has been a feature (Davidse 1987). There are a few genera where the caryopsis is dispersed apparently without any accessory structures (*Agrostis*, *Eragrostis*).

Occasionally, the glumes or lemmas have long hairs, which allow the fruit to be blown long distances by the wind (*Stipagrostis*, *Imperata cylindrica*, *Phragmites australis*). Rarely the entire inflorescence breaks off and is rolled about by the wind as a tumbleweed (*Trichoneura grandiglumis*, *Panicum volutans*), or the inflorescence falls together with the flag leaf, which acts as a sail (*Tribolium pusilla*).

In a number of genera that are associated with water, the corky inflorescence axes breaks up into short sections, which then float to a new location (*Hemarthria altissima*, *Rottboellia cochinchinensis*).

There are many adaptations to dispersal by animals. In some, the bare seed are extruded from the viscous pericarp to the spikelet apex from where it adheres to a passing animal (*Sporobolus*). Other dispersal mechanisms include hooks on the glumes or lemmas (*Tragus racemosus*, *Pseudechinolaena polystachya*); tangles of large scabrous awns from several spikelets (*Heteropogon contortus*); clusters of spikelets with scabrous subtending bristles (*Setaria verticillata*) or burrs (*Cenchrus brownii*); bristles with retrorse hairs (*Setaria verticillata*); and calluses with pungent tips that penetrate skin (*Aristida stipitata*, *Heteropogon contortus*). Callus hairs as well as the bent and twisted awns act together in self-propulsion. The callus hairs allow the floret or spikelet to move in only one direction, which, due to hygroscopic changes that causes the twisting of the awn, drills the floret or spikelet into the soil (*Heteropogon*, *Pentameris*).

In many Paniceae, the fruit is closely surrounded by glumes. Herbivory is also a dispersal mechanism, and here many species have soft and palatable herbage and spikelets where the lower lemma and palea as well as the hard upper lemma and palea form protective layers possibly to ensure its safe passage through the digestive tracts of animals (*Panicum*, *Brachiaria*, *Paspalum*). Oil-containing appendages known as elaiosomes, which mature at the same time as the caryopsis, attract insects with the offer of food. Ants carry the seed underground along with the accessory structure bearing the elaiosome. In *Rottboellia cochinchinensis* the elaiosome is on the 'peg' at the base internode that accompanies the dehiscent spikelet; in *Eriochloa meyeriana* it is a beadlike structure at the base of the spikelet formed from a reduced glume and the adjacent internode; in *Ehrharta calycina* the ear-like appendage at the base of the sterile lemmas may be a elaiosome.

Finally, the copious endosperm of the seed contributes to the widespread dispersal of grasses. These nutritious grains were collected by hunter-gatherer people, and led to the cultivation and improvement of cereal crops, resulting in today's mechanised agricultural industry and its highly selected hybrid cultivars.

# HOW TO

## HOW TO COLLECT AND PRESS GRASSES (EXCLUDING LARGE WOODY BAMBOOS)

- Collect the whole plant; include stolons and underground parts such as roots and rhizomes.
- Inflorescences should not be too young (especially *Aristida, Stipagrostis, Loudetia*) or so old that only glumes and/or palea are left (*Eragrostis*).
- Do not break up or cut up specimens with scissors or secateurs or cut the specimen in half or smaller—fold; do not cut if possible.
- Large specimens can be folded to size by bruising (use thumb nail) at the point of folding.
- In the case of very large specimens (*Phragmites*), collect representative parts such as inflorescence, branching point of culm and basal system of roots and rhizomes. This will result in a number of sheets and all these sheets should have the same collector's number.
- If possible, collect at least one specimen where the inflorescence is not separated from the rest of the specimen.
- Press by laying out the specimen in such a way that the characters of the inflorescence (branching, spikelet numbers) are clearly visible and so that it is easy to see the basal parts such as leaf sheaths, shape and position of rhizome or stolons where present. Figure 10.
- Label information:
  - Essential information includes the locality, date of collection, collector's name and number.
  - Habitat.
  - Height and colour of plant; whether leaves are flat or folded or rolled. Be aware that although grasses do not appear to wilt, flat open leaves often roll up on picking.

## HOW TO COLLECT BAMBOOS

There is only one or maybe two indigenous bamboos in the FSA region, but a number of different species have been cultivated and very little is known of what species and from where they have been introduced. Unfortunately, there are indications that some may become serious invaders and these will need to be collected and identified.

### Minimum requirements

Never mix material from two distinct plants under the same number, even though they may appear to represent the same taxon. Always collect the following:

#### Culm sheaths:

- Preferably from nodes above the fifth node on a mature culm.
- Should be in good condition and complete with blades and auricles.
- Press flat; if too big, cut or fold. If the sheath cannot be spread out without breaking, let it roll up naturally and do not press it. Wrap the ends carefully in paper to preserve fragile parts.

#### Leafy branches:

- Collect twigs or branches with leaf blades of all sizes and ages.
- Press immediately, before the leaves wilt and curl up.

#### Branch complement:

- Collect at least one typical example of a branch complement from the middle of a mature culm.
- Cut off the branches about 5 cm from their base.
- Include a segment of culm embracing the selected branch complement. If possible, collect a series of branch complements from the buds that develop into branches.

#### Culm nodes and internodes:

- Collect a segment of mature culm that includes nodes four and five and the internode between them.

#### Rhizome:

- Get examples of rhizomes to show the branching habit. (Draw or photograph the rhizome once cleaned in lieu of preserving if you prefer.)

#### Flowering branches:

- Collect as much as possible to show any range of variation in habit, leafiness, stage of development etc.
- Press and dry immediately.




Figure 10.—A grass specimen prepared for pressing with a herbarium mounting board in mind and spread out to show all the parts. Artist: G. Condy.

### Seedlings:

- Look for seedlings under the clump; press and dry immediately.

### Field notes:

- Note the habit of the clump; maximum height and diameter of culm; length of internodes; thickness of culm; if possible, take a photograph of the clump.

## HOW TO MOUNT GRASSES

- Do not use too much glue as one needs to see the characters on the basal sheaths, structures on the culm (ligule) and inflorescence branches and usually have to remove spikelets.
- The base of the plant should be clearly visible: is it annual or perennial, what do the basal sheaths look like?
- Try to ensure that at least one leaf is mounted in such a way that its shape can be seen.
- Mount in such a way that the shape and branching of the inflorescence is clearly visible.

## HOW TO EXAMINE A GRASS SPECIMEN FOR IDENTIFICATION

In grasses, many of the characters used in keys have to do with the spikelet, which is usually very small and often cannot easily be seen with the naked eye.

### Equipment

- A hand lens of at least a 10× magnification but preferably a microscope. When using a hand lens, move the object to be viewed towards the lens.
- Small ruler graduated in mm for measuring various parts of the spikelet.
- Very fine forceps and/or fine needles; use a fine embroidery needle, shorten and pushed in with glue into a dowel which has been cut into easily handled lengths.
- 'Windolene' (must contain ammonia) is used to soften dried spikelets and prevent them from springing away. The softening process is immediate and not only allows for easier dissection but tends to show up the venation better.

### Characters frequently used for identification

- Make sure the specimen is a grass, as members of the Cyperaceae (sedges) and Juncaceae (rushes) often resemble grasses.
- Whether the plant is annual or perennial, a difficult but often used character. A perennial usually has some shoots without inflorescences and there are dormant buds at base of the plant or rhizomes are present.
- Whether distinctive rhizomes and/or stolons present. A rhizome may be slender, robust, oblique, short or long.
- Basal leaf sheaths: glabrous or hairy; hairiness may only be visible on the inner sheaths as they may have fallen or been rubbed off on the outer ones, or may break into fine or robust fibres.
- Culms erect, geniculate or rooting at the nodes; nodes glabrous or hairy, type and position of hairs.
- Leaves mostly basal or cauline; blades flat, rolled, terete; unless specified do not use the flag leaf.
- Some structures are scabrid or hairy: run finger along structure and if it hooks = scabrid; if soft or rough but not hooking = hairy. If hooks/prickles are small then said to be scaberulous, if hooks/prickles large then it is scabrid.
- Inflorescence type: whether open or contracted; type of branching, in particular are the lowest branches whorled or not; glands present or absent; axils hairy or not; pedicels' lengths; number of spikelets per inflorescence, whether crowded or distant, and grouped in a particular way e.g. sessile–pedicellate pairs or 3-nate.
- Spikelets:
  - Examine several spikelets from a single inflorescence; avoid the terminal and basal spikelets of a branch or axis, as these are often different.
  - Mimicry often occurs, usually with the glumes and lemmas looking alike e.g. the lower glume is reduced or absent and the upper glume and lower lemma resemble each other (*Melinis*); this may be compounded by the lower palea being absent (*Paspalum*).
  - The nerves are often clearer on the inner surface and 'windolene' makes the nerves really become more visible.
  - Awns or parts of the awns may be glabrous, scabrid or hairy. Be aware that in fresh material the hairs are often adpressed and not obvious, only becoming visible after being left to dry for a short while.
  - Florets: their length, sexuality, textures and structures such as awns may vary within one spikelet e.g. Paniceae have 2 florets, usually very different from each other; in others, like *Eragrostis*, the lemma lengths often become shorter towards the apex.

## HOW TO USE KEYS

Why is it important to be able to use keys and understand descriptions? It is possible to learn the names of a large number of plants by matching the specimen

with specimens in a herbarium or illustrations or by being taught that, for example, this is *Panicum maximum* and that is *Panicum heterostachyum*. Your mind will, without you knowing it, register a number of characters that you will use whenever you come across a specimen of either of these species. But the problem arises when you have a specimen of another species unknown to you (*Panicum coloratum* or *Panicum infestum*) that closely resembles one that you do know (*Panicum maximum*). Now you will have to use keys and descriptions to identify your plant specimen. Remember that, at some time, the specimens you are using for matching or as a reference had to be properly identified to ensure that the correct concept for that species was followed. An example is where the correct identification of a specimen that had economic importance involved the *Digitaria sanguinalis* and *Digitaria ciliaris* complex. These two closely related species were known to occur in South Africa as weeds in cultivated lands, and a herbicide had been developed for use by farmers. But suddenly it was found that the herbicide was not effective in some cases, although the plants that survived looked like either of the above-mentioned species. It was only by using the keys available that it was established that those plants not killed by the herbicide were *Digitaria nuda*, another species belonging to the complex.

Keys in this book are known as dichotomous keys and consist of pairs of contrasting alternative taxonomic characters. The user must compare the unknown plant at hand and decide which of the two alternatives applies better to the unknown plant, and then pass on as directed to the appropriate following pair of alternatives. In each set of contrasts, the characters that provide the strongest contrast are given first. But it is necessary to observe all the characters given in each set, because often a combination of characters is needed for the identification of a given species. This process is repeated until the user arrives at the name of the plant. When a tentative identification has been reached it is best to verify it by comparing it with specimens of known identity, illustrations and descriptions. Hint: to get to know and understand a particular key, interpret the choices and learn what characters to observe, take a known species and, starting at the end point (where the species is identified), work backwards to the beginning.

To enable one to use the keys and understand the descriptions for the different genera and species an understanding of the basic grass terminology is needed.

Keys in this book, especially those to species, are totally artificial and are constructed to be as practical as possible by using, where possible, ± unique characters so as to bring out the species as soon as possible. Unfortunately this may result in related species, even varieties or subspecies of a particular species appearing widely separated from each other.

# HOW TO PREPARE LEAF BLADE MATERIAL FOR GRASS ANATOMICAL STUDIES

It has been found that more information about the grass epidermis is obtained with light microscopy than with SEM (scanning electron microscopy).

*Leaf blade epidermal preparations and transverse sections* should be taken from the mid-laminar region, avoiding diseased material, flag leaves, first seedling leaves and others that seem likely to be 'atypical'. Dried material can be boiled for a few minutes in water with a wetting agent (such as a detergent).

The epidermis should be taken from the underside (abaxial surface) of the blade. It can be prepared by peeling or by scraping away the tissues from the other side. Sections can be cut using a razor blade or a sharp hollow-ground razor, with the leaf blade supported in carrot, pickled elder pith or expanded polystyrene. Many of the most useful anatomical features can be satisfactorily observed in unstained sections and pieces of epidermis, mounted in water, at magnifications between ×25 and ×400. Features such as chloroplast distribution are reliably interpreted only in this way, and it is recommended that all preparations from living material should first be examined unstained.

As a simple, rapid, *temporary stain*, use phloroglucinol plus concentrated hydrochloric acid. It is particularly useful for an inexperienced observer, because the lignified cell walls are stained bright red and provide a valuable guide to tissue identification and section orientation, and the acid renders thick sections more transparent.

The stain Bismarck brown is recommended for *permanent preparations of both epidermis and transverse sections*, as it is particularly useful in picking out detail such as the shapes of silica bodies. Recipe to make the Bismarck brown stain: 1 kg Bismarck brown; 5 g phenol crystals; 100 ml distilled water. Mix and leave to stand for 1 hour (keeps indefinitely).

*The method for the preparations is as follows*:

Stain for 10–15 minutes; wash in distilled water; dehydrate in the usual way through a sequence of alcohols ending in absolute; clear in xylene (avoid inhaling the vapour!); then mount in Depex or Canada balsam.

# KEY TO KEYS

1. Tall woody bamboos; leaf blade usually constricted into a pseudo-petiole; flowering erratically (if spikelets unisexual see *Olyra*) . . . . **Key 1** (p. 19)
Culms usually herbaceous, sometimes woody; leaf blade rarely constricted at base into a pseudo-petiole; flowering annually (if a rhizomatous lawn-forming perennial, with an inconspicuous inflorescence of 2–4 spikelets enclosed in upper leaf sheath, with only anthers and stigmas long-exserted, see *Pennisetum clandestinum*) . . . . . 2
2. Inflorescence an obvious complex leafy false panicle; spikelet-bearing axis (usually a short raceme) either single or paired and closely to sparsely subtended by spathes and spatheoles . . . **Key 2** (p. 19)
Inflorescence leafless or spikelet-bearing axis not obviously subtended by spathes or spatheoles (sometimes closely associated with uppermost or flag leaf) . . . . . 3
3. Inflorescence of either paired or of 3 to many digitately or subdigitately arranged branches . . . . . **Key 3** (p. 20)
Inflorescence not digitate or subdigitate . . . . . 4
4. Inflorescence a true spike or spike-like (spikelets or inflorescence branches being so closely packed against the axis to appear like a spike), linear to globose in shape, occasionally spikelet solitary on culm . . . . . **Key 4** (p. 21)
Inflorescence an open or contracted panicle or raceme, never spike-like or with spike-like primary branches scattered up the elongated central axis. . . . . **Key 5** (p. 27)

## Key 1 (Woody bamboos)

1. Leaf blade strongly cross-veined, forming a tessellate pattern; spikelets not in globose clusters; stamens 3 . . . . . **Thamnocalamus**
Leaf blade not strongly cross-veined; spikelets in globose clusters; stamens 6. . . . . 2
2. Culm sheath blade very broad . . . . . ***Bambusa**
Culm sheath blade narrow . . . . . **Oxytenanthera**

## Key 2 (Inflorescence a complex, leafy, false panicle)

1. Inflorescence branches each subtended by a smooth ivory-like bead or cupule enclosing female spikelets; male spikelets on a tassel exserted from bead; annuals (rarely perennial) . . . . .***Coix**
Inflorescence branches not subtended by a smooth ivory-like bead or cupule; annuals or perennials . . . . . 2
2. Spikelet subtended by a bristle. . . . . **Pennisetum**
Spikelet not subtended by a bristle . . . . . 3
3. Upper lemma of sessile spikelet awnless . . . . . 4
Upper lemma of sessile spikelet awned or mucronate (sometimes minutely so) . . . . . 8
4. Pedicel of pedicelled spikelet free from rachis . . . 5
Pedicel of pedicelled spikelet usually discernible but fused with rachis and appearing sessile. . . . 6
5. Keels of lower glume of sessile spikelet winged; inflorescence rachis joints transverse, internodes clavate; sessile spikelet 4.5–5.0 mm long . . . . . .**Coelorachis**
Keels of lower glume of sessile spikelet not winged (usually with a thick oil streak); inflorescence rachis joints oblique, internodes columnar to subclavate; sessile spikelet 5–15 mm long . . . **Elionurus**
6(4). Sessile spikelet globose; lower glume conspicuously pitted or tuberculate; raceme internodes oblong . . . . . **Hackelochloa**
Sessile spikelet elliptic to lanceolate; lower glume smooth; raceme internodes clavate or flattened to semi-cylindrical . . . . . 7
7. Racemes dorsally compressed, resembling the culm, tough; plants perennial, decumbent or rambling; basal sheaths without irritant hairs; spikelets of a pair similar, especially in sexuality . . . . . .**Hemarthria**
Racemes cylindrical, fragile; robust annuals, erect; basal sheaths with irritant hairs; spikelets of a pair very dissimilar, especially in sexuality. . . . . .**Rottboellia**
8(3). Spikelets clustered into triangular units resembling a single spikelet, each unit usually 1-awned, rarely 2- or 3-awned, composed of a single, awned, sessile, bisexual spikelet and two pedicelled spikelets, enclosed by an involucre of 4 sterile sessile spikelets . . . . . **Themeda**
Spikelets not in triangular units resembling a single spikelet . . . . . 9
9. Racemes solitary in spatheoles . . . . . 10
Racemes 2 or more in spatheoles . . . . . 13
10. Ligule an unfringed membrane; spatheole boat-shaped, distinct and closely associated with spikelet-bearing axis; sessile spikelet 3.5–4.0 mm long . . . . . .**Monocymbium**
Ligule a fringed membrane or a fringe of hairs; spatheole not boat-shaped, closely or not closely associated with spikelet-bearing axis; sessile spikelet 4–20 mm long (rarely 2–3 mm long) . . . . . 11
11. Pedicelled spikelet smaller than sessile spikelet . . . . . **Schizachyrium**
Pedicelled spikelet larger than sessile spikelet . . . . . 12
12. Lower glume of sessile spikelet deeply and narrowly grooved; inflorescence awned all the way; at least one glume per spikelet in pair long-awned . . . . . **Andropogon**
Lower glume of sessile spikelet flat or rounded on back; inflorescence awned only in upper part; glumes of both spikelets in pair awnless . . . . . **Heteropogon**
13(9). Inflorescence without conspicuous spathes and spatheoles subtending spikelet-bearing axis (low down on flowering culm(s) and closely adpressed to inflorescence rachis) . . . . . 14
Inflorescence with conspicuous spathes and spatheoles subtending spikelet-bearing axis . . . . . 18

14. Callus of sessile spikelet long, acute to pungent . . . . . 15
Callus of sessile spikelet short, obtuse or rounded . . . . . 16
15. Sessile spikelet callus inserted into apex of internode; sessile spikelet lower glume with a median groove . . . . . **Diheteropogon**
Sessile spikelet callus oblique on internode apex; sessile spikelet lower glume rounded on the back . . . . . .**Elymandra**
16(14). Pedicel and internodes longitudinally grooved with a translucent median line . . . .**Bothriochloa**
Pedicel and internodes without a translucent median line . . . . . 17
17. Upper lemma of sessile spikelet 2-lobed, awn from between lobes; internodes of rachis ± cup-shaped on top . . . . . **Andropogon**
Upper lemma of sessile spikelet entire, apex gradually passing into awn; internodes of rachis not cup-shaped . . . . . .**Dichanthium**
18(13). Awn of upper lemma of sessile spikelet glabrous (hairs may not be visible on fresh wet material); sessile spikelet callus inserted into apex of internode, apex not visible; fresh plants usually aromatic . . . . . **Cymbopogon**
Awn of upper lemma of sessile spikelet distinctly hairy (awns need to be dry); sessile spikelet callus applied to apex of internode, apex visible; fresh plants not aromatic . . . . . 19
19. Lower glume of sessile spikelet flattened to rounded on back; upper glume of sessile spikelet obtuse to acute or mucronate; pedicelled spikelet 3–8(–10) mm long . . . . . **Hyparrhenia**
Lower glume of sessile spikelet with a shallow median groove; upper glume of sessile spikelet acute to apiculate or shortly awned; pedicelled spikelet 9–14 mm long . . . . . .**Hyperthelia**

# Key 3 (Inflorescence paired, digitate or subdigitate)

1. Spikelets in triads with pedicels fused, the whole mimicking a single spikelet . . . . . **Tristachya**
Spikelets solitary or 2- to many-nate, pedicels not fused to resemble a single spikelet (one spikelet of a pair may be missing and only represented by an empty pedicel) . . . . . 2
2. Spikelets 2–many-nate (at point of attachment to rachis) . . . . . 3
Spikelets solitary (at point of attachment to rachis) . . . . . 23
3. Spikelets all similar; upper lemma usually similar to firmer in texture than glumes; spikelets sessile, subsessile or equally or unequally pedicelled . . . 4
Spikelet pairs usually dissimilar; if similar, then upper lemma of bisexual spikelet less firm in texture than glumes; 1 spikelet usually sessile or subsessile, the other pedicelled (long–short combination), sometimes pedicel without spikelet . . . . . 10
4. Spikelet awnless (glume or lemma sometimes long-acuminate and appearing awned) . . . . . 5
Spikelet awned or mucronate (sometimes minutely so) . . . . . 7
5. Upper lemma with narrow, inrolled margins clasping only edges of palea (paspalum-type) . . . . . .**Paspalum**
Upper lemma with flat, thin margins covering most of the palea and often overlapping (digitaria-type) . . . . . 6
6. Lower glume as long as to slightly longer than spikelet . . . . . .**Megaloprotachne**
Lower glume shorter than spikelet or suppressed . . . . . **Digitaria**
7(4). Florets 2 per spikelet, lower sterile or male, upper bisexual; spikelet dorsiventrally compressed, falling with glumes . . . . . 8
Florets 2 or more per spikelet, lower floret(s) bisexual; spikelet laterally compressed, disarticulating above glumes . . . . . 9
8. Lower glume well developed; upper glume as long as lemma; lower lemma awnless; upper lemma awned, awn robust, shorter than spikelet . . . . . **Alloteropsis**
Lower glume absent, upper glume a minute scale; lower lemma awned, awn fine, longer than spikelet; upper lemma awnless . . . . . .**Stereochlaena**
9(7). Glumes very unequal in size; bisexual floret 1, rarely 2 per spikelet, rest reduced or sterile . . . . . **Chloris**
Glumes ± equal in size; bisexual florets 2–7 per spikelet, upper reduced or sterile. . . .**Tetrapogon**
10(3). Internodes of rachis and pedicels stout, 3-angled, rounded or flattened and thickened upwards; upper lemma of bisexual spikelet (usually sessile spikelet) awnless . . . . . 11
Internodes of rachis and pedicels slender, filiform or linear, sometimes thickened upwards, clavate or substantial, but then upper lemma of bisexual spikelet (usually sessile spikelet) awned . . . . . 13
11. Lower glume of sessile spikelet produced into long awn-like flattened tail; sessile spikelet 20–40 mm long; ligule a fringed membrane . . . . . **Vossia**
Lower glume of sessile spikelet without a long herbaceous tail; sessile spikelet 6–8 mm long; ligule an unfringed membrane . . . . . 12
12. Pedicelled spikelet long-awned (5–120 mm) from lower glume . . . . . **Urelytrum**
Pedicelled spikelet awnless; lower glume of sessile spikelet strongly ridged due to prominent nerves . . . . . **Phacelurus**
13(10). Pedicelled spikelet absent, represented only by a flattened, linear pedicel; glumes rugose; coarse annuals; leaf base amplexicaul . . . . **Thelepogon**
Pedicelled spikelet present; glumes rugose or not; annuals or perennials; leaf base amplexicaul or not . . . . . 14
14. Spikelets unequally pedicelled; subsessile spikelet male or sterile, awnless, long-pedicelled spikelet bisexual, awned . . . . . **Trachypogon**
Spikelets usually 1 sessile and the other pedicelled, with only the sessile spikelet or both spikelets bisexual, awned or awnless . . . . . 15
15. Both spikelets of a sessile-pedicelled pair with at least one lemma with a long awn . . . . . 16
Usually only sessile spikelet of a pair with at least one lemma with long awn . . . . . 18
16. Spikelet-bearing rachis substantial, clavate or inflated, often appearing U- or V-shaped from the back; sessile or subsessile spikelet with lower palea well developed . . . . . **Ischaemum**
Spikelet-bearing rachis slender; sessile spikelet with lower palea absent or reduced . . . . . 17
17. Lower glume shallowly concave to medianly grooved; spikelets and pedicels glabrous or sparsely hairy; inflorescence open with spikelets loosely spaced; plants rambling or creeping . . . . . *__Microstegium__
Lower glume concave to ± flat; spikelets and pedicels hairy; inflorescence dense with spikelets closely spaced; plants tufted . . . . . **Eulalia**

18(15). Upper lemma of sessile spikelet entire, gradually passing into awn; callus of sessile spikelet not inserted into hollowed top of internode . . . . . 19
Upper lemma of sessile spikelet lobed, awned from between lobes or low down on back; callus of sessile spikelet inserted into hollowed top of internode (if not clear, then pedicels and internodes inflated) . . . . . 20
19. Lower glume of sessile spikelet acute to subacute; pedicels and internodes longitudinally grooved with a translucent median line . . . **Bothriochloa**
Lower glume of sessile spikelet obtuse to truncate; pedicels and internodes not grooved, without a translucent median line . . . . . **Dichanthium**
20(18). Palea of lower floret of sessile or subsessile spikelet well developed; inflorescence axis usually appears U- or V-shaped from the back . . . . . **Ischaemum**
Palea absent in lower floret of sessile spikelet; inflorescence axis not U- or V-shaped from the back . . . . . 21
21. Callus long, acute to pungent . . **Diheteropogon**
Callus often short, obtuse to truncate . . . . . 22
22. Upper lemma of sessile spikelet awned from between bilobed apex; lower glume of sessile spikelet not spinously muricate; leaf base not markedly cordate; callus obtuse . . . . . **Andropogon**
Upper lemma of sessile spikelet awned from low down on back; lower glume of sessile spikelet spinously muricate; leaf base markedly cordate; callus truncate . . . . . **Arthraxon**
23(2). Inflorescence branches not obviously secund. . 24
Inflorescence branches obviously secund . . . . 25
24. Ligule an unfringed membrane; lemma 5–9-nerved, usually with a short stout awn; florets all similar in shape; hairs on lemma clavate and apiculate . . . . . **Lintonia**
Ligule a fringed membrane; lemma 3-nerved, awn slender; upper sterile florets modified to form a tuft of awns; hairs on lemma not clavate . . . . . **Lophacme**
25(23). Each inflorescence spike ending in a rigid, naked point . . . . . **Dactyloctenium**
Each inflorescence spike not ending in a naked point . . . . . 26
26. Florets strictly 1 per spikelet, occasionally with a rachilla extension, rarely a vestigial floret present (if lower glume and palea missing and upper glume and lower lemma similar see *Axonopus* and *Paspalum*) . . . . . 27
Florets 2 or more per spikelet, florets all fertile or mixed, some fertile and others male, sterile or reduced . . . . . 31
27. Lemma awned; awn long and flexuous, becoming entangled with awns of other spikelets . . . . . **Schoenefeldia**
Lemma awnless or mucronate . . . . . 28
28. Spikelet 12–15 mm long; glumes very unequal . . . . . **Spartina**
Spikelet 2.5–5.0 mm long; glumes ± equal to unequal . . . . . 29
29. Glumes shorter than spikelet, rarely as long, but then not enclosing floret . . . . . **Cynodon**
Glumes enclosing spikelet; floret not visible . . . 30
30. Spikelet laterally compressed; lower glume symmetrical in shape, both glumes medially keeled; inflorescence branches two . . . . . **Brachyachne**
Spikelet dorsiventrally compressed; lower glume asymmetrically 1-keeled, upper flat on back, 2-keeled; inflorescence branches several . . . . . **Craspedorhachis**
31(26). Lemma(s) of bisexual floret(s) awnless, sometimes mucronate . . . . . 32
Lemma(s) of bisexual floret(s) awned, awn sometimes minute . . . . . 37
32. Spikelet with 3–15 florets; lemmas similar, sometimes uppermost reduced . . . . . **Eleusine**
Spikelet with 2 florets; lemmas usually dissimilar, rarely 3 florets present, but then second floret male . . . . . 33
33. Lower floret male or reduced, upper floret bisexual (lower glume and lower palea absent, upper glume and lower lemma looking similar) . . . . 34
Lower floret bisexual, upper sterile, reduced or vestigial . . . . . 36
34. Upper lemma with flat, thin margins covering most of the palea and often overlapping (digitaria-type); lower palea present . . . . . **Megaloprotachne**
Upper lemma with narrow, inrolled margins clasping only edges of palea (paspalum-type); lower palea absent . . . . . 35
35. Spikelet abaxial (lower glume turned away from rachis, upper glume and lemma facing rachis . . . . . **Paspalum**
Spikelet adaxial (upper glume and lemma turned away from rachis) . . . . . **Axonopus**
36(33). Upper glume distinctly awned; spikelets golden to dark brown; sheaths strongly flabellate . . . . . **Eustachys**
Upper glume awnless; spikelets not golden or dark brown; sheaths not strongly flabellate . . . . . **Cynodon**
37(31). Lemma rounded or flat on back . . . . . 38
Lemma keeled . . . . . 39
38. Spikelet laterally compressed, 6–10 mm long; lemma with short, sharp-pointed to obtuse or club-shaped hairs . . . . . **Lintonia**
Spikelet dorsiventrally compressed, 3–5 mm long; lemma glabrous . . . . . **Enteropogon**
39(37). Glumes unequal in size . . . . . 40
Glumes ± equal in size (excluding awn) . . . . . 42
40. Upper glume awned, awn up to half as long as body of glume . . . . . **Eustachys**
Upper glume awnless or with an awn point . . . 41
41. Lemma of bisexual floret similar to firmer in texture than glumes . . . . . **Chloris**
Lemma of bisexual floret less firm in texture than glumes . . . . . **Lophacme**
42(39). Lemma hairy, awn 3–11 mm long; spikelet cuneate; glumes nearly to as long as spikelet; hairy callus present . . . . . **Tetrapogon**
Lemma glabrous, awn 0.3–0.9 mm long; spikelet oblong with serrated outline; glumes much shorter than spikelet; callus absent . . . **Acrachne**

## Key 4 (Inflorescence a spike or spike-like)

1. Spikelets solitary on flowering culm . . . . . 2
Spikelets many on flowering culm . . . . . 3
2. Florets 5–22 per spikelet, all florets bisexual, or uppermost sterile or reduced . . . **Brachypodium**
Florets 3 per spikelet, lower 2 sterile and reduced to lemmas, upper bisexual . . . . . **Ehrharta**
3(1). Spikelet or clusters of spikelets enclosed in an involucre of bracts or subtended by 1 to many bristles, spines, scales or bracts, bristle may be solitary, not obvious or hardened to form rigid

spines, or inflorescence enclosed by a specialised inflated flag leaf, and the whole falling as a unit . . . . . 4
Spikelets not enclosed by an involucre of bracts nor subtended by a bristle or bristles, if enclosed in flag leaf this not specialised and inflorescence not falling as a unit, sometimes enclosed by chaffy and/or enlarged glumes or spathes . . . . . 11
4. Inflorescence enclosed by inflated flag leaf, disarticulating below flag leaf and falling as one unit; glumes and lemmas long-awned; 3–7 florets per spikelet . . . . . **Tribolium**
Spikelet(s) enclosed by an involucre of bracts or a cupule of spines, or subtended by one to many bristles, scales or spines; florets 1 or 2 per spikelet . . . . . 5
5. Bristle(s) persisting on axis after spikelet(s) falls . . . . . **Setaria**
Bristle(s), scales, bracts or herbaceous cupule falling with spikelet(s) . . . . . 6
6. Involucre of several sterile spikelets or coriaceous bracts; bristles absent . . . . . **Anthephora**
Involucre of one to many bristles, spines or herbaceous cupules or scales . . . . . 7
7. Involucral bristle, scale or cupule solitary . . . . . 8
Involucral bristles or spines several to many . . . 10
8. Spikelet subtended by a herbaceous, lobed cupule or scale, one lobe longer and awn-like; stipe supporting spikelet blunt . . . . . **Odontelytrum**
Spikelet subtended by a solitary robust and awn-like or slender bristle; stipe supporting spikelet pungent or absent . . . . . 9
9. Spikelet subtended by a long, pungent stipe; bristle robust and awn-like . . . . . **Paratheria**
Spikelet sessile, not subtended by a stipe; bristle slender . . . . . **Pennisetum**
10(7). Bristles free throughout, ± filiform . . **Pennisetum**
Bristles connate and flattened below, forming a disc, sometimes flattened and/or hardened, forming rigid spines enclosing the spikelet . . . . . **Cenchrus**
11(3). Inflorescence obviously 1-sided (secund) to subsecund . . . . . 12
Inflorescence not obviously secund; spikelets sometimes distichous . . . . . 33
12. Spikelets all awnless or mucronate . . . . . 13
Spikelets, all or at least some, awned . . . . . 28
13. Spikelet with 2 florets, lower male or sterile, upper bisexual (lower glume may be minute or absent, upper glume and lower lemma may resemble each other) . . . . . 14
Spikelet with 1–many florets, all bisexual or upper male or sterile, or florets 3 with lower 2 sterile and upper bisexual, or if florets 2, then lowest bisexual . . . . . 17
14. Central inflorescence axis thickened; racemes very short (sometimes a single spikelet), embedded in distinct cavities, raceme rachis ending in a subulate tip and without spikelets . . . . . **Stenotaphrum**
Central inflorescence axis not thickened; spikelets or racemes free or in slight cavities . . . . . 15
15. Inflorescence of obvious short racemes scattered singly on alternate sides and adpressed to long central axis . . . . . **Paspalidium**
Inflorescence with spikelets solitary, in pairs or triads densely packed on single raceme . . . . . 16
16. Upper lemma of spikelet with flat, hyaline margins enfolding and enclosing most of palea . . . **Digitaria**
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Glumes ± equal in size . . . . . 21
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19. Florets 3, lower 2 sterile, reduced to lemmas . . . . . **Ehrharta**
Florets 2–many, lowest bisexual, upper sometimes reduced . . . . . 20
20. Glumes similar in appearance and/or texture; lemma 5–9-nerved . . . . . **Tribolium**
Glumes dissimilar in appearance and/or texture; lemma 3-nerved . . . . . **Harpochloa**
21(17). Ligule an unfringed membrane . . . . . 22
Ligule a fringed membrane (fringe sometimes minute) or a fringe of hairs . . . . . 23
22. Florets 3 per spikelet, lower 2 sterile, upper bisexual, usually smaller than lower 2; lower glume 5-nerved . . . . . **Ehrharta**
Florets 3–10 per spikelet, all bisexual except uppermost reduced and sterile; lower glume 1–3-nerved . . . . . ***Catapodium**
23(21). Floret 1 per spikelet . . . . . 24
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24. Spikelet dark, usually brown or purple, not noticeably to dorsiventrally compressed; lemma 2-nerved . . . . . **Microchloa**
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25(23). Florets 4–10 per spikelet . . . . . **Tribolium**
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Florets 2 per spikelet, lower bisexual, upper bisexual or sterile . . . . . 27
27. Annuals; spikelet laterally compressed; glumes 5–8-nerved . . . . . **Pentameris**
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28(12). Ligule an unfringed membrane; spikelets dissimilar, bisexual ones mixed with sterile or male ones on same inflorescence . . . . . 29
Ligule a fringe of hairs or a fringed membrane, (fringe sometimes minute); spikelets all similar in sexuality on inflorescence . . . . . 30
29. Inflorescence soft and silky; spikelet cluster of 2 or 5 sterile spikelets with a terminal bisexual spikelet, clusters fall as a whole; bisexual spikelet with one fertile and one sterile floret; male or sterile spikelets with awnless lemmas . . . . . ***Lamarckia**
Inflorescence appearing bristly; spikelet cluster of 1 or more sterile spikelets mixed with bisexual spikelets consisting of (1)2 or 3 florets, clusters do not fall as a whole, spikelets disarticulating above glumes; sterile spikelets with glumes and lemma bearing long rigid awns . . . . . ***Cynosurus**
30(28). Upper glume with an oblique dorsal awn well below apex, 2- or 3-nerved, nerves with tubercles; lower 2 florets male or sterile . . . . **Ctenium**
Upper glume awned from near apex or awnless, 1-nerved or 5–7-nerved, nerves not tubercled; lower florets bisexual, upper floret usually reduced and sterile . . . . . 31
31. Glumes ± equal in size; spikelet cuneate . . . . . **Tetrapogon**
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32. Spikelet dorsiventrally compressed; inflorescence secund; tall robust plants usually 500 mm high or higher . . . . . **Enteropogon**

Spikelet laterally compressed; inflorescence subsecund; slender plants up to 220 mm high . . . . . **Tripogon**

33(11). Ligule absent from upper or all leaves . . . . . 34
Ligule present on all leaves . . . . . 35

34. Spikelets densely and irregularly crowded on inflorescence; spikelet softly long-hairy . . . . **Brachiaria**
Spikelets in regular rows on inflorescence; spikelet minutely soft-hairy or with long, rigid hairs . . . . . **Echinochloa**

35(33). Bisexual spikelet with 1 floret (rachilla extension sometimes present) . . . . . 36
Bisexual spikelet with 2–many florets (some florets may be reduced to lemmas or differ in size and shape) . . . . . 64

36. Ligule an unfringed membrane . . . . . 37
Ligule a fringed membrane or a fringe of hairs . . . . . 50

37. Some or all spikelets awned . . . . . 38
All spikelets awnless or mucronate . . . . . 46

38. Spikelets in triads, central spikelet bisexual, two lateral spikelets male or sterile; central spikelet with one floret, rachilla extension present; glumes side by side . . . . . **Hordeum**
Spikelets not in triads, or if in triads, then all spikelets alike in function; glumes not displaced . . . 39

39. Glumes swollen and rounded on back near base . . . . . ***Gastridium**
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40. Spikelets falling entire with the glumes . . . . . 41
Spikelets disarticulating above the glumes. . . . 43

41. Glumes 3-nerved . . . . . ***Alopecurus**
Glumes 1-nerved . . . . . 42

42. Inflorescence a contracted panicle; lemma 5-nerved . . . . . **Polypogon**
Inflorescence a cylindrical spike or spike-like raceme; lemma 1-nerved . . . . . **Perotis**

43(40). Glumes plumose with long silky hairs; inflorescence globose to ovoid . . . . . ***Lagarus**
Glumes glabrous or hairy, not plumose with long silky hairs; inflorescence linear . . . . . 44

44. Lemma awn very long and extending beyond glumes, awn apical or from sinus; lemma becoming indurated . . . . . **Stipa**
Lemma awn short, not extending beyond glumes, awned from well below apex or at base; lemma not becoming indurated . . . . . 45

45. Callus glabrous or with hairs up to half as long as lemma; spikelet up to ± 5 mm long . . . **Agrostis**
Callus beaded with long white hairs as long as to longer than lemma; spikelet 5.5–8.0 mm long . . . . . **Calamagrostis**

46(37) Glumes longer than 9 mm . . . . . ***Ammophila**
Glumes 1–8 mm long . . . . . 47

47. Inflorescence with spikelets alternating on opposite sides and sunk in rachis; annuals . . . . . 48:
Inflorescence with many spikelets all around, not sunk into rachis; perennials, sometimes annuals . . . . . 49

48. Glumes 1, lower suppressed (terminal spikelets with 2) . . . . . ***Hainardia**
Glumes 2 but displaced, side-by-side . . . . . ***Parapholis**

49(47) Inflorescence a contracted panicle; spikelet pedicelled, disarticulating above glumes; glumes similar in shape and/or texture; lemma 3–5-nerved . . . . . **Agrostis**
Inflorescence a dense spike; spikelet sessile, falling with glumes; glumes very dissimilar in shape and/or texture, upper glume flat-backed; lemma 1–3-nerved . . . . . **Mosdenia**

50(36). Spikelet awned or mucronate (sometimes minute) . . . . . 51
Spikelet neither awned nor mucronate . . . . . 62

51. Lemma 1–3-awned . . . . . 52
Lemma mucronate, muticous or awnless . . . . 59

52. Lemma 1-awned (beware: 2 lateral awns may be very small and reduced, appearing 1-awned) . . 53
Lemma 3-awned (due to fusion of the lower parts of the awns into a column; it may be seen as 1 awn with 3 branches) . . . . . 56

53. Lower glume a minute membranous scale; lemma less firm in texture than glumes . . . . **Monelytrum**
Lower glume well developed; lemma firmer in texture than glumes, usually becoming indurated . . 54

54. Ligule a fringed membrane; lemma articulation never present . . . . . **Stipa**
Ligule a dense fringe of hairs; lemma articulation usually present (absent in *Aristida transvaalensis*) . . . . . 55

55. Base of column with a pencil of long white hairs; callus pungent . . . . . **Stipagrostis**
Base of column glabrous; callus obtuse to truncate to rounded . . . . . **Aristida**

56(52). Lemma distinctly 2-lobed, lobes awned with long straight awns; central awn geniculate . . . . ***Lagarus**
Lemma not appearing lobed, awns coming off ± together at apex, similar though lateral awns may be shorter; column present or absent . . . . . 57

57. Lemma awns all or only centre awn plumose; palea indurated . . . . . **Stipagrostis**
Lemma awns all glabrous, smooth or scabrid; palea not indurated . . . . . 58

58. Upper glume 3–5-nerved; lower glume usually 3-nerved; glumes rounded on back; awns spirally contorted at base; caryopsis deeply grooved ventrally . . . . . **Sartidia**
Upper glume 1(3)-nerved; lower glume nearly always 1-nerved; glumes 1-keeled to middle or below; awns not spirally contorted at base; caryopsis not deeply grooved . . . . . **Aristida**

59(51). Spikelets ± embedded on central axis . . . . . 60
Spikelets not embedded on central axis (sometimes adpressed) . . . . . 61

60. Plant stoloniferous; leaves mainly cauline; spikelet dorsiventrally compressed, 8–22 mm long; upper glume awned . . . . . **Lepturus**
Plant densely tufted, not stoloniferous; leaves mainly basal; spikelet laterally compressed, 2.5–4.5 mm long; upper glume awnless **Oropetium**

61(59). Glumes awnless; inflorescence oblong; spikelet disarticulating above glumes . . . . . **Polevansia**
Glumes (or at least one) awned; inflorescence linear; spikelet disarticulating with glumes . . . **Perotis**

62(50). Upper glume with large, hooked, curved or straight prickles, 5–7-nerved; spikelets dorsiventrally compressed; lower glume absent or a minute scale . . . . . **Tragus**
Upper glume without hooked, curved or long, straight prickles, 1-nerved; spikelet laterally to not noticeably compressed; lower glume substantial or reduced to a scale . . . . . 63

63. Lower glume substantial; lemma glabrous . . . . . **Sporobolus**
Lower glume small or reduced to a linear scale; lemma hairy, hairs in tufts or lines on either side of keel . . . . . **Catalepis**

64(35). Ligule an unfringed membrane . . . . . 65
Ligule a fringed membrane (fringe sometimes minute) or a fringe of hairs . . . . . 110

65. Spikelets viviparous, mainly upper florets distorted and enlarged . . . . . **Poa**

Spikelets usually not viviparous . . . . . 66
66. All spikelets awnless and not mucronate . . . . 67
All or some spikelets awned or mucronate . . . . 84
67. Spikelets in pairs, one sessile and the other pedicelled, dissimilar in form and sex; pedicelled spikelet very reduced or absent and pedicel empty . . . . . **Rhytachne**
Spikelets solitary or clustered, if paired, spikelets all similar in form and sex . . . . . 68
68. Glumes ± equal in size . . . . . 69
Glumes unequal in size, sometimes lower one reduced or absent (terminal spikelets often have both glumes well developed) . . . . . 76
69. Florets 2 or 3 per spikelet; lowest 1 or 2 florets sterile or reduced to lemmas, upper floret bisexual . . . . . 70
Florets 2–many per spikelet; lowest floret bisexual, upper sometimes sterile or reduced . . . . 72
70. Spikelet with 2 florets . . . . . **Tarigidia**
Spikelet with 3 florets . . . . . 71
71. Glumes 5-nerved; lower 2 sterile florets usually larger than upper bisexual floret . . . . . **Ehrharta**
Glumes 3-nerved; lower 2 sterile florets very small to more than half as long as the larger upper bisexual floret . . . . . ***Phalaris**
72(69). Spikelet (15–)28–40 mm long; inflorescence a true spike; spikelet falling with glumes . . . **Thinopyrum**
Spikelet 1–15 mm long; inflorescence a contracted panicle or raceme; spikelet disarticulating above glumes . . . . . 73
73. Spikelet 10–15 mm long; upper sterile spikelets compacted to form a club-shaped body on prolonged rachis . . . . . **Melica**
Spikelet 1–7 mm long; upper spikelets, if sterile, not forming a club-shaped body . . . . . 74
74. Spikelet 1–3 mm long; lemma 3-nerved . . . . . **Diandrochloa**
Spikelet 3–7 mm long; lemma 3–7(–11)-nerved, if 3 mm long, lemma 5-nerved . . . . . 75
75. Palea of mature spikelet projecting, thinner in texture than lemma; spikelet shining . . . . . **Koeleria**
Palea of mature spikelet not projecting, same texture as lemma; spikelet not shining . . . . . **Poa**
76(68). Florets 3, lower 2 sterile, usually different and larger than upper bisexual floret . . . . . **Ehrharta**
Florets 2 or more, all bisexual or upper or lowermost ones reduced and sterile . . . . . 77
77. Inflorescence a spike; spikelets sunk into partial cavities on alternate sides of central axis; lower glume absent or rarely minute (present in terminal spikelet); upper glume facing outwards . . . . . 78
Inflorescence a contracted raceme or panicle, branches adpressed, not sunk into central axis; lower glume usually present, sometimes reduced in size . . . . . 79
78. Spikelet laterally compressed; disarticulating above glumes; lemma 5–7-nerved (best seen on inner surface) . . . . . ***Lolium**
Spikelet dorsiventrally compressed, falling with glumes; lemma 3-nerved . . . . . **Lepturus**
79(77). Spikelet with 2 florets; upper lemma indurated; upper glume prominently nerved, usually gibbous; inflorescence mostly cylindrical . . . . . **Sacciolepis**
Spikelet with 2 or more florets; no lemma indurated; upper glume never gibbous; inflorescence not cylindrical . . . . . 80
80. Spikelet 1–3 mm long (lemma 3-nerved, if 5-nerved see *Poa*) . . . . . **Diandrochloa**
Spikelet 4–20 mm long . . . . . 81
81. Lemma without median keel, usually rounded on back, at least at base . . . . . 82
Lemma with median keel . . . . . 83
82. Lemma glabrous or shortly hairy; upper floret similar in form, sometimes reduced in size . . **Festuca**
Lemma with long hairs; upper florets reduced to lemmas compacted to form a club-shaped body . . . . . **Melica**
83(81). Palea of mature spikelet projecting; spikelet shining . . . . . **Koeleria**
Palea of mature spikelet not projecting; spikelet not shining . . . . . **Poa**
84(66). Spikelets in triads, central spikelet well developed, bisexual, 2 lateral spikelets male or sterile, smaller or reduced (sometimes reduced to awns) . . . . . **Hordeum**
Spikelets solitary, in pairs or in clusters, spikelets all similar or pairs sometimes dissimilar in form and sex . . . . . 85
85. Spikelets in pairs, these dissimilar in form and sex, sometimes some pairs on inflorescence similar . . . . . 86
Spikelets solitary, in clusters or in pairs, all spikelets similar in form and sex on inflorescence . . . . 90
86. Pedicelled spikelet with lower glume drawn out into an awn 5–120 mm long; lemmas of all spikelets awnless . . . . . **Urelytrum**
Pedicelled spikelet with lower glume awnless or with a short awn up to 5 mm long, or entire spikelet reduced to an awn; lemmas of the sessile and/or pedicelled spikelets awned (except in *Rhytachne* where lemmas are awnless) . . . . . 87
87. Awn short, straight; internodes clavate . . . . . **Rhytachne**
Awn long, not straight, usually geniculate; internodes linear . . . . . 88
88. Long-pedicelled spikelet bisexual; upper lemma long-awned; subsessile spikelet male or sterile, usually awnless; spikelet pairs usually similar along whole length of raceme . . . . . **Trachypogon**
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89. Inflorescence a panicle of numerous long racemes in whorls up long central axis; spikelets not in homogamous pairs . . . . . **Bothriochloa**
Inflorescence a single raceme; spikelet pairs in lower parts of raceme homogamous (alike in sex and shape), those in upper parts heterogamous (differing in sex and shape) . . . . . **Heteropogon**
90(85). Spikelets in clusters, clusters often ± subtended by enlarged spreading glumes of lower spikelets . . . . . **Elytrophorus**
Spikelets solitary, paired or clustered, not subtended by glumes of lower spikelets . . . . . 91
91. Florets 3 per spikelet; lower 2 male or sterile; upper bisexual, awnless . . . . . 92
Florets 2 to many per spikelet; lowest usually bisexual, sometimes male; upper sometimes sterile and reduced, awned or awnless . . . . . 93
92. Lemma awns dissimilar: lowest lemma awned from upper half, awn usually straight; second lemma awned from near base, awn usually geniculate . . . . . **Anthoxanthum**
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93(91). Florets 2; lower lemma awnless; upper lemma awned with a short stout awn, awn sometimes recurved and hooked . . . . . **Holcus**
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94. Lower glumes absent in all spikelets (except terminal one), upper glume turned outwards; spikelets partially sunk in cavities, obviously distichous on inflorescence . . . . . *__Lolium__
Lower glumes present in all spikelets, but sometimes very reduced . . . . . 95
95. Glumes ± as long as to longer than spikelet . . . 96
Glumes shorter than spikelet, at least lower glume much shorter (in *Helictotrichon galpinii* glumes just shorter than spikelet) . . . . . 99
96. Spikelet mucronate or minutely awned; palea hyaline, projecting and conspicuous in mature spikelets . . . . . __Koeleria__
Spikelet with obvious awn; palea not projecting from mature spikelet . . . . . 97
97. Inflorescence a spike; spikelet 10–15 mm long, long-awned . . . . . __Secale__
Inflorescence a contracted panicle or branches scattered along central axis; spikelet 2–11 mm long, short-awned . . . . . 98
98. Inflorescence a dense, contracted panicle; upper glume 3-nerved . . . . . *__Lophochloa__
Inflorescence of numerous branches scattered up central axis; upper glume 1-nerved . . __Trichoneura__
99(95). Awns geniculate or bent, often twisted . . . . 100
Awns straight or mucro present . . . . . 101
100. Lower lemma awned from between lobes; lowest floret bisexual . . . . . __Helictotrichon__
Lower lemma awned from lower third of back; lowest floret usually male . . . . *__Arrhenatherum__
101(99). Spikelet 2–6 mm long . . . . . 102
Spikelet 7–44 mm long . . . . . 104
102. Lemma bilobed; awns obvious; annuals . . . . . *__Lophochloa__
Lemma entire; awns not obvious; perennials, rarely annuals . . . . . 103
103. Palea thinner in texture than lemma, obvious in mature spikelet . . . . . __Koeleria__
Palea similar in texture to lemma, not obvious in mature spikelet . . . . . __Poa__
104(101). Inflorescence a spike . . . . . 105
Inflorescence a condensed panicle or single raceme . . . . . 106
105. Spikelet 10–20 mm long . . . . . *__Elytrigia__
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106(104). Lemma awn very short . . . . . __Festuca__
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107. Lower glume 0- or 1-nerved . . . . . 108
Lower glume 3–9-nerved . . . . . 109
108. Glumes ± similar in form and texture; ovary with apical appendage . . . . . __Bromus__
Glumes dissimilar in form and texture; ovary glabrous or hairy, without apical appendage . . . . . *__Vulpia__
109(107). Inflorescence a panicle (rarely a raceme); ovary with apical appendage . . . . . __Bromus__
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110(64). All or some spikelets awned or mucronate. . . . 111
All spikelets muticous . . . . . 171
111. Lemma margins lobed; lobes with large flat awns, median lobes sometimes with smaller awns; lemma becoming distinctly indurated, apex between marginal nerves bent forward; glumes 9–11-nerved . . . . . __Kaokochloa__
Characters not in above combination . . . . . 112
112. Lemma 5- or 9-awned . . . . . 113
Lemma 1–3-awned or mucronate (at least one lemma) . . . . . 114
113. Lemma 5-awned, awns scabrid, alternating with hyaline lobes . . . . . __Schmidtia__
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114(112). Spikelets paired, usually dissimilar in sex and form (heterogamous), often one sessile and the other pedicelled (pedicel sometimes fused to rachis but discernable) . . . . . 115
Spikelets solitary, clustered or paired, all similar in sex and form . . . . . 120
115. Upper lemma of sessile spikelet awnless . . . 116
Upper lemma of sessile spikelet awned or mucronate . . . . . 117
116. Sessile spikelet hairy to sparsely hairy; lower glume with oil streaks along keels; inflorescence obvious; pedicels free . . . . . .__Elionurus__
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117(115). Sessile spikelet 9–15 mm long; upper palea well developed . . . . . __Sehima__
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119. Inflorescence with up to three-quarters of lower part with homogamous, awnless spikelet pairs; upper lemma of sessile spikelet entire . . . . . __Heteropogon__
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121. Glumes unequal in size . . . . . 122
Glumes ± equal in size . . . . . 124
122. Ligule a fringed membrane . . . . . __Arundinella__
Ligule a fringe of hairs . . . . . 123
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125. Florets dissimilar in form; upper floret specialised male or sterile; lemma awned with stout hooked awn; lower lemma awnless; upper glume awned . . . . . __Holcus__
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126. Lemma 6–16 mm long . . . . . 127
Lemma 2.0–5.8 mm long . . . . . 129
127. Basal leaf sheaths woolly hairy; plants geophytes (if woolly only at extreme base see *Ellisochloa rangei*) . . . . . __Geochloa__
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Characters not in above combination __Tenaxia__
129(126). Articulation on pedicel situated some distance below spikelet and bearded with long hairs; spikelet falling with glumes . . . . . __Chaetobromus__
Articulation not present on pedicel; spikelet disarticulating above glumes . . . . . __Pentameris__

130 (124). Spikelet 4–7 mm long . . . . . 131
Spikelet 7.5–25.0 mm long . . . . . 133
131. Lemma hairs in tufts . . . . . **Tribolium**
Lemma hairs not in tufts . . . . . 132
132. Perennial; lemma densely hairy below row of hairs across back . . . . . **Tribolium**
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133(130). Articulation on pedicel situated some distance below spikelet and bearded with long hairs; spikelet falling with glumes . . . . . **Chaetobromus**
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141. Glumes unequal; lower glume acute to acuminate, often mucronate . . . . . **Echinochloa**
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147(144). Spikelet spiny due to stout deflexed awns of lemmas; fertile lemma firmer in texture than glumes . . . . . **Entoplocamia**
Spikelet not spiny, awns slender; fertile lemma less firm than, to similar in texture to glumes . . . 148
148. Lemma glabrous; spikelet 10–44 mm long . . . . . **Brachypodium**
Lemma hairy; spikelet 1.5–7.0(–10.0) mm long . . . . . **Tribolium**
149(143). Inflorescence a solitary spike; spikelets borne alternately up along rachis . . . . . **Tripogon**
Inflorescence a panicle or raceme with branches closely adpressed to or stiff and at right angles to central axis, or with dense clusters of spikelets at intervals on central axis . . . . . 150
150. Lemma glabrous (rarely with tubercle-based hairs on side nerves) . . . . . 151
Lemma hairy . . . . . 154
151. Glumes sparsely hairy . . . . . **Elytrophorus**
Glumes glabrous . . . . . 152
152. Lemma 5–7-nerved . . . . . **Brachychloa**
Lemma 3-nerved . . . . . 153
153. Lemma lanceolate to ovate-lanceolate; inflorescence resembling a herring bone due to many stiff side branches . . . . . **Pogonarthria**
Lemma ovate, elliptic to oblong; inflorescence not resembling a herring bone . . . . . **Eragrostis**
154(150). Lemma deeply lobed, 3-awned . . . . . 155
Lemma entire or not deeply lobed, 1-awned or mucronata . . . . . 156
155. Lemma with lateral nerves glabrous or minutely hairy; glumes 3-lobed or entire; base of plant with dense fibrous sheaths . . . . . **Styppeiochloa**
Lemma with lateral nerves long-hairy; glumes usually 2-lobed; base of plant without fibrous sheaths . . . . . **Triraphis**
156(154). Leaf blades short, distichous, pungent; perennials . . . . . **Odyssea**
Leaf blades not pungent; annuals . . . . . 157
157. Lemma mucronate . . . . . 158
Lemma awned . . . . . 159
158. Glumes glabrous to minutely scaberulous . . . . . **Brachychloa**
Glumes densely hairy with tubercle-based hairs . . . . . **Stiburus**
159(157). Inflorescence silky; leaves broad, lanceolate to ovate; glumes very unequal . . . . **Leptocarydion**
Inflorescence bristly; leaves narrow, linear; glumes ± equal to slightly unequal . . . . . **Elytrophorus**
160(142). Lower glume 1- or 2-nerved . . . . . 161
Lower glume 3–11-nerved . . . . . 166
161. Inflorescence of short, stiff spikes spaced up to 30 mm apart, ascending at first, reflexing at maturity . . . . . **Dinebra**
Inflorescence dense and continuous or of dense, globose clusters at intervals on central axis . . . 162
162. Glumes with tubercle-based hairs . . . . **Stiburus**
Glumes glabrous or hairy, hairs not tubercle-based . . . . . 163
163. Annual hydrophytes . . . . . **Elytrophorus**
Perennials; rarely annuals but then not hydrophytic . . . . . 164
164. Spikelet 1–3 mm long . . . . . **Chloris**
Spikelet 4–25 mm long . . . . . 165
165. Lemma keeled; spikelet strongly laterally compressed; basal sheaths not woolly hairy . . . . . **Fingerhuthia**
Lemma rounded on back; spikelet not strongly laterally compressed; basal sheaths woolly hairy . . . . . **Geochloa**
166(160). Articulation on pedicel situated some distance below spikelet and bearded with long hairs; spikelet falling with glumes . . . . . **Chaetobromus**
Articulation not present on pedicel; spikelet disarticulating above glumes . . . . . 167

167. Glumes with keels usually with large, prominent, stalked glands . . . . . **Pentameris**
Glumes with keels eglandular or glands not prominent or stalked . . . . . 168
168. Spikelet 9–13 mm long . . . . . **Geochloa**
Spikelet 1.5–7.0(–10.0) mm long . . . . . 169
169. Lemma entire, rarely minutely emarginate . . . . . **Tribolium**
Lemma lobed or emarginate . . . . . 170
170. Lemma awn 1.0–1.5 mm long . . . . . **Tribolium**
Lemma awn or mucro less than 1 mm long . . . . **Schismus**
171(110). Spikelets in pairs, usually one sessile and the other pedicelled, these differing in form and sex, sometimes unequally pedicelled and similar in form and sex; pedicels free or fused and ± discernible . . . . . 172
Spikelets apparently solitary, in pairs or clusters, similar in form and sex . . . . . 175
172. Annuals; internodes fused to adjacent pedicels, pedicels hardly discernible; basal sheaths usually with irritant hairs . . . . . **Rottboellia**
Perennials; pedicels discernable; basal sheaths without irritant hairs . . . . . 173
173. Inflorescence of a number of branches ± adpressed to central axis; callus with tawny hairs half as long as to longer than spikelet . . . . **Eriochrysis**
Inflorescence a single raceme; hairy callus present or absent, hairs white to silver, usually less than half as long as spikelet . . . . . 174
174. Lower glume winged, without oil streaks along keels; spikelet and callus glabrous; rachis joints transverse; callus truncate, with peg . . . . . **Coelorachis**
Lower glume wingless, usually with oil streaks along keels; spikelet and callus hairy (sometimes sparsely so); rachis joints oblique; callus cuneate, without peg . . . . . **Elionurus**
175(171). Inflorescence white to silvery due to long silky hairs from callus and glumes which almost conceal spikelets . . . . . **Imperata**
Inflorescence glabrous or hairy, hairs not long and silky, not concealing spikelets . . . . . 176
176. Lower 1 or 2 florets sterile, male or reduced; upper floret bisexual . . . . . 177
Florets 2–many, all bisexual or upper reduced . . . . . 184
177. Florets 3 per spikelet . . . . . 178
Florets 2 per spikelet . . . . . 179
178. Lower sterile florets usually larger than upper bisexual floret, sometimes lowest floret very small and reduced; glumes 5-nerved . . . . . **Ehrharta**
Lower sterile florets very small to more than half as long as upper bisexual floret; glumes 3-nerved . . . . . ***Phalaris**
179(177). Inflorescence a single cylindrical raceme; spikelets sunk into rachis; upper bisexual lemma less firm in texture than glumes . . . . . **Oxyrachis**
Inflorescence a contracted panicle or a number of racemes scattered up along central axis (racemes, not spikelets, may be sunk into central axis); upper bisexual lemma usually similar to, to firmer in texture than glumes . . . . . 180
180. Upper lemma hairy . . . . . **Entolasia**
Upper lemma glabrous . . . . . 181
181. Inflorescence of a number of racemes scattered up along central axis . . . . . 182
Inflorescence a contracted panicle, sometimes cylindrical . . . . . 183
182. Spikelet glabrous, abaxial to rachis. . . **Paspalidium**
Spikelet hispid or hispidulous, adaxial to rachis . . . . . **Echinochloa**
183(181). Upper glume and lower lemma hairy, hairs in tufts or fringes; upper glume not gibbous; spikelet 7 mm long . . . . . **Leucophrys**
Upper glume and lower lemma glabrous; upper glume gibbous; spikelet 1.3–4.5 mm long . . . . . **Sacciolepis**
184(176). Glumes shorter than spikelet . . . . . 185
Glumes as long as to longer than spikelet . . . 191
185. Glumes 1-nerved, rarely 3-nerved; lemma 3-nerved . . . . . 186
Glumes 3–7-nerved; lemma 5–9-nerved . . . 190
186. Plants prickly . . . . . 187
Plants not prickly . . . . . 188
187. Plant woody; central axis of inflorescence very stout and stiff, resembling culms, often ending in a pungent point, inflorescence sparse; lemma glabrous or very shortly hairy; glumes ± equal . . . . **Cladoraphis**
Plants not woody; inflorescence not very stout and stiff usually ending in a spikelet or soft point, inflorescence dense; lemma with silky hairs on lower part of nerves; glumes unequal . . . . . **Odyssea**
188(186). Lemma hairy all over with long hairs . . . . **Stiburus**
Lemma glabrous or hairs present on nerves only . . . . . 189
189. Lemma lanceolate to ovate-lanceolate; inflorescence resembling a herring bone due to numerous stiff side branches . . . . . **Pogonarthria**
Lemma ovate, elliptic to oblong; inflorescence not resembling a herring bone . . . . . **Eragrostis**
190(185). Lemma awnless or muticous, or awn straight and less than 1 mm long, or longer then basal part twisted and lobes awned . . . . . **Schismus**
Lemma awnless or muticous or awn more than 1 mm long, straight or basally twisted but lobes awnless . . . . . **Tribolium**
191(184). Florets 2 per spikelet . . . . . 191
Florets 3–many per spikelet . . . . . 195
192. Lower glume 1-nerved . . . . . 193
Lower glume 3–8-nerved . . . . . 194
193. Lemma entire, keeled; glumes minutely to long-hairy on keels . . . . . **Fingerhuthia**
Lemma lobed, rounded on back; glumes glabrous or puberulous all over . . . . . **Pentameris**
194(192). Glumes rounded at apex . . . . . **Pentameris**
Glumes acute to acuminate at apex . . . **Tribolium**
195(191). Spikelet strongly laterally compressed; glumes 1-nerved . . . . . **Fingerhuthia**
Spikelet laterally to not noticeably compressed; glumes 3–7-nerved . . . . . 196
196. Lemma awnless or muticous, or awn straight and less than 1 mm long, or longer then basal part twisted and lobes awned . . . . . **Schismus**
Lemma awnless or muticous or awn more than 1 mm long, straight or basally twisted but lobes awnless . . . . . **Tribolium**

## Key 5 (Inflorescence a panicle or raceme, or with spike-like branches scattered up the central axis)

1. Lemma 5- or more-awned . . . . . 2
Lemma awnless, or less than 5-awned . . . . . 4
2. Lemma with two side nerves produced into large flat awns, other nerves excurrent into smaller

awns; lemma not deeply cleft, becoming distinctly indurated; callus absent; palea apically notched . . . . . **Kaokochloa**
Lemma nerves excurrent into thin awns or awns alternating with awnless lobes, awns not large and flat; lemma deeply cleft, not becoming indurated; callus short; palea entire . . . . . 3
3. Lemma 5-awned, awns scabrid, alternating with hyaline lobes . . . . . **Schmidtia**
Lemmas 9-awned, awns plumose or scabrid, not alternating with hyaline lobes . . . . **Enneapogon**
4(1). Leaf blade with cross venation (usually more conspicuous on lower surface) . . . . . 5
Leaf blade without obvious cross venation . . . . 10
5. Inflorescence of 2–6 racemes or fascicles of spikelets scattered up central axis; florets 2, lower floret sterile or male, upper floret bisexual . . . . . 6
Inflorescence an open or contracted panicle; florets 1–many, all bisexual or upper reduced and sterile . . . . . 7
6. Lower glume awnless; upper glume gibbous, longer than spikelet . . . . . **Pseudechinolaena**
Lower glume awned; upper glume not gibbous, shorter than spikelet . . . . . **Oplismenus**
7(5). Leaf blade pseudopetiolate; male and female spikelets on same inflorescence (males below females, or on lower parts of panicle); female spikelets with 1 floret, lower glume drawn out into an awn up to 20 mm long; male spikelets with lemma awned; plants woody . . . . . **Olyra**
Leaf base not pseudopetiolate; spikelets all alike on inflorescence; glumes and lemmas awnless or with short mucro or awn; plants usually herbaceous . . . . . 8
8. Floret 2 per spikelet; lower floret male or sterile, upper floret bisexual; upper glume 5-nerved; upper lemma entire, indurated, shining . . . . . **Panicum**
Florets many per spikelet; florets all alike in function or upper sterile, and often smaller; upper glume 3- or 4-nerved; lemma shortly 2-lobed or emarginate, not becoming indurated; spikelet laterally compressed . . . . . 9
9. Glumes 1-nerved . . . . . **Glyceria**
Glumes 4-nerved . . . . . **Megastachya**
10(4). Ligule absent; florets 2 per spikelet, upper lemma indurated . . . . . **Echinochloa**
Ligule present (may be absent in some leaves); florets 1–many, upper lemma may or may not be indurated . . . . . 11
11. Ligule an unfringed membrane (sometimes minutely or sparsely ciliolate or fimbriate) . . . . . 12
Ligule a fringe of hairs or a fringed membrane . . . . . 116
12. Spikelet unconventional and hard to interpret; glumes absent or very reduced or specialised . . . . . 13
Spikelet conventional; glumes, at least upper one, usually present . . . . . 15
13. Florets apparently 1 per spikelet (sterile lemmas suppressed); glumes absent or reduced to rim, lemma boat-shaped, keels rigidly ciliate . . . . . **Leersia**
Florets 3 per spikelet; lower florets sterile and reduced to lemmas; glumes absent or very reduced or joined, forming a cup . . . . . 14
14. Bisexual floret with lemma not strongly keeled, membranous to chartaceous; leaves heterophyllous, some leaves clinging by retrorsely scabrid blade margins; climbing forest grasses; lemma awnless; caryopsis longitudinally grooved . . . . . **Prosphytochloa**
Bisexual floret with lemma strongly keeled, coriaceous; leaves not heterophyllous; not climbing forest grasses; lemma long-awned (awn 10–160 mm long); caryopsis not grooved . . . . . **Oryza**
15(12). Floret 1 per spikelet . . . . . 16
Florets 2 or more per spikelet . . . . . 26
16. Glumes shorter than spikelet . . . . . 17
Glumes ± as long as to longer than spikelet . . . 18
17. Lemma awnless; spikelet 2.5–4.0 mm long; rachilla extension not present; plants of wet areas in high altitude grassland . . . . . **Catabrosa**
Lemma awned, awn long and straight; spikelet 7–9 mm long; rachilla extension present; forest grass . . . . . **Festuca**
18(16). Lemma less firm to similar in texture to glumes, not becoming indurated . . . . . 19
Lemma firmer in texture than glumes, becoming indurated . . . . . 22
19. Callus beaded with conspicuous white hairs longer than lemma; plant tall, robust . . . . . **Calamagrostis**
Callus absent, if present, then glabrous or hairy, hairs inconspicuous, up to half as long as lemma; plant small, slender . . . . . 20
20. Spikelet falling with glumes; lemma awnless or awned, central awn arising at or near apex . . . . . **Polypogon**
Spikelet disarticulating above glumes; lemma awnless or awned, central awn arising well below apex or at base . . . . . 21
21. Inflorescence a panicle with spikelets not secund on branches; lemma not keeled . . . . . **Agrostis**
Inflorescence of one-sided racemes scattered along central axis due to spikelets being secund on branches; lemma keeled . . . . . **Leptochloa**
22(18). Lemma apex fuse into a crown; if crown not obvious then lemma and spikelet gibbous . . . . . ***Nassella**
Lemma apex without crown . . . . . 23
23. Callus blunt . . . . . 24
Callus pungent . . . . . 25
24. Lemma apex with a pappus or plume of hairs 4–8 mm long . . . . . ***Jarava**
Lemma apex without plume or pappus, and hairs less the 3 mm long . . . . . **Stipa**
25(23). Spikelet 12–16 mm long (excluding awns) . . . . **Stipa**
Spikelet 9–10 mm long (excluding awns) . . . . . ***Austrostipa**
26(15). Florets 2 per bisexual spikelet; rachilla extension present or absent . . . . . 27
Florets more than 2 per bisexual spikelet . . . . 72
27. Spikelets paired (terminal spikelets often in triads), usually dissimilar in function, one sessile and the other pedicellate, sometimes pedicel without a spikelet, or spikelets unequally pedicelled . . . . 28
Spikelets solitary, paired or in groups, all similar in function . . . . . 30
28. Lower glumes with 1–3 pits; pedicels and internodes longitudinally grooved with a translucent median line . . . . . **Bothriochloa**
Lower glume without pits; pedicels and internodes not grooved with a translucent median line . . . . . 29
29. Pedicelled spikelets all awnless . . . . . **Sorghum**
Pedicelled spikelets usually reduced to pedicels, sometimes some pedicels bear awned spikelets similar to sessile ones on same inflorescence . . . . . **Sorghastrum**
30(27). Lower floret male or sterile; upper bisexual . . . . 31
Both florets bisexual or upper male, sterile or reduced . . . . . 44

31. Lower floret with stout, geniculate awn from lower third of lemma . . . . . *__Arrhenatherum__
Lower floret awnless or, if awned, awn not geniculate . . . . . 32
32. Upper glume gibbous . . . . . 33
Upper glume not gibbous . . . . . 34
33. Glumes very unequal in size, distinctly ribbed, upper glume without rigid hairs developing after fertilisation; spikelet 2.5–3.5 mm long . . . . . __Sacciolepis__
Glumes ± equal in size, not distinctly ribbed, upper glume with rigid hairs developing after fertilisation; spikelet 3.5–5.0 mm long . . . . . __Pseudechinolaena__
34(32). Upper lemma awned . . . . . 35
Upper lemma awnless or mucronate . . . . . 37
35. Spikelets solitary; glumes similar; spikelet light brown to black . . . . . __Cleistachne__
Spikelets paired; glumes very dissimilar; spikelet pale-coloured . . . . . 36
36. Spikelets unequally pedicellate; lower glume flattened on back; inflorescence a panicle; plants robust, tufted . . . . . __Miscanthus__
Spikelets: one sessile and the other pedicelled; lower glume with broad median groove; inflorescence of spike-like racemes along central axis; plants delicate, usually rambling or creeping . . . . . *__Microstegium__
37(34). Spikelet surrounded by an involucre of long, spreading hairs from callus . . . . . __Miscanthus__
Spikelet not obviously surrounded by involucre of long, spreading hairs from callus or callus glabrous or absent . . . . . 38
38. Lower glume conspicuously awned . . .__Oplismenus__
Lower glume awnless or minutely awned . . . . 39
39. Upper lemma margins lying flat and enclosing palea . . . . . 40
Upper lemma margins inrolled and clasping palea edges . . . . . 41
40. Lower glume up to a quarter of length of spikelet . . . . . __Digitaria__
Lower glume two-thirds of length of spikelet . . . . . __Tarigidia__
41(39). Inflorescence a panicle, open or condensed . . . 42
Inflorescence of spike-like racemes scattered along the central axis . . . . . 43
42. Lower floret palea hard and inflated at maturity . . . . . *__Steinchisma__
Lower floret palea not hard and inflated at maturity . . . . . __Panicum__
43(41). Lower glume adaxial (adjacent to rachis; sometimes difficult to see); lower glume well developed . . . . . __Brachiaria__
Lower glume abaxial (turned away from rachis), sometimes lower glume absent but spikelet still turned in this position; lower glume absent or scale-like, rarely up to half as long as spikelet . . . . . __Paspalum__
44(30). Lemmas all awnless . . . . . 45
Lemmas all, or at least one in spikelet, awned or mucronate . . . . . 53
45. Spikelet large, 7–45 mm long; ovary pilose; glumes as long as to longer than spikelet . . . . . *__Avena__
Spikelet small, up to 8 mm long; ovary glabrous; glumes shorter than to rarely ± as long as spikelet . . . . . 46
46. Lemma distinctly keeled on back, at least near base . . . . . 47
Lemma rounded on back, at least at base (sometimes keeled on all nerves) . . . . . 49
47. Spikelet 3.0–6.0 mm long; lemma 5–7(11)-nerved . . . . . __Poa__
Spikelet 1.0–3.5 mm long; lemma 3-nerved . . . 48
48. Inflorescence a panicle, dense, divaricately branched; stamens 2 . . . . . __Diandrochloa__
Inflorescence of spike-like racemes scattered along central axis; stamens 3 . . . . . __Leptochloa__
49(46). Glumes ± equal in size . . . . . 50
Glumes unequal in size . . . . . 51
50. Glumes shorter than spikelet; internodes elongated between florets . . . . . *__Periballia__
Glumes ± as long as spikelet; internodes not elongated between florets . . . . . *__Aira__
51(49). Annuals; lower glume minute, scale-like to almost absent, 0-nerved; spikelet 2–3 mm long . . . . . *__Sphenopus__
Perennials; lower glume well developed, 1–3-nerved; spikelet 3–20 mm long . . . . . 52
52. Lemma 1–3 mm long, tips scarious, obtuse or blunt, often ragged . . . . . __Puccinellia__
Lemma 3.5–11.0 mm long, tips firm, acute . . . . . __Festuca__
53(44). Lemma awn with ring of hairs at junction of twisted column and clavate limb . . . . . *__Corynephorus__
Lemma mucronate or awned, awn without a ring of hairs or clavate limb . . . . . 54
54. Lower lemma awnless; upper lemma with short hooked awn from back near apex; spikelets falling with glumes . . . . . __Holcus__
Lemmas all similar, all awned or mucronate (upper lemmas may be reduced); spikelets disarticulating above glumes . . . . . 55
55. Annuals . . . . . 56
Perennials . . . . . 61
56. Spikelet 18–46 mm long . . . . . *__Avena__
Spikelet 1.9–14.0 mm long . . . . . 57
57. Glumes shorter than spikelet . . . . . 58
Glumes as long as to longer than spikelet . . . . 59
58. Lemma minutely awned or mucronate; upper glume keeled . . . . . __Leptochloa__
Lemma awn long and obvious; upper glume rounded on back . . . . . *__Vulpia__
59(57). Lemma awn geniculate or at least slightly bent . . . . . *__Aira__
Lemma mucronate or awned, awn straight . . . 60
60. Lemma with long, obvious hairs on margins; glume apices straight; lemma with a fine bristle-like awn, rounded on back . . . . . __Trichoneura__
Lemma pilose around lower half of midrib, or glabrous; glumes with caudate curving tips; lemma mucronate, keeled . . . . . __Dinebra__
61(55). Awn of lemma, at least of lower lemma, much longer than body of lemma . . . . . 62
Awn of lemma shorter than, to equal to body of lemma, rarely slightly longer than lemma or mucronate . . . . . 65
62. Awn of lemma very long and flexuous, intertwining with awns from other florets, resulting in spikelet falling as a unit . . . . . __Streblochaete__
Awn of lemma stiff, not flexuous and intertwining with awns of other florets for spikelet to fall as a unit . . . . . 63
63. Spikelet 3–6 mm long; ovary glabrous . . . . . *__Deschampsia__
Spikelet 7–30 mm long; ovary hairy . . . . . 64
64. Lower lemma with central awn from upper third of back; lemma awns all similar . . . . __Helictotrichon__
Lower lemma with central awn from lower third of back; lemma awns differ in same spikelet . . . . . *__Arrhenatherum__
65(61). Glumes unequal in size . . . . . 66
Glumes ± equal in size . . . . . 69

66. Spikelet 5–20 mm long . . . . . 67
Spikelet 2–4 mm long . . . . . 68
67. Lemma rounded on back, at least near base; inflorescence not lobed, spikelets not in dense one-sided clusters . . . . . **Festuca**
Lemma strongly keeled; inflorescence lobed with dense clusters of spikelets crowded on one side at ends of branches . . . . . ***Dactylis**
68(66). Inflorescence a dense, contracted panicle; spikelet 3.5–4.0 mm long; membranous palea projecting out of mature florets; lemma entire . . . . **Koeleria**
Inflorescence open, of numerous racemes scattered along elongated central axis; lemma 2-lobed . . . . . **Leptochloa**
69(65). Inflorescence lobed, dense clusters of spikelets crowded on one side at ends of branches . . . . . ***Dactylis**
Inflorescence open or contracted, not lobed . . . 70
70. Inflorescence of racemes scattered along central axis; spikelet 5.5–9.0 mm long . . . . . **Bewsia**
Inflorescence a panicle; spikelet 3–6 mm long . . . . . 71
71. Inflorescence open; lemma awned from near base, rounded on back . . . . . ***Deschampsia**
Inflorescence contracted; lemma awned or mucronate from apex or just below, keeled . . . . . **Koeleria**
72(26). Florets 3, lower 2 sterile or male (often reduced to lemma only), upper floret bisexual . . . . . 73
Florets 3 or more, if 3 then lower floret bisexual and uppermost sterile or reduced . . . . . 75
73. Glumes reduced to minute lips, separated from florets by a stipe . . . . . ***Microlaena**
Glumes conventional, lower sometimes shorter than upper or reduced, not separated from florets by a stipe . . . . . 74
74. Upper glume 5-nerved; lower two lemmas usually similar, awnless or tapering into awns, (sometimes only 1-awned) . . . . . **Ehrharta**
Upper glume 3-nerved; first lemma awned from above middle of back, awn usually straight; second lemma awned from near base, awn often robust, twisted in lower part . . . . . **Anthoxanthum**
75(72). Lemma as broad as long, gibbous and cordate at base; lemma 7–9-nerved . . . . . ***Briza**
Characters not in same combination as for *Briza* . . . . . 76
76. Lemma awnless . . . . . 77
Lemma awned or mucronate (sometimes minutely so) . . . . . 93
77. Spikelet 1.0–3.5 mm long . . . . . 78
Spikelet 4–90 mm long . . . . . 83
78. Lemma 5–many-nerved; upper glume usually 3-nerved . . . . . 79
Lemma 3-nerved; upper glume 1-nerved, 1–3-nerved in *Koeleria* . . . . . 80
79. Glumes ± equal in size, rarely unequal, keeled . . . . . **Poa**
Glumes very unequal in size, not keeled . . . . . **Puccinellia**
80(78). Inflorescence of racemes scattered along central axis . . . . . **Leptochloa**
Inflorescence an open or contracted panicle . . . 81
81. Lemma rounded but keeled on 3 nerves; lower glume 0-nerved . . . . . ***Sphenopus**
Lemma strongly keeled; lower glume usually 1-nerved . . . . . 82
82. Annuals; spikelet 1–3 mm long; lemma 0.5–1.0 mm long . . . . . **Diandrochloa**
Perennials; spikelet 3.5–4.0 mm long; lemma 3–5 mm long . . . . . **Koeleria**
83(77). Lemma distinctly and strongly keeled . . . . . 84
Lemma rounded on back, at least at base or keelless . . . . . 85
84. Palea thinner in texture than lemma; lemma 3-nerved; glumes as long as to longer than spikelet . . . . . **Koeleria**
Palea similar in texture to lemma; lemma 5–many-nerved; glumes shorter than spikelet **Poa**
85(83). Upper glume 1-nerved . . . . . 86
Upper glume 3–11-nerved . . . . . 87
86. Spikelet laterally compressed; lemma acute and entire . . . . . **Festuca**
Spikelet ± terete or dorsiventrally to not noticeably compressed; lemma ± truncate or 2-lobed . . . . . **Leptochloa**
87(85). Glumes unequal in size . . . . . 88
Glumes ± equal in size . . . . . 91
88. Upper florets reduced to lemmas, these form a terminal club-shaped appendage; lower lemmas with long silky hairs . . . . . **Melica**
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90. Plant 100–650 mm high; leaf blade 1–4 mm wide . . . . . **Puccinellia**
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93(76). Lemma with flexuous awn up to 3 times longer than body of lemma, all awns of a spikelet twisting together and spikelet falling as a unit . . . . . **Streblochaete**
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94. Lemma awned, awn geniculate . . . . . 95
Lemma mucronate or awned, awn straight . . . . 96
95. Glumes as long as to longer than spikelet; annuals; lemma similar in texture to glumes . . . . . ***Avena**
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98. Lemma awn more than half as long as body of lemma . . . . . 99
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99. Spikelet 6–20 mm long; annuals; glumes rounded on back . . . . . ***Vulpia**
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105(103). Spikelet 6–20 mm long; glumes usually much shorter than adjacent lemmas; lemma rounded on back, at least at base . . . . . **Festuca**
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107. Spikelet 3–4 mm long; lemma mucronate or awned, awn minute . . . . . **Koeleria**
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121. Lemma similar in texture to glumes; upper glume not to slightly 1-keeled; inflorescence a panicle; upper glume 0 to slightly 1-keeled. . . .**Sporobolus**
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123. Inflorescence open with racemes scattered up along central axis; glumes ± equal; lemma less firm in texture than glumes . . . **Craspedorhachis**
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Inflorescence dense and racemes adpressed to central axis; glumes very unequal; lemma similar in texture to glumes . . . . . **Polevansia**
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129. Spikelet 10–18 mm long; lemma incised; inflorescence large, plumose with many spikelets; large tussock-forming plant up to 4 m tall; lemma awn-like, long drawn-out to a filiform tip. . ***Cortaderia**
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130. Lemma exposed; upper glume rounded on back, keel-less . . . . . **Willkommia**
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132. Awns of lemma all or only central one plumose (*S. anomala* with awn solitary and with a pencil of hairs at base of column); palea indurated . . . . . **Stipagrostis**
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Upper glume 1(3)-nerved; lower glume nearly always 1-nerved; glumes 1-keeled to middle or below; awns not spirally contorted at base; caryopsis not deeply grooved . . . . . **Aristida**

134(118). Spikelets in triads; pedicels entirely or partly fused mimicking a single spikelet; spikelet long-awned; 2 florets per spikelet . . . . . **Tristachya**
Spikelets solitary, paired, clustered or in triads but then pedicels free; spikelet awned or awnless; with 2–many florets . . . . . 135

135. Florets 2 per spikelet . . . . . 136
Florets 3–many per spikelet . . . . . 194

136. Lemma of bisexual spikelet less firm in texture than glumes; spikelets usually paired, one sessile and the other pedicellate and dissimilar in form and function, or in triads, rarely paired or solitary and similar in form and function . . . . . 137
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137. Spikelets solitary or in pairs, equally or unequally pedicelled (maybe reduced to pedicel only), or sessile; spikelets of pairs similar in form and sexuality . . . . . 138
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138. Lowest floret male or sterile . . . . . 139
Lowest floret bisexual . . . . . 140

139. Glumes very unequal in size; lower lemma resembling upper glume . . . . . **Melinis**
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140(138). Plants reed-like; inflorescence a large plumose panicle . . . . . ***Arundo**
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141. Glumes 1-nerved, awned; lemma 3-nerved, minutely toothed . . . . . **Dinebra**
Glumes 3–7-nerved, awnless; lemma 5–7-nerved, entire . . . . . **Tribolium**

142(137). Pedicelled spikelet absent, reduced to a pedicel or glume (occasionally with a spikelet on same inflorescence) . . . . . **Sorghastrum**
Spikelets all present . . . . . 143

143. Spikelets in triads, middle spikelet sessile, two lateral spikelets pedicelled . . . . . **Chrysopogon**
Spikelets usually in pairs, but terminal spikelets often in triads . . . . . 144

144. Pedicels and internodes with a longitudinally grooved translucent line; glumes of sessile spikelet usually with pits . . . . . **Bothriochloa**
Pedicels and internodes without a grooved translucent line; glumes of sessile spikelet without pits . . . . . 145

145. Sessile spikelet compressed laterally; inflorescence of many slender, spike-like racemes in whorls on central axis; lower glume of sessile spikelet spinulose . . . . . **Vetiveria**
Sessile spikelet compressed dorsiventrally; inflorescence an open or dense panicle or of spike-like racemes scattered, not whorled, along central axis and densely adpressed to central axis; lower glume of sessile spikelet not spinulose . . . . . 146

146. Inflorescence a large, usually open panicle; sessile spikelet usually long-awned; pedicelled spikelet male or sterile, sometimes reduced to a glume . . . . . **Sorghum**
Inflorescence of spike-like racemes ± adpressed up central axis; sessile spikelet awnless; pedicelled spikelet female only . . . . . **Eriochrysis**

147(136). Lower floret male or sterile, usually reduced to a lemma; upper floret bisexual . . . . . 148
Both florets bisexual or upper sterile . . . . . 175

148. Spikelet supported on a bead-like swelling . . . . . **Eriochloa**
Spikelet not supported on a bead-like swelling . . . . . 149

149. Upper lemma awned or mucronate (either can be minute) . . . . . 150
Upper lemma awnless or apiculate . . . . . 164

150. Upper lemma entire . . . . . 151
Upper lemma incised (sometimes minutely lobed or emarginate) . . . . . 158

151. Inflorescence a panicle . . . . . 152
Inflorescence of spike-like racemes scattered up central axis . . . . . 153

152. Upper glume and lower lemma awned; upper glume awn 3–4 times longer than body of lemma . . . . . **Oryzidium**
Upper glume and lower lemma awnless or, if awned, awn very short . . . . . **Brachiaria**

153(151). Lower glume adaxial (adjacent to rachis) . . . 154
Lower glume abaxial (turned away from rachis) or absent . . . . . 155

154. Upper palea acute with reflexed tip (needs careful dissection); spikelets usually in 4 or more rows . . . . . **Echinochloa**
Upper palea without reflexed tip; spikelets mostly in 1 or 2 rows . . . . . **Brachiaria**

155(153). Lower glume or both glumes long-awned . . . . . **Oplismenus**
Glumes awnless or with short awn point or only upper glume long-awned . . . . . 156

156. Lower glume absent . . . . . **Paspalum**
Lower glume present (sometimes very small) . . . . . 157

157. Upper lemma shorter than spikelet; upper palea obtuse, its apex not reflexed . . . . . **Urochloa**
Upper lemma ± as long as spikelet; upper palea acute, apex often briefly reflexed. . . . **Paspalidium**

158(150). Ligule a fringed membrane; upper lemma scabrid to scaberulous . . . . . **Arundinella**
Ligule a fringe of hairs; upper lemma usually hairy to glabrous or smooth, rarely scaberulous . . . 159

159. Upper lemma glabrous or hairy, hairs not in tufts . . . . . 160
Upper lemma hairy, hairs in tufts or tufts mixed with dispersed hairs . . . . . 163

160. Lower lemma 3-nerved . . . . . **Loudetia**
Lower lemma 5–9-nerved . . . . . 161

161. Callus short, oblong, rounded; spikelets ± 10 mm long . . . . . **Danthoniopsis**
Callus long, linear, bifid, pointed or pungent; spikelet 10–35 mm long . . . . . 162

162. Longest pedicel of spikelet group just over twice as long as shortest pedicel, pedicels stout . . . . . **Loudetia**
Longest pedicel of spikelet group much longer than shortest pedicel, not stout . . . . **Tristachya**

163(159). Upper lemma with 2 tufts of hairs; upper palea keels wingless; stamens 2; leaves deflexed . . . . . **Trichopteryx**
Upper lemma with 6–8 tufts of hair, sometimes tufts mixed with dispersed hairs; upper palea keels winged; stamens 3; leaves not reflexed . . . . . **Danthoniopsis**

164(149). Upper lemma hairy . . . . . **Entolasia**
Upper lemma glabrous; (maybe papillose) . . . . 165

165. Upper lemma with distinct green crest at apex . . . . . **Acroceras**

Upper lemma not crested at apex, sometimes beaked . . . . . 166

166. Lower lemma with 2 transverse fringes of long hairs on back; upper glume tapering to an awn-like apex, with 2 tufts or a continuous transverse fringe of long hairs just above middle . . . . . **Leucophrys**

Lower lemma and upper glume glabrous, hispidulous or hairy, hairs not in transverse fringes of long hairs on back above middle, tufts of short hairs sometimes present . . . . . 167

167. Inflorescence an open or condensed panicle. . 168

Inflorescence of one-sided racemes scattered up central axis, sometimes with secondary branches . . . . . 172

168. Upper lemma coriaceous to crustaceous; lower lemma entire . . . . . 169

Upper lemma cartilaginous; lower lemma emarginate or lobed . . . . . 171

169. Spikelet laterally compressed; upper glume gibbous or saccate at base . . . . . **Sacciolepis**

Spikelet ± dorsally compressed; upper glume usually not gibbous . . . . . 170

170. Lower floret palea hard and inflated at maturity . . . . . *__Steinchisma__

Lower floret palea not hard and inflated at maturity . . . . . **Panicum**

171(168). Upper floret laterally compressed; spikelet awned or awnless . . . . . **Melinis**

Upper floret dorsally compressed; spikelet awnless or minutely mucronate . . . . . **Tricholaena**

172(167). Spikelet hispidulous; upper palea acute, tip reflexed, slightly protuberant (needs careful dissection) . . . . . **Echinochloa**

Spikelet hairy or glabrous; upper palea obtuse or acute but then tip not reflexed . . . . . 173

173. Lower glume awned . . . . . **Oplismenus**

Lower glume awnless or glume absent . . . . . 174

174. Spikelet abaxial (lower glume turned away from rachis); lower glume usually absent, rarely up to half as long as spikelet . . . . . **Paspalum**

Spikelet adaxial (lower glume turned towards rachis); lower glume present . . . . . **Brachiaria**

175(147). Spikelet awnless, 1.5–8.0 mm long (sometimes glumes and/or lemmas so long-acuminate as to appear awned) . . . . . 176

Spikelet awned or mucronate, if awnless then 10–18 mm long (lemma sometimes awn-like) . . . . . 181

176. Glumes with long, glassy hairs; lemma with fringe of hairs on margins . . . . . **Tribolium**

Glumes glabrous or hairy, hairs not long and glassy; lemmas glabrous or hairy, hairs not in fringes on margins . . . . . 177

177. Spikelet up to 2.5 mm long . . . . . **Eragrostis**

Spikelet 3–7 mm long . . . . . 178

178. Spikelet dorsiventrally compressed. . . **Leptochloa**

Spikelet laterally compressed . . . . . 179

179. Glumes ± as long as to much longer than spikelet; lemma 2-lobed, dorsally rounded. . . **Pentameris**

Glumes much shorter than spikelet; lemma entire, keeled . . . . . 180

180. Inflorescence a panicle; upper glumes usually 3-nerved; lemma 5–7(–11)-nerved . . . . . **Poa**

Inflorescence of spike-like racemes scattered up central axis (often resembling a herring-bone); upper glume 1-nerved; lemma 3-nerved . . . . . **Pogonarthria**

181(175). Lower lemma awnless; upper lemma (sterile floret) awned with short stout hooked dorsal awn . . . . . **Holcus**

Lower lemma or both lemmas awned or mucronate, if upper lemma awned, awn not hooked . . . . . 182

182. Lemma mucronate . . . . . **Dinebra**

Lemma awned (lower lemma sometimes awnless) . . . . . 183

183. Pedicel articulated a distance below spikelet, beaded with long hairs at articulation point, spikelet and part of pedicel falling as a whole; callus hairy, pungent; glumes as long as or longer than spikelet . . . . . **Chaetobromus**

Character combination not precisely as for *Chaetobromus* . . . . . 184

184. Central awn of lemma short and straight, shorter than body of lemma or lemma apex awn-like . . . . . 185

Central awn of lemma geniculate, usually longer than body of lemma . . . . . 189

185. Glumes markedly shorter than spikelet . . . . 186

Glumes as long as to longer than spikelet . . . 187

186. Lemma incised, 3-lobed at apex, hairy; basal sheaths split, forming a hard fibrous base . . . . . **Styppeiochloa**

Lemma entire, glabrous; basal sheaths not splitting into fibrous base . . . . . **Pogonarthria**

187(185). Inflorescence a non-plumose panicle, 170–270 mm long . . . . . **Merxmuellera**

Inflorescence a plumose panicle, 300–800 mm long . . . . . 188

188. Plants reed-like, woody; leaves mainly on culm; plants with all spikelets bisexual; ligule a short, fringed membrane; glumes 3–5 mm long . . . . . *__Arundo__

Plants forming huge tussocks; leaves mainly basal; plants either with all spikelets bisexual or exclusively gynodioecious; ligule a fringe of hairs; glumes 1(–3) mm long . . . . . *__Cortaderia__

189(184). Ovary apex hairy; fruit an achene . . . **Pentameris**

Ovary apex glabrous; fruit a caryopsis . . . . . 190

190. Glumes 15–60 mm long; lemma firmer in texture than glumes . . . . . **Pseudopentameris**

Glumes 2–12(–30) mm long; lemma similar in texture to glumes . . . . . 191

191. Lemma glabrous, if hairy, then hairs not in tufts (if plant tall and reed-like see *Capeochloa arundinacea*) . . . . . **Pentameris**

Lemma hairy, hairs in tufts . . . . . 192

192. Lemma back hair tufts 5–7 mm long, most basal and marginal tuft shorter, rest of lemma sparsely hairy . . . . . **Merxmuellera**

Lemma back hair tufts up to 3.5 mm long, rest of lemma glabrous . . . . . 193

193. Leaf blade cylindrical, apex pungent, adaxial groove present; plant up to 300 mm; from Namibia . . . . . **Ellisiochloa**

Leaf involute or permanently folded, apex hard, not pungent; plant usually taller than 300 mm; not from Namibia . . . . . **Merxmuellera davyi**

194(135). Florets 3 per spikelet, lower 2 sterile, often reduced to lemmas; upper floret bisexual . . . . 195

Florets 3–many per spikelet, all bisexual or upper male, sterile or reduced, or lower 2 and uppermost sterile or reduced, in between florets bisexual, rarely only male or female . . . . . 196

195. Callus present, hairy; glumes reduced to minute lips, separated from florets by a stipe . . . . . *__Microlaena__

Callus absent; glumes of variable length, not reduced to lips, nor separated from florets by a stipe . . . . . **Ehrharta**

196(194). Pedicel articulated a distance below spikelet, bearded with long hairs at articulation point, spikelet and part of pedicel falling as a whole; callus pungent, hairy; glumes as long as to longer than spikelet; spikelet 9–18 mm long . . . . . **Chaetobromus**
Character combinations not precisely as for *Chaetobromus* . . . . . 198
197. Plants reed-like; leaves mainly cauline . . . . . 198
Plants not reed-like . . . . . 200
198. Spikelet awned, awn geniculate or bent and lower part usually twisted . . . . . **Capeochloa**
Spikelet awned or awnless, awn straight . . . . 199
199. Glumes very unequal in size, shorter than spikelet; lemma glabrous (but enveloped by long hairs from callus); mature inflorescence branches flexible, usually drooping . . . . . **Phragmites**
Glumes ± equal in size, as long as spikelet; lemma long-hairy; mature inflorescence branches stiff and ascending . . . . . ***Arundo**
200(197). Lemma with an incurved, emarginate apex and a narrow, awned lobe at each margin, sometimes with 1 or 2 shorter, additional lobes, lateral awns long . . . . . **Kaokochloa**
Characters not as for *Kaokochloa* . . . . . 201
201. Central awn of lemma geniculate or bent, lower part usually twisted . . . . . 202
Central awn of lemma short and straight, or lemma shortly mucronate or awnless . . . . . 210
202. Spikelet 4–7 mm long . . . . . 203
Spikelet 7.5–25.0 mm long . . . . . 205
203. Lemma hairs in tufts . . . . . **Tribolium**
Lemma hairs not in tufts . . . . . 204
204. Perennial; lemma densely hairy below row of hairs across back . . . . . **Tribolium**
Annual; lemma sparsely to glabrous below row of hairs across back . . . . . **Schismus**
205(202). Glumes prominently 7–11-nerved; callus obliquely pungent . . . . . **Centropodia**
Glumes 1–5(–7)-nerved; callus rounded . . . . 206
206. Glumes rounded, flat or with more than 1 keel; palea thinner in texture than lemma . . . . . **Dregeochloa**
Glumes 1-keeled to middle or below; palea similar in texture to lemma . . . . . 207
207. Basal leaf sheaths densely woolly hairy; plants geophytic . . . . . **Geochloa**
Basal leaf sheath glabrous or hairy but not densely woolly hairy; plants not geophytic . . . . . 208
208. Lemma back with hair tufts 5–7 mm long . . . . . **Ellisochloa**
Lemma back with hair tufts up to 3.5 mm long . . . . . 209
209. Hilum linear; old leaf bases usually spilt and curl away, if not then leaf margin fringed ending in marginal tuft at apex . . . . . **Merxmuellera**
Hilum dot-like; old leaf bases do not spilt and curl away, and if lemma margins fringed then a tuft of margin hairs occurs at the base . . . . . **Tenaxia**
210(201). Leaves hard, needle-like, pungent; plants prickly . . . . . 211
Leaves not needle-like; plants not prickly . . . 213
211. Central axis of inflorescence usually ending in a spine, not in spikelets, lateral branches distant as rigid spines or in clusters scattered up central axis . . . . . **Cladorhaphis**
Central axis of inflorescence ending in spikelets, inflorescence usually dense and contracted . . . . 212
212. Glumes very unequal in size, 1-nerved; lemma mucronate or with a short stout awn; long hairs on nerves . . . . . **Odyssea**
Glumes ± equal in size, 5–11-nerved; lemma 3-awned; tufts of hairs on lemma and scattered hairs between nerves . . . . . **Centropodia**
213(210). Lemma glabrous . . . . . 214
Lemma hairy or long-ciliate . . . . . 221
214. Upper glume 1-nerved . . . . . 215
Upper glume 3–7-nerved . . . . . 219
215. Glumes as long as to longer than spikelet . . . . . **Dinebra**
Glumes shorter than spikelet . . . . . 216
216. Inflorescence a large, plumose panicle; lemma apex appears awn-like . . . . . ***Cortaderia**
Inflorescence various, not large and plumose; lemma with true awn or awnless . . . . . 217
217. Upper glume and lemmas with stout awn; spikelets secund (if spikelets not secund see *Eragrostis*) . . . . . **Acrachne**
Upper glume awnless, lemmas awned, mucronate or awnless; spikelets secund or not secund . . . 218
218. Inflorescence branches not one-sided; spikelets not secund . . . . . **Eragrostis**
Inflorescence with many spike-like, one-sided racemes spreading from central axis (like a herringbone); spikelets secund . . . . . **Pogonarthria**
219(214). Lemma entire . . . . . **Eragrostis**
Lemma lobed or notched (sometimes minutely so) . . . . . 220
220. Ligule a fringe of hairs; lower glume 5–7-nerved . . . . . **Schismus**
Ligule a fringed membrane; lower glume 1–3-nerved . . . . . **Brachychloa**
221(213). Ligule a fringe of hairs . . . . . 222
Ligule a fringed membrane . . . . . 236
222. Lemma entire . . . . . 223
Lemma incised, emarginate to deeply lobed . . 227
223. Inflorescence large, plumose; lemma with long fine hairs at base reaching ± to apex of body of lemma . . . . . ***Cortaderia**
Inflorescence not large and plumose; lemma without long hairs reaching to apex of body of lemma . . . . . 224
224. Lower glume 5–7-nerved (often best observed in lower part) . . . . . **Tribolium**
Lower glume 1–3-nerved (often best observed in lower part) . . . . . 225
225. Lemma 6–11-nerved; spikelet spiny . . . . . **Entoplocamia**
Lemma 3–5-nerved; spikelet not spiny . . . . 226
226. Lowest florets bisexual, complete; lemma 3-nerved . . . . . **Eragrostis**
Lowest 2 florets reduced to lemmas; lemma 5-nerved . . . . . **Tetrachne**
227(222). Glumes unequal in size . . . . . 228
Glumes ± equal in size . . . . . 230
228. Lemma hairs short or stiff, and not obvious or glabrous . . . . . **Eragrostis**
Lemma distinctly hairy, hairs long, usually soft . . . . . 229
229. Plant base hard, dense and fibrous; lemma not deeply lobed, with hairs on margin near base, sometimes lateral nerves with short adpressed hairs . . . . . **Styppeiochloa**
Plant without fibrous base; lemma deeply lobed, with long hairs from apex to base on lateral nerves . . . . . **Triraphis**
230(227). Lemma deeply cleft . . . . . 231
Lemma not deeply cleft . . . . . 233
231. Glumes shorter than spikelet; lemma 3-nerved . . . . . **Triraphis**
Glumes as long as to longer than glumes; lemma 7–11-nerved . . . . . 232

232. Callus rounded . . . . . **Geochloa**
Callus pungent . . . . . **Centropodia**
233(230). Lemma 3-nerved . . . . . **Eragrostis**
Lemma 5–11-nerved . . . . . 234
234. Lemma 5–16 mm long . . . . . **Merxmuellera**
Lemma 1.8–3.0 mm long . . . . . 235
235. Lemma awn or mucro less than 1 mm long . . . . . **Schismus**
Lemma awn 1.0–1.5 mm long . . . . . **Tribolium**
236(221). Lemma 3-awned, awns of lobes obvious . . **Triraphis**
Lemma awnless, mucronate or 1-awned, entire or lobed, awns on lobes minute . . . . . 237
237. Lowest lemma awned, central awn more than twice as long as body of lemma . . . . . **Chloris**
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238. Upper glume 1-nerved . . . . . 239
Upper glume 3–7-nerved (often clearer on inner surface) . . . . . 240
239. Lemma saccate at base, hairs club-shaped; spikelet laterally compressed; palea shorter than lemma . . . . . **Coelachyrum**
Lemma not saccate at base, hairs acute; spikelet dorsiventrally compressed (± terete); palea ± equal to lemma . . . . . **Leptochloa**
240(238). Lemma 3-nerved . . . . . **Brachychloa**
Lemma 5–9-nerved . . . . . **Tribolium**

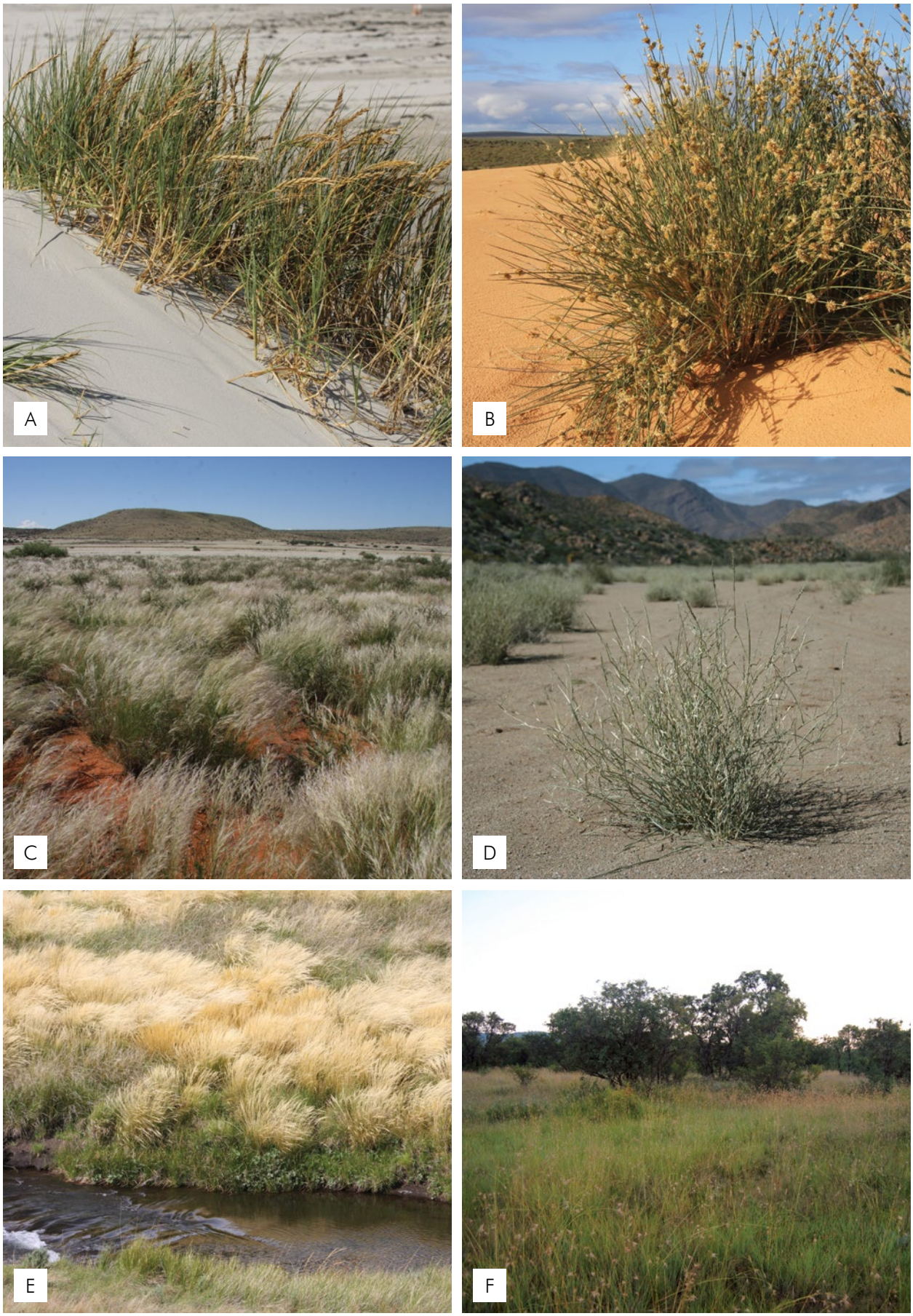



Plate 1.—Habitat. A, coastal sand dunes, *Thinopyrum distichum*; B, Kalahari sand dunes, *Cladoraphis cyperoides*; C, semi-arid, Kalahari sands, *Stipagrostis* spp.; D, semi-arid, dry river bed, *Leucophrys mesocoma*; E, high altitude mesic grasslands, *Merxmuellera macowanii*; F, Bushveld, *Themeda triandra*, dominant grass. Photographers: A–E, M. Koekemoer; F, S.P. Bester.

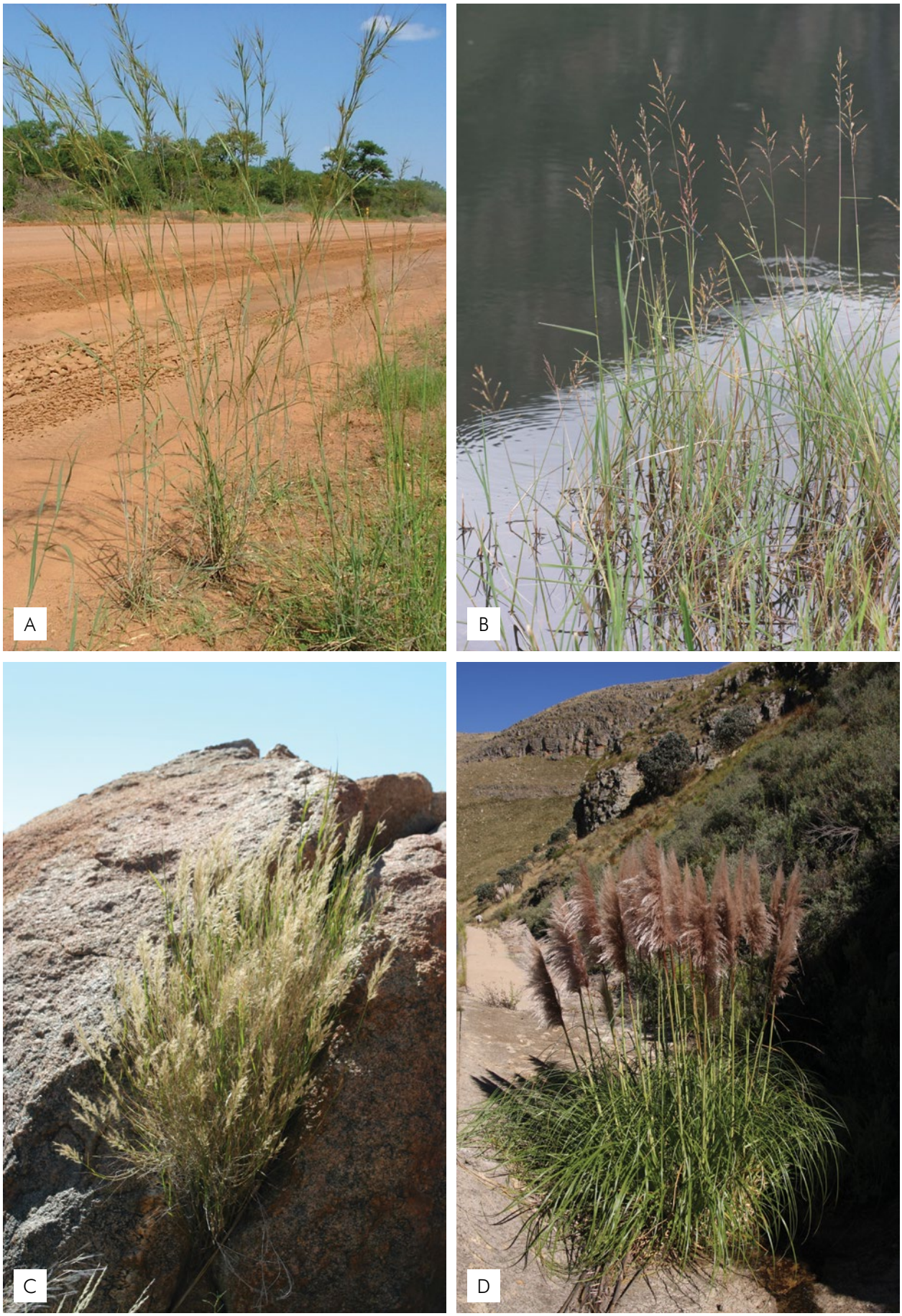



Plate 2.—Habitat. A, disturbed road side, in Bushveld, *Hyperthelia dissoluta*; B, water's edge, widespread, *Leersia hexandra*; C, rocky cliffs, semi-arid areas, *Triraphis ramosissima*; D, alien invader, *Cortaderia selloana*. Photographer: M. Koekemoer.

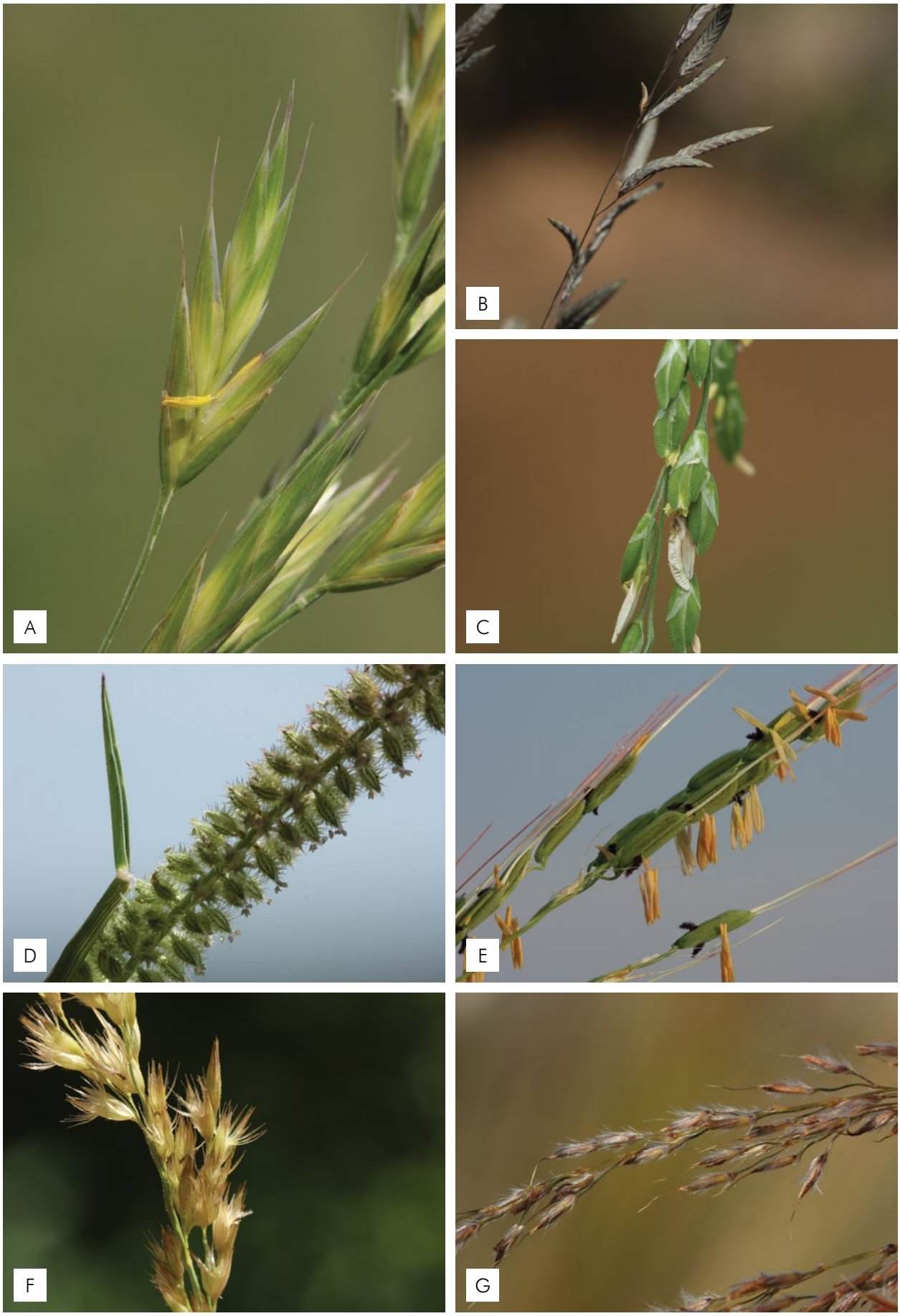



Plate 3.—Spikelets. A, *Bromus catharticus*; B, *Eragrostis inamoena*; C, *Ehrharta erecta*; D, *Tragus berteronianus*; E, *Oryza longistaminata*; F, *Enneapogon pretoriensis*; G, *Miscanthus junceus*. Photographer: M. Koekemoer.

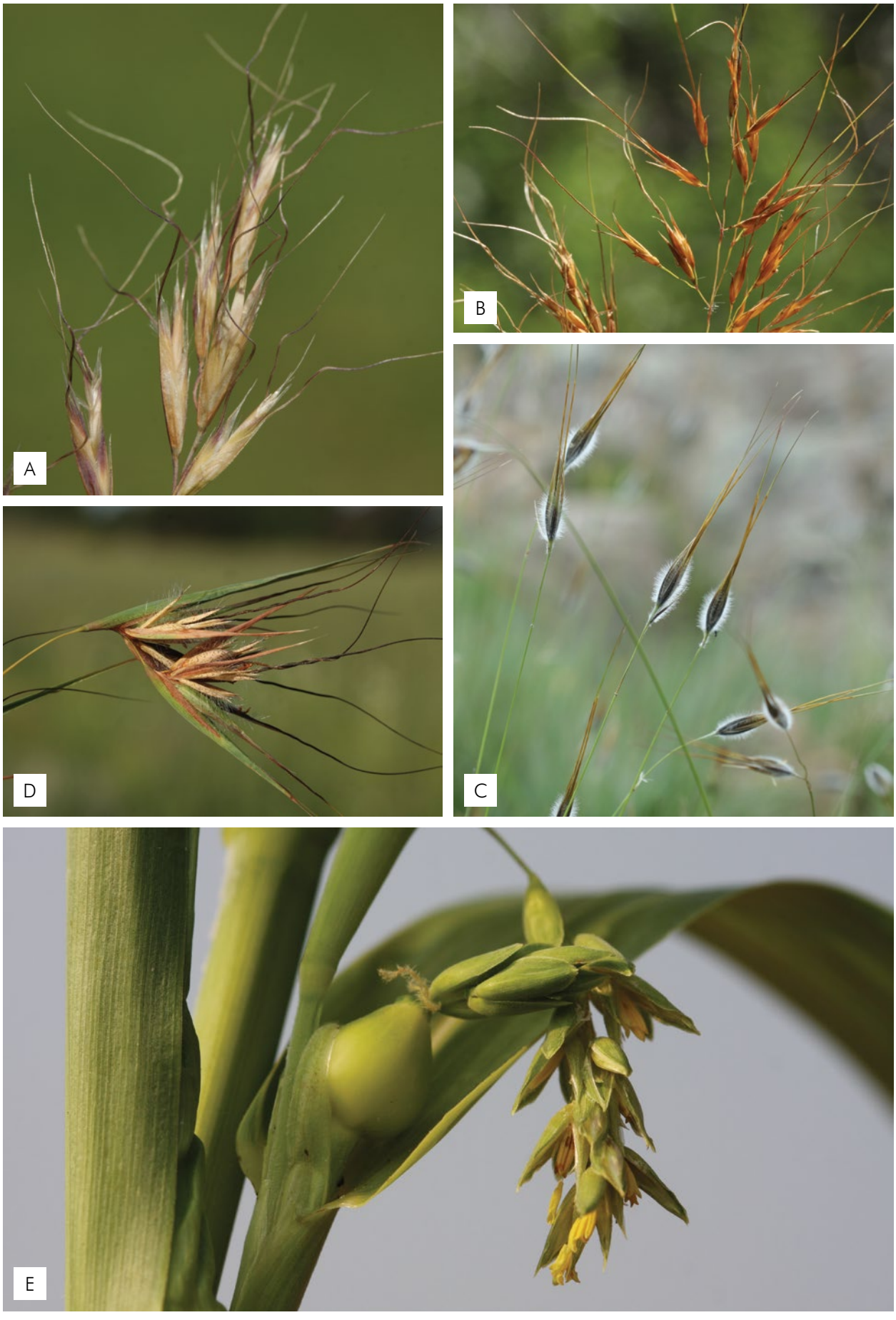



Plate 4.—Spikelets. A, *Helictotrichon turgidulum*; B, *Loudetia simplex*; C, *Tristachya leucothrix*; D, *Themeda triandra*; E, *Coix lacryma-jobi*. Photographer: M. Koekemoer.

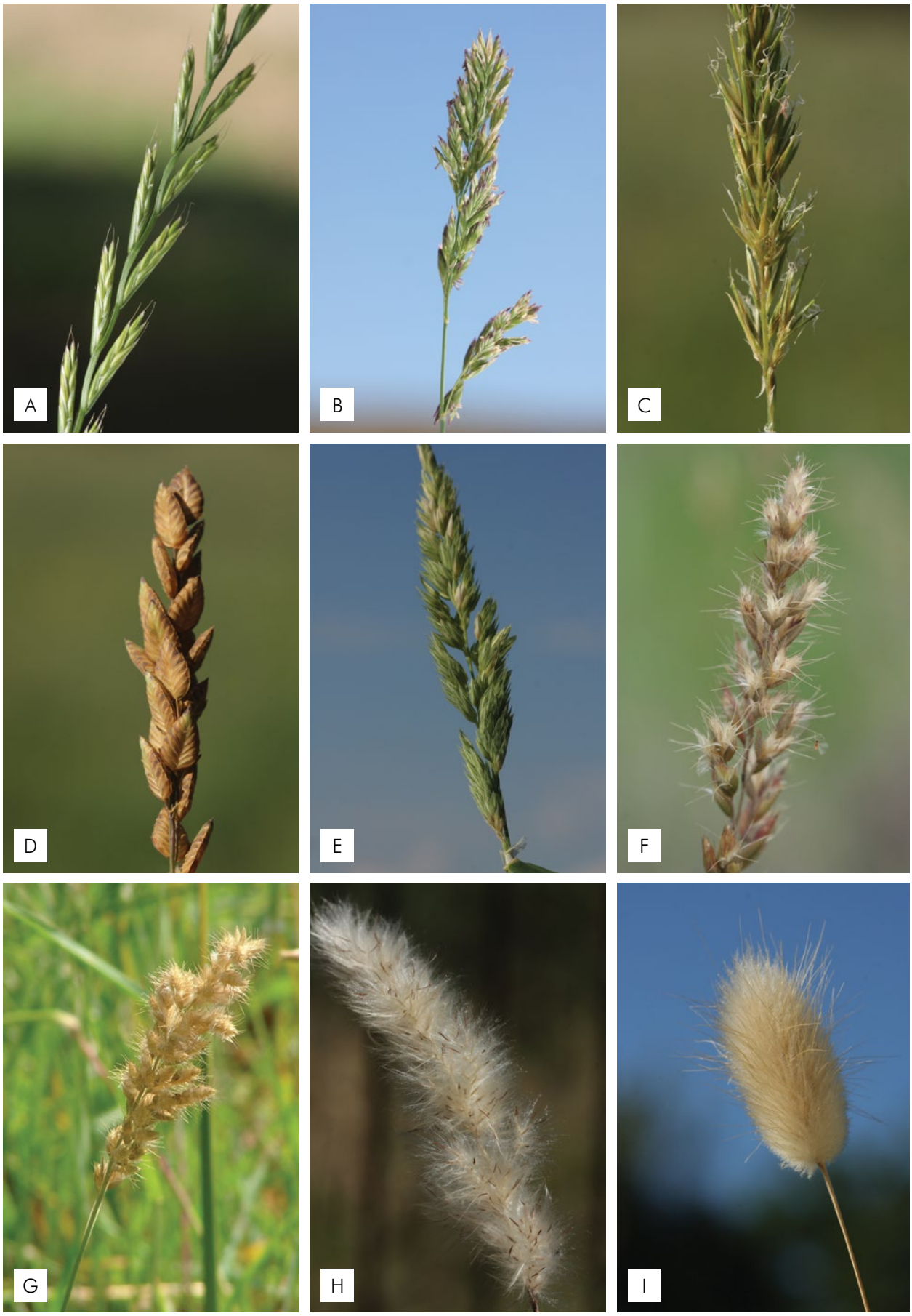



Plate 5.—Inflorescence a true spike or spike-like. A, *Lolium multiflorum*; B, *Festuca* sp.; C, *Anthoxanthum odoratum*; D, *Eragrostis capensis*; E, *Phalaris arundinacea*; F, *Schmidtia pappophoroides*; G, *Schmidtia pappophoroides*; H, *Imperata cylindrica*; I, *Lagurus ovatus*. Photographer: M. Koekemoer.

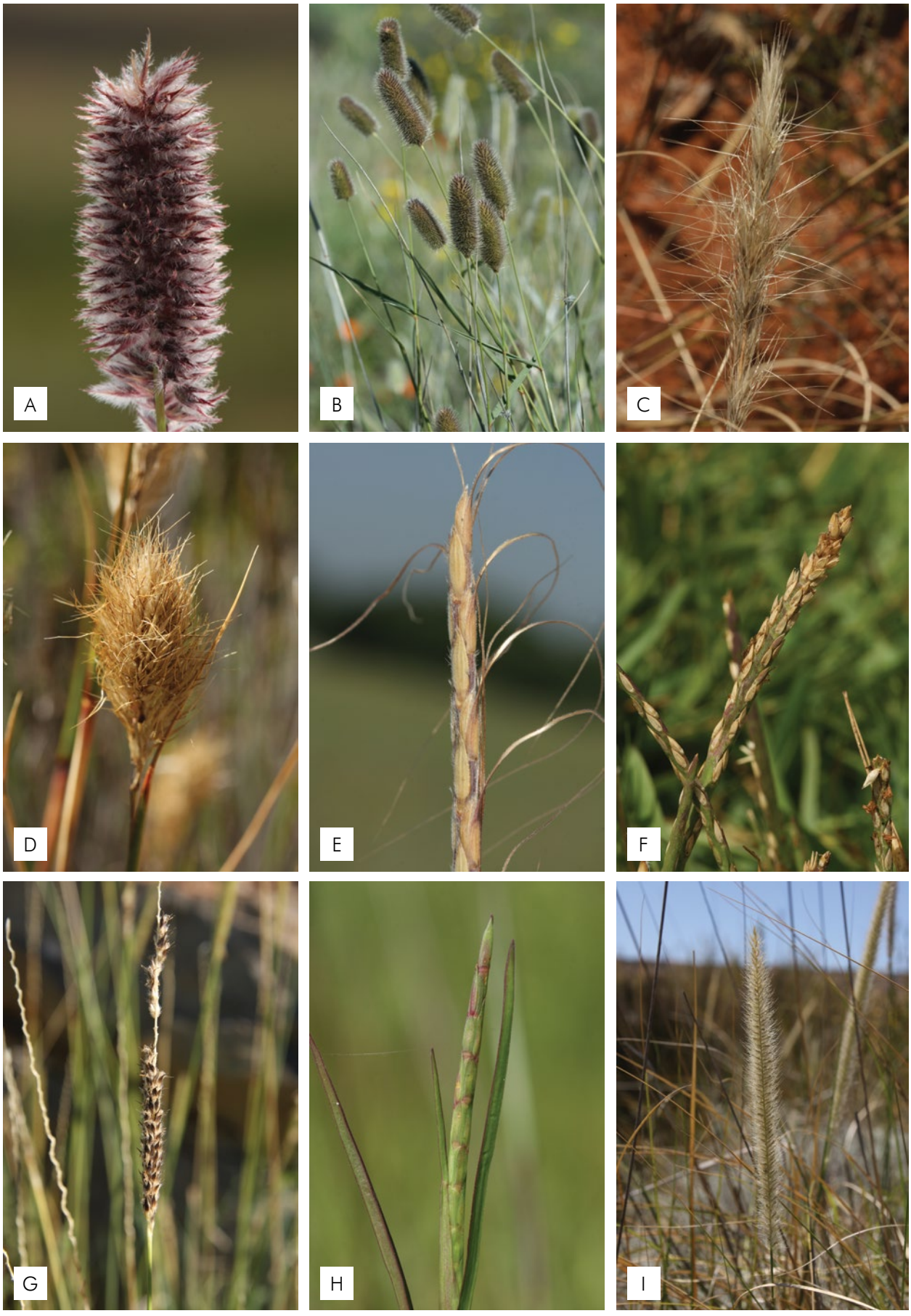



Plate 6.—Inflorescence a true spike or spike-like. A, *Stiburus alopecuroides*; B, *Fingerhuthia africana*; C, *Aristida congesta* subsp. *congesta*; D, *Pentameris curvifolia*; E, *Urelytrum agropyroides*; F, *Stenotaphrum secundatum*; G, *Anthephora pubescens*; H, *Hemarthria altissima*; I, *Pennisetum macrourum*. Photographer: M. Koekemoer.

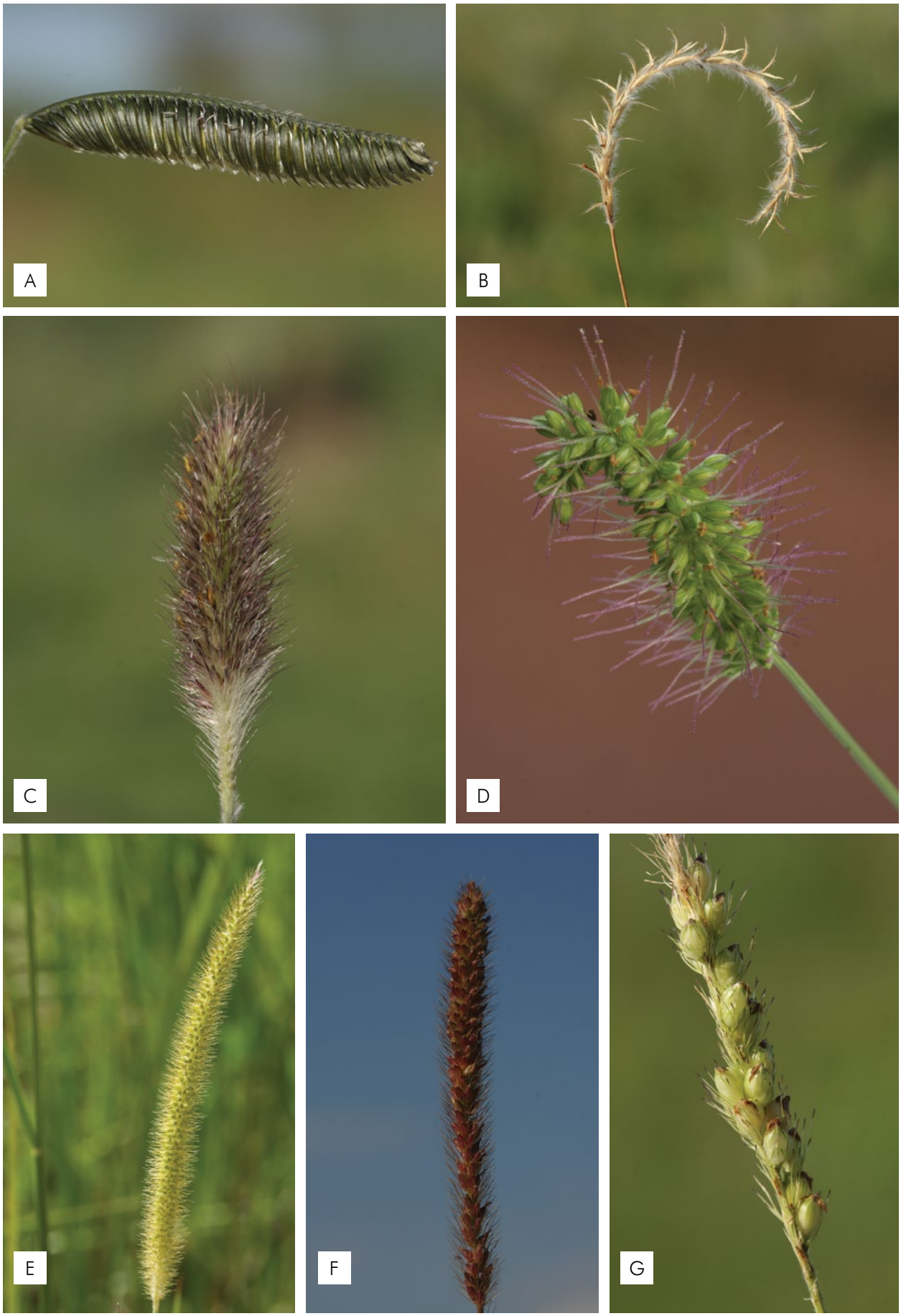



Plate 7.—Inflorescence a true spike or spike-like. A, *Harpochloa falx*; B, *Elionurus muticus*; C, *Pennisetum thunbergii*; D, *Setaria verticillata*; E, *Setaria sphacelata* var. *sphacelata*; F, *Setaria sphacelata* var. *torta*; G, *Setaria incrassata*. Photographer: M. Koekemoer.

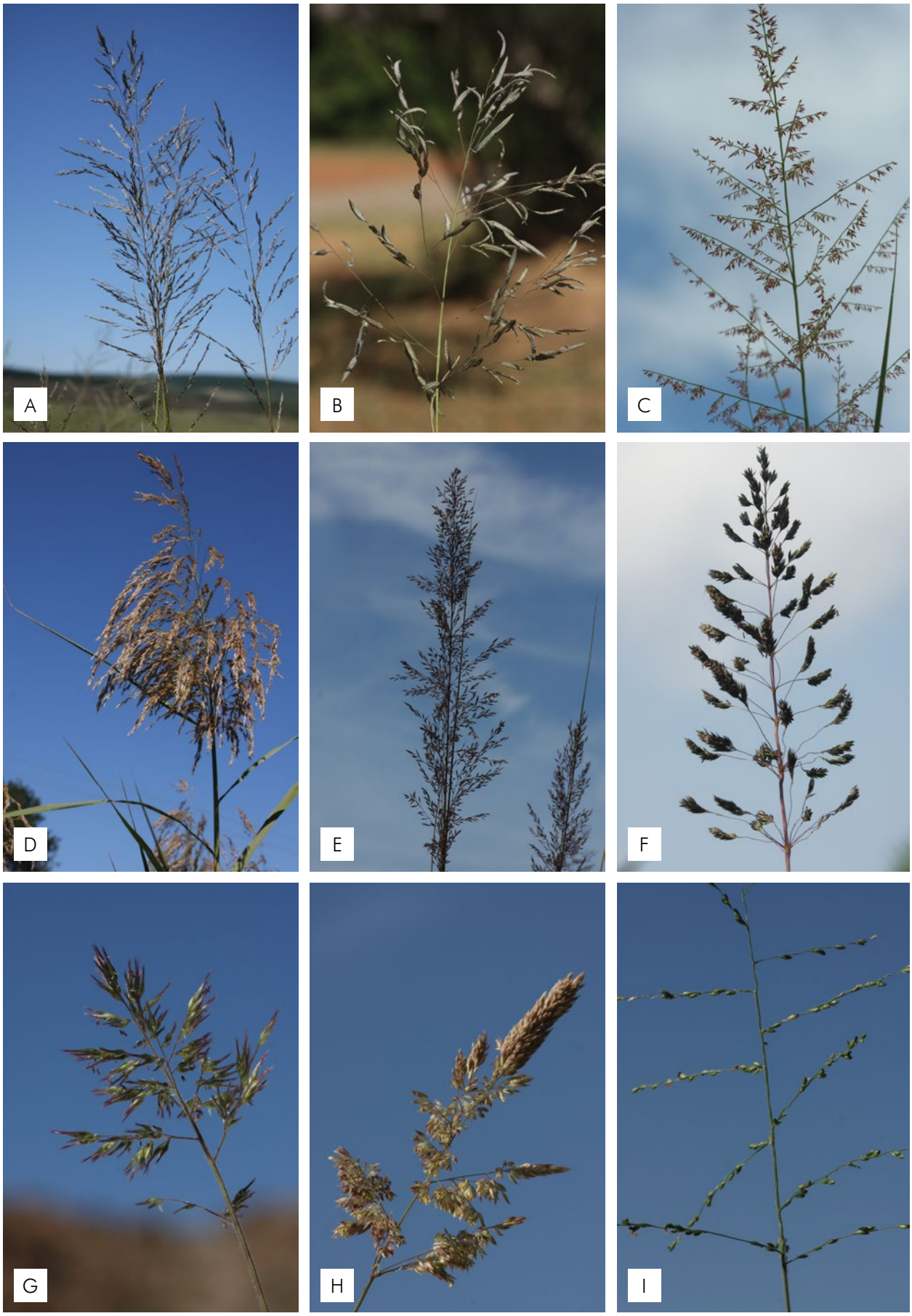



Plate 8.—Inflorescence a panicle. A, *Eragrostis curvula*; B, *Eragrostis inamoena*; C, *Eragrostis gummiflua*; D, *Phragmites australis*; E, *Miscanthus junceus*; F, *Sporobolus pectinatus*; G, *Enneapogon scabra;* H, *Holcus lanatus*; I, *Panicum deustum*. Photographers: A–E, G–I, M. Koekemoer; F, L. Fish.

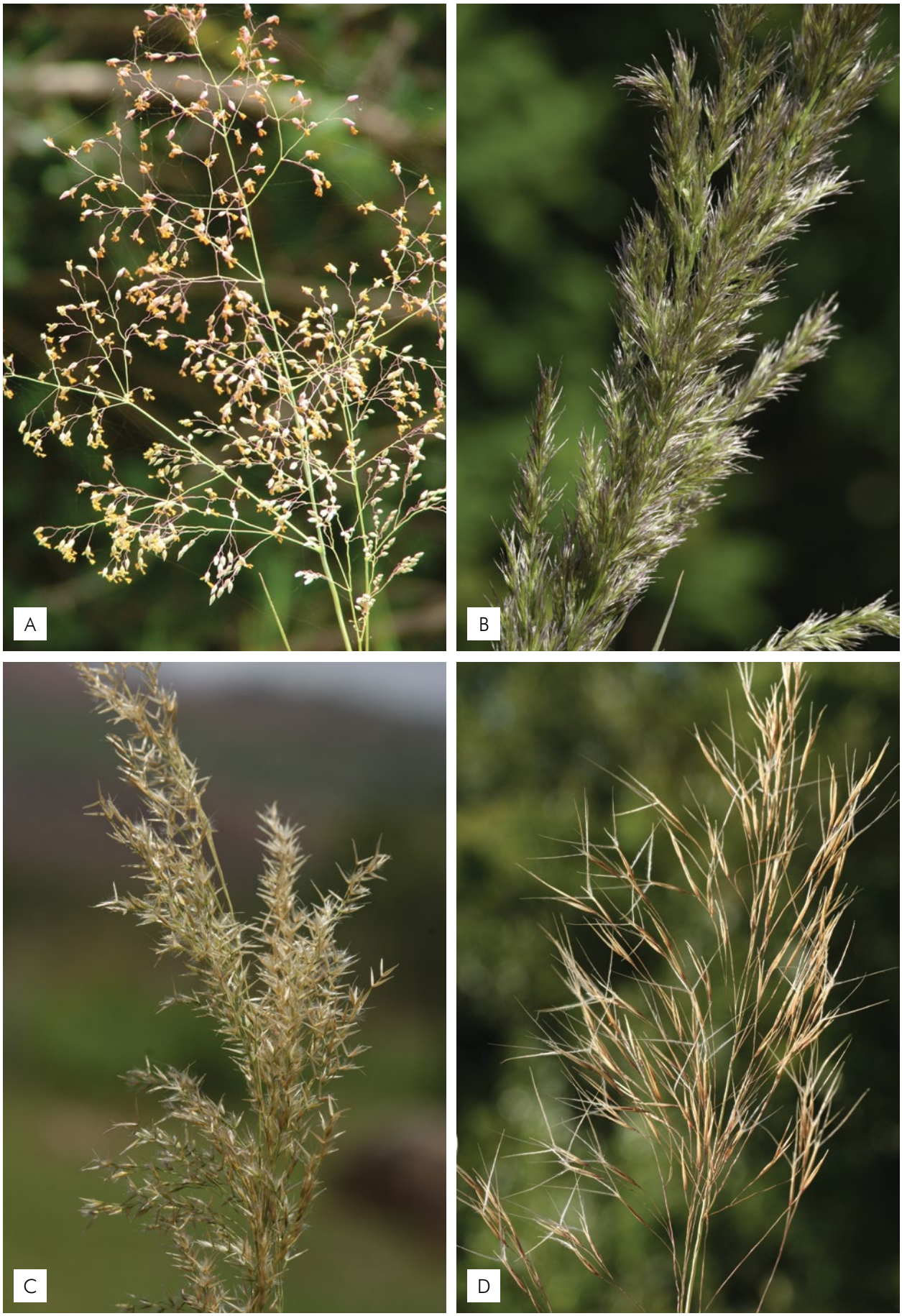



Plate 9.—Inflorescence a panicle. A, *Tricholaena monachne*; B, *Calamagrostis epigejos*; C, *Agrostis barbuligera*; D, *Stipagrostis zeyheri*. Photographer: M. Koekemoer.

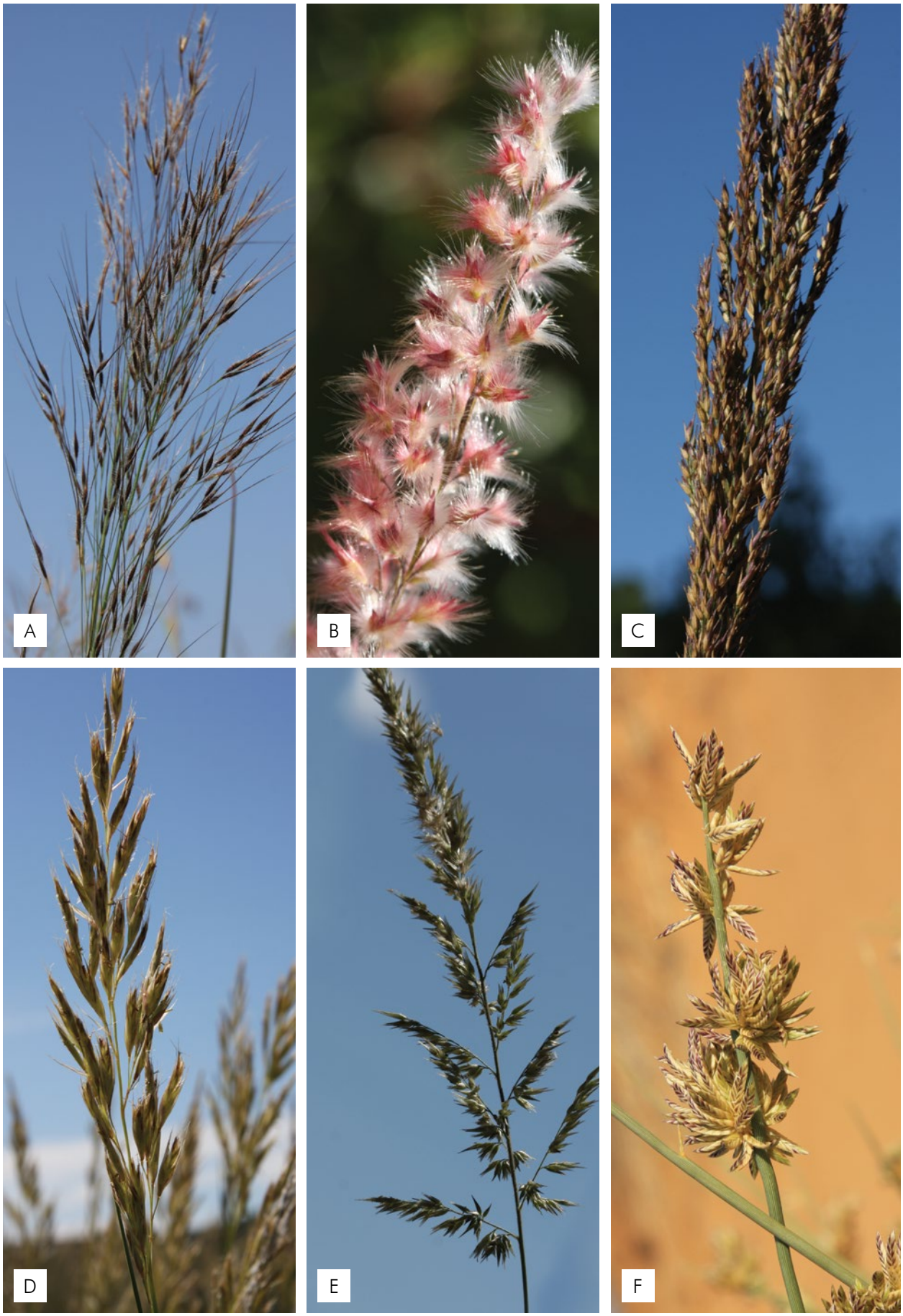



Plate 10.—Inflorescence a panicle. A, *Loudetia simplex*; B, *Melinis nerviglumis*; C, *Arundinella nepalense*; D, *Tenaxia stricta*; E, *Enneapogon cenchroides*; F, *Cladoraphis cyperoides*. Photographer: M. Koekemoer.

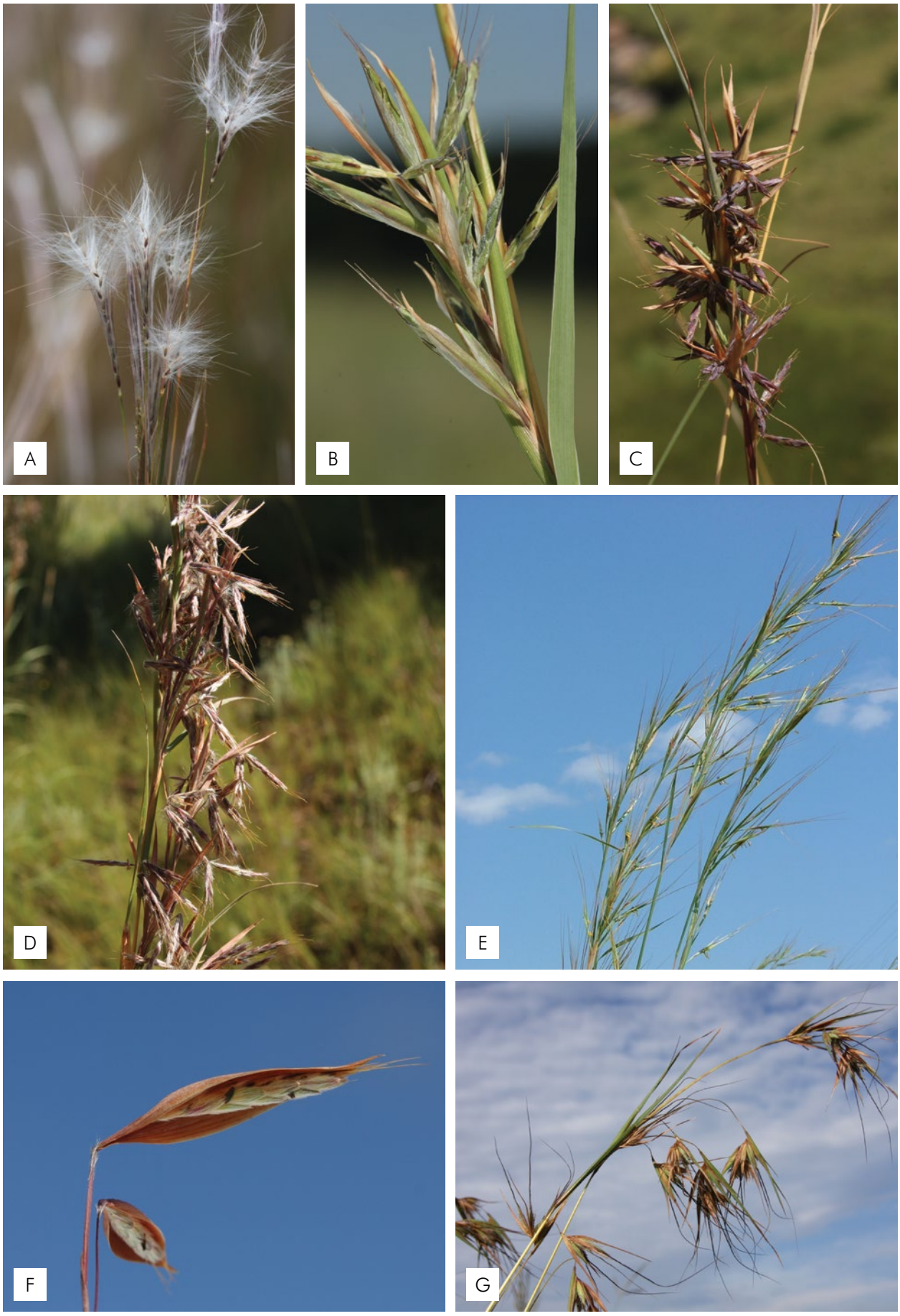



Plate 11.—Inflorescence a leafy false panicle. A, *Andropogon eucomus;* B, *Cymbopogon caesius*; C, *Cymbopogon pospischilii*; D, *Hyparrhenia* sp.; E, *Hyperthelia dissoluta*; F, *Monocymbium ceresiiforme*; G, *Themeda triandra*. Photographer: M. Koekemoer.

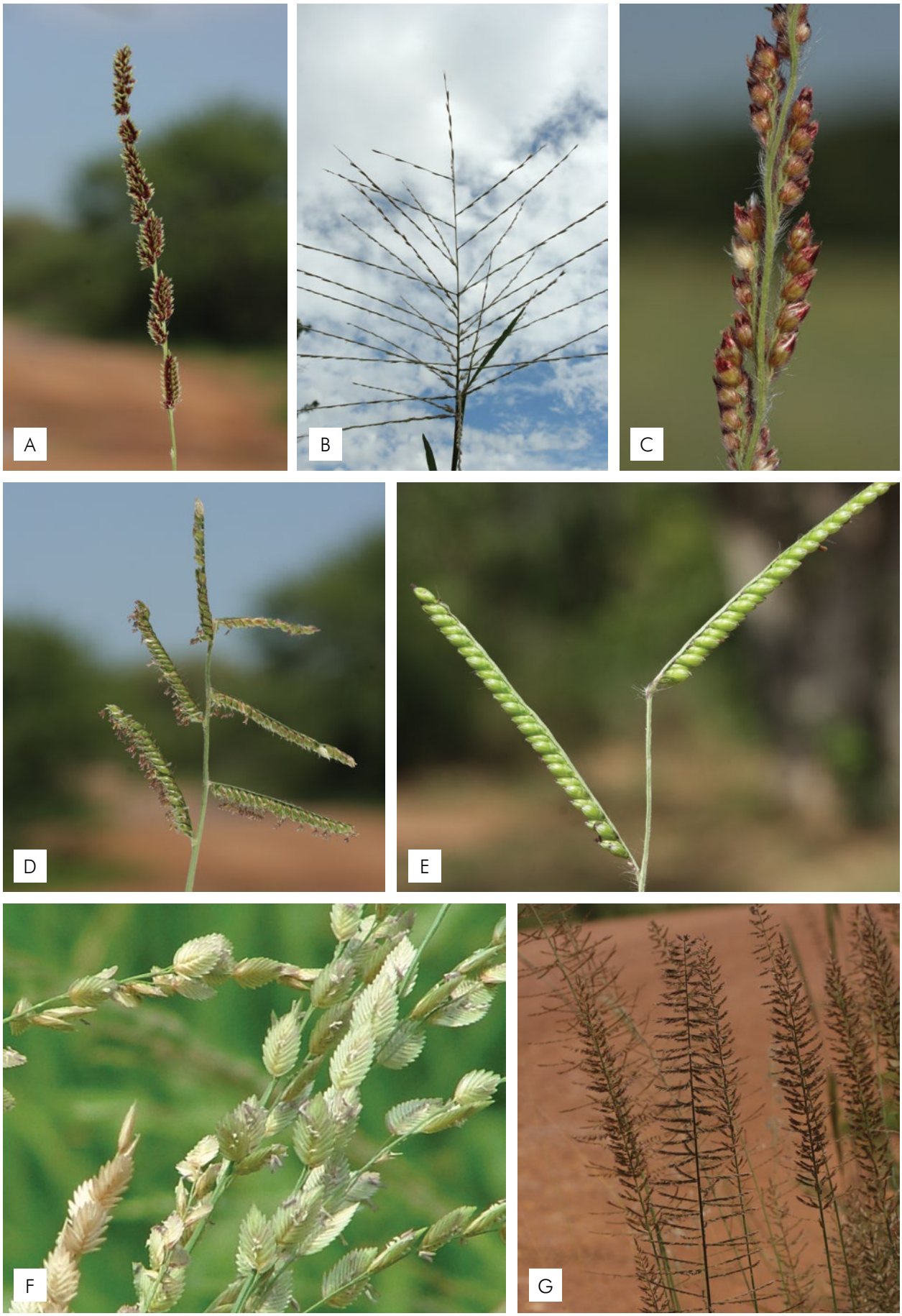



Plate 12.—Inflorescence with racemes scattered up central axis. A, *Echinochloa colona*; B, *Trichoneura grandiglumis*; C, *Brachiaria serrata*; D, *Urochloa trichopus*; E, *Brachiaria brizantha*; F, *Eragrostis superba*; G, *Pogonarthria squarrosa*. Photographer: M. Koekemoer.




Plate 13.—Inflorescence digitate. A, *Urelytrum agropyroides*; B, *Alloteropsis semialata* subsp. *eckloniana*; C, *Andropogon appendiculatus*; D, *Cynodon dactylon*. Photographer: M. Koekemoer.




Plate 14.—Inflorescence digitate. A, *Digitaria eriantha*; B, *Eustachys paspaloides*; C, *Dactyloctenium aegyptium*; D, *Chloris virgata*. Photographers: A, B & D, M. Koekemoer; C, L. Fish.

# GENERA AND SPECIES

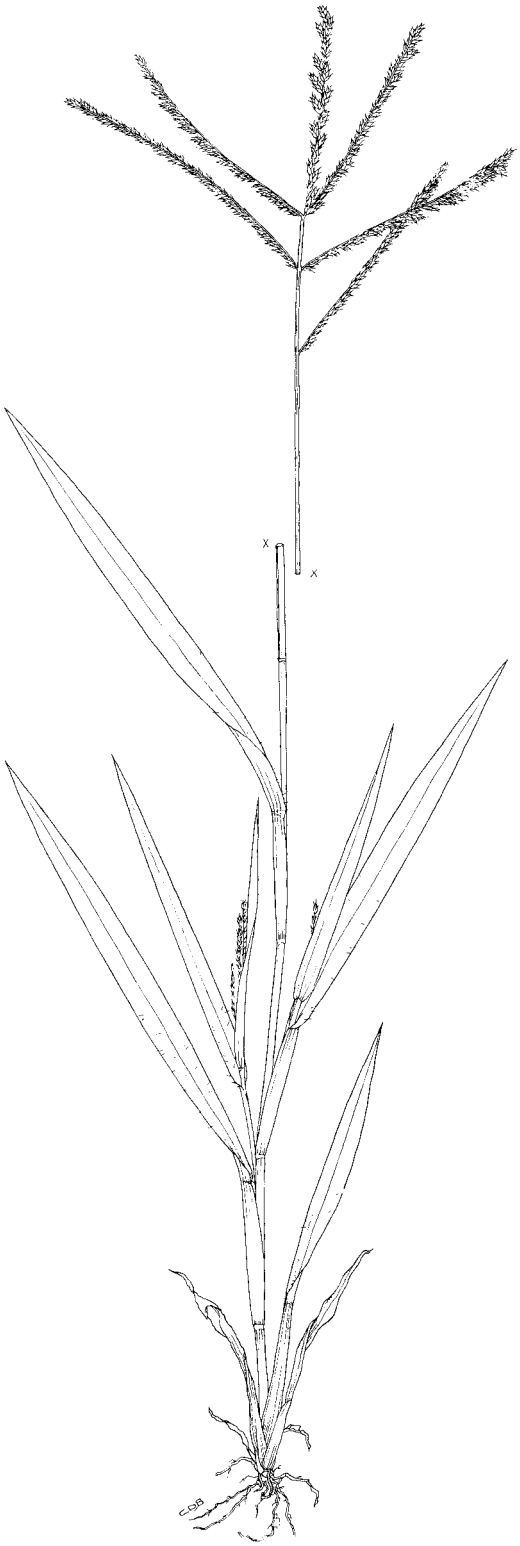


Figure 11.—*Arachne racemosa*. Artist: C.D. Bartman.

## **Acrachne** Wight & Arn. ex Chiov.

Chiovenda: 361 (1907); Chippindall: 132 (1955); Pilger: 29 (1956); Launert: 18 (1970a); Phillips: 258 (1974); Chippindall & Crook: 41 (1976); Clayton & Renvoize: 222 (1986); Gibbs Russell et al.: 31 (1990); Watson & Dallwitz: 68 (1994); Cope: 159 (1999).

Annual, tufted. **Leaf blade** broadly linear, tapering to hair-like apex, expanded, soft; *ligule* a fringed membrane to a fringe of hairs. **Inflorescence** of 5–10 spike-like racemes; digitate or subdigitate or along central axis, 1-sided; *spikelets* solitary. **Spikelet** oblong with serrated outline, laterally compressed, lemmas disarticulating from below, leaving palea and rachilla, or spikelets falling entire or in parts; *glumes* ± equal, similar, shorter than spikelet, membranous; lower glume ovate-lanceolate, keeled, scabrid on keel, 1-nerved, with nerve mucronate; upper glume lanceolate, awned. **Florets** 8–20, bisexual, upper reduced; *lemmas* ± similar, ovate, similar to or firmer in texture than glumes, membranous, glabrous, keeled, keel scabrid above, deeply concave, shortly 2-lobed, 3-nerved, central nerve produced into an awn; *awn* short, stout, straight; *callus* 0; *palea* as long as lemma, lanceolate, 2-keeled, deeply channelled between keels. **Lodicules** 2, small, cuneate, glabrous. **Stamens** 3. **Ovary** ellipsoid, glabrous; styles distinct, plumose. **Caryopsis** 0.8–1.1 mm long, ellipsoid, surface with ornamentation; hilum short; pericarp free; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines even. PCR cell chloroplasts centripetal.

**Species** 3, Africa, southeast Asia and Australia; 1 in southern Africa: *Acrachne racemosa* (Roem. & Schult.) Ohwi, Namibia, Botswana, Swaziland, Limpopo and Mpumalanga.

Species treatment by M.J. Moeaha.

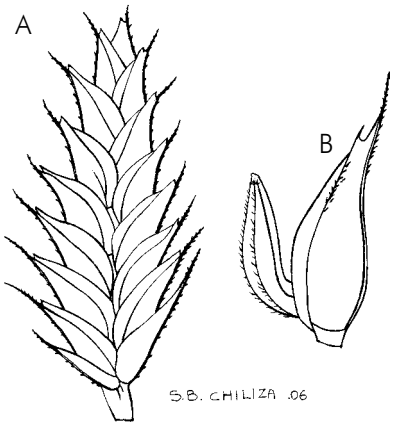



Figure 12.—*Arachne racemosa*. A, spikelet (9.0 × 4.5 mm); B, floret showing lemma (right), palea (left) (3.1 × 1.4 mm). Artist: S.B. Chiliza.



Figure 13.—*Arachne racemosa* spikelet (6–9 mm). Photographer: M. Koekemoer.

**Acrachne racemosa** (B.Heyne ex Roem. & Schult.) Ohwi., in *Bulletin of the Tokyo Science Museum* 18: 1 (1947). Type: India.

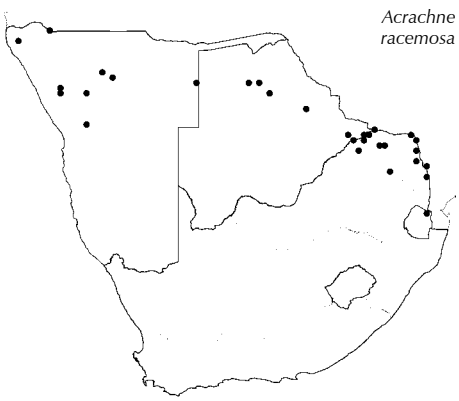
*A. verticillata* (Roxb.) Chiov., in *Annales del Institute Botanico, Roma* 8: 361 (1908). Type: India.

Tufted annual 120–800 mm high; culms erect or geniculately ascending. Leaf blade 120–200 × 8–15 mm. Inflorescence with 5–10 spike-like secund racemes in 1–3 whorls. Spikelet 6–9 mm long, 10–15-flowered; glume and lemma extending into awns $^1/_3$–$^2/_3$ their body lengths; lemma awn 0.3–0.9 mm long; anther up to 0.5 mm long.

[The ligule of this species is found to be an important diagnostic feature derived from the ciliate type, which is also found in *Eragrostis*. The ligule, however, is membranous, with outer surface pilose rendering the appearance of a fringed membrane or a fringe of hairs (Phillips 1974).]

*Flowering*: January to April. *Ecology*: Sandy soil in moist and shady places; disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to West and East Africa; Old World tropics including Arabia, Pakistan and Australia, West Indies, N, B, S, LIM and M. *Economics*: Weed in cultivated lands.

Illustration: Chippindall: 132, fig. 105 (1955); Cope: 159, tab. 47 (1999).
Anatomy vouchers: *Ellis 522, 3194, 3849* & *4749*.
Voucher: *Pienaar 253*.




## **Acroceras** Stapf

Stapf: 621 (1920); Chippindall: 385 (1955); Launert: 19 (1970a); Clayton & Renvoize: 564–568 (1982); Clayton & Renvoize: 363 (1986); Clayton: 48–50 (1989); Gibbs Russell et al.: 32 (1990); Watson & Dallwitz: 71 (1994).



Figure 14.—*Acroceras macrum* spikelet (4–5 mm). Photographer: M. Koekemoer.

Perennial, tufted and rhizomatous, usually with a long prostrate base. **Leaf blade** expanded; *ligule* a narrow, fringed membrane or fringe of hairs. **Inflorescence** a number of 1-sided, spike-like racemes scattered on a central axis, sometimes a panicle; *spikelets* usually in pairs, pedicelled, pedicels of each pair ± connate below. **Spikelet** oblong, laterally or dorsiventrally compressed or plumply subterete; upper glume and lower lemma ± thickened at apex; *glumes* unequal in size, membranous; lower glume lanceolate, 3-nerved, shorter than spikelet; upper glume equalling to as long as spikelet, 5–7-nerved. **Florets** 2; *lower floret* male or sterile; lemma similar to upper glume, 5–7-nerved, awnless; palea developed, hyaline; *upper floret* bisexual; *lemma* firmer than glumes, crustaceous, oblong, very obscurely keeled or rounded on back, faintly 5-nerved, glabrous and shiny, apex with distinct green crest, hard and blunt, awnless; *palea* similar to lemma. **Lodicules** 2, cuneate, fleshy. **Stamens** 3. **Ovary** ellipsoid, glabrous; styles large, plumose. **Caryopsis** ellipsoid, flattened on one side; hilum long-linear ($^1/_2$ to $^2/_3$ the fruit length). **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 9$ (polyploidy).

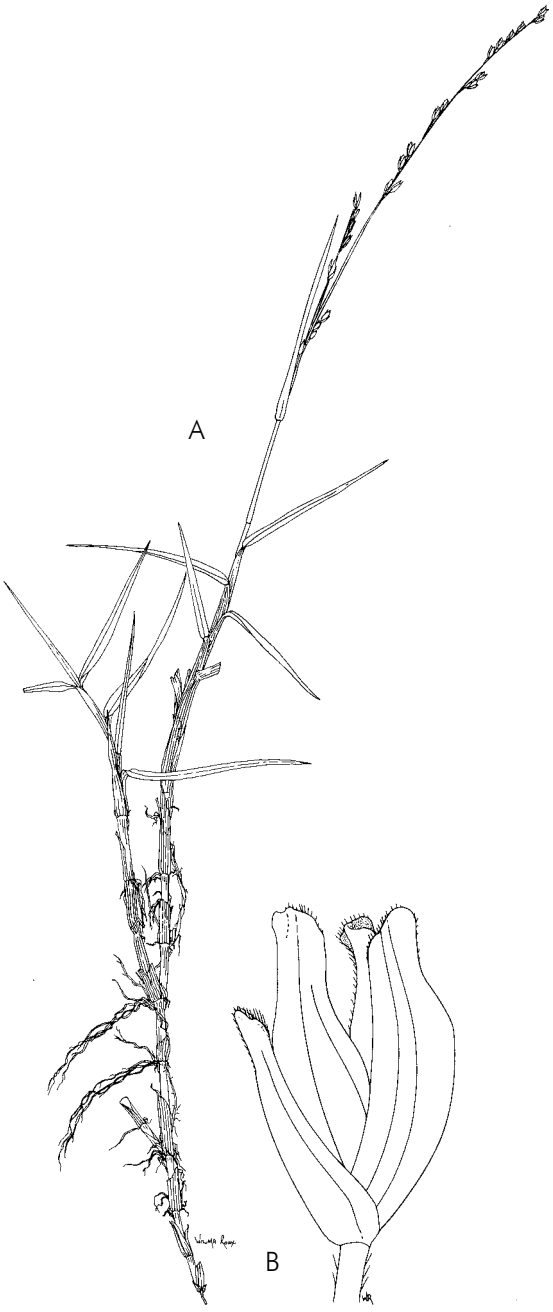



Figure 15.—A, *Acroceras macrum*; B, *A. macrum* spikelet (4.5 × 2.5 mm). Artist: W. Roux.

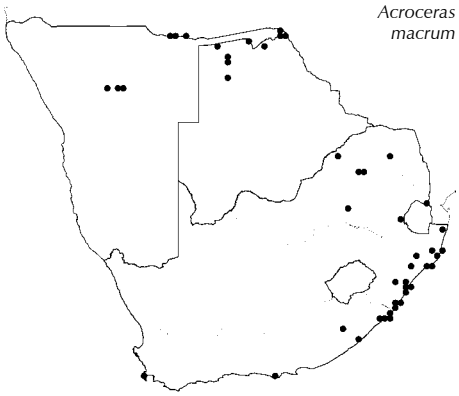





Figure 16.—*Agrostis eriantha*. Artist: C.D. Bartman.

**Species** ± 19, Africa, Madagascar and Indo-Malayan region; 1 in southern Africa: *Acroceras macrum* Stapf, northern Namibia, Botswana, Limpopo, Mpumalanga, Gauteng, KwaZulu-Natal, Western Cape and Eastern Cape.

Species treatment by A.C. Mashau.

**Acroceras macrum** Stapf, in *Flora of tropical Africa* 9: 624 (1920). Type: Mozambique, Beira, *Swynnerton 1596*; Zimbabwe, (Harare), *Craster 22* & *81*; Angola, Cunene, *Pearson 2024* (syntypes).

NILE GRASS

Tufted perennial 400–1 100 mm high; rhizome creeping extensively. Leaf blade 120 × 10 mm; ligule a very short fringe of hairs. Spikelet 4–5 × 1.5 mm; glumes and upper lemma with distinct indurated green crest at apex; lower glume $^{2}/_{3}$ as long as spikelet; upper glume as long as spikelet; anther 2.0–2.5 mm long.

*Flowering*: November to July. *Ecology*: In a wide range of soils; flooded areas near rivers, swamps or vleis. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to East Africa, Ethiopia and DRC, N, B, LIM, G, M, KZN, ?WC (specimen old and species may not have established), EC. *Economics*: Highly palatable and often cultivated as pasture, but the disadvantage is that it is difficult to eradicate.

Illustration: Chippindall: 385, fig. 329 (1955); Clayton: 51, tab. 12 (1989).
Anatomy vouchers: *Ellis 3741, 1859, 2119* & *3406*.
Voucher: *Smith 413*.

## **Agrostis** L.

Linnaeus: 61 (1753); Stapf: 545 (1899); Goossens & Papendorf: 172 (1945); Chippindall: 96 (1955); Launert: 20 (1970a); Clayton: 104 (1970); Launert: 86 (1971); Chippindall & Crook (1976); Smook & Stirton: 637 (1979); Clayton & Renvoize: 134 (1986); Gibbs Russell et al.: 32 (1990); Rugolo de Agrasar & Molina: 179 (1992); Watson & Dallwitz: 83 (1994); Edgar & Conner: 271 (2000); Harvey: 633 (2007); Victor et al. (2012).

Annual or perennial; tufted or decumbent, often rooting at lower nodes; sometimes stoloniferous or rhizomatous. **Leaf blade** narrow, linear, expanded, rarely folded; *ligule* an unfringed membrane. **Inflorescence** a panicle, open or contracted, rarely spike-like; primary branches often fascicled on central axis; *spikelets* solitary, pedicelled. **Spikelet** small, up to ± 5 mm long, laterally compressed, linear-lanceolate to oblong, often gaping, disarticulating above glumes, rachilla sometimes produced, rarely bearing rudiment of a second floret; *glumes* ± equal, as long as to longer than spikelet, similar in form, membranous, acuminate or acute, 1-nerved, keeled, awnless to rarely awned. **Floret** 1, bisexual; *lemma* lanceolate or linear, less firm than glumes, thinly membranous to hyaline, hairy or glabrous, not keeled, 3–5-nerved, side nerves sometimes excurrent into mucros, awnless or awned from back below apex or from base, awn short, not extending beyond glumes; *palea* usually shorter than lemma, sometimes reduced or 0, 2-nerved or nerveless, thinly membranous, hyaline; *callus* small, glabrous or shortly pubescent with hairs up to half as long as lemma. **Lodicules** 2, lanceolate or oblong, hyaline. **Stamens** 3. **Ovary** ellipsoid; styles very short; stigma plumose. **Caryopsis** hilum short; embryo small. **Pho-**

**tosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (aneuploids, high polyploidy).

**Species** ± 220, temperate regions throughout the world; on mountains in the tropics; ± 11 (3 naturalised) in southern Africa, widespread, but generally absent from the dry central regions.

[Genus in southern Africa is in need of revision.]

Species treatment by A.C. Mashau.

### Quick guide to easily confused genera:

1. Florets 2 . . . . . 2
   Floret 1 . . . . . 3
2. Perennial; lemma awned from the back near base; palea ± as long as lemma . . . . . *__Deschampsia__
   Annual; lemma awned from below middle or awnless; palea slightly shorter than lemma . . . . . *__Aira__
3(1). Spikelet 5.5–8.0 mm long; callus beaded with white hairs longer than lemma . . . . . __Calamagrostis__
   Spikelet up to 5.5 mm long; callus absent, if present, then glabrous or hairy, hairs up to as long as lemma . . . . . 4
4. Spikelet falling entire with pedicel or part thereof . . . __Polypogon__
   Spikelet breaking up above glumes . . . . . __Agrostis__

### Quick guide to easily confused taxa:

1. Spikelet awnless; glumes gradually tapering to the apex . . . . . *__Phalaris arundinacea__
   Spikelet awned; glumes mucronate . . . . . 2
2. Florets 2–4; lemma 3-nerved; spikelet 3.5–4.0 mm long . . . . . __Koeleria capensis__
   Floret 1; lemma 5-nerved; spikelet ± 5.0 mm long . . . . . __Agrostis continuata__

### Key to species:

1. Glume 3.5–5.5 mm long . . . . . 2
   Glume to 3.5 mm long . . . . . 7
2. Glume lanceolate, acute, middle nerve extending into a short awn . . . . . __A. polypogonoides__
   Glume acute to acuminate, awnless . . . . . 3
3. Panicle narrow, spike-like, spikelets closely imbricate on adpressed branches; palea $^1/_4$–$^1/_3$ as long as lemma . . . . . __A continuata__
   Panicle spreading, spikelets not closely imbricate; palea ± equal to slightly shorter than lemma . . . . . 4
4. Plant annual; glume 2.0–3.5 mm long . . . . . ***A. avenacea**
   Plant perennial; glume 3.5–5.5 mm long . . . . . 5
5. Rachilla not produced; leaf blade 1–2 mm wide; panicle branches rigid, straight, ascending . . . . . __A. eriantha__
   Rachilla produced; leaf blade 2–6 mm wide; panicle branches flexuous (spreading at maturity) . . . . . 6
6. Lemma awned from $^1/_4$ above the base; glume 4.0–5.5 mm long . . . . . __A. barbuligera__ var. __barbuligera__
   Lemma awned from ± the middle; glume 3.0–3.5(4.0) mm long . . . . . __A. barbuligera__ var. __longipilosa__
7(1). Spikelets widely separated; panicles very diffuse, branches hair-like . . . . . 8
   Spikelets close together; panicles open or compact, not diffuse .10
8. Palea absent or very reduced (0.2 mm long); lemma awned from above the middle . . . . . ***A. montevidensis**
   Palea present, ± equal to shorter than or as long as or slightly longer than lemma; lemma awned from ± middle of the back . .9
9. Glume 1.5–2.5 mm long; anther (0.5)0.8–1.2 mm long . . . . . __A. bergiana__ var. __bergiana__

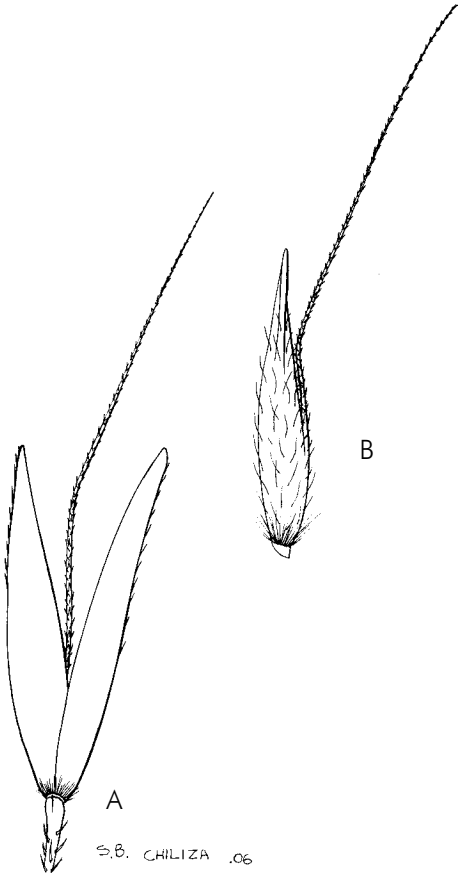



Figure 17.—*Agrostis eriantha*. A, spikelet (7.0 × 1.1 mm); B, lemma (4.0 × 0.6 mm). Artist: S.B. Chiliza.



Figure 18.—*Agrostis eriantha* spikelet (3.5–5.0 mm). Photographer: M. Koekemoer.

Glume 2.5–3.0 mm long; anther 1.3–1.7 mm long . . . . . **A. bergiana** var. **laeviuscula**

10(7). Anther 0.5–0.7 mm long; lemma 3-nerved; panicle 150–400 mm long, narrow and sinuous, branches held nearly erect . . . . . **A. lachnantha**

Anther 0.5–1.7 mm long; lemma 3–5-nerved; panicle to 200 mm long, open or compact, branches ascending to spreading . . . 11

11. Lemma glabrous; rachilla not produced . . . . . 12

Lemma hairy; rachilla produced . . . . . 13

12. Palea 1/2 as long as lemma; leaf blade 3–5 mm wide, flat; glumes greenish or purple-tinged; perennial 400–750 mm high, rhizomatous; lemma 3–5-nerved . . . . . ***A. gigantea**

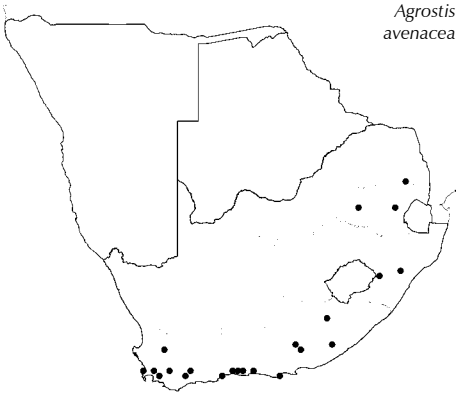
Palea ± equal to lemma; leaf blade 0.5–1.0 mm wide, folded; glumes usually dark purple; delicate, annual or weak perennial 50–300 mm high; lemma 5-nerved . . . . . **A. subulifolia**

13(11). Rachilla 1/2–3/4 as long as spikelet; glumes tinged with purple; Western Cape . . . . . **A. schlechteri**

Rachilla less than 1/2 as long as spikelet; glumes light green; plant not restricted to the Western Cape . . . . . 14

14. Annual; lemma hairs up to 0.5 mm long, not spreading . . . . . ***A. avenacea**

Perennial; lemma hairs up to 1.5 mm long, spreading . . . . . **A. barbuligera** var. **longipilosa**



*Agrostis avenacea*

***Agrostis avenacea** J.F.Gmel., in *Systema Naturae* 2: 171 (1791). Type: New Zealand?

Alternate name: *Lachnagrostis filiformis* (G.Frost.) Trin.

Bent grass, blown grass

Annual 180–600 mm high. Leaf blade to 170 × ± 2 mm, flat. Inflorescence 80–190 mm long, open. Spikelet 2.5–4.0 mm long; rachilla less than 1/2 as long as spikelet; glume 2.0–3.5 mm long, acute to acuminate, 1-nerved, keels scaberulous, awnless; lemma hairy, hairs up to 0.5 mm long, not spreading, 5-nerved, awned from middle of back; awn usually fine, geniculate; palea ± equal to slightly shorter than lemma; callus hairs up to 1/3 the lemma length; anther 0.2–4.0 mm long.

*Flowering*: July to March. *Ecology*: Disturbed areas or wet places. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from Australia, New Zealand, New Guinea and Easter Isle; also naturalised in South America and Malaysia. G, M, FS, KZN, WC, EC. *Economics*: Weed of cultivation.

Anatomy vouchers: *Ellis 3371* & *5471*.
Voucher: *Van der Walt 398*.

**Agrostis barbuligera** Stapf var. **barbuligera**, in *Flora capensis* 7: 548 (1899). Type: South Africa, Eastern Cape: King William's Town Div., Amatola mountains; *Buchanan 24*; Somerset Div., on the higher rocks of Bosch Berg, *MacOwan 2189* (syntypes).

Alternate name: *Lachnagrostis barbuligera* (Stapf) Rúgolo & A.M.Molina

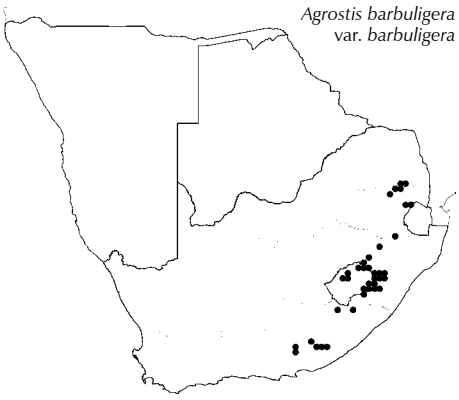
Tufted perennial 200–800 mm high; basal sheaths splitting into fibres. Leaf blade to 250 × 2–6 mm, flat. Inflorescence branches flexuous, spreading at maturity. Spikelet 4.0–5.5 mm long; rachilla

produced as a hairy bristle; glume 4.0–5.5 mm long, lanceolate, acute, keels scaberulous; lemma hairy all over or only below the middle, 5-nerved, awned from $^1/_4$ above base; awn very fine, geniculate, twisted; palea ± equal to slightly shorter than lemma; callus hairs up to $^1/_3$ the lemma length; anther 1.2–2.5 mm long.

[Differs from var. *longipilosa*, which has a shorter spikelet, 3.0–3.5(3.7) mm long and lemma awned from ± middle of back.]

*Flowering*: November to March. *Ecology*: Mountain grassland. *Frequency in southern Africa*: Infrequent, or locally common. *Distribution*: Endemic. L, M, FS, KZN, EC.

Anatomy vouchers: *Ellis 667, 1391, 4453, 5710* & *Du Toit 2280*.
Voucher: *Acocks 21079*.


*Agrostis barbuligera* var. *barbuligera*

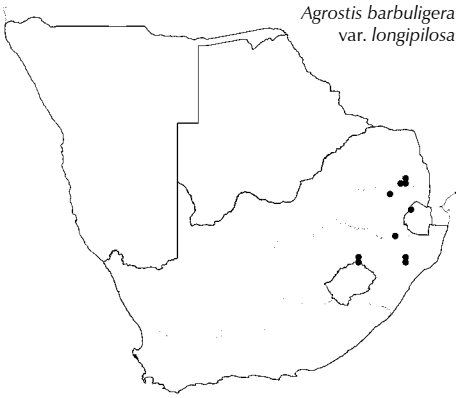
**Agrostis barbuligera** Stapf var. **longipilosa** Gooss. & Papendorf, in *South African Journal of Science* 41: 179 (1945). Type: South Africa, KwaZulu-Natal, Qudeni Reserve, *Fisher and Schweickerdt 25* (NH?; PRE?).

Perennial 200–800 mm high; basal sheaths splitting into fibres. Leaf blade to 250 × 2–6 mm, flat. Inflorescence spreading, spikelets not closely imbricate. Spikelet 3.0–3.5(4.0) mm long; rachilla produced; glume 3.0–3.5(4.0) mm long, acute, light green, keels scaberulous; lemma hairy, hairs up to 1.5 mm long, spreading, 5-nerved, awned from ± middle of back; awn geniculate, twisted; palea ± equal to slightly shorter than lemma; callus hairs up to $^1/_3$ the lemma length; anther 0.6–1.7 mm long.

[Differs from var. *barbuligera*, which has a longer spikelet (4.0–5.5 mm long) and lemma awned from lowest $^1/_4$ above base.]

*Flowering*: November to January. *Distribution*: Endemic. S, M, FS, KZN. *Economics*: Probably palatable and grazed by livestock.

Anatomy voucher: *Smook 4826*.
Voucher: *Van der Schijff 4776*.

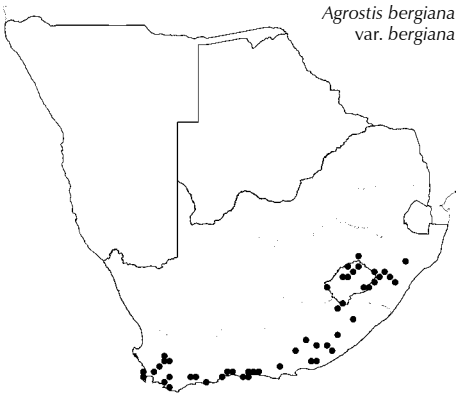

*Agrostis barbuligera* var. *longipilosa*

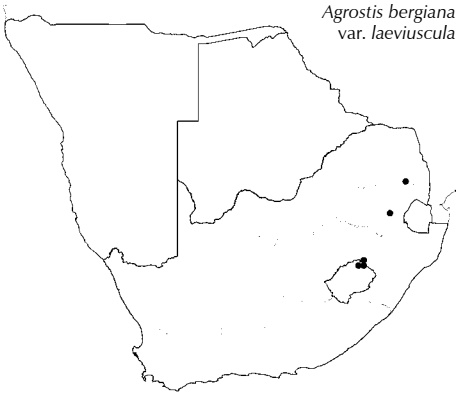
**Agrostis bergiana** Trin. var. **bergiana**, in *De Graminibus unifloris et Dissertatio botanica*: 203 (1824). Type: South Africa, Western Cape, *'in Montibus poue'* Koude river, *Schlechter 9596*.

Delicate, weak perennial or annual 150–300(–600) mm high. Leaf blade to 90 × 1–2 mm, expanded or rolled and filiform. Inflorescence very diffuse, branches hair-like. Spikelet 1.5–2.5 mm long; rachilla not produced; glume 1.5–2.5 mm long, lanceolate, acute to acuminate, keels scabrid; lemma glabrous, 5-nerved, awnless or awned from ± middle of back; awn slightly geniculate; palea ± equal to slightly shorter than lemma; callus glabrous to minutely tufted hairy; anther 0.8–1.2 mm long.

*Flowering*: November to February. *Ecology*: Mountain grassland in sheltered or wet places. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. L, FS, KZN, WC, EC.

Anatomy vouchers: *Ellis 655, 1493, 1494* & *5698*.
Voucher: *Huntley 422*.


*Agrostis bergiana* var. *bergiana*


*Agrostis bergiana* var. *laeviuscula*

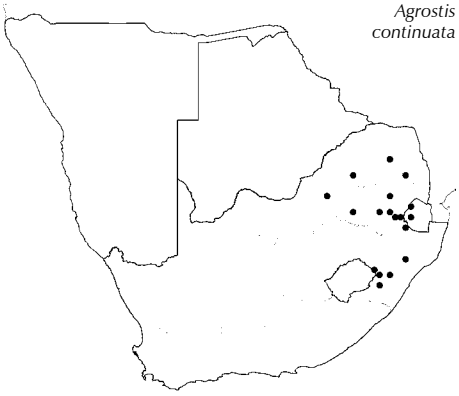
**Agrostis bergiana** Trin. var. **laeviuscula** Stapf, in *Flora capensis* 7: 547 (1899). Type: South Africa, Free State, *Buchanan 17* (PRE, fg.).

Weak perennial or annual 150–300(–600) mm high. Leaf blade to 90 × 1–2 mm, expanded or rolled. Inflorescence very diffuse, longest branches 25.4 mm long (rarely longer). Spikelet 2.5–3.0 mm long; rachilla not produced; glume 2.5–3.0 mm long, acute, keel scabrid; lemma glabrous except for tufted hairs at base, 5-nerved, awnless or awned from ± middle of back; awn straight or slightly geniculate; palea as long as or slightly longer than lemma; callus hairs up to $^1/_3$ the lemma length; anther 1.3–1.7 mm long.

[Similar to var. *bergiana*, which has a shorter spikelet of 1.5–2.5 mm long.]

*Flowering*: October to February. *Ecology*: Wet places in mountain grassland. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. L, M, FS.

Voucher: *De Winter & Codd 209*.


*Agrostis continuata*

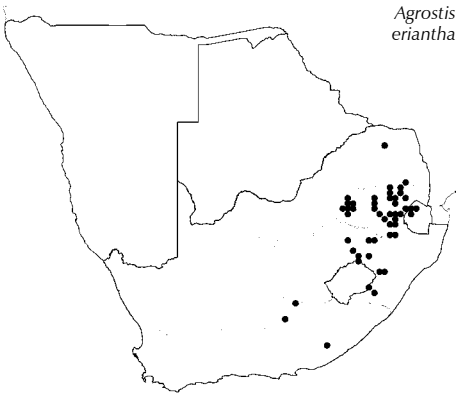
**Agrostis continuata** Stapf, in *Kew Bulletin* 1897: 290 (1897). Type: Malawi, without precise locality, *Buchanan 356* (K, holo.).

*A. natalensis* Stapf, in *Kew Bulletin* 1897: 290 (1897). Type: South Africa, KwaZulu-Natal, Umpumulo, *Buchanan 159* (PRE, fg.).

Coarse, tufted perennial 600–900 mm high. Leaf blade to 250 × 6(–8) mm. Inflorescence dense, narrow, spike-like; spikelets overlapping, closely imbricate on adpressed branches. Spikelet ± 5 mm long; rachilla not produced; glumes 5 mm long, lanceolate, mucronate, keel scabrid; lemma glabrous or sparsely hairy, 5-nerved, awned from $^1/_4$ the way up back or less; awn geniculate; palea $^1/_4$–$^1/_3$ as long as lemma; callus glabrous to tufted hairy, up to $^1/_3$ the lemma length; anther 0.7–1.5 mm long.

*Flowering*: December to April. *Ecology*: Grassland vleis and wet places, sometimes at high altitudes. *Distribution*: Zimbabwe, Malawi and Tanzania, S, LIM, NW, G, M, KZN.

Illustration: Chippindall: 99, fig. 70 (1955).
Anatomy voucher: *Ellis 1853*.
Voucher: *Pole-Evans 1968*.


*Agrostis eriantha*

**Agrostis eriantha** Hack., in *Vierteljahrsschrift der naturforschenden Gessellschaft in Zürich* 49: 172 (1904). Type: South Africa, Gauteng, *in humidis prope* Pretoria, *Schlechter 4144*, Jan. 1894; Eastern Cape *in collibus prope* Middelburg, *Schlechter 4052*, Dec. 1893 (syntypes).

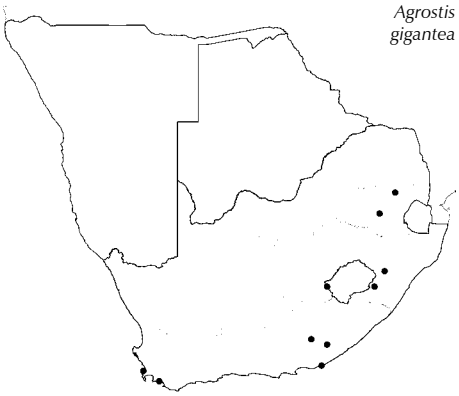
*Agrostis eriantha* Hack. var. *planifolia* Gooss. & Papendorf., in *South African Journal of Science* 41: 181 (1945). Type: South Africa, Gauteng, Irene, Doornkloof, *Pole-Evans 666* (holo., PRE.).

Tufted perennial to 700 mm high; rhizomatous. Leaf blade to 180 × 1–2 mm, folded. Inflorescence branches rigid, straight, ascending at maturity. Spikelet 3.5–5.0 mm long; rachilla not produced; glume 3.5–4.5 mm long, lanceolate, acute to acuminate, keel scabrid; lemma hairy, 5-nerved, awned from ± middle; awn geniculate, twisted; palea ± equal to slightly shorter than lemma; callus hairs usually up to $^1/_3$ rarely up to $^1/_2$ the lemma length; anther 1.9–2.5 mm long.

*Flowering*: January to April. *Ecology*: Wet places, sometimes in disturbed areas or cultivation. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. S, L, LIM, G, M, FS, KZN, EC.

Illustration: Chippindall: 100, fig. 71 (1955).
Anatomy vouchers: *Ellis 444, 1367, 1532, 1831 & 3337.*
Voucher: *Potter 1745*.

*Agrostis gigantea*



***Agrostis gigantea** Roth, in *Tentamen Florae germanicea* 1: 31. (1788). Type: Germany.

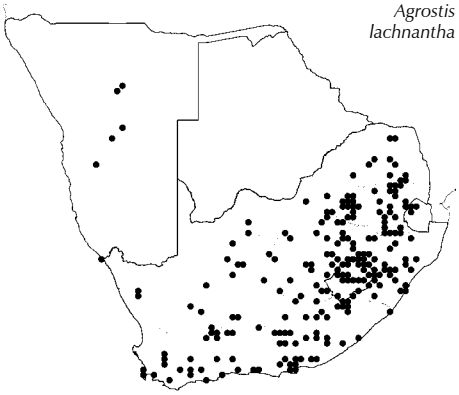
Bent grass

Perennial 400–750 mm high, rhizomes present or absent; culm erect. Leaf blade to 90 × 3–5 mm, flat. Inflorescence 70–200 mm long, open, branches ascending. Spikelet 1.5–2.5 mm long; rachilla not produced; glume 2.0–3.5 mm long, lanceolate, acute, greenish or purple-tinged, keels scabrid; lemma glabrous, 3–5-nerved; awnless or rarely minutely awned; palea $^1/_2$ as long as lemma; callus glabrous to minutely tufted hairy; anther 1.0–1.5 mm long.

*Flowering*: November to April. *Ecology*: Wet disturbed places. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from Eurasia, also naturalised in America. L, M, KZN, EC, WC.

Voucher: *Burtt Davy 9233*.

*Agrostis lachnantha*



**Agrostis lachnantha** Nees, in *Linnaea* 10, Litt.: 115 (1836). Type: South Africa, Eastern Cape, Zwartskops R., *Drège*.

*A. huttoniae* (Hack.) C.E.Hubb., in Hill, in *Flora tropical Africa* 10: 172 (1937). Type: Angola, Huila, *Welwitsch 2629*.

*A. lachnantha* Nees var. *glabra* Gooss. & Papendorf, in *South African Journal of Science* 41: 184 (1945).

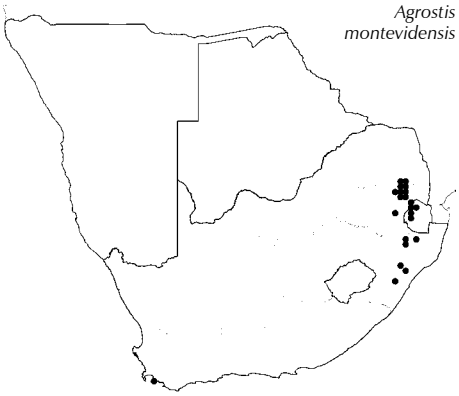
Alternate name: *Lachnagrostis lachnantha* (Nees) Rúgolo & A.M.Molina

South African bent grass, vink-agrostis

Loosely tufted, usually robust, short lived perennial or annual 300–900 mm high. Leaf blade 70–200 × 2–4 mm, flat. Inflorescence 150–400 mm long, narrow, sinuous, branches nearly erect. Spikelet 1.5–2.5(–3.0) mm long; rachilla not produced; glumes 1.4–2.5 mm long, persistent, lanceolate, smooth or granular except keel scabrid; lemma pubescent to pilose with hairs up to 1 mm long, rarely glabrous, denticulately obtuse, 3-nerved; awnless or with subapical awn up to 0.5 mm long; palea almost as long as or shorter than lemma; callus hairs up to $^1/_3$ the lemma length; anther 0.5–0.7 mm long.

*Flowering*: October to March (occasionally earlier or later). *Ecology*: River banks and wet places. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards through East Africa to Sudan and Ethiopia. N, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Probably palatable but an unimportant grazing grass as it is never very common in the veld; it produces many viable seeds and is a valuable grass to stabilise damp soil.

Illustration: Chippindall: 101, fig. 73 (1955).
Anatomy vouchers: *Ellis 472, 477, 996, 1454 & 5405*.
Voucher: *Oakes & Scheepers* 301.


*Agrostis montevidensis*

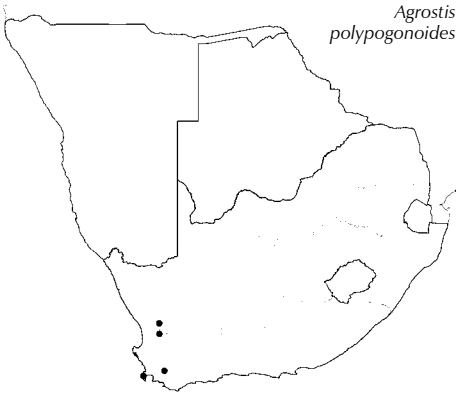
*__Agrostis montevidensis__ Spreng. ex Nees, in *Agrostologia Brasiliensis* 403 (1829). Type: Uruguay.

FOG GRASS

Tufted annual 200–600 mm high. Leaf blade to 130 × 1–2 mm. Inflorescence very diffuse, branches hair-like. Spikelet 1.5–2.5 mm long; rachilla not produced; glume 1.5–2.5 mm long, lanceolate, acuminate, keel scabrid; lemma glabrous, 5-nerved, awned from ± middle; palea absent or very reduce (0.2 mm long); callus glabrous to minutely tufted hairy; anther 0.5–1.1 mm long.

*Flowering*: November to April. *Ecology*: Moist and disturbed places in mountain grassland. *Frequency in southern Africa*: Appears to be spreading. *Distribution*: Naturalised from South America. S, M, KZN, WC. *Economics*: Weed.

Anatomy voucher: *Ellis 4457*.
Voucher: *Story 5438*.


*Agrostis polypogonoides*

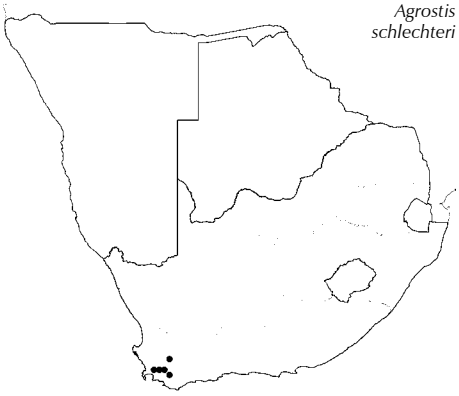
**Agrostis polypogonoides** Stapf, in *Flora capensis* 7: 549 (1898). Type: South Africa, Western Cape, Muizenburg vlei, *Wolley-Dod 2349*.

Tufted perennial to 750 mm high. Leaf blade to 120 × 3–4 mm. Inflorescence 100–160 mm long, narrow, somewhat contracted, branches unequal. Spikelet 4.0–4.5 mm long; rachilla produced; glume 3.0–3.5 mm long, lanceolate, acute, shortly hairy, keel scabrid, awn 1–3 mm long; lemma hairy, 5-nerved, awned from ± middle of back, awn geniculate, twisted; palea ± equal to slightly shorter than lemma; callus glabrous to tufted hairy, up to $^1/_3$ the lemma length; anther 0.7–1.8 mm long.

[This is the only FSA *Agrostis* species with awned glumes.]

*Flowering*: October to January. *Ecology*: Wet places. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. NC, WC.

Anatomy voucher: *Ellis 1159*.
Voucher: *Acocks 17581*.


*Agrostis schlechteri*

**Agrostis schlechteri** Rendle, in *Journal of Botany*: 380 (1899). Type: South Africa, *Rudolph Schlechter 10274*.

Alternate name: *Lachnagrostis schlechteri* (Rendle) Rúgolo & A.M.Molina

Annual 30–650 mm high. Leaf blade to 100 × 2.0–2.5 mm. Inflorescence open, 90–150 mm long, branches ascending. Spikelet 3.0–3.5 mm long; rachilla $^1/_2$–$^3/_4$ as long as spikelet; glume 3.0–3.5 mm long, lanceolate, acute, tinged with purple, keel scaberulous; lemma hairy, 5-nerved; awned from below middle, awn very fine; palea shorter than lemma; callus with short hairs, up to $^1/_3$ the lemma length; anther 1.0 mm long.

*Flowering*: January to April. *Ecology*: Wet places in mountains. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

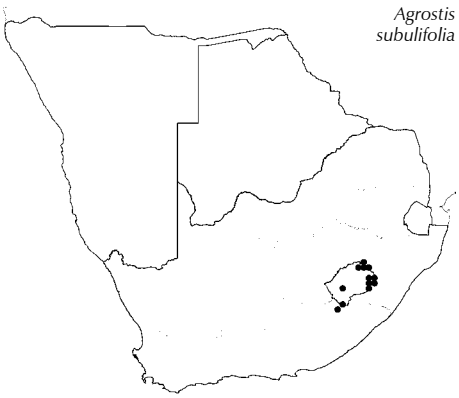
Voucher: *Esterhuysen 27690*.

**Agrostis subulifolia** Stapf, in *Kew Bulletin of Miscellaneous Information* 1910: 130 (1910). Type: South Africa, Eastern Cape, Barkly East Division, damp slopes of Ben McDhui (Wittebergen), 228 m, *Galpin 6911*; in a marsh at the base of Doodman's Krans mountain, 2 550m, *Galpin 6910* (syntypes).

Tufted, delicate perennial, or possibly annual 50–300 mm high; hygrophyte. Leaf blade to 70 × 0.5–1.0 mm, folded. Inflorescence 15–80 mm long, contracted to open, branches ascending. Spikelet 2–3 mm long; rachilla not produced; glume 3 mm long, acute to acuminate, usually dark purple, keel scaberulous; lemma glabrous, 5-nerved, awnless or awned from middle of back; awn straight; palea ± equal to lemma; callus glabrous to minutely tufted hairy; anther 0.8–1.7 mm long.

*Flowering*: January to March. *Ecology*: Mountain bogs. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. L, FS, KZN, EC.

Anatomy vouchers: *Ellis 1399* & *3180*.
Voucher: *Coetzee 574*.




## *Aira L.

Linnaeus: 63 (1753); Stapf: 463 (1899); Chippindall: 86 (1955); Clayton: 84 (1970); Launert: 79 (1971); Clayton: 371 (1972); Tutin: 227 (1980); Clayton & Renvoize: 131 (1986); Gibbs Russell et al.: 35 (1990); Linder: 55 (1991); Watson & Dallwitz: 85 (1994); Sell & Murrell: 181 (1996).

Annual, small, tufted. **Leaf blade** expanded or folded, almost filiform; *ligule* a hyaline, unfringed membrane. **Inflorescence** a panicle, open or rarely contracted, primary branches often paired; *spikelets* solitary, pedicelled. **Spikelet** small, laterally compressed, disarticulating above glumes; *glumes* persistent, ± equal, similar, ± as long as spikelet, ovate or elliptic, delicately membranous, acute, obtuse to subobtuse, keeled, 1-nerved, awnless. **Florets** 2, bisexual; *lemma*

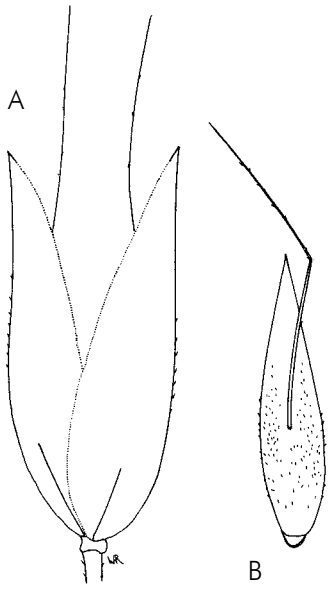



Figure 19.—*Aira cupaniana*. A, spikelet (3.6 × 1.0 mm); B, lemma (3.0 × 0.4 mm). Artist: W. Roux.



Figure 20.—*Aira cupaniana* spikelet (2–3 mm). Photographer: M. Koekemoer.




Figure 21.—*Aira cupaniana*. Artist: W. Roux.

firmer than glumes, lanceolate or ovate-lanceolate, rounded on the back, obscurely 5-nerved, glabrous or hairy with hairs sometimes in tufts, acute, sometimes acuminate, often minutely 2-lobed, dorsally awned from below middle or awnless, *awn* geniculate or slightly bent, sometimes upper lemma awned and lower awnless; *palea* slightly shorter than lemma, narrow, 2-lobed, membranous or subhyaline. **Lodicules** 2, delicate. **Stamens** 3. **Ovary** glabrous; styles plumose. **Caryopsis** ellipsoid; fusiform; hilum short; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (polyploidy).

**Species** 8, Europe and Mediterranean to Iran; most species widespread weeds; 2 naturalised in southern Africa, Drakensberg area of KwaZulu-Natal to Eastern Cape, Western Cape and Northern Cape.

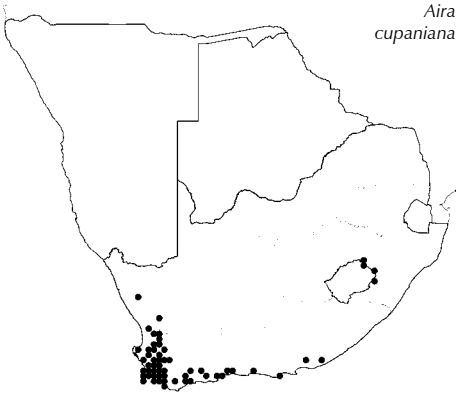
Species treatment by A.C. Mashau.

### Quick guide to easily confused taxa:

1. Ligule a fringe of hairs . . . . . **Pentameris airoides**
   Ligule an unfringed membrane . . . . . 2
2. Glumes shorter than spikelet; lemma awnless; elongated internode between florets . . . . . ***Periballia minuta**
   Glumes longer than spikelet; lemma awned; no elongated internode between florets . . . . . ***Aira cupaniana**

### Key to species:

1. Inflorescence a spike-like panicle; pedicels mostly shorter than spikelets; lemma awned from a $^1/_4$ above base . . . . . ***A. praecox**
   Inflorescence an open, spreading or sometimes contracted panicle; pedicels mostly longer than spikelets; lemma awned from a $^1/_3$ above base or from just below middle . . . . . 2
2. Glumes obtuse or subobtuse, denticulate towards apex, often mucronate; lower floret often awnless . . . . . ***A. cupaniana**
   Glumes acute to acuminate, scabridulous on keel; both florets awned . . . . . ***A. caryophyllea**
   *(not in FSA, European species said to occur in other parts of Africa)*



*Aira cupaniana*

***Aira cupaniana** Guss., in *Florae Siculae Synopsis* 1: 148 (1843). Type: Sicily.

Tufted annual 30–400 mm high. Leaf blade 10–95 × to 3 mm; sheath not inflated. Inflorescence an open, spreading or sometimes contracted panicle; pedicels mostly longer than spikelets. Spikelet 2 to 3 mm long; glumes pear-shaped, obtuse or subobtuse, denticulate towards apex, often mucronate; lemma awned from a $^1/_3$ above the base or from below the middle; awn 2 to 3 mm long, column 0.8–1.2 mm long; lower lemma awned, sometimes awnless; anther 0.3–0.6 mm long.

[A variable species known to intergrade with *A. caryophyllea* and in Africa the two species can be difficult to separate (Clayton 1970). In the past, FSA specimens were distributed between the two species, *A. caryophyllea* L. and *A. cupaniana* Guss. but are here treated under *A. cupaniana*, pending further research.]

*Flowering*: September to January. *Ecology*: Shallow soils in damp to wet areas. *Frequency in southern Africa*: Common. *Distribution*: Naturalised from Europe. KZN, NC, WC, EC. *Economics*: Weed.

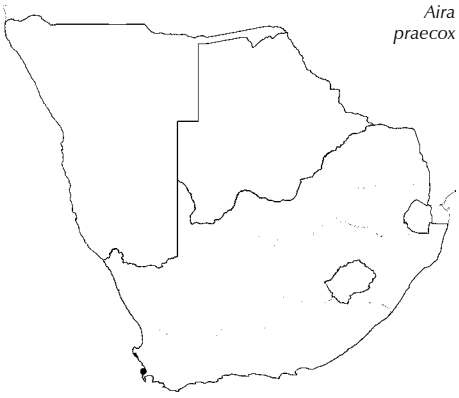
Illustration: Chippindall: 86, fig. 57 (1955).
Anatomy vouchers: *Ellis 614, 2218, 5119, 5123 & 5143*.
Voucher: *Davidse 33862*.

*__Aira praecox__ L., in *Species plantarum* 65 (1753). Type: Europe.

Delicate annual to 180 mm high; erect, spreading or prostrate. Leaf blade 30 × 1 mm; sheath smooth to finely scaberulous. Inflorescence a spike-like panicle, branches erect, very short; pedicels mostly shorter than spikelets. Spikelet 3 mm long; glumes acute, scaberulous in upper 1/3; lemma awned from a 1/4 above the base; awn 3.5–3.7 mm long, column 1.5 mm long; anther 0.2 mm long.

*Flowering*: October. *Ecology*: Well-drained, sandy, gravelly and rocky ground and dunes; preferring acid soils. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from Europe, where it is widespread. Naturalised in Northern America, South America and Australia. WC.

Voucher: *Linder 5045*.




## **Alloteropsis** J.Presl

Presl: 343 (1830); Stapf: 482 (1919); Chippindall: 423 (1955); Butzin: 123 (1968); Clayton & Renvoize: 615 (1982); Gibbs Russell: 205 (1983); Frean et al.: 901 (1983); Clayton & Renvoize: 282 (1986); Clayton: 58 (1989); Gibbs Russell et al.: 36 (1990); Watson & Dallwitz: 91 (1994).

Annual or perennial, tufted or decumbent. **Leaf blade** expanded or ± convolute, linear to lanceolate, glabrous or hairy with tubercle-based hairs; *ligule* a fringed membrane or a fringe of hairs. **Inflorescence** of spike-like, 1-sided racemes, digitate or subdigitate, usually on a short central axis; *spikelets* 2- or 3-nate, rarely solitary or in clusters, unequally pedicelled. **Spikelet** ovate to elliptic, dorsiventrally compressed, falling with glumes; *glumes* unequal; lower glume shorter than the spikelet, membranous, acute to acuminate, pubescent, 3–5-nerved, usually awnless; upper glume equals lemma, elliptic, sometimes with broad auricled flaps, membranous to chart-

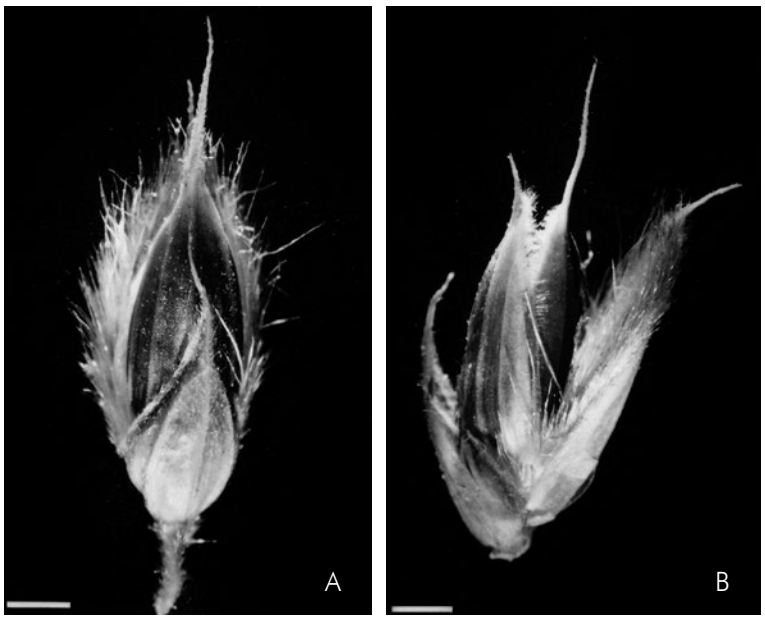



Figure 22.—*Alloteropsis semialata* subsp. *eckloniana*, spikelet. A, abaxial view (5–8 mm); B, side view (5–8 mm). Photographer: M. Koekemoer.




Figure 23.—*Alloteropsis semialata* subsp. *semialata*. A, plant; B, ligule. Artist: C.D. Bartman

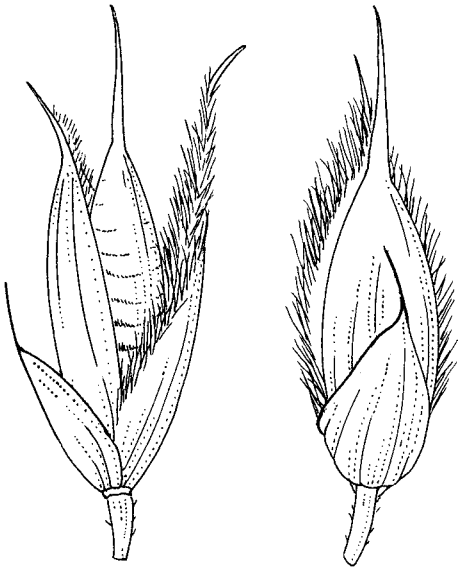


Figure 24.—*Alloteropsis semialata* subsp. *eckloniana* spikelets. Artist: W. Roux.

aceous, 5-nerved, hairy on margins. **Florets** 2; *lower floret* male or sterile, lemma resembling upper glume but not hairy, indurated, 3–5-nerved; palea shorter than lemma, deeply 2-lobed with marginal flaps, awnless; *upper floret* bisexual, *lemma* similar in texture to glumes, membranous to chartaceous, 5-nerved, long attenuate into an awn or mucro, *awn* straight; *palea* as long as lemma, 2-keeled. **Lodicules** 2, broadly cuneate. **Stamen**s 3. **Ovary** glabrous; styles plumose above. **Caryopsis** ellipsoid to oblong; hilum short; embryo large. **Photosynthetic pathway**: Usually $C_4$ but $C_3$ in *A. semialata* subsp. *eckloniana*. The anatomical organisation when $C_4$ is non-conventional. Biochemical type PCK (in Australian $C_4$ *A. semialata*), or NADP-ME (in southern African $C_4$ *A. semialata*), evidently more biochemical typing needed in relation to the intergrading $C_4$ anatomical forms and the problematical taxonomy. Usually XYMS+, or XYMS- in $C_4$ forms of *A. semialata*. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 9$ (polyploidy).

**Species** ± 8, Old World tropics; 3 in southern Africa, Namibia (Caprivi), Botswana, Swaziland, Lesotho, South Africa: North West, Limpopo, Gauteng, Mpumalanga, Free State, KwaZulu-Natal and Eastern Cape.

Species treatment by M.J. Moeaha.

**Quick guide to easily confused genera:**

1. Upper lemma awned . . . . . **Alloteropsis**
   Upper lemma awnless . . . . . 2
2. Lower glume as long as to longer than spikelet . . .**Megaloprotachne**
   Lower glume shorter than the spikelet length, often absent . . . . . **Digitaria**

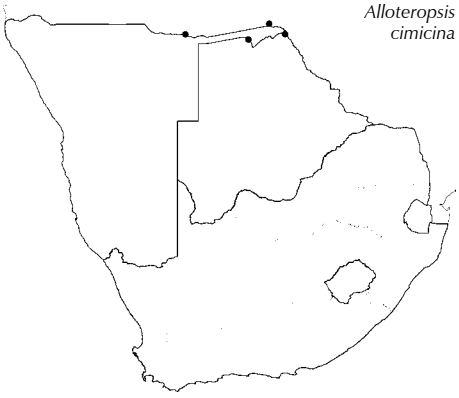
**Key to species:**

1. Upper palea papillose with globular warts; spikelet (2.5)3.0–4.5 (–5.5) mm long . . . . . 2
   Upper palea glabrous or sparsely hairy, not papillose; spikelet 5–8 mm long . . . . . 3
2. Annual; base sheaths sparsely hairy to glabrous; northern Namibia and Botswana . . . . . **A. cimicina**
   Perennial; base sheaths densely hairy; KwaZulu-Natal and Mpumalanga . . . . . **A. papillosa**

3(1). Basal leaf sheath nerves forming ribs 0.5–1.1 mm wide; racemes (40)60–100(170) mm long, spikelets usually loosely arranged and light-coloured; leaf blades usually up to 5 mm wide but can be up to 7 mm wide, tapering gradually to the apex . . . . . **A. semialata** subsp. **semialata** (C4)
   Basal leaf sheath nerves usually up to 0.3 mm wide; racemes (30)40–70(160) mm long, spikelets usually tightly packed together and dark-coloured; leaf blades (3)4–8(12) mm wide, usually flat, tapering abruptly to the apex . . . . . **A. semialata** subsp. **eckloniana** (C3)

[It is extremely difficult to find clear morphological characters to separate the subspecies of *A. semialata*, but in general subsp. *semialata* has narrow leaves that are often folded, especially at the apex and longer paler racemes, while subsp. *eckloniana* has broad flat leaves and shorter, darker racemes. The best character is the width of the nerves on the basal sheaths, but these may be difficult to see as only some nerves at the very base may be broader and the sheaths may also sometimes be lost during collecting.]

**Alloteropsis cimicina** (L.) Stapf, in *Flora tropical Africa* 9: 487 (1919). Type: India.

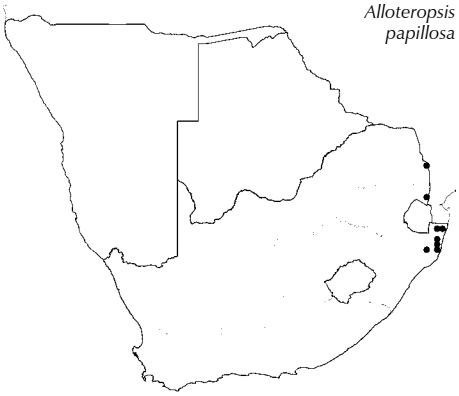

*Alloteropsis cimicina*

Tufted annual 300–1 000 mm high; culms erect or ascending, nodes hairy. Leaf blade 30–150 × 5–10 mm, base amplexicaul, bulbous-based hairs present, margins ciliate. Spikelet 3.5–5.5 mm long; upper floret palea papillose with globular warts; anthers 1.0–1.8 mm long.

*Flowering*: December to May. *Ecology*: Moist open places on sandy clay soil. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to East Africa and throughout the Old World tropics, N, B.

Illustration: Clayton: 63, tab 15 (1989).
Anatomy vouchers: *Killick & Leistner 3327.*
Voucher: *Killick & Leistner 3027.*

**Alloteropsis papillosa** Clayton, in *Kew Bulletin* 33: 21 (1978). Type: Kenya, Nairobi, *Mbuvi 469* (K, holo.).


*Alloteropsis papillosa*

Tufted perennial, 400–700 mm high; culm bases knotted; old basal leaf sheaths silky pubescent. Leaf blade 40–250 × 2–8 mm, base amplexicaul, bulbous-based hairs present, margins ciliate. Spikelet 3.0–4.5 mm long; upper floret palea papillose with globular warts; anthers 1.8–2.2 mm long.

[Combines the perennial habit and longer leaves of *A. semialata* with the ciliate blade margins and papillate palea of *A. cimicina*. Possibly of hybrid origin.]

*Flowering*: November to May. *Ecology*: Sandy soil in open or shaded habitats. *Distribution*: Northwards to tropical East Africa, M, KZN.

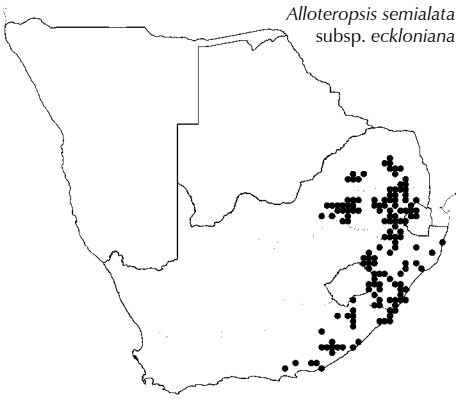
Anatomy vouchers: *Ellis 3567, 3562, 3638, 3563, 4073, 4075, 6026* & *Ward 3055*.
Voucher: *Ward 4140.*

**Alloteropsis semialata** (R.Br.) Hitchc.

*A. semialata* is a very variable species, both morphologically and photosynthetically, and is most unusual in having two photosynthetic types in one species and therefore two subspecies are recognised. *A. semialata* subsp. *semialata* has $C_4$ photosynthesis and old basal leaf sheaths with veins forming ribs 0.5–1.1 mm wide; while that of *A. semialata* subsp. *eckloniana* is $C_3$ and old basal leaf sheaths usually with veins to 0.3 mm wide.

**Alloteropsis semialata** (R.Br.) Hitchc. subsp. **eckloniana** (Nees) Gibbs Russ., in *Bothalia* 14: 211 (1983).

*A. semialata* (R.Br.) Hitchc. var. *ecklonii* (Stapf) Stapf, in *Flora tropical Africa* 9: 485 (1919).

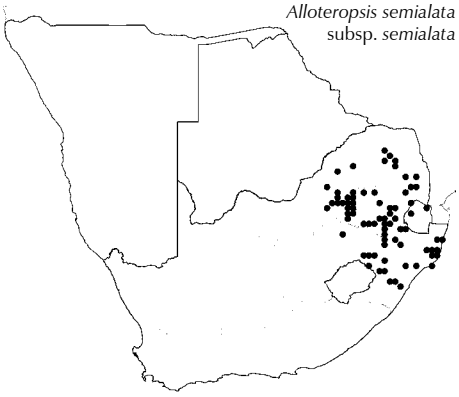

*Alloteropsis semialata* subsp. *eckloniana*

Short-rhizomatous and tufted perennial 250–1 100 mm high; basal sheaths V-shaped in silhouette, usually bulbous, with veins to 0.3 mm wide. Leaf blade flat, base tapering, tapering abruptly to the apex, velvety to sparsely hairy, hairs not bulbous-based, margins not ciliate. Inflorescence with racemes usually shorter than 80 mm, spikelets tightly packed, dark-coloured. Spikelet 5–8 mm long; upper floret palea glabrous or sparsely hairy; anthers 2.2–3.0 mm long.

[This subspecies is unusual in the Paniceae because it has $C_3$ photosynthesis.]

*Flowering*: September to March (sometimes in other months). *Ecology*: Grassland, rocky places and forest margins; usually at higher altitudes and more acid soil than subsp. *semialata*. *Frequency in southern Africa*: Common. *Distribution*: North to Tanzania at high altitudes. S, L, LIM, NW, G, M, FS, KZN, EC. *Economics*: Natural pasture only at the young stage, due to leaves that become hard at maturity.

Anatomy vouchers: *Ellis 1827, 1828, 1829, 1854, 1861, 1862, 2813, 2830, 3806, 3809, 3811 4305; Saayman 3, 17a, 17b, 25b & 25c.*
Voucher: *Smook 2586*.


*Alloteropsis semialata* subsp. *semialata*

**Alloteropsis semialata** (R.Br.) Hitchc. subsp. **semialata**, in *Contributions from the United States National Herbarium* 12: 210 (1909). Type: Australia.

Short-rhizomatous, tufted perennial 300–1 300(–1 500) mm high; basal sheaths bulbous, rounded in silhouette, with ribs 0.5–1.1 mm wide. Leaf blade usually curved inward or loosely rolled, sparsely hairy, hairs not bulbous-based, base tapering, gradually tapering to the apex, margins not ciliate. Inflorescence with racemes usually longer than 80 mm, spikelets loosely arranged and light-coloured. Spikelet 5–8 mm long; palea of upper floret glabrous or sparsely hairy; anthers 2.5–2.8 mm long.

*Flowering*: September to March. *Ecology*: Grasslands and bushveld. *Frequency in southern Africa*: Common. *Distribution*: Old world tropics. S, LIM, NW, G, M, FS, KZN. *Economics*: Natural pasture only at the young stage, due to leaves that become hard when they mature.

Illustration: Chippindall: 423, fig. 532 (1955).
Anatomy vouchers: *Ellis 1244, 1785, 1789, 2809, 3160, 3483, 3484, 3486, 3506, 3528, 3775, 3807, 3808, 3810 & 3813*.
Voucher: *Van der Schijff 2035*.

## *Alopecurus L.

Linnaeus: 60 (1753); Clarke: 241 (1980); Crins: 782 (2007).

Annual or perennial; sometimes rhizomatous or stoloniferous; culms occasionally corm-like at base; nodes glabrous. **Leaf blade** flat or involute; ligule an unfringed membrane. **Inflorescence** a spike-like, cylindrical to capitate panicle; *spikelet* pedicelled. **Spikelet** laterally compressed; disarticulating with the glumes; glumes equal to, to longer than spikelet, similar, keeled, 3-nerve acute to obtuse, awn present or absent. **Floret** 1, bisexual; lemma less firm to similar in texture to glumes, margins often connate in lower half, keeled, 3–5-nerved, apex acute to truncate, awned dorsally from base to about halfway; *awn* straight or geniculate; *callus* glabrous; palea greatly reduced to absent. **Lodicules** absent. **Stamens** 3. **Ovary** glabrous. **Caryopsis** glabrous, hilum short. **Photosynthetic pathway**: $C_3$; XyMS+.

**Species** 36, North temperate and South America; 1 naturalised, southern Africa: **Alopecurus arundinaceus* Poir., Mpumalanga.

Species treatment by L. Fish.

*__Alopecurus arundinaceus__ Poir., in *Encyclopedie methodique* 8: 776 (1808). Type: Cult. Paris.

CREEPING MEADOW FOXTAIL

Short-lived erect perennial 300–100 mm high; rhizomatous. Leaf blade to 400 × 3–10 mm; ligule truncate. Inflorescence spike-like, cylindrical. Spikelet 3.6–5.5 mm long; glumes connate near base, keels long hairy; apices divergent; lemma connate in lower $^1/_3$, truncate to obtuse, awn 1.5–5.5 mm long; anthers 2.0–3.0 mm long.

*Flowering*: December. *Ecology*: In wetlands. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from Eurasia and North Africa; introduced as fodder elsewhere. M. *Economics*: Weed, possible invader; often introduced into countries as fodder.

Illustration: Crins: 783.
Voucher: *S. Mofutsonyana s.n.*

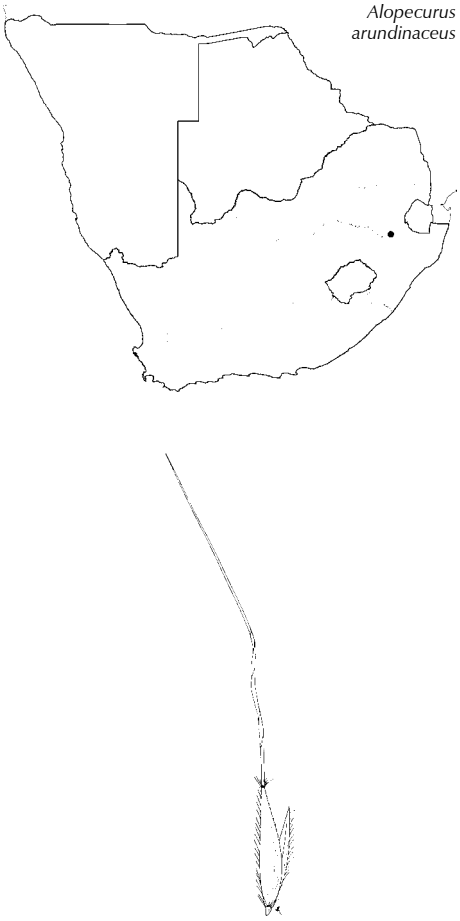



Figure 25.—*Amelichloa clandestina*. Floret showing lemma with awn and callus (left), 26.0 × 1.5 mm; palea (right). Artist: W. Roux.

## *__Amelichloa__ Arriaga & Barkworth

Arriaga & Barkworth: 145 (2006); Arriaga: 181 (2007).

Perennial, tufted; rhizomatous, leaves mostly basal; culms erect, not branching at upper nodes. **Leaf blade** stiff, pungent, rolled; auricles absent; *ligule* a fringed membrane. **Inflorescence** a panicle, contracted to open. **Spikelet** disarticulating above glumes; *glumes* longer than spikelet (excluding awns), acute to acuminate, 1–5-nerved. **Floret** 1, terete; *lemma* hairy, with a ring of short hairs below lemma-awn junction; crown absent; *awn* 3–80 mm long, usually scabrid, once or twice geniculate; *palea* $^3/_4$ as long as to longer than lemma, flat, hairs 0.2–1.0 mm long, nerves usually ending at or near rounded apex; *callus* obtuse, hairy. **Lodicules** 3. **Stamens** 3, apex penicillate. **Ovary** glabrous; stigmas 2. **Caryopsis** obovoid, 3 longitudinal smooth ribs present.

**Species** ± 5, 1 naturalised in southern Africa. Free State, Eastern Cape and Western Cape.

Species treatment by L. Fish.

### Quick guide to easily confused genera/taxa:

1. Lemma apex fused into a crown . . . . . *__Nassella__
   Lemma apex without crown . . . . . 2
2. Apex of lemma and/or lower part of awn with a plume of long hairs, 4–8 mm long, . . . . . 3
   Lemma apex and/or awn base glabrous or hairy, hairs less than 3.5 mm, not plume-like . . . . . 4
3. Apex of lemma and base of awn with a plume of long hairs; callus obtuse; perennial . . . . . *__Jarava plumosa__
   Only basal part of awn with a plume of long hairs above articulation; callus pungent; annual . . . . . **Stipagrostis anomala**
4(2). Awn 30–100 mm long; callus pungent . . . . . 5
   Awn up to 25 mm long; callus blunt . . . . . 6
5. Plant perennial; awn lower part not obviously twisted . . . . . *__Austrostipa variabilis__
   Plant annual; awn lower part strongly and obviously twisted . . . . . **Stipa capensis**



Figure 26.—*Amelichloa clandestina* specimen.

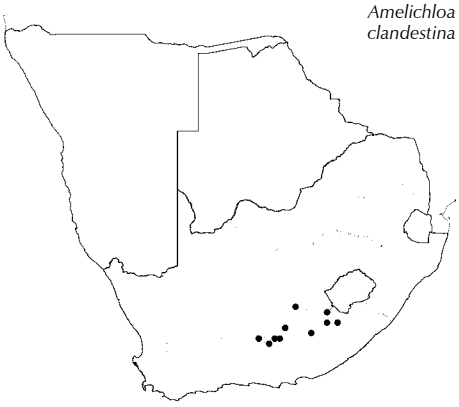





Figure 27.—*Ammophila arenaria* specimen.

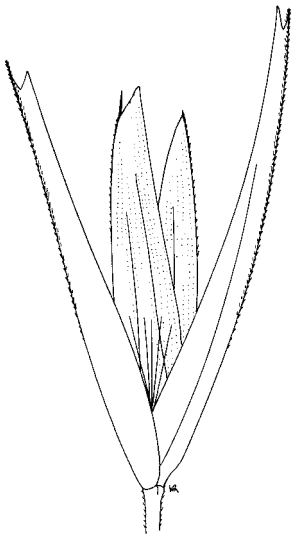


Figure 28.—*Ammophila arenaria* spikelet. Artist: W. Roux.

6(4). Plant annual; callus hairs up to 2.5 mm long . . . **Aristida parvula**
Plant perennial; callus hairs up to 1 mm long . . . . . 7
7. Leaves flat . . . . . **Stipa dregeana**
Leaves convolute or rolled . . . . . ***Amelichloa clandestina**

***Amelichloa clandestina** (Hack.) Arriaga & Barkworth, in *Sida* 22: 145 (2006). Type: México.

*Stipa clandestina* Hack., in *Repertoriu specierum Novarum. regni vegetabilis; Centrablatt für Sammlung und Veröffentlichung von Einzeldiagnosen neuer Pflanzen* 8: 516 (1910).

*Achnatherum clandestinum* (Hack.) Barkworth, in *Phytologia* 74: 6 (1993).

Densely tufted erect perennial 500–1 500 mm high, forming big hard tufts; rhizomatous; base knotty. Leaf blade to 750 × about 1 mm, rolled, setaceous; ligule a fringed membrane. Inflorescence branches spreading, longest lowest branch 40–120 mm long. Spikelet 5–7 mm long (excluding awn); glumes ± equal, longer than spikelet, greenish, acuminate, 3-nerved; lemma strongly and firmly overlapping, hairy in parts, apex with a ring of hairs 0.7–1.0 mm long below lemma-awn junction; awn 11–23 mm long, geniculate, twisted, glabrous or scabrid; palea shorter than lemma, hairy in centre between nerves, 2-nerved; callus 0.3–0.6 mm long, obtuse, hairs 0.5–0.8 mm long; anther 3–4 mm long, apex penicillate .

*Flowering*: November to May. *Ecology*: Disturbed places in grassland. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from Mexico and Colombia. G? (Cult.?), FS, WC, EC. *Economics*: Introduced as pasture; weedy escape.

Illustrations: Arriaga: 183 (2007).
Voucher: *Acocks 19284*.

## *Ammophila Host

Host: 24 (1809); Hubbard: 262 (1954); Chippindall: 93 (1955); Clayton & Renvoize: 136 (1986); Gibbs Russell et al.: 38 (1990); Watson & Dallwitz: 97 (1994); Sell & Murrell: 194 (1996).

Tufted perennial, long rhizomatous; culms creeping extensively and rooting from lower nodes. **Leaf blade** rigid, convolute, pungent; *ligule* an unfringed membrane. **Inflorescence** a dense, cylindrical, spike-like panicle; *spikelets* shortly pedicelled. **Spikelet** strongly laterally compressed, disarticulating above glumes, rachilla extension present; *glumes* 10 mm and longer, ± equal to, to longer than spikelet, keeled, acute, awnless; lower glume 1-nerved; upper glume 1–3-nerved. **Floret** 1, bisexual; *lemma* lanceolate, similar in texture to glumes, glabrous, keeled, 5–7-nerved, 2-lobed with

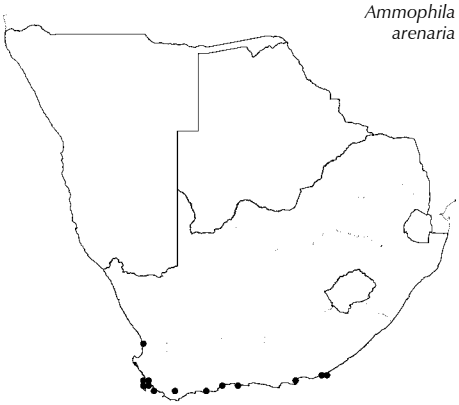


Figure 29.—*Ammophila arenaria* spikelet (10–15 mm). Photographer: M. Koekemoer.

subapical mucro; *callus* short, hairy; *palea* almost equalling lemma, 2–4-nerved. **Lodicules** 2. **Stamens** 3. **Ovary** glabrous. **Caryopsis** ellipsoid; hilum $^2/_3$ of fruit length, long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (high polyploidy).

**Species** 2, north temperate; 1 naturalised in southern Africa: **Ammophila arenaria* (L.) Link, Western and Eastern Cape.

Species treatment by M.T. Nembudani.


*Ammophila arenaria*

**Ammophila arenaria* (L.) Link, in *Hortus regius botanicus berolinensis* 1: 105 (1827). Type: Europe.

MARRAM GRASS

Robust, tufted perennial 600–1 300 mm high; rhizomatous; culms creeping through blown sand. Leaf blade to 750 mm long, rolled, appearing setaceous; ligule a conspicuous, tapering, unfringed membrane that splits into two. Inflorescence very narrow, spike-like; old inflorescences persistent until autumn. Spikelet 9–13 mm long; callus hard, knob-like; anther 4.5–6.5 mm long.

*Flowering*: October to December. *Ecology*: Seaside dunes. *Distribution*: Naturalised from Europe. Widely naturalised. WC, EC. *Economics*: Erosion control on seaside dunes.

Illustration: Hubbard: 287 (1984); Chippindall: 95, fig. 65 (1955).
Anatomy vouchers: *Ellis 2333* & *Acocks 19076*.
Voucher: *Liebenberg 4024*.



Figure 31.—*Andropogon appendiculatus*. Artist: W. Roux.

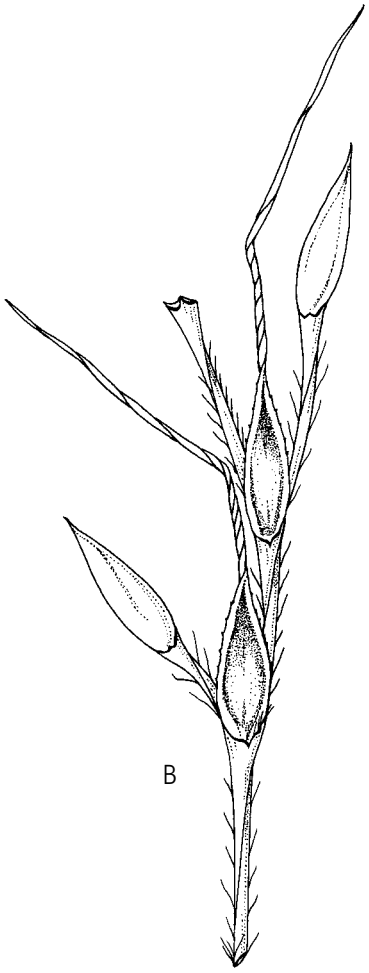
## **Andropogon** L.

Linnaeus: 1045 (1753); Stapf: 334 (1898); Chippindall: 495 (1955); Clayton: 470 (1964); Anderson: 5 (1966); Clayton & Renvoize: 767 (1982); Clayton & Renvoize: 349 (1986); Gibbs Russell et al.: 38 (1990); Watson & Dallwitz: 109 (1994); Sales: 60 (2002).

*Diectomis* Kunth: 69 (1815) name conserved, not of P.Beauv.; Chippindall: 504 (1955).

Perennial, rarely annual, tufted, rarely straggling, sometimes rhizomatous. **Leaf blade** linear, never aromatic; *ligule* an unfringed to fringed or fimbriate membrane. **Inflorescence** of spike-like racemes, usually paired or digitate, rarely solitary, terminal or axillary and crowded into a spatheate false panicle, internodes filiform, linear to ovoid or clavate, raceme-bases unequal, ± terete, racemes not deflexed at maturity; *spikelets* paired, in long–short combinations: one sessile, the other pedicelled. **Sessile spikelet** (2 or 3)5–11 mm long, dorsiventrally or laterally or not noticeably compressed, fall-


Figure 30.—*Andropogon chinensis* spikelet (5–7 mm). Photographer: M. Koekemoer.



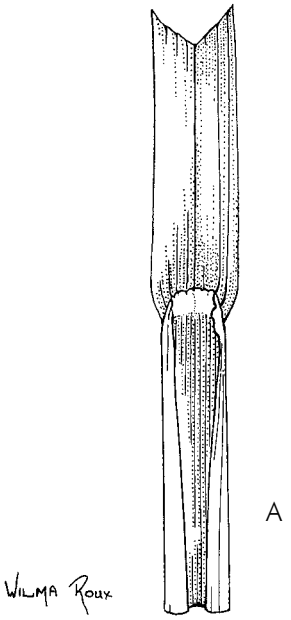




Figure 32.—*Andropogon appendiculatus*. A, ligule; B, portion of raceme with sessile and pedicelled spikelets. Artist: W. Roux.

ing with glumes; *glumes* ± equal, dissimilar, glabrous or hairy; lower glume indurated, flat, shallowly furrowed or deeply grooved on back, sometimes pitted, 2-keeled, keels lateral or dorsal, wingless or narrowly winged, margins folded; upper glume keeled upwards, awnless, mucronate or awned. **Florets** 2; *lower floret* reduced to a lemma, hyaline, 2-nerved, awnless; *upper floret* bisexual, *lemma* less firm in texture than glumes, membranous or firm, 2-lobed, awned from sinus, *awn* geniculate, conspicuous with a glabrous or hairy column, sometimes entire and awnless; *callus* obtuse, short, inserted in concave top of internode; *palea* hyaline, nerveless, scale-like or 0. **Lodicules** 2, minute. **Stamens** 1–3. **Ovary** glabrous; styles plumose. **Caryopsis** narrowly lanceolate to oblong, subterete to plano-convex. **Pedicelled spikelet** more conspicuous than sessile spikelet, occasionally suppressed, male or barren, usually awnless. **Photosynthetic pathways**: $C_4$; biochemical type NADP-ME (3 species); XyMS-. **Cytology**: $x = 5$, 10 (high polyploidy).

**Species** ± 100, pantropical; 15 in southern Africa, widespread.

Species treatment by L. Fish.

### Quick guide to easily confused genera/taxa:

1. Callus oblique on apex of internode, not inserted . . . . . 2
   Callus inserted into apex of internode. . . . . 3
2. Sessile spikelet upper glume awnless . . . . . **Hyparrhenia**
   Sessile spikelet upper glume awned . . . . . **Elymandra**
3(1). Both spikelets of spikelet pair have upper lemmas long awned. . . . 4
   Only sessile spikelet has upper lemma long awned . . . . . 5
4. Sessile or subsessile spikelet lower palea well developed . . . . . **Ischaemum**
   Sessile spikelet lower palea absent or reduced . . . . . **Eulalia**
5(3). Callus pungent; pedicelled spikelet lower glume usually awned, awn 0.5–12.0 mm long . . . . . **Diheteropogon**
   Callus obtuse; pedicelled spikelet lower glume awnless or awn not longer than 0.5 mm . . . . . **Andropogon schirensis**

### Key to species:

1. Annual . . . . . **A. fastigiatus**
   Perennial . . . . . 2
2. Sessile spikelet lower glume with upper part winged, wings often asymmetrical . . . . . 3
   Sessile spikelet lower glume not winged . . . . . 5
3. Sessile spikelet lower glume distinctly pitted . . . . . **A. lacunosus**
   Sessile spikelet lower glume without pits (shallow depressions may be present) . . . . . 4
4. Plant base densely hairy; pedicel and internodes with one margin long hairy (maybe difficult to see or only basally hairy), other margin glabrous or sparsely short hairy; sessile spikelet 9–16 mm long, upper lemma awn 15–30 mm long . . . . . **A. distachyos**
   Plant base glabrous or hairs scattered; pedicel and internode margins both clearly densely long hairy; sessile spikelet 5.0–8.5 mm long, upper lemma awn 10–15 mm long . . . . . **A. amethystinus**
5(2). Sessile spikelet upper lemma awnless . . . . . 6
   Sessile spikelet upper lemma awned . . . . . 7
6. Racemes 4–15 per spatheole, 60–120 mm long; internode long, slightly shorter than spikelet; sessile spikelet lower glume usually shallowly grooved; plant robust; culms 3.5–6.0 mm wide . . . . . **A. brazzae**
   Racemes 1(2) per spatheole, 30–40 mm long; internode ± $^1/_5$ the length of sessile spikelet; sessile spikelet lower glume flat; plant slender; culms 1–3 mm wide . . . . . **A. festuciformis**

7(5). Inflorescence silky plumose; internode and pedicel hairs at least as long as sessile spikelet; pedicellate spikelet usually conspicuously reduced or absent . . . . . 8
Inflorescence not silky plumose; internode and pedicel hairs, when present, not longer than sessile spikelet; pedicellate spikelet not conspicuously reduced . . . . . 10
8. Sessile spikelet 2–3 mm long; inflorescence hairs at least twice as long as sessile spikelet; pedicellate spikelet always lacking . . . . . **A. eucomis**
Sessile spikelet 3.5–6.0 mm long; inflorescence hairs as long as sessile spikelet; pedicellate spikelet present but maybe reduced, rarely absent . . . . . 9
9. Racemes 4–10 per spatheole; plants robust, 900–1 800 mm high . . . . . **A. huillensis**
Racemes 2(3) per spatheole; plants slender, 300–900 mm high . . . . . **A. laxatus**
10(7). Sessile spikelet upper glume awned . . . . . 11
Sessile spikelet upper glume awnless . . . . . 12
11. Internode and pedicel clavate; callus inserted into cup-like internode apex . . . . . **A. chinensis**
Internode and pedicel linear, filiform; callus on top of apex, not inserted . . . . . **A. mannii**
12(10). Pedicelled spikelet lower glume appears ribbed due to many nerves equidistant from each other . . . . . 13
Pedicelled spikelet lower glume not ribbed, central nerve prominent, 2 to 3 slender lateral nerves are widely spaced . . . . . 15
13. Sessile spikelet lower glume grooved next to midrib, flat on either side to keels; leaf blade base petiole-like and usually reduced to midrib; leaves usually cauline . . . . . **A. gayanus**
Sessile spikelet lower glume deeply grooved; leaf base not petiole-like; leaves basal . . . . . 14
14. Sessile spikelet lower glume keels separate; callus broadly obtuse; basal parts and rhizomes knotted; basal sheaths glabrous; mountain sourveld . . . . . **A. ravus**
Sessile spikelet lower glume keels nearly meeting; callus obtuse to subacute; basal parts and rhizomes straight; basal sheaths hairy at base (often only at very base where roots come out); various habitats . . . . . **A. schirensis**
15(12). Internode apex and callus point glabrous or very sparsely minutely hairy; inflorescence subdigitate or racemes scattered along central axis . . . . . **A. brazzae**
Internode and callus point densely hairy, hairs usually (0.2)0.3–0.5 mm long; inflorescence digitate to subdigitate . . . . . 16
16. Internode densely hairy at apex, apex almost straight, not a cup-like rim; culm long hairy below inflorescence, rarely glabrous . . . . . **A. mannii**
Internode cup-shaped, hairs inside; culm glabrous below inflorescence . . . . . **A. appendiculatus**

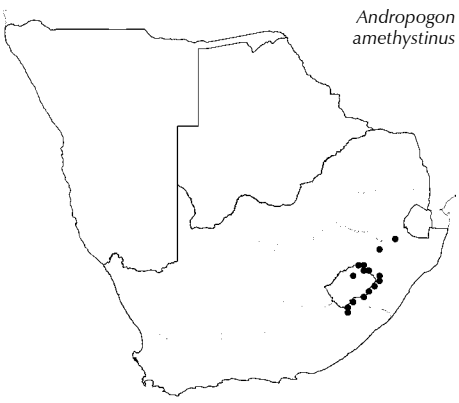
**Andropogon amethystinus** Steud., in *Synopsis plantarium glumacearum* 1: 371 (1854). Type: Ethiopia, Mt. Bachit, *Schimper* (P, holo.).

*A. pilosellus* Stapf, in *Flora tropical Africa* 9: 221 (1919). Type: Eritrea, At-Zien, *Pappi 5285*.

Tufted perennial 80–700 mm high, rhizomatous; base glabrous or only scattered hairs present; culms branched below. Leaf blade 10–150 × 1–4 mm, sparsely to densely hairy; base auriculate, tapering to a fine point; ligule a very short, fringed membrane. Inflorescence of 2 racemes per spatheole, 30–80 mm long; pedicels and internodes linear to slightly clavate, long hairy on both margins. Sessile spikelet 5.0–8.5 mm long; glumes lack pits between nerves; lower glume keels with hyaline asymmetrical wings, rarely wingless, flat or with a shallow median groove, bidentate, often mucronate or minutely awned, glabrous or with hairs longer than 1 mm; upper glume awn 2–6 mm long; upper lemma bilobed to about middle,



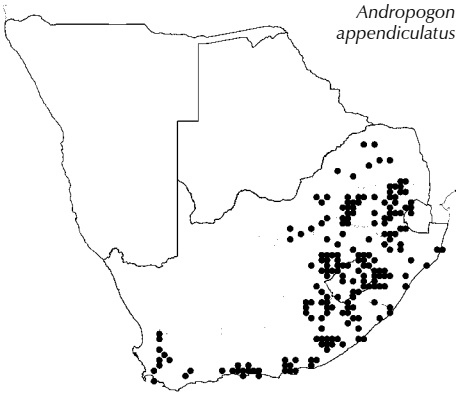

Figure 33.—*Andropogon distachyos*. A, long-awned, sessile spikelet (25.0 × 1.2 mm); B, short-awned, pedicelled spikelet (20 × 2 mm). *Andropogon lacunosus*. C, sessile and pedicelled spikelet pair showing pits or lacunae (20.0 × 2.3 mm). Artist: W. Roux.



awn 10–15 mm long, geniculate; callus oblong, up to 1 mm long; anthers 2–3 mm long. Pedicellate spikelet 4–8 mm long; male; glumes winged; lower glume awn 1.0–3.5 mm long; upper glume awn 0.7–2.0 mm long (rarely longer).

*Flowering*: February to June. *Ecology*: Mountain grassland. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards through Zambia, Malawi to East Africa and Ethiopia; also Nigeria, Yemen and India, L, FS, KZN, EC.

Illustration: Phillips: 323 (1995).
Anatomy vouchers: *Ellis 3163, 4996, 5727* & *Nicholas & Briggs 1973*.
Voucher: *Edwards 2819*.



*Andropogon appendiculatus*

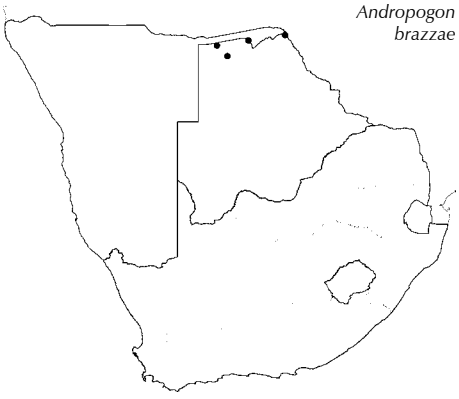
**Andropogon appendiculatus** Nees, in *Florae Africanae australioris* III: 105 (1841). Type: South Africa, Eastern Cape, Aliwal North, Klein Buffelsvallei near Gaatjie, *Drège s.n.* (S, lecto.).

VLEI BLUESTEM, BLOUGRAS

Densely tufted perennial 300–1 300 mm high; basal sheaths distichous, compressed, keeled, flattened, shining, yellow becoming brown; culms branched, yellowish usually reddish tinged. Leaf blade 150–500 × to 6 mm, folded, keeled; margins smooth, reddish, tapering to a fine point; ligule a minutely fringed membrane. Inflorescence subdigitate, 4–20 racemes per spathe, racemes (30–)60–150 mm long, usually dark purple; pedicels and internodes filiform, broadening at apex, hairy on margins; culm glabrous below inflorescence. Sessile spikelet (4)5–7 mm long; glumes lack pits between nerves, not winged; lower glume deeply and broadly grooved or ± flat, awnless, glabrous except for hairs on keels near apex; upper glume back concave; upper lemma bifid to middle; awn 9–15 mm long, geniculate; callus inserted in internode apex, socket with hairs inside; anthers ± 1.5 mm long. Pedicellate spikelet 3.5–6.5 mm long; lower glume with a prominent median nerve and a wide space between the 2 to 3 slender lateral nerves; male; shortly mucronate or awned; anthers 3–4 mm long.

*Flowering*: October to April. *Ecology*: Wet or shady places. *Frequency in southern Africa*: Common. *Distribution*: Zimbabwe, LIM, NW, G, M, S, FS, KZN, L, WC, EC. *Economics*: Palatable, well utilised grass.

Illustration: Chippindall: 500, fig. 403 (1955).
Anatomy vouchers: *Ellis 38, 715, 1373, 1800, 3375* & *5691*.
Voucher: *Huntley 456*.



*Andropogon brazzae*

**Andropogon brazzae** Franch., in *Bulletin de la Sociéte d'Histoire Naturelle d'Autun* 8: 326 (1895). Type: Congo-Brazzaville, between Mokeno and Mongo, *Brazza & Thollon 234*.

Robust, tufted perennial to 2 000 mm high; rhizomatous; basal sheaths keeled, flattened; culms stout, branched. Leaf blade to 600 × to 5 mm, keeled, tapering to a fine point; ligule a fringed membrane. Inflorescence nearly glabrous; racemes subdigitate or scattered along central axis, 4–15 per spatheole, 60–120 mm long, slender, flexuous; pedicel and internodes linear, filiform, rounded, broadening at apex to slightly clavate, both margins hairy or scabrid to glabrous, apex very sparsely minutely hairy or glabrous. Sessile spikelet (4.3)5.5–7.0 mm long; glumes lack pits between nerves; lower glume shallowly concave; upper glume ± flat; upper lemma

entire or bifid, awnless or awned; awn 3.5–8.0 mm long, geniculate. Pedicellate spikelet 4.5–7.5 mm long, male; awnless to shortly mucronate; lower glume median nerve prominent and a wide space between 2 to 3 slender lateral nerves; anthers 2–3 mm long.

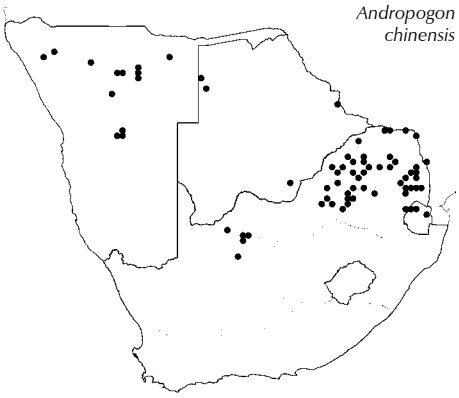
*Flowering*: February to May. *Ecology*: Beside permanent rivers. *Frequency in southern Africa*: Rare. *Distribution*: Zambia, Zimbabwe; also Angola and DRC, N, B.

Anatomy vouchers: *Ellis 3700* & *3740*.
Voucher: *Smith 2685*.

**Andropogon chinensis** (Nees) Merr., in Philipp, in *Journal of Science, Botany* 12: 101 (1917). Type: China.

*A. schinzii* Hack., in DC., in *Monographiae Phanerogamarum Prodromi nunc Continuatio, nunc Revisio* 6: 458 (1889). Type: Namibia, Amboland, Oshando, *Schinz 670* (Z, holo.; PRE, fg.).

HAIRY BLUEGRASS, TWEEVINGERGRAS


*Andropogon chinensis*

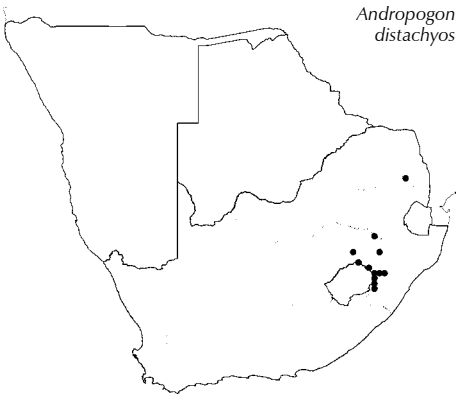
Densely tufted perennial 600–1 200 mm high; base slightly bulbous, knotty; culms branched, glaucous. Leaf blade 100–400 × to 8 mm, tapering to a fine point, sheaths glabrous, auricles well developed, triangular; ligule a fringed membrane, 1.5–4.0 mm long. Inflorescence of 2–3 racemes per spatheole, 30.5–90.5 mm long; pedicels and internodes inflated, clavate, lobed at apex, both margins hairy, hairs white, to 6 mm long; callus hairs visible at apex of internode. Sessile spikelet 5–8 mm long, strongly compressed between internode and pedicel; glumes lack pits between nerves; lower glume deeply and narrowly grooved, loosely hairy to glabrous; upper glume convex on back, bilobed, awn 4–9(12) mm long; upper lemma bidentate to middle, awn 20–35 mm long, geniculate; callus short, broad, obtuse, shallowly inserted in internode apex; anthers 2.2–3.5 mm long. Pedicellate spikelet 4–7 mm long, male; lower glume hairy, bilobed, awn (3.5)4.0–8.0 mm long; upper glume awn 0.7–5.0 mm long or awnless.

*Flowering*: December to June. *Ecology*: Rocky hillsides and often in poor sandy soil. *Frequency in southern Africa*: Common. Distribution: Northwards to tropical Africa; also Arabia, Asia to China. N, B, S, LIM, NW, G, M, NC. *Economics*: Only useful for grazing in young stage; becoming hard and unpalatable as it matures.

Illustrations: Clayton *et al.*: 769, fig. 180,3 (1982); Sales: 65, tab. 23, 4 (2002).
Anatomy vouchers: *Ellis 1907* & *2061*.
Voucher: *De Winter & Leistner 5487*.

**Andropogon distachyos** L., in *Species plantarum*: 1046 (1753). Type: Europe.

MOUNTAIN ANDROPOGON, TWEEVINGERGRAS

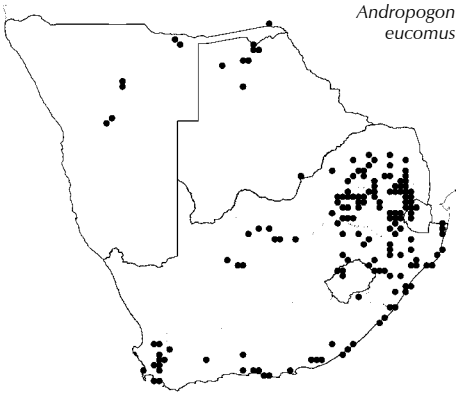

*Andropogon distachyos*

Tufted perennial 300–1 000 mm high; may be decumbent; rhizome sometimes present; base densely silky hairy; culms unbranched. Leaf blade 70–200 × 2–4 mm, hairy, tapering to a fine point; ligule a fringed membrane, with long hairs at the back. Inflorescence of 2 racemes per spatheole, 30–100 mm long; pedicels and internodes slender to stout, oblong to slightly clavate, sometimes ± inflated, broadening to a lobed, cup-shaped tip, one margin with hairs up to 3.5 mm long, other margin with a few short hairs or glabrous (hairs may be difficult to see,

being hidden behind spikelet). Sessile spikelet 9–16 mm long; glumes lack pits between nerves but shallow depressions often present; lower glume keels broadly asymmetrically winged above, shallowly grooved, apex bidentate, often awned between teeth, short hairy or glabrous; upper glume ± flat, awn 4–10 mm long; upper lemma bilobed to middle, awn 15–30 mm long, geniculate; callus 1–2 mm long, oblong; anthers 2.5–3.0 mm long. Pedicellate spikelet 6–11 mm long, male; lower glume asymmetrical, keels broadly winged, bidentate, awn 3–9 mm long; upper glume awn ± 2 mm long.

*Flowering*: January to June. *Ecology*: Mountain grassland; areas of high moisture content. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards through Zambia, Zimbabwe to East Africa, Ethiopia, Sudan, Cameroon; also southern Europe to Arabia and Thailand. M, FS, KZN.

Illustration: Sales: 64, tab. 23, 2 (2002).
Anatomy vouchers: *Ellis 4992* & *4995*.
Voucher: *Edwards 2006*.


*Andropogon eucomus*

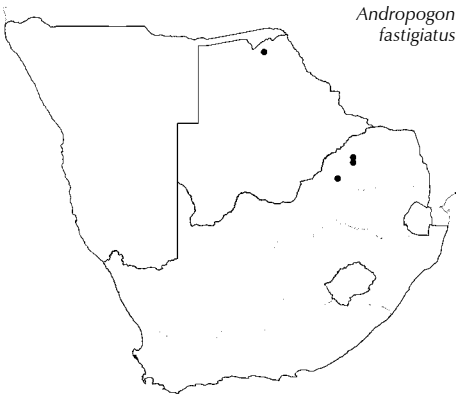
**Andropogon eucomus** Nees, in *Florae Africanae australioris*: 104 (1841). Type: South Africa, Western Cape, Berg River, *Drège* and several other syntypes.

SNOWFLAKE GRASS, OLD MAN'S BEARD, SILVER THREAD GRASS, KAPOKGRAS

Densely tufted perennial 200–900 mm high; culm much branched above, tinged reddish. Leaf blade 40–200 × to 4 mm, folded; sheath shortly auriculate; ligule a fimbriate membrane. Inflorescence plumose, of 2–6 flowering branches; racemes 2–5 per spatheole, 20.5–40.0 mm long; pedicels and internodes filiform, hairs white, silky, 5–10 mm long, twice as long as spikelet, both margins hairy. All spikelets sessile, but each one is accompanied by an empty hairy pedicel of the pedicelled spikelet. Sessile spikelet 2–3 mm long, glabrous; glumes lack pits between nerves; lower glume deeply and narrowly grooved, wingless, glabrous; upper glume flat, awnless; lemma bilobed or entire, awn 12–18 mm long, flexuous; anthers 0.3–1.8 mm long. Pedicellate spikelet absent.

[Closely related to *A. huillensis* with larger spikelets (3.5–5.5 mm long); Sales (2002) placed both species as a subspecies of *A. eucomus*. This has not been taken up as more research is needed in the FSA region.]

*Flowering*: November to May. *Ecology*: Vleis and wet places; often roadsides and other disturbed places. *Frequency in southern Africa*: Common. *Distribution*: Northwards to East Africa, DRC and Angola; also Madagascar. N, B, L, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Useless for grazing as unpalatable; useful for stabilising disturbed moist areas. Attractive in flower arrangements.


*Andropogon fastigiatus*

Illustrations: Chippindall: 501, fig. 404 (1955); Sales: 65, tab. 23, 1 (2002).
Anatomy vouchers: *Ellis 457, 1357, 1381, 1526* & *4468*.
Voucher: *Louw 870*.

**Andropogon fastigiatus** Sw., in *Prodromus* (1788). Type: Jamaica.

*Diectomis fastigiata* (Sw.) Kunth, in *Nova genera et species plantarum* 1: 193 (1816). Type as above.

Tufted, usually erect, annual 300–500 mm high, reddish-brown; culms much branched above. Leaf blade 50–300 × 1–4 mm; sheaths

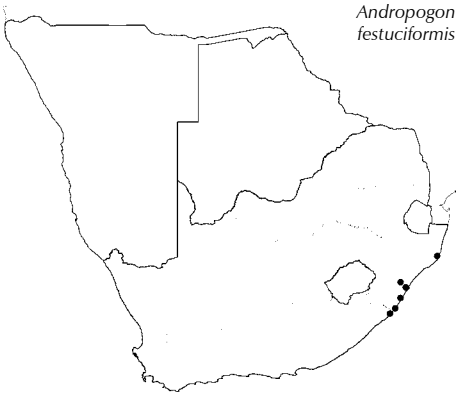
glabrous; ligule an unfringed membrane 4–7 mm long, acute. Inflorescence of numerous flowering branches per culm; raceme solitary in spatheole; pedicel and internode clavate, margins both hairy, hairs ± 2 mm long. Sessile spikelet (3.5)4.0–5.0 mm long, strongly compressed between internode and pedicel; glumes lack pits between nerves; lower glume very deeply and narrowly grooved, glabrous; upper glume bilobed, awn (5.5)10.0–20.0 mm long; upper lemma bidentate, awn 24–48 mm long, geniculate; anthers 1.0–1.5 mm long. Pedicellate spikelet longer and wider, 5–9 mm long; awn 4–8 mm long; lower glume large, flat, papery; awn 5–7(15) mm long.

*Flowering*: April to May. *Ecology*: Dry sandy soil. *Frequency in southern Africa*: Rare. Locally common. *Distribution*: Pantropical. B, LIM.

Illustration: Chippindall: 505, fig. 405 (1955).
Anatomy voucher: *Smith 2071*.
Voucher: *Codd 4029*.

**Andropogon festuciformis** Rendle, in Hiern et al., in *Catalogue of the African Plants collected by F. Welwitch* 2: 145 (1899). Type: Angola; Huilla, Humpata dist.; ?*Welwitsch 7505*.

*Hypogynium schlechteri* (Hack.) Pilg., in *Der natürlichen Pflanzenfamilien*, edn. 2, 14e: 158 (1940).


*Andropogon festuciformis*

Densely tufted perennial 160–1 000 mm high; basal sheaths distichous, keeled, flattened; culms 1–3 mm wide, much branched above, slender, reddish throughout. Leaf blade 50–300 × 1.5–3.0 mm, glabrous; ligule a fringed membrane. Inflorescence glabrous, racemes solitary, 30–40 mm long, in fascicles of 1–6; pedicels and internodes linear, short, rounded, glabrous; internodes ± $^1/_5$ the length of sessile spikelet. Sessile spikelet 4.0–4.5(5.3) mm long, awnless, a small crown of hairs present at base; glumes lack pits between nerves; lower glume flat on back; upper glume boat-shaped, sharply keeled; palea absent; anthers 2.0–2.5 mm long. Pedicellate spikelet larger, 4.0–5.3 mm long, male.

*Flowering*: July to January. *Ecology*: Moist places. *Frequency in southern Africa*: Infrequent. *Distribution*: Zambia, Malawi, DRC, Angola and Guinea. KZN.

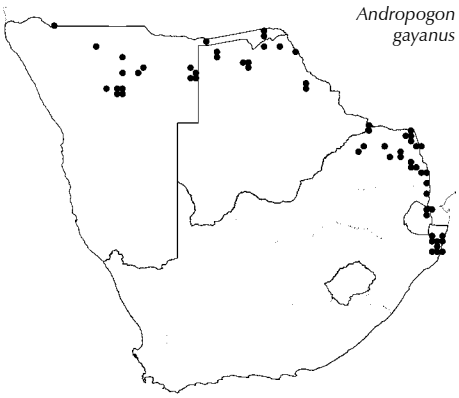
Illustration: Chippindall: 517, fig. 412 (1955).
Anatomy vouchers: *Ellis 3399, 3422, 3795* & *6019*.
Voucher: *Wood 8543*.

**Andropogon gayanus** Kunth, in *Enumeratio plantarum* 1: 491 (1833). Type: Senegal, *Gay*.

*A. gayanus* Kunth var. *squamulatus* (Hochst.) Stapf, in *Flora tropical Africa* 9: 263 (1919). Type: Ethiopia, Ferrfera Valley, *Schimper 715*.

*A. gayanus* Kunth var. *polycladus* (Hack.) Clayton, in *Kew Bulletin* 32: 1 (1977). Type: Namibia, Hereroland, *Nels 76*.

Blue grass, grootbaardgras


*Andropogon gayanus*

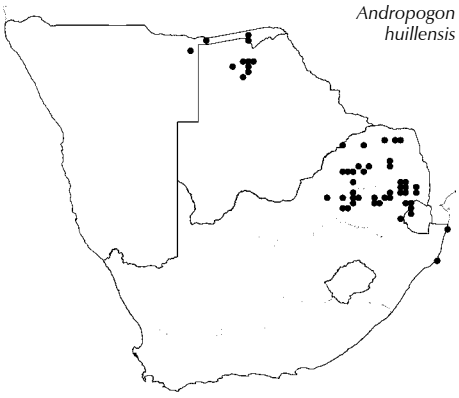
Robust, tufted perennial 1 200–3 600 mm high; glabrous, glaucous; basal sheaths not keeled; leaves usually cauline; culms branched above. Leaf blade to 600 × 5–20 mm, base narrow, petiole-like, reduced to midrib; ligule a fringed membrane, back without long hairs. Inflorescence of 2 racemes per spatheole; pedicel and internode ± clavate, inflated, apex lobed, both margins hairy, hairs to ± 4 mm long; callus hairs protruding at internode apex. Sessile spike-

let 6.0–7.5(8.5) mm long; glumes lack pits between nerves; lower glume broad, flat but with a narrow shallow to deep central groove, wingless, apex not toothed, awnless, scabrid towards apex, glabrous, shortly hairy or long hairy on margins, keels scabrid; upper glume convex, mucronate; upper lemma deeply bilobed, awn 10–32 mm long, geniculate; callus short, broad, obtuse; anthers 2.2–5.0 mm long. Pedicellate spikelet 5–8 mm long; lower glume glabrous or hairy; mucronate or awned, awn up to 4.5 mm long, appears ribbed due to many nerves equidistant from each other on back.

[Four varieties have been recognised in West Africa; var. *polycladus* is said to be the variety occurring elsewhere in Africa. Although the FSA material agrees in hairiness of margins of both internode and pedicel, the presence or absence of hairs on both the pedicelled and sessile spikelets are variable. Therefore, until more work has been done the varieties are not accepted.]

*Flowering*: December to June. *Ecology*: Sandy loam or sandy soils; coastal dunes, on bare rock, river beds; riverine vegetation, savanna or grassland; often in disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Southern to tropical Africa; introduced into Australia. N, B, S, LIM, M, KZN. *Economics*: Good grazing grass until flowering although of low nutritional value, then becoming too hard; has been planted as pasture in some countries. Used for veld reclamation.

Illustrations: Chippindall: 499, fig. 402 (1955); Sales: 65, Tab. 23, 3 (2002).
Anatomy vouchers: *Ellis 554, 1591, 3564 & 3690*.
Voucher: *De Winter & Marais 4827*.



*Andropogon huillensis*

**Andropogon huillensis** Rendle, in Hiern et al., in *Catalogue of the African plants collected by Dr F. Welwitsch* 2: 146 (1899). Type: Angola; Huilla, at Humpata; *Welwitsch 2670* (PRE, fg.).

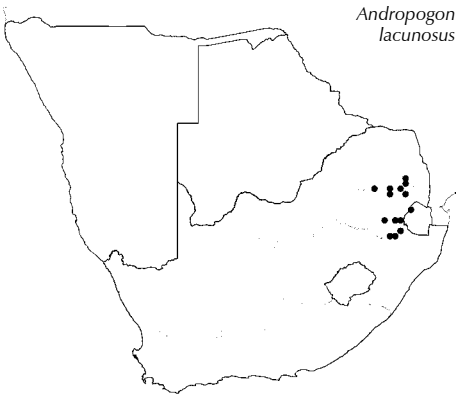
LARGE SILVER ANDROPOGON, GROOTWITBAARD ANDROPOGON, RIETGRAS

Tufted, robust perennial 900–1 800 mm high; basal sheaths glabrous, compressed, keeled, distichous. Leaf blade 80–400 × 2–4 mm; ligule a fringed membrane. Inflorescence plumose, with 5–7 flowering branches per culm; subdigitate; racemes 4–10 per spatheole; pedicels and internodes linear, both margins hairy, hairs 5–10 mm long, as long as to slightly longer than sessile spikelet, white. Sessile spikelet 3.5–6.5 mm long; glumes lack pits between nerves; lower glume deeply and broadly grooved; anthers 1.8 mm long. Pedicellate spikelet reduced to a sterile glume up to 4.5 mm long.

[Closely related to *A. eucomus* and placed by Sales (2002) as a subsp. of *A. eucomus* while *A. laxatus* is placed into synonymy under subsp. *huillensis*. This has not been followed as more work needs to be done for the FSA region.]

*Flowering*: September to June (but usually in autumn). *Ecology*: Wet places, usually on sand; sometimes in drainage areas of roadsides; indicator of wet sandy soils. *Frequency in southern Africa*: Fairly common. *Distribution*: Northwards to Zambia, Zimbabwe, Malawi and Mozambique; also Angola. N, B, S, LIM, NW, G, M, KZN.

Anatomy vouchers: *Ellis 321, 1341, 1525 & 4444*.
Voucher: *Repton 4058*.


*Andropogon lacunosus*

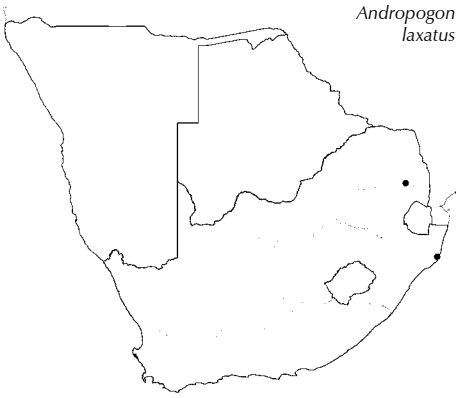
**Andropogon lacunosus** J.G.Anderson, in *Bothalia* 8: 113 (1962). Type: South Africa, Mpumalanga, Ermelo, *Gericke A. 49* (PRE, holo.).

Straggling perennial 300–600 mm high; culms unbranched, internodes compressed. Leaf blade 80–150 × 2–5 mm; ligule a short, fringed membrane. Inflorescence of 2–3 racemes, 2.5–5.0 mm long; pedicels and internodes filiform, both margins hairy sometimes sparsely so to almost glabrous; hairy at internode apex. Sessile spikelet 5.0–7.5 mm long; lower glume with a deep central groove, 2–several pits between nerves, winged, mainly glabrous but hairs often at base in central groove; upper glume awn 1–2 mm long; upper lemma bifid to middle, awn 8.0–14.0(16.5) mm long, geniculate. Pedicellate spikelet 8–9 mm long, tinged purple; lower glume winged, nerves several, pits 2–many, glabrous; palea absent.

[Related to *A. distachyos*, which lacks the glume pits but may have shallow depressions.]

*Flowering*: November to April. *Ecology*: Swampy places at high altitudes; often on black soils. *Frequency in southern Africa*: Infrequent. *Distribution*: Zimbabwe, Tanzania and Cameroon. S, M.

Anatomy vouchers: *Ellis 448, 3539, 4445, 4446, 4474, 4478 & 4819.*
Voucher: *Codd 6441.*


*Andropogon laxatus*

**Andropogon laxatus** Stapf, in *Flora tropical Africa* 9: 237 (1919). Type: Zimbabwe, Harare, *Mundy* (K, lecto.).

Tufted, slender perennial 300–900 mm high. Leaf blade 20–200 × 2–3 mm, glabrous; ligule a fringed membrane. Inflorescence plumose; racemes 2–3 per spatheole; internode and pedicel filiform, both margins hairy, hairs white silky, ± as long as sessile spikelet. Sessile spikelet 4–6 mm long; glumes lack pits between nerves; lower glume deeply and broadly grooved, wingless; upper glume awnless; upper lemma bilobed, awn 10–20 mm long, flexuous or geniculate; callus short. Pedicellate spikelet suppressed or reduced, then up to 2.5 mm long, with or without awn up to 3 mm long.

[Closely related to *A. eucomus*, which has smaller spikelets (2–3 mm long), and *A. huillensis*, which is a larger more robust plant with more racemes. Sales (2002) placed *A. huillensis* as a subsp. of *A. eucomus*, and *A. laxatus* into synonymy under *A. huillensis*, but more work is needed in the FSA region before this is accepted.]

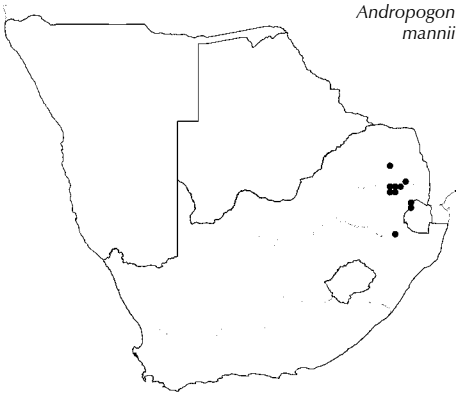
*Flowering*: October to March. *Ecology*: Wet places. *Frequency in southern Africa*: Rare. *Distribution*: Zambia, Zimbabwe, Malawi, Mozambique and Angola. M, KZN.

Illustration: Clayton et al.: 769, fig. 180, 2 (1982).
Anatomy vouchers: *Ellis 4495* & *Du Toit 1052.*
Voucher: *De Winter & Codd 218.*

**Andropogon mannii** Hook.f., in *Journal of the Proceedings of the Linnaean Society* 7: 232 (1864). Type: Bioko, (Fernando Po), *Mann 654 & 1475* (many syntypes).

*A. platybasis* J.G.Anderson, in *Kirkia* 1: 102 (1961). Type: South Africa, Mpumalanga, Belfast distr., 5½ miles from Dullstroom on road to Lydenburg, *De Winter & Codd 180* (PRE, holo.).

Densely tufted perennial 100–600 mm high; basal sheaths compressed, ± keeled, flat, papery; culms erect, unbranched, long hairy

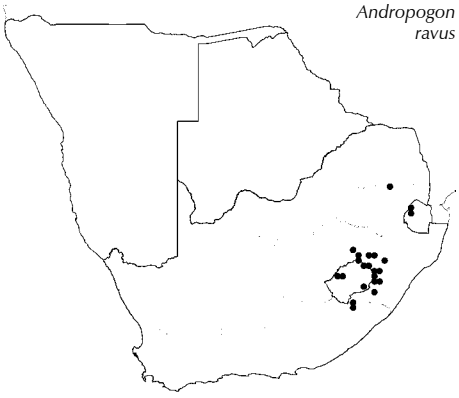

*Andropogon mannii*

below inflorescence. Leaf blade 20–250 × 2–8 mm, flat, tapering to a fine point, long hairy; ligule a fringed membrane. Inflorescence of 1–5 racemes per spatheole, 15–45 mm long; pedicel and internode filiform, almost glabrous or both margins hairy; internode apex a straight densely hairy rim, not lobed; spikelet dark red or purple. Sessile spikelet 4.5–8.0 mm long, hairy at base; glumes lack pits between nerves; lower glume shallowly grooved below, glabrous, mucronate; upper glume back rounded , awnless or awn up to 5 mm long; upper lemma bilobed, awn 4–16 mm long, geniculate; callus covered with a dense tuft of short hairs; anthers 2.2–3.4 mm long. Pedicellate spikelet 5.5–8.0 mm long, similar to sessile spikelet, male, awnless or with a short-awn point or mucronate; lower glume with prominent central nerve and a wide space to lateral nerves near keels.

[The species is variable over its range, with forms on the disjunct highland areas all differing slightly.]

*Flowering*: October to December. *Ecology*: Mountain grassland in moist, often water-logged places. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to Zambia, Zimbabwe, Malawi, Mozambique to tropical West Africa and Sudan. S, LIM, M.

Anatomy vouchers: *Devenish 1827, Smook 4805* & *Ellis 4321*.
Voucher: *De Winter* & *Codd 199*.


*Andropogon ravus*

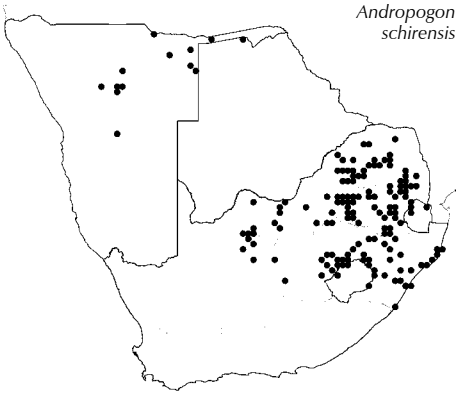
**Andropogon ravus** J.G.Anderson, in *Bothalia* 7: 417 (1960). Type: South Africa, KwaZulu-Natal, Bergville, Cathedral Peak, *Killick 1261* (PRE, holo.).

Perennial 150–900 mm high, glaucous; rhizomes branched, knotted; basal sheaths glabrous. Leaf blade to 300 × 2–7 mm; ligule a fringed membrane, 1.5–2.0 mm long. Inflorescence of 2(–3) racemes; pedicel and internode ± clavate, both margins long hairy. Sessile spikelet 7–9 mm long; glumes lack pits between nerves; lower glume deeply, narrowly to widely grooved, keels to almost touching, awnless; upper lemma deeply lobed, lobes acute, awn 15–20 mm long, geniculate; callus broad, obtuse, hairy. Pedicellate spikelet considerably longer, 7–12 mm long; male; lower glume appears ribbed due to many nerves equidistant from one another; anthers 4–5 mm long.

[Only doubtfully distinct from *A. schirensis*, with which it intergrades.]

*Flowering*: January to March. *Ecology*: Mountain sourveld. *Frequency in southern Africa*: Locally common. *Distribution*: southern Africa. Endemic? L, S, M, FS, KZN, EC.

Anatomy vouchers: *Ellis 1424, 1425* & *4449*.
Voucher: *Killick 1261*.


*Andropogon schirensis*

**Andropogon schirensis** Hochst. ex A.Rich., in *Florae Abyssinicae* 2: 456 (1851). Type: Ethiopia, Shire [Chiré], *Schimper 1807* (P, holo.).

*A. schirensis* Hochst. ex A.Rich. var. *angustifolius* Stapf, in *Flora capensis* 7: 340 (1898). Type: KwaZulu-Natal, Harrismith, *Buchanan 120* (many syntypes).

*A. schirensis* Hochst. ex A.Rich. var. *natalensis* Hack., in *Memoires de l'Herbier Biossier* 20: 9 (1900). Type: South Africa, KwaZulu-Natal, De Beers, *Wood 6002*.

STAB GRASS, GESTEEKTE-GRAS

Densely tufted perennial 600–1 200 mm high, reddish; culms branched, sometimes glaucous, tinged with purple or dark red; basal

sheaths hairy right at base (sometimes hairs only just where roots come out. Leaf blade 90–600 × 3–14 mm; ligule a fringed membrane, 0.5–1.0 mm long. Inflorescence of 2 racemes 50–150 mm long; pedicel and internode ± clavate, both margins long hairy; internode lobed. Sessile spikelet (4.3)5.0–7.0(8.5) mm long, strongly compressed between internode and pedicel; glumes acute, awnless, lacking pits between nerves; lower glume deeply and very narrowly grooved, keels nearly meeting or narrow towards apex; upper glume convex on back; upper lemma bilobed to middle, awn 22–40 mm long, twice geniculate; callus deeply inserted into internode, obtuse; anthers 2.5–4.5 mm long. Pedicellate spikelet 5–11 mm long, longer than sessile spikelet, acute, rarely acuminate; awnless rarely mucronate; lower glume appears ribbed due to many equidistant nerves, margins usually with obvious, stiff hairs.

*Flowering*: December to April. *Ecology*: Open veld and rocky hillsides. *Frequency in southern Africa*: Common. *Distribution*: Northwards to Zambia, Zimbabwe, Malawi, Mozambique and rest of tropical Africa. N, B, L, S, LIM, NW, G, M, FS, KZN, NC. *Economics*: Average to poor grazing grass, mature plant not palatable.

Illustration: Sales: 72, tab. 24 (2002).
Anatomy vouchers: *Ellis 2007, 2009, 3391, 4420, 4434, 4447, 4448, 4991* & *6164*.
Voucher: *Feely, Tinley & Ward 3*.

## **Anthephora** Schreb.

Schreber: 105 (1810); Stapf: 440 (1899); Goossens: 189 (1932); Chippindall: 436, fig. 362–364 (1955); Launert: 23 (1970a); Clayton & Renvoize: 660 (1982); Clayton & Renvoize: 306 (1986); Clayton: 190 (1989); Gibbs Russell et al.: 42, 43 (1990); Watson & Dallwitz: 119 (1994); Müller: 18–23 (2007).

Perennial or annual, tufted; culm erect or geniculate. **Leaf blade** linear, expanded or folded; *ligule* an unfringed membrane. **Inflorescence** spike-like, cylindrical, rachis 3-angled, wavy, composed of sessile clusters formed by 3–11 *spikelets*, inner fertile spikelets enclosed in an outer involucre formed by several lower glumes of vestigial sterile spikelets or glumaceous, coriaceous bracts, these are usually connate at base, clusters disarticulating as a whole from the persistent main axis. **Involucre spikelet**: lower glume acute, acuminate or drawn out into short rigid sometimes bifid awn, 2–13-nerved (nerves visible on inside), indurated. **Fertile spikelet** lanceolate to oblong, dorsiventrally compressed; *glumes* dissimilar; lower glume suppressed; upper glume shorter than spikelet, 1-nerved. **Florets** 2; *lower floret* reduced to a lemma shorter than spikelet, membranous, 2–7-nerved; *upper floret* bisexual, *lemma* lanceolate, membranous, entire, glabrous, 3–5-nerved, margins flat, thin covering most of palea, awnless; *palea* similar to lemma, 2-nerved. **Lodicules** 2. **Stamens** 3. **Ovary** lanceolate-oblong; styles plumose. **Caryopsis** oblong-ellipsoid, dorsiventrally compressed; hilum short. **Photosynthetic pathway**: $C_4$. The



Figure 34.—*Anthephora pubescens*. Spikelet cluster (6–7 mm). Photographer: M. Koekemoer.

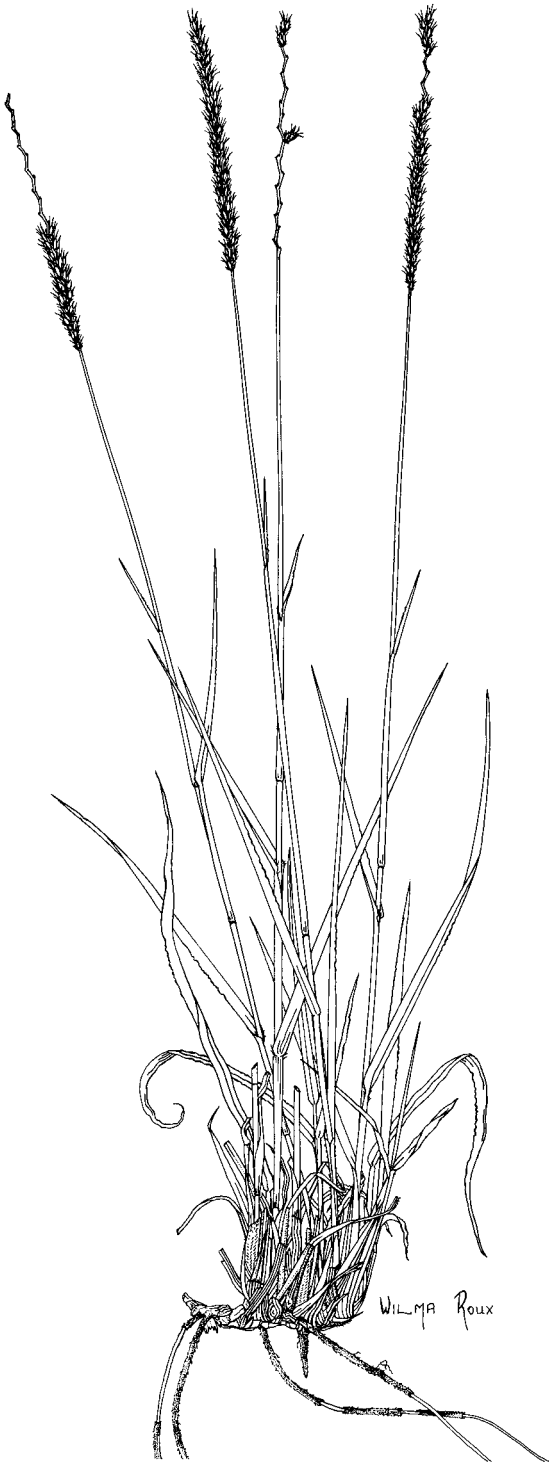



Figure 35.—*Anthephora pubescens*. Artist: W. Roux.

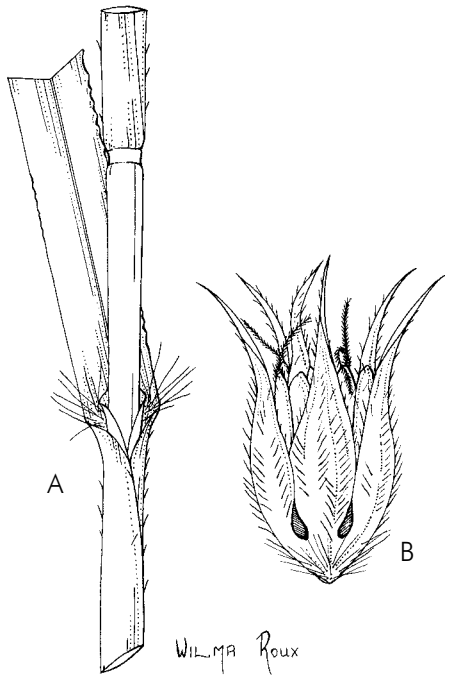



Figure 36.—*Anthephora pubescens*. A, culm, sheath mouth and portion of leaf blade; B, spikelet cluster. Artist: W. Roux.

anatomical organisation usually conventional, or rarely unconventional. Organisation of PCR tissue when unconventional, supposedly arundinella-type (see W.V. Brown 1977, quoting Johnson 1965). XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: *x* = 9 (polyploidy).

[The homology of the involucral bracts or spikelets is in dispute, but here they are taken as derived from the glumes of the sterile spikelets.]

**Species** 12, tropical and southern Africa, Arabia and tropical America; 3 in southern Africa, Namibia, Botswana, North West, Limpopo, Gauteng, Mpumalanga, Free State and Northern Cape.

Species treatment by A.C. Mashau.



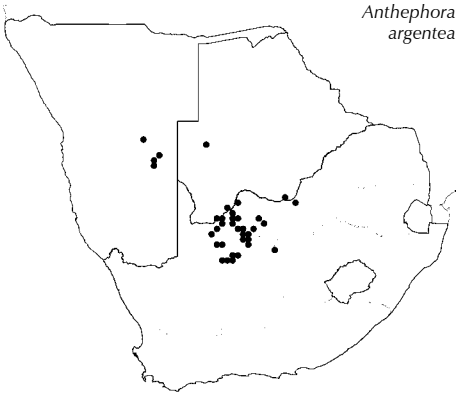
Figure 37.—*Anthephora schinzii*. Spikelet cluster (to 10 mm). Photographer: M. Koekemoer.

**Quick guide to easily confused taxa:**

1. Spikelets in clusters, outer glumes/bracts hard, forming an involucre . . . . . **Anthephora pubescence**
   Spikelets in pairs or clusters but hard involucre absent . . . . . 2
2. Ligule a fringed membrane; sessile spikelet upper lemma less firm in texture than glumes . . . . . **Elionurus muticus**
   Ligule an unfringed membrane; upper lemma similar in texture to glumes . . . . . **Tarigidia aequiglumis**

**Key to species:**

1. Annual; involucral glume/bract lower half distinctly convex, upper constricted and curving outwards . . . . . **A. schinzii**
   Perennial; involucral glume/bract lower half not distinctly convex, upper not constricted and curving outwards . . . . . 2
2. Leaves rigid, often folded, margins smooth, apex shortly tapering to a stiff point; spikelet cluster 2 mm wide, involucral glume acute, rarely acuminate . . . . . **A. argentea**
   Leaves flat, margins crinkled/wavy, apex tapering to a soft point; spikelet cluster 3 mm wide, involucral glume acuminate or shortly awned . . . . . **A. pubescens**



*Anthephora argentea*

**Anthephora argentea** Gooss., in *Transactions of the Royal Society of South Africa* 20: 194, f. 2 (1932). Type: South Africa, Northern Cape, Hay dist., near Dunmurry, on sides of kloof, *Wilman* 2203 (PRE, iso.).

*A. angustifolia* Gooss., in *Transactions of the Royal Society of South Africa* 20: 194, f. 2 (1932). Type: South Africa, Northern Cape, Gordonia dist., *Pole Evans 2060* (PRE, ?).

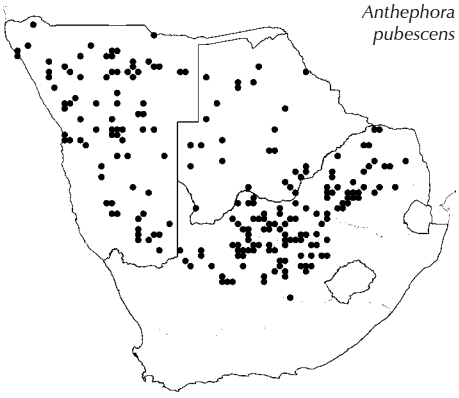
Perennial tufted, 1 000 mm high; culm slender, wiry; basal sheath rounded, smooth, glabrous. Leaf blade 100–150 × 1–3 mm, blue-green, rigid, strongly ribbed above; often folded, apex shortly tapered to a stiff point; ligule an unfringed membrane up to 8 mm long and often split. Inflorescence 3–6 mm wide. Spikelet cluster 6 × 2 mm, covered with hairs; involucral glume/bract acute, rarely acuminate; anther 3.0–3.5 mm long.

*Flowering*: November to April. *Ecology*: Sandy soil; often on dunes; confined to Kalahari Thornveld. *Frequency in southern Africa*: Infrequent. Distribution: Endemic. N, B, NW, NC. *Economics*: A valuable, palatable natural pasture grass with a high nutritive value; indicator of good veld management.

Anatomy vouchers: *Ellis 3589 & 3598*.
Voucher: *Hansen 3333*.

**Anthephora pubescens** Nees, in *Florae Africanae australioris illustrationes monographicae*: 74 (1841). Type: South Africa, ?Gariep to Lauwwaterskloof, *Lichtenstein 569* (B, holo.).

*A. ramosa* Gooss., in *Transactions of the Royal Society of South Africa* 20: 192, f. 1 (1932). Type: South Africa, Northern Cape, Gordonia, Karreeboem, *Pole Evans 2407*. (PRE, ?).


*Anthephora pubescens*

WOOL GRASS, BORSELTJIEGRAS

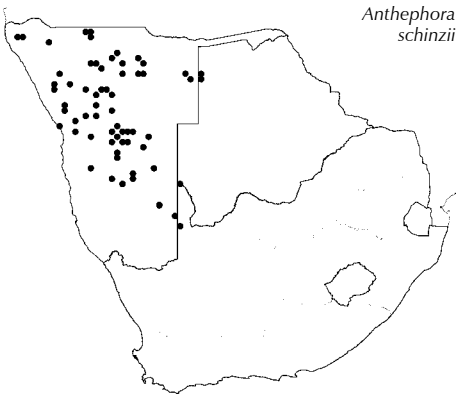
Perennial, densely tufted or occasionally forming lax tufts up to 1 000 mm wide, 300–1 500 mm high; basal sheath slightly laterally compressed and papery, otherwise rounded; culm not branched or sometimes branching profusely from base. Leaf blade 100–200 × 2–6 mm, scarcely ribbed above (appears well ribbed in very narrow leaves), long-tapering to soft point, often curling when dry, margins wavy and usually thickened; stiff hairs on collar. Inflorescence 5–10 mm wide, straw coloured or dull purple. Spikelet ± 6–8 × 2–3 mm; densely or sometimes sparsely covered with hairs; involucral glume/bract acuminate, rarely acute or shortly awned; lower lemma hairs 1 mm long; anther 2.3–3.0 mm long.

[Although *A. ramosa* is characterised by a branched habit and sparsely hairy spikelets it has been placed into synonymy as it is found that spikelet indumentum varies greatly and there are many intermediates.]

*Flowering*: December to May. *Ecology*: Shallow, acid, sandy soils; among rocks often on hillsides and ravines, usually in well drained areas. *Frequency in southern Africa*: Common. *Distribution*: Northwards to Mali and East Africa to Sudan; also Iran. N, B, NW, LIM, M, G, FS, NC. *Economics*: Very palatable and drought resistant; cultivated as pastures especially in the drier regions; indicator of good veld conditions.

Anatomy vouchers: *Botha & Panagos 8, 31*; *Gibbs Russell & Smook 5386*; *Smook 5088, 5089*; *Ellis 1351, 1758 & 2070*.
Voucher: *Smook 4441; De Winter 3308*.

**Anthephora schinzii** Hack. in Schinz, in *Verhandlungen des botanischen Vereins der Provinz Brandenburg* 30: 139 (1888). Type: Namibia, Olukonda in Ondonga-Stamm (Amboland) *H. Schinz 610* (PRE, fg.).


*Anthephora schinzii*

ANNUAL WOOL GRASS, EENJARIGE-BORSELTJIEGRAS

Tufted annual 120–350 mm high. Leaf blade 60–100 × 4–6 mm. Inflorescence 10 mm wide; spikelets in groups of five, vase-shaped. Spikelet cluster 10 × 3 mm; involucral glume/bract is convex on lower half, with a central constricted area, then it curves outwards, apex acute or awned, length variable, up to 15 mm long; anther 3.1–3.6 mm long.




Figure 38.—*Anthoxanthum ecklonii*. Artist: C.D. Bartman.

*Flowering*: December to April. *Ecology*: Pioneer grass on sandy soils, and disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Angola. N, B, NC. *Economics*: Natural pasture.

Anatomy vouchers: *Gibbs Russell & Smook 5209, 5290*; *Ellis 4362, 5261 & 5274*. Voucher: *Maguire 2164*.

## **Anthoxanthum** L.

Linnaeus: 28 (1753); Stapf: 465 (1899); Hitchcock & Chase: 549 (1950); Chippindall: 90 (1955); Launert: 72 (1971); Tutin: 229 (1980); Clayton & Renvoize: 133 (1986); Gibbs Russell et al.: 43 (1990); Watson & Dallwitz: 121 (1994).

Annual or perennial, tufted to decumbent; stoloniferous or rhizomatous; sometimes aromatic. **Leaf blade** linear, expanded; *ligule* an unfringed membrane. **Inflorescence** a narrow, spike-like panicle; *spikelets* solitary, sessile or pedicelled. **Spikelet** moderately laterally compressed, disarticulating above glumes; *glumes* unequal, similar, membranous with hyaline margins, glabrous to hairy, awnless; lower glume 1–5-nerved; upper glume 3-nerved. **Florets** 3, *lower* 2 *florets* male or sterile with lower lemma(s) longer than uppermost lemma, membranous, hairy, 5–7-nerved, apex 2-lobed, lowest lemma with a short straight awn from above middle of the back, second lemma awned from near the base, *awn* geniculate; *uppermost floret* bisexual, *lemma* glabrous, awnless; *palea* without keels, usually 1-nerved. **Lodicules** 0. **Stamens** 2 or 3 (rarely). **Ovary** glabrous; styles long, plumose. **Caryopsis** hilum short; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 5$ (polyploidy).

**Species** ± 20, north temperate and mountains of tropical Africa and Asia; ± 4 in southern Africa (1 naturalised), Lesotho, Mpumalanga, Free State, KwaZulu-Natal, Eastern and Western Cape.

[Genus in need of revision for the FSA region.]

Species treatment by A.C. Mashau.

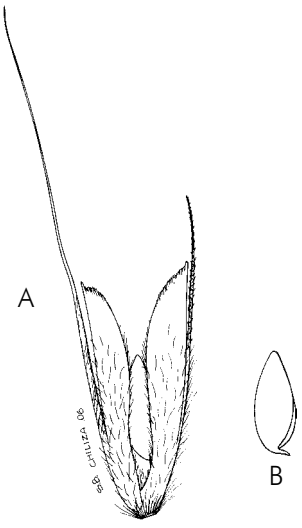



Figure 39.—*Anthoxanthum ecklonii*. A, three florets: lower two awned, upper awnless (8.6 × 2.0 mm); B, awnless upper floret (2.2 × 0.8 mm). Artist: S.B. Chiliza.

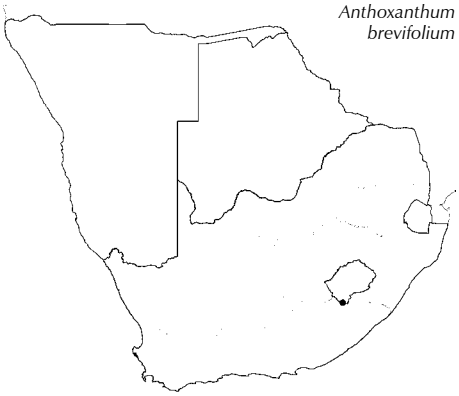


Figure 40.—*Anthoxanthum ecklonii* spikelet (6–8 mm). Photographer: M. Koekemoer.

**Key to species:**

1. Lower glume 1-nerved . . . . . 2
   Lower glume 3–5-nerved . . . . . 4
2. Glumes sub-acuminate; lower lemma not densely hairy, pilose or hairs somewhat shaggy . . . . . **A. brevifolium**
   Glumes acute to acuminate; lower lemma densely or sparsely hairy . . . . . 3
3. Lower lemma 3.0–3.5 mm long, always dark brown, densely hairy; anther 4.0–4.5 mm long . . . . . ***A. odoratum**
   Lower lemma 5 mm long, pale to light brown, usually sparsely hairy; anther 2.0–2.3 mm long . . . . . **A. ecklonii**
4(1). Inflorescence small, oblong, contracted or reduced to a scanty raceme; plant delicate and weak; leaves soft . . . . . **A. tongo**
   Inflorescence spike-like, fairly dense, occasionally interrupted near the base; plant usually distinctly tufted and erect; leaves usually rigid and pungent . . . . . **A. dregeanum**

**Anthoxanthum brevifolium** Stapf, in *Kew Bulletin of Miscellaneous Information*: 59 (1910). Type: South Africa, Eastern Cape: Barkly East Division; on Ben McDhui (Wittebergen), 2955m., *Galpin 6884*.


*Anthoxanthum brevifolium*

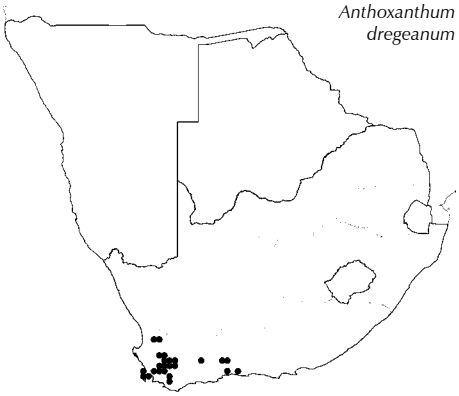
Tufted rhizomatous perennial 150–220 mm high; leaves crowded at the base. Leaf blade to 37.5 × 5.6 mm, short, broad, apex blunt. Inflorescence contracted, spike-like, 30–40 mm long. Spikelet 7 mm long; glumes sub-acuminate, glabrous or scabrid on the back, keels smooth or scaberulous; lower glume 5 mm long, 1-nerved, subhyaline; upper glume 7 mm long, 3-nerved, longer than and enfolding the spikelet; lower lemma 5.5 mm long, 5-nerved, light brown, hairs not dense but somewhat shaggy or pilose; anther 2.4 mm long.

[This species is known only from the type collection. Except for the very short, broad leaf blades and sub-acuminate glume, this specimen is difficult to distinguish from *A. ecklonii*, which has glumes acute to acuminate.]

*Flowering*: March. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. EC.

Voucher: *Galpin 6884*.

**Anthoxanthum dregeanum** (Nees ex Trin.) Stapf, in *Flora capensis* 7: 466 (1899). Type: South Africa, Western Cape, 'Cape Good Hope'.

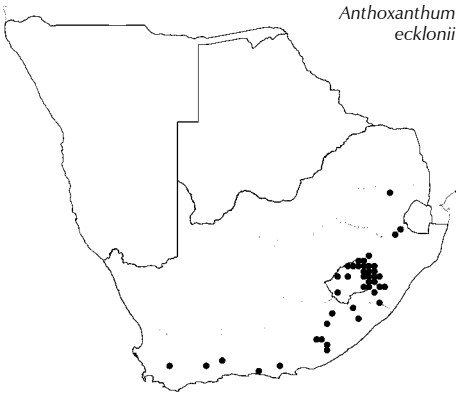

*Anthoxanthum dregeanum*

Tufted, rhizomatous perennial 200–600 mm high. Leaf blade to 250 × to 9 mm, linear, usually rigid, often folded, gradually tapering to a pungent point. Inflorescence spike-like, up to 80 mm long, occasionally interrupted near the base. Spikelet 6 to 7 mm long; glumes shortly acuminate, glabrous or minutely hairy on the backs, keels smooth or scaberulous; lower glume 4–5 mm long, 3-nerved; upper glume 6 to 7 mm long, 3-nerved, longer than and enfolding the spikelet; lower lemma 4–6 mm long, dark brown, hairy; anther 2.6–3.9 mm long.

[Sometimes not clearly distinguished from *A. tongo*, which normally is a very delicate plant with a scanty inflorescence.]

*Flowering*: October to January. *Ecology*: On moist mountain slopes. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Endemic. WC.

Illustration: Chippindall: 92, fig. 63 (1955).
Anatomy vouchers: *Ellis 4646* & *5496*.
Voucher: *Esterhuysen 26575*.


*Anthoxanthum ecklonii*

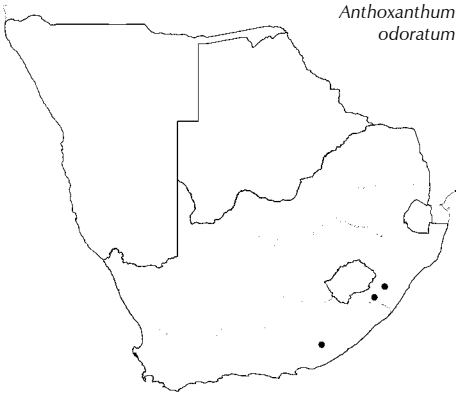
**Anthoxanthum ecklonii** (Nees ex Trin.) Stapf, in *Flora capensis* 7: 466 (1899). Type: South Africa, Western Cape, 'Cape Good Hope'.

Loosely or densely tufted perennial 350–800 mm high; rhizomatous; base of culm usually bulbous. Leaf blade 70–250 × 4–9 mm, expanded or folded, tapering to a very fine acute point. Inflorescence spike-like, 40–130 mm long. Spikelet 6–8 mm long; glumes acute to acuminate, glabrous or scabrid on the backs, keels scaberulous; lower glume 5–6 mm long, 1-nerved, hyaline; upper glume 6–8 mm long, 3-nerved (rarely 1-nerved), subhyaline, longer than and enfolding the spikelet; lower lemma 5 mm long, pale to light brown, usually sparsely hairy; anther 2.0–2.3 mm long.

[Resembles *A. odoratum*, which has the lower lemma shorter (3.0–3.5 mm long), and is dark brown and densely hairy.]

*Flowering*: December to April. *Ecology*: Usually in moist places such as stream sides and on grassy mountain slopes, extending to forest margins. *Frequency in southern Africa*: Infrequent but fairly widespread. *Distribution*: Possibly Malawi. L, M, FS, KZN, WC, EC.

Illustration: Chippindall: 94, fig. 64 (1955).
Anatomy vouchers: *Ellis 673, 1390, 1420, 2365* & *3128*.
Voucher: *Killick 1296*.


*Anthoxanthum odoratum*

***Anthoxanthum odoratum** L., in *Species plantarum* 1: 28 (1753). Type: Europe.

Sweet vernal grass

Loosely or densely tufted perennial 300–600(–1 000) mm high. Leaf blade 150–300 × 2–8 mm, expanded, apex acute to acuminate. Inflorescence spike-like, 10–90 mm long. Spikelet 7–10 mm long; glumes acute, hyaline, glabrous or minutely hairy on the back, keel scaberulous; lower glume up to 5 mm long, 1-nerved; upper glume 7–10 mm long, longer than and enfolding the spikelet; lower lemma 3.0–3.5 mm long, always dark brown, densely hairy; anther 4.0–4.5 mm long. Fresh plant smells of coumarin.

[Resembles *A. ecklonii*, which has the lower lemma longer (5 mm long), lighter coloured and sparsely hairy.]

*Flowering*: October to February. *Ecology*: Humic soils in moist, swampy areas. *Frequency in southern Africa*: Rare. Locally common. *Distribution*: Naturalised from Europe. Introduced in North and South America, Australia, Tasmania and New Zealand. KZN, EC. *Economics*: Introduced as a fodder grass to some countries.

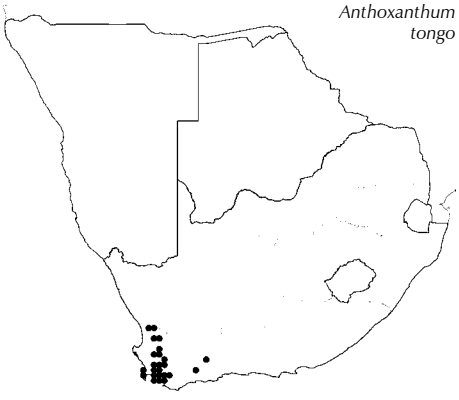

*Anthoxanthum tongo*

Illustration: Hitchcock & Chase: 550, fig. 796 (1950); Allred & Barkworth: 761 (2007).
Voucher: *Acocks 22118*.

**Anthoxanthum tongo** (Trin.) Stapf, in *Flora capensis* 7: 467 (1899). Type: South Africa, Western Cape, 'Cape Good Hope'.

Straggling or loosely tufted perennial 100–400 mm high; culm very fine; occasionally mat-forming. Leaf blade 20–100(–170) × to 2 mm,

flat or folded, filiform to setaceous. Inflorescence small, up to 35 mm long, oblong, contracted or reduced to a scanty raceme, with very few spikelets. Spikelet 5–7 mm long; glumes acute, glabrous or pilose on the back; lower glume up to 5 mm long, 3–5-nerved; upper glume 5–7 mm long, 3-nerved, longer than and enfolding the spikelet; lower lemma ± 4 mm long, creamy white to light brown, densely hairy; anther 2.5–3.2 mm long.

[Many specimens deposited under *A. tongo* and *A. dregeanum* at PRE seem to be misplaced. This problem cannot be solved within the current classification and stresses the need for a revision of this genus, which is very poorly studied in the FSA region.]

*Flowering*: September to February. *Ecology*: In moist shady places in the shelter of rocks and in shallow crevices. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC.

Illustration: Chippindall: 91, fig. 62 (1955).
Anatomy vouchers: *Ellis 2304, 2303, 5099* & *5146*.
Voucher: *Esterhuysen 33603*.

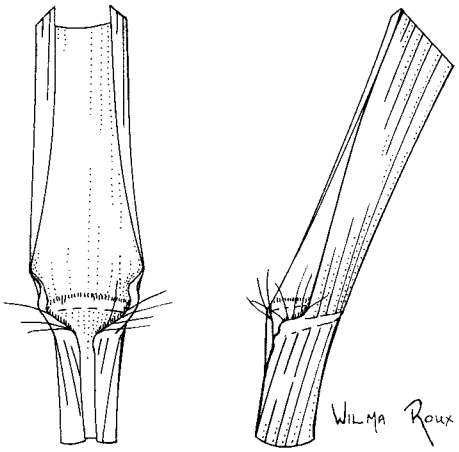



Figure 42.—*Aristida congesta* subsp. *barbicollis*. Sheath mouth showing ligule (left), collar (right). Artist: W. Roux.

## **Aristida** L.

Linnaeus: 82 (1753); Stapf: 551 (1899); Henrard: 1 (1926–1933); Henrard: 45 (1929–1933); Chippindall: 291 (1955); De Winter: 234 (1965); Clayton: 140 (1970); Launert: 25 (1970a); Giess: 365 (1971); Melderis: 97 (1971); Clayton & Renvoize: 186 (1986); Gibbs Russell et al.: 45 (1990); Watson & Dallwitz: 134 (1994); Müller: 108 (2007).

Annual or perennial, tufted, rhizomatous, sometimes geniculate. **Leaf blade** linear, expanded or folded; *ligule* a dense fringe of hairs. **Inflorescence** a panicle, open to contracted, sometimes spike-like; *spikelets* solitary, pedicelled. **Spikelet** disarticulating above glumes; *glumes* unequal to ± equal, equal to longer than spikelet (at least one glume), 1-keeled to middle or below, narrow, awnless to mucronate or awned; lower glume 1-nerved; upper glume 1(–3)-nerved. **Floret** 1, bisexual; *lemma* firmer than glumes, indurated, cylindrical, dorsally or laterally compressed, margins involute, forming a ventral groove, 3-nerved, 3-awned; *awns* usually fused to appear as 1 awn with 3 branches, lateral awns sometimes reduced or 0, glabrous or scabrid, never hairy, column present or 0, long or short and twisted, articulation various: between apex of column and base of awns, between apex of lemma and base of column or 0; *callus* usually well developed, obtuse, truncate, acute to pungent, bifid, or emarginate, hairy, usually with short stiff hairs; *palea* usually half as long as lemma, not indurated, nerveless, or 2-nerved, margins curved inwards. **Lodicules** 2 or 0. **Stamens** 1 or 3. **Ovary** glabrous; styles plumose. **Caryopsis** terete, shallowly grooved. **Photosynthetic pathway**: $C_4$; NADP-ME (3 species); XyMS- (with double PCR sheaths). PCR cells without a suberised lamella. PCR cell chloroplasts

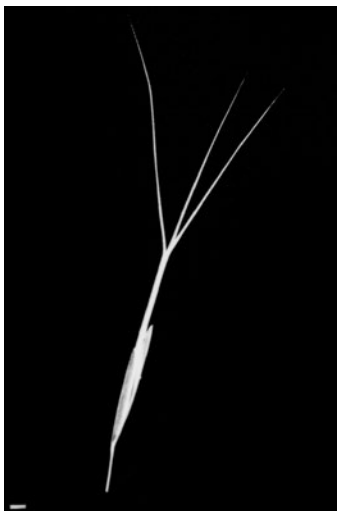


Figure 41.—*Aristida adscensionis* spikelet (10–40 mm). Photographer: M. Koekemoer.




Figure 43.—*Aristida congesta* subsp. *barbicollis*. Artist: W. Roux.

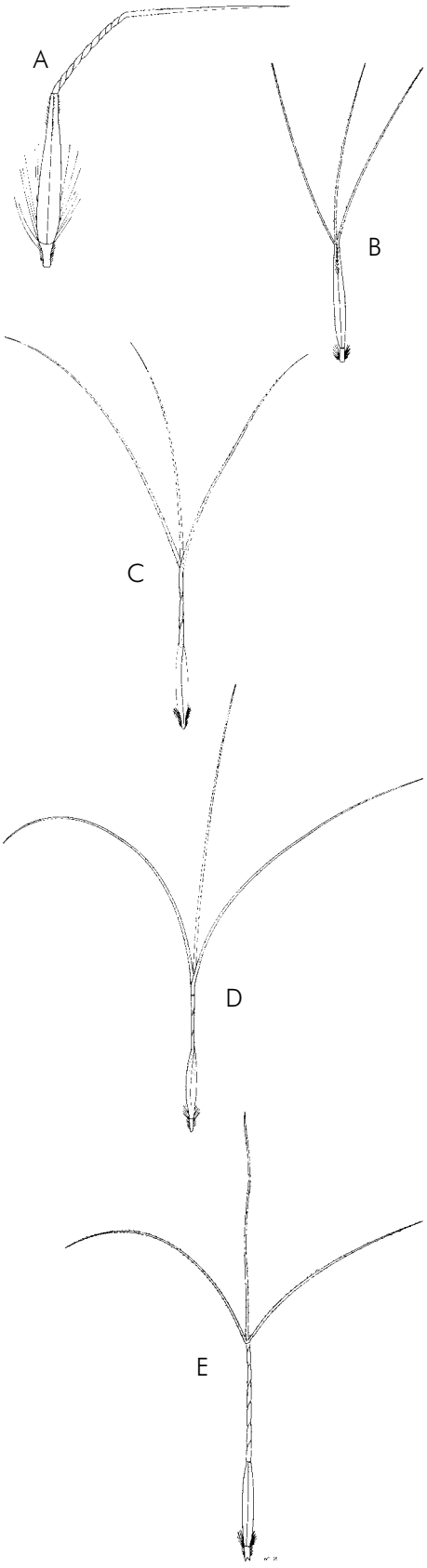



Figure 44.—*Aristida* spp. Florets: A, *A. parvula* (17.5 × 0.7 mm); B, *A. adscensionis* (2.2 × 0.4 mm); C, *A. aequiglumis* (31.0 × 0.5 mm); D, *A. congesta* (30.0 × 0.4 mm); E, *A. meridionalis* (41.0 × 0.7 mm). Artist: M. Ueckermann.

ovoid; with well-developed grana, or with reduced grana; centrifugal/peripheral, or centripetal. **Cytology**: $x = 11, 12$ (polyploidy).

**Species** ± 290, tropics and subtropics; 28 in southern Africa, widespread.

Species treatment by A.C. Mashau.

### Quick guide to easily confused taxa (in FSA):

1. Ligule a fringed membrane; lemma articulation never present . . . . . **Stipa**
   Ligule a dense fringe of hairs; lemma articulation present or absent . . . . . 2
2. Awns, or at least the central awn plumose . . . . . **Stipagrostis**
   Awns never plumose . . . . . 3
3. Awns spirally contorted at base at maturity . . . . . **Sartidia**
   Awns not spirally contorted at base at maturity . . . . . **Aristida**

### Key to species:

1. Lemma awn solitary or the two lateral awns poorly developed, ± 1/2 the length of the central awn . . . . . 2
   Lemma awns three, lateral awns well developed, longer than 1/2 the length of the central awn . . . . . 3
2. Plant annual; lemma articulation between apex of lemma and base of column . . . . . **A. parvula**
   Plant perennial; lemma without articulation . . . . **A. transvaalensis**
3(1). Lower glume without an awn or mucro . . . . . 4
   Lower glume with an awn or mucro (can be minute) . . . . . 23
4. Lower glume longer than upper glume (in some species the long, delicate apex breaks off early) . . . . . 5
   Lower glume shorter than to equalling the upper glume . . . . . 7
5. Plant perennial; lower glume long, tapering to an acuminate apex . . . . . **A. monticola**
   Plant annual; lower glume narrowing abruptly to an acute apex. . . 6
6. Lemma usually scabrid except for lower 1/4 . . . . . **A. effusa**
   Lemma keel and lateral nerves scaberulous towards apex, lower part glabrous and smooth . . . . . **A. wildii**
7(4). Plant annual . . . . . 8
   Plant perennial . . . . . 11
8 Articulation absent; callus rounded . . . . . 9
   Articulation present; callus bifid . . . . . 10
9 Inflorescence narrowly oblong to lanceolate; lemma usually scabrid only on the keel . . . . . **A. adscensionis**
   Inflorescence ovate; lemma usually scabrid all over except on the lower 1/4 . . . . . **A. effusa**
10(8). Lower glume 3.5–4.0 mm long, broadly oblong, apex obtuse to truncate or slightly emarginate, fimbriate; spikelet bright yellow; glume apex dark . . . . . **A. dewinteri**
   Lower glume 6–9 mm long, lanceolate, apex acute, not fimbriate; spikelet dull yellow to purple; glume apex without a dark patch . . . . . **A. stipoides**
11(7). Lemma articulation absent or inconspicuous . . . . . 12
   Lemma articulation present between the lemma apex and column base . . . . . 15
12. Plant robust; culm diameter 5–6 mm . . . . . **A. sciurus**
   Plant slender; culm diameter 1.5–3.0 mm . . . . . 13
13. Culms much branched from the upper nodes; leaves folded, straight, rigid, erect . . . . . **A. dasydesmis**
   Culms unbranched or sparsely branched from the upper nodes; leaves flat or rolled, curved or slightly curled, not straight and erect . . . . . 14
14. Spikelet to 22 mm long (including awns); inflorescence branches with spikelets congested; callus apex naked, rounded and swollen . . . . . **A. canescens** subsp. **canescens**

Spikelet 25–45 mm long (including awns); inflorescence branches with spikelets distinct from one another; callus apex bifid . . . . . **A. diffusa** subsp. **burkei**

15(11). Lower internodes of culms pubescent to woolly-hairy, upper internodes pubescent or glabrous . . . . . 16
Lower and upper culms internodes glabrous . . . . . 17

16. Lemma column 8–20 mm long; inflorescence oblong to broadly oblong, symmetrical, to 800 mm long, over 200 mm wide, much branched . . . . . **A. meridionalis**
Lemma column 5–7 mm long; inflorescence narrowly oblong to narrowly elliptic, usually asymmetric, to 200 × 120 mm . . . . . **A. vestita**

17(15). Callus apex truncate, obliquely truncate or slightly emarginate; leaves erect and rigid . . . . . **A. dasydesmis**
Callus apex bifid; leaves curved or bent, flexible, not rigid . . . 18

18. Lower glume with upper $^1/_3$ membranous, often torn and broken . . . . . **A. spectabilis**
Lower glume apex firm or only the very apex membranous . . . 19

19. Some leaf auricles with long woolly hairs . . . . . **A. meridionalis**
All leaf auricles glabrous, if pubescent then hairs not long woolly . . . . . 20

20. Culms much branched . . . . . **A. engleri** var. **ramosissima**
Culms unbranched to sparsely branched . . . . . 21

21. Lower glume apex acute, finely fimbriate . . . **A. engleri** var. **engleri**
Lower glume apex obtuse, usually entire, only occasionally coarsely fimbriate . . . . . 22

22. Upper glume 12–18 mm long . . . . . **A. diffusa** subsp. **diffusa**
Upper glume to 12 mm long . . . . . **A. diffusa** subsp. **burkei**

23(3). Lemma articulation present (sometimes only shown by a swollen line or colour differentiation, usually directly below branching point of awns) . . . . . 24
Lemma articulation absent . . . . . 33

24. Lemma articulation between the lemma apex and base of the long column; callus 1.5–3.0 mm long, apex acuminate, pungent . . . . . 25
Lemma articulation not as above; callus 0.5–1.5 mm long, apex narrowly or broadly rounded to truncate . . . . . 30

25. Lower internodes of culms woolly to densely tomentose . . . . 26
Lower internodes of culms glabrous or hairy but not with woolly hairs . . . . . 27

26. Inflorescence contracted, spike-like, very dense . . . . . **A. mollissima** subsp. **mollissima**
Inflorescence narrow, lax, ± divaricately branched . . . . . **A. mollissima** subsp. **argentea**

27(25). Inflorescence spike-like, sometimes interrupted towards the base, branches closely adpressed to main axis . . . . . 28
Inflorescence not spike-like, much interrupted, branches suberect or spreading . . . . . 29

28. Plant robust, to 1 500 mm high; culms sparsely branched at upper nodes; inflorescence usually 150–300 mm long . . . . . **A. stipitata** subsp. **stipitata**
Plant slender, to 600 mm high; culms much branched at upper nodes; inflorescence usually to 150 mm long ... . . . . **A. stipitata** subsp. **spicata**

29(27). Plant robust; culm diameter 2.5–4.0 mm; inflorescence usually 200–350 mm long . . . . . **A. stipitata** subsp. **robusta**
Plant slender; culm diameter 1.0–2.5 mm; inflorescence usually 100–200 mm long . . . . . **A. stipitata** subsp. **graciliflora**

30(24). Culm internodes pubescent; lemma slightly narrowed at apex but column absent, articulation between lemma apex and awns branching point . . . . . **A. hordeacea**
Culm internodes glabrous; lemma narrowed into a distinct column, articulation (often only indicated by a colouration difference) between column apex and awns branching point . . . . . 31

31. Spikelet clusters linear to oblanceolate (including awns); longest pedicel to 5.5 mm long; plant robust and coarse . . . . . **A. pilgeri**

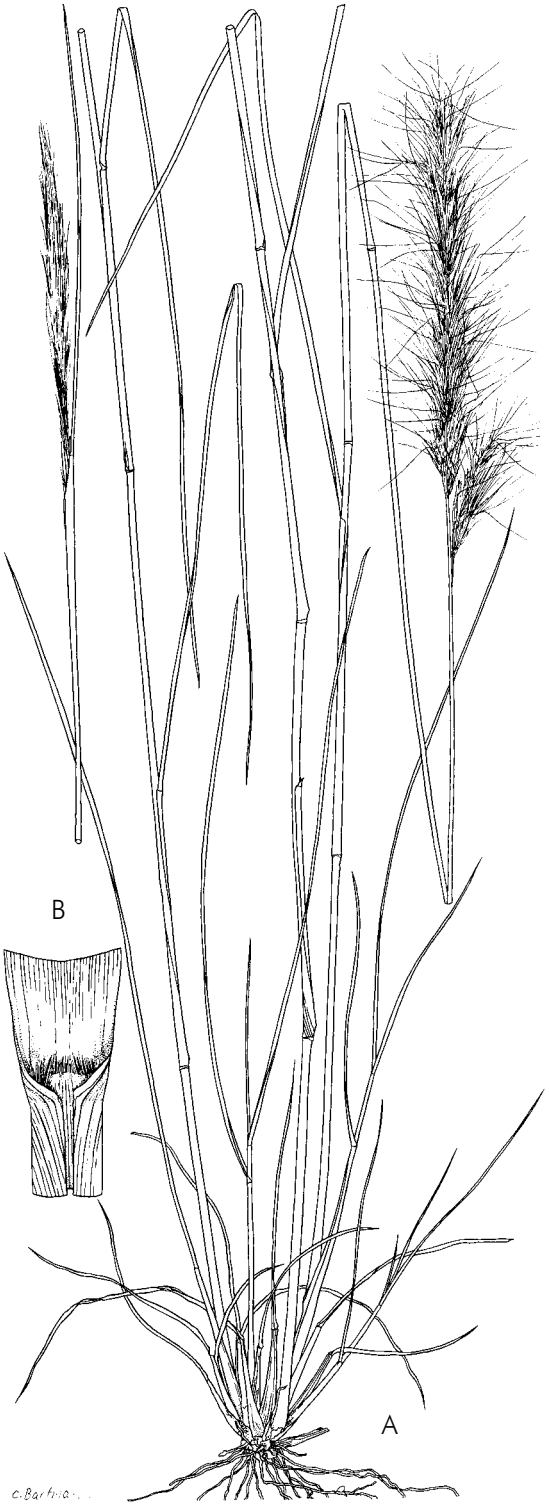



Figure 45.—*Aristida congesta* subsp. *congesta*. A, plant; B, ligule. Artist: C.D. Bartman.

Spikelet clusters narrow obovate (including awns); longest pedicel to 1.5 mm long; plant usually slender . . . . . 32

32. Inflorescence very dense, branches closely adpressed and covering main axis except occasionally at the base where 1–2 subspicate branches spread from the main axis . . . . . **A. congesta** subsp. **congesta**
Inflorescence variable, with many side branches spreading from and exposing the main axis, these either with a few spikelet laxly clustered or many spikelets densely clustered at the ends of the long, naked side branches, or with spikelets adpressed all along the side branches . . . . . **A. congesta** subsp. **barbicollis**

33(23). Plant annual . . . . . 34
Plant perennial to sub-perennial . . . . . 39

34. Lemma narrowly elliptic, dorsally compressed . . **A. hubbardiana**
Lemma linear, laterally compressed . . . . . 35

35. Lower glume with a distinct, robust awn 0.8–3.5 mm long . . . 36
Lower glume mucronate or with a short awn to 0.8 mm long. . . . 38

36. Spikelet coarse, 35–50 mm long (including awns). . . . **A. rhiniochloa**
Spikelet slender and fine, 10–30 mm long (including awns) . . . . 37

37. Inflorescence delicate, branchlets and pedicels spreading, spikelets distant from one another at the end of the branches . . . . . **A. scabrivalvis** subsp. **scabrivalvis**
Inflorescence robust, branchlets and pedicels adpressed, spikelets densely congested at the ends of branches . . . . . **A. scabrivalvis** subsp. **contracta**

38(35). Inflorescence oblong to ovate, 80 mm or wider, side branches spreading from the main axis with lax clusters of 2–3 spikelets distant from each other at the end; lower glume $^{3}/_{4}$ as long to equalling, or sometimes longer than upper glume . . . . . **A. effusa**
Inflorescence linear to lanceolate, usually 10–50 mm wide, side branches adpressed to main axis, spike-like but interrupted towards the base, or open and spreading, spikelets densely clustered; lower glume usually $^{2}/_{3}$ or $^{3}/_{4}$ the length of the upper glume . . . . . **A. adscensionis**

39(33). Inflorescence open, branches rigid, spreading at 90 degrees from the main axis; lower glume equal to or longer than upper glume . . . . . **A. bipartita**
Inflorescence contracted, usually dense, branches flexible, erect or spreading not more than 45 degrees from main axis; glumes variable, but lower glume never longer than upper glume . . . . . 40

40. Spikelet to 14 mm long (including awns) . . . . . **A. recta**
Spikelet 15–40 mm long (including awns) . . . . . 41

41. Lemma oblong, almost the same width throughout, sometimes with a minute constriction at the branching point of the awns; column absent . . . . . **A. canescens** subsp. **ramosa**
Lemma narrowly lanceolate, distinctly tapering towards the branching point of the awns; column present or absent . . . . . 42

42. Leaves mainly basal, forming a dense basal tuft in which the culms are hidden; culms mainly unbranched in the upper nodes . . . 43
Leaves mainly cauline, or not basally dense and the culms obvious for most of their length; culms branched or unbranched in the upper nodes . . . . . 44

43. Rhizomes long, oblique, thin and creeping; spikelet 15–30 mm long (including awns); glumes usually very unequal; high eastern mountains . . . . . **A. junciformis** subsp. **galpinii**
Rhizomes short and stout; spikelet 20–35 mm long (including awns); glume usually equal to subequal; bushveld and highveld . . . . . **A. aequiglumis**

44(42). Culms much branched, usually at every node; lateral awns usually rudimentary, very much shorter and thinner than the central awn . . . . . **A. transvaalensis**
Culms branched, but not at every node; lateral awns well developed, shorter or subequal to the central awn, never rudimentary . . . . . **A. junciformis** subsp. **junciformis**

**Aristida adscensionis** L., in *Species plantarium*: 82 (1753). Type: Ascension I.

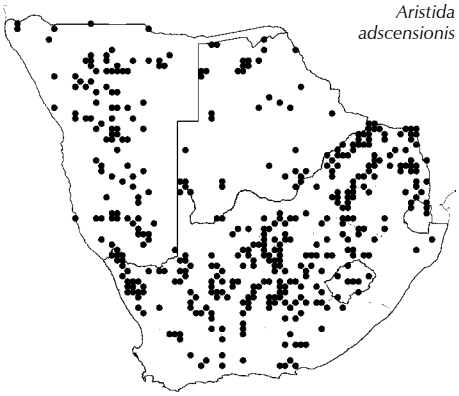
*A. guineensis* Trin. & Rupr., in *Species graminum stipaceorum:* 137 (1842).

*A. adscensionis* L. subsp. *guineensis* (Trin. & Rupr.) Henrard, in *Mededeelingen van's Rijksherbarium te Leiden* 54: 216 (1926).

*A. curvata* (Nees) T.Durand & Schinz, in *Species graminum stipaceorum*: 133 (1842).

*A. submucronata* Schumach., in Schumach. & Thonn., in *Beskrivelse af Guineeiske planter*: 67 (1827).

ANNUAL BRISTLE GRASS, STEEKGRAS


*Aristida adscensionis*

Tufted annual to 1 000 mm high, erect, often branched. Leaf blade to 300 × to 3 mm. Inflorescence 10–50 mm wide, narrowly oblong to lanceolate, usually spike-like, interrupted at base, side branches adpressed to main axis, sometimes branches open and spreading; spikelets densely clustered on branches. Spikelet 10–40 mm long (including awns); lower glume $^{2}/_{3}$–$^{3}/_{4}$ the length of upper glume, sometimes with a mucro or short awn to 0.8 mm long; lemma laterally compressed, articulation and column absent, usually only keel scabrid; awns three, laterals well developed, shorter than central awn; callus with rounded, naked apex; anther 1.0–1.3 mm long.

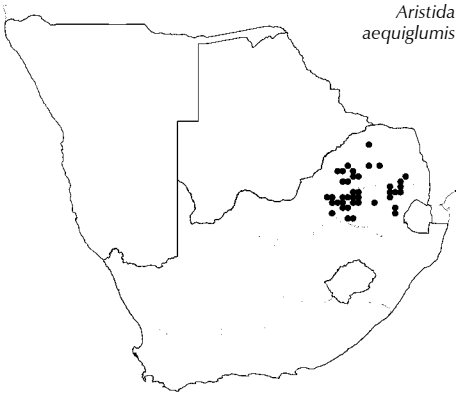
[This species has a very wide geographical distribution and exhibits considerable variation in its external morphology. In the past it has been divided into species, subspecies and varieties. Here the treatment of Melderis (1972) is followed pending a future detailed study. Some forms resemble *A. hubbardiana*, which has the lemma dorsally compressed; while others resemble forms of *A. congesta*, which have a lemma articulation between the column apex and the awns branching point.]

*Flowering*: December to September. *Ecology*: Stony, sandy loam, clayey, calcareous, shallow soils; on stony hills, moist areas along pans and rivers, along roads and other disturbed ground. *Frequency in southern Africa*: Common. *Distribution*: Throughout the tropics. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Grazed only when very young; indicator of advanced retrogression of veld and disturbed ground; weed; troublesome in wool and causing sores by piercing the sheep's skin.

Illustration: Müller: 109 (2007).
Anatomy vouchers: *Ellis 917* & *4736*.
Voucher: *Smook 2781, Van Jaarsveld 179, Schmitz 1523*.

**Aristida aequiglumis** Hack., in Schinz, in *Bulletin de l'Herbier Boissier* 3: 381 (1895). Type: South Africa, Gauteng, Pretoria, Kuduspoort, *Rehmann 4696*.

CURLY LEAVED THREE-AWNED GRASS

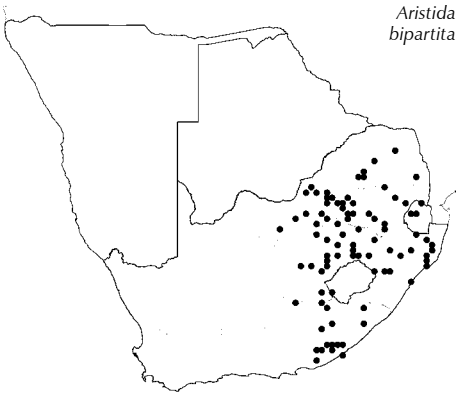

*Aristida aequiglumis*

Densely tufted to 800 mm high; rhizome stout, short; leaves mainly basal, curling, forming a dense basal tuft, enclosing the culms for most of their length; culms usually unbranched. Leaf blade to 150 × to 1 mm. Inflorescence contracted, dense; much branched, branches not spreading more than 45 degrees from main axis. Spikelet 20–35 mm long (including awns); glumes equal to subequal, often pubescent, mucronate; lemma narrowly lanceolate, tapering upwards, articulation absent; column long and twisted; awns three, laterals shorter but well developed; callus apex naked, truncate to slightly emarginate; anther 3.4–3.6 mm long.

[Although this species does occur on the highveld, it is more common in bushveld areas. Resembles *A. junciformis* subsp. *galpinii*, which has a long, thin, oblique rhizome, generally unequal glumes and is found in mountain sourveld.]

*Flowering*: December to May. *Ecology*: Sandy, shallow soils; on rocky hill slopes or in seasonally flooded areas. *Frequency in southern Africa*: Common. *Distribution*: Zimbabwe to Zambia. NW, LIM, M, G. *Economics*: Indicator of eroded soils.

Anatomy vouchers: *De Winter 7515* & *Ellis 442*.
Voucher: *Smook 2709, Smook 1435*.


*Aristida bipartita*

**Aristida bipartita** (Nees) Trin. & Rupr., in *Species graminum stipaceorum* 144 (1842). Type: South Africa, Eastern Cape, Katrivier, *Drège*.

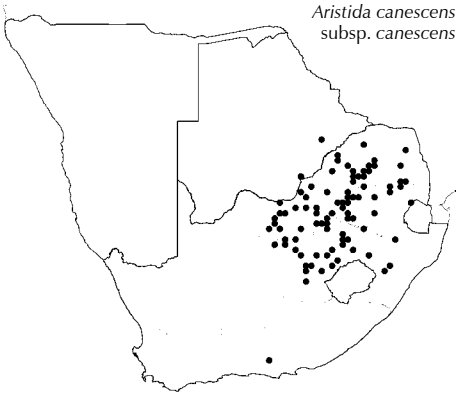
THREE-AWNED ROLLING GRASS

Tufted perennial to sub-perennial, to 650 mm high, erect or geniculate. Leaf blade to 200 × to 2 mm. Inflorescence open; branches rigid, naked for most of their length, spreading at 90 degrees from main axis; spikelets borne at the apices of the long, naked branches. Spikelet 18–20 mm long (including awns); glumes awned; lower glume equalling or longer than upper glume; lemma articulation and column absent; awns three, subequal; callus apex thickened, naked, rounded to obtuse; anther 2.2–4.0 mm long.

[Resembles *A. effusa*, which is a definite annual, has a lower glume with or without a mucro; and forms of *A. scabrivalvis*, an annual with the lower glume less than $^{2}/_{3}$ the length of the upper glume (excluding awns). The whole inflorescence breaks off at maturity and is rolled about as a tumbleweed by the wind.]

*Flowering*: October to May. *Ecology*: Sandy, stony, loamy, clayey and black turf soils; in moist areas around vleis and dongas, and in overgrazed and other disturbed ground. *Frequency in southern Africa*: Common. *Distribution*: Mozambique. S, L, LIM, NW, G, M, FS, KZN, EC.

Anatomy vouchers: *Ellis 78, 285* & *291*.
Voucher: *Scheepers 1574*.


*Aristida canescens* subsp. *canescens*

**Aristida canescens** Henrard subsp. **canescens**, in A critical revision of the genus *Aristida*. *Mededeelingen van's Rijksherbarium te Leiden,* Supplement: 708 (1933). Type: South Africa, North West, Wolmaransstad, *Cronjé 7643* (PRE, iso.).

VAALSTEEKGRAS

Tufted slender, erect perennial to 1 500 mm high; culm 1.5–3.0 mm in diameter, unbranched to sparsely branched from the upper nodes. Leaf blade to 300 × to 2 mm, flat or rolled, curved to curled. Inflorescence with spikelets congested on the branches. Spikelet to 22 mm long (including awns); lower glume $^{1}/_{2}$ as long as to nearly equalling the upper glume, firm except for the very apex, which is membranous, without mucro or awn; lemma articulation and column absent; awns three; callus apex naked, subobtuse to rounded; anther 5.0–5.2 mm long.

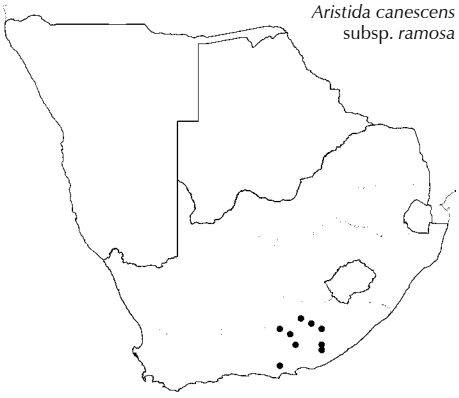
[Differs from subsp. *ramosa*, which has the culms much branched from the upper nodes and the lower glume awned. Resembles *A.*

*junciformis*, which has the lower glume awned or mucronate; *A. pilgeri*, which has a lemma articulation; and *A. sciurus*, which has a culm diameter of 5–6 mm.]

*Flowering*: December to May. *Ecology*: Shallow, sandy, stony soils; on rocky ridges, eroded and disturbed ground. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe to Zambia. B, LIM, NW, G, M, FS, KZN, EC.

Anatomy voucher: *Smook 2759.*
Voucher: *Smook 2063, De Winter 7561.*

**Aristida canescens** Henrard subsp. **ramosa** De Winter, in *Kirkia* 3: 132 (1963). Type: South Africa, Eastern Cape, Cathcart, Kei Valley at Kei View, *Acocks 9691* (PRE, holo.).


*Aristida canescens* subsp. *ramosa*

Tufted perennial to 600 mm high; culms sometimes geniculate, much branched from the upper nodes. Leaf blade to 150 × to 1.5 mm. Inflorescence contracted, branches erect or spreading not more than 45 degrees from the main axis. Spikelet 15–18 mm long (including awns); lower glume more than $^2/_3$ the length of the upper, awned; lemma oblong, almost the same width throughout, sometimes with a minute constriction at the branching point of the awns; articulation and column absent; awns three, subequal; callus apex naked, swollen, rounded; anther 3.7–4.7 mm long.

[Differs from subsp. *canescens,* which has the culm mainly unbranched and the lower glume unawned.]

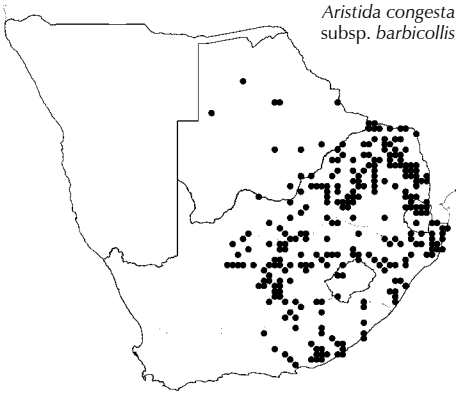
*Flowering*: July, December, February and March. *Ecology*: Dolerite slopes. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. EC.

Voucher: *Donaldson 318*.

**Aristida congesta** Roem. & Schult. subsp. **barbicollis** (Trin. & Rupr.) De Winter, in *Bothalia* 8: 173 (1964). Type: South Africa, Eastern Cape, Kunab River to Kat River, *Drège* (lecto.).

*A. barbicollis* Trin. & Rupr., in *Species graminum stipaceorum*: 152 (1842).

Spreading three-awn grass, witsteekgras


*Aristida congesta* subsp. *barbicollis*

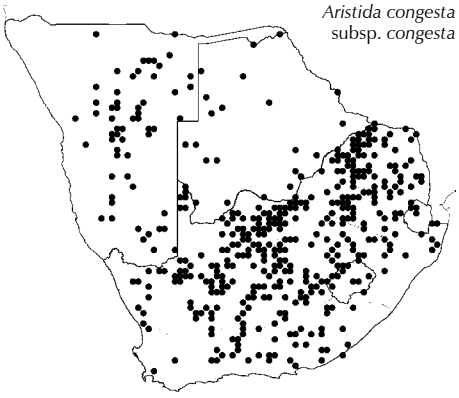
Tufted perennial, or slender annual to 750 mm high. Leaf blade to 200 × to 3 mm. Inflorescence variable, with many side branches spreading from and exposing the main axis; spikelets either a few laxly clustered or many densely clustered at the ends of long, naked side branches or spreading to the base of the side branches; spikelet clusters narrow, obovate to ovate (including awns); longest pedicel to 1.5 mm long. Spikelet 20–30(–50) mm long (including awns); lower glume awned; lemma articulation between apex of column and branching point of awns, articulation sometimes represented only by a swollen line or colour differentiation; column present; awns three, laterals well developed; callus 0.5–1.5 mm long, apex naked, narrow or broadly rounded to truncate; anther 0.8–1.0 mm long.

[The spikelets of the two subspecies cannot be distinguished from each other, the inflorescence shape being the main character used but this tends to intergrade. Thus there are some plants that cannot be referred to with certainty to either subspecies. In this treatment,

pending further study, specimens with inflorescences open and lax or those with most of the side branches spreading from and exposing the main axis are included in subsp. *barbicollis*.]

*Flowering*: October to May. *Ecology*: Deep, sandy clayey soils; on rocky hillsides, old lands and disturbed ground. *Frequency in southern Africa*: Common. *Distribution*: Northwards to East Africa. B, S, L, LIM, NW, G, M, FS, KZN, NC, EC. *Economics*: Indicator of poor veld management or other disturbances; weed; the callus penetrates sheep's skins, causing sores.

Illustration: Melderis: 130, tab. 33 (1971).
Anatomy vouchers: *Ellis 102, 113 & 124*.
Voucher: *Smook 2787, 5703*; *Codd 4865*; *Herbst 50*.


*Aristida congesta* subsp. *congesta*

**Aristida congesta** Roem. & Schult. subsp. **congesta**, in *Systema vegetabilium* 2: 401 (1817). Type: South Africa, Cape (locality unknown), *Lichtenstein*.

*A. alopecuroides* Hack., in *Verhandlungen des Botanischen Vereins für die Provrovinz Brandenburg* 30:114 (1888). Type: Namibia, Amboland, *Schinz 15847* (W, holo.).

*A. longicauda* Hack. & Henriq., in *Boletim da Sociedade broteriana* 6: 143 (1883). Type: Mozambique, (locality unknown), *Carvalho 35* (W, holo.).

KATSTERTSTEEKGRAS

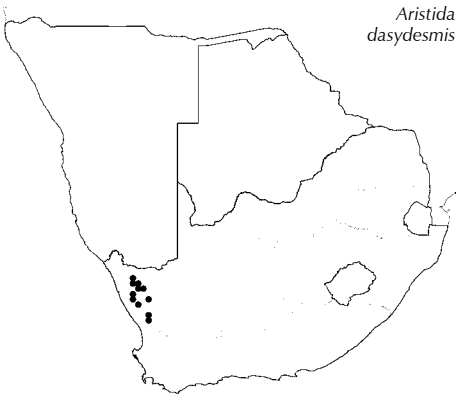
Densely tufted slender perennial, or occasionally annual, to 900 mm high. Leaf blade to 300 × to 5 mm. Inflorescence very dense, branches closely adpressed, enclosing main axis except occasionally at the base where 1–2 sub-spicate side branches spread away from the main axis; spikelet clusters narrowly obovate to obovate. Spikelet 25–30 mm long (including awns); lower glume awned; lemma articulation between the column apex and the awns branching point, articulation sometimes represented only by a swollen line or a colour differentiation; column present; awns three, laterals well developed; callus apex naked, narrowly to broadly rounded to truncate; anther 0.8–1.4 mm long.

[The spikelets of the two subspecies cannot be distinguished from each other, inflorescence shape being the main character used although it tends to intergrade. Thus there are some plants that cannot be referred to with certainty to either subspecies. In this treatment, pending further studies, specimens with very dense inflorescences, with branches closely adpressed and covering the main axis, occasionally interrupted at the base by 1–2 spreading branches are included in this subspecies. Resembles *A. hordeacea*, which has culm internodes pubescent and column absent, and *A. hubbardiana*, which has the lemma articulation absent.]

*Flowering*: December to May. *Ecology*: Hard or stony loam, sandy basalt, black clayey soils, Kalahari sands; on stony slopes, open eroded places, old lands, road verges and other disturbed ground. *Frequency in southern Africa*: Common. *Distribution*: Northwards to northeast and East Africa; and the Mediterranean. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Pasture for small stock only; indicator of retrogression of veld; weed; tangles in wool, and the callus pierces the skin causing sores.

Illustration: Müller: 111 (2007).
Voucher: *Theron 1264*; *Giess, Volk & Bleissner 7025*; *De Winter & Marais 4128*.

**Aristida dasydesmis** (Pilg.) Mez, in *Feddes Repertorium* 17: 148 (1921). Type: South Africa, Northern Cape, Namaqualand, *Schlechter 11228* (?lectotype).


*Aristida dasydesmis*

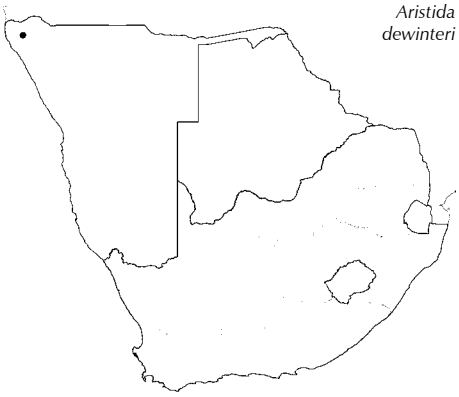
Densely tufted slender perennial to 800 mm high; leaves mainly cauline; culms 1.5–3.0 mm in diameter, much branched from the upper nodes. Leaf blade to 300 × about 1 mm, folded, straight, erect and rigid. Spikelet 25–30 mm long (including awns); lower glume just over $^1/_2$ the length of the upper glume, mucro or awn absent; lemma articulation (sometimes inconspicuous) between the lemma apex and column base, or absent; column to 6 mm long; awns three, laterals well developed; callus apex naked, truncate, obliquely truncate or slightly emarginate; anther 1.2–3.5 mm long.

[Resembles *A. junciformis* subsp. *junciformis* and *A. transvaalensis*, which both have the lower glumes awned or mucronate; *A. vestita*, which has the lower internodes pubescent to woolly-hairy, and *A. diffusa*, which has flexible leaves.]

*Flowering*: August to September. *Ecology*: Granite slopes in arid areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC, NC.

Voucher: *Acocks 19518*.

**Aristida dewinteri** Giess, in *Bothalia* 10: 365–366 (1971). Type: Namibia, Kaokoveld, 18 miles west of Enyandi, *Giess 9345* (PRE, holo.).


*Aristida dewinteri*

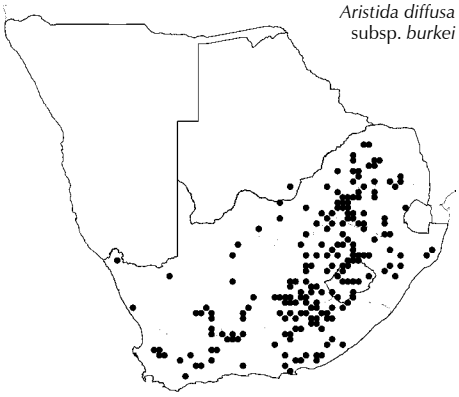
Tufted annual to 1 000 mm high. Leaf blade to 300 × to 3 mm. Inflorescence effuse, open, pallid. Spikelet 40–50 mm long (including awns), bright yellow, with a dark patch at the apex of the glumes; lower glume 3.5–4.0 mm long, $^1/_2$ the length of the upper glume, broadly oblong, apex obtuse to truncate or slightly emarginate, fimbriate, without a mucro or awn; lemma articulation between the lemma apex and column base; column 1.3–1.4 mm long; awns three, laterals well developed but shorter than the central awn; callus apex naked, distinctly bifid; anther 3.0–5.1 mm long.

*Flowering*: April. *Frequency in southern Africa*: Rare. Locally common (where found). *Distribution*: Endemic, but possibly in Angola. N.

Voucher: *Smook 7777*.

**Aristida diffusa** Trin. subsp. **burkei** (Stapf) Melderis, in *Boletim da Sociedade broteriana*, Sér. 2: 44: 287 (1970). Type: South Africa, Free State, near the Vaal River, *Burke 165* (PRE, fg.); Free State, near Hoopstad, *Grindon* (syntypes).

*A. diffusa* Trin. var. *burkei* (Stapf) Schweick., in *Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem* 14: 122 & 195 (1938).


*Aristida diffusa* subsp. *burkei*

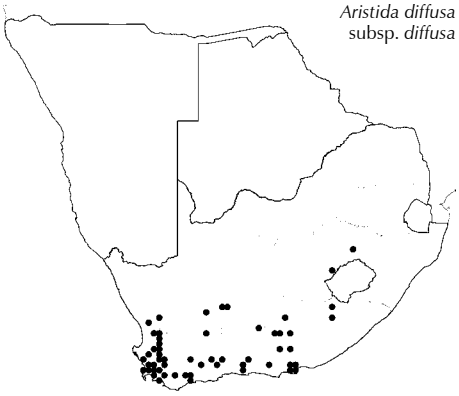
KOPERDRAADGRAS, YSTERGRAS

Densely tufted slender perennial to 1 000 mm high; culm 1.5–3.0 mm in diameter, unbranched or sparsely branched. Leaf blade to 300 × to 2 mm. Inflorescence open; spikelets distant from one another. Spikelet 25–40 mm long (including awns); lower glume $^1/_2$–$^2/_3$ the length of the upper glume, obtuse, occasionally coarsely fimbriate at apex, mucro or awn absent; upper glume to 12 mm long; lemma articulation present between lemma apex and column base, or absent; column present; callus apex naked, deeply bifid; anther 5.5–7.0 mm long.

[Barely distinguished from subsp. *diffusa*, from which it is separated by the longer upper glume and distribution; further study is needed.]

*Flowering*: November to April. *Ecology*: Dry, sandy, gravelly loam soils; on hilly slopes. *Frequency in southern Africa*: Common. *Distribution*: Zimbabwe. B, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Indicator of overgrazing.

Anatomy vouchers: *Ellis 144, 305 & 1603*.
Voucher: *Smook 6404, 3442*; *Smook & Gibbs Russell 2275*.


*Aristida diffusa* subsp. *diffusa*

**Aristida diffusa** Trin. subsp. **diffusa**, in *Mémoires del' Académie imperiale des Sciences de St. Petersborg* (*Classe des Sciences physiques et mathématiques*) 6,1: 86 (1830). Type: South Africa.

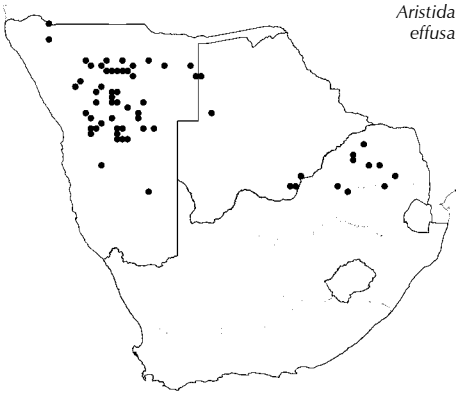
*A. diffusa* Trin. var. *genuina* Henrard, in A monograph of the genus *Aristida*. *Mededeelingen van's Rijksherbarium te Leiden* 1: 97 (1929).

Densely tufted slender perennial to 750 mm high, erect; culms unbranched or sparsely branched. Leaf blade to 300 × to 2 mm, flexible; leaf auricles glabrous or short-hairy, not woolly. Spikelet 25–45 mm long (including awns); lower glume $^1/_2$–$^2/_3$ the length of the upper glume, apex obtuse, occasionally coarsely fimbriate; upper glume 12–18 mm long; lemma articulation present between lemma apex and column base, or absent; column present; awns three, laterals well developed; callus apex naked, deeply bifid; anther 4.6–6.5 mm long.

[Barely distinguishable from subsp. *burkei*, from which it is mainly separated by the shorter upper glume. Further study is needed.]

*Flowering*: October. *Ecology*: Sandy soils; between rocks and in disturbed places. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. FS, NC, WC, EC.

Anatomy voucher: *Ellis 1209*.
Voucher: *Liebenberg 4240*.


*Aristida effusa*

**Aristida effusa** Henrard, in A critical revision of the genus *Aristida*. *Mededeelingen van's Rijksherbarium te Leiden* 1: 155 (1926). Type: Namibia, Karibib, *Engler 6162*.

Spreading steekgras, loose bristle grass, pluimsteekgras

Tufted erect annual to 900 mm high; culms branched. Leaf blade to 300 × to 3 mm. Inflorescence open, ovate; spikelets clustered at the end of lax, flexible branches. Spikelet 25–32 mm long (including awns); lower glume $^3/_4$ as long to longer than the upper glume, narrowed abruptly into a short, acute apex, mucro or awn absent; lemma usually scabrid except for lower $^1/_4$; articulation absent; column or beak absent, awns three, laterals shorter; callus apex naked, swollen, rounded; anther 1.3–1.6 mm long.

[Resembles some forms of *A. scabrivalvis*, which has the lower glume strongly awned; *A. bipartita*, which is perennial with the lower glume awned; and *A. wildii*, which has a lemma glabrous at lower part, keel and lateral nerves scaberulous towards apex.]

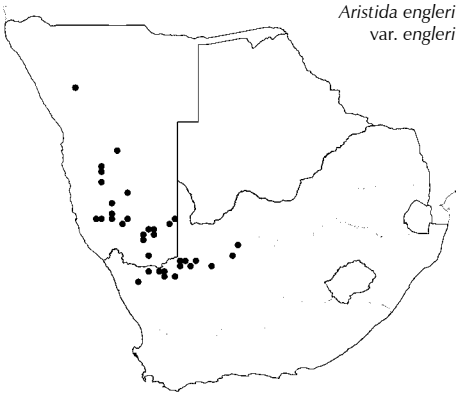
*Flowering*: February to May. *Ecology*: Calcareous, sandy loam, stony soils; along roadsides. *Frequency in southern Africa*: Locally com-

mon. *Distribution*: Endemic. N, B, LIM, NW, G, GM. *Economics*: Indicator of retrogression of veld.

Illustration: Müller: 157 (2007).
Voucher: *De Winter & Leistner 5174, Field 3051.*

**Aristida engleri** Mez var. **engleri**, in *Feddes Repertorium* 17: 147 (1921). Type: Namibia, Kuibis, *Engler 6717* (PRE, fg.).

ENGLER'S BRISTLE GRASS, BRISTLE THREE-AWN


*Aristida engleri* var. *engleri*

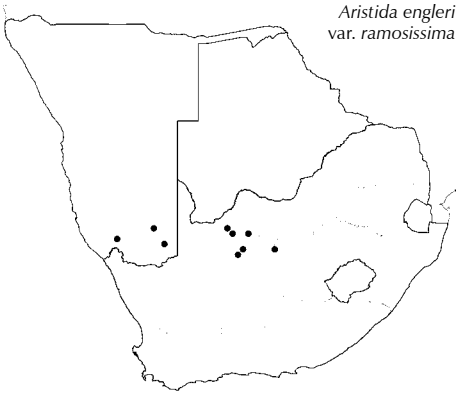
Densely tufted to 700 mm high, erect to geniculate; culms unbranched or sparsely branched. Leaf blade to 150 × to 2.5 mm, flexible; leaf auricles glabrous to short-hairy, not woolly. Spikelet 25–35 mm long (including awns); lower glume $^1/_2$ the length of upper glume, apex acute, finely fimbriate; lemma articulation between the lemma apex and column base; column present; awns three, laterals well developed; callus apex naked, deeply bifid; anther 4.2–5.2 mm long.

[Resembles *A. diffusa*, which has the lower glume apex obtuse and only occasionally coarsely fimbriate; and *A. vestita*, which has lower internodes pubescent to woolly hairy. This variety is not always distinguishable from var. *ramosissima*, which has the culms much branched.]

*Flowering*: February to August. *Ecology*: Rocky outcrops. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. N, NC.

Illustration: Müller: 113 (2007).
Anatomy vouchers: *Ellis 879* & *903*.
Voucher: *Giess & Müller 11954, Theron 1972*.

**Aristida engleri** Mez var. **ramosissima** De Winter, in *Kirkia* 3: 132 (1963). Type: South Africa, Northern Cape, Gordonia, ± 15 m. NNW. of Winstead, *Acocks 2053* (PRE, holo.).


*Aristida engleri* var. *ramosissima*

Tufted perennial to 900 mm high, to sprawling; culms much branched. Leaf blade to 150 × to 2 mm, flexible; auricles glabrous or shortly pubescent. Spikelet 20–25 mm long (including awns); lower glume to $^1/_2$ the length of upper glume; lemma articulation between lemma apex and column base; column present; awns three; callus apex naked, deeply bifid; anther 4.0–5.3 mm long.

[This variety is not always distinguishable from var. *englerii*, which has culms unbranched to sparsely branched.]

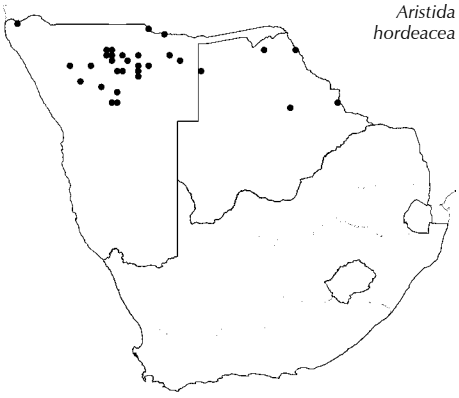
*Flowering*: January to June. *Ecology*: Red sandy soils; between rocks on hillsides. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NC.

Illustration: Müller: 159 (2007).
Voucher: *Liebenberg 5228*.

**Aristida hordeacea** Kunth, in *Révision des graminées* 2: 517, t. 173 (1831). Type: Senegal, *Leprieur*.

JAKKALSSTERT, GARSSTEEKGRAS

Tufted annual to 900 mm high, erect to geniculate; leaves and sheaths usually scabrid; culm internodes pubescent. Leaf blade to 300 × 10 mm. Inflorescence very dense, spike-like, sometimes interrupted at base. Spikelet 15–45 mm long (including awns); lower

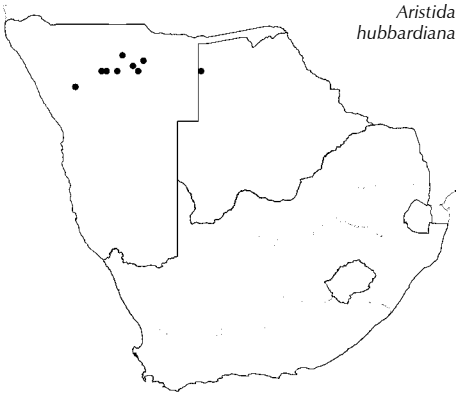

*Aristida hordeacea*

glume to $^2/_3$ the length of upper glume (excluding awns), long awned; lemma articulation between lemma apex and awn branching point; column absent but lemma narrowed below branching point of the awns; awns three, subequal; callus 0.5–1.5 mm long, apex naked, narrowly to broadly rounded; anther 1.6–2.0 mm long.

[Resembles *A. hubbardiana*, which has no lemma articulation; and forms of *A. congesta* subsp. *congesta*, which have a distinct column.]

*Flowering*: January to May. *Ecology*: Moist heavy soils; in shallow depressions, on edges of pans and vleis, in old farmlands. *Frequency in southern Africa*: Locally common. *Distribution*: Throughout tropical Africa. N, B. *Economics*: Indicator of retrogression of veld.

Illustrations: Müller: 115 (2007), Melderis: 117, tab. 31(1971).
Voucher: *De Winter 2729, Giess & Muller 11803*.


*Aristida hubbardiana*

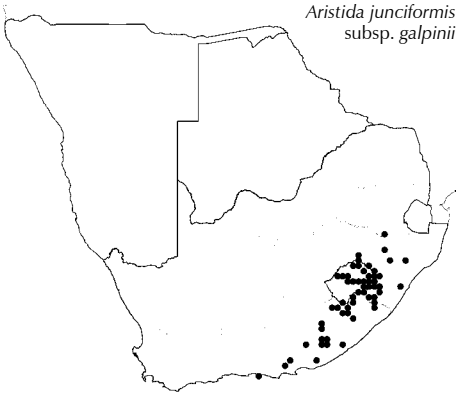
**Aristida hubbardiana** Schweick., in *Notizblatt des Botanischen Gartens und Museums Berlin-Dahlem* 14, 122: 196 (1938). Type: Namibia, Tsumeb, *Dinter 7600* (PRE, ?holo.).

Densely tufted annual to 500 mm high, branched, erect to geniculate; lower leaf surface and sheaths smooth; culm internodes glabrous. Leaf blade to 100 × to 2 mm. Inflorescence dense, spike-like. Spikelet 10–30 mm long (including awns); lower glume $^2/_3$ as long as to nearly equalling upper glume, short-awned; lemma narrowly elliptic, dorsally compressed, usually very scabrid in the upper $^2/_3$ with large prickles in rows; articulation absent; column absent but lemma narrowed into a short beak; awns three, laterals well developed; callus apex naked, swollen and rounded.

[Resembles some forms of *A. adscensionis*, which has the lemma laterally compressed; and *A. hordeacea*, which has a lemma articulation.]

*Flowering*: March to April. *Ecology*: Damp calcareous, clayey soils; around vleis and seasonally flooded depressions. *Frequency in southern Africa*: Locally common (but with a limited distribution). *Distribution*: Endemic, but possibly in Angola. N, B.

Voucher: *Giess, Volk & Bleissner 6405*; *Smith 3641*.


*Aristida junciformis* subsp. *galpinii*

**Aristida junciformis** Trin. & Rupr. subsp. **galpinii** (Stapf) De Winter, in *Kirkia* 3: 132 (1963). Type: South Africa, Eastern Cape, Barkly East Division, Ben McDhui (Wittebergen), *Galpin, 6900* (PRE, iso.).

Densely tufted perennial to 500 mm high, erect; rhizome long, oblique, slender; leaves mainly basal, forming a dense basal tuft in which the culms remain hidden; culms mainly unbranched at upper nodes. Leaf blade to 250 × to 1 mm. Inflorescence contracted, branches erect or spreading but not more than 45 degrees from the main axis. Spikelet 15–30 mm long (including awns); glumes usually very unequal, lower $^1/_2$–$^2/_3$ the length of upper, mucronate to shortly awned; lemma narrowly lanceolate, articulation absent; distinctly tapering towards a short beak or very short column; awns three, laterals well developed; callus apex naked, truncate or broadly rounded; anther 2.4–5.0 mm long.

[This subsp. occurs in very high mountainous sourveld. This separates it from *A. aequiglumis*, which occurs mainly in the bushveld

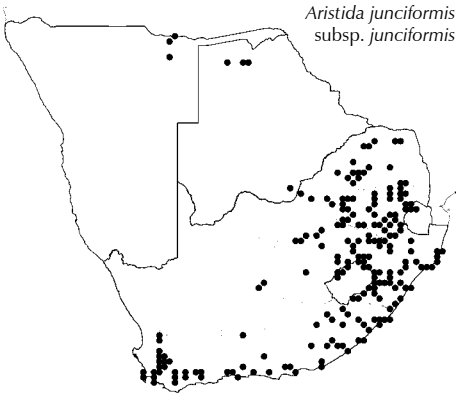
and has a short, stout rhizome and glumes that are usually subequal to equal.]

*Flowering*: November to April. *Ecology*: Shallow soils and on basalt or sandstone; overgrazed areas and rocky slopes of very high mountains. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. L, FS, KZN, EC. *Economics*: Indicator of overgrazed and disturbed areas.

Illustration: Chippindall: 313, fig. 278 (1955).
Anatomy voucher: *Ellis 237.*
Voucher: *Killick 4471, Acocks 21992.*

**Aristida junciformis** Trin. & Rupr. subsp. **junciformis**, in *Species graminum stipaceorum*: 143 (1842). Type: South Africa, without precise locality, *Drège* (PRE, iso.).

GONGONI-STEEKGRAS, WIRE GRASS


*Aristida junciformis* subsp. *junciformis*

Densely tufted perennial to 900 mm high, erect; stoutly rhizomatous; leaves mainly cauline or at least not densely basal; culms unbranched to branched at some nodes, always clearly visible for most of their lengths. Leaf blade to 300 × to 3 mm. Inflorescence contracted, dense to lax, branches erect to spreading up to 45 degrees from main axis. Spikelet 20–30 mm long (including awns); lower glume up to $^2/_3$ the length of upper, awned; lemma narrowly lanceolate; articulation absent; distinctly tapering into a beak or column; awns three, laterals well developed; callus apex naked, swollen, rounded to truncate, anther 2.7–4.2 mm long.

[In this treatment De Winter's broad concept of the subspecies has been followed and specimens that may be referable to subsp. *macilenta* (Zambia, Malawi and Zimbabwe) and subsp. *welwitschii* (Zambia and Zimbabwe) are included. Resembles *A. transvaalensis*, which is branched at most nodes and lateral awns either absent or shorter and thinner than central awn; *A. aequiglumis*, which has a dense tuft of basal leaves; and *A. dasydesmis*, which has the lower glume without an awn or mucro.]

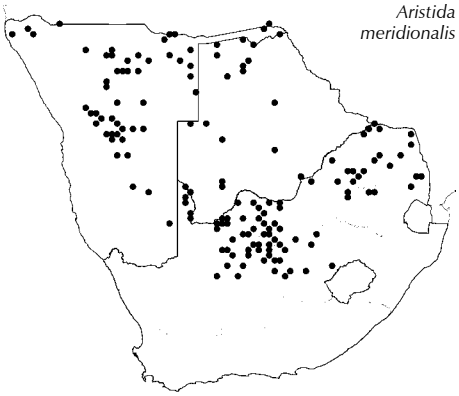
*Flowering*: November to May. *Ecology*: Sandy, clayey, stony soils or shallow soils; on stony hillsides, in depressions where water collects and in other damp places, along roadsides and other disturbed ground. *Frequency in southern Africa*: Common to locally dominant (widely distributed). *Distribution*: The species in the broad sense occurs northwards to East Africa. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Domestic use such as brooms; indicator of mismanagement of veld; weed and can be a problem as an extremely tough, pioneer grass.

Illustration: Chippindall: 309, fig. 274 (1955).
Anatomy vouchers: *Ellis 279, 439 & 1439.*
Voucher: *Strey & Schlieben 8524, Smook 4651, De Winter 735.*

**Aristida meridionalis** Henrard, in A critical revision of the genus *Aristida*. *Mededeelingen van's Rijksherbarium te Leiden* 2: 344 (1927). Type: Namibia, Tsumeb, *Dinter 2476* (PRE, fg.).

LANGBEENSTEEKGRAS

Densely tufted perennial to 2 000 mm high; lower culm internodes glabrous or pubescent to woolly-hairy. Leaf blade to 650 × to 5 mm,

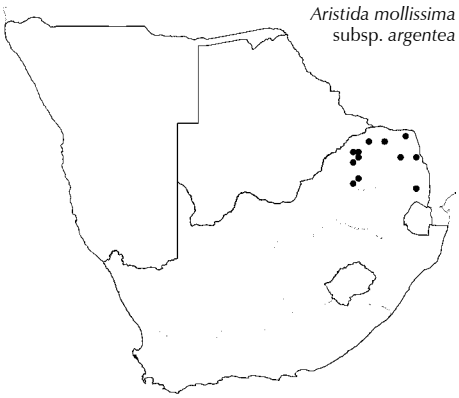

*Aristida meridionalis*

flexible; some leaf auricles with long woolly hairs. Inflorescence large, to 800 mm long and over 200 mm wide, oblong to broadly oblong, symmetrical; much branched. Spikelet 35–50 mm long (including awns); lower glume less than $^2/_3$ the length of upper glume, awnless; lemma articulation between lemma apex and column base; column 8–20 mm long; awns three, subequal; callus apex naked, deeply bifid; anther 5.5–6.0 mm long.

[Similar to *A. stipoides*, an annual; and *A. spectabilis*, which has the lower glume membranous for the upper $^1/_3$–$^2/_3$; and *A. vestita*, which has a lemma awn column 5–7 mm long.]

*Flowering*: November to May. *Ecology*: Deep sandy to stony soils; in open areas, along roadsides and in moist areas around vleis and damp depressions. *Frequency in southern Africa*: Locally common to common. *Distribution*: Angola, Zimbabwe, Mozambique, northwards to Tanzania. N, B, LIM, NW, G, M, FS, NC. *Economics*: Occasionally used for thatching; only grazed when very young.

Anatomy vouchers: *Ellis 865 & 925*.
Voucher: *Smook 4344*.


*Aristida mollissima* subsp. *argentea*

**Aristida mollissima** Pilg. subsp. **argentea** (Schweick.) Melderis, in *Boletim da Sociedade broteriana*, Sér. 2, 44: 288 (1970). Type: South Africa, Limpopo, Potgietersrus, district, 50 miles northwest of Potgietersrus on the way to Maastroom, *Schweickerdt 1806* (PRE, fg.).

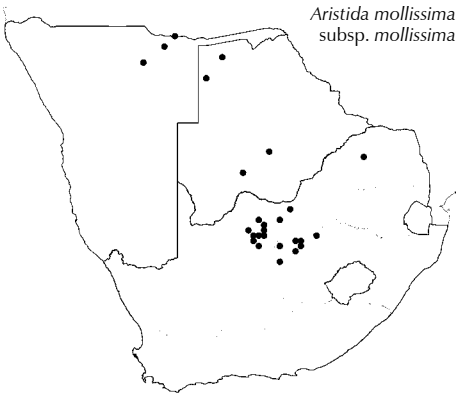
*A. argentea* Schweick., in Engler, in *Botanische Jahrbücher* 76: 218 (1954).

Densely tufted perennial to 1 000 mm high, erect to geniculate; lower internodes of culms woolly to densely tomentose. Leaf blade to 400 × to 4 mm. Inflorescence narrow, lax, ± divaricately branched. Spikelet 50–90 mm long (including awns); lower glume to $^2/_3$ the length of upper glume, awned; lemma articulation between lemma apex and base of long column; column 13–30 mm long, twisted; awns three, slightly unequal to subequal; callus 1.5–3.0 mm long, apex naked, acuminate, pungent; anther 3.5–4.5 mm long.

[Resembles *A. stipitata* subsp. *graciliflora,* which has the lower culm internodes glabrous or pubescent but not woolly hairy.]

*Flowering*: December to March. *Ecology*: Light, sandy to stony sandy soils; in open areas, on mountain slopes or disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe, Mozambique. LIM, M.

Voucher: *Ellis 3211*.


*Aristida mollissima* subsp. *mollissima*

**Aristida mollissima** Pilg. subsp. **mollissima**, in *Botanische Jahrbücher* 40: 80 (1907). Type: Namibia, Kalahari between Senuma and Kooa, *Schultze 342* (PRE, fg.).

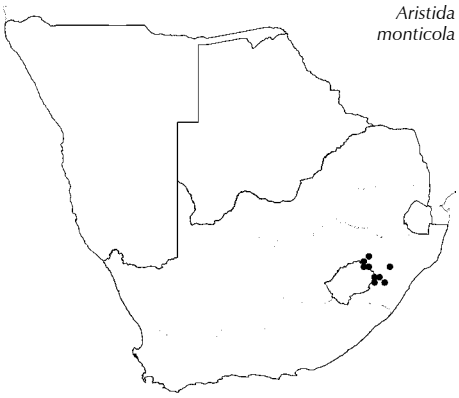
Densely tufted perennial to 850 mm high, erect; lower internodes of culm woolly to densely tomentose. Leaf blade to 300 × to 4 mm. Inflorescence contracted, spike-like, very dense. Spikelet 50–95 mm long (including awns); lower glume to $^2/_3$ the length of upper glume, awned; lemma articulation between lemma apex and base of long column; column 16–30 mm long; awns three, subequal; callus 1.5–3.0 mm long, apex naked, acuminate, pungent; anther 3.0–3.7 mm long.

[Resembles *A. stipitata* subsp. *stipitata*, which has lower culm nodes glabrous or hairy but not woolly.]

*Flowering*: December to May. *Ecology*: Deep sandy soils especially red Kalahari sands. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe, Kenya. N, B, LIM, NW, FS, NC.

Voucher: *Davidse 6071*.

**Aristida monticola** Henrard, in A critical revision of the genus *Aristida*. *Mededeelingen van's Rijksherbarium te Leiden* 2: 355 (1927). Type: South Africa, Kwazulu-Natal, Mont aux Sources, *A.O.G. Mogg H 20634* (PRE, iso.).


*Aristida monticola*

Tufted perennial to 900 mm high, erect to geniculate; rhizome long; culm much branched. Leaf blade to 120 × to 2 mm. Spikelet 18–25 mm long (including awns); lower glume longer than upper glume, long tapering to an acuminate apex (this often breaks very early, giving a false idea of the length), no awn or mucro present; lemma without articulation, but a beak or short, twisted column present; awns three, two laterals shorter than central; callus apex naked, rounded to truncate; anther 1.9–3.2 mm long.

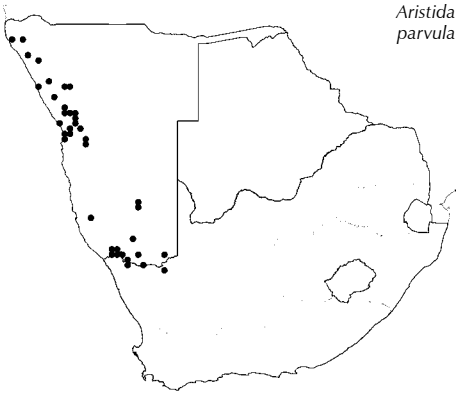
[Resembles *A. transvaalensis* and some forms of *A. junciformis*, but in these two species the lower glume is awned or mucronate.]

*Flowering*: January to May. *Ecology*: Moist and shady situations such as stream banks and seepage areas on mountain slopes. *Frequency in southern Africa*: Locally common (in the Drakensberg). *Distribution*: Endemic. FS, KZN.

Anatomy vouchers: *Ellis 1416* & *1458*.
Voucher: *Killick 1382*.

**Aristida parvula** (Nees) De Winter, in *Kirkia* 3: 132 (1963). Type: South Africa, Northern Cape, Namaqualand, stony Karoo hills, *Drège 2551* (PRE, fg.).

*Stipa parvula* Nees, *Florae Africanae australioris* 169 (1841).

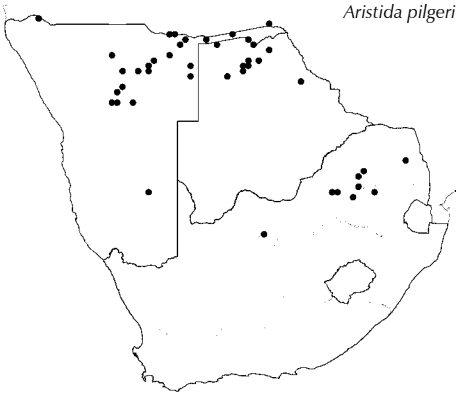

*Aristida parvula*

Tufted annual to 400(–800) mm high, erect or geniculate to semi-prostrate. Leaf blade to 120 × to 2 mm. Spikelet 18–22 mm long (including awns); glumes unequal; lower glume to $^2/_3$ the length of upper glume (excluding awns), awned; lemma laterally compressed, articulation between lemma apex and column base; column to 5 mm long, twisted; awn solitary, usually bent; callus apex naked, broad, truncate to rounded, with long hairs at the junction between lemma and callus, these hairs are $^1/_2$ the lemma body length; anther 1.5–1.7 mm long.

[In the past this species has been included in *Stipa* because of the single awn, but *Stipa* has a membranous ligule and detailed studies shown it to be an *Aristida* with the lateral awns missing.]

*Flowering*: August to October and January to May (in Namibia). *Ecology*: Sandy, stony or gravel soils; on gravel plains, along water courses, disturbed areas and rocky hillsides. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NC.

Anatomy voucher: *Ellis 884*.
Voucher: *Oliver, Müller & Steenkamp 6620*.


*Aristida pilgeri*

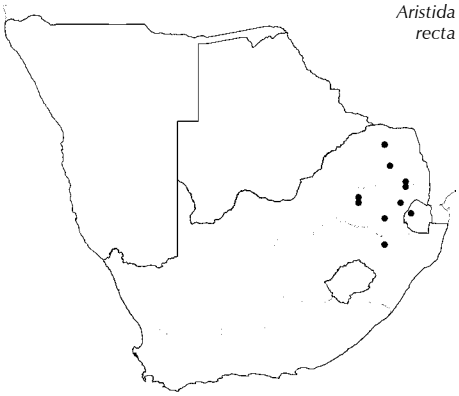
**Aristida pilgeri** Henrard, in A critical revision of the genus *Aristida*. *Mededeelingen van's Rijksherbarium te Leiden* 2: 443 (1927). Type: Namibia, Otjitjika, *Dinter 2938* (PRE, fg.).

Densely tufted robust, coarse perennial to 1 500 mm high; lower culm internodes glabrous. Leaf blade to 500 × 0.9–4.5 mm. Inflorescence with spikelet clusters linear to oblanceolate (including awns); longest pedicel to 8.5 mm long. Spikelet 10–26 mm long (including awns); lower glume $^{1}/_{2}$–$^{2}/_{3}$ the length of upper glume, long-awned; lemma articulation between column apex and awns branching point, sometimes articulation represented only by a swollen line or colour differentiation; column distinct, to 2.5 mm long; awns three, slightly unequal; callus 0.5–1.5 mm long, apex naked, broadly rounded; anther 3.5–4.5 mm long.

[Resembles *A. sciurus*, forms of *A. junciformis* subsp. *junciformis* and *A. canescens* subsp. *canescens*, but all these taxa have no lemma articulation.]

*Flowering*: February to July. *Ecology*: Calcareous or sandy, stony soils; in moist depressions, along edges of floodplains, on river banks. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe, Zambia. N, B, LIM, NW, G, M. *Economics*: Indicator of retrogression of veld.

Illustration: Müller: 117 (2007).
Voucher: *Smith 3834*.

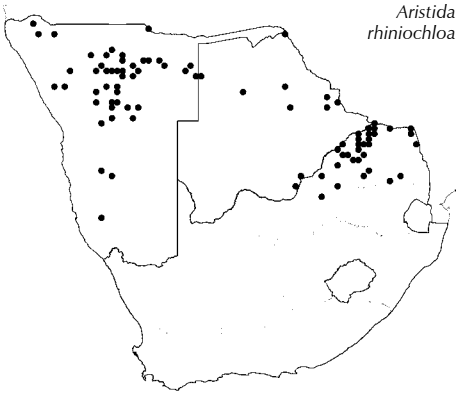

*Aristida recta*

**Aristida recta** Franch., in *Bulletin de la Société d'Histoire Naturelle d'Autun* 8:365 (1896). Type: Democratic Republic of Congo, Franceville, *Brazza & Thollon 226*.

Tufted, erect perennial to 500 mm high, usually shorter; occasionally shortly rhizomatous; basal leaf sheaths persistent, breaking up into fibres and forming a dense tuft at the base of culms. Leaf blade to 200 × to 1 mm. Inflorescence contracted, branches erect or spreading less than 45 degrees from main axis. Spikelet 10–12 mm long (including awns), brownish-purple to deep purple; lower glume to $^{2}/_{3}$ the length of upper glume, awned; lemma articulation absent; column absent, a short beak may be present; awns three, subequal; callus very short, apex naked, large, swollen, rounded; anther 1.7–2.2 mm long.

*Flowering*: September to November. *Ecology*: Damp ground around vleis and seepage areas, usually on slopes of sour mountain grassland. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Tropical Africa. S, LIM, G, M, KZN.

Illustration: Chippindall: 312, fig. 277 (1955).
Voucher: *Kluge 1982*.


*Aristida rhiniochloa*

**Aristida rhiniochloa** Hochst., in *Flora* 38: 200 (1855). Type: Ethiopia, TU, Gageros, *Schimper 1229*.

*A. andoniensis* Henrard, in *Mededeelingen van's Rijksherbarium te Leiden* 54B: 691 (1928). Type: Namibia, Ovamboland, Andoni, *Barnard 16519* (PRE, fg.).

SKURWE STEEKGRAS

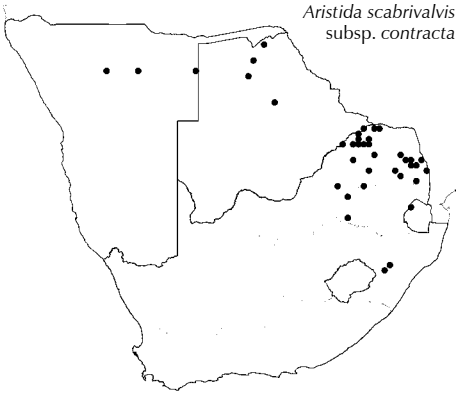
Tufted, erect annual to 900 mm high; plant usually very scabrid, occasionally smooth. Leaf blade to 200 × to 4 mm. Spikelet 35–50 mm long (including awns), coarse; lower glume usually slightly longer than upper glume, awn 0.8–3.5 mm long; lemma linear, laterally compressed, articulation absent; column absent; awns three, laterals

well developed; callus apex naked, broad, swollen, rounded, anther 2.7–3.2 mm long.

*Flowering*: January to May. *Ecology*: Sand to sandy loam, stony to heavier soils, sometimes over calcareous outcrops; on dry ground along rocky slopes, gravel plains and eroded areas. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical East and West Africa. N, B, LIM, NW, M. *Economics*: Indicator of overgrazing, drought and other disturbances.

Illustration: Müller: 163 (2007).
Anatomy voucher: *Ellis 1575*.
Voucher: *Smook 4221, Volk 1251*.

**Aristida scabrivalvis** Hack. subsp. **contracta** (De Winter) Melderis, in *Boletim da Sociedade broteriana*, Sér. 2, 44: 287 (1970). Type: South Africa, Limpopo, Soutpansberg, *De Winter & Codd 321* (PRE, holo.).


*Aristida scabrivalvis* subsp. *contracta*

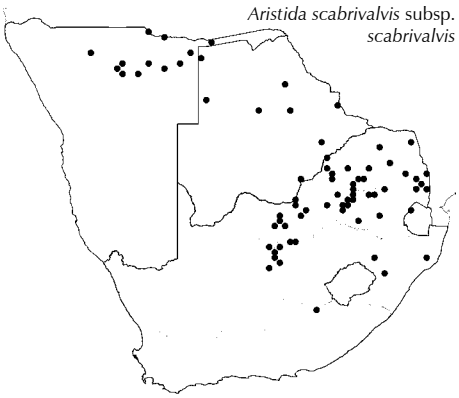
Tufted annual to 850 mm high, erect to geniculate. Leaf blade to 300 × to 3.2 mm. Inflorescence robust, branchlets and pedicels adpressed, with spikelets densely congested at branch ends. Spikelet 10–25 mm long (including awns), slender, fine; lower glume less than $^3/_4$ the length of upper glume (excluding awns), awn 0.8–3.5 mm long; lemma linear, laterally compressed, articulation and column absent; awns three, laterals well developed; callus apex naked, swollen, rounded; anther 1.0–1.3 mm long.

[Distinguished from subsp. *scabrivalvis*, which has a more delicate inflorescence with the branchlets spreading and spikelets distant from one another at the branch ends. There appears to be a complete gradation between specimens conforming to the 'typical' subsp. *contracta* and specimens that have been referred to as subsp. *borumensis* (Botswana, Mozambique, Zambia, Malawi, Zimbabwe). Pending a more detailed study, all these specimens are included in subsp. *contracta*. Resembles the perennial *A. bipartita*, and *A. effusa*, which may have a mucro or awn to 0.8 mm long on the lower glume.]

*Flowering*: March to May. *Ecology*: Shale, heavy basalt or sandy soils; in open and disturbed places on roadsides and hill slopes. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to Mozambique, Zambia, Malawi, Zimbabwe and Tanzania. N, B, S, LIM, NW, G, M, KZN.

Anatomy voucher: *Ellis 1578*.
Voucher: *Smith 2361; Ellis 524*; *Smook 4236, 3114*.

**Aristida scabrivalvis** Hack. subsp. **scabrivalvis**, in *Bulletin de l'Herbier Boissier*, sér. 2,6: 708 (1906). Type: South Africa, Limpopo, Makapans-Poort, *Schlechter 4689* (syntype).


*Aristida scabrivalvis* subsp. *scabrivalvis*

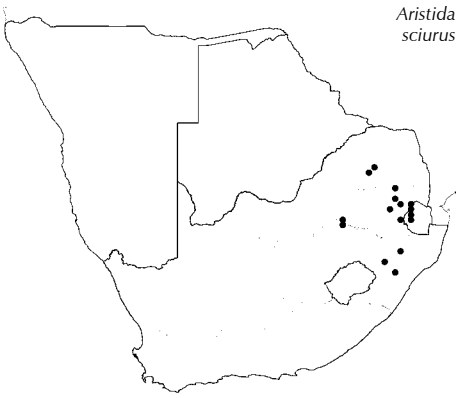
Pers steekgras

Tufted annual to 850 mm high, erect to geniculate. Leaf blade to 200 × to 3.5 mm. Inflorescence delicate, branchlets and pedicels spreading; spikelets few and distant from one another at branchlet ends. Spikelet 18–24 mm long (including awns); lower glume less than $^3/_4$ the length of upper glume (excluding awns), awn 0.8–3.5 mm long; lemma linear, laterally compressed, articulation and column absent; awns three, laterals well developed; callus apex naked, swollen, rounded; anther 1.0–1.3 mm long.

[Distinguished from subsp. *contracta*, which has a more robust inflorescence with branchlets adpressed and spikelets clustered at branch ends. Resembles *A. effusa*, which may have a mucro or short awn to 0.8 mm long, and the perennial *A. bipartita*.]

*Flowering*: January to May. *Ecology*: Sandy, sandy loam, clays, often over limestone; usually in disturbed places such as roadsides and old lands. *Frequency in southern Africa*: Locally common. *Distribution*: Tropical Africa. N, B, S, LIM, NW, G, M, KZN, NC, EC.

Anatomy voucher: *Ellis 494*.
Voucher: *Giess, Volk & Bleissner 6508*.


*Aristida sciurus*

**Aristida sciurus** Stapf, in *Flora capensis* 7: 557 (1899). Type: South Africa, Limpopo, Zebedelis kraal, near the Inkumpi River, *Nelson 26* (PRE, fg.); KwaZulu-Natal, without precise locality, *Gerrard 471* (syntypes).

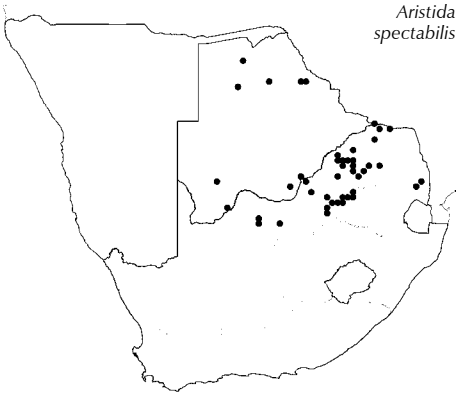
TALL THREE-AWNED GRASS

Tufted erect, robust perennial to 1 400 mm high; shortly rhizomatous; culm 5–6 mm in diameter, unbranched, lower internodes woolly hairy or glabrous. Leaf blade to 800 × 2–3(–6) mm. Spikelet 25–30 mm long (including awns); lower glume $^1/_2$ the length of upper glume, mucro or awn absent; lemma articulation absent, narrowed into a beak or very short twisted column; awns three, subequal; callus apex small, naked, swollen and rounded; anther 4.3–6.5 mm long.

[Resembles *A. pilgeri*, which has a lemma articulation; *A. spectabilis*, with the lower glume membranous for the upper $^1/_3$–$^2/_3$; and *A. canescens* subsp. *canescens*, a more slender plant with a culm diameter of 1.5–3.0 mm.]

*Flowering*: January to May. *Ecology*: Moist sandy soils; mainly in mountain sourveld. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. S, LIM, G, M, FS, KZN.

Voucher: *Turner 133, Compton 30594*.


*Aristida spectabilis*

**Aristida spectabilis** Hack., in *Bulletin de l'Herbier Boissier* 3: 380 (1895). Type: South Africa, Gauteng, Pretoria, Kuduspoort, *Rehmann 4695* (PRE, fg.).

BERGSTEEKGRAS

Densely tufted perennial to 1 750 mm high. Leaf blade to 600 × 4–5 mm. Spikelet 35–40 mm long (including awns); lower glume $^2/_3$ the length to nearly as long as upper glume, firm below, upper $^1/_3$–$^2/_3$ membranous and often torn, mucro or awn absent; lemma articulation present between lemma apex and column base; column 4–6 mm long, twisted; awns three, equal to subequal; callus apex naked, emarginate to distinctly bifid; anther 4.2–6.5 mm long.

[Resembles *A. meridionalis*, which has the lower glume with only the extreme apex membranous; *A. pilgeri*, with an articulation between the column apex and awns branching point; and *A. sciurus*, which has no articulation.]

*Flowering*: February to April. *Ecology*: Shallow and sandy soils mainly derived from quartzite; on stony; rocky mountain slopes. *Frequency*

*in southern Africa*: Infrequent to locally common. *Distribution*: Endemic. B, LIM, NW, G, M.

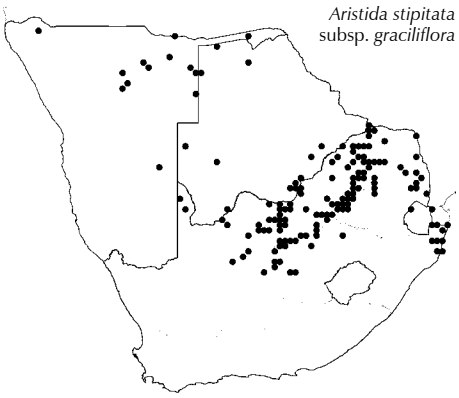
Anatomy voucher: *Ellis 833*.
Voucher: *Smook 4755*.

**Aristida stipitata** Hack. subsp. **graciliflora** (Pilg.) Melderis, apud Launert in Merxmüller, *Prodromus einer Flora von Südwestafrika* 160: 34 (1970). Type: Mozambique, Baía de Maputo [Delagoa Bay], dunes, *Schlechter 11984* (B, holo.; PRE, iso.).

*A. graciliflora* Pilg., in *Engler Botanischen Jahrbürcher* 53: 599 (1907).

*A. stipitata* Hack. var. *graciliflora* (Pilg.) De Winter, in *Kirkia* 3:133 (1963).

LANGNAALDSTEEKGRAS


*Aristida stipitata* subsp. *graciliflora*

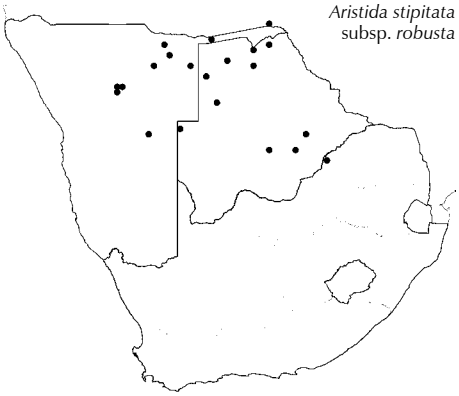
Loosely tufted slender, erect perennial to 900 mm high; culm 1.0–2.5 mm in diameter, lower internodes glabrous or pubescent, not woolly-hairy. Leaf blade to 200 × 2–3 mm. Spikelet 60–80 mm long (including awns). Inflorescence narrow, not spike-like, sparse, branches lax, not closely adpressed to main axis; lower glume to $^{2}/_{3}$ the length of upper glume, awned; lemma articulation between lemma apex and column base; column present; awns three, laterals well developed; callus 1.5–3.0 mm long, apex naked, acuminate, pungent, anther 4.0 mm long.

[A polymorphic species that is so variable that it is often difficult to distinguish between the subspecies, although the extreme variants are distinct. Resembles *A. mollissima* subsp. *argentea*, which has lower culm internodes woolly to densely tomentose.]

*Flowering*: November to June. *Ecology*: Sandy or loamy soils; in rocky situations, seepage zones and disturbed ground. *Frequency in southern Africa*: Common (widespread). *Distribution*: Zimbabwe, Zambia, Mozambique. N, B, S, LIM, NW, G, M, FS, KZN, NC.

Illustration: Müller: 120 (2007).
Anatomy vouchers: *Ellis 314* & *1825*.
Voucher: *Smook 4166, Tinley 609*.

**Aristida stipitata** Hack. subsp. **robusta** (Stent & J.M.Rattray) Melderis, apud Launert in Merxmüller, *Prodromus einer Flora von Südwestafrika* 160: 34 (1970). Type: Zimbabwe, Hwange (Wankie), near Fuller Siding, Katsetchetti Vlei, *Pardy* in GHS 3785; Nyamandhlovu, Gwaai Forest Reserve, *Pardy* in GHS 4071 (syntypes).

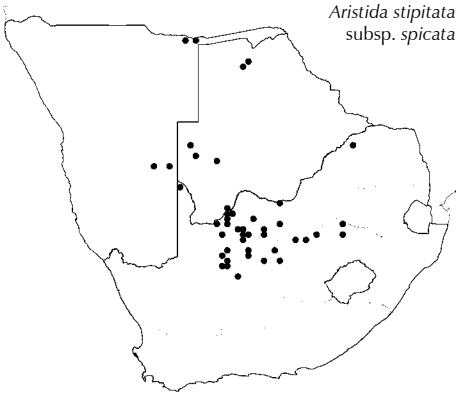

*Aristida stipitata* subsp. *robusta*

Tufted robust perennial to 1 500 mm high; culm 2.5–4.0 mm in diameter; lower internodes glabrous or pubescent, not woolly hairy. Leaf blade to 300 × to 4 mm. Inflorescence narrow, not spike-like, 200–350 mm long; branches lax, not closely adpressed to main axis. Spikelet 70–90 mm long (including awns); lower glume to $^{3}/_{4}$ the length of upper glume, awned; lemma articulation between lemma apex and column base; column present; awns three, laterals well developed; callus 1.5–3.0 mm long, apex naked, acuminate, pungent, anther 4.0–5.0 mm long.

[A polymorphic species that is so variable that it is often difficult to distinguish between the subspecies, although the extreme variants are distinct.]

*Flowering*: January to April. *Ecology*: Deep, heavy sands, often in disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe, Zambia. N, B, LIM.

Illustration: Müller: 121 (2007).
Anatomy voucher: *Smook 5204*.
Voucher: *Smith 1640*.


*Aristida stipitata* subsp. *spicata*

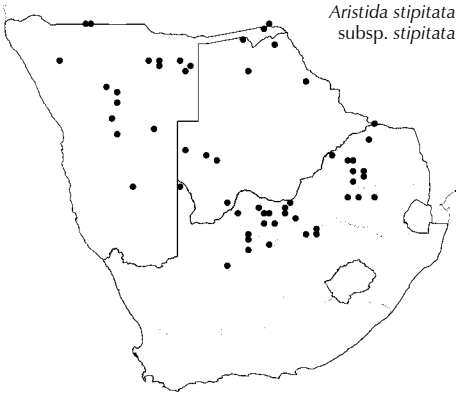
**Aristida stipitata** Hack. subsp. **spicata** (De Winter) Melderis, apud Launert in Merxmüller, *Prodromus einer Flora von Südwestafrika* 160: 34 (1970). Type: Botswana, Tsabong, *De Winter 7485* (PRE, holo.).

Loosely to densely tufted, slender, erect perennial to 600 mm high; culms much branched at upper nodes, lower internodes glabrous or pubescent, not woolly hairy. Leaf blade to 150 mm long. Inflorescence narrow, dense, spike-like, usually to 150 mm long; branches closely adpressed to main axis, sometimes interrupted towards the base. Spikelet 50–100 mm long (including awns); lower glume to $^2/_3$ the length of upper glume, awned; lemma articulation between lemma apex and column base; column well developed; awns three, laterals well developed; callus 1.5–3.0 mm long, apex naked, acuminate, pungent; anther 3.0–3.7 mm long.

[A polymorphic species, which is so variable that it is often difficult to distinguish between the subspecies, although the extreme variants are distinct.]

*Flowering*: February to May. *Ecology*: Deep sandy soils associated with rocky outcrops. *Frequency in southern Africa*: Locally common. *Distribution*: Zambia. N, B, LIM, NW, FS, NC.

Illustration: Müller: 122 (2007).
Voucher: *Acocks 2159*.


*Aristida stipitata* subsp. *stipitata*

**Aristida stipitata** Hack. subsp. **stipitata**, in *Verhandlungen des botanischen Vereins der Provinz Brandenburg* 30: 143 (1888) Type: Namibia, Omatope, *Schinz 685* (PRE, fg.).

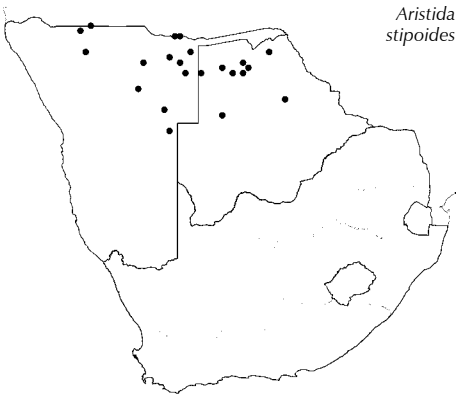
Tufted robust erect perennial to 1 500 mm high; culm sparsely branched at the upper nodes, lower internodes glabrous or pubescent, not woolly hairy. Leaf blade to 300 × to 4 mm. Inflorescence narrow, 150–300 mm long, dense, spike-like; branches closely adpressed to main axis, sometimes interrupted towards the base. Spikelet 50–90 mm long (including awns); lower glume to $^2/_3$ the length of upper glume, awned; lemma articulation between lemma apex and column base; column present; awns three, laterals well developed; callus 1.5–3.0 mm long, apex naked, acuminate, pungent; anther 2.5–4.0 mm long.

[A polymorphic species that is so variable that it is often difficult to distinguish between the subspecies, although the extreme variants are distinct. Resembles *A. mollissima* subsp. *mollissima*, which has the lower internodes woolly.]

*Flowering*: December to April. *Ecology*: Deep sandy or calcareous soils. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe, Zambia. N, B, LIM, NW, G, M, FS, NC. *Economics*: Use for thatching; or pasture but a pioneer grass of little forage value.

Illustration: Müller: 123 (2007).
Voucher: *Smook 4310, De Winter 2280*.

**Aristida stipoides** Lam., in *Tableau encyclopédique et méhodique* 1: 157 (1791). Type: Senegal, *Roussillon*.


*Aristida stipoides*

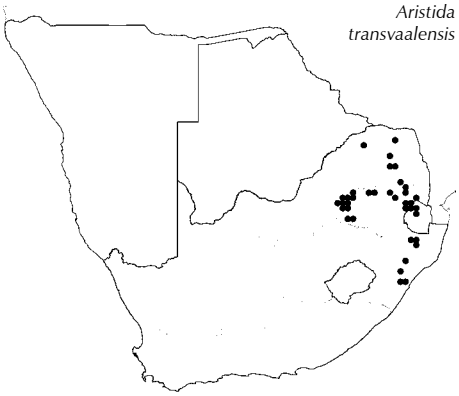
Loosely tufted annual to 1 500 mm high. Leaf blade to 300 × 3–5 mm, auricles with long woolly hairs. Spikelet 55–75 mm long (including awns), dull yellow to purple; lower glume lanceolate, 6–9 mm long, to $^2/_3$ the length of upper glume, apex acute, mucro or awn absent; lemma articulation between lemma apex and column base; column 20–35 mm long; awns three, subequal; callus apex naked, deeply bifid; anther 2.8–3.8 mm long.

[Resembles the robust perennial *A. meridionalis*.]

*Flowering*: February to May. *Ecology*: Damp sandy soils; along seasonal floodplains, dry river beds, rocky hillsides, roadsides or old cultivated lands. *Frequency in southern Africa*: Locally common. *Distribution*: Zambia, West Africa, Ethiopia to Tanzania. N, B.

Illustration: Müller: 165 (2007).
Voucher: *Smith 1954, Schweickerdt 2129*.

**Aristida transvaalensis** Henrard, in A critical revision of the genus *Aristida*. *Mededeelingen van's Rijksherbarium te Leiden* Supplement: 742 (1933). Type: South Africa, Gauteng, Pretoria, Baviaanspoort, *Moss 14259* (PRE, iso.).


*Aristida transvaalensis*

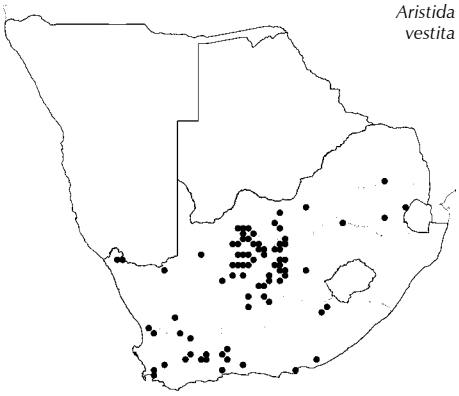
ROCK THREE-AWNS

Densely tufted perennial to 700 mm high; culms branched at all the upper nodes. Leaf blade to 150 mm long. Spikelet 15–30 mm long (including awns); lower glume (including awns) $^2/_3$ the length of upper glume, awned; lemma without articulation; column of variable length; central awn sometimes solitary, lateral awns absent or weakly developed being very much shorter ± $^1/_2$ as long as central awn and more slender; callus apex naked, swollen, obtuse to truncate; anther 3.0 mm long.

[Resembles *A. junciformis* subsp. *junciformis*, which has culms branched but not at every node and lateral awns well developed; and *A. monticola*, which has the lower glume mucronate but awnless.]

*Flowering*: December to May. *Ecology*: Shallow soils; in crevices and pockets on dry rocky outcrops and hillsides. *Frequency in southern Africa*: Common. *Distribution*: Endemic. S, LIM, G, M, KZN.

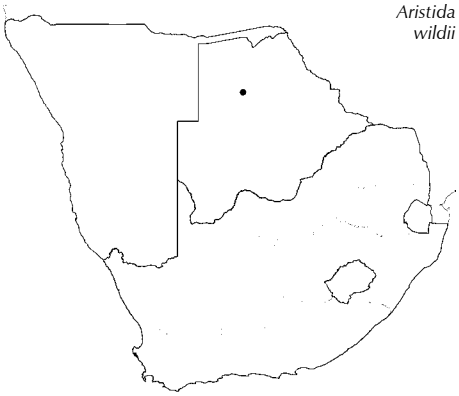
Anatomy vouchers: *Ellis 384* & *1546*.
Voucher: *Wells 1866, Smook 3056*.


*Aristida vestita*

**Aristida vestita** Thunb., in *Prodromus plantarum capensium*?: 19 (1794). Type: South Africa, Cape Province (precise locality not known), *Thunberg*.

LARGE WOOLLY THREE-AWN, HARDE-STEEKGRAS

Densely tufted perennial to 85 mm high; lower culm internodes pubescent to woolly-hairy, upper internodes pubescent to glabrous. Leaf blade to 240 × to 4 mm. Inflorescence to 200 × 120 mm, narrowly oblong to narrowly elliptic, usually asymmetric. Spikelet 30–50 mm long (including awns); lower glume to $^2/_3$ the length of




upper glume, awn or mucro absent; lemma articulation between lemma apex and column base; column 5–7 mm long; awns three, laterals well developed; callus apex naked, distinctly bifid; anther 5.5–6.3 mm long.

[Resembles both *A. diffusa* and *A. englerii*, which have the lower culm internodes glabrous.]

*Flowering*: Sporadically, but mostly November to May. *Ecology*: Dry sandy loam or black clay, limestone soils; in stony and rocky veld. *Frequency in southern Africa*: Locally common to common. *Distribution*: Northwards to Tanzania. NW, M, FS, NC, WC, EC.

Anatomy vouchers: *Van Heerden 79* & *Ellis 844*.
Voucher: *Smook 3495*.

**Aristida wildii** Melderis, in *Boletim da Sociedade broteriana*, Sér. 2, 44: 283, t. II, IV, fig. B (1970). Type: Botswana, 10 km N of Aha Hills, *Wild & Drummond 6948*.

Delicate erect annual 350–550 mm high; culm slender, simple or branched, nodes glabrous. Leaf blade up to 220 × 1–2 mm long. Spikelet 22 mm long (including awns); glumes unequal; lower glume longer than upper glume, apex acute; lemma without articulation, exserted from glumes, glabrous at lower part, keels and lateral nerves scaberulous towards apex; column absent; awn three, laterals well developed; callus apex naked, shortly barbate.

*Flowering*: December to April. *Ecology*: In shallow, gritty rock-derived soil under mixed woodland. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. B.

Voucher: *Smith 3397*.




Figure 46.—*Arrhenatherum elatius*. A, plant. Artist: G.E. Lawrence. B, two florets; lowest lemma with stout bent awn; upper lemma with small straight awn (17 × 3 mm). Artist: W. Roux.

## *Arrhenatherum P.Beauv.

(Pooideae—Aveneae)

Palisot de Beauvois: 152 (1812); Chippindall: 81 (1955); Holub: 216 (1980); Clayton & Renvoize: 124 (1986); Gibbs Russell et al.: 55 (1990); Watson & Dallwitz: 136 (1994); Sell & Murrell: 173, 174 (1996); Hatch: 740 (2007).

Perennial, loosely tufted. **Leaf blade** expanded; *ligule* an unfringed membrane. **Inflorescence** a narrow panicle, branches arranged in rather remote whorls; *spikelets* pedicelled. **Spikelet** laterally compressed, disarticulating above glumes, florets falling together; *glumes* unequal, shorter to ± as long as spikelet, similar, shining, awnless; lower glume 1-nerved; upper glume 3-nerved. **Florets** 2(–rarely 5), with or without the rachilla prolonged and with a rudimentary floret; *lowest* or *lower florets* usually male, rarely bisexual, 5–9-nerved, glabrous or hairy,

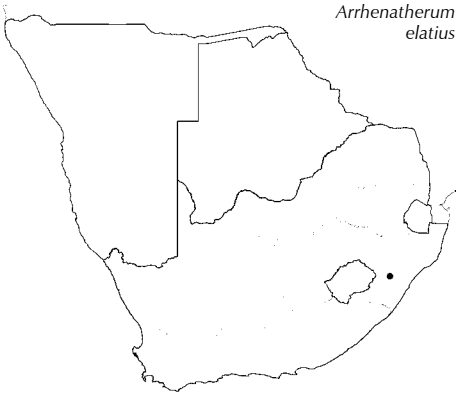


Figure 47.—*Arrhenatherum elatius* spikelet (7–11 mm). Photographer: M. Koekemoer.

stoutly awned from lower third of back; awn geniculate, longer than body of lemma; *upper floret* bisexual, *lemma* firmer in texture than glumes, 5–7-nerved, glabrous to hairy, rounded on back, entire or shortly 2-lobed, awned from middle or upper third of back or awnless; *awn* straight; *callus* short, hairy; *palea* shorter than corresponding lemma, shortly bidentate at apex, ciliate on keels. **Lodicules** 2, membranous. **Stamens** 3. **Ovary** ellipsoid, hairy; styles plumose. **Caryopsis** ellipsoid, hairy; hilum long, linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (polyploidy).

**Species** ± 6, Europe, Mediterranean and Middle East; 1 naturalised in southern Africa: **Arrhenatherum elatius* (L.) J.Presl & C.Presl, KwaZulu-Natal.

Species treatment by M.J. Moeaha.




**Arrhenatherum elatius* (L.) J.Presl & C.Presl, in *Flora Čechica* 17 (1819). Type: Europe.

Loosely tufted perennial 500–1 400 mm high; basal internodes sometimes swollen; culms solitary, nodes glabrous or hairy. Leaf blade 100–190 × 2–5 mm. Inflorescence usually an open to sometimes a contracted panicle, branches filiform, conspicuously unequal. Spikelet 7–11 mm long; lower lemma awned from back towards the base, awn conspicuous, well developed, stout, geniculate; upper lemma awnless, or shortly awned or awned from middle; anthers 2.5–4.5 mm long.

*Flowering*: November to December. *Ecology*: Disturbed places, roadsides and gardens. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from Europe. KZN. *Economics*: Cultivated in the northern humid regions of the world. Introduced and cultivated to a limited extent in South Africa, occasionally found as an escape in parts of KwaZulu-Natal.

Illustration: Hatch: 741 (2007).
Voucher: *Huntley 271*.




Figure 49.—*Arthraxon lanceolatus* var. *lanceolatus*. A, plant; B, portion of raceme with two awned sessile and one awnless pedicelled spikelets (17.0 × 2.2 mm). Artist: W. Roux.

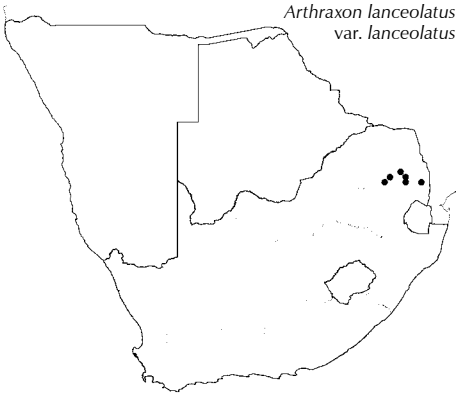
## **Arthraxon** P.Beauv.

Palisot de Beauvois: 111 (1812); Stapf: 162 (1917); Chippindall 455 (1955); Van Welzen: 255 (1981); Clayton & Renvoize: 741 (1982); Clayton & Renvoize: 353 (1986); Gibbs Russell et al.: 56 (1990); Watson & Dallwitz: 138 (1994); Phillips: 309, 310 (1995).

Perennial or annual, often trailing. **Leaf blade** linear-lanceolate to ovate-lanceolate, cordate and amplexicaul at base; *ligule* an unfringed to fringed membrane (rarely). **Inflorescence** of slender racemes, subdigitate, internodes and pedicels filiform to linear; *spikelets* secund, usually paired, in long–short combinations: one sessile, the other pedicelled, pedicels free. **Sessile spikelet** laterally compressed, falling with glumes; *glumes* ± equal in size, dissimilar, awnless; lower glume rounded on back, with or without 2 lateral keels,



Figure 48.—*Arthraxon lanceolatus*. Spikelet pair (5.0–6.5 mm). Photographer: M. Koekemoer.




spinously muricate; upper glume laterally compressed. **Florets** 2; *lower floret* sterile, reduced to a hyaline lemma, awnless; *upper floret* bisexual, *lemma* less firm than glumes, hyaline, awned from low down on back, *awn* glabrous, geniculate; *callus* truncate, inserted into hollow top of internode; *palea* reduced or 0. **Lodicules** 2, fleshy, glabrous. **Stamens** 2 or 3. **Ovary** glabrous. **Caryopsis** terete, ellipsoid; hilum short; embryo large. **Pedicelled spikelet** variable in form, male, sterile or vestigial. **Photosynthetic pathway**: $C_4$; XyMS-. **Cytology**: $x = 9$ (polyploidy).

**Species** ± 7, Old World tropics, but mainly India; 1 in southern Africa: *Arthraxon lanceolatus* (Roxb.) Hochst. var. *lanceolatus*, Limpopo and Mpumalanga provinces.

Species treatment by A.C. Mashau.

**Arthraxon lanceolatus** (Roxb.) Hochst. var. **lanceolatus**, in *Flora* 39: 188 (1856). Type: India.

*A. prionodes* (Steud.) Dandy, in *The Flowering Plants of the Sudan* 3: 399 (1956). Type: Ethiopia, *Ovartin Dillen s.n.*; *Schimper* 111 (syntypes).

Perennial, often trailing, 600 mm long. Leaf blade 20–70 × 4–20 mm, base markedly cordate, margins with tubercle-based hairs. Sessile spikelet 4.0–6.5 mm long; lower glume spiny on keels; lemma awned from near base; anther 2.0–2.5 mm long; callus short, obtuse to truncate. Pedicellate spikelet shorter than sessile one.

*Flowering*: October to April. *Ecology*: River banks. *Frequency in southern Africa*: Rare. *Distribution*: Eastern Africa to India and tropical Asia. LIM, M.

Illustration: Van Welzen: 286, fig. 8 (1981).
Anatomy vouchers: *Ellis 4308*, *4306* & *4307*.
Voucher: *Strey 3637*.



Figure 50.—*Arundinella nepalensis*. Artist: F. Lauth.

## **Arundinella** Raddi

Raddi: 37 (1823); Stapf: 448 (1899); Chippindall: 275 (1955); Clayton: 121 (1967b); Hubbard: 407 (1974); Clayton & Renvoize: 316 (1986); Clayton: 199 (1989); Gibbs Russell et al.: 56 (1990).

Perennial, tufted; rhizomatous. **Leaf blade** linear, expanded; *ligule* a fringed membrane. **Inflorescence** an oblong panicle, open or contracted; *spikelets* solitary, shortly pedicelled or usually paired and unequally pedicelled with both spikelets alike or the shorter-pedicelled spikelet sterile and reduced to a glume. **Spikelet** lanceolate, laterally compressed, disarticulating beneath upper floret; *glumes* equal to very unequal; lower glume acute to mucronate, 3-nerved; upper glume as long as



Figure 51.—*Arundinella nepalensis* spikelet (4–6 mm). Photographer: M. Koekemoer.

spikelet, acuminate, 5-nerved. **Florets** 2; *lower floret* male, rarely sterile or bisexual, lemma membranous, falcate, 3–7-nerved, obtuse, awnless, palea hyaline; *upper floret* bisexual, lemma similar to firmer in texture than glumes, glabrous, scabrid to scaberulous, 1–7-nerved, minutely 2-lobed at apex, rarely entire, lobes sometimes produced into short hair-like bristles, awned from between lobes; *awn* geniculate; *callus* short, hairy; *palea* 2-keeled. **Lodicules** 2, cuneate, fleshy. **Stamens** 3. **Ovary** oblong, glabrous; styles distinct or connate at base, plumose. **Caryopsis** oblong; hilum small; embryo large. **Photosynthetic pathway**: $C_4$. The anatomical organisation conventional, or unconventional. Organisation of PCR tissue when unconventional: arundinella-type. Biochemical type NADP–ME (*A. nepalensis*); XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 7$, 10, 12, 14 (high polyploidy).

**Species** ± 50, tropics and subtropics but mainly Asia; 1 in southern Africa: *Arundinella nepalensis* Trin., widespread.

Species treatment by M.T. Nembudani.

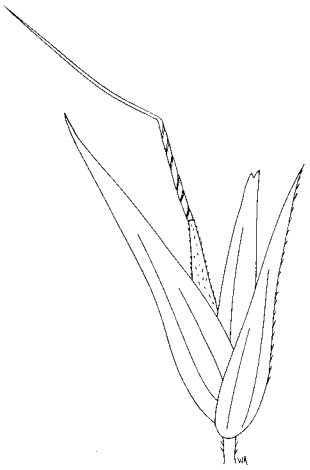


Figure 52.—*Arundinella nepalensis*. Spikelet showing lower and upper glumes, awnless lower floret (right) and awned upper floret (left), 6.2 × 1.8 mm. Artist: W. Roux.

**Arundinella nepalensis** Trin., in *De Graminibus paniceis*: 62 (1826). Type: India.

River grass, beesgras, rietgras

Tufted perennial; 900–1 500 mm high; rhizome creeping, often covered with short scale-like leaves, resulting in a plaited look. Leaf blade 80–300 × 3–10 mm; sheath hairy. Inflorescence 120–300 mm long, dense; spikelets usually in pairs. Spikelet 4–6 mm long, brown, sometimes tinged with green or purple; glumes unequal, acute; lemma awn 3–6 mm long, longer than body of lemma, scabrid, column brown and twisted, bristle white; callus truncate, hairy; anther 1.0–1.5 mm long.

*Flowering*: December to March. *Ecology*: Vleis, river banks and moist grasslands. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical East Africa eastwards to Asia and Australia. S, L, LIM, NW, G, M, FS, KZN, EC, WC. *Economics*: Useful as soil binder along rivers, moist slopes; domestic use such as thatching; or natural pasture only in young stage, becoming hard and unpalatable with age.

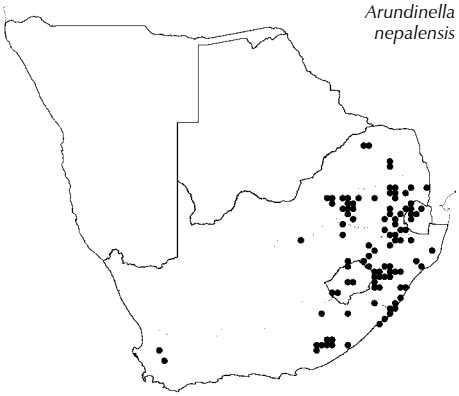



Illustration: Chippindall: 276, fig. 247 (1955); Clayton: 200, tab. 54 (1989).
Anatomy vouchers: *Ellis 479, 1218, 1368, 1617, 3358* & *4977.*
Voucher: *Smook 4999.*

## *Arundo L.

Linnaeus: 81 (1753); Chippindall: 229 (1955); Tutin: 252 (1980); Clayton & Renvoize: 181 (1986); Gibbs Russell et al.: 57 (1990); Watson & Dallwitz: 145 (1994); Henderson: 10 (2001); Allred (2003).

Reed-like perennial; rhizomes long; leaves cauline. **Leaf blade** linear-lanceolate to lanceolate, expanded, deciduous at base of blade; leaf base with large collar or auricles clasping the culms; *ligule* a short fringed membrane. **Inflorescence** a large, plumose panicle, branches stiff and ascending; *spikelets* pedicelled. **Spikelet** later-

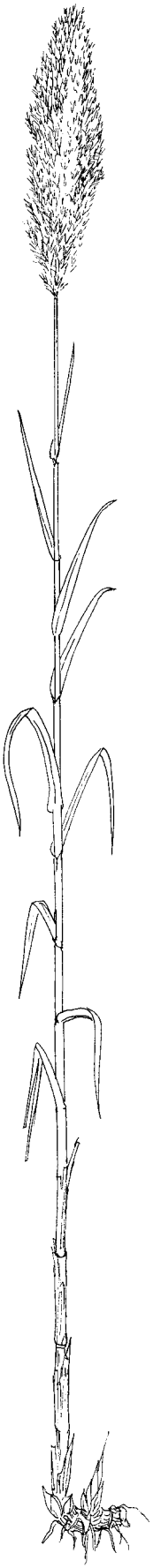


Figure 53.—*Arundo donax*. Artist: H.W. du Toit.

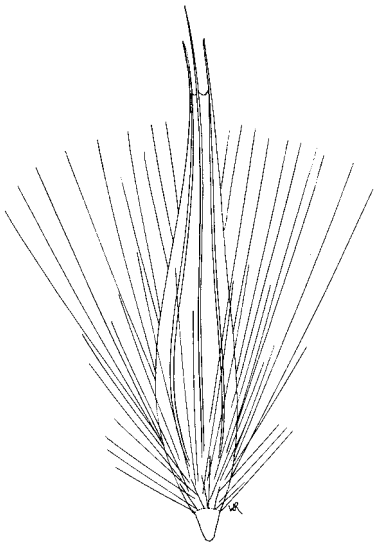


Figure 54.—*Arundo donax*. Lemma with long hairs. Artist: W. Roux.



Figure 55.—*Arundo donax* spikelet (8–15 mm). Photograph: M. Koekemoer.

ally compressed, disarticulating above glumes; *glumes* ± equal, ± as long as spikelet, membranous, 3–5-nerved, awnless. **Florets** 2–7, bisexual or *uppermost floret* reduced; *lemma* similar to less firm in texture to glumes, hyaline or membranous, not becoming indurated, long hairy on the back, 3–9-nerved, awned; *awn* straight, shorter than body of lemma; *callus* short, blunt, hairy; *palea* present, shorter than lemma, 2-nerved. **Lodicules** 2, fleshy, glabrous. **Stamens** 3. **Ovary** glabrous. Hilum short; pericarp fused; embryo large. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 12$ (aneuploids, high polyploidy).

**Species** 3, Mediterranean to China, widely introduced elsewhere; 1 naturalised and cultivated in southern Africa: **Arundo donax* L., widespread.

Species treatment by M.J. Moeaha.

**Quick guide to easily confused genera:**

Leaf base collar or auricle large, distinct and clasping the culm; glumes ± equal in size, as long as spikelet; lemma long-hairy; mature inflorescence branches stiff and ascending; lowest inflorescence branches without silky hairs at base . . . . . ***Arundo**
Leaf base collar or auricle small, not clasping the culm; glumes very unequal in size, shorter than spikelet; lemma glabrous but enveloped by long hairs from the callus; mature inflorescence branches flexible, usually drooping; lowest inflorescence branches with silky hairs at base . . . . . **Phragmites**

***Arundo donax** L., in *Species plantarum*, ed. 1.: 81 (1753). Type: Spain.

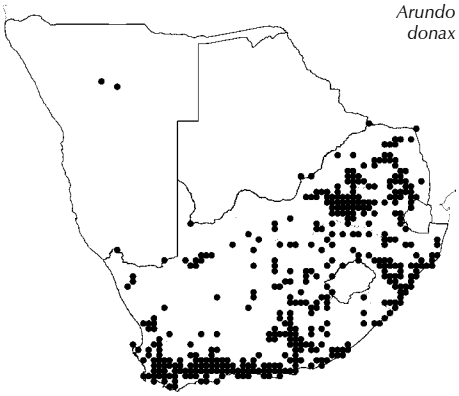
Giant reed, Spaanseriet

Robust, reed-like perennial, up to 3 000 mm high; rhizomatous. Leaf blade 700 × 80 mm, deciduous; base rounded or caudate, collar or auricle large and distinct, clasping the culm; apex not sharp; ligule a short fringed membrane. Inflorescence 300–600 mm long, a compact plumose panicle; mature inflorescence branches stiff and

ascending; lowest inflorescence branches without silky hairs at the base. Spikelet 8–15 mm long; glumes as long as spikelet, membranous, awnless; lemma back long hairy; anthers 2.5–3.5 mm long.

*Flowering*: February or April. *Ecology*: Moist disturbed places. Invasive weed. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from warm regions of the Old World. N, B, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Used worldwide as a barrier and ornamental; for hedges, fences, roofs, huts, mats, baskets and organ pipes. Escapes from cultivation and has become a serious invader in many countries.

Illustration: Chippindall: 229, fig. 203 (1955); Henderson: 10 (2001); Allred: 12 (2003).
Voucher: *McClean 536*.




## *Austrostipa S.W.L.Jacobs & J.Everett

Vickery, Jacobs & Everett: 1 (1986); Barkworth & Everett: 251 (1987); Jacobs & Everett: 579 (1996); Barkworth: 1 (1993).

Perennial, sometimes shrub-like; rhizome present or absent; culms unbranched or branched above, erect to geniculate; leaves mostly basal. **Leaf blade** occasionally greatly reduced; over 0.5 mm wide, flat, rolled or acicular; auricles present to absent; ligule an unfringed membrane. **Inflorescence** an open or contracted panicle; spikelets pedicellate. **Spikelet** narrow, usually terete, laterally or dorsiventrally to not noticeably compressed, disarticulating above glumes; *glumes* very unequal to ± equal, as long as spikelet to usually longer than spikelet (excluding awn), acute or acuminate 3–5(–7)-nerved. **Floret** 1; lemma usually convolute becoming indurated, firmer than glumes; margins usually partially enclosing palea, entire or minutely 1 to 2 lobed; crown absent; 3–5(–7)-nerved, hairy to glabrous; lemma-awn junction conspicuous, awned from apex or between lobes; *awn* flexuous, column twisted (when mature), glabrous to hairy; *palea* membranous, thinner than lemma, shorter to rarely longer than lemma, 2-nerved; *callus* long, rarely short, oblique, pungent or obtuse, hairy. **Lodicules** 2 or 3, membranous, glabrous. **Stamens** 3; anthers frequently penicillate. **Ovary** glabrous; styles free. **Caryopsis** fusiform-terete, free from lemma and palea; hilum long-linear. **Photosynthetic pathways**: C3; XyMS+.

**Species** ± 63; Australia and New Zealand; 1 naturalised? in South Africa, Western Cape.

Species treatment by L. Fish.

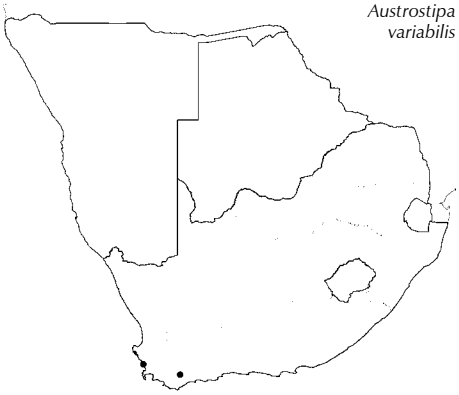
### Quick guide to easily confused genera/taxa:

1. Apex of lemma and/or lower part of awn with a plume of long hairs, 4–8 mm long . . . . . 2
   Lemma apex and/or awn base, if hairy, hairs not plume-like but stiff and less than 3.5 mm . . . . . 3
2. Apex of lemma and base of awn with a plume of long hairs; callus obtuse; perennial . . . . . *__Jarava plumosa__
   Only basal part of awn with a plume of long hairs above articulation; callus pungent; annual . . . . . __Stipagrostis anomala__
3(1). Ligule a dense fringe of hairs; annual . . . . . __Aristida parvula__
   Ligule an unfringed membrane or a fringed membrane (dense long hairs behind ligule may give false impression, but then plant perennial); annual or perennial . . . . . 4
4. Lemma apex with a crown (may be minute), body scabrid, finely or coarsely tuberculate or papillose . . . . . *__Nassella__



Figure 56.—*Austrostipa variabilis* specimen.

Lemma apex without a crown, may have long erect hairs at junction, body scaberulous or smooth, hairy (all or margins and nerves only) . . . . . 5
5. Callus pungent . . . . . 6
Callus blunt . . . . . 7
6. Annual; awn distinctly kneed or straight, column densely and obviously twisted . . . . . **Stipa capensis**
Perennial; awn curved, column not obviously twisted . . . . . *__Austrostipa variabilis__
7(5). Leaves rolled, setaceous up to 1 mm wide, hard . . . . . *__Amelichloa clandestina__
Leaves flat, 5–14 mm wide, soft . . . . . .__Stipa dregeana__


*Austrostipa variabilis*

*__Austrostipa variabilis__ (Hughes) S.W.L.Jacobs & J.Everett, in *Telopea* 6: 579 (1996). Type: West Australia.

*Stipa variabilis* Hughes, in *Kew Bulletin of Miscellaneous Information*, Kew 1921: 15, fig. 14A (1921) .

Tufted, erect to geniculate perennial to 700 mm high. Leaf blade to 250 × 1–4 mm, usually rolled; ligule an unfringed membrane; auricles thickened, hairy basally. Inflorescence contracted, rarely spreading; branches with few spikelets; pedicel unequal, up to 20 mm long. Spikelet 9–13 mm long, (excluding awn); glumes longer than lemma body; lemma sparsely hairy towards apex, lobes 0.25 mm long; junction with lemma and awn conspicuous; awn 50–90 mm long, curved, column not obviously twisted, base hairy with spreading hairs 0.2–0.5 mm long, rest scabrid; palea shorter than lemma, acute to obtuse; a line of white hairs on back, margins and apex glabrous; callus elongate, pungent, short hairy; anther 1.5–2.8 mm long, penicillate.

*Flowering*: October. *Ecology*: Roadsides. Potential weed in the Fynbos. *Frequency in southern Africa*: Rare. *Distribution*: ?Naturalised from Australia. So far known only from a single specimen collected at Atlantis. WC.

Voucher: *Smook 3617.*



Figure 57.—*Avena fatua*. Artist: B. Connell.

## *__Avena__ L.

Linnaeus: 83 (1753); Stapf: 477 (1899); Adamson & Salter: 69 (1950); Hubbard: 213 (1954); Chippindall: 80 (1955); Baum: 12 (1968); Launert: 74 (1971); Baum: 1 (1977); Rocha Afonso: 206 (1980); Hubbard: 81 (1970); Clayton & Renvoize: 124 (1986); Gibbs Russell et al.: 58 (1990); Watson & Dallwitz: 158 (1994); Sell & Murrell: 174 (1996).

Annual. **Leaf blade** linear, expanded, flaccid; *ligule* an unfringed membrane. **Inflorescence** an open panicle; *spikelets* pedicelled, pendulous. **Spikelet** large, laterally compressed, disarticulating above glumes, sometimes between florets (persistent in cultivated forms); *glumes* persistent, ± equal, usually as long as to longer


Figure 58.—*Avena barbata* spikelet (18–26 mm). Photographer: M. Koekemoer.

than spikelet, similar, membranous, margin hyaline, rounded on the back, 3–11-nerved, apex acute to acuminate, awnless. **Florets** 2–several; *lower* (1)2–6 *florets* bisexual; *upper florets* ± reduced; *lemma* similar in texture to glumes, membranous when immature, later becoming indurated, hairy to glabrous, 5–9-nerved, not keeled, 2-lobed, lobes awned or awnless; central *awn* dorsal, or absent in some species and cultivars, inserted at middle or higher, longer than body of lemma, twisted below, geniculate, rarely straight; *callus* short, obtuse to acute, usually hairy; *palea* shorter than lemma, 2-keeled, 2-nerved, membranous. **Lodicules** 2, relatively large. **Stamens** 3. **Ovary** densely pilose; styles short, plumose. **Caryopsis** oblong to ellipsoid, hairy or glabrous; hilum long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (high polyploidy).

**Species** ± 25, mainly Mediterranean and Middle East; 5 naturalised in southern Africa, not in Namibia and Botswana, mainly escapes from cultivation.

Species treatment by A.C. Mashau.

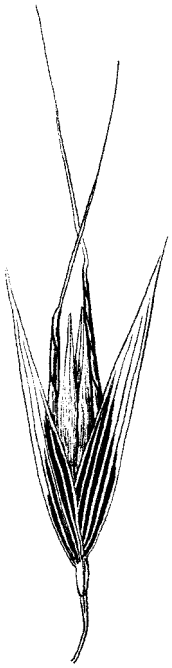


Figure 59.—*Avena fatua* spikelet. Artist: B. Connell.

**Key to species:**

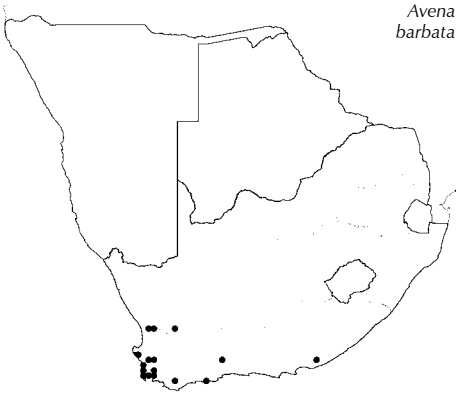
1. Lemma glabrous or sparsely hairy at the base only; central awn straight or weakly geniculate, sometimes absent . . . . . 2
   Lemma densely hairy from base up to awn insertion; central awn strongly geniculate . . . . . 3
2. Central awn (when present) with a distinct column; rachilla breaking at apex of internode and falling with lower floret . . . . . ***A. sativa***
   Central awn lacking distinct column; rachilla breaking at base of internode and falling with upper floret . . . . . ***A. byzantina***
3(1). Lemma lobes awned, awns 4–8 mm long, nerves reaching apex . . . . . ***A. barbata***
   Lemma lobes awnless, nerveless or nerves not reaching apex . . . 4
4. Lemma lobes 1.0–1.5 mm long; callus present on all lemmas . . . . . ***A. fatua***
   Lemma lobes to 0.5 mm long; callus present on lowest lemma only . . . . . ***A. sterilis***

***Avena barbata** Pott ex Link., in Schrader, in *Journal für Botanik* 1799 (2,2): 314, 315. 1799[1800] Type: Lusitania.

Tufted annual 300–1 300 mm high; culms solitary. Leaf blade 70–300 × 3–10 mm, soft and expanded. Spikelet 18–26 mm long, 2 to 3-flowered; lower glume 3–5-veined; upper glume 5–7-veined, lanceolate or elliptical, apex acute; lemma hairy in lower half; lobe awn 4–8 mm long, 1-nerved; central awn 35–40 mm long; palea shorter than lemma, hairy on keels; callus present on all lemmas; anther 2.0–3.2 mm long.

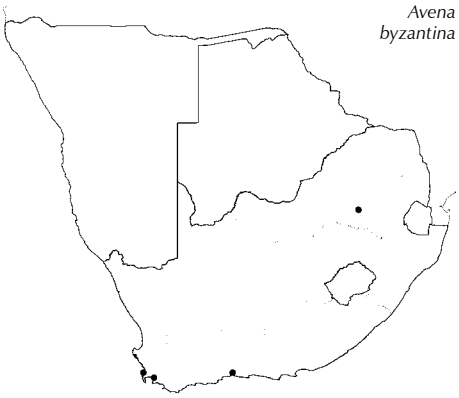
[Variable in plant height and spikelet size, easily distinguished by lemma lobes awned.]

*Flowering*: August to December. *Ecology*: On sandy soil; waste and/or disturbed places, roadsides. *Frequency in southern Africa*: Locally dominant (disturbed areas in the Cape). *Distribution*: Naturalised from Europe. NC, WC, EC. *Economics*: Ornamental and used in dried flower arrangements. Weed.



*Avena barbata*

Illustration: Chippindall: pl. 17 (1955); Baum: 736 (2007).
Voucher: *Compton 15370*.


*Avena byzantina*

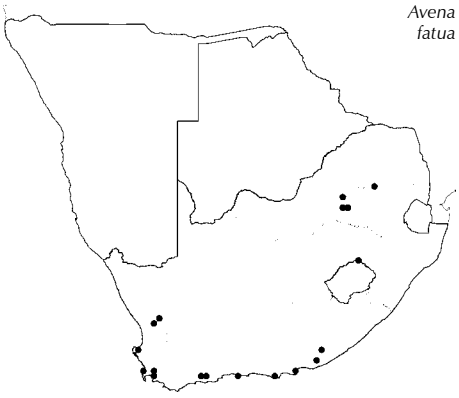
***Avena byzantina** K.Koch., in *Linnaea* 21(4): 392. (1848). Type: Turkey.

Loosely tufted annual 500–1 600 mm high. Leaf blade 150–500 × 3–9 mm. Spikelet 25–35 mm long; rachilla breaking at base of internode and falling with upper floret; glumes subequal; lemma glabrous or sometimes sparsely hairy at the base; lobes 0.5–1.5 mm long, awnless, 1-nerved; central awn straight or weakly geniculate, without a distinct column; palea $^3/_4$ as long as lemma; callus present on all lemmas; anther 2.5–3.5 mm long.

[Very similar to and often growing together with and regarded as possibly derived from *A. sativa*, which differs in having the central awn with a distinct column.]

*Flowering*: September to December. *Ecology*: Waste and disturbed areas and roadsides. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from Europe. G, WC. *Economics*: Potential ornamental. Is cultivated as a cereal in some parts of the world. Weed.

Voucher: *Esterhuysen 609*.


*Avena fatua*

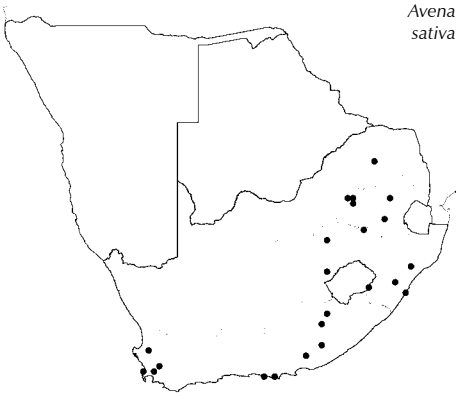
***Avena fatua** L., in *Species plantarum*: 80 (1753). Type: Europe.

Loosely tufted annual 250–700 mm high; culms solitary. Leaf blade 50–280 × 3–8 mm. Spikelet 18–32 mm long, 2–3-flowered; lemma usually brownish in colour especially the hairs, hairs loosely scattered; lobes usually 1.0–1.5 mm long, awnless, 1-nerved; palea shorter than the lemma, densely, minutely hairy on both keels; callus present on all lemmas; anther 2.0–4.7 mm long.

[Not always easy to distinguish from *A. sterilis*, but the lobes are usually shorter in the latter species.]

*Flowering*: August to November. *Ecology*: On sandy soil; disturbed and waste places, roadsides. Weed. *Frequency in southern Africa*: Common. *Distribution*: Naturalised from Europe. Europe, North Africa, western and central Asia, also introduced in Kenya and Zimbabwe. NW, G, M, FS, NC, WC, EC. *Economics*: It is a reasonably palatable grazing grass. A serious weed throughout the world as it is difficult to control chemically and highly selective herbicides are needed.

Illustrations: Clayton et al. 83, fig. 28 (1970); Baum: 736 (2007).
Voucher: *Gibbs Russell 3942*.


*Avena sativa*

***Avena sativa** L., in *Species plantarum* 1: 79. (1753). Type: Europe.

Oats

Loosely tufted annual 350–1 500 mm high; culms solitary. Leaf blade 100–400 × 3–9 mm. Spikelet 17–35 mm long, 2 to 3-flowered; rachilla disarticulating above the glumes only at maturity; glumes membranous on the margins; lemma sparsely hairy or glabrous, apices emarginated; lobes awnless or awned, awn up to 4.5 mm long, 1-nerved; central awn with a distinct column, almost straight, sometimes absent; palea enclosed by margins of the lemma, scabrid on keels; callus present on all lemmas; anther 2.0–4.6 mm long.

[This species can be easily confused with *A. byzantina*, but can be distinguished by the distinct column of the awn.]

*Flowering*: September to November. *Ecology*: Waste places, disturbed areas, roadsides. *Frequency in southern Africa*: Common. *Distribution*: Naturalised from Europe. L, LIM, G, M, FS, KZN, WC, EC. *Economics*: Cereal crop used for food and drink. One of the worst weeds in the world.

Anatomy vouchers: *Ellis 1185* & *3816*.
Voucher: *Crook 802*.

***Avena sterilis** L., in *Species plantarum*, ed. 2: 118 (1762). Type: Europe.

Loosely tufted annual 500–1 450 mm high; culms solitary. Leaf blade 200–500 × 4–15 mm. Spikelet 20–46 mm long; glumes as long as spikelet; lemma scabrid or shortly pubescent above; lobes to 0.5 mm long, awnless, 1-nerved; palea lanceolate, with 2 minutely hairy keels; callus present on lowest lemma only; anther 2.0–4.5 mm long. The distinguishing characters do not always occur together. Sometimes the rigid proximal hairs on lemmas are missing, but the short lobes are always present. Two subspecies are recognised namely subsp. *sterilis* (ligule 5–6 mm long, florets up to 5) and subsp. *ludoviciana* (ligule 3 mm long, florets up to 3).

[Very much like *A. fatua*, and previously some specimens of this species have been wrongly referred to as *A. strigosa* at PRE.]

*Flowering*: September to November. *Ecology*: Mainly on sandy soil; waste places, disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Naturalised from Europe. WC. *Economics*: Weed

Illustrations: Baum: 738 (2007).
Anatomy vouchers: *Ellis 360* & *375*.
Voucher: *Bolus 24908*.

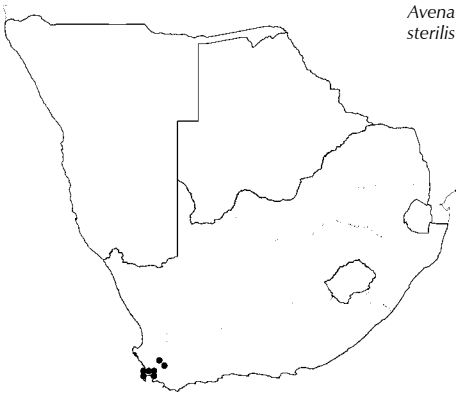





Figure 61.—*Axonopus fissifolius*. Artist: W. Roux.

## ***Axonopus** P.Beauv.

Palisot de Beauvois: 12 (1812); Stapf: 417 (1899); Stapf: 566 (1919); Chippindall & Crook: 130 (1976); Clayton & Renvoize: 613 (1982); Clayton & Renvoize: 289 (1986); Clayton: 91 (1989); Gibbs Russell et al.: 59 (1990); Watson & Dallwitz: 160 (1994); Barkworth: 565 (2003).



Figure 60.—*Axonopus fissifolius* spikelet (2 mm). Photographer: M. Koekemoer.

Perennial, tufted, stoloniferous. **Leaf blade** somewhat linear, expanded or folded, apex abruptly rounded; *ligule* a narrow, fringed membrane. **Inflorescence** of 2–many slender racemes, digitate or subdigitate; *spikelets* solitary, subsessile, alternating on one side of 3-angled rachis, back of upper lemma turned away from rachis. **Spikelet** lanceolate to oblong, dorsiventrally compressed, falling with glumes; *glumes* unequal, awnless; lower glume absent; upper glume membranous, as long as spikelet, 4–5-nerved. **Florets** 2; *lower floret* sterile, lemma similar to upper glume; palea 0; *upper floret* bisexual, *lemma* firmer than glumes,

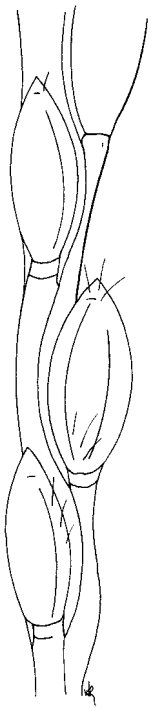


Figure 62.—*Axonopus fissifolius*. Portion of rachis with spikelets (6.0 × 1.1 mm). Artist: W. Roux.

chartaceous to crustaceous, as long as spikelet, obtuse, 4-nerved, glabrous, entire, margins narrow, inrolled and covering only edges of palea (paspalum-type), awnless; *palea* equal or subequal to lemma, indurated. **Lodicules** 2, minute, broadly cuneate. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose. **Caryopsis** ellipsoid, dorsiventrally compressed, small; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; NADP-ME (1 species); XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 10$ (high polyploidy).

**Species** 110, tropical and subtropical America; 1 naturalised in Africa: **Axonopus fissifolius* (Raddi) Kuhlm., Swaziland, Limpopo, Mpumalanga, KwaZulu-Natal and Eastern Cape.

[*A. compressus* (Sw.) P.Beauv. from tropical America, found in damp, shady places has been introduced throughout the humid tropics, mainly as a lawn grass. There is one specimen of this species at the National Herbarium, (PRE); *Mrs Pienaar s.n.* (PRE CAS 0727309) collected in 1981 in the Durban Botanic Garden. There is no indication on the label whether it was cultivated there or not. As yet it has not been recorded as naturalised in the FSA region and therefore is not fully treated here.]

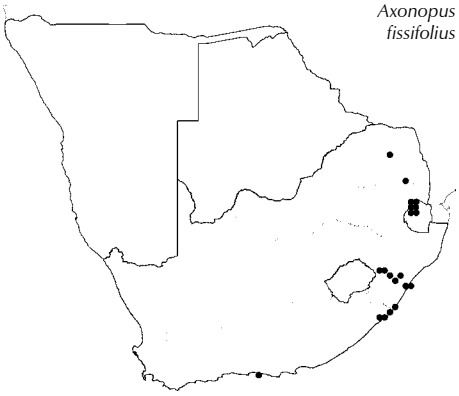
Species treatment by A.C. Mashau.

### Quick guide to easily confused genera:

Upper lemma paspalum-type . . . . . *__Axonopus__
Upper lemma digitaria-type . . . . . **Digitaria**

### Key to species:

Upper glume and lower lemma obtuse to subacute; upper lemma apex obscurely hairy . . . . . *__A. fissifolius__
Upper glume and lower lemma acute to acuminate; upper lemma apex with a short tuft of hairs . . . . . *__A. compressus__



*Axonopus fissifolius*

*__Axonopus fissifolius__ (Raddi) Kuhlm., in *Commissao de Linhas Telegráphias Botanica* 67: 87 (1922). Type: Brazil.

*Axonopus affinis* Chase, in *Journal of the Washington Academy of Sciences* 28: 180 (1938). Type: USA.

Carpet grass

Perennial 250–600 mm high; strongly stoloniferous, forming dense swards; culm nodes glabrous. Leaf blade 200 × 8 mm, rounded at apex, which distinguishes it from *Digitaria* species with similar inflorescences. Inflorescence with spikelets adaxial on branches and solitary at point of attachment. Spikelet 2 × 1 mm; lower glume 0; upper glume and lower lemma similar, apices obtuse to subacute; upper lemma as long as spikelet; anther 0.7–1.0 mm long.

*Flowering*: December to May. *Ecology*: Moist and disturbed ground. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from tropical America. Introduced worldwide. S, LIM, M, KZN, EC. *Economics*: Cultivated as pasture and lawns; used for erosion control; invader in some areas.

Illustration: Chippindall & Crook: 130 (1976).
Anatomy vouchers: *Ellis 1468, 4467 & 5196*.
Voucher: *Smook 5526*.

## *Bambusa Schreb.

Schreber: 236 (1789) name conserved; Chippindall: 31 (1955); Clayton & Renvoize: 53 (1986); Gibbs Russell et al.: 60 (1990); Stapleton: 1–12 (1994); Watson & Dallwitz: 161 (1994); Ohrnberger: 254 (1999).

Perennial, woody; rhizomes sympodial; culm sheaths very broad. **Leaf blade** pseudopetiolate, disarticulating from sheaths; *ligule* unfringed to fringed membrane. **Inflorescence** a panicle of 1–many *pseudo-spikelets* in globose clusters, sessile on nodes. **Spikelet** disarticulating above glumes; *glumes* 1–3, ± equal, shorter than adjacent lemma. **Florets** 1–many, bisexual; *lowermost florets* sometimes sterile; *lemma* 9–22-nerved, awnless; *palea* 2-keeled with several nerves. **Lodicules** 3, membranous. **Stamens** 6. **Ovary** hairy with conspicuous, broadly conical and fleshy appendage; stigmas usually 3. **Hilum** long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 12$ (aneuploids, polyploidy).

**Species** ± 120, tropical Asia and America; 1 naturalised and cultivated in southern Africa: ***Bambusa balcooa*** Roxb. ex Roxb., Limpopo, Mpumalanga, KwaZulu-Natal, Western Cape and Eastern Cape.

[The large bamboos were often planted at homesteads that may have long gone, but there is indication that bamboos are becoming invasive. Another problem with these large bamboos is identification and a study should be done to establish precisely what is in the FSA region.]

Species treatment by M.T. Nembudani.



Figure 63.—*Bambusa balcooa* spikelet (7–16 mm). Photographer: M. Koekemoer.

**Quick guide to easily confused taxa:**

1. Culm solid or sub-solid; diameter less than 50 mm . . . . . ***Dendrocalamus strictus**
   Culm hollow; diameter greater than 50 mm . . . . . 2
2. Culm sheath with auricles; inflorescence bud prophyll 2-keeled . . . . . ***Dendrocalamus giganteus**
   Culm sheath without auricles; inflorescence bud prophyll 1-keeled . . . . . ***Bambusa balcooa**

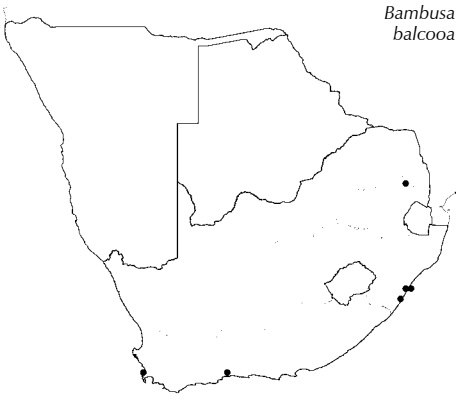
***Bambusa balcooa** Roxb. ex Roxb., in *Hortus bengalensis*: 25 (1814), [without description], *Flora Indica*. ed. 2,2: 196 (1832). Type: India.

BAMBOO

Tree, 15–21 m high, grows in dense clumps; rhizomatous; culms arch gracefully above. Culm sheath with brown hairs, auricles absent. Leaf blade to 150 × 40 mm; ligule an unfringed membrane. Spikelet 7–16 mm long; lemma and palea hairy; anther 4–5 mm long, brown, numerous, hanging outside on very long filaments; style hairy. Reproduces freely from rhizomes as well as from seeds.

*Flowering*: Rare and sporadic. *Ecology*: Stream banks and forest margins. *Distribution*: Naturalised from India. Cultivated in many countries of the world. LIM, M, KZN, WC, EC. *Economics*: In southern Africa occurs mainly as a garden ornamental, but bamboos have many uses in other parts of the world. Has the potential to become invasive.

Voucher: *Forbes & MacClean 26173*.



## **Bewsia** Gooss.

Stapf: 593 (1898–1900); Goossens: 183 (1941); Chippindall: 121 (1955) under *Diplachne* P.Beauv.; Clayton: 286 (1974); Chippindall & Crook: 176 (1976); Clayton & Renvoize: 212 (1986); Gibbs Russell et al.: 61 (1990); Watson & Dallwitz: 168 (1994); Cope: 36 (1999).

Tufted perennial; rhizomatous. **Leaf blade** linear to linear-lanceolate; expanded or rolled; *ligule* an unfringed membrane. **Inflorescence** of spike-like racemes scattered on and adpressed to central axis; *spikelets* solitary, pedicels short. **Spikelet** weakly laterally compressed, disarticulating above glumes and not between florets; *glumes* ± equal, shorter than spikelet, similar, 1-nerved, acuminate, awnless. **Florets** 2–6, bisexual, but *uppermost floret* reduced; *lemma* similar in texture to glumes, membranous, lightly keeled, 3-nerved, hairy on lateral nerves, entire or incised, awned from back below apex; *awn* straight, shorter to as long as body of lemma; *callus* short, blunt, densely hairy; *palea* as long as lemma, hairy. **Lodicules** 2, long and narrow, glabrous. **Stamens** 3. **Ovary** glabrous. **Caryopsis** up to 2 mm long, linear-oblong; pericarp fused. **Photosynthetic pathway**: $C_4$; XyMS+ (the MS thick-walled, sometimes double). PCR sheath outlines even, without extensions. PCR cell chloroplasts centripetal. **Cytology**: 2x = 30 (1 report).

**Species** 1, Africa: *Bewsia biflora* (Hack.) Gooss., Namibia, Swaziland, North West, Gauteng, Limpopo, Mpumalanga, Free State and KwaZulu-Natal.

Species treatment by M.J. Moeaha.

### Quick guide to easily confused genera:

Lemma awned from the back below apex, awn 1–8 mm long . . . . . **Bewsia**
Lemma awned from apex not dorsally, awn 0.3–0.8 mm long; or mucronate or awnless . . . . . **Leptochloa**

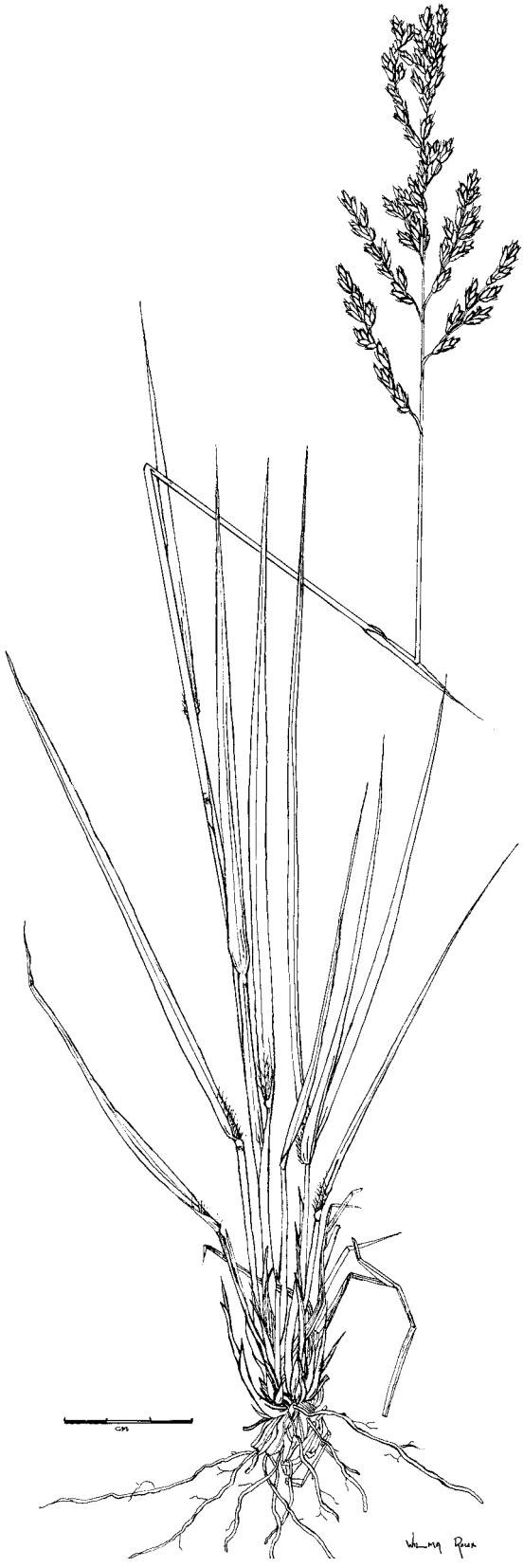


Figure 64.—*Bewsia biflora*. Artist: W. Roux.

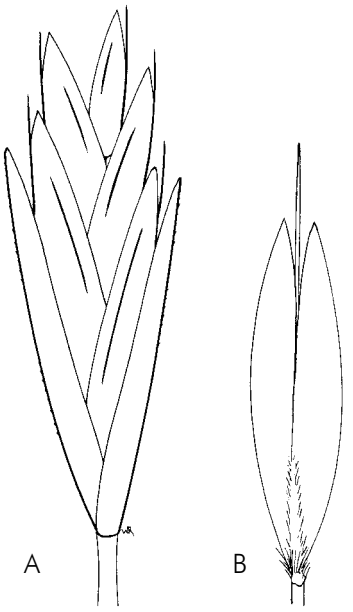



Figure 65.—*Bewsia biflora*. A, spikelet; B, dorsal view of lemma. Artist: W. Roux.



Figure 66.—*Bewsia biflora* spikelet (5.5–9.0 mm). Photographer: M. Koekemoer.

**Bewsia biflora** (Hack. ex Schinz) Gooss., in *South African Journal of Science* 37: 184, fig. 1–5 (1941). Type: South Africa, Limpopo Province, Makapansberge, Strydpoort, *Rehmann 5386* (PRE, fg.).

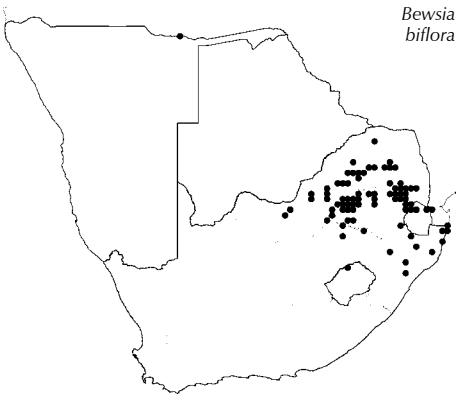
*Diplachne biflora* Hack., in *Bulletin de l'Herbier Boissier* 3: 387 (1895). Type: as above.

BLOUSAADGRAS, FALSE LOVE GRASS

Tufted perennial 260–930 mm high; rhizome short. Leaf blade 100–400 × 1–5 mm, apex filiform. Spikelet 5.5–9.0 mm long, reddish-brown, 2–6-flowered; glumes glabrous; lemma awned from back, awn 1–8 mm long; anther 1.5–2.5 mm long.

*Flowering*: November to April. *Ecology*: Rocky hillsides, plains or mixed bushveld usually in the open but occasionally in shade. *Frequency in southern Africa*: Fairly common in the northern parts of South Africa and Swaziland. *Distribution*: Northwards to Tanzania, and Ivory Coast. N, S, LIM, NW, G, M, FS, KZN. *Economics*: Unimportant grazing grass as usually not abundant enough; ornamental in gardens.

Illustration: Chippindall: 121, fig. 92 (1955); Cope: 37, tab. 16 (1999).
Anatomy vouchers: *Ellis 139, 419, 713, 754, 1225* & *De Winter 8313*.
Voucher: *Smook 946*.




## **Bothriochloa** Kuntze

Kuntze: 762 (1891); Stapf: 344 (1898); Chippindall: 482 (1955); Clayton & Renvoize: 719 (1982); Clayton & Renvoize: 344 (1986); Gibbs Russell et al.: 62 (1990); Watson & Dallwitz: 175 (1994); Setshogo: 44 (2002).

Perennial, tufted; sometimes decumbent or stoloniferous. **Leaf blade** linear, usually expanded, often bearded at collar; *ligule* an unfringed to a fringed membrane. **Inflorescence** of digitate, or subdigitate racemes or a panicle with a long central axis or a spatheate, leafy false panicle (this may not be clearly discernible); pedicels and internodes linear, longitudinally grooved with a translucent median line; *spikelets* secund, usually paired, in long–short combinations: one sessile, the other pedicelled; pedicels free from rachis. **Sessile spikelet** dorsiventrally compressed, falling with glumes; *glumes* ± equal, dissimilar, firm to membranous; lower glume flattened on back, 2-keeled, sometimes with 1–3 pits in the middle, hairy or glabrous, acute to subacute; upper glume distinctly keeled. **Florets** 2; *lower floret* sterile, reduced to a hyaline lemma, awnless; *upper floret* bisexual, *lemma* less firm in texture than the glumes, reduced to a hyaline stipe, glabrous, entire, awned, *awn* glabrous, geniculate, longer than body of lemma; *callus* short, rounded, hairy; *palea* reduced or 0. **Lodicules** 2. **Stamens**



Figure 67.—*Bothriochloa insculpta*. Sessile–pedicellate spikelet pair (4.5–5.0 mm). Photographer: M. Koekemoer.



Figure 68.—*Bothriochloa insculpta*. Artist: C.D. Bartman.

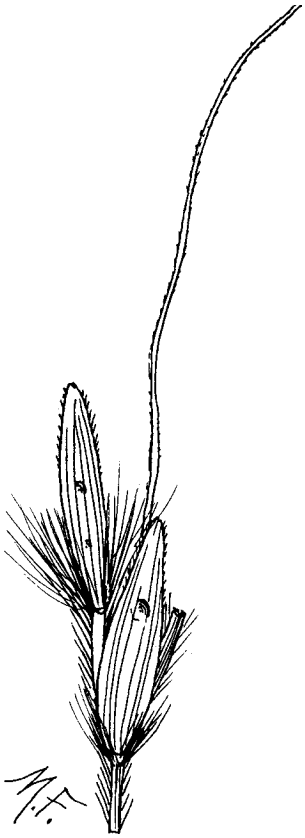


Figure 69.—*Bothriochloa insculpta*. Spikelet pair, awned sessile and awnless pedicellate spikelets, pits present. Artist: M. Franks.

3. **Ovary** ellipsoid, glabrous; styles plumose above. **Caryopsis** oblong, slightly dorsiventrally compressed hilum short; embryo large. **Pedicelled spikelet** symmetrical, same size or smaller than sessile spikelet, glabrous; sterile or male; awnless. **Photosynthetic pathway**: $C_4$; XyMS-. PCR sheaths outlines uneven. PCR cell chloroplasts with reduced grana, centrifugal/peripheral. **Cytology**: $x = 10$ (high polyploidy).

**Species** ± 35, throughout the tropics; 3 in southern Africa, widespread.

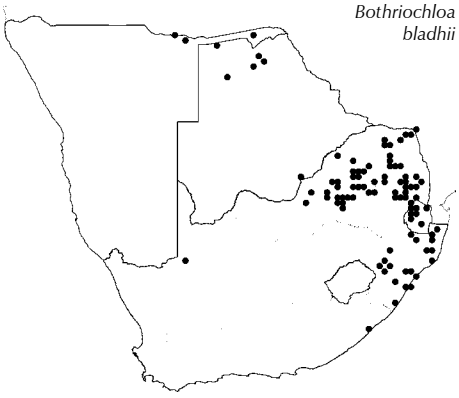
Species treatment by M.J. Moeaha.

**Quick guide to easily confused genera:**

Sessile spikelet lower glume obtuse to truncate; pedicels and internodes not grooved, translucent median line absent . . . **Dichanthium**
Sessile spikelet lower glume acute to subacute; pedicels and internodes longitudinally grooved with a translucent median line . . . . . **Bothriochloa**

**Key to species:**

1. Sessile spikelet lower glume without pits . . . . . **B. radicans**
   Sessile spikelet lower glume with 1–3 deep pits . . . . . 2
2. Inflorescence central axis longer than racemes; racemes more than 20; hairs along sides of pedicels and on callus usually shorter than 1 mm long . . . . . **B. bladhii**
   Inflorescence central axis shorter than racemes; racemes 3–20; hairs along sides of pedicels and on callus 1–3 mm long . . . . . **B. insculpta**



*Bothriochloa bladhii*

**Bothriochloa bladhii** (Retz.) S.T.Blake, in *Proceedings of the Royal Society of Queensland* 80: 62 (1970). Type: China.

*B. glabra* (Roxb.) A.Camus, in *Annales de la Société linnéenne de Lyon*. n.s. 76: 164 (1931). Type: India.

PURPLE PLUME GRASS, BLOUKLOSGRAS

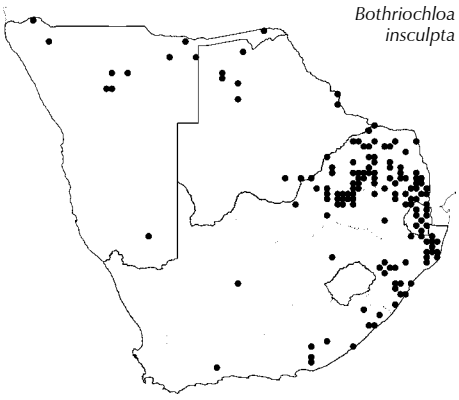
Tufted perennial 600–1 800 mm high. Leaf blade 100–550 × 2–12 mm; ligule a fringed membrane, hairs shorter than membrane. Inflorescence axis longer than racemes; racemes more than 20; pedicel hairs usually shorter than 1 mm long. Sessile spikelet 3–4 mm long; lower glume pitted; callus hairs usually shorter than 1 mm; anthers 1.0–1.5 mm long.

[Hybridises readily with related species.]

*Flowering*: December to June. *Ecology*: River banks and vleis. *Frequency in southern Africa*: Common. *Distribution*: Northwards to East Africa; Old World tropics including India, Australia and Pacific; introduced into North America. N, B, S, LIM, NW, M, G, KZN, EC, ?NC (possibly washed down by river, and may not have become established).

Illustration: Setshogo: 46, tab. 17 (2002).
Anatomy vouchers: *Ellis 434, 1555, 1913, 1915 & 4473*.
Voucher: *Schoenfelder 95*.

**Bothriochloa insculpta** (A.Rich.) A.Camus, in *Annales de la Société linnéenne de Lyon*, n.s. 76: 165 (1931). Type: Ethiopia, Mt. Sholoda [Selleuda], *Schimper* 80.


*Bothriochloa insculpta*

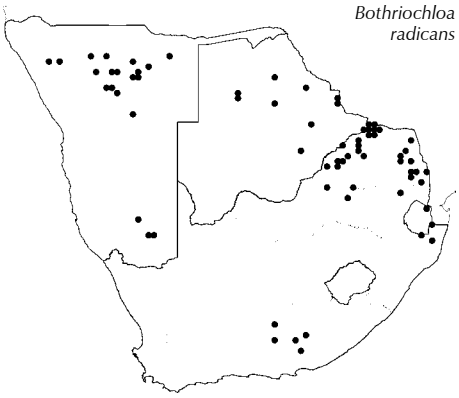
PINHOLE GRASS, KLOSGRAS, STIPPELGRAS

Perennial up to 1 500 mm high, sometimes stoloniferous; aromatic. Leaf blade 40–300 × 2–8 mm; ligule a fringed membrane, hairs shorter than the membrane. Inflorescence axis shorter than racemes; racemes 3–20; pedicel hairs 1–3 mm long. Sessile spikelet 4.5–5.0 mm long; lower glume pitted; callus hairs 1–3 mm long; anthers 1.5–2.0 mm long. Pedicelled spikelets up to 5.0 mm long.

*Flowering*: October to June. *Ecology*: Grassland and hillsides, often in overgrazed places. *Frequency in southern Africa*: Common. *Distribution*: Northwards throughout Africa and Yemen. N, B, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: As it is aromatic it is only an average grazing grass; indicator of disturbance; useful for erosion control.

Anatomy vouchers: *Ellis 398, 788, 1348, 1554* & *Liengme 572*.
Voucher: *Liebenberg 4382*.

**Bothriochloa radicans** (Lehm.) A.Camus., in *Annales de la Société linnéenne de Lyon*, n.s. 76: 164 (1931). Type: cultivated in Hamburg from seed from South Africa.


*Bothriochloa radicans*

SMELLY GRASS, STINKGRAS, VLEI-STINKGRAS

Perennial 300–700 mm high, often stoloniferous; aromatic. Leaf blade 60–200 × 2–6 mm; ligule a fringed membrane, hairs shorter than membrane. Inflorescence axis shorter than racemes, racemes 5–16. Sessile spikelet 2.5–5.0 mm long; lower glume sparsely hairy, without pits; anthers 1.0–1.5 mm long. Pedicelled spikelet 3.0–3.5 mm long.

*Flowering*: October to April. *Ecology*: Rocky hillsides. *Frequency in southern Africa*: Common. *Distribution*: North to Ethiopia; introduced to tropical America. N, B, S, LIM, NW, M, G, KZN, EC. *Economics*: Not a useful grazing grass as too aromatic; indicator of veld degradation; useful for soil erosion control.

Illustration: Chippindall: 483, fig. 395 (1955).
Anatomy vouchers: *Ellis 525, 1896* & *4537*.
Voucher: *De Winter 2824*.

## **Brachiaria** (Trin.) Griseb.

Trinius: 194 (1834); Grisebach: 496 (1853); Stapf: 383 (1898); Stapf: 505 (1919); Chippindall: 370 (1955); Anderson: 104 (1961); Launert: 40 (1970a); Chippindall & Crook: 122 (1976); Scholz: 384 (1978); Clayton & Renvoize: 575 (1982); Clayton & Renvoize: 283 (1986); Webster: 15 (1987); Clayton: 62 (1989); Gibbs Russell et al.: 63 (1990); Morrone & Zuloaga: 43 (1992); Watson & Dallwitz: 179 (1994); Veldkamp: 135 (2004); Müller: 72–85 (2007).

*Pseudobrachiaria* Launert: 158 (1970b); Launert: 156 (1970a).

Annual or perennial. **Leaf blade** linear to lanceolate; *ligule* unfringed or a fringed membrane or fringe of hairs, rarely absent on all or only



Figure 70.—*Brachiaria deflexa*. Artist: C.D. Bartman.

upper leaves. **Inflorescence** of 1–many, usually 1-sided, spike-like racemes scattered up a central axis, rarely spike-like or like a panicle; rachis 3-angled (triquetrous) or flattened; *spikelets* solitary, paired or clustered, sessile or pedicelled, adaxial (orientated with lower glume adjacent to rachis of raceme). **Spikelet** not noticeably to dorsiventrally compressed, disarticulating with glumes or above them, ovate to oblong, plump, obtuse to acute, rarely softly long-hairy; *glumes* unequal in size, rarely ± equal, dissimilar, awnless; lower glume usually shorter than spikelet, membranous, obtuse at apex, 1–7-nerved; upper glume usually as long as spikelet and similar to lower lemma, acuminate, 5–11-nerved. **Florets** 2; *lower floret* male or sterile with lemma similar to upper glume, 5–7-nerved, *palea* shorter than lemma, membranous; *upper floret* bisexual; *lemma* firmer than glumes, crustaceous, faintly 5-nerved, glabrous, margins inrolled and covering only edges of palea (paspalum-type), awnless; *palea* obtuse to subacute, firm with two marginal flaps at base. **Lodicules** 2, broadly cuneate. **Stamen**s 3. **Ovary** ovoid; styles plumose above. **Caryopsis** ellipsoid, dorsiventrally compressed; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; PCK (12 species); XyMS+. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 7, 9$ (high polyploidy).

**Species** ± 100, tropics, mainly Old World; 22 in southern Africa, widespread.

Species treatment by A.C. Mashau.

### Quick guide to easily confused genera:

Lower glume adjacent to rachis . . . . . **Brachiaria**
Lower glume turned away from rachis . . . . . **Urochloa**

### Quick guide to easily confused taxa:

Spikelet glabrous; lower glume shorter than spikelet; upper floret rugose . . . . . **Brachiaria chusqueoides**
Spikelet pilose; lower glume as long as spikelet; upper floret pale and shiny . . . . . **Panicum aequinerve**

### Key to species:

1. Inflorescence with pedicels of unequal lengths (except *B. xantholeuca* has pedicels equal); at least some spikelets borne on long slender pedicels exceeding 1–2 mm; spikelets mostly more than their own length apart . . . . . 2
   Inflorescence with pedicels of equal lengths; spikelets almost sessile or borne on pedicels shorter than 1 mm; spikelets overlapping for at least 1/4 their lengths . . . . . 7
2. Upper glume and lower lemma with distinct tufts of erect, stiff hairs in the upper 1/2 on either side below the apex, usually between the first and second nerves . . . . . **B. marlothii**
   Upper glume and lower lemma without distinct tufts of erect stiff hairs at apex . . . . . 3
3. Leaf blade base cordate and pseudopetiolate; racemes usually fewer than 5, lax and widely spaced; a coastal bush or forest grass rarely occurring inland . . . . . **B. chusqueoides**
   Leaf blade base linear or rounded; racemes more than 5, stiff and arranged in a broadly ovate panicle; mainly an inland wooded grassland species . . . . . 4
4. Lower glume not separated from upper glume by an internode; spikelets solitary, rarely paired, then only at the base of the longer racemes . . . . . 5
   Lower glume separated from upper glume by an internode; spikelets mostly paired . . . . . 6

5. Spikelet 2.7–4.2 mm long, usually hairy; pedicels of equal lengths; racemes secund . . . . . **B. xantholeuca**
Spikelet 1.5–2.0 mm long, glabrous; pedicels of unequal lengths; racemes not secund . . . . . ***B. umbellata**

6(4). Spikelet 2.5–3.5 mm long, supported on a short stipe; upper lemma finely rugose . . . . . **B. deflexa**
Spikelet 3.0–4.2 mm long, stipe absent; upper lemma coarsely rugose . . . . . **B. grossa**

7(1). Raceme not conspicuously secund; spikelets clustered; racemes mostly adpressed to central axis or spreading slightly . . . . . 8
Raceme very conspicuously secund; spikelets usually arranged in one or two, rarely four rows; racemes spreading, rarely adpressed . . . . . 9

8. Short rachilla extension present; lower glume 1–2-nerved; upper lemma glabrous; plant usually covered with soft, short, velvety, white hairs . . . . . **B. glomerata**
Rachilla extension absent; lower glume 3(–5)-nerved; upper lemma hairy on margins; plant usually covered with very dense, long, golden hairs all over . . . . . **B. psammophila**

9(7). Lower glume $^2/_3$ as long as spikelet, 7–9-nerved; upper glume and lower lemma with cross-veins between nerves . . . . . 10
Lower glume up to $^1/_2$ as long as spikelet (rarely up to $^2/_3$ in *B. nigropedata*), mostly 1–3-nerved (7-nerved in *B. brizantha*); upper glume and lower lemma cross-veins absent . . . . . 13

10. Lower glume and upper glume separated by a short internode; spikelet 4.5–7.0 mm long . . . . . 11
Lower glume and upper glume not separated by an internode; spikelet 2.8–4.5 mm long . . . . . 12

11. Racemes 4–12; plant densely tufted, not stoloniferous; culm erect to geniculate, not rooting at nodes; upper lemma distinctly apiculate . . . . . **B. dictyoneura**
Racemes 1–4; plant stoloniferous; culm often decumbent, geniculate, usually rooting at nodes; upper lemma indistinctly apiculate . . . . . **B. humidicola**

12(10). Leaf blade filiform, usually up to $^1/_2$ as long as culm, rarely hairy . . . . . **B. subulifolia**
Leaf blade flat or sometimes convolute, usually much less than $^1/_2$ as long as culm, usually hairy . . . . . **B. bovonei**

13(9). Lower glume 7-nerved; spikelet 4–6 mm long, arranged in a single row (occasionally two rows near the base of a raceme) . . . . . **B. brizantha**
Lower glume 1–5-nerved; spikelet 1.5–5.0 mm long, usually arranged in two or four rows, rarely in one . . . . . 14

14. Raceme 90–120 mm long; lower glume $^1/_2$ as long as spikelet, not scale-like; spikelets in one or two rows . . . . . 15
Raceme 5–50 mm long; lower glume usually $^1/_4$ as long as spikelet, scale-like (rarely to $^1/_2$ as long as spikelet); spikelets in two or four rows . . . . . 16

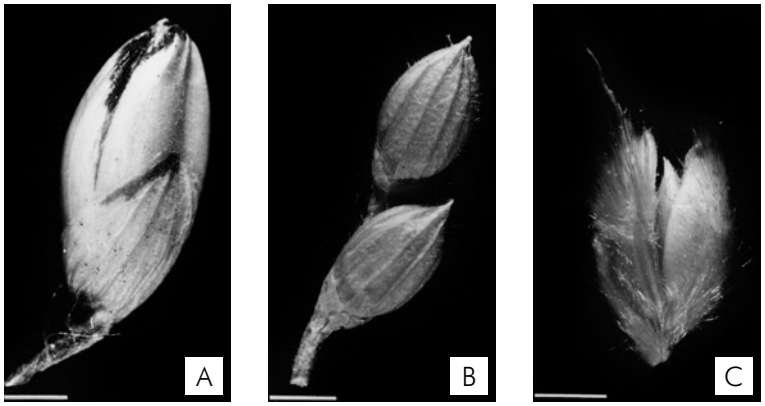



Figure 71.—Spikelets; A, *Brachiaria brizantha* (4–6 mm); B, *Brachiaria deflexa* (2.0–3.4 mm); C, *Brachiaria serrata* (2.4–4.5 mm). Photographer: M. Koekemoer.

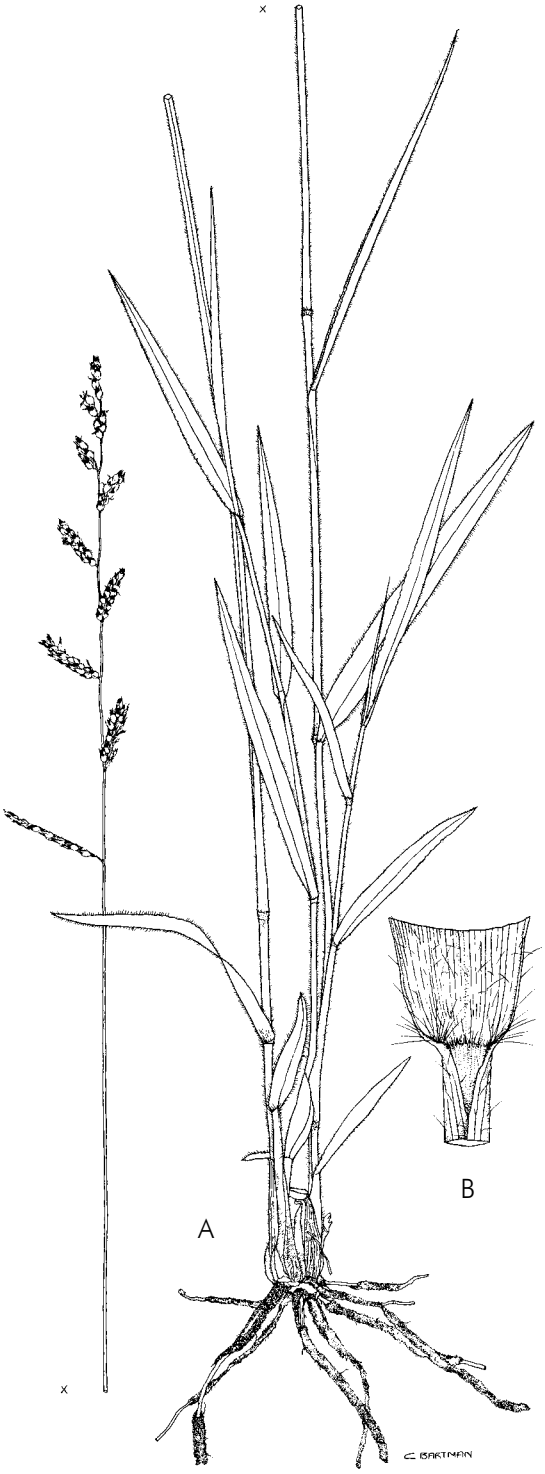



Figure 72.—*Brachiaria serrata*. A, plant; B, ligule. Artist: C.D. Bartman.

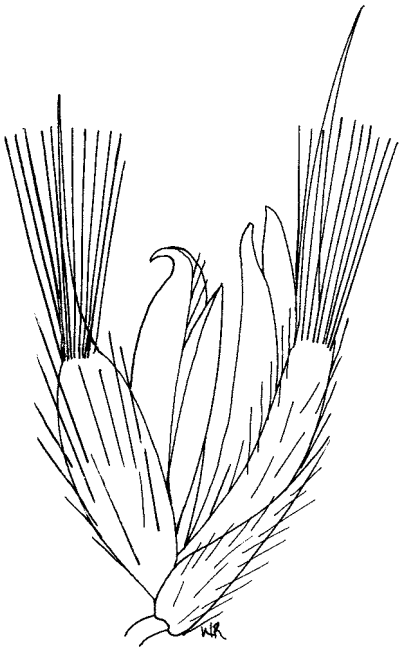


Figure 73.—*Brachiaria serrata* spikelet (4.1 × 2.0 mm). Artist: W. Roux.

15. Spikelet glabrous or sparsely pilose; occurs in Namibia and Botswana . . . . . **B. dura** var. **dura**
Spikelet densely pilose; known only from Witsand, Northern Cape (2822CB & DA) . . . . . **B. dura** var. **pilosa**

16(14). Rachis 1.0–1.9 mm wide, flat, ribbon-like, broadly winged; spikelet glabrous . . . . . **B. arrecta**
Rachis less than 1 mm wide, solid, triquetrous or crescentic, sometimes very narrowly winged; spikelet sparsely or densely hairy (*B. eruciformis* rarely glabrous) . . . . . 17

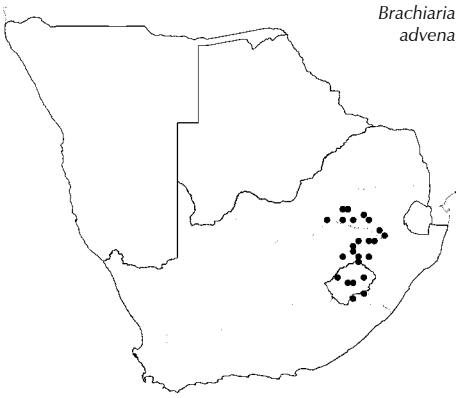
17. Lower lemma and palea acuminate or often long-acuminate, with a short, stout mucro or awn up to 1.5 mm long . . . . . 18
Lower lemma acute or rounded; palea rounded at apex . . . . 19

18. Spikelet supported on a dark coloured stipe; lower glume distinctly darkly coloured at the base; lower lemma often long-acuminate . . . . . **B. nigropedata**
Spikelet stipe absent; lower glume base rarely with a distinctive colour difference; lower lemma and palea with a short stout mucro or awn up to 1.5 mm long . . . . . **B. serrata**

19(17). Spikelet very densely hairy, hairs long (1.0–1.5 mm long); panicle mostly simple . . . . . **B. schoenfelderi**
Spikelet sparsely hairy, hairs short (up to 0.5 mm long), rarely glabrous; panicle simple or compound . . . . . 20

20. Inflorescence compound with racemes attached to primary branches (at least in the lower part); lowest part of rachis bare; spikelet bearded at apex . . . . . **B. malacodes**
Inflorescence simple, racemes attached to central axis; spikelets covering the whole length of the rachis; spikelet not bearded at apex . . . . . 21

21. Spikelet 3.0–3.8 mm long, distinctly flattened on the one side; upper lemma narrow obovate-oblong, rough, matt . . . . . ***B. advena**
Spikelet 1.7–2.7 mm long, not distinctly flattened; upper lemma obtuse, smooth, shiny . . . . . **B. eruciformis**



*Brachiaria advena*

***Brachiaria advena** Vickery, in *Contributions of the New South Wales National Herbarium* 1(6): 329 (1950). Type: Australia.

Alternate name: *Urochloa advena* (Vick.) R.Webster

Very loosely tufted perennial or annual 200–800 mm high; occasionally stoloniferous; culm erect, sometimes straggly or decumbent and rooting at the nodes. Leaf blade 50–130 × 2–6 mm; ligule a fringe of hairs. Inflorescence simple, with a firm, stout central axis; racemes 10–30 mm long, secund; rachis less than 1 mm wide, solid, triquetrous or crescentic, sometimes narrowly winged; spikelets arranged in two rows, covering the whole length of the rachis; pedicels of equal lengths. Spikelet 3.0–3.8 mm long, distinctly flattened on one side, sparsely hairy, hairs short (up to 0.5 mm long); lower glume $^1/_4$ as long as spikelet, acute or obtuse, not separated from upper glume by an internode, 1-nerved or unobtrusively nerved; lower lemma acute or rounded; upper lemma indurated, narrow obovate-oblong, rough; palea apex rounded; anther 0.7–1.3 mm long.

[Resembles *B. eruciformis*, which has a delicate inflorescence, spikelet shorter (1.7–2.7 mm long) and not distinctly flattened on one side; and *B. malacodes*, which has a compound panicle-like inflorescence.]

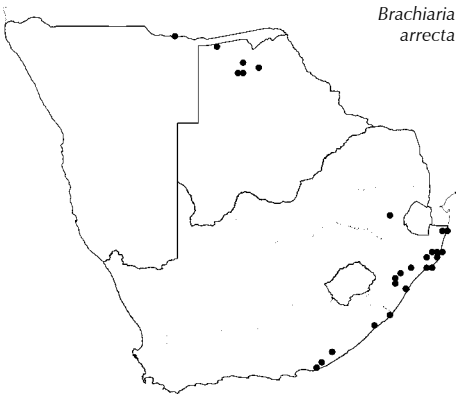
*Flowering*: December to March. *Ecology*: Usually in damp, disturbed areas on black clayey soil, often in mealie or sunflower fields. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Naturalised from Australia. L, G, M, FS, EC. *Economics*: Weed of cultivation.

Anatomy vouchers: *Ellis 1510 & Smook 4689*.
Voucher: *Smook 4686*.

**Brachiaria arrecta** (Hack. ex T.Durand & Schinz) Stent, in *Bothalia* 1: 263 (1924). Type: South Africa, Eastern Cape; Assegai Bosch to Botram, *Drège*; Kei R., *Drège* (syntypes).

*B. latifolia* Stapf, in *Flora tropical Africa* 9: 526 (1919). Type: Malawi, Shire R., *Kirk s.n.* (K, holo.).

Alternate name: *Urochloa arrecta* (T.Durand & Schinz) Morrone & Zuloaga


*Brachiaria arrecta*

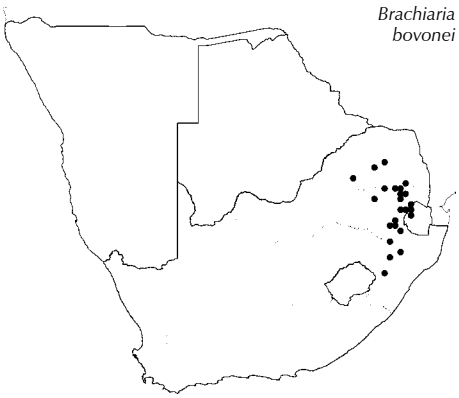
Tufted perennial 500–1 300 mm high; usually a hygrophyte; stoloniferous; culm prostrate and rooting at nodes. Leaf blade 50–250 × 5–15 mm; ligule a fringe of hairs. Racemes 10–50 mm long, secund; rachis 1.0–1.9 mm wide, flat and ribbon-like, broadly winged, margins scabrid; spikelets arranged in two rows; pedicels of equal lengths. Spikelet 3.0–4.3 mm long, glabrous; lower glume less than $^1/_2$ as long as spikelet, not separated from upper glume by an internode, 1-nerved; upper lemma obtuse, with a ± obscure mucro, rugulose; anther 1.1–2.3 mm long.

[The flat ribbon-like rachis distinguishes this from other *Brachiaria* species with spikelets arranged in two rows and lower glume 1-nerved. Some specimens have previously been wrongly identified as *B. rugulosa,* from East Africa, which has a rachis with minutely ciliolate margins. Resembles *B. mutica* (Forssk) Stapf, a forage grass introduced into many parts of southern African that has paired spikelets in four untidy rows.]

*Flowering*: December to June. *Ecology*: In shallow water of river floodplains or vleis, and extending to areas around rivers and lakes, often in shade and usually on wet soils. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical Africa. Introduced to tropical America. N, B, M, KZN, EC.

Anatomy vouchers: *Ellis 3381, 4060, 4422 & 4490.*
Voucher: *Smook 1920, De Winter & Marais 4912.*

**Brachiaria bovonei** (Chiov.) Robyns, in *Bulletin du Jardin botanique de'État à Bruxelles* 9: 174 (1932). Type: DRC, Bianos, *Bovone 89* (TO, holo.).


*Brachiaria bovonei*

Wiry signal grass

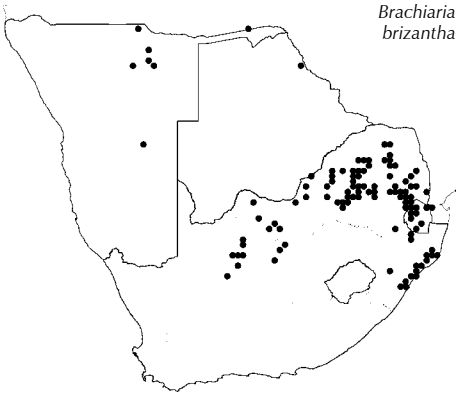
Densely tufted perennial 250–1 000 mm high. Leaf blade 30–300 × 3–6 mm, flat or sometimes convolute, mostly much less than $^1/_2$ as long as the culm, usually hairy; ligule an unfringed membrane. Racemes 10–30(–50) mm long, secund; rachis about 0.5 mm wide, triquetrous, sometimes narrowly winged; spikelets borne singly; pedicels of equal lengths. Spikelet 3.2–4.5 mm long, subacute; lower glume $^2/_3$ as long as spikelet, not separated from upper glume by an internode, 7-nerved; upper glume with cross-veins present; lower lemma with laterals nerves near margins connected by cross-veins; upper lemma subacute, slightly rough/rugulose; anther 1.7–2.3 mm long.

[Sometimes when most of the leaves are convolute it is difficult to distinguish from *B. subulifolia*, which is very similar but has a filiform leaf blade that can be up to $^1/_2$ as long as the culm.]

*Flowering*: October to January. *Ecology*: Usually on sandy soils; in open veld or on mountain slopes; in wet, marshy or damp areas around vleis, dams or streams. *Frequency in southern Africa*: Infre-

quent to locally common. *Distribution*: Northwards to southern tropical Africa, also DRC and Kenya. S, LIM, M, KZN.

Voucher: *Liebenberg 2805*.


*Brachiaria brizantha*

**Brachiaria brizantha** (A.Rich.) Stapf, in *Flora tropical Africa* 9: 531 (1919). Type: Ethiopia, Shire [Chiré], *Quartin Dillon*; Adua [Adoua], *Schimper 89* (syntypes).

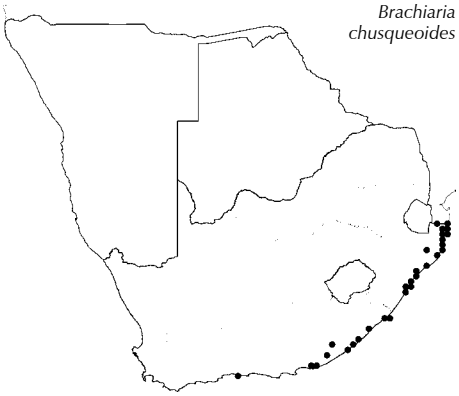
Alternate name: *Urochloa brizantha* (A.Rich) R.D.Webster

COMMON SIGNAL GRASS, BROODSINJAALGRAS

Loosely tufted, often robust perennial 300–2 000 mm high. Leaf blade 100–400 × 7–20 mm; ligule a fringed membrane. Racemes 25–100 mm long, secund; rachis ± 1 mm wide, crescentic in section, with narrow inrolled wings, ciliate on margins; spikelets arranged in a single row or occasionally two rowed near the base; pedicels of equal lengths. Spikelet 4–6 mm long; lower glume less than $^1/_2$ as long as spikelet, deeply concave with edges upturned, separated from upper glume by a short internode, 7-nerved; lower lemma resembles upper glume; upper lemma acute, granulose; anther 2.8–3.3 mm long.

*Flowering*: October to May. *Ecology*: Usually in sandy or rich soils; prefers undisturbed areas where water supplies are good, especially under trees in open woodland. *Frequency in southern Africa*: Common. *Distribution*: Northwards to tropical Africa, introduced into other parts of the world. N, B, S, LIM, NW, G, M, KZN, NC. *Economics*: Palatable grass that can endure heavy grazing, has a good pasture forage value as it has a high leaf production although the leaves are hard.

Anatomy vouchers: *Ellis 1123, 1349, 1535 & 3392*.
Voucher: *De Winter 3913*.


*Brachiaria chusqueoides*

**Brachiaria chusqueoides** (Hack.) Clayton, in *Kew Bulletin* 34: 558 (1980). Type: South Africa, KwaZulu-Natal, Durban, *Rehmann 8648*.

*Panicum chusqueoides* Hack., in *Bulletin de l'Herbier Boissier* 3: 377 (1895).

*Panicum obumbratum* Stapf, in *Flora capensis* 7: 401 (1899).

Tufted annual 300–750 mm high; scandent or creeping. Leaf blade 30–120 × 3–10 mm, cordate and pseudopetiolate at the base; ligule an unfringed membrane. Inflorescence of usually fewer than 5 racemes; racemes 15–70 mm long, lax and widely spaced; rachis triquetrous, pubescent; spikelets more than their own length apart, borne loosely and singly, in pairs or the lower on short branchlets; pedicels of unequal lengths. Spikelet 3–5 mm long, glabrous; lower glume $^1/_3$–$^1/_2$ as long as spikelet, separated from upper glume by a short internode, 3-nerved; upper lemma acute, rugose; anther 2.1–2.6 mm long.

[Resembles *B. grossa*, which lacks the pseudopetiolate leaf blade base, has more racemes, and grows in Namibia, Botswana, Limpopo and Mpumalanga. Similar to *B. deflexa*, which usually has a smaller spikelet 2.0–3.5 mm long and the leaf lacks a pseudopetiole.]

*Flowering*: October to April. *Ecology*: On deep sand or humiferous soil; forest undergrowth in disturbed or more open places; frequently

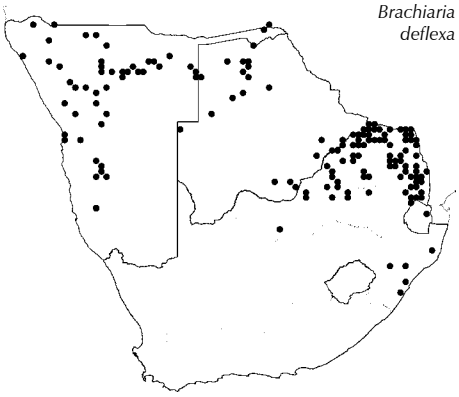
in coastal dune forest. *Frequency in southern Africa*: Common. *Distribution*: Northwards into tropical East Africa. KZN, EC, WC.

Anatomy vouchers*: Ellis 2111, 2112, 4047, 5184* & *Smook 4058*.
Voucher: *Anderson 37*.

**Brachiaria deflexa** (Schumach.) C.E.Hubb. ex Robyns, in *Bulletin du Jardin botanique de l'État à Bruxelles* 9: 181 (1932). Type: Ghana, *Thonning* (C, holo.).

*Pseudobrachiaria deflexa* (Schumach.) Launert, in *Mitteilungen der Botanischen Staatssammlung, München* 8: 158 (1970).

False signal grass, bastersinjaalgras


*Brachiaria deflexa*

Loosely tufted annual 150–700 mm high; culm often weak and ascending, solitary or branched. Leaf blade 40–180(–250) × 4–22 mm; ligule a fringe of hairs. Inflorescence panicle-like, broadly ovate, branches rigid, simple or compound; racemes 7–15, 20–100 mm long; rachis triquetrous; spikelets mostly paired, distant; pedicels of unequal lengths, the longer one up to 15 mm long. Spikelet 2.0–3.5 mm long, supported on a short stipe; lower glume $^1/_3$–$^1/_2$ as long as spikelet, separated from upper lemma by an internode, 5-nerved; upper lemma subacute to acute, finely rugose; anther 1.2–1.5 mm long.

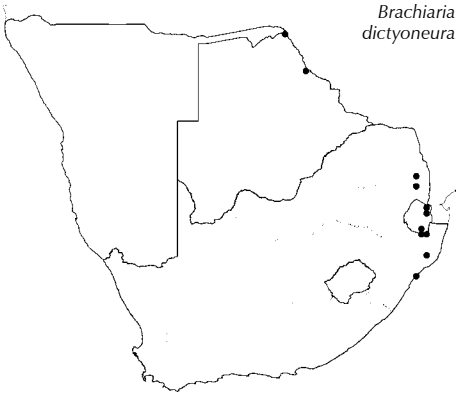
[Formerly placed in *Pseudobrachiaria*, but because of its similarity with *B. grossa*, which has a larger spikelet (3.0–4.2 mm long) and upper lemma coarsely rugose, and *B. chusqueoides*, which has a pseudopetiolate leaf blade, this species is retained in *Brachiaria* pending further research.]

*Flowering*: December to June. *Ecology*: Shady places in open woodland or forest margins, often ruderal in disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Northwards to Senegal and Yemen with a few records from India. N, B, S, NW, LIM, G, M, KZN. *Economics*: A palatable grass with an average leaf production; a very important pioneer grass in dry tropical parts; seeds are eaten by birds.

Illustration: Chippindall: 378, fig. 323 (1955).
Anatomy vouchers: *Ellis 1315, 1582, 1767, 1879, 4733, 4770* & *Smook 4247*.
Voucher: *Smook 1138*.

**Brachiaria dictyoneura** (Fig. & De Not.) Stapf, in *Flora tropical Africa* 9: 512 (1919). Type: Sudan, Kordofan, *Figari* (FI, holo.).

Alternate name: *Urochloa dictyoneura* (Fig. & De Not.) Veldkamp

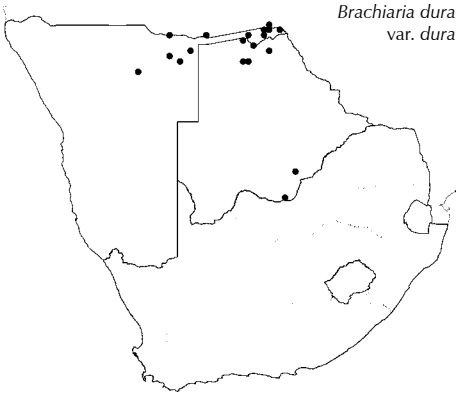

*Brachiaria dictyoneura*

Densely tufted perennial 300–1 200 mm high; without rhizomes or stolons; culm erect to geniculate, not rooting at nodes. Leaf blade 50–300 × 3–10(–30) mm; ligule a fringed membrane. Racemes 4–12, 10–80 mm long, secund; rachis 0.5 wide, triquetrous, margins setaceous, hairs 1.5–2.0 mm long; spikelets arranged in two rows; pedicels of equal lengths. Spikelet 5–7 mm long; lower glume more than $^2/_3$ as long as spikelet, separated from upper glume by a short internode, 7–9-nerved, usually glabrous; upper glume and lower lemma with cross-veins present between nerves; upper lemma subobtuse to distinctly apiculate, slightly papillose; anther 2.6–3.1 mm long.

[Closely related to *B. humidicola*, which is stoloniferous, has fewer racemes (1–4), and culms often decumbent and rooting at the nodes.]

*Flowering*: November to March. *Ecology*: Usually in bush or mixed mopane veld, along roadsides in damp ditches. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to tropical Africa and Ethiopia. N, B, S, LIM, M, KZN.

Anatomy vouchers: *Ellis 4430* & *Killick & Leistner 3330*.
Voucher: *Anderson 51*.


*Brachiaria dura* var. *dura*

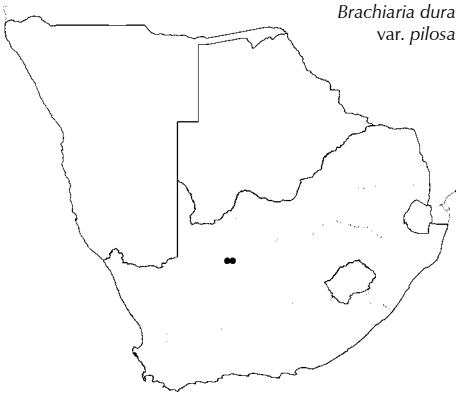
**Brachiaria dura** Stapf var. **dura**, in *Flora tropical Africa* 9: 531 (1919). Type: Angola. Benguella, *Gosseweiler 2665*.

Perennial 400–1 500 mm high; rhizome short, oblique. Leaf blade 100–350 × 1–3 mm, convolute and wiry; ligule a fringe of hairs. Racemes 1–2, 90–120 mm long, secund; rachis 1 mm wide, semiterete, flattened upwards, scabrid or with rigid hairs along angles, otherwise glabrous; spikelets in one or two rows; pedicels of equal lengths. Spikelet 4–5 mm long, glabrous or sparsely pilose; lower glume $^1/_2$ as long as spikelet, not separated from upper glume by an internode, 4-nerved; upper lemma obtuse or obscurely apiculate, glossy and smooth; anther 2.1–3.1 mm long.

[Distinguished from var. *pilosa* with the spikelet densely pilose.]

*Flowering*: December to May. *Ecology*: On dunes or sandy soil along dry rivers and floodplains; often in shade. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Guinea. N, B.

Anatomy vouchers: *Ellis 316, 341* & *3720*.
Voucher: *Maguire 2206*.


*Brachiaria dura* var. *pilosa*

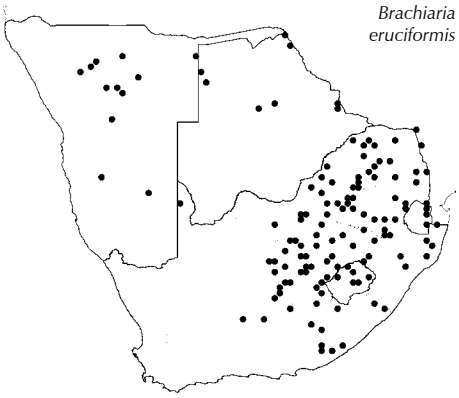
**Brachiaria dura** Stapf var. **pilosa** J.G.Anderson, in *Kirkia* 1: 104 (1961). Type: South Africa. Northern Cape, Hay district, Witsand, on foot of dunes, *Esterhuysen 2269* (PRE, holo.).

Perennial 500–1 300 mm high; rhizome usually deeply buried; basal sheath densely covered with white hairs. Leaf blade 100–350 × 1–3 mm, convolute, wiry; ligule a fringe of hairs. Inflorescence of 1–2(rarely 3) racemes; racemes 90–120 mm long, secund; rachis triquetrous, sometimes narrowly winged; spikelets in one or two rows; pedicels of equal lengths. Spikelet 4–5 mm long, densely pilose; lower glume $^1/_2$ as long as spikelet, not separated from upper glume by an internode, 3–6-nerved; upper lemma obtuse or obscurely apiculate, rough; anther 2.0–3.2 mm long.

[Distinguished from var. *dura*, which has the spikelet glabrous or sparsely pilose.]

*Flowering*: December to April. *Ecology*: On white sand dunes. *Frequency in southern Africa*: Rare. Locally common (Northern Cape, Witsand 2822CB & DA). *Distribution*: NC.

Anatomy vouchers: *Ellis 4332, 4333* & *4334*.
Voucher: *Leistner 1372*.


*Brachiaria eruciformis*

**Brachiaria eruciformis** (Sm.) Griseb., in Ledebour, *Flora Rossica* 4: 469 (1853). Type: Greece.

SWEET SIGNAL GRASS, LITJIESINJAALGRAS

Loosely tufted annual 100–500(–1 000) mm high; culm erect, decumbent, sometimes straggly or procumbent and rooting at the nodes. Leaf blade 20–150 × 2–6 mm; ligule a fringe of hairs. Inflo-

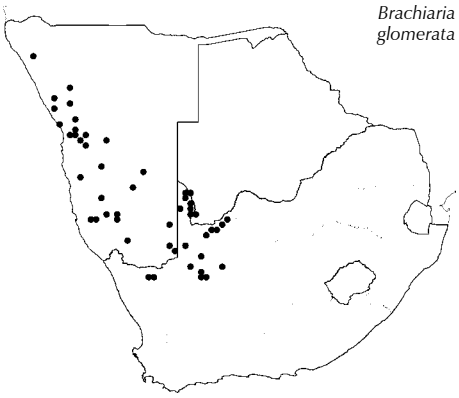
rescence of 10–25(–30) mm long racemes, secund; rachis less than 1 mm wide, solid, triquetrous or crescentic, sometimes narrowly winged; spikelets covering the whole length of the rachis and arranged in two rows; pedicels of equal lengths. Spikelet 1.7–2.7 mm long, sparsely hairy (rarely glabrous), hairs short (up to 0.5 mm long); lower glume up to $^1/_5$ as long as spikelet, not separated from upper glume by an internode, 1-nerved or nerveless; lower lemma acute or rounded; upper lemma readily deciduous, obtuse, smooth, shiny; palea rounded at apex; anther 0.9–1.1 mm long.

[Resembles *B. advena*, which has a longer spikelet (3.0–3.8 mm long), distinctly flattened on the one side and an inflorescence with a firm, stout central axis and rachis.]

*Flowering*: November to May. *Ecology*: On clay or black turf; in moist places and in disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Northwards to the Mediterranean and then eastwards to India, naturalised in North America. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, EC. *Economics*: Palatable, but seldom has a high leaf production; indicator of waterlogged soils; weed of gardens and/or cultivated lands.

Anatomy vouchers: *Ellis 769, 1102, 3338, 3863, 5270* & *Loxton & Ellis 971*.
Voucher: *Leistner 1243*.

**Brachiaria glomerata** (Hack.) A.Camus, in *Bulletin de la Société botanique de France* 77: 640 (1930). Type: Namibia, Cubub bei Aus, *Schinz 640*.


*Brachiaria glomerata*

Loosely tufted annual 100–300(–600) mm high; usually covered with soft, white, velvety hairs; culm sometimes decumbent, rooting at the lower nodes. Leaf blade 50–130 × 5–10(–18) mm; ligule not clearly developed. Racemes 20–30 mm long, not conspicuously secund, adpressed to the central axis; rachis triquetrous; spikelets densely clustered around the rachis; pedicels of equal lengths but inconspicuous. Spikelet 2–4 mm long; rachilla extension short and stalk-like at base of upper palea; lower glume ± $^1/_2$ as long as spikelet, not separated from upper glume by an internode, 1–2-nerved; upper lemma obtuse or subacute, glabrous, smooth, shiny; anther 1.9–2.5 mm long.

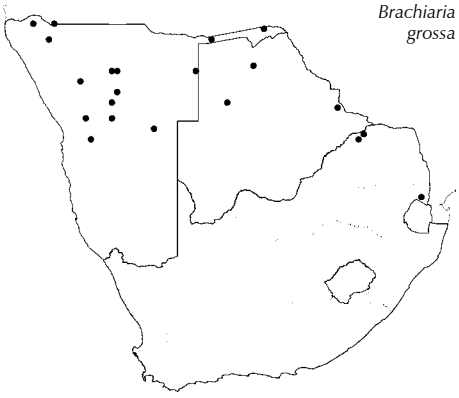
[Similar to *B. psammophila*, which is golden-hairy and lacks a rachilla extension. *Giess 13422* and a few other specimens might represent another taxon with larger, loosely arranged spikelets that combine the short velvety hairs and rachilla extension of *B. glomerata* with the robust habit of *B. psammophila*.]

*Flowering*: December to June. *Ecology*: On red sand dunes or sandy patches on granite outcrops, also in dry water courses. *Frequency in southern Africa*: Locally common. *Distribution*: ?Endemic. N, B, NC.

Illustration: Chippindall: 379, fig. 324 (1955).
Anatomy vouchers: *Botha & Panagos 23*; *Gibbs Russell & Smook 5507* & *Ellis 937, 3599, 3601, 4336, 4729, 4746, 4763*.
Voucher: *Jensen 249*.

**Brachiaria grossa** Stapf, in *Flora tropical Africa* 9: 547 (1919). Types: Angola, Benguella, *Gossweiler 1667* & several other syntypes.

Tufted annual 300–1 000(–1 500) mm high; only a few basal leaves present. Leaf blade 50–300 × 4–15(–20) mm, oblique and rounded at the base; ligule a fringed membrane. Inflorescence panicle-like,

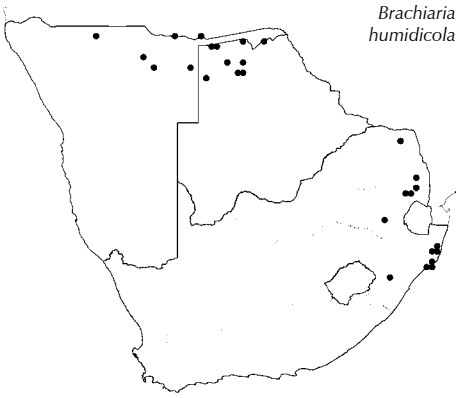

*Brachiaria grossa*

broadly ovate; racemes 5–12, 30–100 mm long, rigid; rachis narrow, stiff, triquetrous; spikelets paired, spaced, appearing loosely continuous; pedicels of unequal lengths. Spikelet 3.0–4.2 mm long, not supported on a stipe; lower glume $^1/_4$–$^1/_2$ as long as spikelet, separated from upper glume by a short internode, 3–4-nerved; upper lemma obtuse, coarsely rugose; anther 1.0–1.8 mm long.

[Similar to *B. chusqueoides*, which has cordate, pseudopetiolate leaves and grows in KwaZulu-Natal and to *B. deflexa*, a smaller plant with smaller spikelets (2.0–3.5 mm long).]

*Flowering*: January to April. *Ecology*: In sandy pockets of soil on granite outcrops or on rocky mountain slopes, also around pans or rivers, occasionally in the shade. *Frequency in southern Africa*: Infrequent and locally common. *Distribution*: North to Tanzania. N, B, LIM, M. *Economics*: Pasture, but seldom cultivated. Weed in lucerne.

Illustration: Clayton: 77, tab. 18 (1989).
Anatomy voucher: *Ellis 4724*.
Voucher: *Giess, Volk & Bleissner 5712*.


*Brachiaria humidicola*

**Brachiaria humidicola** (Rendle) Schweick., in *Kew Bulletin* 1936: 297 (1936). Type: Angola, Monino R., *Welwitsch 2678*.

Alternate name: *Urochloa humidicola* (Rendle) Morrone & Zuloaga

Creeping signal grass, kruipsinjaalgras

Perennial 400–1 100 mm high, stoloniferous; culm geniculate, often decumbent, usually rooting at nodes. Leaf blade 40–250 × 3–16 mm; ligule a fringed membrane. Inflorescence with racemes 1–4, 25–55 mm long, widely spaced, secund; rachis triquetrous, sometimes narrowly winged; spikelets in one to two rows; pedicels of equal lengths. Spikelet 4.5–6.0 mm long; lower glume more than $^2/_3$ as long as spikelet, separated from upper glume by a short internode (careful dissection may be needed), 7-nerved, usually glabrous; upper glume and lower lemma with cross-veins between nerves; upper lemma subobtuse to indistinctly apiculate, slightly papillose; anther 2.1–3.3 mm long.

[Similar to *B. dictyoneura*, which has more racemes (4–12) , is densely tufted without stolons, culm erect to geniculate and not rooting at nodes.]

*Flowering*: December to May. *Ecology*: Usually on sandy soils and wet areas; vlei edges or seasonally swampy grassland but also extends into woodlands. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Northward to tropical Africa, Sudan and Ethiopia. N, B, LIM, M, KZN. *Economics*: Erosion control on roadsides.

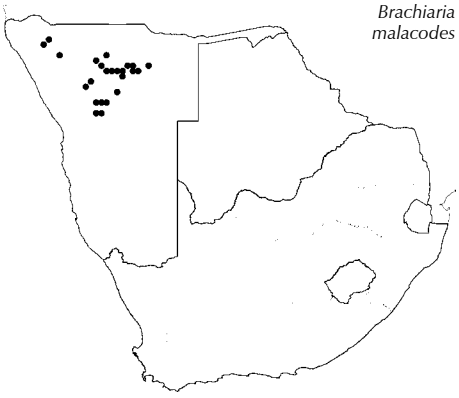
Illustration: Chippindall: 373, fig. 319 (1955).
Anatomy vouchers: *Ellis 3378* & *3693*.
Voucher: *Smith 2636*.

**Brachiaria malacodes** (Mez & K.Schum.) H.Scholz, in *Willdenowia* 8: 384 (1978). Type: Angola, Huila, *Antunes 202*.

*B. poaeoides* Stapf, in *Flora tropical Africa* 9: 554 (1919). Type: Angola. Mossamedes, *Pearson 2849, 2446*; *Newton 7, 3*; Namibia. *Een* (syntypes).

Very loosely tufted annual 200–850 mm high; leaves few; culm erect but often decumbent and rooting at the nodes. Leaf blade 50–180 ×

4–11 mm; ligule a fringe of hairs. Inflorescence panicle-like, compound, primary branching at least in the lower part, branches filiform, lax and bare for about half their length, branches with racemes 5–25 mm long, secund; rachis less than 1 mm wide, solid, triquetrous or crescentic, sometimes narrowly winged; spikelets arranged in two rows, covering whole length of the rachis; pedicels of equal lengths. Spikelet 2.0–3.7 mm long, sparsely hairy, hairs short (up to 0.5 mm long), bearded at apex; lower glume $^1/_4$ as long as spikelet, not separated from upper glume by an internode, 1-nerved or nerveless; lower lemma acute or rounded; upper lemma oblong to elliptic-oblong; thinly crustaceous, smooth, shiny; anther 0.8–1.7 mm long.

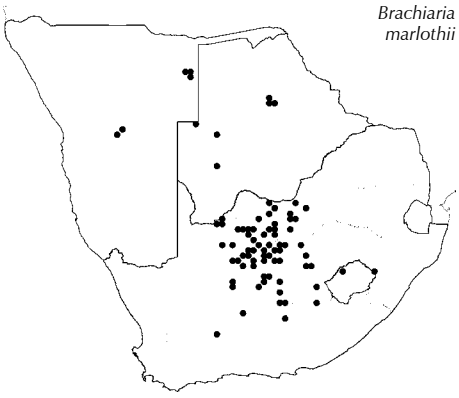

*Brachiaria malacodes*

[Resembles *B. schoenfelderi*, which is very densely hairy with long hairs and *B. advena* and *B. eruciformis*, which have unbranched panicle-like inflorescences.]

*Flowering*: February to May. *Ecology*: On sand or black clay; in vleis, often in seasonally wet depressions; in forests or open mopane woodland. *Frequency in southern Africa*: Locally common. *Distribution*: Angola. N. *Economics*: Valuable pasture in Namibia.

Illustration: Chippindall: 377, fig. 322 (1955).
Anatomy vouchers: *le Roux 846; Smook 5086, 5208* & *5113*.
Voucher: *Smook 5086*.

**Brachiaria marlothii** (Hack.) Stent, in *Bothalia* 1: 263 (1924). Type: South Africa, North West, on stony plains near Maneering, *Marloth 1147* (ex *Hackel*).


*Brachiaria marlothii*

Tufted, usually annual 70–500 mm high; mat-forming, stoloniferous; culm decumbent and rooting from the lower nodes. Leaf blade 10–140 × 1–5 mm; ligule a fringe of hairs. Racemes 25–50 mm long, secund; rachis triquetrous; spikelets arranged in four rows; pedicels of equal lengths. Spikelet 2.0–2.5 mm long, sparsely hairy on the nerves, upper glume and lower lemma with very distinct tufts of erect, stiff hairs in the upper $^1/_2$ on either side below the apex; lower glume about $^1/_2$ as long as spikelet, not separated from upper glume by an internode, 1-nerved or nerveless; upper lemma white, finely rugulose, apex a blunt point, slightly hooded; anther 0.9–2.2 mm long.

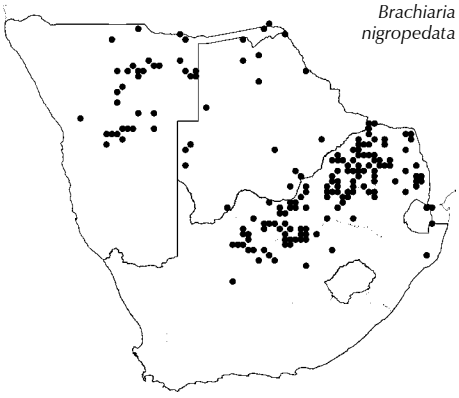
*Flowering*: December to May. *Ecology*: On shallow sand or loam; near dams or in seasonally moist spots, most frequent in disturbed or heavily grazed areas. *Frequency in southern Africa*: Common. *Distribution*: Endemic. N, B, L, NW, FS, KZN, NC, EC. *Economics*: A palatable fodder for sheep but with an average to low leaf production. Weed, nuisance in lawns and gardens.

Anatomy vouchers: *Ellis 3579, 3586, 3592* & *3607*.
Voucher: *Smook 2882*.

**Brachiaria nigropedata** (Ficalho & Hiern) Stapf, in *Flora tropical Africa* 9: 535 (1919). Type: South Africa, North West, Chue Spring, *Burchell 2391*; Northern Cape, Kosi Fontein, *Burchell 2577*; Knegts Fontein to Klip Fontein, *Burchell 2610* (syntypes).

SPOTTED SIGNAL GRASS, WURMSINJAALGRAS

Densely tufted perennial 300–1 200 mm high; rhizome long, creeping. Leaf blade to 300 × 5–9 mm; ligule a fringe of hairs. Racemes 15–30(–40) mm long, secund; rachis triquetrous, sometimes very narrowly winged, less than 1 mm wide, villous; spikelets in two

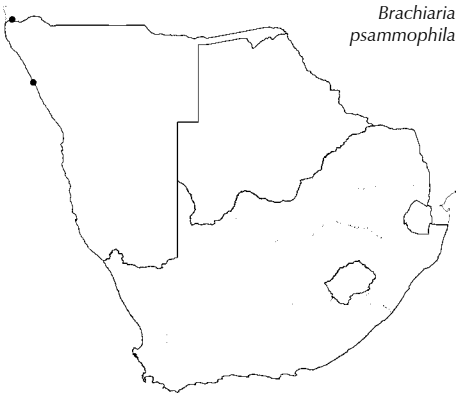

*Brachiaria nigropedata*

rows; pedicels of equal lengths. Spikelet 3–4 mm long, supported on a dark coloured stipe; lower glume $^1/_3$–$^1/_2$(–$^2/_3$) as long as spikelet, often long-acuminate but very variable in the same inflorescence, distinctly darkly coloured at the base, 3–5-nerved; upper glume and lower lemma acuminate; upper lemma acute to mucronulate, obscurely rugulose; anther 1.0–2.3 mm long.

[Close to *B. serrata* which has a spikelet not supported by a stipe. Fairly easily distinguished from other *Brachiaria* species by the tightly clasping lower glume that is dark coloured below and often long-acuminate.]

*Flowering*: November to April. *Ecology*: Usually on sandy or well-drained soils; open veld or bush on rocky slopes or among rocks. *Frequency in southern Africa*: Common, usually scattered but sometimes forming dense stands. *Distribution*: Southern tropical Africa with interrupted northern extensions. N, B, S, LIM, NW, G, M, FS, KZN, NC. *Economics*: Palatable climax grass with high leaf production well utilised by grazers; a pasture with good forage value; an indicator of good veld condition.

Illustration: Chippindall: 374, fig. 320 (1955); Clayton: 72, tab. 17 (1989).
Anatomy vouchers: *Ellis 834, 1229, 1766, 2027.*
Voucher: *Smook 4871, Story 6127.*


*Brachiaria psammophila*

**Brachiaria psammophila** (Welw. ex Rendle) Launert, in *Mitteilungen der Botanischen Staatssammlung München* 8: 149 (1970). Type: Angola, Mossamedes, 8.1859, *Welwitsch 2626* (BM).

Tufted annual 250–400 mm high; usually covered with very dense, long golden-yellow hairs; a few basal leaves present; culm erect or decumbent. Leaf blade 40–130 × 7–13 mm; ligule not clearly developed. Racemes 10–30 mm long, not conspicuously secund, mostly adpressed to the central axis; rachis triquetrous, solid; spikelets clustered; pedicels of equal lengths. Spikelet 3.0–4.5 mm long, hairy, lacking a conspicuous rachilla extension; lower glume $^1/_2$–$^2/_3$ as long as spikelet, not separated from upper glume by an internode, 3(–5)-nerved; upper lemma hairy on margins, apiculate, smooth; anther 2.2–3.1 mm long.

[Similar to *B. glomerata*, which is covered with short velvety hairs and the spikelet has a conspicuous rachilla extension.]

*Flowering*: November, March and April. *Ecology*: On sand dunes or in dry river beds. *Frequency in southern Africa*: Rare and conservation status not known. *Distribution*: Angola. N.

Anatomy voucher: *Giess 3925* (epidermis only).
Voucher: *Merxmueller & Giess 30661.*

**Brachiaria schoenfelderi** C.E.Hubb. & Schweick., in *Kew Bulletin of Miscellaneous Information* 1936: 323 (1936). Type: Namibia, Grootfontein, on red soil near Gross Huis, March 1931, *Schoenfelder S. 584* (PRE, iso).

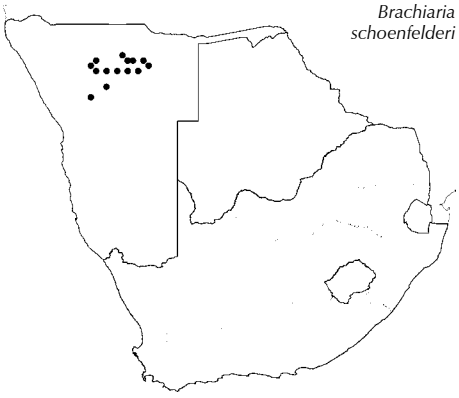
Tufted annual or perennial 300–800 mm high; occasionally stoloniferous; culm branching at the base, often decumbent and rooting at nodes. Leaf blade 30–120(–150) × 3–8 mm; ligule a fringe of hairs. Inflorescence delicate and lax; racemes 10–35 mm long, secund, often incurved, lower racemes often bare in the lower part; rachis

less than 1 mm wide, solid, triquetrous or crescentic, sometimes narrowly winged; spikelets arranged in two rows, covering the whole length of the rachis; pedicels of equal lengths. Spikelet 2.0–3.4 mm long, very densely hairy, with long hairs (1.0–1.5 mm long); lower glume $^1/_3$ as long as spikelet, not separated from upper glume by an internode, 1–2-nerved; lower lemma acute or rounded; upper lemma oblong, rotund-obtuse, pallid, smooth; anther 0.7–1.2 mm long.

[Distinguished from *B. malacodes*, *B. advena* and *B. eruciformis* by its very densely hairy spikelets.]

*Flowering*: February to May. *Ecology*: In gravelly and black vlei soil; in depressions; in mopane veld or bushveld. *Frequency in southern Africa*: Locally common but plants usually scattered amongst other grasses. *Distribution*: ?Endemic. N. *Economics*: Palatable.

Anatomy vouchers: *Smook 5107* & *5119*.
Voucher: *Smook 5119*.

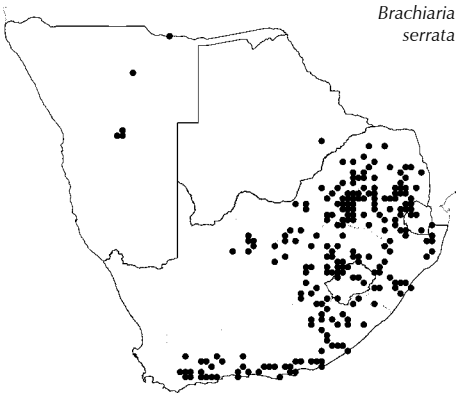

*Brachiaria schoenfelderi*

**Brachiaria serrata** (Thunb.) Stapf, in *Flora tropical Africa* 9: 537 (1919). Type: South Africa, *Thunberg* (UPS, holo.).

*B. serrata* (Thunb.) Stapf var. *gossypina* (A.Rich.) Stapf, in *Flora tropical Africa* 9: 538 (1919). Type: Ethiopia, *Schimper 174* & *1196* (syntypes).

Red top grass, velvet signal, rooisinjaalgras

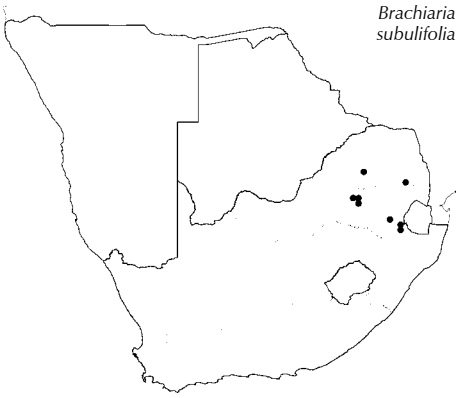
Densely or loosely tufted perennial 300–750 mm high; rhizomatous; vegetative parts very variable; basal sheath silky hairy; leaves either a dense basal tuft or cauline, base bare; culm single or profusely branched. Leaf blade 50–250 × 2–10 mm, margins ± cartilaginous, white and usually crinkled; ligule a fringe of hairs. Racemes 10–25 mm long, secund; rachis less than 1 mm wide, solid, triquetrous or crescentic, sometimes narrowly winged; spikelets covering whole length of the rachis, arranged in two rows; pedicels of equal lengths. Spikelet 2.3–4.5 mm long, stipe absent, with dense, long, silky, white, pink to red or purple hairs concentrated at the apex; lower glume $^1/_2$ as long as spikelet, not separated from upper lemma by an internode, 3-nerved; lower lemma acute or rounded, with a short stout mucro or awn up to 1.5 mm long and lower palea similar; upper lemma ovate, striate, acute, rugulose; anther 1.0–2.5 mm long.


*Brachiaria serrata*

[Similar to *B. nigropedata*, which has a spikelet supported on a dark coloured stipe. The mucronate lower lemma and palea, crinkled leaf margins and concentration of hairs on the spikelet apex distinguish this species from *B. arrecta*, *B. dura* and *B. xantholeuca*, which all have a 1-nerved lower glume and spikelets arranged in two rows. Although the var. *gossypina*, which has a distinctly different habit and leaves, was previously recognised, and specimens from the north-western part of the range tend to have smaller spikelets than those from the south, the change is very gradual and does not warrant taxonomic recognition unless future studies prove otherwise.]

*Flowering*: October to May. *Ecology*: On shallow sandy soil; usually in rocky areas or on mountain slopes but extending into open bush, grassland and occasionally to vlei edges. *Frequency in southern Africa*: Common. *Distribution*: Northwards into tropical Africa. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Reasonably palatable but with relatively low leaf production and therefore average forage value; may indicate good veld conditions in stony places.

Illustration: Chippindall: pl. 12(II) (1955).
Anatomy vouchers: *Smook 3745*; *Loxton & Ellis 972, 975*; *Ellis 8, 260, 368* & *635*.
Voucher: *Smook 4849*.


*Brachiaria subulifolia*

**Brachiaria subulifolia** (Mez) Clayton, in *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie, Engler* 34: 135 (1904). Type: South Africa, *Wahlenberg* (S, holo.).

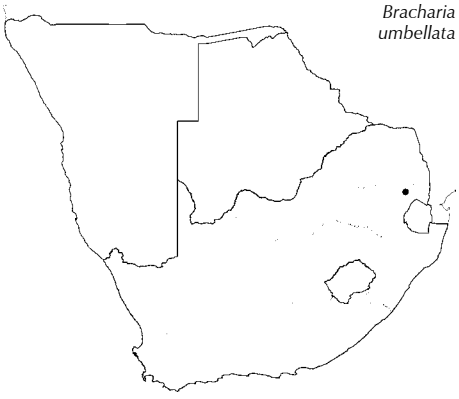
*B. filifolia* Stapf, in *Flora tropical Africa* 9: 516 (1919).

Tufted, erect perennial 200–1 000 mm high; rhizome oblique. Leaf blade 50–200 × 0.7–1.0 mm, filiform, usually up to $^1/_2$ as long as the culm, glabrous, rarely hairy; ligule an unfringed membrane. Racemes 10–30 mm long, secund; rachis triquetrous, margins usually sparsely hairy with white or yellow hairs; spikelets arranged in two rows; pedicels of equal lengths. Spikelet 2.8–4.0 mm long; lower glume $^2/_3$ as long as spikelet, not separated from upper glume by an internode, 7-nerved; upper glume and lower lemma lateral nerves near the margins are connected by cross-veins; upper lemma subacute, slightly rough; anther 1.2–1.9 mm long.

[Very similar to *B. bovonei*, which has a flat or convolute, hairy leaf blade mostly much less than $^1/_2$ as long as the culm.]

*Flowering*: September to November. *Ecology*: Frequently in damp or seepage areas on sandy soils. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to East Africa. LIM, G, M.

Illustration: Clayton: 67, tab. 16 (1989).
Anatomy vouchers: *Ellis 1521*, *3499*, *3531*, *3535* & *4317*.
Voucher: *De Winter & Codd 164*.

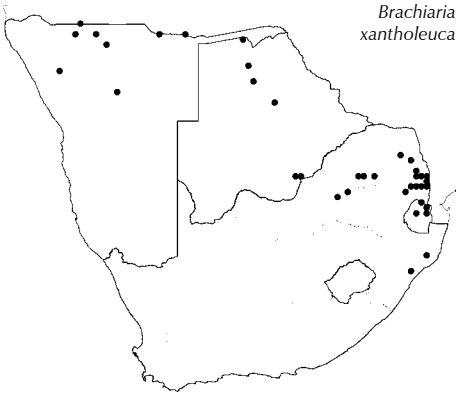

*Bracharia umbellata*

***Bracharia umbellata** (Trin.) Clayton, in *Kew Bulletin* 34: 559 (1980). Type: Mauritius, *Sieber 34*.

Sward-forming perennial ± 100 mm long; culm procumbent. Leaf blade 10–30 × 2–6 mm, narrowly lanceolate. Racemes 5–30 mm long, not secund; rachis slender, triquetrous and hairy; spikelets solitary, not arranged in rows; pedicels of unequal lengths, ± as long as spikelet. Spikelet 1.5–2.0 mm long, glabrous; lower glume $^1/_8$–$^1/_4$ as long as spikelet, not separated from upper glume by an internode, unobtrusively nerved; upper lemma acute, papillose; anther 1.0 mm long.

*Flowering*: May (collected in May 2006 in Lowveld National Botanical Garden, Nelspruit). *Ecology*: Grows in a disturbed area. *Distribution*: Tanzania, Madagascar and Indian Ocean Islands. Introduced as a lawn grass to several localities in southern Africa, Zimbabwe, Malawi, and Mozambique. M. (not yet identified as invading natural veld or naturalised). *Economics*: Planted as a lawn grass and groundcover plant in tea gardens, but also occurs as an escape in forest clearings. Weed.

Voucher: *Smook 11950*.


*Brachiaria xantholeuca*

**Brachiaria xantholeuca** (Schinz) Stapf, in *Flora tropical Africa* 9: 541 (1919). Type: Namibia, Olukonda, *Schinz 639*.

Tufted annual 200–600 mm high; culm decumbent, branching or rooting at lower nodes. Leaf blade 30–150 × 4–10 mm, broadly linear to narrowly lanceolate, velvety pubescent; ligule a fringe of hairs. Racemes 20–70 mm long, secund; rachis triquetrous; spikelets soli-

tary, arranged neatly in one to two rows; pedicels of equal lengths. Spikelet 2.7–4.0 mm long, usually hairy; lower glume $^1/_2$ as long as spikelet, not separated from upper glume by an internode, 3-nerved; upper lemma subacute, rugulose; anther 0.8–1.5 mm long.

*Flowering*: November to March. *Ecology*: In sandy loam or clayey soils; amongst trees, usually near water, often in overgrazed and disturbed places. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical Africa. N, B, S, LIM, NW, G, M, KZN. *Economics*: Weed in some areas.

Anatomy vouchers: *Ellis 111* & *513*.
Voucher: *Smook 4778*.

## **Brachyachne** (Benth.) Stapf

Stapf: 20 (1917); Stapf: t. 3099 (1922); Renvoize: 311 (1974); Chippindall & Crook: part 237 (1976); Clayton & Renvoize: 243 (1986); Gibbs Russell et al.: 68 (1990); Watson & Dallwitz: 181 (1994); Cope: 238 (1999).



Figure 74.—*Brachyachne patentiflora* spikelet (3.0–4.4 mm). Photographer: M. Koekemoer.

Perennial, tufted. **Leaf blade** linear, flat or rolled and filiform; *ligule* a fringed membrane to a fringe of hairs. **Inflorescence** a single, terminal, 1-sided spike-like raceme, (rarely paired and digitate); *spikelets* solitary, subsessile, adpressed to axis. **Spikelet** often light golden brown, strongly laterally compressed, usually disarticulating above glumes, obtuse; *glumes* ± equal, longer than and enclosing spikelet, broad, dissimilar, keeled, 1-nerved, awnless. **Floret** 1, bisexual, rachilla extension occasionally with a reduced lemma; *lemma* less firm to similar in texture to glumes, membranous to hyaline, hairy, 3-nerved, obtuse to truncate, awnless, rarely with a short mucro; *callus* hairy; *palea* ciliate along nerves. **Lodicules** 2, fleshy, glabrous. **Stamens** 3. **Ovary** glabrous. **Caryopsis** ovoid, small, ellipsoid; hilum short; pericarp fused; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines uneven, or even. PCR cell chloroplasts centrifugal/ peripheral, or centripetal.

**Species** ± 10, Africa, Java to Australia; 1 in southern Africa: *Brachyachne patentiflora* (Stent & Rattray) C.E.Hubb., Botswana.

Species treatment by A.C. Mashau.

**Quick guide to easily confused taxa:**

Glumes strongly keeled . . . . . **Microchloa caffra**
Glumes not strongly keeled . . . . . **Brachyachne patentiflora**

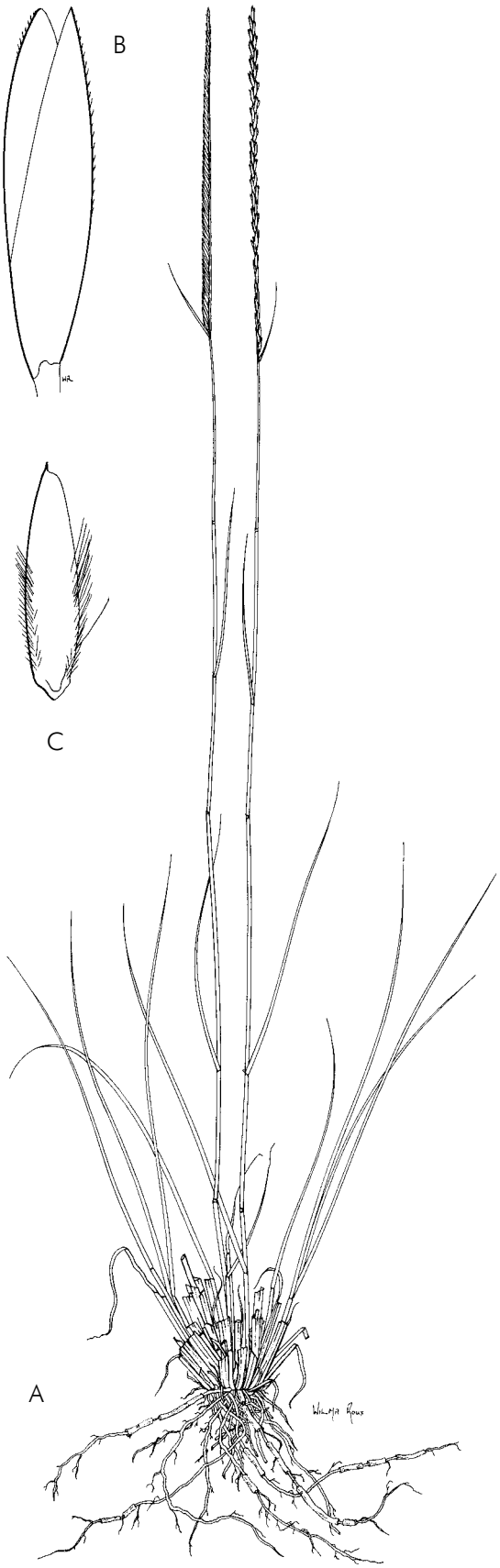
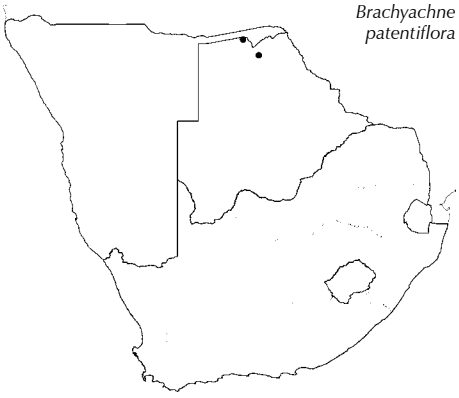



Figure 75.—*Brachyachne patentiflora*. A, plant; B, spikelet (3.0 × 0.6 mm); C, floret showing rachilla extension (1.9 × 0.5 mm). Artist: W. Roux.




**Brachyachne patentiflora** (Stent & J.M.Rattray) C.E.Hubb., in *Kew Bulletin* 1933: 503 (1933). Type: Zimbabwe, Harare, *Eyles 1955* (SRGH, holo.).

Tufted perennial 100–500 mm high; lower leaf bases persistent and breaking into fibres. Leaf blade 30–120 × 1 mm; ligule a fringe of hairs. Inflorescence a slender, solitary, erect spike-like raceme, sometimes paired. Spikelet 2.0–4.4 mm long, light-coloured, laterally compressed; glumes not strongly keeled; lower glume asymmetrical in shape; lemma obtuse to truncate, sometimes mucronate; anther 1.0–1.8 mm long.

*Flowering*: December to January. *Ecology*: Seasonal swamps on waterlogged clayey soil and moist crevices on rocky outcrops. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to East Africa and DRC. B.

Voucher: *Smith 4081.*

## **Brachychloa** S.M.Phillips

Phillips: 158 (1982); Clayton & Renvoize: 214 (1986); Gibbs Russell et al.: 69 (1990); Watson & Dallwitz: 182 (1994); Cope: 47 (1999).

*Heterocarpha* Stapf & C.E.Hubb.: 263 (1929) in part; Schweickerdt: 193 (1961).

Perennial or annual, tufted or decumbent, stoloniferous. **Leaf blade** linear to almost lanceolate, rigid; *ligule* a short, truncate, fringed membrane. **Inflorescence** of racemes on a central axis; racemes long and deciduous or short, persistent and crowded into a loose head or spreading; *spikelets* solitary, pedicelled. **Spikelet** laterally compressed, lanceolate-oblong to ovate-oblong, disarticulating above glumes and between florets; *glumes* ± equal, shorter than spikelet, lateral to rachis, lanceolate, keeled, glabrous to minutely scaberulous; lower glume subcoriaceous, acute, awnless, sometimes mucronate, 1–3-nerved; upper glume coriaceous with margins membranous, 3–7-nerved, acuminate to shortly mucronate from between lobes. **Florets** 3–*7*, bisexual or *uppermost floret* reduced and sterile; *lemma* similar in texture to glumes, chartaceous,



Figure 76.—*Brachychloa schiemanniana*. Artist: W. Roux.




Figure 77.—A, *Brachychloa schiemanniana* spikelet; B, *B. fragilis* spikelet. Artist: W. Roux.



Figure 78.—*Brachychloa schiemanniana* spikelet (4–7 mm). Photographer: M. Koekemoer.

subobtuse to obtuse, lightly keeled with a single median keel, glabrous or hairy on margins, 3–7-nerved, nerves faint in upper half, 2-lobed, shortly mucronate; *callus* 0; *palea* shorter than lemma, slightly gibbous at base, lanceolate to ovate-lanceolate, 2-keeled. **Lodicules** 2, hyaline, minute. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose. **Caryopsis** ellipsoid or trigonous, with free pericarp; hilum short. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines uneven and even. PCR sheath extensions present. Maximum number of extension cells 1. PCR cell chloroplasts centripetal.

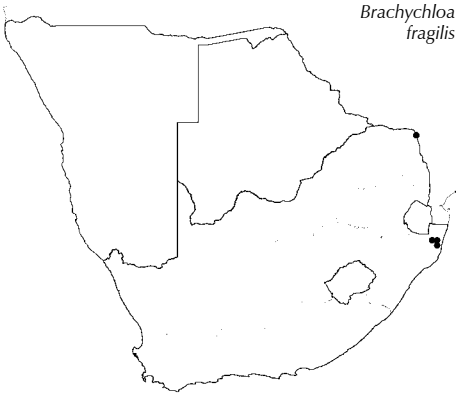
**Species** 2, both in Mozambique and southern Africa, Limpopo, KwaZulu-Natal.

Species treatment by A.C. Mashau.

**Key to species:**

Lemma 3-nerved (nerves close to keel), lower margins pubescent; annual; inflorescence with long, deciduous racemes . . . **B. fragilis**
Lemma 5–7-nerved, margins glabrous; perennial; inflorescence with short, persistent racemes, often in a loose head . . . . . **B. schiemanniana**

**Brachychloa fragilis** S.M.Phillips, in *Kew Bulletin* 37: 159 (1982). Type: South Africa, KwaZulu-Natal, Ulukondo, *Pooley 1650* (K, holo.).


*Brachychloa fragilis*

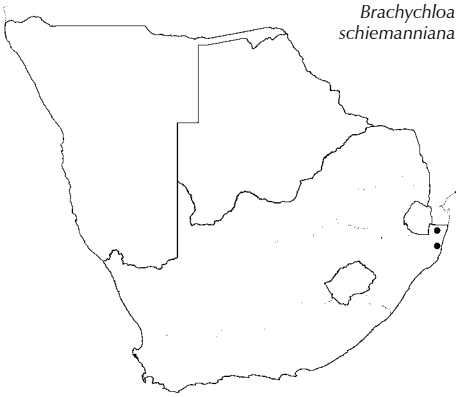
Tufted annual 250–500 mm high; culm decumbent and rooting from nodes. Leaf blade 50–100 × 2–6 mm, linear-lanceolate, flat. Inflorescence of 6–10 distant and ± horizontally spreading racemes, each raceme longer than 30 mm, deciduous. Spikelet 4–5 mm long; lower glume 1-nerved; upper glume 3–5-nerved; lemma 3-nerved, pubescent on lower part of margins; anther 0.1–0.3 mm long.

*Flowering*: January to April. *Ecology*: Sandy soil; on coastal dunes. *Frequency in southern Africa*: Rare. *Distribution*: Mozambique (Maputo). LIM, KZN.

Anatomy vouchers: *Ellis 3559, 3634 & 6123*.
Voucher: *P. Burgoyne & J. Gumbi 6979*.

**Brachychloa schiemanniana** (Schweick.) S.M.Phillips, in *Kew Bulletin* 37: 159 (1982). Type: Mozambique, between Maputo (Lourenco Marques) and Costa do Sol, 2. iv. 1948, *Schweickerdt 1900* (PRE, holo.).

*Heterocarpha schiemanniana* Schweick., in *Züchter* 31: 193 (1961).


*Brachychloa schiemanniana*

Perennial 150–300 mm high; stolons present. Leaf blade 40–80 × 5–8 mm, narrowly lanceolate, flat. Inflorescence of 10–15 short, erect or ascending racemes, raceme 15–40 mm long, persistent. Spikelet 4–7 mm long, 6–8(–10)-flowered; lower glume (1)3-nerved; upper glume 5–7-nerved; lemma 5–7-nerved, margins glabrous, floret appears gibbous due to palea which sticks out; anther 0.3–0.5 mm long.

*Flowering*: February to May. *Ecology*: Sandy soil; dunes and forest margins. *Frequency in southern Africa*: Rare. *Distribution*: Mozambique. KZN.

Illustration: Cope: 48, tab. 22 (1999).
Anatomy vouchers: *Ellis 3641 & 3642*.
Voucher: *Schweickerdt 1908*.




Figure 79.—*Brachypodium flexum*. A, florets (glumes removed); B, plant. Artists: A, W. Roux; B, C.D. Bartman.

## **Brachypodium** P.Beauv.

Palisot de Beauvois: 100, 155 (1812); Stapf: 735 (1900); Hitchcock & Chase: 57 (1950); Chippindall: 68 (1955); Clayton: 71 (1970); Launert: 62 (1971); Clayton: 371 (1972); Smith: 189 (1980); Clayton & Renvoize: 149 (1986); Gibbs Russell et al.: 70 (1990); Watson & Dallwitz: 184 (1994).



Figure 80.—*Brachypodium flexum* spikelet (12–44 mm). Photographer: M. Koekemoer.

Perennial or annual, tufted or decumbent, sometimes wiry; often rhizomatous or rooting at nodes. **Leaf blade** linear, expanded or rolled; *ligule* an unfringed or fringed membrane. **Inflorescence** a raceme or sometimes reduced to 1–3 spikelets; spike-like or racemes scattered up central axis; *spikelets* solitary, pedicellate, alternating in 2 rows on opposite sides of tough rachis. **Spikelet** slightly laterally compressed, disarticulating above glumes and between florets; *glumes* unequal to ± equal, shorter than spikelet, similar, rounded on back, obtuse to shortly awned or awnless, membranous; lower glume 5–7-nerved; upper glume 7–9-nerved. **Florets** 5–22, bisexual or *uppermost floret* sometimes reduced and sterile, densely imbricate at first; *lemma* similar in texture to glumes, rounded on back, glabrous, 7–9-nerved, entire, awned; *awn* straight, slender; *callus* short, obtuse, glabrous; *palea* slightly shorter than lemma, 2-keeled, pectinate-ciliate along keels. **Lodicules** 2, lanceolate, apex usually truncate. **Stamens** 3. **Ovary** hairy with villous appendage at apex; styles laterally inserted on appendage. **Hilum** long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 5, 7, 9, 10$ (aneuploids, high polyploidy).

**Species** 16, temperate Eurasian, tropical mountains, Mexico to Bolivia; 3 in southern Africa, Swaziland, Lesotho, Limpopo, Gauteng, Mpumalanga, Free State, KwaZulu-Natal, southern Northern Cape, Western and Eastern Cape.

Species treatment by M.T. Nembudani.

**Key to species:**

1. Lemma awn 10–25 mm long; annual . . . . . *__B. distachyon__
   Lemma awn 4–8 mm long; perennial . . . . . 2
2. Culms erect; inflorescence straight, with 1–4 spikelets crowded near the apex; leaves mainly basal, lanceolate, erect, rigid; a mountain grassland species . . . . . **B. bolusii**
   Culms straggling; inflorescence usually flexuous, with (3–)5–9 spikelets along the rachis; leaves mostly cauline, linear, soft, spreading; a forest species that occasionally extends to thickets and bushland . . . . . **B. flexum**

**Brachypodium bolusii** Stapf, in *Flora capensis* 7: 737 (1900). Type: South Africa, Eastern Cape, Compass Berg, *Bolus 1986*.

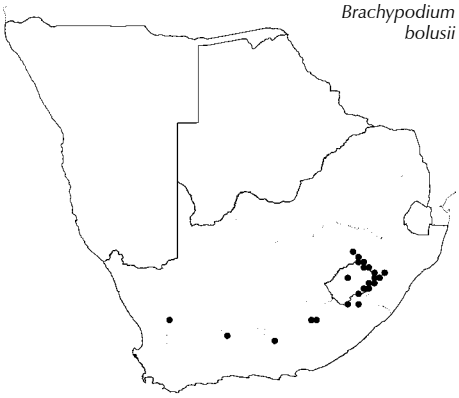
Densely tufted perennial 150–450(–700) mm high; leaves basal. Leaf blade 20–70(–170) × 8 mm, lanceolate, erect, rigid, rough. Inflores-

cence to 55 mm long, straight; 1–4 spikelets crowded near apex. Spikelet to 30 × 2–8 mm; lemma awn 4–8 mm long; anther 2.5–3.0 mm long.

[Very similar to *B. flexum*, which usually has straggling culms, cauline leaves, flexuous racemes with (3–)5–9 spikelets. Intermediates between these two species are common and very difficult to place.]

*Flowering*: November to March. *Ecology*: In mountain grassland. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. L, FS, KZN, NC, WC, EC.

Illustration: Chippindall: 67, fig. 40 (1955).
Anatomy vouchers: *Ellis 232, 239, 1413* & *2385*.
Voucher: *Edwards 646*.

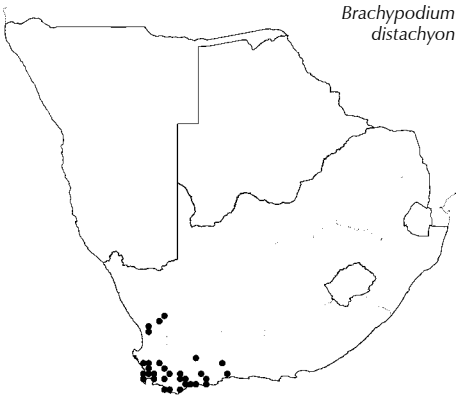

*Brachypodium bolusii*

*__Brachypodium distachyon__ (L.) P.Beauv., in *Essai d'une nouvelle agrostographie*: 101, 155 (1812). Type: Europe.

Slender to fairly robust, tufted annual 100–500(–700) mm high; leaves mostly cauline; culms often decumbent and branching near base. Leaf blade 20–90 × 5 mm, rigid or soft, rough, young leaves erect, old leaves curly. Inflorescence (10–)30–90(–100) mm long, with 2–6 spikelets. Spikelet 10–35(–40) × 1.5–6.0 mm; lemma awn 10–25 mm long; anther 0.8–2.7 mm long.

*Flowering*: Sporadic throughout the year, but mainly September to January. *Ecology*: Weed in disturbed places such as gardens, excavations, roadsides and waste places, occasionally in indigenous vegetation. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from Europe and the Mediterranean. WC, NC. *Economics*: Invasive weed.

Anatomy vouchers: *Ellis 678, 1255* & *5415*.
Voucher: *Smook 3711*.


*Brachypodium distachyon*

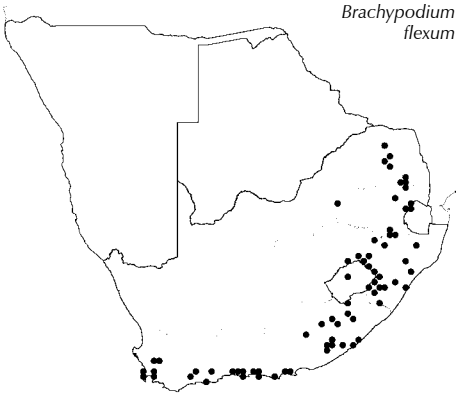
**Brachypodium flexum** Nees, in *Florae Africanae australioris illustrationes monographicae* 1: 456 (1841). Types: South Africa, several syntypes.

Perennial 300–900 mm high; leaves mainly cauline; culms straggling, slender, wiry, sometimes decumbent and rooting at lower nodes. Leaf blade 50–170 × 2–8 mm, linear, rough. Racemes 60–120 mm long, usually flexuous, (3–)5–9 spikelets spreading along the rachis. Spikelet 12–44 × 1.5–4.0 mm; lemma awn 4–8 mm long; anther 2.0–2.5 mm long.

[Very similar to *B. bolusii*, which has leaves basal, erect culms, straight racemes with 1–4 spikelets.]

*Flowering*: October to April. *Ecology*: In moist shady places of forests, usually near streams, occasionally in thickets and bushland. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe to Malawi. S, L, LIM, ?G, M, FS, KZN, WC, EC.

Illustration: Chippindall fig. 39 (1955); Clayton fig. 24 (1970).
Anatomy vouchers: *Ellis 390, 473, 1568, 1870* & *1876*.
Voucher: *Davidse 6787*.


*Brachypodium flexum*

## *Briza L.

Linnaeus: 70 (1753); Stapf: 707 (1900); Hitchcock & Chase: 137 (1950); Chippindall: 47 (1955); Launert: 45 (1971); Matthei: 79 (1975); Hubbard: 51 (1970); Chippindall & Crook: 202 (1976); Tutin: 173 (1980); Clayton & Renvoize: 99 (1986); Gibbs Russell et al.: 72 (1990); Watson & Dallwitz: 185 (1994); Snow: 613 (2007).

Annual or perennial, tufted. **Leaf blade** linear to linear-lanceolate, expanded; *ligule* an unfringed membrane. **Inflorescence** a panicle, open to loosely contracted; *spikelets* solitary, pedicelled. **Spikelet** laterally compressed or globose, ovate to rotund, disarticulating above glumes and between florets; *glumes* ± equal, shorter than spikelet, similar, 3–9-nerved, awnless. **Florets** many, bisexual, closely imbricate; *upper floret* sometimes reduced, *lemma* similar in texture to glume, papery with broad scarious margins all round, often as broad as long, gibbous, cordate at base, not keeled, horizontally spreading, 7–9-nerved, obtuse to acuminate, 2-lobed, awnless or mucronate; *callus* short, glabrous; *palea* shorter than lemma, membranous, 2-keeled, keels often narrowly winged. **Lodicules** 2, small, glabrous. **Stamens** 3. **Ovary** glabrous. **Caryopsis** ellipsoid; hilum short or long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 5, 7$ (aneuploids, polyploidy).

**Species** ± 20, temperate Eurasia, South America; 3 naturalised in southern Africa, widely distributed, not recorded from Namibia and Botswana.

Species treatment by M.T. Nembudani.

**Key to species:**

1. Perennial; lemma acuminate . . . . . ***B. subaristatum**
   Annual; lemma obtuse . . . . . 2
2. Spikelet longer than wide, 8–25 × 8–15 mm; panicle appearing secund, with 3–12 nodding spikelets . . . . . ***B. maxima**
   Spikelet as wide as or slightly wider than long, 3–5 × 3–6 mm; panicle open, with more than 20 spikelets . . . . . ***B. minor**




Figure 81.—*Briza minor*. A, plant; B, spikelet. Artist: Cythna Letty.

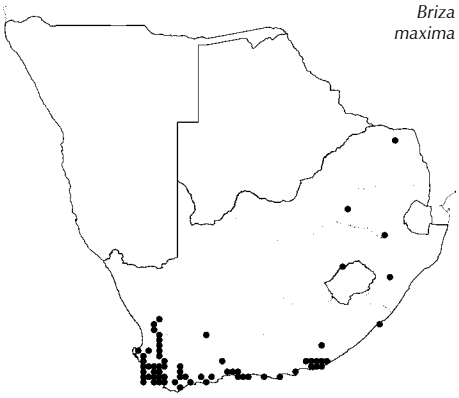


Figure 82.—*Briza maxima* spikelet (8–25 mm). Photographer: M. Koekemoer.



Figure 83.—*Briza subaristatum* spikelet (4–5 mm). Photographer: M. Koekemoer.

***Briza maxima** L., in *Species plantarum* 1: 70 (1753). Type: Italy.


*Briza maxima*

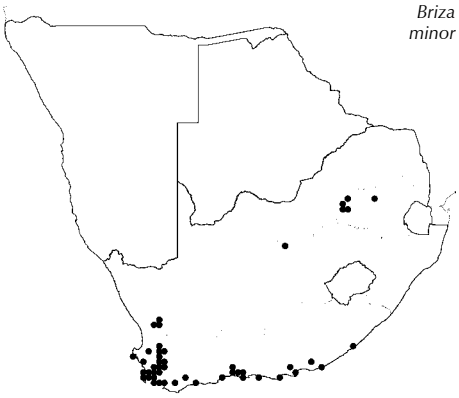
BIG QUAKING GRASS, GROOTBEWERTJIEGRAS

Loosely tufted annual, 100–600(–1 000) mm high; culms erect, simple or branched. Leaf blade 70–250 × 3–8 mm. Inflorescence open, appearing secund, branches single or in fascicles of 2–4; spikelets 3–12, solitary at apices of slender branches, prettily nodding. Spikelet 8–25 × 8–15 mm, longer than wide, 7–20-flowered; glumes green, brown or purple, 5–9-nerved; lemma obtuse, straw-coloured, occasionally variegated with purple, sometimes minutely papillose and hairy; anther 1.0–1.5 mm long; caryopsis 2.5 × 2.0 mm.

*Flowering*: July to December. *Ecology*: Mostly on well-drained soils; in disturbed areas, especially on roadsides or on the margins of irrigated lands. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from the Mediterranean region; occurring in many warm temperate countries. LIM, G, FS, KZN, NC, WC, EC. *Economics*: Weed. Used for dried flower arrangements or as ornamentals in gardens.

Illustration: Chippindall: 47, fig. 16 (1955), Hubbard: 52, fig. 19 (1970).
Anatomy vouchers: *Ellis 609, 1199, 2245* & *4619*.
Voucher: *Loxton 205*.

***Briza minor** L., in *Species plantarum*: 70 (1753). Type: Switzerland.

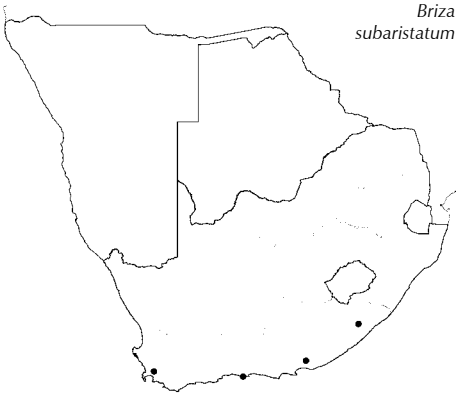

*Briza minor*

LITTLE QUAKING GRASS, KLEINBEWERTJIEGRAS

Loosely tufted annual, 100–600(–700) mm high; culms soft with dark nodes, often branched near base. Leaf blade 40–220 × 3–9 mm. Inflorescence open, spreading, branches single or in fascicles of 2–4; spikelets more than 20. Spikelet 3–5 × 3–6 mm, almost as wide as or slightly wider than long, 3–8-flowered; glumes 3–5-nerved; glumes and lemmas green, usually tinged with purple, margins distinctly lighter in colour; lemma obtuse; papillose on back, glabrous; anther 0.3– 0.5 mm long; caryopsis 0.6 × 0.5 mm.

*Flowering*: September to December. *Ecology*: On loam or clayey soils; usually in moist shady and disturbed places around streams and vleis, roadsides. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Naturalised in many warm temperate countries from the Mediterranean region. NW, G, M, KZN, NC, WC, EC. *Economics*: Ornamental in gardens and in dried flower arrangements. Weed on roadsides.

Illustration: Hitchcock & Chase: 139, fig. 184 (1950): Snow: 613 (2007).
Anatomy vouchers: *Ellis 623, 1256, 2246, 3513* & *4620*.
Voucher: *Smook 3686*.


*Briza subaristatum*

***Briza subaristatum** Lam., in *Tableau encyclopédique et méthodique des Régnes de la Nature Botanique* 1: 187 (1791). Type: Uruguay.

*B. triloba* Nees, in *Flora brasiliensis seu enumeratio plantarum* 2: 482 (1829).

*Chascolytrum subaristatum* (Lam.) Desv., in *Nouveau bulletin des sciences, publié par la Société Philomatique de Paris* 2: 190 (1810).

Tufted perennial, 300–600 mm high; basal sheaths persist as fibres. Leaf blade 80–200 × 1–2 mm, rolled. Inflorescence contracted. Spikelet 4–5 × 2.0–3.5 mm, ovoid, 6–10-flowered; glumes mucro-

nate, 5–7-nerved, cordate at base; lemma acuminate; caryopsis 0.5 × 0.5 mm.

*Flowering*: October to December. *Ecology*: In moist cultivated areas and on roadsides. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from South America. WC, EC.

Voucher: *Liebenberg 4221*.

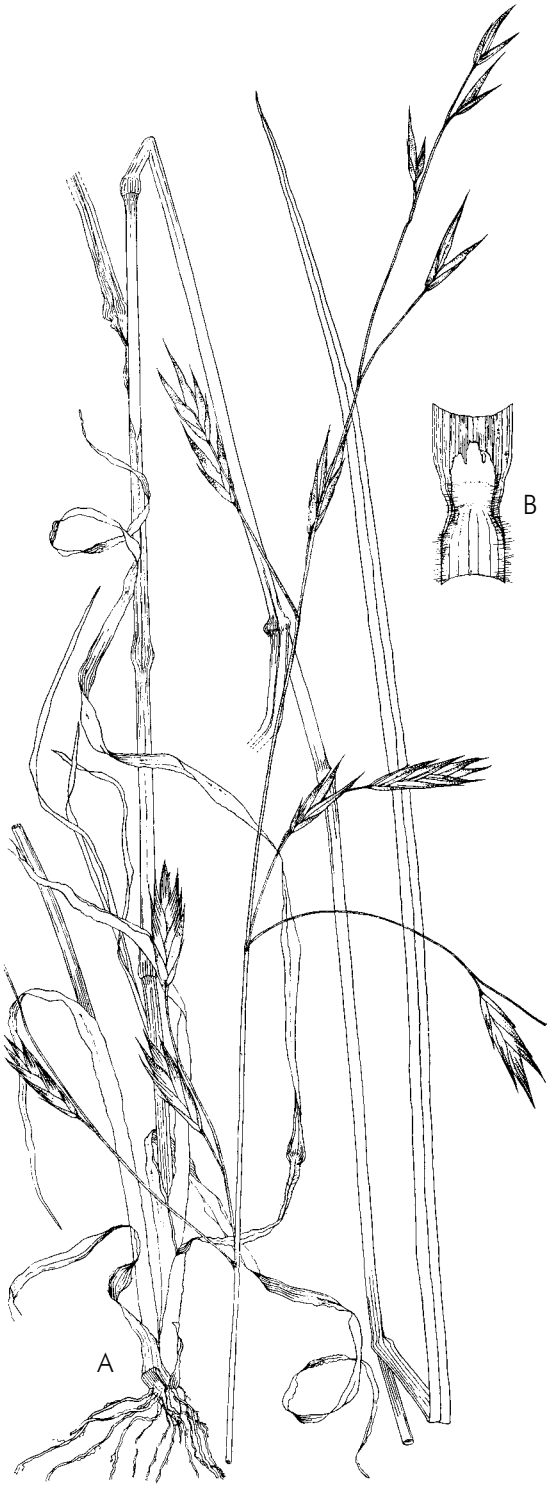



Figure 84.—*Bromus catharticus*. A, plant; B, ligule. Artist: C.D. Bartman.

## **Bromus** L.

Linnaeus: 76 (1753); Stapf: 726 (1900); Chippindall: 62 (1955); Clayton: 66 (1970); Launert: 59 (1971); Pinto-Escobar: 9 (1976); Smith: 182 (1980); Clayton & Renvoize: 144 (1986); Linder: 61 (1986); Gibbs Russell et al.: 73 (1990); Veldkamp et al.: 483 (1991); Watson & Dallwitz: 188 (1994); Sell & Murrell: 202 (1996); Pavlick & Anderton: 193 (2007).

Annual or perennial or short-lived perennial, tufted, sometimes rhizomatous, sometimes geniculate. **Leaf blade** linear, flat or rolled; *ligule* an unfringed membrane. **Inflorescence** a panicle, open or contracted, rarely reduced to a raceme; *spikelets* solitary, pedicelled. **Spikelet** laterally compressed to a varying degree, disarticulating above glumes; *glumes* unequal, rarely ± equal, similar, shorter than spikelet, keeled or rounded on back, awnless; lower glume 1–7-nerved; upper glume 3–9-nerved. **Florets** 3–many (rarely 1 or 2), bisexual with *uppermost floret* reduced; *lemma* 5–15-nerved, keeled or rounded on back, entire or 2-lobed, awnless, mucronate or awned from sinus, *awn* straight, often stiff; *palea* as long as or slightly shorter than lemma, membranous, 2-nerved, 2-keeled, ciliate or pectinate along keels. **Lodicules** 2. **Stamens** 1–3. **Ovary** obovoid, hairy, with a conspicuous villous appendage at apex; styles 2, plumose. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (high polyploidy).



Figure 85.—*Bromus catharticus* spikelet (20–35 mm). Photographer: M. Koekemoer.

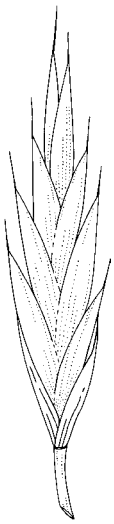


Figure 86.—*Bromus catharticus* spikelet. Artist: W. Roux.

**Species** ± 150, mainly north temperate areas, tropical mountains, South America; ± 15 naturalised and indigenous in southern Africa, widespread.

[The indigenous perennial species are in need of more studies.]

Species treatment by L. Fish.

## Quick guide to easily confused genera:

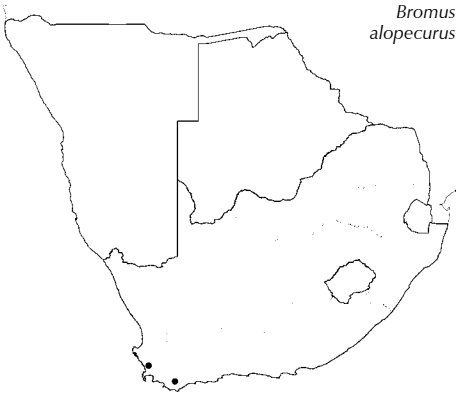
Ovary with conspicuous apical appendage; palea keels ciliate; leaf sheaths hairy; lodicules not toothed . . . . . **Bromus**
Ovary without conspicuous apical appendage; palea keels smooth or scaberulous; leaf sheaths glabrous; lodicules toothed . . . . . **Festuca**

## Key to species:

1. Perennial; anthers 2–8 mm long (if shorter see *B. catharticus*, cleistogamous floret anthers 0.5–1.0 mm long and chasmogamous floret anthers 2–5 mm long) . . . . . 2
Annual; anthers 0.5–1.7 mm long (if longer see *B. catharticus*) . . . . 8
2. Spikelet strongly laterally compressed . . . . . *__B. catharticus__
Spikelet not noticeably laterally compressed to terete . . . . . 3
3. Lemma awn lengths variable, longest awn shorter than 2 mm . . . . . *__B. inermis__
Lemma awn lengths variable, longest awn longer than 3 mm . . .4
4. Spikelet glabrous or scabrid . . . . . 5
Spikelet densely hairy (hairs maybe minute, or hairiness variable in same inflorescence) . . . . . 6
5. Spikelet 15–32 mm long (including awns) . . . . . **B. leptoclados**
Spikelet 35–55 mm long (including awns) . . . . . **B. natalensis**
6(4). Pedicels glabrous and smooth, rarely with few scattered prickles . . . . . **B. speciosus**
Pedicels hairy to scabrid or scaberulous . . . . . 7
7. Pedicels scabrid; spikelets usually pale green . . . . **B. leptoclados**
Pedicels usually entirely densely hairy, sometimes sparsely hairy just below spikelet only or scaberulous; spikelets usually dark or at least strongly flushed with purple . . . . . **B. firmior**
8(1). Lemma awn 30–70 mm long . . . . . 9
Lemma awnless or awn 0.2–25.0 mm long . . . . . .10
9. Callus rounded, scar circular; panicle open, branches spreading; anthers 0.8–1.5 mm long . . . . . *__B. diandrus__
Callus pointed, scar elliptical; panicle dense, branches erect; anthers 0.5–0.7 mm long . . . . . *__B. rigidus__
10(8). Upper glume 3-nerved; lower glume 1-nerved . . . . . 11
Upper glume 5–11-nerved; lower glume 3–9-nerved (occasionally 1-nerved in *B. pectinatus*) . . . . . 13
11. Spikelets densely crowded, panicle branches not visible . . . . . *__B. rubens__
Spikelets not densely crowded, panicle branches visible . . . . .12
12. Inflorescence with spikelets ± secund; lower branches with ± 4 spikelets; upper glume 7–12 mm long; lemma 8–13 mm long; branches and pedicels twisted or curved, flexuous . . . *__B. tectorum__
Inflorescence with spikelets not secund; lower branches with 1 or 2 spikelets; upper glume 14–20 mm long; lemma 12–15 mm long; branches and pedicels straight, stiff. . . . . *__B. madritensis__
13(10). Spikelet strongly laterally compressed; lemma keeled . . . . . *__B. catharticus__
Spikelet terete to moderately laterally compressed; lemma rounded on back . . . . . 14
14. Inflorescence open, most pedicels as long as to longer than spikelets . . . . . 15
Inflorescence contracted, most pedicels shorter than spikelets. . . 16
15. Awn equalling or shorter than lemma (ignore lowest lemma awn); lemma apex rounded to subacute . . . . . *__B. commutatus__
Awn longer than lemma (ignore lowest lemma awn); lemma apex acute to sub-acuminate. . . . . ?*__B. pectinatus__
16(14). Spikelet 18–25 mm long; awn flattened, twisted, spreading . . . . . *__B. alopecurus__
Spikelet 7–15 mm long; awn not flattened, occasionally twisted, spreading or recurved . . . . . *__B. hordeaceus__ subsp. __ferronii__



Figure 87.—*Bromus diandrus*. Artist: M. Franks.

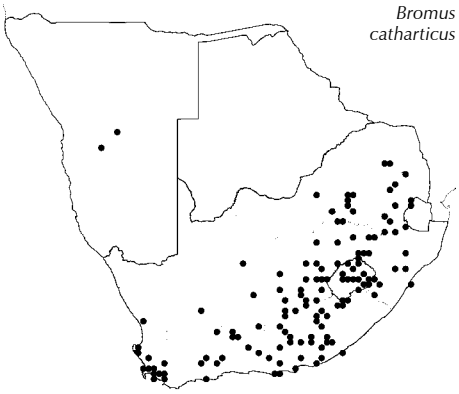

*Bromus alopecurus*

***Bromus alopecurus** Poir., in *Voyage en Barbarie* 2: 100 (1789). Type: Algeria (P, holo.).

Tufted annual 150–300 mm high; culm erect or decumbent at base. Leaf blade 30–70 × 1–3 mm; softly hairy. Inflorescence contracted, most pedicels shorter than spikelets. Spikelet 18–50 × 2–3 mm, glabrous or hairy; glumes and lemmas rounded on back; lower glume 5-nerved, upper glume 7-nerved; lemma 9–12 mm long, apex distinctly bifid; awn from sinus between lobes; awn 8–15 mm long, lax, flattened, twisted, spreading; anthers 0.5–1.5 mm long.

*Flowering*: October. *Ecology*: Roadsides and waste ground. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from Mediterranean basin. WC.

Voucher: *Du Toit 1823*.


*Bromus catharticus*

***Bromus catharticus** Vahl, in *Symbolae Botanicae* 2: 22 (1791). Type: Peru.

*B. unioloides* Humb., Bonpl. & Kunth, in *Nova Generta et Species Plantarum* 1: 151 (1816). Type: Ecuador.

*B. willdenowii* Kunth, in *Revision des Graminées publiées dans les Nova Genera et Species Plantarum de Humboldt et Bonpland* 134 (1829).

Alternate name: *Ceratochloa cathartica* (Vahl) Herter

Rescue grass, Reddingsgras

Tufted, short-lived perennial or annual 150–1 000 mm high; culms erect to decumbent. Leaf blade to 400 × 8 mm. Inflorescence open, flexuous; pedicels mostly longer than spikelets. Spikelet (15) 20–35 × 5–8 mm, strongly laterally compressed; glumes and lemmas prominently keeled; lower glume 3–7(9)-nerved; upper glume 5–9(11)-nerved; lemma 15–25 mm long, minutely bifid, lobes shorter than 1 mm, apex acuminate, 9–11–nerved, awnless or awn 0.5–5.0 mm long; palea much shorter than lemma, keels ciliate; callus scar circular; anthers 0.5–1.0 mm long in cleistogamous florets, 2–5 mm long in chasmogamous florets.

[The great variability in this species can be attributed to the large range of habitats and growth conditions in which it appears; there are also many different strains.]

*Flowering*: October to April. *Ecology*: Usually in moist to wet places, often in shade; disturbed places and natural veld. *Frequency in southern Africa*: Common. *Distribution*: Naturalised from South and Central America, now worldwide. N, L, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Very good annual winter pasture; used for erosion control; weed in cultivated areas.

Illustration: Chippindall: 63, fig. 35 (1955); Pavlick & Anderton: 200 (2007).
Anatomy vouchers: *Ellis 72, 300, 485, 600* & *3610*.
Voucher: *Smook & Gibbs Russell 2422, Thompson 3088*.

***Bromus commutatus** Schrad., in *Flora Germmanica* 353 (1806). Type: Germany.

Hairy chess

Tufted annual or biennial 150–900 mm high. Leaf blade 60–150 × 3–6 mm, hairy. Inflorescence 60–160 × 30–60 mm, open, even-

tually dropping to one side; pedicels with at least some as long as to longer than spikelets; culm glabrous below inflorescence. Spikelet 10–25(28) × 4–7 mm, almost linear at maturity, slightly laterally compressed; lower glume 3–5-nerved; upper glume 5–9-nerved; lemma 7–9 mm long, rounded on back, apex obtuse, distinctly bifid; awn 3–8(10) mm long, inserted less than 1.5 mm below apex; palea much shorter than lemma, keels ciliate; callus scar circular; anthers 0.5–1.7 mm long.

*Flowering*: September to December. *Ecology*: In disturbed, wet places. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from Europe, the Baltic, North Africa and Asia; introduced to other parts of the world. L, FS, KZN, EC, WC. *Economics*: Pasture and weed.

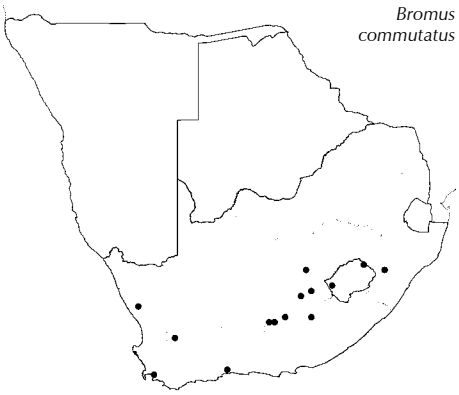

*Bromus commutatus*

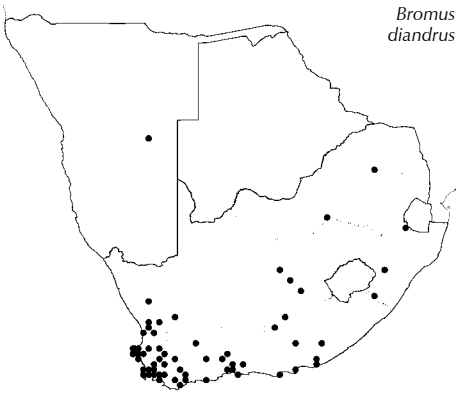
Illustration: Pavlick & Anderton: 229 (2007).
Voucher: *Theron 341*.

***Bromus diandrus** Roth, in *Botanische Abhandlungen und Beobachtungen*: 44 (1787). Type: Europe.

Alternate name: *Anisantha diandra* (Roth) Tutin & Tzvelev

Ripgut brome, langnaaldbromus, predikantluis

Loosely tufted annual 300–1 100 mm high. Leaf blade 50–400 × 3–8 mm, hairy. Inflorescence usually open, branches stiff, erect or spreading; culm hairy below inflorescence; pedicels glabrous, scabrid or hairy. Spikelet 30–90 × 3–8 mm (including awns), open, wedge-shaped, moderately laterally compressed; glumes unequal; lower glume 1–3-nerved, upper 3–5-nerved; lemma 12–22(35) mm long, rounded on back, apex distinctly bifid, acuminate; awn 30–70 mm long, stiff, straight, arising 1.5 mm or more below apex; palea keels ciliate; callus scar circular; anthers 0.8–1.6 mm long.


*Bromus diandrus*

[Two distinct species, *B. diandrus* and *B. rigidus*, are recognised in Europe. In South Africa these species hybridise to form a complete range of intermediates, which can be named *B. diandrus* agg.]

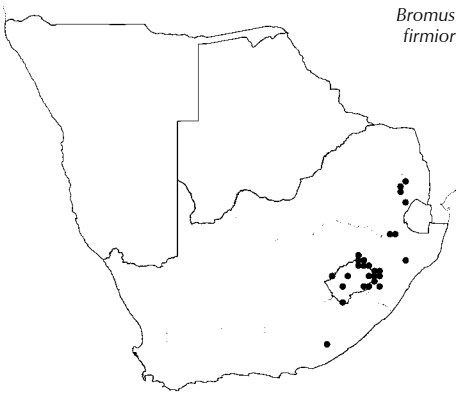
*Flowering*: September to January (occasionally in March). *Ecology*: In disturbed and weedy places. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from southern and western Europe, North Africa; also Asia; introduced into many temperate countries. N, LIM, NW, M, FS, KZN, NC, WC, EC. *Economics*: Serious weed of cultivated and disturbed areas, especially in winter rainfall areas of South Africa.

Illustration: Chippindall: 66, fig. 38 (1955); Pavlick & Anderton: 225 (2007).
Anatomy vouchers: *Ellis 608* & *1183*.
Voucher: *Von Breitenbach 43*.

**Bromus firmior** (Nees) Stapf, in *Flora capensis* 7: 733 (1900). Type: Eastern Cape, in the Stormberge and Witteberg, 5500'–6000', *Drège s.n.* (SAM, lecto.).

*B. firmior* (Nees) Stapf var. *firmior*, in *Florae Africae australioris* 454 (1841). Type: South Africa, Eastern Cape, Witbergen, *Drege*.

*B. firmior* (Nees) Stapf var. *leiorhachis* Stapf, in *Flora capensis* 7: 734 (1900). Type: Eastern Cape, Amatola Mts., *Buchanan 42*.


*Bromus firmior*

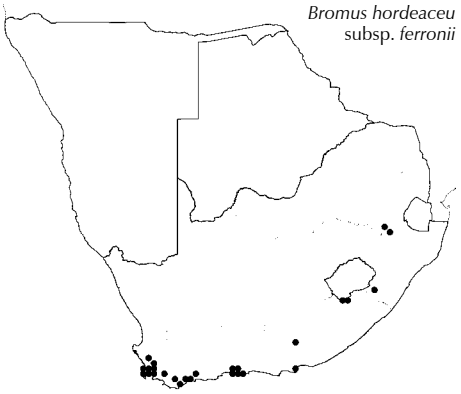
Tufted perennial 500–1 500 mm high; culms sparsely to densely pilose; old leaf sheaths fibrous to not obviously fibrous. Leaf blade 200–400 × 4–8 mm, flat, glabrous or sparsely to densely hairy;

sheath base just above node usually hairy. Inflorescence open, much exserted; pedicels and branches densely to sparsely hairy occasionally only sparsely scabrid; pedicels (at least some) longer than spikelets. Spikelet 15–45 × 4–8 mm (including awns), green to purple; glumes unequal, densely hairy rarely nearly glabrous; lower glume 1–3-nerved, upper 3–5-nerved; lemma 10–20 mm long, densely hairy; awn 3–12 mm long; palea ciliate on keel, sparsely to densely hairy between keels; callus scar circular; anthers 4–8 mm long.

[Very closely related to *B. natalensis*, which has spikelet glabrous; and to *B. speciosus*, which has glabrous pedicels.]

*Flowering*: November to March. *Ecology*: At high altitudes on moist grassy slopes of the Drakensberg. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. L, M, FS, KZN, EC.

Anatomy vouchers: *Ellis 2381, 1434, 4320, 5702* & *5711.*
Voucher: *Killick 1629, Gemmell 5804.*


*Bromus hordeaceu* subsp. *ferronii*

***Bromus hordeaceus** L. subsp. **ferronii** (Mabille) P.M.Sm., in *Watsonia* 6: 330 (1968). Type: Europe.

**Bromus hordeaceus* L. subsp. *molliformis* (J.Lloyd) Maire & Weiller, in Maire, *Flore de l'Afrique du Nord* 3: 255 (1955). Type: France.

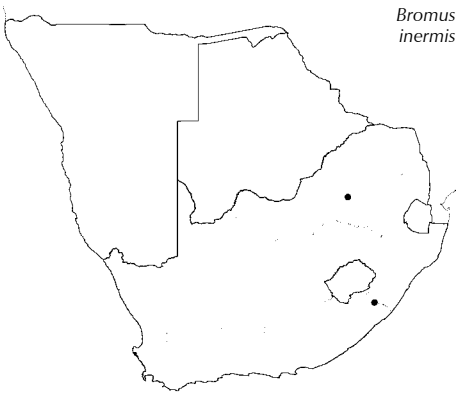
*B. molliformis* Lloyd, in *Flore de la Loire-Inférieure*: 315 (1844).

Soft brome

Tufted annual or biennial to 600 mm high; culm decumbent but usually erect; glabrous or minutely hairy below inflorescences. Leaf blade 50–150 × 3–4 mm, somewhat glaucous, flat, soft. Inflorescence up to 50 mm long, dense, stiffly erect, short hairy. Spikelet 7–22 × 3–5 mm, slightly laterally compressed, glabrous to densely hairy; lower glume 3–5-nerved; upper glume 5–7-nerved; lemma 5.5–11.0 mm long, rounded on back, bifid, lobes shorter than 1 mm long, awned from just below apex; awn 2–10 mm long, erect or recurved to somewhat spreading and twisted at maturity; palea ciliate on keels, glabrous between keels; callus scar circular; anthers 0.5–1.0 mm long.

*Flowering*: October to February. *Ecology*: Disturbed areas; embankments and cultivated lands. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from Europe, introduced elsewhere. M, KZN, EC, WC. *Economics*: Weed of cultivation.

Illustration: Pavlick & Anderton: 231 (2007).
Voucher: *Crook 2345, Paterson 2284* (BOL).


*Bromus inermis*

***Bromus inermis** Leyss., in *Flora Halensis* 16 (1761). Type: Germany.

Alternate name: *Bromopsis inermis* (Leyss.) Holub

Smooth brome

Perennial 500–1 000 mm high, rhizomatous; old leaf sheaths flimsy, curly, not fibrous, usually glabrous. Leaf blade 200–500 × 4–7 mm, usually glabrous. Inflorescence open, branches erect or spreading; pedicels glabrous to scabrid. Spikelet 10–20(40) mm long, narrowly oblong, round to moderately laterally compressed; lower glume 1(3)-nerved, upper 3-nerved; lemmas 6.0–8.5(13.0) mm long,

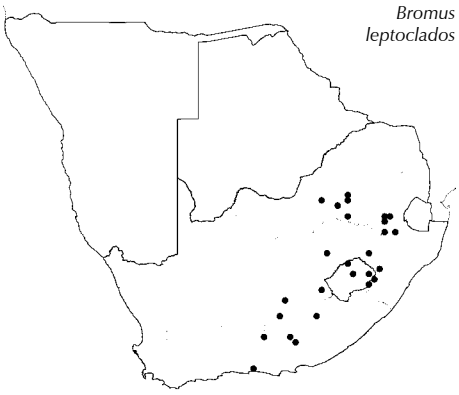
rounded on back, apex not distinctly bifid, acute to subacute, awnless or awned just below apex; awn fine, minute to 3 mm long; palea ciliate on keels, glabrous between keels; anthers 3–6 mm long.

[A very variable species.]

*Flowering*: November to April. *Ecology*: Disturbed or weedy places. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from Eurasia; introduced into many temperate regions. G, KZN. *Economics*: Cultivated pasture; weed.

Illustration: Pavlick & Anderton: 208 (2007).
Voucher: *Galpin 7944*.

**Bromus leptoclados** Nees, in *Florae Africae australioris* 1: 453 (1841). Type: South Africa, Eastern Cape, Kraairivier, *Drège*.


*Bromus leptoclados*

MOUNTAIN BROME GRASS

Loosely tufted perennial (200–)500–1 500 mm high; old leaf sheaths flimsy, curly, not fibrous; culm erect or geniculate, usually hairy. Leaf blade 100–300 × 5–13 mm, scabrid, hairy, rarely glabrous; sheath hairy, at least, at base just above node. Inflorescence large, open, erect to nodding; branches and pedicels scabrid. Spikelet 10–30(40) × 2–6 mm (including awns), narrowly oblong to wedge-shaped, moderately laterally compressed, glabrous to shortly hairy; glumes unequal, acuminate or with awn up to 5 mm long; lower glume 1-nerved; upper 3-nerved; lemmas 8–12(16) mm long, rounded on back, hairy or glabrous, usually scaberulous to scabrid on nerves, margins hyaline, awned at or just below apex; awn 2–12 mm long; palea ciliate on keels, glabrous between keels; callus scar circular; anthers 2.2–3.0(5.0) mm long.

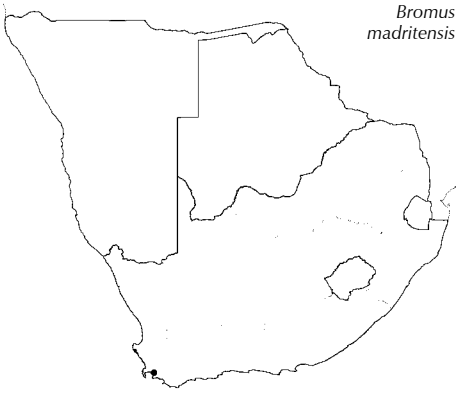
[Variable grass, especially in spikelet, lemma and anther size.]

*Flowering*: October to February. *Ecology*: Usually in moist, shady places along rivers and streams. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards on high mountains of tropical Africa. L, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Palatable natural pasture.

Illustration: Launert: 61, tab. 17 (1971); Phillips: 56 (1995).
Voucher: *Acocks 18671*.

***Bromus madritensis** L., in *Centuria Plantarium* 1: 5 (1755). Type: Europe.

Alternate name: *Anisantha madritensis* (L.) Nevski


*Bromus madritensis*

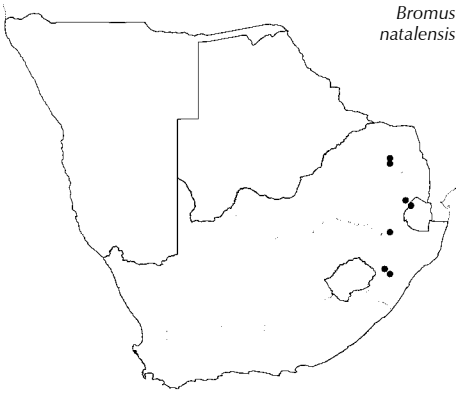
SPANISH BROME

Tufted slender annual 120–350(–600) mm high. Leaf blade 80–200 × 2–5 mm. Inflorescence contracted and dense to open, branching visible; lower branches with 1–2 spikelets, pedicels and branches shorter than spikelets, straight, robust; culm glabrous or minutely hairy below inflorescence. Spikelet 10–25(60) (including awns) × 4–5 mm, moderately laterally compressed; becoming wedge-shaped with age, hairy; lower glume 1-nerved; upper glume 14–20 mm long, 3-nerved; lemma 12–15(20) mm long, rounded on back, hairy,

margins hyaline, apex distinctly bifid, acuminate, awned from well below apex; awn 15–20 mm long erect to recurved; palea ciliate on keels, glabrous between keels; callus scar circular; anthers 0.5–1.0 mm long.

*Flowering*: October. *Ecology*: Weedy places. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from southern and western Europe, eastwards to Afghanistan. Introduced and naturalised worldwide. WC (Somerset West).

Illustration: Hubbard: 64 (1984), Pavlick & Anderton: 227 (2007).
Voucher: *Parker 4917*.


*Bromus natalensis*

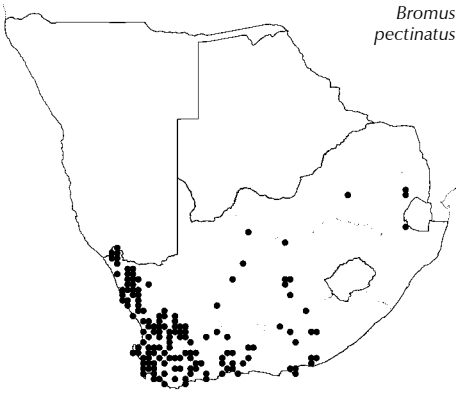
**Bromus natalensis** Stapf, in *Flora capensis* 7: 732 (1900). Type: KwaZulu-Natal, without precise locality, *Buchanan 58* (K, holo.; PRE, fg.).

*B. natalensis* Stapf var. *lasiophilus* Stapf, in *Flora capensis* 7: 732 (1900). Type: South Africa, KwaZulu-Natal, Weenen dist., South Downs, *Wood 4460* (PRE, fg.).

Perennial 500–1 200 mm high, rhizomatous; old leaf sheaths firm, erect, fibrous. Leaf blade 70–150 × 4–7 mm. Inflorescence open; culms glabrous or scaberulous below inflorescence; at least some pedicels/branches usually longer than spikelets; sparsely hairy to hispid. Spikelet 35–55 × 5–10 mm (including awns), glabrous, finely scabrid; lower glume 3-nerved; upper glume 5–7-nerved; lemma 15–18 mm long, nerves scabrid; awn 6–15 mm long, straight; anthers 5.8–6.5 mm long.

*Flowering*: October to January. *Ecology*: Rocky hillsides. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. S, LIM, M, KZN.

Illustration: Chippindall: 64, fig. 36 (1955).
Voucher: *Devenish 1520, Braun 1186*.

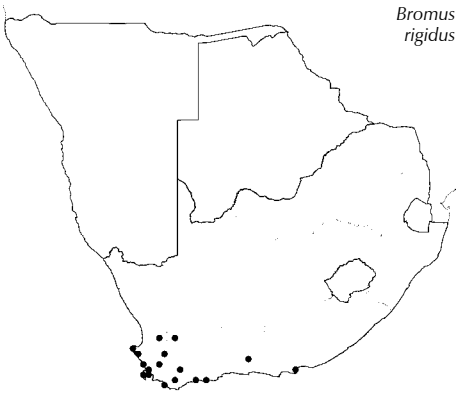

*Bromus pectinatus*

**?*Bromus pectinatus** Thunb., in *Podromus Plantarum capensium*: 22 (1794). Type: South Africa, Western Cape, *Thunberg* in herb *Thg2522* (UPS, holo.).

Tufted annual 100–800 mm high. Leaf blade 50–300 × 2–8 mm; sheaths hairy. Inflorescence open, nodding; pedicels and branches as long as to longer than spikelets. Spikelet 10–30 × 3–6 mm, moderately laterally compressed, wedge-shaped at maturity; rachilla segments clavate; lower glume (1)3-nerved; upper glume 5–7-nerved; lemma 7–14(17) mm long, rounded on back; apex acute to sub-acuminate, hyaline; awn 6–18 mm long, longer than lemma, straight; palea ciliate on keels, glabrous between keels; callus scar circular; anthers 0.5–1.3 mm long.

*Flowering*: August to February. *Ecology*: In disturbed and eroded areas. *Frequency in southern Africa*: Locally common. *Distribution*: East Africa, Ethiopia, Sudan to Yemen. NW, G, M, FS, NC, WC, EC. (It is unclear whether this species is indigenous or naturalised in FSA.)

Illustration: Phillips: 56 (1995).
Anatomy vouchers: *Ellis 639 & 2209*.
Voucher: *Repton 2633*.


Bromus rigidus

*__Bromus rigidus__ Roth, in *Botanische Magazin Zürich* 4: 21 (1790). Type: ?Europe.

Alternate name: *Anisantha rigida* (Roth) Hyl.

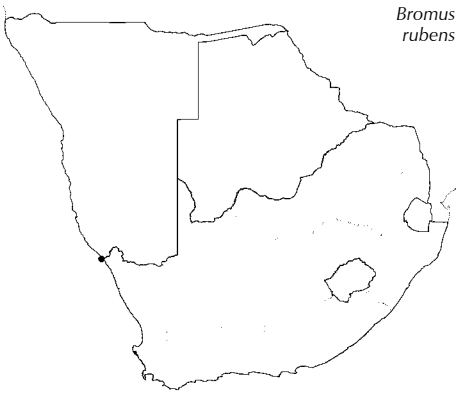
RIPGUT BROME

Loosely tufted annual 400–700 mm high. Leaf blade 50–150 × 3–7 mm. Inflorescence contracted to sometimes open, pedicels and branches hispid to hairy. Spikelet 15–25 × 2–6 mm (excluding awns), narrow, ovate to linear; lower glume 1-nerved; upper 3-nerved; lemma 20–25(30) mm long, apex distinctly bifid, acute, awns 30–50 mm long; palea ciliate on keels, rarely hairy between keels; callus scar elliptical, hairy; anthers 0.5–0.7 mm long.

[Distinct in Europe, but forms a complete range of intermediates with *B. diandrus* in South Africa. These intermediates are best identified as *B. diandrus* aggregates (see Sales (1993): 1).]

*Flowering*: September to October. *Ecology*: Disturbed and weedy places. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised weed from Europe, introduced into Northern America and other parts of the world. EC, WC.

Voucher: *Cleghorn 3106*.


Bromus rubens

*__Bromus rubens__ L., in *Centuria plantarum* 1: 5 (1755). Type: Spain.

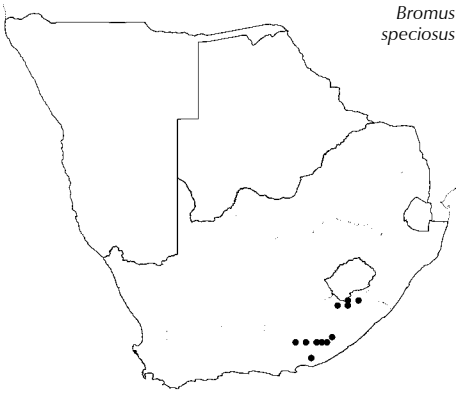
Alternate name: *Anisantha rubens* (L.) Nevski

RED BROME, FOXTAIL CHESS

Tufted annual 150–450 mm high. Leaf blade 60–120 × 3–5 mm. Inflorescence dense, erect, compact, ovoid; lower branches fascicled; branches shorter than spikelets, hairy. Spikelet 21–28 mm long, moderately laterally compressed, wedge-shaped at maturity, often reddish, hairy or glabrous; lower glume 1-nerved; upper glume 3-nerved; lemma 13–15 mm long, back rounded, margins hyaline, bifid; awn 18–22 mm long, straight, from well below apex; anthers 0.3–1.0 mm long.

*Ecology*: Disturbed places and waste ground. *Frequency in southern Africa*: Rare. *Distribution*: Mediterranean region east, eastwards to central Asia; introduced to many areas such as North America. NC. Possibly not naturalised yet, as only known from a single collection from a street in Oranjemund.

Illustration: Pavlick & Anderton: 227 (2007).
Voucher: *Williamson ?s.n.* (BOL).


Bromus speciosus

__Bromus speciosus__ Nees, in *Florae Africae australioris* 454 (1841). Type: South Africa, Eastern Cape, 'In montibus alt. V et VI propo Coloniam Herehutorum ad flumen Klipplaatrivier (Tanbukiland)', *Ecklon*; 'In depressis montium Stormbergen alt. 1000', *Drège* (syntypes).

PURPLE BROME

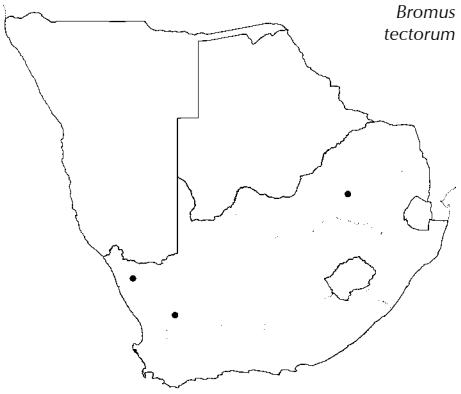
Tufted perennial 300–600 mm high; old leaf sheaths firm, erect, fibrous. Leaf blade 80–200 × 2–4 mm. Inflorescence open, scabrid; pedicels and branches glabrous to rarely sparsely scabrid,

at least some shorter to almost as long as spikelets. Spikelet 15–50 × 3–6 mm (including awns), linear, purplish, hairy; lower glume 1–3-nerved; upper glume 3–5-nerved; lemma 10–15 mm long; awn 3–6 mm long; palea ciliate on keels, minutely hairy between keels; callus scar circular; anthers 4–7 mm long.

[Very closely related to *B. firmior*, which has hairy pedicels and branches, and to *B. natalensis*, which has glabrous lemmas.]

*Flowering*: December to March. *Ecology*: On steep, moist mountain slopes, occasionally in shade and along streams. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. EC.

Anatomy vouchers: *Ellis 5685* & *5690*.
Voucher: *Galpin 6905*.



*Bromus tectorum*

***Bromus tectorum** L., in *Species plantarum*: 77 (1753). Type: Europe.

Alternate name: *Anisantha tectorum* (L.) Nevski

Tufted annual 100–250 mm high. Leaf blade 60–100 × 2–4 mm, hairy. Inflorescence open, drooping, spikelets ± secund; lower pedicels and branches with ± four spikelets; branches and pedicels twisted or curved, flexuous. Spikelet 8–15(20) × 2–4 mm, moderately laterally compressed, spikelet hairy to glabrous; lower glume 1-nerved; upper glume 7–12 mm long; 3–5-nerved; lemma 8–13 mm long, rounded on back, margins hyaline, bifid; awn 8–20 mm long, straight, arising well below apex; palea ciliate on keels, hairy between keels; callus scar circular, minutely hairy; anthers 0.5–1.0 mm long.

*Flowering*: August to October. *Ecology*: Sandy soil; in disturbed places such as on roadsides. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from Europe; naturalised in many regions of the world. G, NC.

Illustrations: Hubbard: 62 (1984); Pavlick & Anderton: 225 (2007).
Voucher: *Rosch & Le Roux 634*.

## **Calamagrostis** Adans.

Adanson: 31, 530 (1763); Stapf: 550 (1898–1900); Chippindall: 94 (1955); Hubbard: 102 (1970); Clayton & Renvoize: 135 (1986); Gibbs Russell et al.: 76 (1990); Watson & Dallwitz: 195 (1994); Marr et al.: 710 (2007).

Tufted, robust, perennial; long-rhizomatous. **Leaf blade** linear, expanded or rolled; *ligule* an unfringed membrane. **Inflorescence** usually a linear, rather narrow, contracted and dense panicle; *spikelets* shortly pedicelled. **Spikelet** laterally compressed, linear, narrow, acuminate, disarticulating above glumes; *glumes* subequal, linear-lanceolate, longer than spikelet, firmly membranous, keeled upwards, scaberulous, awnless; lower glume 1-nerved; upper glume 1–3-nerved. **Floret** 1, bisexual, *lemma* less firm to similar in texture to glumes, hyaline, glabrous, 3–5-nerved, truncate-denticulate or lobed, awned from back well below apex; *awn* short, fine and straight, not extending beyond glumes; *callus* hairy, hairs white, as long as or longer than lemma; *palea* as long as lemma or shorter, 2-nerved, hyaline. **Lodicules** 2, hyaline, glabrous. **Stamens** 3. **Ovary** glabrous; styles plumose. **Caryopsis** narrowly ellipsoid; hilum short; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (high polyploidy).

**Species** ± 270, temperate regions of both hemispheres; 1 in southern Africa: *Calamagrostis epigejos* (L.) Roth var. *capensis* Stapf, North West, Gauteng, Eastern Cape and Northern Cape.

Species treatment by M.J. Moeaha.

### Quick guide to easily confused genera:

1. Florets 2 . . . . . 2
   Floret 1 . . . . . 3
2. Perennial; lemma awned at the back from near base; palea ± as long as lemma . . . . . *__Deschampsia__
   Annual; lemma awned from below middle or awnless; palea slightly shorter than lemma . . . . . *__Aira__
3. Spikelet 4.5–8.0 mm long; callus beaded with white hairs longer than lemma . . . . . __Calamagrostis__

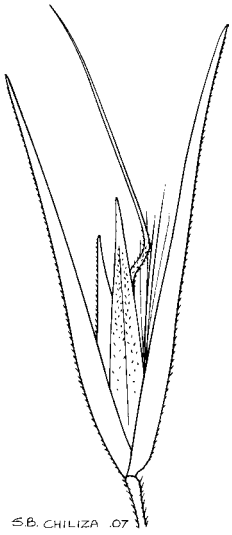



Figure 88.—*Calamagrostis epigejos* spikelet. Artist: S.B. Chiliza.

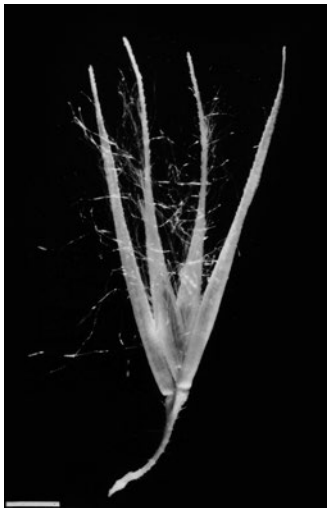


Figure 89.—*Calamagrostis epigejos* spikelet (5.5–8.0 mm). Photographer: M. Koekemoer.

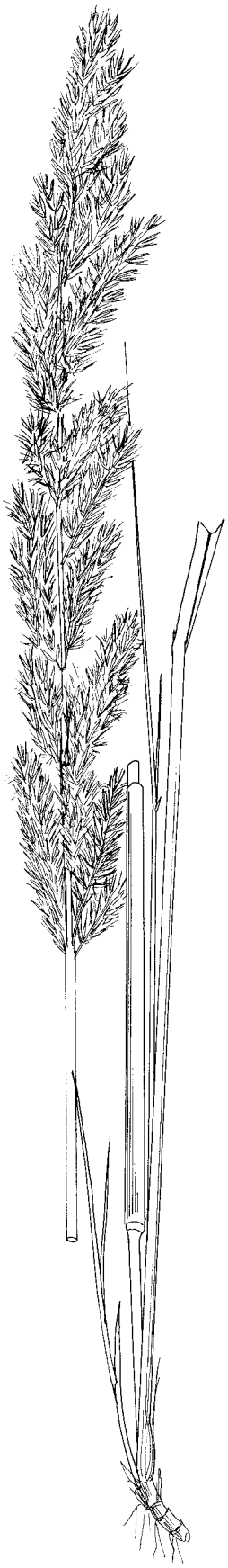


Figure 90.—*Calamagrostis epigejos*. Artist: H.W. du Toit.

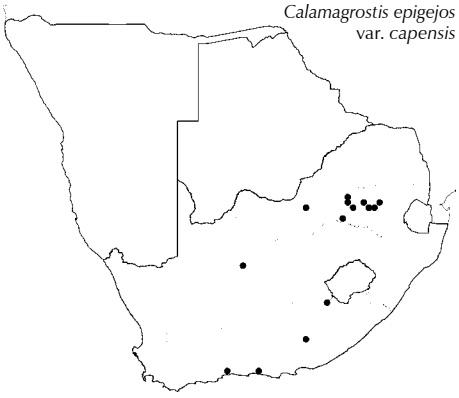





Figure 91.—*Capeochloa arundinacea* specimen.

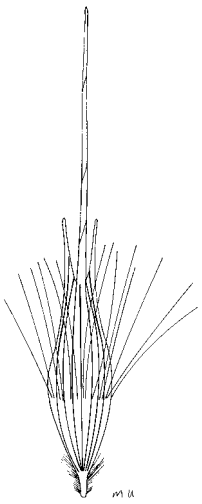


Figure 92.—*Capeochloa cincta* lemma (15.0 × 1.5 mm). Artist: M. Ueckermann.

Spikelet up to 5.5 mm long; callus absent, if present, then glabrous or hairy, hairs up to as long as lemma . . . . . 4

4. Spikelet falling entire with pedicel or part thereof . . . **Polypogon**
Spikelet breaking up above glumes . . . . . **Agrostis**

**Calamagrostis epigejos** (L.) Roth var. **capensis** Stapf, in *Flora capensis* 7: 551 (1899). Type: South Africa, Eastern Cape, Witbergen (3027CA), *Drège 8089*; Northern Cape, Griquatown (2823CC), *Burchell 1912*; *Krebs s.n.* (syntypes).

Tufted, erect perennial 600–1 200 mm high; rhizome creeping. Leaf blade up to 450 × 10 mm; ligule an unfringed membrane, sometimes erose. Inflorescence up to 250 mm long, narrow, contracted, dense, green or tinged with purple, becoming light brown. Spikelet 5.5–8.0 mm long; glumes acuminate; lemma awned from $^1/_4$–$^1/_3$ the way up on back; callus with conspicuous long white hairs, 5 mm long.

[The taxonomy of this genus is said to be complicated due to extensive interspecific hybridisation and apomixy. The typical variant occurs in temperate Eurasia and has smaller spikelets.]

*Flowering*: January to May. *Ecology*: Moist areas; in upland grasslands, vleis, pans and rivers as well as disturbed places. *Frequency in southern Africa*: Originally rare but since ± 2009 been collected in Gauteng and Mpumalanga a number of times and reported as being locally dominant. *Distribution*: East Africa, Rwanda and Sudan. NW, G, M, NC, WC, EC.

Illustration: Hubbard: 103, fig. 35 (1970); Phillips: 52, fig. 24 (1995).
Anatomy voucher: *Ellis 1374*.
Voucher: *Codd 2733, De Castro & Brits 225*.

## **Capeochloa** H.P.Linder & N.P.Barker

Stapf: 516 (1899) under *Danthonia* DC; Chippindall: 241 (1955) under *Danthonia* DC; Conert: 129 (1970); Conert: 299 (1971); Ellis: 89 (1982a); Clayton & Renvoize: 175 (1986) under *Rytidosperma* Steud.; Gibbs Russell et al.: 213 (1990); Barker & Ellis: 27 (1991); Watson & Dallwitz: 593 (1994); Barker: 104 (1999); Linder et al.: 322 (2010).

*Danthonia* DC., in part, Stapf: 516 (1899).

*Merxmuellera* Conert, in part, Conert: 132 (1970).

Perennial, tufted, often reed-like; sometimes rhizomatous; basal sheaths sometimes persistent, white and shiny, glabrous. **Leaf blade** linear, flat or rolled, sometimes pungent; sheath-mouth often bearded; *ligule* a short fringe of hairs. **Inflorescence** an open panicle; *spikelets* up to 200, pedicelled. **Spikelet** laterally compressed; disarticulating above glumes and between florets; *glumes* similar, as long as spikelet, chartaceous, margins and apex hyaline, keeled to middle or below, 1-nerved, median nerve prominent, lateral nerves usually only prominent in low-



Figure 93.—*Capeochloa arundinacea* spikelet (20–35 mm). Photographer: M. Koekemoer.

ermost part, awnless. **Florets** 2–4; *lemma* rounded on back, similar in texture to glumes, hairy, hairs scattered all over, along margins, or in a row across upper back, 2-lobed, lobes acute to acuminate, finely awned, central awn from sinus; *awn* usually geniculate and column twisted; *callus* rounded, hairy; *palea* truncate to bidentate, awnless, almost equal to lemma, 2-keeled, lanceolate, similar in texture to lemma, hyaline, occasionally margins hairy. **Lodicules** 2, long, membranous, often ciliate. **Stamens** 3. **Ovary** ovoid, glabrous; styles 2, long and plumose. **Caryopsis** pericarp fused. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 6$.

**Species** 3, southern Africa, lowlands and mountains of Northern, Western and Eastern Cape.

Species treatment by A.C. Mashau & L. Fish.

**Key to species:**

1. Lemma back densely pubescent, hairs not in obvious tufts or rows . . . . . **C. arundinacea**
   Lemma with hairs in tufts along the margins or in rows across the back below lobes . . . . . 2
2. Lemma margins with tufts of hairs . . . . . **C. setacea**
   Lemma back with a row of white hairs 3.5–7.0(–12.0) mm long across the middle . . . . . 3
3. Glume 9–16 mm long; lemma hairs 3.5–8.0 mm long; usually on mountain slopes . . . . . **C. cincta** subsp. **cincta**
   Glume 14–23 mm long; lemma hairs 10–11 mm long; mainly coastal dunes, with a single inland locality on silcrete . . . . . **C. cincta** subsp. **sericea**

**Capeochloa arundinacea** (P.J.Bergius) N.P.Barker & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 324 (2010). Type: South Africa (SBT, holo.).

*Merxmuellera arundinacea* (P.J.Bergius) Conert, in *Senckenbergiana Biologica* 51: 132.

*Danthonia arundinacea* (P.J.Bergius) Schweick., in *Notizblatt des botanischen Gartens und Museums zu Berlin-Dahlem*, 14 (1921): 197 (non Steudel 1840).

Densely tufted, tall reed-like perennial 1 000–1 200 mm high; base of plant glabrous. Leaf blade to 600 × 4–7 mm. Inflorescence 120–250 mm long, densely contracted. Spikelet (9.0–)13.5–16.5 × 9–11 mm, (2–)3–4-flowered; glume 10–15 mm long, 1-nerved, usually pubescent; lemma 6–8 mm long, including lobes, which extends into short, soft awns, back completely covered with white hairs; central awn 9–13 mm long; anther 3.3–2.5 mm long.

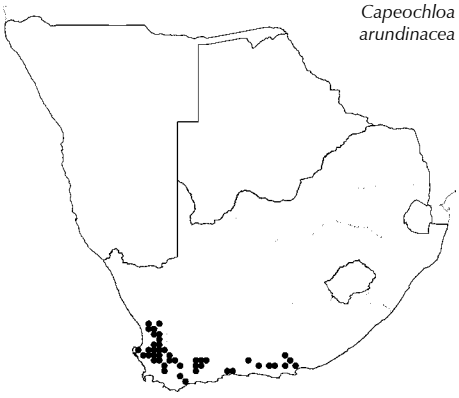
[Similar in habit to *C. cincta*, which has tufted hairs on the lemma.]

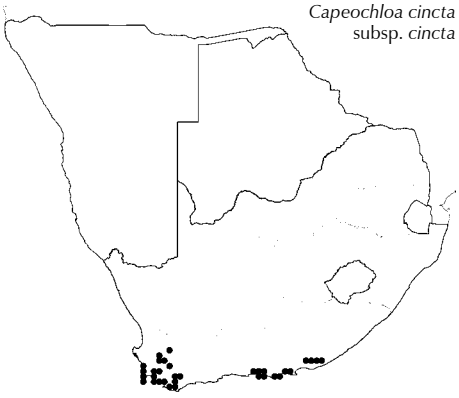
*Flowering*: August to November. *Ecology*: Xeric areas on north-facing slopes of the Cape fold mountains. *Frequency in southern Africa*: Locally common on warm slopes with a northern aspect. *Distribution*: Endemic. EC, WC, NC.

Anatomy vouchers: Studied anatomically by Ellis (1982a). *Ellis 709, 1149, 1707, 2474, 2503* & *5103*.
Voucher: *Ellis 2474*.



Figure 94.—*Capeochloa setacea*. Artist: G. Condy.




*Capeochloa cincta* subsp. *cincta*

**Capeochloa cincta** (Nees) N.P.Barker & H.P.Linder subsp. **cincta**, in *Annals of the Missouri Botanical Garden* 97: 324 (2010). Type: South Africa, 'In Promotorio bonae spei, *Reeves in Herb. Lindley*' (K, lectotype).

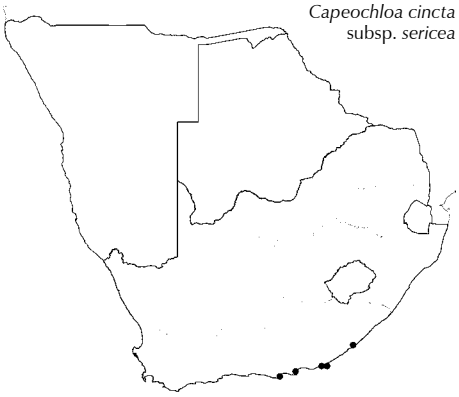
*Merxmuellera cincta* (Nees) Conert subsp. *cincta*, in *Senckenbergiana Biologica* 51: 132 (1970).

*Danthonia cincta* Nees in part, in *Florae Africae australioris*: 332 (1841).

Densely tufted, tall reed-like perennial, to 2 000 mm high. Leaf blade 1 000 (or more) × 5–15 mm; lacunae absent. Inflorescence 200–400 mm long, dense, contracted. Spikelet to 14 × to 8 mm, 3–4-flowered; glumes 9–16 mm long, 1-nerved; lemma 7–8 mm long, includes 3.5–4.0 mm long lobes; lobes awned, row of tufted white hairs 3.5–8.0 mm long just below lobes across the back, glabrous below; central awn 5–14 mm long, sometimes longer; anther 2.5 mm long.

*Flowering*: September to February. *Ecology*: Moist areas such as seeps and stream banks on the south-facing mountain slopes. *Frequency in southern Africa*: Locally common in damp areas. *Distribution*: Endemic. EC, WC.

Anatomy vouchers: *Comins 974, Acocks 20044, Ellis 2331, 2332 & 3268*.
Voucher: *Burgers 82*.


*Capeochloa cincta* subsp. *sericea*

**Capeochloa cincta** (Nees) N.P.Barker & H.P.Linder subsp. **sericea** (N.P.Barker) N.P.Barker & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 324 (2010). Type: South Africa, Eastern Cape, Rufanes River Mouth, *N.P. Barker 1545* (GRA, holo.; BOL, NBG, PRE, iso.).

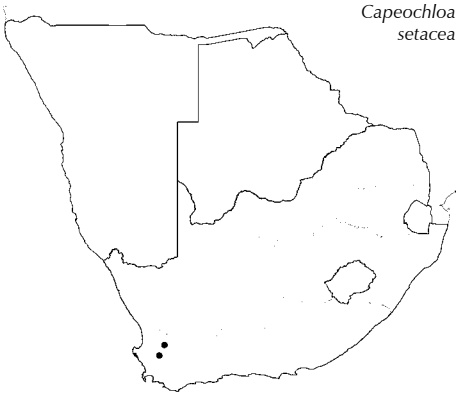
*Merxmuellera cincta* (Nees) Conert subsp. *sericea* N.P.Barker, in *South African Journal of Botany* 65: 104 (1999).

*Danthonia cincta* Nees, in part, *Florae Africae australioris*: 332 (1841).

A perennial; base of plant glabrous; culm erect. Leaf blade up to 1 000 mm long, flat to somewhat rolled; lacunae present. Inflorescence up to 500 mm long, contracted, shortly branched, upper half drooping. Spikelet 14–23 mm long, 2–3 flowered; glume 14–23 mm long, 1-nerved; lemma 3–6 mm long, lobes 4–6 mm long, lobes awned, a row of long, silky hairs 10–11 mm long in tufts across the back above, glabrous below; central awn 14–17 mm long, occasionally slightly contorted at base and then geniculate; anther 2.0–3.0 mm long.

*Flowering*: September to November. *Ecology*: In coastal dune slacks and seeps in dune areas where water is forced to the surface by rock strata; one inland locality on an outcrop of silcrete. Ellis (1982a) noted the presence of lacunae in the leaf blades, an apparent adaptation to aquatic environments. *Distribution*: Endemic. EC.

Anatomy vouchers: *Flanagan 2586 & Acocks 21447.*
Voucher: *Spies 3504*.


*Capeochloa setacea*

**Capeochloa setacea** (N.P.Barker) N.P.Barker & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 324 (2010). Type: South Africa, Western Cape (Worcester): Groot Winterhoek Wilderness area, northwest of Groen Mt., Suurvlakte plateau, *Ellis 5500* (PRE, holo.).

*Merxmuellera setacea* N.P.Barker, in *Bothalia* 21: 27 (1991)

Perennial 730–1 000 mm high; rhizome short; base of plant glabrous; culm base bulbous, glabrous, straw-coloured. Leaf blade to

150 × ± 1 mm, basal, short and pungent. Inflorescence to 150 mm long, contracted, shortly branched. Spikelet 12–15 × 4–6 mm (excluding awns); glumes 9–13 mm long, 1-nerved; 3(–4)-flowered; lemma 8.5–11.0 mm long including 5–7 mm long lobes, awn to 5 mm long, back glabrous except for one tuft of white hairs on each margin halfway up lemma body; central awn 11–15 mm long, geniculate near base; anther 3.0–3.5 mm long.

*Flowering*: November. *Ecology*: Seeps and stream banks. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

Voucher: *Ellis 5500*.

## **Catabrosa** P.Beauv.

Palisot de Beauvois: 97 (1812); Hedberg & Hedberg: 601 (1994); Soreng & Fish: 1 (2011).



Figure 95.—*Catabrosa drakensbergense* spikelet (2.5–4.0 mm). Photographer: M. Koekemoer.

Perennial, tufted or decumbent; stoloniferous. **Leaf blade** flat; *ligule* an unfringed membrane. **Inflorescence** an open panicle. **Spikelet** disarticulating above glumes; *glumes* unequal, shorter than spikelet, $^1/_6$–$^2/_3$ length of lemma above, 0–3-nerved, awnless. **Florets** 1–4(7), variable on same panicle; rachilla extension up to 0.2 mm, present or absent in 1-flowered spikelets; *lemma* firmer than glumes, prominent nerves 3, rarely with faint laterals, glabrous or hairy, awnless; *palea* keels prominent. **Lodicules** 2, hyaline upper portion reduced. **Stamens** 3. **Ovary** glabrous. **Caryopsis** small, laterally compressed; hilum elliptic to oblong, ovoid to round, darker than caryopsis body. **Photosynthetic pathway**: C3; XyMS+.

**Species** 3, in North Temperate Zone, Chile and northwest Africa; 1 in Southern Africa: *Catabrosa drakensbergense* (Hedberg & I.Hedberg) Soreng & Fish, Lesotho.

Species treatment by L. Fish.

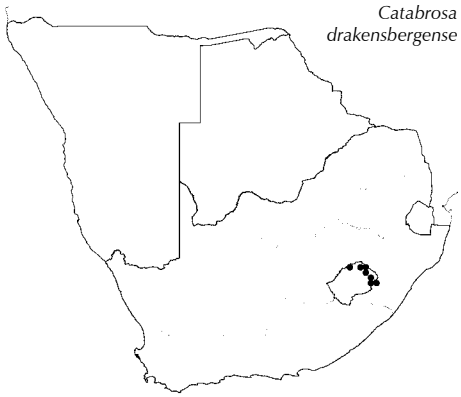



Figure 96.—*Catabrosa drakensbergense*. A, plant; B, spikelet (3.5 × 1.2 mm). Artist: W. Roux

**Catabrosa drakensbergense** (Hedberg & I.Hedberg) Soreng & Fish, in *Kew Bulletin* 66: 1–10 (2011). Type: Lesotho, Sani Pass, Sani pass Lodge, *O. Hedberg 82088* 'A' (lectotype).

*Colpodium drakensbergense* Hedberg & I.Hedberg, in *Nordic Journal of Botany* 14: 606 (1994).

Perennial 100–250(300) mm high, hydrophyte; stoloniferous. Leaf blade 20–60(–150) × 3–5 mm, strongly keeled, folded when young. Inflorescence 40–120 mm long; branches spreading, bare in lower part. Spikelet 2.5–4.2 mm long, number of florets 1 to 2, variable in same inflorescence; glumes unequal, broadly lanceolate to oblanceolate, obtuse to acute, lower glume $^1/_2$–$^2/_3$ the length of lowest lemma; upper glume $^2/_3$–$^3/_4$ to equalling or exceeding lowest lemma;



lemma same texture as glumes or firmer, broadly lanceolate to oblanceolate, acute to obtuse, glabrous to sparsely minutely hairy, nerves 3, prominent; palea sub-chartaceous, strong coloured.

*Flowering*: December to March. *Ecology*: Wet places, in streams and sedge meadows at high altitudes. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. L.

Voucher: *Killick 4414, Pangos 121, Du Toit 2328*.



Figure 97.—*Catalepis gracilis*. Artist: W. Roux.

## **Catalepis** Stapf & Stent

Stapf & Stent: 11 (1929); Chippindall: 207 (1955); Clayton & Renvoize: 252 (1986); Gibbs Russell et al.: 77 (1990); Watson & Dallwitz: 206 (1994).

Perennial, tufted, creeping; rhizomatous. **Leaf blade** linear, setaceous; *ligule* a fringe of hairs. **Inflorescence** a narrow, often 1-sided, spike-like panicle, rarely a raceme; *spikelets* solitary, 4–5 grouped on short lateral branches on the central axis. **Spikelet** laterally compressed, falling with glumes; *glumes* unequal, very dissimilar, awnless; lower glume small or reduced to a small linear scale; upper glume lanceolate, longer than spikelet, keeled, deeply concave, glabrous or hairy, scabrid on the keel, 1-nerved. **Floret** 1, bisexual; *lemma* similar in texture to glumes, scabrid on keel, hairy, hairs in tufts or a line of hairs on either side of keel, 3-nerved, entire, awnless; *palea* ± as long as lemma, obtuse, 2-keeled. **Lodicules** 2, cuneate. **Stamens** 3. **Ovary** ellipsoid; styles plumose above. **Photosynthetic pathway**. $C_4$; XyMS+. PCR sheath outlines uneven. PCR sheath extensions present. Maximum number of extensions cells 1. PCR cell chloroplasts centrifugal/peripheral.

**Species** 1, southern Africa: *Catalepis gracilis* Stapf & Stent, Lesotho, Mpumalanga, Free State, KwaZulu-Natal and Eastern Cape.

Species treatment by M.T. Nembudani.

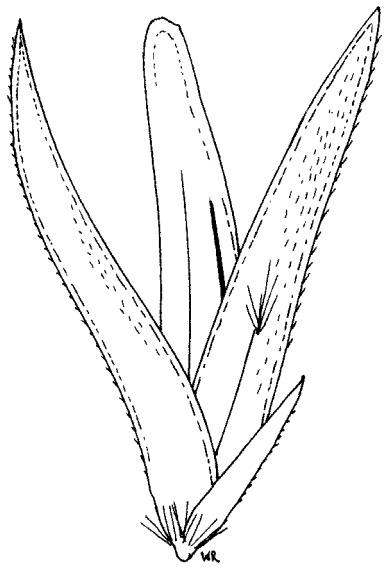


Figure 98.—*Catalepis gracilis* spikelet (4.4 × 2.6 mm). Artist: W. Roux.



Figure 99.—*Catalepis gracilis* spikelet (4–5 mm). Photographer: M. Koekemoer.

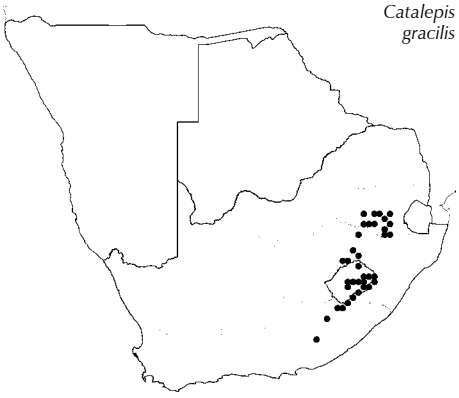
**Catalepis gracilis** Stapf & Stent, in *Kew Bulletin of Miscellaneous Information* 1929: 11 (1929). Type: South Africa, Mpumalanga, Ermelo, Nooitgedacht, *Potter (Henrici 1595)* (PRE, iso.).

GAUSE GRASS

Tufted perennial, 100–400 mm high; rhizome creeping. Leaf blade 10–150 × 1–2 mm, fine, curly with age. Inflorescence 15–50 mm long, spike-like. Spikelet 4–5 mm long; lower glume reduced to a small scale; upper glume 1-nerved; anther 1.5–2.0 mm long.

*Flowering*: January to March. *Ecology*: Sometimes in shallow sandy soil, but more often on black clay; in vleis, weed on roadsides. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. L, M, FS, KZN, EC. *Economics*: Highly palatable natural pasture and used for erosion control as pioneer.

Illustration: Chippindall pl. 4 (1955).
Anatomy voucher: *Smook 7143*.
Voucher: *Schweickerdt 1760*.




## *Catapodium Link

Link: 44 (1827); Stapf: 718 (1900); Hitchcock & Chase: 76 (1950); Hubbard: 181 (1954); Chippindall & Crook: 224 (1976); Stace: 158 (1980) under *Desmazeria* Dumont; Bor: 1721 (1985); Clayton & Renvoize: 107 (1986); Gibbs Russell et al.: 78 (1990); Watson & Dallwitz: 207 (1994); Sell & Murrell: 167 (1996).

*Scleropoa* Griseb.: 431 (1846); Chippindall: 50 (1955).



Figure 100.—*Catapodium rigidum* spikelet (5–7 mm). Photographer: M. Koekemoer.

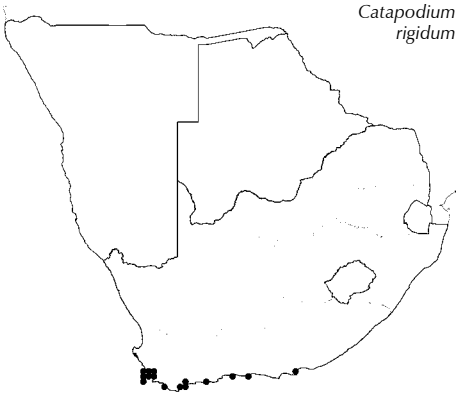
Annual, tufted or culms solitary, sometimes geniculate. **Leaf blade** rolled or expanded, glabrous; *ligule* a hyaline, unfringed membrane. **Inflorescence** a panicle with somewhat rigid, short branches, or a raceme, spike-like, linear to ovate, secund; *spikelets* solitary. **Spikelet** laterally compressed, green or purplish in colour, disarticulating above glumes; *glumes* ± equal, shorter than spikelet, similar to dissimilar, keeled, membranous, awnless; lower glume 1–3-nerved; upper glume 3–5-nerved. **Florets** 3–10, bisexual or *uppermost floret* reduced and sterile; *lemmas* overlapping at first, rounded at least towards base, glabrous, 5-nerved, awnless; *palea* ± equal to lemma, 2-keeled. **Lodicules** 2, ovate, hyaline. **Stamens** 3. **Ovary** ovoid, glabrous; styles distinct, plumose. **Caryopsis** hilum short; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$.

**Species** 2, Europe and North Africa to Iran, mainly Mediterranean region, introduced elsewhere; 1 naturalised in southern Africa: **Catapodium rigidum* (L.) C.E.Hubb., coastal districts of Eastern and Western Cape.

Species treatment by A.C. Mashau.




Figure 101.—*Catapodium rigidum*. A, plant; B, spikelet (6.0 × 1.2 mm). Artist: W. Roux.



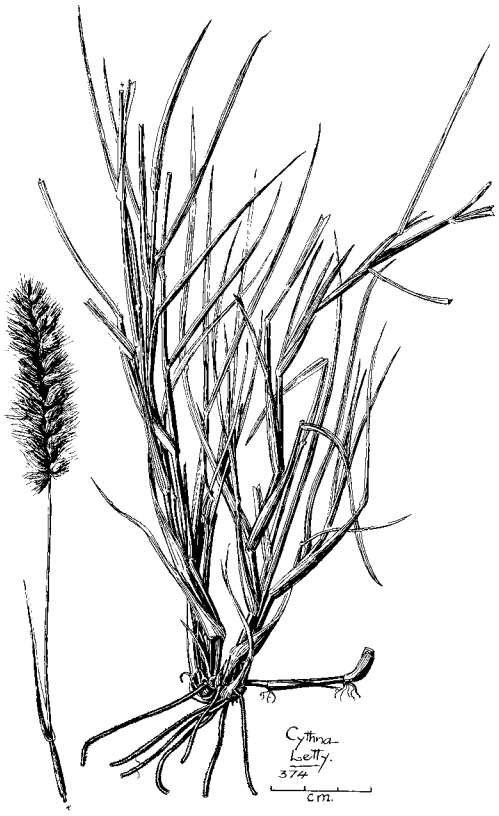




Figure 102.—*Cenchrus ciliaris*. Artist: C. Letty.

***Catapodium rigidum** (L.) C.E.Hubb., in Dony, *Flora of Bedfordshire* 437. (1953). Type: Europe.

*Desmazeria rigida* (L.) Tutin, in *Flora of the British Isles*: 1434 (1952).

*Scleropoa rigida* (L.) Griseb., in *Spicilegium Florae rumelicae et bithynicae* 2: 431 (1844).

FERN GRASS

Slender tufted annual, 100–250(–450) mm high. Leaf blade 30–150 × 1.0–2.0(–3.5) mm. Inflorescence a narrow panicle, 50–100 mm long, branches stiff, alternate; bearing 2–5 spikelets ± secund, on trigonous pedicels. Spikelet 5–7(–10) mm long, awnless; glumes 1.8–2.2 mm long, much shorter than spikelet; florets 6–10, widely spaced on fragile rachilla; lemma rounded on back at least at base; anther 0.3–0.5 mm long.

*Flowering*: October to December. *Ecology*: Mostly on waste land in parks, gardens and disturbed places; in moist shady areas, also in rock crevices amongst other Fynbos species. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Atlantic islands, Europe and Mediterranean region eastwards to Iran. Naturalised in South Africa also Australia, New Zealand, Tasmania and temperate Americas. EC, WC. *Economics*: Common garden and roadside weed; invader.

Illustration: Chippindall: 51, fig. 20 (1955); Hitchcock & Chase: 76, fig. 76 (1950).
Anatomy vouchers: *Ellis 672, 2244, 5450 & 5477.*
Voucher: *Hugo 1954*.

## **Cenchrus** L.

Linnaeus: 1049 (1753); Stapf: 431 (1899); Chippindall: 449 (1955); Delisle: 259 (1963); Launert: 45 (1970a); Clayton & Renvoize: 691 (1982); Clayton & Renvoize: 304 (1986); Clayton: 186 (1989); Gibbs Russell et al.: 79 (1990); Watson & Dallwitz: 210 (1994); Stieber & Wipff: 529 (2003); Chemisguy et al.: 107 (2010).

Annual or perennial. **Leaf blade** expanded, folded, or involute; *ligule* a fringed membrane to a fringe of hairs. **Inflorescence** a cylindrical spike-like panicle; each *spikelet* or *cluster of spikelets* enclosed by a deciduous involucre composed of 1 or more whorls of bristles and/or spines, joined at the base, forming a disc below the spikelet or joined some distance above, bristles sometimes ± flattened and/or

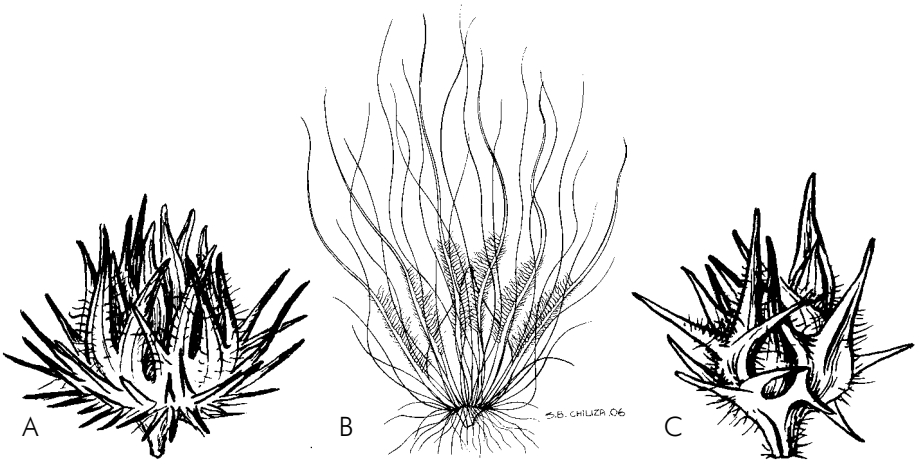



Figure 103.—*Cenchrus* spp. spikelets. A, *C. brownii*; B, *C. ciliaris*; C, *C. incertus*. Artists: A, G.E. Lawrence; B, S.B. Chiliza; C, M.E. Connell.



Figure 104.—*Cenchrus ciliaris* spikelet cluster (4–5 mm). Photographer: M. Koekemoer.

hardened to form rigid spines enclosing spikelets, thus forming burrs. **Spikelet** lanceolate to ovate, dorsiventrally compressed, acute to acuminate; *glumes* unequal, awnless; lower glume up to half as long as spikelet, hyaline or membranous, 1–5-nerved; upper glume a little shorter than spikelet, 1–7-nerved. **Florets** 2; *lower floret* male or sterile, lemma as long as spikelet, membranous, acuminate, 3–7-nerved, awnless, palea similar to lemma, hyaline; *upper floret* bisexual, *lemma* as long as spikelet, similar to firmer than glumes, membranous to chartaceous, not indurated, 5–7-nerved, entire, smooth, flat, with thin margins covering much of palea; *palea* similar to lemma, hyaline. **Lodicules** 0 or abortive. **Stamens** 3. **Ovary** ovoid; styles plumose above. **Caryopsis** ellipsoid to ovoid, dorsiventrally compressed; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; NADP-ME (*pauciflorus, incertus*); XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 9$, 12 (aneuploids, polyploidy).




Figure 105.—*Cenchrus brownii*. Artist: M.E. Connell.

**Species** 22, tropical and warm temperate; 1 indigenous and 3 naturalised in southern Africa, widespread.

Species treatment by A.C. Mashau.

### Quick guide to easily confused genera/taxa:

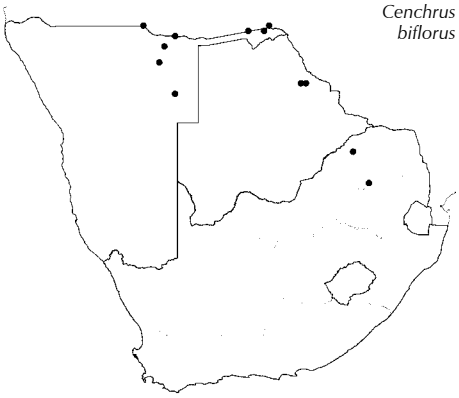
1. Lemma 9-lobed; bristles absent from the spikelet base . . . . . **Enneapogon cenchroides**
   Lemma not 9-lobed; bristles present from the spikelet base . . . 2
2. Bristles persistent on inflorescence . . . . . **Setaria**
   Bristles and/or spines fall with the spikelet . . . . . .3
3. Bristles and/or spines free throughout, always ± filiform . . . . . **Pennisetum**
   Bristles and/or spines connate to a greater or lesser degree to form a disc (may be minute) . . . . . **Cenchrus ciliaris**

### Key to species:

1. Perennial; bristles 5–10 mm long, joined to form a small inconspicuous disc at base of spikelet cluster . . . . . **C. ciliaris**
   Annual; bristles and/or spines 2–5 mm long, joined to form a hard spiny involucre or burr around spikelet cluster . . . . . 2
2. Involucre with two distinct longitudinal clefts, bristles absent; spines flattened and spreading at the base . . . . . *__C. incertus__
   Involucre without distinct longitudinal clefts, an outer whorl of bristles and an inner whorl of connate spines present . . . . . 3
3. Spines and/or bristles connate at base; involucre with a distinct ovate disc at the base . . . . . *__C. biflorus__
   Spines and/or bristles connate for a distance upwards from base; involucre with an inconspicuous disc at the base . . . . *__C. brownii__

*__Cenchrus biflorus__ Roxb., in *Flora indica* 1: 288 (1820). Type: India.

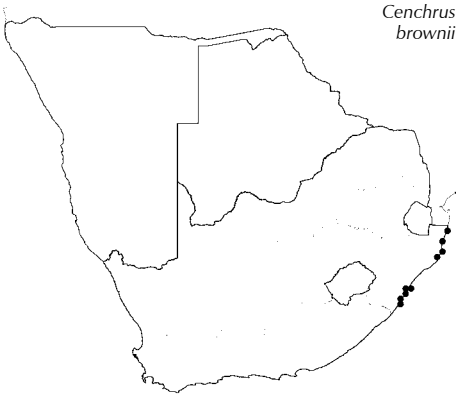
Tufted annual to 800 mm high. Leaf blade 60–350 × 4–10 mm; ligule a fringed membrane. Inflorescence a false spike 20–100 mm long; bearing spikelet clusters in a burr, base of burr a distinct ovoid


*Cenchrus biflorus*

disc, involucre of two whorls; outer whorl of 40–60 short, bristle-like spines; inner whorl with connate spines which are plumose on their inner surface and 1–3 shallow grooves on their outer surface. Spikelet 5 × 4 mm; upper lemma thinly coriaceous; anther 0.8–1.2 mm long.

*Flowering*: February to June. *Ecology*: Mainly sandy soil. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from tropical America. Northwards to tropical Africa extending to Arabia and India; also introduced into Australia. N, B, LIM. *Economics*: Invader; noxious weed in many parts of the world.

Illustrations: De Lisle: 336, fig. 21(I–L) (1963); Stieber & Wipff: 536 (2003).
Anatomy voucher: *Ellis 3684*.
Voucher: *De Winter 9194*.


*Cenchrus brownii*

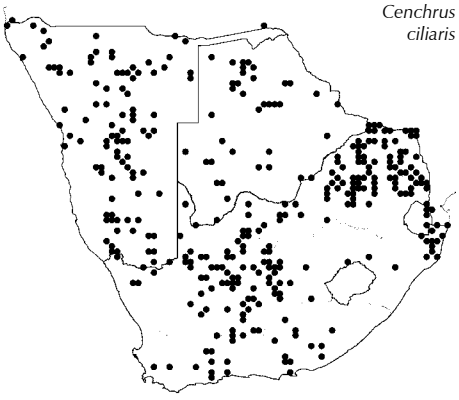
***Cenchrus brownii** Roem. & Schult., in *Systema Vegetabilium* 2: 258 (1817). Type: Australia.

Fine-bristled burgrass

Tufted annual 300–900 mm high. Leaf blade 80–150 × 8–10 mm; ligule a fringed membrane. Inflorescence a false spike 30–100 mm long; bearing spikelet clusters in a burr or involucre; an inconspicuous disc present at the base; involucre in two whorls: outer whorl of 40–80 spines, which are bristle-like and short; an inner whorl of connate spines, plumose on their inner surface. Spikelet 4–6 × 4–6 mm; upper lemma thinly coriaceous; anther 1.5–2.3 mm long.

*Flowering*: January to June. *Ecology*: Mainly sandy soil. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from tropical America. Now pantropical, introduced into Australia at a very early date. KZN. *Economics*: Invader; weed.

Illustration: Stieber & Wipff: 532 (2003).
Anatomy vouchers: *Ellis 3397, 4046, 4059* & *6022*.
Voucher: *Smook 1906*.


*Cenchrus ciliaris*

**Cenchrus ciliaris** L., in *Mantissa Plantarum altera*: 302 (1771). Type: South Africa, Cape of Good Hope, *Koenig s.n*. (Linn, holo.).

Foxtail buffalo grass, bloubuffelsgras, buffelsgras

Tufted perennial 600–1 000 mm high. Leaf blade 100–250 × 4–8 mm. Inflorescence a bristly false spike, 40–120 mm long, straw- or purple-coloured; all bristles are joined at base below spikelet cluster to form a small inconspicuous disc, bristles mostly 5–10 mm long; outer bristles slender, scabrid; inner bristles slender, plumose. Spikelet 4–5 × 3 mm; lower glume 1-nerved or nerveless; upper glume 1–3-nerved, minutely awned; lower lemma usually 5-nerved, minutely awned; lower and upper lemmas similar, upper lemma slightly thicker in texture; anther 1.5–2.7 mm long.

[A variable species, with many cultivars available e.g. 'Malopo'.]

*Flowering*: August to April. *Ecology*: Especially on sandy soils; common in hot dry areas. *Distribution*: Common mainly Africa, through Arabia to India, introduced to Australia and other hot drier areas of the world. N, B, S, LIM, NW, G, M, FS, NC, WC, EC. *Economics*: A palatable species with a high leaf production; often planted as pasture (*Farming in South Africa* leaflet 114. 1983. *A cultivation guide*).

Anatomy vouchers: *Ellis 86* & *853*.
Voucher: *Smook 2822*.

*__Cenchrus incertus__ M.A.Curtis, in *Boston Journal of Natural History* 1: 135 (1837). Type: USA.

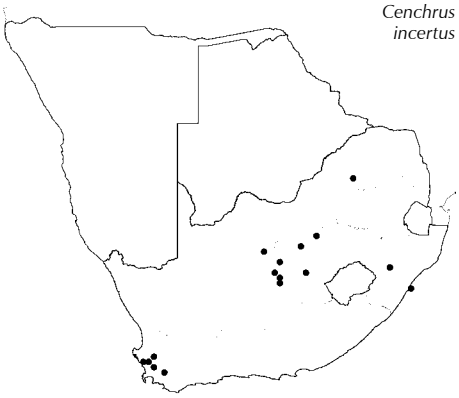
*C. pauciflorus* Benth., *Botany of the voyage of HMS Sulphur* 56. (1844).

BURR GRASS, SANDBURR, SPINY SAND BURR

Tufted annual 100–400 mm high. Leaf blade 60–120 × 3–4 mm. Inflorescence open or compact 20–80 mm long; burrs ovoid to globose with longitudinal clefts on two sides and 8–40 spines of variable shapes and sizes; outer spines are connate and spreading in all directions; inner spines have a plumose inner surface and are more regular; bristles absent. Spikelet 5–7 × 3–4 mm; upper lemma thinly coriaceous; anther 1.3–2.5 mm long.

*Flowering*: January to March. *Ecology*: Mainly sandy soil. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from tropical America; now pantropical. LIM, FS, NC, WC. *Economics*: Invader; noxious weed in many parts of the world.

Illustration: Chippindall: 452, fig. 375 (1955).
Anatomy voucher: *Ellis 3616*.
Voucher: *Fellingham 244*.




## **Centropodia** Rchb.

Reichenbach: 212a (1828); Chippindall: 246, fig. 218 (1955) under *Danthonia* Stapf; Conert: 239 (1962) under *Asthenatherum* Nevski; Hubbard: 122 (1970) under *Asthenatherum* Nevski; Cope: 657 (1982); Clayton & Renvoize: 177 (1986); Gibbs Russell et al.: 80 (1990); Watson & Dallwitz: 214 (1994); Cope: 12 (1999); Müller: 124 (2007); Barker et al.: 150 (2007); Peterson et al.: 1113 (2011).

*Asthenatherum* Nevski (1934).

Perennial or annual, tufted to decumbent; rhizomatous. **Leaf blade** linear or setaceous, somewhat rigid, flat or rolled and pungent; *ligule* a fringe of hairs. **Inflorescence** a panicle, dense and contracted; *spikelets* solitary, pedicelled or subsessile. **Spikelet** lanceolate, lat-

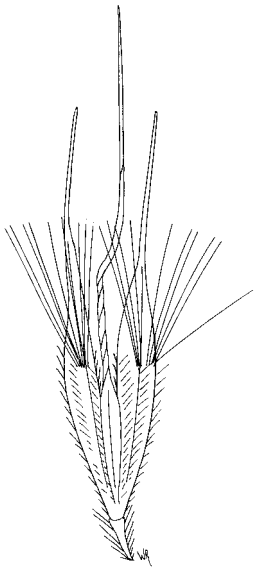


Figure 106.—*Centropodia glauca* lemma (8.0 × 1.3 mm). Artist: W. Roux.



Figure 107.—*Centropodia glauca* spikelet (7.5–10.0 mm). Photographer: M. Koekemoer.

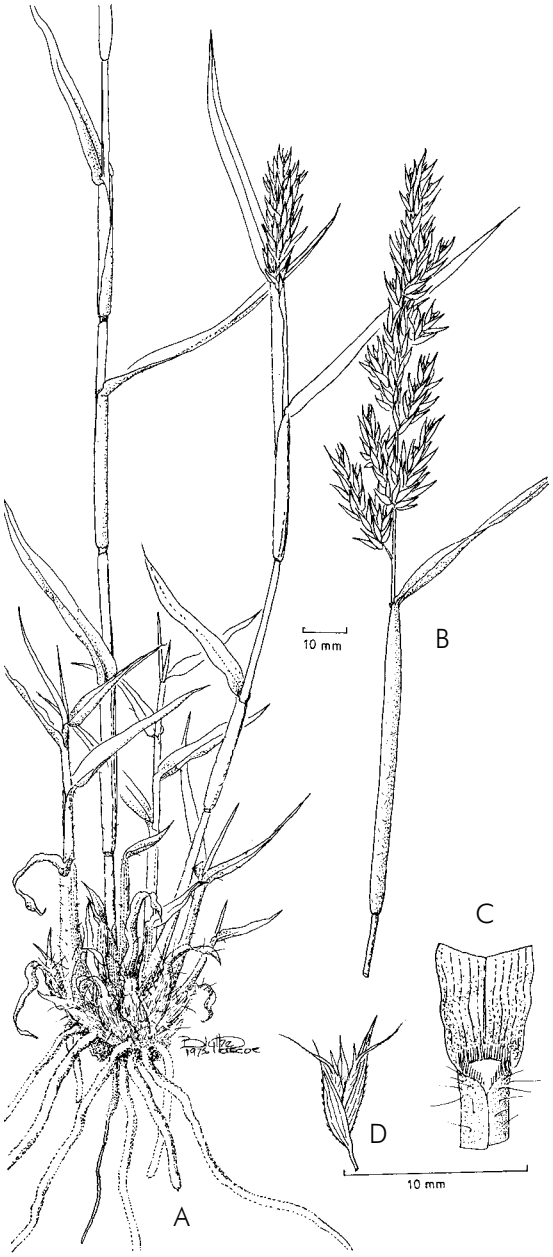



Figure 108.—*Centropodia glauca*. A, plant; B, inflorescence; C, ligule; D, spikelet. Artist: B. Pascoe.

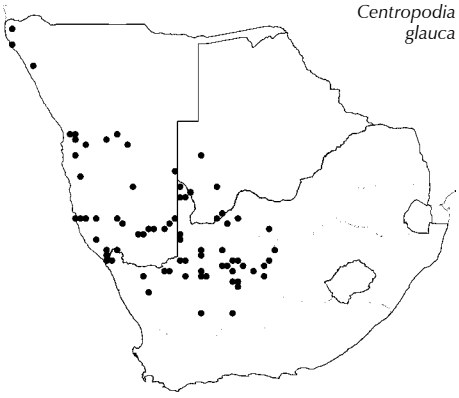
erally compressed, disarticulating above glumes and ± between florets; *glumes* ± equal, as long as to longer than spikelet, similar, firm, with hyaline margin, prominently 5–11-nerved, separated by an internode, awnless; upper glume somewhat narrower than lower, usually acuminate. **Florets** 3–6, bisexual or sometimes upper floret male, sterile and reduced to a small scale; *lemma* similar in texture to glumes, membranous, prominently 7–11-nerved, densely and shortly hairy between nerves and with tufts of hairs at point of insertion of median awn, 2-lobed; lobes narrow, hyaline and tapering into short straight lateral awns; *central awn* arising from the sinus, geniculate; *callus* obliquely pungent, hairy; *palea* membranous, obtuse or 2-lobed, 2-keeled, keels winged. **Lodicules** 2, glabrous, cuneate, fleshy. **Stamens** 3. **Ovary** glabrous; styles long, densely plumose. **Caryopsis** ± 3.4 mm long, narrowly obovate, hilum short; pericarp fused; embryo large. **Photosynthetic pathway**: $C_4$; XYMS+. **Cytology**: $x = 6$, 12 (high polyploidy).

**Species** 4, North Africa through Middle East to India; 2 in southern Africa, Namibia, Botswana, North West and Northern Cape.

Species treatment by M.J. Moeaha.

**Key to species:**

Lemma central awn 3–5 mm long; spikelet 7.5–10.0 mm long, 3(–4)-flowered; panicle 30–120 mm long . . . . . **C. glauca**
Lemma central awn 10–16 mm long; spikelet 18–24 mm long, 4–6-flowered; panicle 150–270 mm long . . . **C. mossamedensis**



*Centropodia glauca*

**Centropodia glauca** (Nees) Cope, in *Kew Bulletin* 37: 658 (1983). Type: Northern Cape, Klein Namaqualand, Kuigunjels, mouth of Orange River, *Drège 2536*.

*Asthenatherum glaucum* (Nees) Nevski, in *Acta Universitatis Asiae mediae, sér. 8b, Botany* 17: 9 (1934).

*Asthenatherum glaucum* (Nees) Nevski var. *lasiophyllum* (Pilg.) Conert, in *Senckenbergiana Biologica* 43,4: 253 (1962). Type: Namibia, Great Namaqualand, *Dinter 1125*.

*Danthonia glauca* Nees, in *Florae Africae australioris* III: 327 (1841). Type as above.

GHA GRASS

Robust tufted perennial or soft annual, 200–750 mm high; basal leaf sheaths loose, densely hairy especially on smaller plants and the annuals. This species tends to be annual on the dunes and perennial in the gravel flats between the dunes. Leaf blade to 110 × 8–10 mm. Inflorescence 30–120 mm long. Spikelet 7.5–10.0 mm long; glumes 6.5–10.0 mm long; 3(–4)-flowered; lower 2 florets bisexual; upper floret usually male; lemma central awn 3–5 mm long; anthers 2.0–3.2 mm long; caryopsis 3.4 mm long, narrowly obovate.

*Flowering*: September to May. *Ecology*: Mainly on loose, deep sandy substrates; either on dunes or on gravel plains between dunes. *Frequency in southern Africa*: Common at foot of sand dunes. *Distribution*: Endemic. N, B, NW, NC. *Economics*: Well-utilised, palatable grass.

Illustrations: Chippindall: 246, fig. 218 (1955) under *Danthonia* Stapf; Conert: 239, fig. 4–6, fig. 7–8 (1962) under *Asthenatherum* Nevski; Hubbard: 123, tab. 39 (1970) under *Asthenatherum* Nevski; Müller: 125 (2007).
Anatomy vouchers: *De Winter & Hardy 7890, Koch PRE 37090, Strey 2593, Ellis 2177, 2178, 4337, 5064 & 5074*.
Voucher: *Ellis 4337*.

**Centropodia mossamedensis** (Rendle) Cope, in *Kew Bulletin* 37: 658 (1983). Type: Angola, *Welwitsch 2282*.

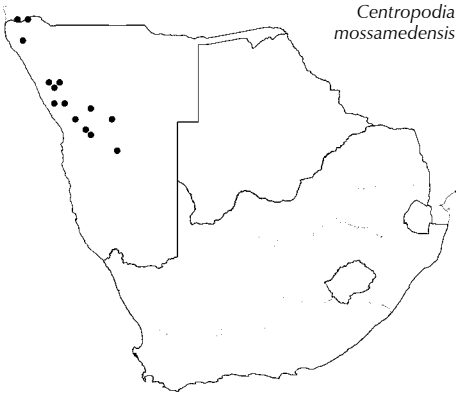
*Asthenatherum mossamedense* (Rendle) Conert, in *Senkenbergiana Biologica* 43: 254 (1962).

*Danthonia mossamedensis* Rendle, in *Catalogue of African Plants of Welwitsch* 2,1: 211 (1899).

Tufted perennial 600–1 500 mm high; rhizome woody, bulbous, covered in hairy scales; basal sheaths usually absent, but if present then not hairy. Leaf blade to 200 × to 7 mm. Inflorescence 150–270 mm long. Spikelet 18–24 mm long; glumes 17–24 mm long; 4–6-flowered; lower two florets bisexual, upper floret usually male or sterile; lemma central awn 10–16 mm long; anthers 2.8–4.5 mm long.

*Flowering*: March to June. *Ecology*: River beds and drainage lines. *Frequency in southern Africa*: Locally common. *Distribution*: Angola. N.

Anatomy vouchers: *De Winter & Hardy 8021, Ellis 4725, 4726 & 4750* (Ellis 1989). Voucher: *Oliver, Müller & Steenkamp 6711*.




## **Chaetobromus** Nees

Nees ab Esenbeck: 449 (1836); Stapf: 537 (1899); Chippindall: 272 (1955); Clayton & Renvoize: 173 (1986); Ellis: 195 (1988); Gibbs Russell et al.: 81 (1990); Watson & Dallwitz: 219 (1994); Verboom & Linder: 57 (1998); Linder et al.: 340 (2010).



Figure 109.—*Chaetobromus involucratus* spikelet (12–18 mm). Photographer: M. Koekemoer.

Perennial, tufted to mat-forming; sometimes stoloniferous or rooting from lower nodes. **Leaf blade** linear to linear-lanceolate, flat or folded; *ligule* a fringe of hairs. **Inflorescence** a panicle, open to contracted, sometimes with only a few spikelets; *spikelets* solitary, pedicelled; pedicel articulated some distance below spikelet, long-hairy at articulation. **Spikelet** laterally compressed, falling with glumes and disarticulating between florets; *glumes* ± equal, as long as to longer than spikelet, keeled, membranous, pubescent, scabrid especially on nerves, awnless; lower glume 5–11-nerved; upper glume narrower, prominently and closely 3–5-nerved. **Florets** 2–4; *lower floret* bisexual; *upper floret* reduced; lemmas decreasing in size upwards, *lowest lemma* 2.5–5.8 mm long, membranous, 7–9-nerved, glabrous or loosely hairy, 2-lobed, lobes with slender, usually long awns or lower lemma awnless, *central awn* arising between lobes, awn twisted in lower part, geniculate or straight; *callus* pungent, hairy; *palea* obscurely 2-nerved, hyaline. **Lodicules** 2, fleshy, cuneate, glabrous. **Stamens** 3. **Ovary** glabrous; styles plumose above. **Caryopsis** lorate, pale brown or yellow, surface smooth, dull; hilum long-linear; pericarp fused. **Photosynthetic pathway**: $C_3$ (probably, though the lateral cell count is low between all but a few bundles, at least in subsp. *dregeanus*); XyMS+. **Cytology**: $x = 6$.

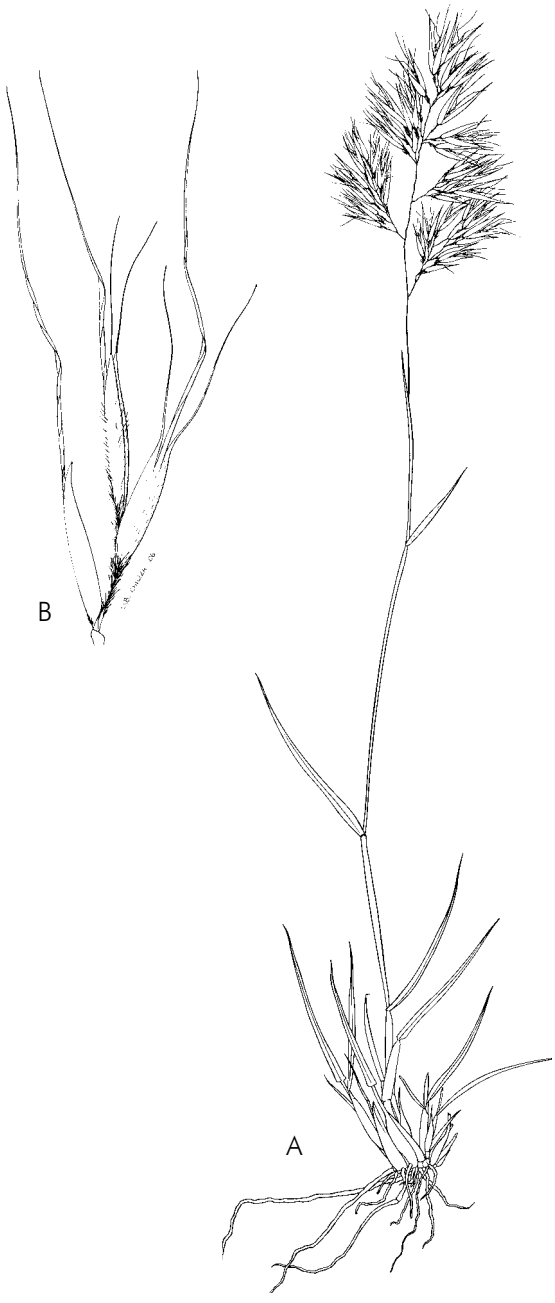



Figure 110.—*Chaetobromus involucratus*. A, plant; B, florets. Artist: S.B. Chiliza.

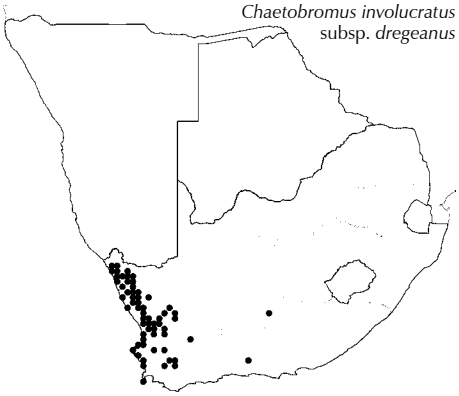
**Species** 1, southern Africa, *Chaetobromus involucratus* (Schrad.) Nees (subsp. *dregeanus,* subsp. *involucratus,* subsp. *sericeus*), southern Namibia, Northern and Western Cape.

[Note: Although a recent biosystematic study (Verboom & Linder 1997) and anatomical evidence (Ellis 1988) indicates three major groups, extensive overlapping of characters suggests *Chaetobromus* is a monotypic genus with three infraspecific taxa.]

Species treatment by A.C. Mashau.

**Key to species:**

1. Inland habitats, sometimes along the coast on rocky outcrops, especially granites; leaf blade commonly rolled or tightly folded, sometimes expanded, glabrous or sparsely hairy, but hairs not distinctly adpressed to leaf sheath; plant loosely to tightly tufted, mostly with contracted rhizomes; from Steinkopf area (2917: Steinkopf) southwards to Hex River (3319: Hex River) . . . . . **C. involucratus** subsp. **dregeanus**
   Coastal habitats, often in loose sand or dunes; leaf blade mostly expanded, sometimes with incurved margins, glabrous or if hairy, hairs closely adpressed to leaf surface; plant loosely tufted to mat-forming with elongated rhizomes . . . . . 2
2. Second floret lemma lateral awn 5.1–8.4 mm long; lowest lemma central awn 9–19 mm long, usually not geniculate; spikelet 11–18 mm long; plants often stoloniferous, evergreen; leaf blade glabrous; distributed south of the Groenriver (3017DC, river mouth) . . . . . **C. involucratus** subsp. **involucratus**
   Second floret lemma lateral awn 2.6–4.8 mm long; lowest lemma central awn 3.0–12.0 mm long, straight or geniculate; spikelet 9–14 mm long; plants mostly lacking stolons, summer deciduous; leaf blade glabrous to densely villous; distributed north of Kleinsee (2917CA) into Namibia . . . . . **C. involucratus** subsp. **sericeus**


*Chaetobromus involucratus* subsp. *dregeanus*

**Chaetobromus involucratus** (Schrad.) Nees subsp. **dregeanus** (Nees) Verboom, in *Nordic Journal of Botany* 18: 74 (1998). Type: South Africa, Northern Cape, Little Namaqualand, between Silwerfontein, Koperberg and Kaus Mountain, *Drège s.n.* (K, lecto.).

*C. dregeanus* Nees, in *Florae Africanae australioris* 1: 343 (1841).

*C. interceptus* Nees, in *Florae Africanae australioris* 1: 342 (1841).

*C. schlechteri* Pilg., in *Botanische Jahrbücher* 40: 82 (1907).

*Danthonia dregeana* Steud., in *Synopsis plantarum glumacearum* 1: 244 (1855).

*Danthonia intercepta* (Nees) Steud., in *Synopsis plantarum glumacearum* 1: 243 (1855).

Tufted perennial to 600 mm high; rhizomes contracted and usually vertical. Leaf blade to 270 × 4 (rarely 5) mm, commonly rolled or tightly folded, sometimes expanded, glabrous or sparsely hairy but hairs not distinctly adpressed to leaf sheath. Spikelet 10–21 × to 10 mm (including awns), 2–4-flowered; glumes 9.9–20.5 mm long; lowest floret lemma 3.4–5.8 mm long, back glabrous, sometimes lateral lobe awn up to 8.8 mm long, central awn 5.6–23.0 mm long mostly geniculate; second floret lemma 3.1–5.0 mm long, back glabrous or sometimes sparsely to moderately villous, rarely densely villous, lateral lobe awn 2.9–10.5 mm long, central awn 9–24 mm long, geniculate; anther 3.7–4.7 mm long.

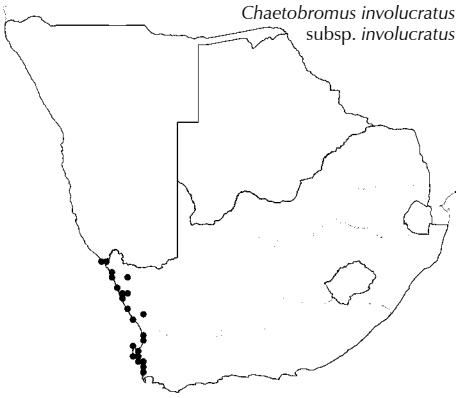
*Flowering*: September to November. *Ecology*: Sandy areas and rocky hillsides; in low rainfall areas. Mostly inland but sometimes on rocky,

especially granitic outcrops along the coast. *Frequency in southern Africa*: Common. *Distribution*: Endemic. 2917: Steinkopf area southwards to 3319: Hex River. NC, WC, EC. *Economics*: A palatable grass with a good leaf production and well-utilised by livestock.

Illustration: Chippindall: 274, fig. 245 (1955).
Anatomy vouchers: *Ellis 2166, 2192, 2422, 2424, 2426, 5400* & *5406*.
Voucher: *Goldblatt 2558*.

**Chaetobromus involucratus** (Schrad.) Nees subsp. **involucratus,** in *Nordic Journal of Botany* 18: 72 (1998). Type: South Africa, Western Cape, Paarden Eiland, *Wolley-Dod 3078* (K, holo.; PRE, fg.).

*C. schraderi* Stapf, in Thiselt. Dyer, *Flora capensis* 7: 538 (1899).

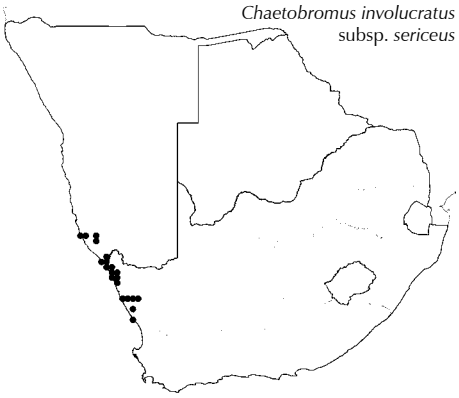

*Chaetobromus involucratus* subsp. *involucratus*

Tufted perennial to 300 mm high, evergreen; rhizomes elongated, mainly horizontal; some or all basal leaves and sheaths covered in long, silky, adpressed hairs. Leaf blade to 120 × to 6 mm, mostly expanded but sometimes with incurved margins, glabrous. Spikelet 11–18 × 10 mm, 3–4-flowered; glumes 10.6–17.8 mm long; lowest floret lemma 2.5–4.0 mm long, back glabrous, lobes absent, central awn 9–19 mm long, usually not geniculate; second lemma 1.8–3.0 mm long, densely covered in short, erect hairs, lateral lobe awn 5.1–8.4 mm long, central awn 11–17 mm long, geniculate; anther 2.8–4.0 mm long.

*Flowering*: September to November. *Ecology*: Coastal areas. *Frequency in southern Africa*: Locally common south of Groenrivier. *Distribution*: Endemic. Southwards from the Groenrivier (3017DC; river mouth) to Cape Town. NC, WC.

Anatomy vouchers: *Ellis 692, 703, 1696, 2357* & *2358*.
Voucher: *Ellis 1691*.

**Chaetobromus involucratus** (Schrad.) Nees subsp. **sericeus** (Nees) Verboom, in *Nordic Journal of Botany* 18: 72 (1998). Type: South Africa, Northern Cape, Little Namaqualand, near the mouth of the Orange River, *Drège s.n.* (K, lecto.; B [*Drège 2570*], K, syn.).


*Chaetobromus involucratus* subsp. *sericeus*

Loosely tufted perennial; mat-forming; summer deciduous. Leaf blade 10–90 (rarely to 120) × 1.4–4.0 mm, expanded but sometimes with incurved margins, glabrous to densely villous, with hairs closely adpressed to the leaf surface. Spikelet 9–14 mm long; glumes 7.9–14.0 mm long; lowest floret lemma back glabrous or occasionally villous, 2.8–4.7 mm long, sometimes with lateral lobe awn up to 2.9 mm long, central awn 3.0–12.0 mm long, straight or geniculate; second lemma 1.8–3.3 mm long, moderately to densely (mostly) villous, lateral lobe awn 2.6–4.8 mm long (excluding lobes), central awn 7–11 mm long, geniculate; anther 2.5–3.2 mm long.

*Flowering*: August to November with occasional records from as early as May. *Ecology*: In arid coastal areas. *Distribution*: Endemic. North of Kleinsee (2917CA) to Klinghardt Mountains in southern Namibia. N, NC, WC.

Anatomy vouchers: *Ellis 2183, 2185* & *5344*.
Voucher: *Smook 7859*.

## **Chloris** Sw.

Swartz: 25 (1788); Stapf: 640 (1900); Hitchcock & Chase: 502 (1950); Chippindall: 196 (1955); Chippendall: 198 (1955); Launert: 47 (1970a); Renvoize: 337 (1974); Renvoize: 844 (1977); Clayton & Renvoize: 236 (1986); Gibbs Russell et al.: 82 (1990); Watson & Dallwitz: 235 (1994); Cope: 209 (1999); Barkworth: 204 (2003).




Figure 111.—*Chloris pycnothrix*. A, plant; B, ligule. Artist: C. Smith.



Figure 112.—*Chloris virgata* spikelet (3.0–3.5 mm). Photographer: M. Koekemoer.

Annual or perennial, tufted; stoloniferous and rhizomatous. **Leaf blade** expanded, folded or rolled; rounded or keeled and flabellate; *ligule* a short, fringed membrane or fringe of hairs. **Inflorescence** of few to many 1-sided spike-like racemes, digitate or densely crowded on an elongated axis; *spikelets* solitary or in pairs, shortly pedicelled or subsessile. **Spikelet** laterally compressed, disarticulating above glumes; *glumes* unequal, shorter than spikelet to longer (at least upper glume), membranous, keeled, 1-nerved, awnless or with awn-point; upper glume acute to bidentate. **Florets** 2–6; *lowest floret* bisexual; rarely all bisexual, *lemma* similar to firmer in texture than glumes, membranous or cartilaginous, dissimilar; *lowest lemma* keeled, usually hairy on margins or keels, or with a long tuft of hairs on upper part, 1–7-nerved, shortly 2-lobed, with a subapical awn, *awn* shorter, as long as or longer than body of lemma; *callus* usually minute, rounded or pungent, hairy; *palea* as long as lemma, 2-keeled, hyaline; *remaining florets* sterile or much reduced, sometimes male; *second lemma* spathulate or obovate, truncate, glabrous, awned, awn straight, shorter than body of lemma; *third* and *fourth lemma*, if present, much reduced, uppermost often reduced to a bristle. **Lodicules** 2, minute. **Stamens** 3. **Ovary** glabrous; styles plumose above. **Caryopsis** ellipsoid, trigonous to lanceolate and subterete; hilum short; pericarp fused; embryo large ($^1/_2$–$^2/_3$ the grain length). **Photosynthetic pathway**: $C_4$; PCK (6 species); XyMS+. **Cytology**: $x = 10$ (aneuploids, high polyploidy).

**Species** ± 55, tropical and warm temperate regions; 8 in southern Africa, widespread.

Species treatment by M.T. Nembudani and L. Fish.

### Quick guide to easily confused genera:

1. Lemma back rounded or flat; ligule an unfringed membrane . . . . . **Lintonia**
   Lemma keeled; ligule a fringed membrane or fringe of hairs . . . 2
2. Glumes equal; spikelet with 3 to 4 fertile florets . . . . **Tetrapogon**
   Glumes unequal; spikelet with only 1 fertile floret . . . . . 3
3. Upper glume awnless . . . . . **Chloris**
   Upper glume awned . . . . . **Eustachys**

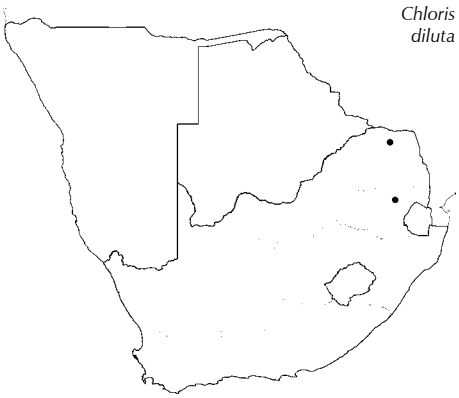
### Key to species:

1. Racemes numerous along a 40–180 mm long elongated central axis . . . . . **C. roxburghiana**
   Racemes less than 20, digitate or subdigitate . . . . . 2




Figure 113.—*Chloris* spp. spikelets with glumes removed showing florets. A, *C. gayana* (8.0 × 1.5 mm); B, *C. flabellata* (2.7 × 2.2 mm); C, *C. mossambicensis* (9.0 × 3.3 mm); D, *C. virgata* (11.0 × 2.2 mm); E, *C. roxburghiana* (16.0 × 0.7 mm); F, *C. truncata* (8.0 × 1.2 mm); G, *C. pycnothrix* (19.0 × 0.7 mm). Artist: M. Ueckermann.

2. Lowest lemma awn 0.5–1.0 mm long; raceme 8–30 mm long . . . . . **C. flabellata**
Lowest lemma awn 2–30 mm long; raceme 30–150 mm long . . .3
3. Lowest lemma glabrous or hairy only near apex . . . . . .4
Lowest lemma hairy all way up margins and keel or only at the base and apex . . . . . 6
4. Lowest lemma glabrous, awn 11–27 mm long . . . **C. pycnothrix**
Lowest lemma hairy in upper ½ , awn 2–12 mm long . . . . . 5
5. Leaf apex broadly rounded and blunt; anther to 0.5 mm long; racemes 6–15; lowest lemma black at maturity . . . . . ***C. truncata**
Leaf apex tapering to a fine point; anther 1.0–1.2 mm long; racemes 4–6; lowest lemma pallid at maturity . . . . . **C. diluta**
6(3). Leaf apex obtuse, sometimes narrowly so; callus pungent . . . . . **C. mossambicensis**
Leaf apex tapering to a fine point; callus rounded . . . . . 7
7. Lowest lemma awn much longer than lemma body, subapical hairs 1.5–4.0 mm long; uppermost leaf inflated around young inflorescence . . . . . **C. virgata**
Lowest lemma awn shorter to as long as lemma body; apical hairs 0.5–1.0 mm long; uppermost leaf not inflated around young inflorescence . . . . . **C. gayana**




**Chloris diluta** Renvoize, in *Kew Bulletin* 31: 844 (1977). Type: Zimbabwe, *Simon, Rushworth & Mavi 1830* (K, holo.; PRE, iso.).

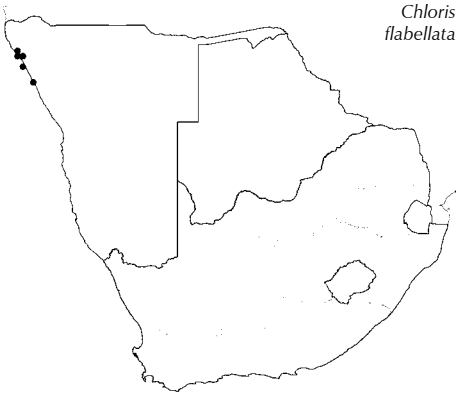
Perennial 300–1 000 mm high; with rhizome and stolons; culm wiry, usually erect. Leaf blade 100–300 × 4–7 mm, acuminate, tapering to a fine point, densely hairy. Inflorescence digitate or subdigitate, racemes 4–6, 50–80 mm long, green tinged with purple; spikelets delicate, overlapping for about half their lengths. Spikelet 2–4 mm

long, 2-flowered; lower glume 2.0–2.5 mm long; upper glume 3.3–4.0 mm long; lowest lemma 3.5 mm long, elliptic, hairy only on upper half of the margins, otherwise glabrous, awn 8–12 mm long, pallid at maturity; second lemma 1 mm long, narrowly oblong, awn 2–8 mm; anther 1.0–1.2 mm long.

[Appears similar to *C. pycnothrix*, which has leaf blade tip broadly rounded and lowest lemma awn 11–27 mm long, and *C. truncata*, which has leaf tip finely rounded, 6–15 racemes and lowest lemma black at maturity.]

*Flowering*: March to June. *Ecology*: In scrub and riverine forest on river banks and in kloofs. *Frequency in southern Africa*: Rare. *Distribution*: Zimbabwe. LIM, M.

Anatomy vouchers: *Ellis 4483* & *4484*.
Voucher: *Scheepers 1138*.



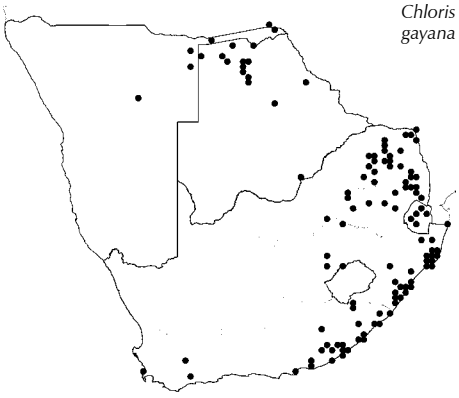
*Chloris flabellata*

**Chloris flabellata** (Hack.) Launert, in *Mitteilungen der Botanischen Staatssammlung München* 8: 147 (1970). Type: Angola, Mossamedes, *Höpfer 78*.

Sward-forming perennial 200–450 mm high; stolons stout, woody. Leaf blade 50–80 × 3–5 mm, densely hairy; upper leaf sheath inflated. Inflorescence digitate, racemes 8–20, 10–30 mm long, stout, densely compacted, curved inwards, yellowish-green to brownish; spikelets overlap for most of their lengths. Spikelet 2.0–2.5 mm long, 3-flowered; lower glume 1.5 mm long; upper glume 2.0–2.5 mm long; lowest lemma 2.5 mm long (excluding awn), broadly elliptic, keel and margins densely hairy with long white silky hairs usually along entire length, awn 0.5–1.0 mm long; second lemma 1.5–2.0 mm long, glabrous, awn 0.5–1.0 mm long; third lemma 0.5–1.0 mm long, glabrous, awnless; anther 1.0–1.5 mm long.

*Flowering*: December to April. *Ecology*: Confined to coastal regions on saline marshes or flats, also in sandy, muddy places and edges of reed beds. *Frequency in southern Africa*: Rare. *Distribution*: Southern Angola; N. *Economics*: Erosion control.

Anatomy vouchers: *Ellis 4354* & *4761*.
Voucher: *Tinley 1626*.



*Chloris gayana*

**Chloris gayana** Kunth, in *Révision des graminées* 1: 293 (1830). Type: Senegal, *Herb. Gay 21* & *40* (syntypes).

RHODES GRASS

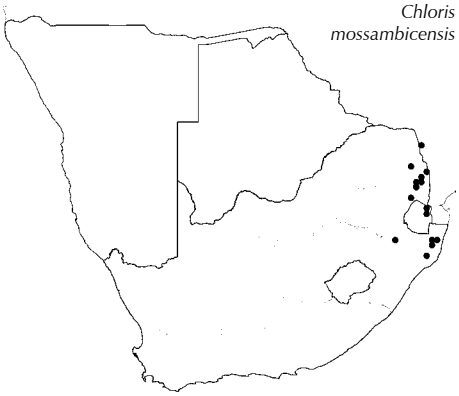
Tufted perennial 500–1 200 mm high; with stolons; basal leaf sheaths strongly keeled. Leaf blade 250–500 × 3–9 mm, tapering to a fine point. Inflorescence digitate, racemes 7–20, 40–150 mm long, green, greenish-brown or light brown; spikelets overlapping for most of their length. Spikelet 3–5 mm long, 3 or 4-flowered; lower glume 1.5–2.5 mm long; upper glume 2–4 mm long; lowest lemma 2.5–3.5 mm long, lanceolate-ovate, sparsely to densely hairy on the margins and keel, with hair length increasing upwards on margins, sometimes margins hairy only near apex, apical hairs 0.5–1.0 mm long, awn 3.4–7.0 mm long, callus rounded; second lemma 1.5–3.0 mm long, lanceolate, glabrous or rarely hairy on the margins and keel, awn 1.5–5.5 mm long; third lemma reduced to an awnless, glabrous, clavate scale 0.75–2.00 mm long, occasionally similar to the second, but then with a rudimentary fourth floret; anther 1.0–1.5 mm long.

*Flowering*: November to May. *Ecology*: On moist soils, occasionally on well drained soils; riverine woodland to open grasslands. *Frequency in southern Africa*: Common. *Distribution*: Northwards to tropical Africa; introduced and naturalised in many parts of the world; cultivated pasture in Australia, New Zealand and North America. N, B, S, LIM, NW, G, M, FS, KZN, WC, EC. *Economics*: Cultivated pasture as it is a good grazing grass of high nutritional value, and used for crop rotation (some geographical strains, e.g. Katambore Rhodes grass from Botswana, is resistant to eelworm); as erosion control along roads and dam walls.

Illustration: Chippindall pl. 7 (1955); Barkworth: 213 (2003).
Anatomy vouchers: *Ellis 275, 296, 738, 1534, 1762, 3356, 3746 & 5193*.
Voucher: *Scheepers 941*.

**Chloris mossambicensis** K.Schum., in *Notizblatt des Königl. Botanischen Gartens und Museum zu Berlin* 1: 104 (1895). Type: Mozambique, Niassa, Cabaceira Grande, *Prelado 88* (B, holo.).

*Tetrapogon mossambicensis* (K.Schum.) Chippind. ex. Fisher, in Meredith, *Grasses and Pastures of South Africa*: 198 (1955).


*Chloris mossambicensis*

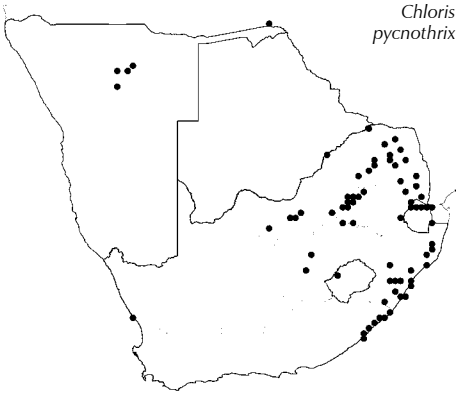
Robust perennial 150–800 mm high; with rhizomes or stolons; basal leaf sheaths strongly keeled, flabellate. Leaf blade 100–350 × 3–6 mm; apex obtuse, sometimes narrowly so. Inflorescence digitate, racemes usually 2–5, 30–80 mm long, yellowish; spikelets overlap for most of their length. Spikelet 2–4 mm long, 2-flowered, rarely 3; lower glume 1.7–2.5 mm long; upper glume 2.75–3.50(–4.00) mm long; lowest lemma 2–3(–4) mm long, obovate-oblanceolate, hairy on the margins and keel, awn 4–11 mm long, callus pungent; second lemma 1.3–3.0 mm long, clavate, glabrous, awn 3–8 mm long; third lemma reduced to an awnless, clavate scale or absent; anther 0.5–1.0 mm long.

*Flowering*: October to April. *Ecology*: On clayey, waterlogged and turf soils; along rivers or on seasonally flooded pans. *Frequency in southern Africa*: Infrequent. *Distribution*: Mozambique, and Zimbabwe, also Somalia, Kenya and Tanzania. S, LIM, M, KZN.

Illustration: Chippindall: 199, fig. 174 (1955); Cope: 211, tab. 61.
Anatomy vouchers: *Ellis 3541, 3637, 3865 & 4529*.
Voucher: *Bredenkamp 1525*.

**Chloris pycnothrix** Trin., in *De Graminibus unifloris et sesquifloris Dissertatio botanica*: 234 (1824). Type: Brazil.

Spiderweb chloris


*Chloris pycnothrix*

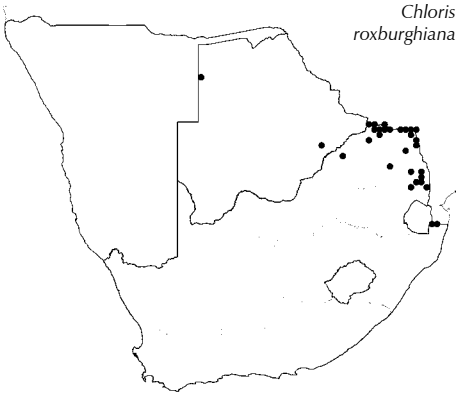
Usually annual, sometimes perennial, 150–500 mm high, tufted; basal sheaths keeled. Leaf blade 20–100 × 3–5 mm, tip rounded and blunt, sparsely hairy. Inflorescence digitate to subdigitate, racemes 4–9, 40–100 mm long, delicate, narrow, usually purple and horizontally spreading at first and straw coloured and curving inwards later; spikelets overlap for most of their lengths. Spikelet 2–3 mm long, 2-flowered; lower glume 1.5–2.0 mm long; upper glume 2.0–2.5 mm long; lowest lemma 2.5–3.2 mm long, tips acuminate to acute, narrowly elliptic, glabrous and scabrid, awn 11–27 mm long, callus rounded; second lemma reduced to a scale 0.1–1.0 mm long, awnless or with awn up to 8 mm long; anther 0.4–0.5 mm long.

[Similar to *C. diluta* and *C. truncata*, both with lowest lemma hairy and awns 2–12 mm and 6–11 mm long respectively.]

*Flowering*: September to May. *Ecology*: In shallow stony soils and in cultivated lands; in disturbed areas and on roadsides. *Frequency in southern Africa*: Common. *Distribution*: Northwards throughout

tropical Africa; Arabia and tropical America. N, S, L, LIM, NW, G, M, FS, KZN, WC, EC. *Economics*: Useful for erosion control as it is a pioneer. Weed in disturbed areas and cultivated lands.

Illustration: Chippindall: 198, fig. 173 (1955).
Anatomy vouchers: *Ellis 761, 2003, 5197* & *Van Heerden 40*.
Voucher: *Smook 5593*.


*Chloris roxburghiana*

**Chloris roxburghiana** Schult., in *Mantissa* 2: 339 (1824). Type: India.

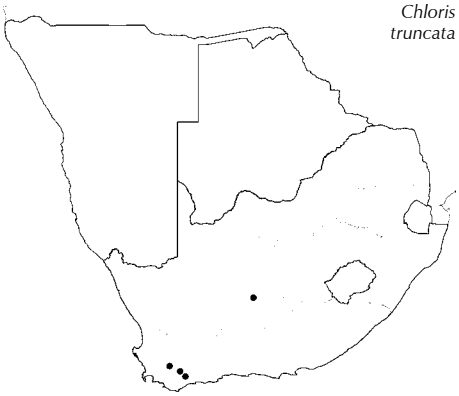
*C. myriostachya* Hochst., in *Flora* 38: 204 (1855). Type: Ethiopia.

Tufted perennial 700–1 250 mm high; with rhizomes; basal sheaths strongly keeled and flabellate. Leaf blade 100–400 × 2–10 mm, glabrous; uppermost leaf sheath often inflated around the young inflorescence. Inflorescence a dense, feathery head of straw- to purple-coloured racemes 30–80 mm long on an central axis 40–180 mm long; spikelets overlap for most of their lengths. Spikelet 1–3 mm long, 3 or 4-flowered; lower glume 1.0–1.5 mm long; upper glume 2.0–2.8 mm long; lowest lemma 1.5–2.0 mm long, elliptic, sparsely hairy on margins and keel, awn 8–17 mm long; second to fourth lemmas progressively smaller, reduced to glabrous, awned, elliptic scales; anther 0.4–0.6 mm long.

[The inflorescence is strikingly different from other southern African *Chloris* species, which have inflorescences digitate or subdigitate.]

*Flowering*: November to May. *Ecology*: Dry, sandy or stony soil; on river banks, in open veld or disturbed places. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to east tropical Africa, Angola, and Arabia to southern India. B, LIM, M, KZN. *Economics*: Palatable and valuable grazing grass; useful for erosion control; possibly a good ornamental for gardens.

Illustration: Chippindall: 196, fig. 171 (1955).
Anatomy vouchers: *Ellis 542, 1890, 1895, 3215* & *3860*.
Voucher: *Godfrey SH 1729*.


*Chloris truncata*

***Chloris truncata** R.Br., in *Prodromus florae Novae Hollandiae et Insulae Van-Diemen*: 186 (1810). Type: Australia.

Tufted perennial 250–450 mm high; sometimes stoloniferous. Leaf blade 30–200 × 2–3 mm, apex broadly rounded and blunt; glabrous. Inflorescence digitate, racemes 6–15, 80–150 mm long, purplish-green turning black, flexuous, spreading horizontally; spikelets delicate, overlapping about half their length. Spikelet 2–3 mm long, 2-flowered; lower glume 1.5–1.8 mm long; upper glume 2.8–4.0 mm long; lowest lemma 2.5–4.0 mm long, black when mature, sparsely to densely hairy only on the upper half of the margins to just below the apex, awn 6–15 mm long; second lemma 1.5 mm long, clavate, glabrous, awn 3.5–10.0 mm long; anther 0.3–0.5 mm long.

[Similar to *C. pycnothrix*, which has the lower lemma with a longer awn (11–27 mm long), and *C. diluta*, which has leaf blade apex acuminate.]

*Flowering*: June to July. *Ecology*: Disturbed places, especially areas of high moisture. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from Australia; introduced and as an escape in North America and Europe. Seems to be spreading in the winter rainfall area of South Africa. WC, NC. *Economics*: Weed in lucerne paddocks, possibly invader. Ornamental as occasionally cultivated in grass gardens.

Illustration: Barkworth: 215 (2003).
Voucher: *Du Toit 2172*.

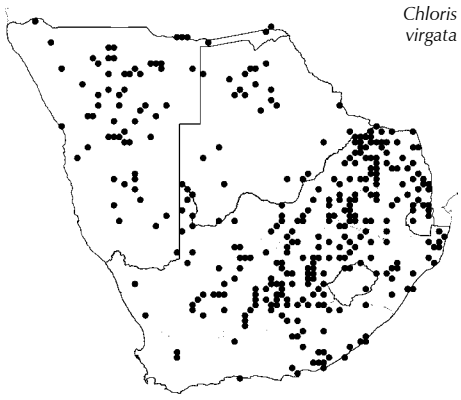
**Chloris virgata** Sw., in *Florae Indiae occidentalis* 1: 203 (1797). Type: West Indies.

FEATHERED CHLORIS, KLOSSIEGRAS

Usually a tufted annual or sometimes perennial 300–750 mm high; erect or geniculate and rooting at nodes; lower sheaths strongly keeled and mostly flabellate. Leaf blade 100–300 × 2–6 mm, tapering to a fine point at apex, sparsely hairy; upper leaf sheath inflated. Inflorescence digitate, racemes 7–15, 20–80 mm long, contracted, erect, green to straw coloured, silky-feathery. Spikelet 3.0–4.5 mm long, 3 rarely 2-flowered; lower glume 1.5–2.5 mm long; upper glume 2.5–4.5 mm long; lowest lemma 2.5–4.0 mm long, obliquely obovate, hairs along margins, keel and flanks, apex with a crown of spreading hairs 1.5–4.0 mm long, awn 5–15 mm long; second lemma 2.0–2.5 mm long, oblong, glabrous, awn 5–12 mm long; third lemma an awnless, clavate scale 0.5–1.2 mm long; anther 0.4–0.5 mm long.

*Flowering*: December to June. *Ecology*: On a variety of soil types; in disturbed places and often moist places. *Frequency in southern Africa*: Common. *Distribution*: Northwards to tropical Africa and worldwide in the tropics. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Used as pasture and hay particularly in arid areas; also a pioneer grass on bare ground. Weed in cultivated lands but easy to control.

Illustration: Chippindall: 197, fig. 172 (1955); Clayton et al.: 344, fig. 97 (1974); Müller: 57 (2007).
Anatomy vouchers: *Ellis 35*, *249*, *920*, *2016*, *2033*, *3678* & *Smook 5161*.
Voucher: *Smook 5122*.




## **Chrysopogon** Trin.

Trinius: 187 (1820) name conserved; Stapf: 349 (1898) under *Andropogon* L.; Stapf: 159 (1917); Chippindall: 468 (1955); Clayton & Renvoize: 736 (1982); Clayton & Renvoize: 342 (1986); Gibbs Russell et al.: 85 (1990); Watson & Dallwitz: 240 (1994); Setshogo: 34 (2002).



Figure 114.—*Chrysopogon serrulatus* spikelet triad (5–8 mm). Photographer: M. Koekemoer.

Perennial, tufted, often rhizomatous. **Leaf blade** linear, basal sheaths strongly compressed; *ligule* a fringed membrane or fringe of hairs. **Inflorescence** panicle-like consisting of many whorled branches (racemes) on a central axis; internodes filiform; *spikelets* dissimilar, in groups of 3, in long–short combinations: central spikelet sessile, two laterals pedicelled (rarely spikelets paired, one sessile, the other pedicelled), pedicels free from rachis; apex of pedicel long-hairy. **Sessile spikelet** ± laterally compressed, falling with glumes, joint and pedicel, awned or awnless; *glumes* ± equal; lower glume laterally compressed, indurated, rounded on back, often with spines on margins; upper glume thinner, keeled, shortly 2-lobed, sometimes awned from between

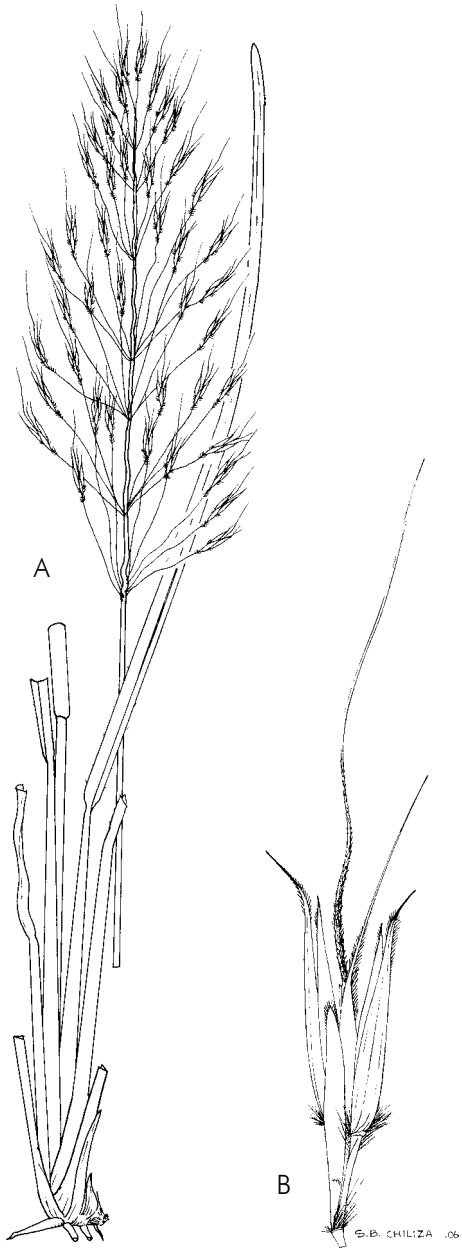



Figure 115.—*Chrysopogon serrulatus*. A, plant; B, spikelet pair: long-awned sessile and short-awned pedicelled spikelets (30.0 × 2.9 mm). Artists: A, H.W. du Toit; B, S.B. Chiliza.

lobes. **Florets** 2; *lower floret* sterile, reduced to a hyaline lemma, awnless; *upper floret* bisexual, *lemma* less firm than glumes, hyaline, glabrous, not keeled, 1–3-nerved, entire or minutely 2-lobed, awned from between lobes, *awn* geniculate; *callus* pungent, hairy, hairs long, commonly pallid or deep fulvous; *palea* small, hyaline or 0. **Lodicules** 2, glabrous, **Stamens** 3. **Ovary** ellipsoid; styles plumose above. **Caryopsis** narrowly ellipsoid; hilum short; embryo large. **Pedicelled spikelet** well developed to rudimentary, dorsally compressed, usually purple, sometimes pallid, male or sterile; awned or awnless. **Photosynthetic pathway**: $C_4$; XyMS-. PCR cells with a suberised lamella. PCR cell chloroplasts with reduced grana (rudimentary); centrifugal/peripheral. **Cytology**: $x = 10$ (polyploidy).

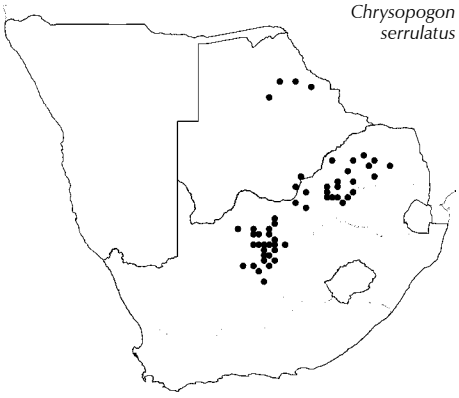
**Species** ± 26, mostly warm regions of both hemispheres; 1 in southern Africa: *Chrysopogon serrulatus* Trin., Botswana, Limpopo, North West, Gauteng, Northern Cape.

Species treatment by A.C. Mashau.

**Quick guide to easily confused taxa:**

Raceme with several to many spikelet pairs; inflorescence lanceolate; internodes linear; sessile spikelet lower glume spinulose on back; callus rounded . . . . . **Vetiveria nigritana** (alt. name, *Chrysopogon nigritanus*)

Raceme reduced to a triad of 1 sessile and 2 pedicelled spikelets; inflorescence ovate; internodes filiform; sessile spikelet lower glume often with spines on margins; callus pungent . . . . . **Chrysopogon serrulatus**


*Chrysopogon serrulatus*

**Chrysopogon serrulatus** Trin., in *Mémoires de l'Académie Impériale des Sciences de Saint Petersbourg,* sér. 6,2: 318 (1832). Type: Nepal.

*C. montanus* Trin. var. *tremulus* (Hack.) Stapf, in *Flora of tropical Africa* 9: 160 (1917). Type: Mozambique, Boruma, *Meyhart 557* (W, holo.).

GOLDEN BEARD GRASS, KRULGRAS

Tufted perennial to 1 000 mm high; sometimes rhizomatous. Leaf blade to 300 × 2–10 mm; ligule a fringe of hairs. Inflorescence ovate, consisting of many whorled racemes on a central axis; internodes filiform. Sessile spikelet 5–8 mm long, laterally compressed; lower glume keel rounded, apex hispidulous, awnless; upper glume glabrous or with a few white hairs on the keel, sometimes apex shortly pilose; awn 6–12 mm long, glabrous; lower lemma awnless; upper lemma minutely bidentate, awned from between lobes; awn 20–30 mm long, geniculate, slightly hairy; anther 3.6–4.0 mm long. Pedicellate spikelet 5–8 mm long, dorsally compressed; lower glume with short white hairs on the back, awn up to 5 mm long, hispidulous; upper glume glabrous, awn up to 2.5 mm long, obscurely hispidulous; upper lemma sparsely ciliolate on margins.

*Flowering*: December to April. *Ecology*: Stony soils; rocky hillsides. *Distribution*: Northwards to eastern Africa and northwest India. B, NW, LIM, G, NC. *Economics*: A palatable to highly palatable climax grass with a high leaf yield making it one of best grazing grasses.

Illustration: Chippindall: 469, fig. 384 (1955).
Anatomy vouchers: *Ellis 847, 2896 & 3582.*
Voucher: *Brueckner 121.*

## **Cladoraphis** Franch.

Franchet: 673 (1887); Stapf: 611 (1900); Hitchcock & Chase: 168 (1950); Chippindall: 183 (1955); De Winter: 132 (1955) included in *Eragrostis* Wolf; Phillips: 159 (1982); Clayton & Renvoize: 217 (1986); Gibbs Russell et al.: 86 (1990); Watson & Dallwitz: 245 (1994).

Perennial, tufted, prickly, woody. **Leaf blade** flat or rolled, hard and woody, pungent; *ligul*e a fringe of hairs. **Inflorescence** a panicle with a stout central axis usually ending in a spine and without spikelets; bearing dorsal primary laterals; lateral branches short, secondarily branched and condensed into clusters adpressed to the central axis or forming simple spreading racemes; *spikelets* solitary, shortly pedicelled. **Spikelet** laterally compressed, disarticulating above glumes and tardily between florets; *glumes* ± equal, shorter than spikelet, similar, 3-nerved, awnless. **Florets** 3–20, bisexual; *uppermost floret* reduced; *lemma* similar in texture to glumes, entire, 3-nerved, rounded, usually glabrous or with short hairs, awnless; *palea* similar in texture to lemma. **Lodicules** 2, fleshy. **Stamens** 3. **Ovary** glabrous. **Caryopsis** narrowly oblong with free pericarp; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines uneven (owing to the adaxial extensions). PCR sheath extensions present with most bundles. Maximum number of extension cells 4–5. PCR cell chloroplasts centripetal. **Cytology**: $x = 10$.

**Species** 2, southern Africa, Namibia and mainly western regions of Northern and Western Cape.

Species treatment by A.C. Mashau.

**Key to species:**

Inflorescence primary branches less than their own length apart, spine-tipped; spikelets arranged at short intervals usually almost perpendicular to the branches; culm septate. . . . . **C. spinosa**

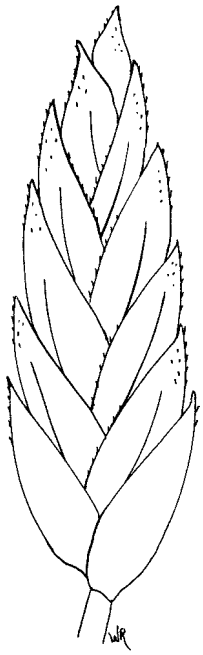


Figure 116.—*Cladoraphis cyperoides* spikelet (8.0 × 2.8 mm). Artist: W. Roux.

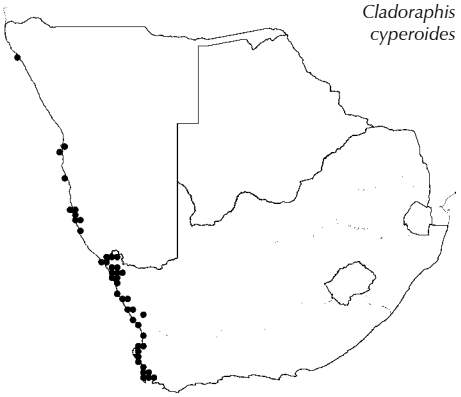


Figure 117.—*Cladoraphis spinosa* spikelet (6–18 mm). Photographer: M. Koekemoer.



Figure 118.—*Cladoraphis spinosa*. Artist: W. Roux.

Inflorescence primary branches more than to more than twice their own length apart, not always developed into a spine; spikelets clustered together against the thick rigid branches; culm not septate . . . . . **C. cyperoides**


*Cladoraphis cyperoides*

**Cladoraphis cyperoides** (Thunb.) S.M.Phillips, in *Kew Bulletin* 37(1): 159 (1982). Type: South Africa, Cape of Good Hope, *Thunberg* (UPS, holo.).

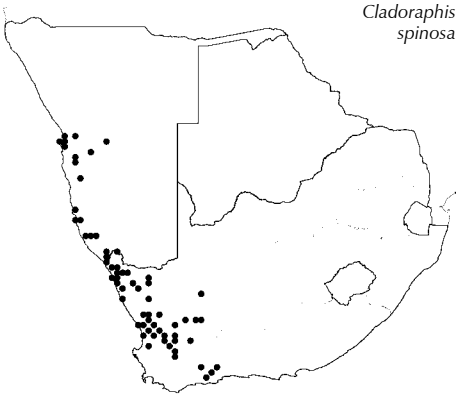
*Eragrostis cyperoides* (Thunb.) P.Beauv., in *Essai d'une nouvelle agrostographie*: 162, 174 (1812).

Sedge-stemmed love grass, steekriet

Tufted spiny, bushy perennial 200–800 mm high; culm not septate. Leaf blade 20–110 × to 4–9 mm. Inflorescence branches up to 80 mm long but usually much shorter, longer than and often more than twice their lengths apart, not always produced as a spine; spikelets mostly clustered and adpressed to the thick, rigid branches. Spikelet 4–8 × 3–5 mm, 4–9(–20)-flowered; lemma 3–5 mm long, nerves prominent; palea keel stout and densely ciliolate; anther 1.9–2.4 mm long.

*Flowering*: August to May peaking from August to October. *Ecology*: Deep loose sand, coastal dunes or on the edges of fresh or saltwater lagoons. *Frequency in southern Africa*: Locally common especially along the coast. *Distribution*: Endemic, probably cultivated in Oregon, USA. N, NC, WC. *Economics*: Occasionally grazed pasture; as erosion control for stabilizing windblown sand.

Anatomy vouchers: *Ellis 1168, 1687, 2152* & *9546*.
Voucher: *Goldblatt 4244*.


*Cladoraphis spinosa*

**Cladoraphis spinosa** (L.f.) S.M.Phillips, in *Kew Bulletin* 37: 159 (1982). Type: South Africa, Cape Good Hope, *Bäck* (LINN, holo.).

*Eragrostis spinosa* (L.f.) Trin., in *Mémoires del' Académie impériale des Sciences de St. Pétersbourg*, ser 6,1: 416 (1830).

Spiny love grass, volstruisdoring

Tufted spiny, bushy perennial 200–600 mm high; culm septate. Leaf blade 10–60 × 4–9 mm. Inflorescence branches up to 50 mm long, less than their own length apart, spine-tipped; spikelets arranged at short intervals, usually almost perpendicular to the branches. Spikelet 6–18 × 3–4 mm, 3–18-flowered; lemma 3.5 mm long, nerves obvious but not prominent; palea keel hard, scaberulous; anther 1.7–2.3 mm long.

*Flowering*: August to May peaking from August to October. *Ecology*: Well-drained, deep, loose sand on dunes and river margins. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NC, WC. *Economics*: Occasionally grazed pasture; an indicator of overgrazed veld; as erosion control for stabilising windblown sand.

Illustration: Chippindall: 183, fig. 158 (1955).
Anatomy vouchers: *Ellis 1125, 1716* & *9544*.
Voucher: *Ward 163*.

## **Cleistachne** Benth.

Bentham: t. 1379 (1882); Stent: 253 (1924); Chippindall: 468 (1955); Clayton & Renvoize: 734 (1982); Clayton & Renvoize: 341 (1986); Gibbs Russell et al.: 86 (1990); Watson & Dallwitz: 247 (1994); Setshogo: 32 (2002).



Figure 119.—*Cleistachne sorghoides* spikelet (3–5 mm). Photographer: M. Koekemoer.

Coarse, annual; sometimes with stilt-roots. **Leaf blade** linear, rolled, often narrowed to a midrib and falsely petiolate; sheaths and blades hispid with tubercle-based hairs; *ligule* an unfringed membrane, scarious. **Inflorescence** a large terminal panicle, ± contracted; primary branches bearing spikelets at regular intervals; *spikelets* solitary, pedicels linear. **Spikelet** usually light brown to black, dorsiventrally compressed, falling with glumes; *glumes* ± equal, similar, leathery, hairy, with inrolled margins, awnless; lower glume broadly rounded, not 2-keeled. **Florets** 2; *lower floret* reduced to a lemma, hyaline, hairy, awnless; *upper floret* bisexual; *lemma* less firm than glumes, hyaline, hairy, 3-nerved, incised, 2-lobed, awned from between lobes; *awn* geniculate, twisted, longer than body of lemma; *callus* obtuse; *palea* minute, ciliate. **Lodicules** 2, broadly cuneate, ciliate, fleshy. **Stamens** 3. **Ovary** sub-ovoid, glabrous; styles plumose above. **Caryopsis** oblong; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; MS. **Cytology**: $x = 9$ (polyploidy).

**Species** 1, tropical Africa and India: *Cleistachne sorghoides* Benth., Mpumalanga.

Species treatment by M.J. Moeaha.

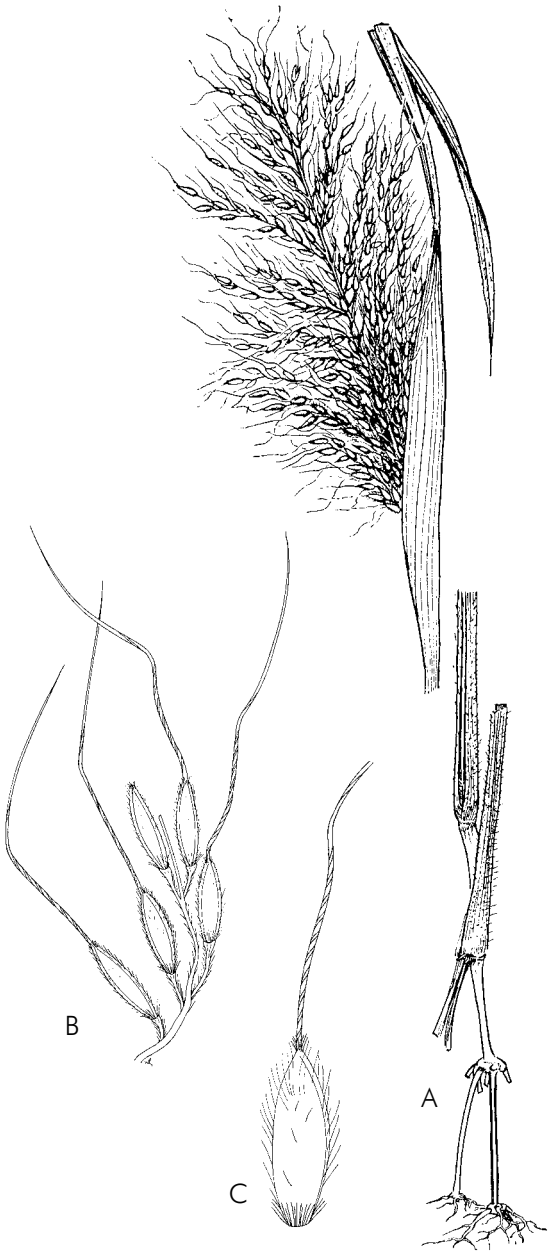



Figure 120.—*Cleistachne sorghoides*. A, plant; B, portion of branchlet with spikelets (30 × 8 mm); C, spikelet (17.0 × 1.2 mm). Artists: A, G.E. Lawrence; B & C, W. Roux.

**Cleistachne sorghoides** Benth., in *Hooker's Icones Plantarum* 14, t. 1379 (1882). Type: Mozambique, Shupanga (Chupanga), *Kirk s.n.* (K, holo.).

Coarse, robust annual up to 2 500 mm high; stilt roots present. Leaf blade up to 1 000 × 14 mm, hairy. Inflorescence 40–400 mm long; spikelets all alike, not in long–short pairs, pedicellate. Spikelet 4–5 mm long, dark and glossy at maturity; glumes pilose; upper lemma awn 5–8 times the length of the lemma, geniculate, column hairy, upper parts scaberulous; anther up to 3.5 mm.

*Flowering*: February to April. *Ecology*: River banks and vleis. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to eastern tropical Africa; through Arabia to India. M.

Illustration: Setshogo: 3, tab. 13 (2002).
Voucher: *Vermeulen April 1952*.

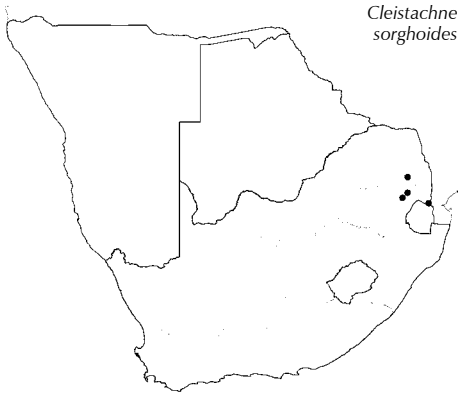
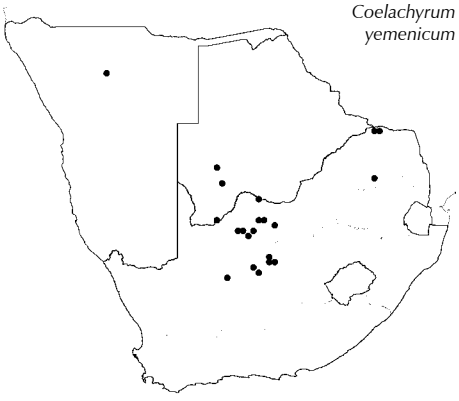





Figure 121.—*Coelachyrum yemenicum*. A, plant; B, spikelet (4.5 ×2.8 mm); C, lemma (dorsal view) (2.7 ×1.0 mm). Artist: W. Roux.




## **Coelachyrum** Hochst. & Nees

Hochstetter & Nees ab Esenbeck: 221 (1842); Chippindall: 121 (1955); Phillips: 246 (1974); Phillips: 154, 159 (1982); Clayton & Renvoize: 220 (1986); Gibbs Russell et al.: 87 (1990); Watson & Dallwitz: 254 (1994).

*Cypholepis* Chiov.: 357 (1908); Phillips: 248 (1974); Watson & Dallwitz: 286 (1994); Cope: 154 (1999).



Figure 122.—*Coelachyrum yemenicum* spikelet (5–10 mm). Photographer: M. Koekemoer.

Perennial, tufted. **Leaf blade** linear, usually expanded; *ligule* a fringed membrane. **Inflorescence** usually of open or dense, spike-like racemes along a central axis; *spikelets* solitary, shortly pedicelled. **Spikelet** laterally compressed, disarticulating above glumes and between florets; *glumes* ± equal to unequal, lanceolate, shorter than spikelet, membranous, rounded or lightly keeled on back, 1(3)-nerved. **Florets** 7–12, bisexual; *uppermost floret* sometimes male only; *lemma* saccate below, lightly keeled above middle, rounded on back in lower half, 3-nerved, hairy with club-shaped hairs on lower back, or glabrous, awnless; *callus* 0; *palea* shorter than lemma, glabrous or with club-shaped hairs on lower half. **Lodicules** 2, fleshy, glabrous. **Stamens** 3. **Ovary** glabrous. **Caryopsis** broadly ellipsoid, strongly flattened, small; pericarp free; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines uneven. PCR sheath extensions absent. PCR cell chloroplasts centripetal.

**Species** 1–8, Africa, Arabian Peninsula and Pakistan; 1 in southern Africa: *Coelachyrum yemenicum* (Schweinf.) S.M.Phillips, Namibia, Botswana, Limpopo, North West and eastern regions of Northern Cape.

Species treatment by A.C. Mashau.

**Quick guide to easily confused taxa:**

Lemma oblong-elliptic to elliptic, keeled, nerves minutely hairy, hairs acute; callus short, blunt; palea 2-keeled . . . . . **Leptochloa eleusine**

Lemma ovate, rounded on back in lower half, hairy near base, hairs club-shaped; callus absent; palea not keeled . . . . . **Coelachyrum yemenicum**

**Coelachyrum yemenicum** (Schweinf.) S.M.Phillips, in *Kew Bulletin* 37: 159 (1982). Type: Yemen.

*Cypholepis yemenica* (Schweinf.) Chiov., in *Annuario Reale del Instituto Botanico di Roma* 8: 357 (1908).

Slender perennial, densely tufted, 310–630 mm high. Leaf blade 70–320 × 2.5–5.5 mm, usually flat; sheaths keeled. Inflorescence 50–190 mm long, racemes 2–8, 15–70 mm long, far apart. Spikelet 5–10 mm long, 7–12-flowered; glumes obtuse to acute; upper glume 1-nerved; lemma with club-shaped hairs near the base; anther 0.8–1.0 mm long.

*Flowering*: February to June. *Ecology*: Calcareous pans, shallow limestone; often in light shade. *Frequency in southern Africa*: Infrequent. *Distribution*: Eastern Africa to Yemen. N, B, LIM, NW, NC. *Economics*: Probably palatable, but with a variable leaf yield.

Illustration: Chippindall: 121, fig. 94 (1955); Clayton et al.: 248, fig. (1974); Cope: 155, tab. 45 (1999).
Anatomy vouchers: *Ellis 3595* & *3611*.
Voucher: *Paton 3156*.

## **Coelorachis** Brongn.

Brongniart: 64 (1831); Stapf: 78 (1917); Chippindall: 523 (1955); Clayton & Renvoize: 840 (1982); Veldkamp et al.: 288 (1986); Clayton & Renvoize: 365 (1986); Gibbs Russell et al.: 88 (1990); Watson & Dallwitz: 255 (1994); Cope: 172 (2002).

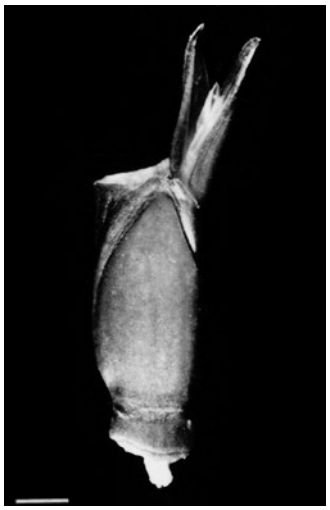


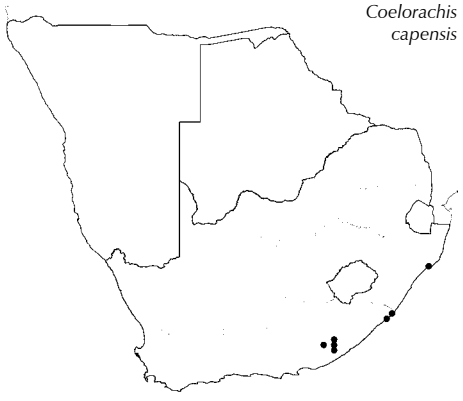
Figure 123.—*Coelorachis capensis* spikelet pair (4.5–5.0 mm). Photographer: M. Koekemoer.

Coarse perennial, tufted; basal sheath often strongly laterally compressed. **Leaf blade** expanded or folded; *ligule* a fringed membrane to a fringe of hairs. **Inflorescence** of spike-like racemes, solitary and terminal or aggregated into a spatheate, leafy false panicle; racemes cylindrical; internodes clavate, mostly shorter than sessile spikelets, rachis joints transverse; *spikelets* in pairs, secund, in long–short combinations: one sessile, the other pedicelled, pedicels free. **Sessile spikelet** dorsiventrally compressed, glabrous; *glumes* ± equal, dissimilar, indurated, awnless; lower glume flat or slightly rounded on back, smooth or variously sculptured, glabrous, 2-keeled upwards, keels winged, faintly 7-nerved; upper glume keeled, acute, wingless. **Florets** 2, *lower floret* sterile, reduced to a hyaline lemma, 2-nerved or nerveless, awnless; palea reduced or 0; *upper floret* bisexual; *lemma* less firm than glumes, hyaline, 2-nerved or nerveless, entire, glabrous, awnless; *palea* present, relatively long; *callus* truncate with prominent peg, glabrous. **Lodicules** 2, cuneate, fleshy, glabrous. **Stamens** 3. **Ovary** glabrous; styles plumose. **Caryopsis** oblong, dorsiventrally compressed; hilum short; embryo large. **Pedicelled spikelet** smaller than sessile spikelet, well developed or vestigial, male or sterile, rarely bisexual, awnless. **Photosynthetic pathway**: $C_4$; XyMS-. **Cytology**: $x = 9$ (polyploidy).




Figure 124.—*Coelorachis capensis*. A, plant; B, portion of raceme with sessile and pedicelled spikelet pair, pedicel and clavate internode (9 × 4 mm). Artists: A, G.E. Lawrence; B, S.B. Chiliza.

**Species** ± 21, mainly tropical; 1 in southern Africa: *Coelorachis capensis* Stapf, northeastern KwaZulu-Natal to Eastern Cape.




Species treatment by M.T. Nembudani.

**Coelorachis capensis** Stapf, in *Kew Bulletin of Miscellaneous Information* 9: 234 (1916). Type: South Africa, Eastern Cape; Stutterheim Div., Fort Cunninghame, *Sim 2733* (PRE, iso.).

Tufted perennial to 700 mm high. Leaf blade 3–8 mm wide; ligule a fringed membrane. Inflorescence raceme narrowly cylindrical, culm-

like, with sunken spikelets. Sessile spikelet 4.5–5.0 mm long; lower glume 4.5–5.0 mm long, rounded on the back, sculptured. Pedicellate spikelet smaller, sometimes much reduced.

[*C. lepidura* Stapf, recorded from Mozambique, is very similar (sessile spikelet lower glume 3–4 mm long); further studies are needed in the genus.]

*Flowering*: September to March. *Ecology*: Grassveld. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic? KZN, EC.

Anatomy vouchers: *Ellis 3788* & *5194*.
Voucher: *Sim 2733*.

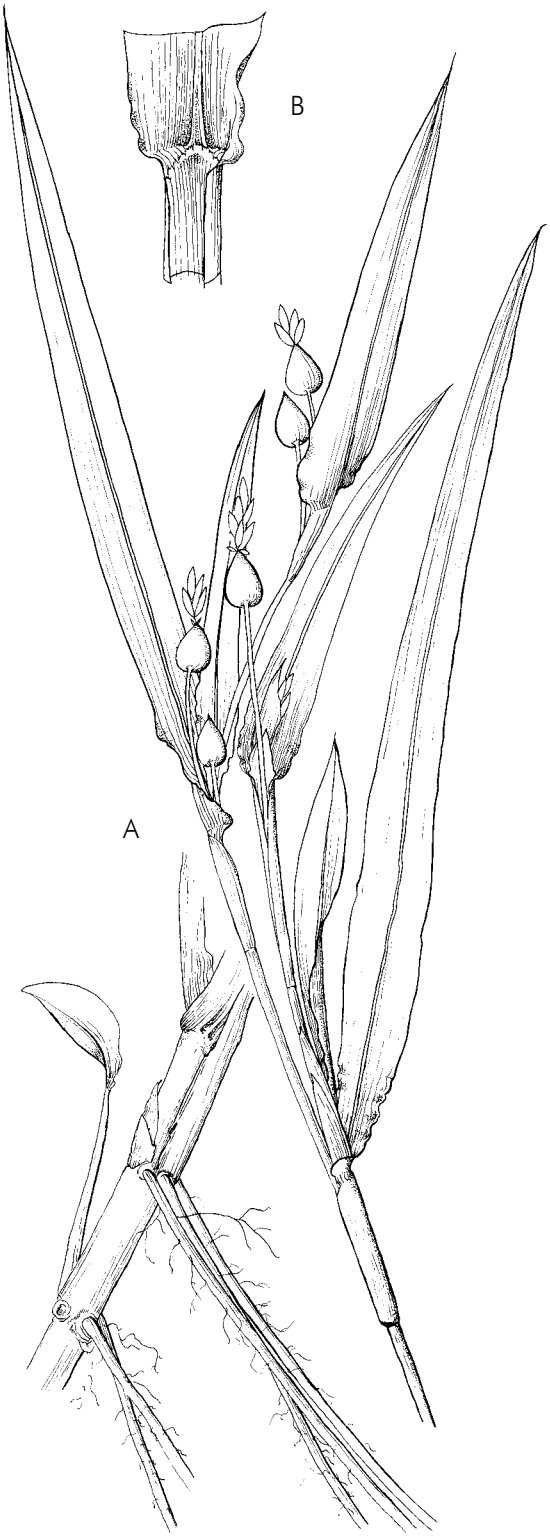



Figure 125.—*Coix lacryma-jobi*. A, plant; B, ligule. Artist: C. Smith.

## *Coix L.

Linnaeus: 972 (1753); Stapf: 27 (1917); Chippindall: 524 (1955); Clayton & Renvoize: 857 (1982); Clayton & Renvoize: 373 (1986); Gibbs Russell et al.: 89 (1990); Watson & Dallwitz: 256 (1994); Thieret: 703 (2003).



Figure 126.—*Coix lacryma-jobi*, partial inflorescence (25–35 mm). Photographer: M. Koekemoer.

Annuals or ?perennials. **Leaf blade** linear-lanceolate, expanded, base often cordate; *ligule* an unfringed to fringed membrane. **Inflorescence** of terminal and axillary branches, these often many, forming a spatheate, leafy false panicle; spikelet-bearing axis with a smooth, globose or elongated, hard, ivory-like bead or cupule (a modified leaf sheath) comprising 2 racemes; *female raceme* enclosed by bead consists of 1 sessile spikelet accompanied by 2 barren pedicels; *male raceme* exserted from mouth of bead as a tassel and falling early; *spikelets* in pairs or threes, 1 or 2 sessile, 1 pedicelled. **Female spikelet** falling with glumes; *glumes* ± equal, beaked, dissimilar, awnless; lower glume subglobose, flattened on back; upper glume strongly keeled. **Florets** 2, *lower floret* sterile, reduced to a membranous lemma, awnless; *upper floret* female; *lemma* less firm to similar in texture to glumes, membranous, mucronate, entire, glabrous, 3–5-nerved, mucronate (beaked); *palea* membranous. **Lodicules** 0. **Stamens** 0, or 3 staminoids. **Ovary** glabrous; stigmas 2, exserted from bead. **Caryopsis** subglobose to ellipsoid. **Male spikelet** lanceolate to elliptic-oblong; lower glume flat on back, 2-keeled, keels winged above; upper glume boat-shaped. **Florets** 2, both male or one sterile; lemma and palea membranous. **Stamens** 3. **Caryopsis** medium-sized; hilum short, circular to elliptical, quite large; embryo large. **Photosynthetic pathway**: $C_4$; XyMS- (but very ambiguously so, could have two PCR sheaths). PCR cell chloroplasts with reduced grana; centrifugal/peripheral. **Cytology**: $x = 5$ (high polyploidy).

**Species** ± 5, tropical Asia; 1 sporadically occurring in southern Africa: **Coix lacryma-jobi* L., in eastern southern Africa.

Species treatment by M.J. Moeaha.

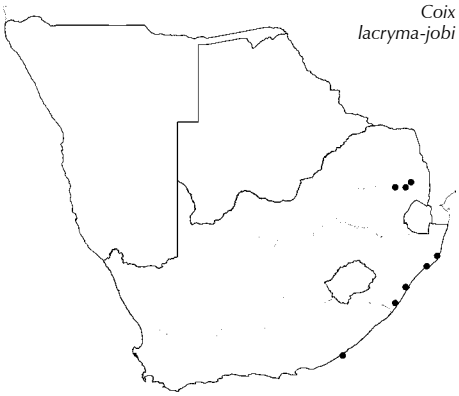
***Coix lacryma-jobi** L., in *Species plantarum*: 972 (1753). Type: India.

JOB'S TEARS

Annual or ?perennial 900–1 200 mm high. Leaf blade 100–500 × 2–7 mm. Inflorescence branches each subtended by a smooth hard, whitish to ivory-like bead or cupule enclosing the female spikelet; male spikelet is on a tassel exserted from the bead. Spikelets unisexual; female spikelet up to 5 mm long; male spikelet 7–10 mm long; anther of male spikelet up to 4.5 mm long.

*Flowering*: August to April. *Ecology*: Damp disturbed places. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from India. M, KZN (said to occur in G). *Economics*: Cultivated in warm areas worldwide; used as food; or as beads strung into necklaces or bracelets and these often regarded as charms; and for other decorations. Ruderal weed and as an escape from cultivation.

Illustration: Chippindall: 525, fig. 419 (1955); Thieret: 704 (2003).
Anatomy vouchers: *Ellis 2115* & *2118*.
Voucher: *Smook 1298*.



*Coix lacryma-jobi*

## *Cortaderia Stapf

Stapf: 378 (1897) name conserved; Robinson: 343 (1984); Clayton & Renvoize: 180 (1986); Gibbs Russell et al.: 90 (1990); Watson & Dallwitz: 263 (1994); Henderson: 11 (2001); Allred: 298 (2003); Linder et al.: 342 (2010).

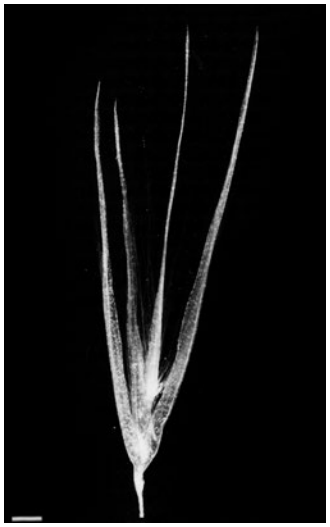


Figure 127.—*Cortaderia selloana* (to 15 mm). Photographer: M. Koekemoer.

Perennial, tufted, tall tussocks up to 4 m tall, bisexual or gynodioecious. **Leaf blade** disarticulating from sheath; *ligule* a fringe of hairs. **Inflorescence** a large, open, plumose panicle, 400–800 mm long, with many spikelets; *spikelets* pedicelled, either bisexual or female, spikelets all alike in sexuality on same plant. **Spikelet** laterally compressed, disarticulating above glumes; *glumes* ± equal, shorter to as long as spikelet, narrow, hyaline, similar, glabrous, 1(3)-nerved, awnless. **Florets** 1–7, depending on sex of spikelet; *lemma* similar to firmer in texture to glumes, hyaline or membranous, not becoming indurated, 7–9-nerved, entire, awn-like, awnless, glabrous or hairy, hairs long and fine, reaching from base to apex of body of lemma; *callus* long, pointed, hairy; *palea* glabrous, relatively long. **Lodicules** 2, fleshy, ciliate. **Stamens** 3, or 0, or minute in female spikelets of dioecious plants. **Ovary** glabrous. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 9$ (high polyploidy).

**Species** 24, mainly South America, also in New Zealand and New Guinea; 2 cultivated and as escapes in southern Africa.

Species treatment by M.J. Moeaha and L. Fish.

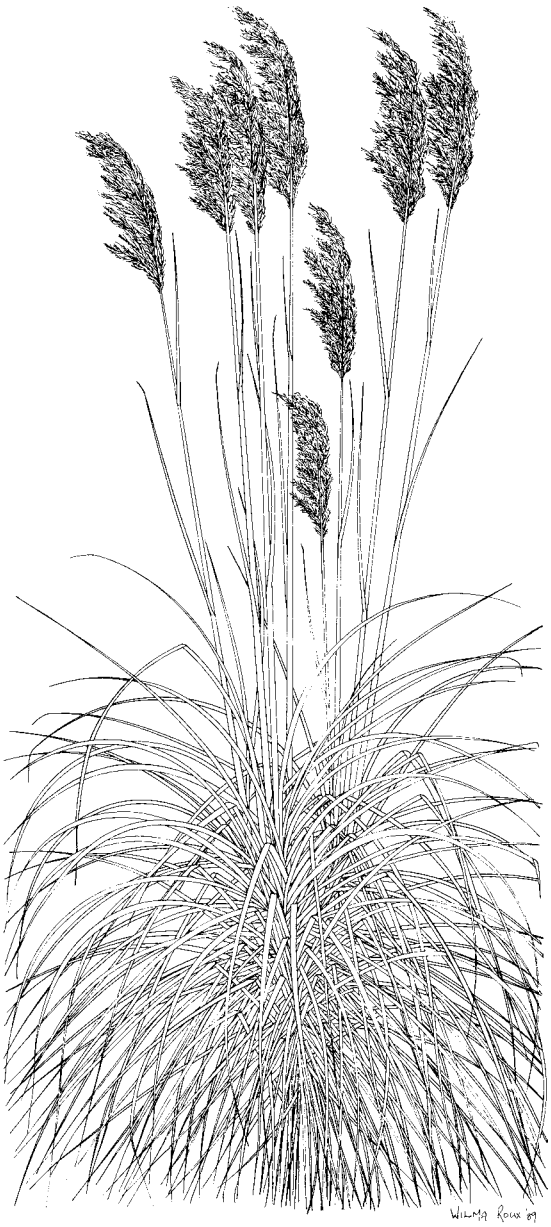


Figure 128.—*Cortaderia selloana*. Artist: W. Roux.

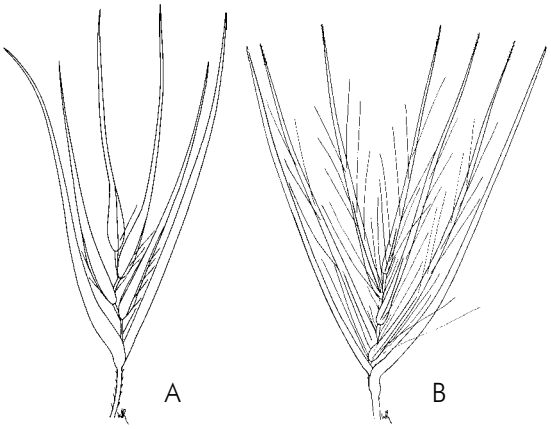
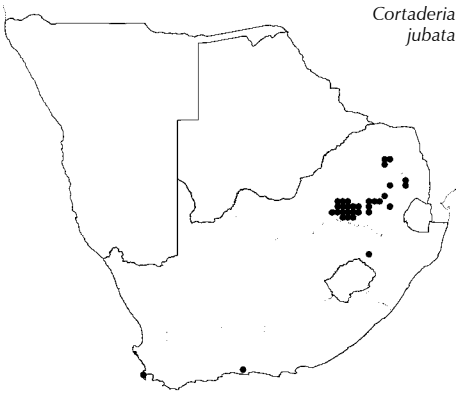
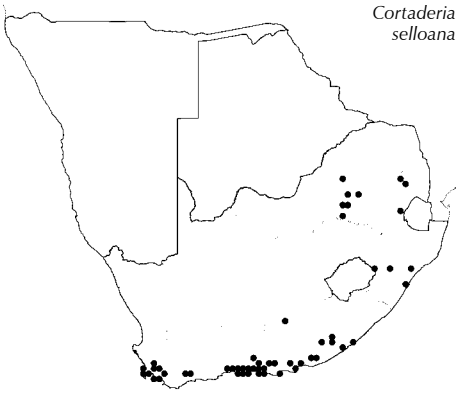



Figure 129.—*Cortaderia selloana*. A, male spikelet; B, female spikelet. Artist: W. Roux.



*Cortaderia jubata*



*Cortaderia selloana*

**Key to species:**

Inflorescence branches flexuous; leaf bright green, flat or slightly V-shaped in cross-section, apex not setaceous, reaching only to ½ culm height; inflorescence extended well above leaves; spikelet rachilla and glume nerves purple; in South Africa female plants only; leaf sheaths hairy . . . . . ***C. jubata**

Inflorescence branches stiff; leaf glaucous, often V-shaped in cross section, apex setaceous, usually reaching more than ⅔ culm height; inflorescence hardly to not extended above leaves; spikelet rachilla and glume nerves colourless; plant female and hermaphrodite; leaf sheaths glabrous or sparsely hairy . . . . . ***C. selloana**

***Cortaderia jubata** (Lemoine ex Carrière.) Stapf, in Hook.f., in *The Botanical Magazine*: t. 7607 (1898). Type: Ecuador.

Purple pampas, jubata grass, pampasgras

Robust, densely tufted perennial to 3 000 mm high; leaves mostly basal, to ½ the height of the culm. Leaf blade 1 000–1 500 × 9–12 mm, apex not setaceous, bright green, with cutting margins and midrib, flat or only slightly V-shaped in cross section. Inflorescence 600–800 mm long, extending well above the leaves, yellowish or purple, branches flexuous. Spikelet female only, florets (1–2)3–5, rachilla purple; glumes approximately equal, 9–13 mm long, 1-nerved, nerves purple; lemma 8–11(15) mm long, 3-nerved, nerves purple, densely hairy, hairs 7–9 mm long; palea glabrous, 3–5 mm long; anther minute, less than 0.25 mm long. Reproduces by agamospermy. Chromosome number: 2x = 108 (Connor & Edgar 1974).

*Flowering*: November to February (rarely to March). *Ecology*: Escape along roadsides, rivers and disturbed places. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from west tropical South America (Ecuador, Peru to Argentina). Widespread throughout southern Africa. LIM, G, M, FS, WC. *Economics*: Erosion control on mine dumps and widely cultivated for ornamental purposes. Weed and invader.

Illustration: Henderson: 11 (2001).
Voucher: *Ruch PRE 34954*.

***Cortaderia selloana** (Schult. & Schult.f.) Asch. & Graebn., in *Synopsis der Mitteleuropa Flora* 2: 325 (1900). Type: Brazil.

Pampas grass, pampasgras, silwergras

Robust, densely tufted perennial to 4 000 mm high; leaves mainly basal, to ⅔ culm height. Leaf blade 800–1 800 × 8–10 mm, apex setaceous, glaucous, blade with cutting margins and midrib, usually markedly V-shaped in cross section. Inflorescence 400–600(–700) mm long, not or hardly extending above leaves, silvery-white to pink or mauve, branches stiff; spikelets either female or hermaphrodite (but then functionally male), rachilla colourless; glumes ± equal, 8–15 mm long, 1-nerved, nerves colourless. Female spikelet pedicel (0.4–)0.8(–1.0) mm long; florets (5–)6(–7); lemma 10–14 mm long, 3-nerved, nerves colourless; densely hairy, hairs 7–12 mm long; palea 2.5–3.8 mm long, glabrous; anther minute, less than 0.2 mm long. Hermaphrodite spikelet pedicel (0.8–)1.0(–1.3) mm long; florets (1–2)3(–4); lemma 12–15 mm long, glabrous or sparsely hairy, 3-nerved, nerves colourless; palea 3.5–5.5 mm long, glabrous; anthers (1.5–)3.0–5.0 mm long. Chromosome number: 2x = 72 (Connor & Edgar 1974).

*Flowering*: February and April. *Ecology*: Seasonally wet habitats (occurs on low lying river banks in South America). *Frequency in southern Africa*: locally common. *Distribution*: Naturalised from South American. Occurs as an escape and invader. LIM, G, M, KZN, WC, EC. *Economics*: Cultivated for ornamental and mine dump stabilisation. Weed and invader (excluding sterile cultivars).

Illustration: Chippindall fig. 204 (1955), Henderson: 12 (2001).
Anatomy voucher: *Ellis 1117*.
Voucher: *Mills 275*.

## *Corynephorus P.Beauv.

Palisot de Beauvois: 90 (1812) name conserved; Tutin: 231 (1980); Clayton & Renvoize: 130 (1986); Gibbs Russell et al.: 91 (1990); Watson & Dallwitz: 265 (1994).

Annual, culms solitary or tufted. **Leaf blade** linear, folded or rolled; *ligule* an unfringed membrane. **Inflorescence** an open or contracted panicle; *spikelets* pedicelled. **Spikelet** laterally compressed, disarticulating above glumes, rachilla extension present; *glumes* equal, ± as long as spikelet, similar, awnless. **Florets** 2, bisexual; *lemma* similar in texture to glumes, membranous, 1-nerved, minutely 2-lobed; *awn* basal, longer than body of lemma, geniculate, ring of hairs at junction of twisted column and clavate limb; *palea* present; *callus* short, hairy. **Lodicules** 2, membranous, glabrous. **Stamens** 3. **Ovary** glabrous. **Caryopsis** ellipsoid. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$.

**Species** 5, Europe and Mediterranean to Iran; 1 naturalised in southern Africa: **Corynephorus fasciculatus* Boiss. & Reut., Western Cape.

Species treatment by M.T. Nembudani.

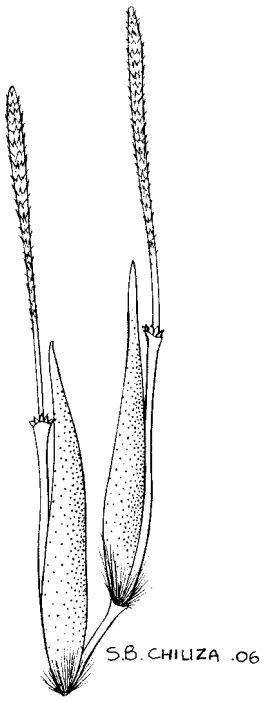



Figure 130.—*Corynephorus fasciculatus* florets. Artist: S.B. Chiliza.

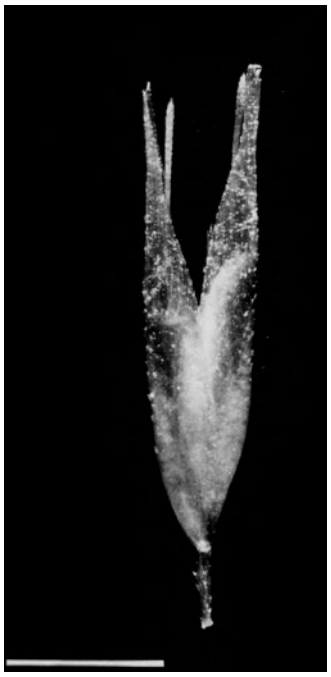
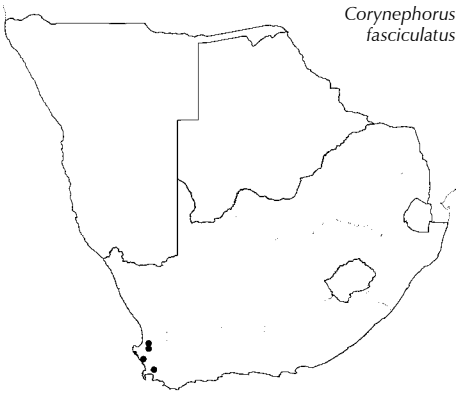


Figure 131.—*Corynephorus fasciculatus* spikelet (to 3 mm). Photographer: M. Koekemoer.



Figure 132.—*Corynephorus fasciculatus*.




***Corynephorus fasciculatus** Boiss. & Reut., in *Pugillis Plantarum novarum Africae borealis Hispaniaeque australis*: 123 (1852). Type: South Europe.

Annual, 200–550 mm high; culms solitary or loosely tufted. Leaf blade 50–120 × 1–2 mm. Spikelet about 3 mm long; hairs at base of floret not longer than 1/4 the lemma length; lemma awn basal, usually about as long as the glumes, divided into lower dark-coloured column and upper whitish clavate limb, with ring of short, thick hairs at junction.

[Similar to European species *C. divaricatus*, which has larger spikelets (3.5–4.0 mm long), awn distinctly shorter than glumes and hairs at base of floret 1/4–1/2 as long as lemma.]

*Flowering*: October to November. *Ecology*: Sandy soils; in disturbed places. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from Europe; Portugal to western Mediterranean. WC.

Voucher: *Van Rensburg 139*.

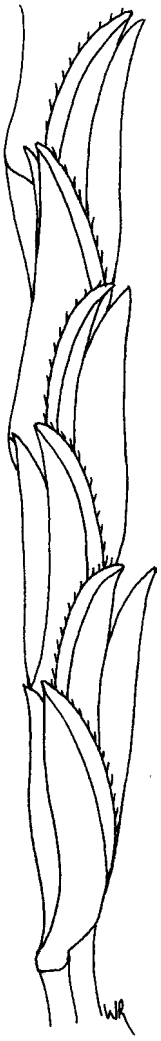


Figure 133.—*Craspedorhachis rhodesiana*. Part of raceme with spikelets (8.0 × 1.2 mm). Artist: W. Roux.

## **Craspedorhachis** Benth.

Bentham: t. 1377 (1882); Pilger: 98 (1956); Chippindall: 204 (1955); Launert: 49 (1970); Clayton et al.: 277 (1974); Chippindall & Crook: 209 (1976); Clayton & Renvoize: 240 (1986); Gibbs Russell et al.: 92 (1990); Watson & Dallwitz: 267 (1994); Cope: 219 (1999).

Perennial, tufted; rhizomatous. **Leaf blade** linear; *ligule* a short, fringed membrane or a fringe of hairs. **Inflorescence** of several slender, spike-like racemes, scattered up the long central axis, rarely



Figure 134.—*Craspedorhachis rhodesiana* specimen.



Figure 135.—*Craspedorachis rhodesiana* raceme with spikelets. Photographer: M. Koekemoer.

subdigitate; *spikelets* solitary, in two rows on a flat rachis. **Spikelet** dorsiventrally compressed, disarticulating above glumes; *glumes* ± equal, longer than spikelet, dissimilar, rather firm, membranous, acute, glabrous, awnless; lower glume appearing winged in upper half, asymmetrically 1-keeled, 1-nerved or nerveless; upper glume back flat with 2 keels, 1–3-nerved. **Floret** 1, bisexual; *lemma* weakly keeled, less firm than glumes, hyaline, entire, hairy or glabrous, weakly 3-nerved, lateral nerves near margin, awnless or mucronate at apex; *palea* shorter than lemma, hyaline, faintly 2-nerved, 2-keeled with long hairs on keels. **Lodicules** 2. **Stamens** 3. **Ovary** glabrous; styles plumose. **Caryopsis** obovoid. **Photosynthetic pathway**: $C_4$; XyMS+. PCR cell chloroplasts centripetal.

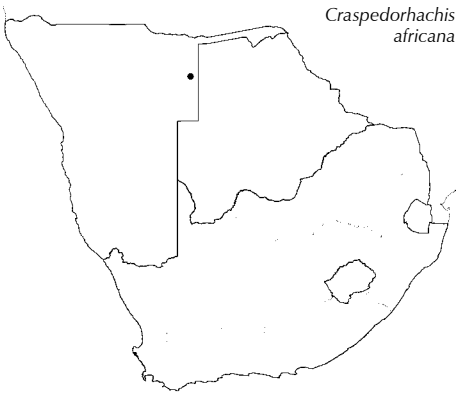
**Species** ± 2–5, tropics of Africa, North and South America; ?2 in southern Africa, northern Namibia.

Species treatment by M.T. Nembudani.

**Key to species:**

Lemma and palea pilose . . . . . **C. africana**
Lemma and palea glabrous . . . . . **C. rhodesiana**

**Craspedorhachis africana** Benth., in *Hooker's Icones Plantarum* 14: t. 1377 (1882). Type: Mozambique, on the Zambezi R., opposite Sena [Senna], Jan 1859, *Kirk s.n.* (K, holo.; PRE, fg.).

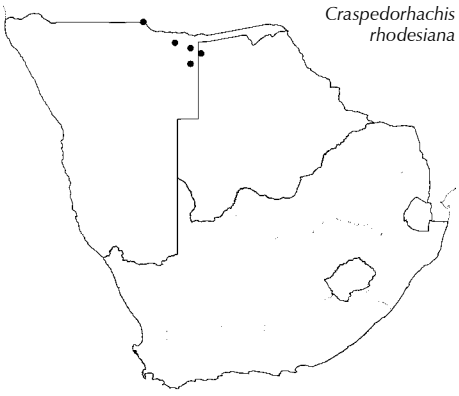

*Craspedorhachis africana*

Densely tufted perennial to 1 200 mm high; rhizome short; lower leaf sheaths persistent, splitting into fibres; culms erect or geniculate. Leaf blade to 200 × 5.5 mm. Inflorescence with racemes usually shorter than 90 mm. Spikelet 3–4 mm long; lemma and palea with long hairs; anther 1.5–2.0 mm long.

*Flowering*: January to April. *Ecology*: In sandy soils. *Frequency in southern Africa*: Rare. *Distribution*: Zambia, Zimbabwe, Malawi, Mozambique and Madagascar. ?N.

Voucher: *Story 6452* (K, not seen). [At PRE the specimen *Story 6452*, collected in Namibia, ± 30 miles north of Gautscha Pan is *C. rhodesiana*).]

**Craspedorhachis rhodesiana** Rendle, in *Journal of the Linnean Society, Botany* 40: 233, t. 5, fig. 5–13 (1911). Type: Zimbabwe, Chimanimani (Melsetter), *Swynnerton 1697* (BM, holo.).


*Craspedorhachis rhodesiana*

Densely tufted perennial to 1 200 mm high; rhizome short; lower leaf sheath chartaceous, persistent; culms erect. Leaf blade 30–120(200) × 2.5 mm. Inflorescence with racemes usually longer than 90 mm. Spikelet 2.5–3.2 mm long; lemma and palea glabrous; anther 1.0–1.5 mm long.

*Flowering*: December, February and March. *Ecology*: Sandy soils or sandy loam; along pan edges, in and along dry river beds and on sand dunes. *Frequency in southern Africa*: Infrequent. *Distribution*: Angola, Zambia, Zimbabwe, Mozambique. N, B.

Illustration: Cope: 222, tab. 65 (1999).
Voucher: *Wild & Drummond 7043*.

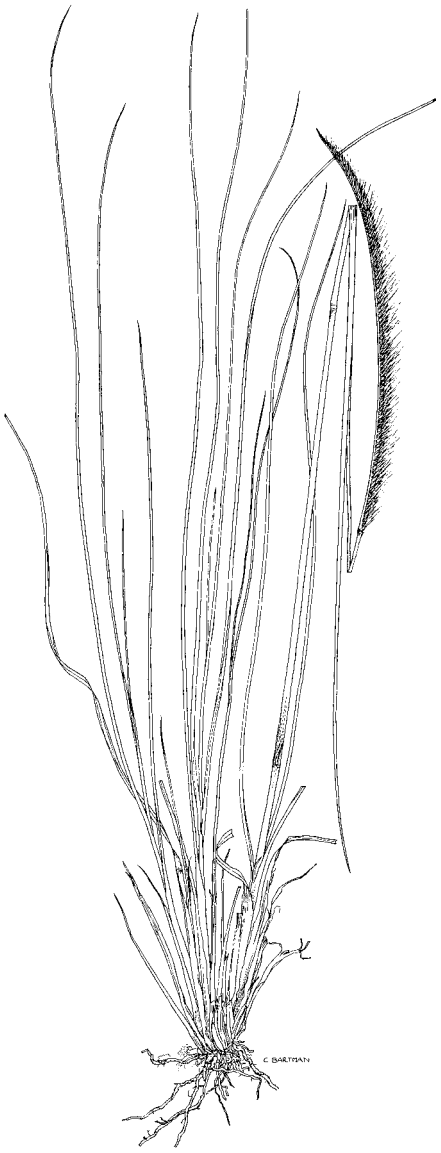



Figure 136.—*Ctenium concinnum*. Artist: C.D. Bartman.



Figure 137.—*Ctenium concinnum* spikelet (11.5 × 3.0 mm). Artist: W. Roux.

## **Ctenium** Panz.

Panzer: 36, 59 (1813) name conserved; Stapf: 638 (1900); Stent: 289 (1924); Chippindall: 192 (1955); Renvoize: 323 (1974); Clayton & Renvoize: 241 (1986); Gibbs Russell et al.: 93 (1990); Watson & Dallwitz: 272 (1994); Cope: 226 (1999).



Figure 138.—*Ctenium concinnum* spikelet (5–7 mm). Photographer: M. Koekemoer.

Tufted perennial, rarely annual; with wiry culms. **Leaf blade** linear, expanded or rolled; *ligule* a short fringed membrane. **Inflorescence** a solitary, terminal, often strongly falcate, 1-sided spike-like raceme; *spikelets* alternately biseriate along midrib of flattened rachis; spikelets solitary. **Spikelet** laterally compressed, disarticulating above glumes, not between florets; *glumes* unequal, dissimilar, tubercled on nerves; lower glume membranous, ± half as long as upper, 1-nerved, acute, keeled, with awn-point; upper glume longer than lemma, lanceolate, flat or rounded obliquely, acuminate, 2- or 3-nerved, awned from back below apex with oblique dorsal awn. **Florets** 3–5, *lower* 2 *florets* male or sterile, *third floret* bisexual, *uppermost floret* rudimentary or male; *lemmas* less firm in texture than glumes, dissimilar, oblong, entire, obtuse, 3-nerved, hairy or uppermost glabrous, awned from just below apex; *awn* straight; *palea* shorter than lemma, 2-keeled, 2-nerved. **Lodicules** 2, quadrate-cuneate or ovate, delicate. **Stamens** 3 in bisexual floret, 2 in male floret. **Ovary** glabrous; styles distinct, plumose above. **Caryopsis** ellipsoid; hilum short; pericarp fused; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines even, cell chloroplasts centripetal. **Cytology**: $x = 9$ (high polyploidy).

**Species** ± 20, tropical and subtropical America and Africa, Madagascar; 1 in southern Africa: *Ctenium concinnum* Nees, Swaziland, Lesotho, Limpopo, Gauteng, Mpumalanga, KwaZulu-Natal and Eastern Cape.

Species treatment by M.J. Moeaha.

**Quick guide to easily confused genera:**

Spikelet awned . . . . . **Ctenium**
Spikelet awnless . . . . . **Harpochloa**

**Ctenium concinnum** Nees, in *Florae Africae australioris*: 237 (1841). Type: South Africa, Cape, *Drège*.

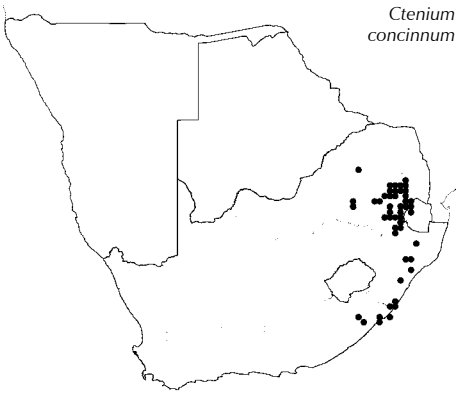
SICKLE GRASS

Tufted perennial 400–700 mm high; culms wiry. Leaf blade 100–300 × 2–5 mm; ligule a fringed membrane, fringe sometimes minute. Inflorescence a one-sided spike-like raceme, 50–170 mm long, sickle-shaped to corkscrew-like at maturity, beard of silky hairs at base

of raceme; spikelets solitary. Spikelet 5–7 mm long; lower glume membranous, 1-nerved, tubercles on nerve; upper glume 2-nerved, one nerve with tubercles, other nerve with an oblique dorsal awn $^1/_2$ way up, spreading at right angles to glume; lemma 4.0–4.5 mm long; 3-nerved, densely pubescent on marginal nerves to pilose between nerves, awned from just below apex on central nerve; awn 4.5–5.5 mm long, straight; anthers up to 2 mm long.

*Flowering*: December to April. *Ecology*: On sandy or sometimes moist soils; open grassland and bushveld. *Distribution*: Angola and northwards to East Africa where *C. somalense* is said to replace *C. concinnum*. S, L, LIM, G, M, KZN, EC. *Economics*: Unpalatable as leaves are hard, therefore not a favourite grazing grass.

Illustrations: Chippindall: 192, fig. 167 (1955).
Anatomy vouchers: *Ellis 257, 380, 1833, 1849, 1858, 3452* & *4827*.
Voucher: *Du Toit 2374*.




## **Cymbopogon** Spreng.

Sprengel: 14 (1815); Stapf: 335 (1898) under *Andropogon* L.; Stent: 247 (1924); Chippindall: 505 (1955); Soenarko: 255 (1977); Clayton & Renvoize: 759 (1982); Clayton & Renvoize: 351 (1986); Gibbs Russell et al.: 94 (1990); Watson & Dallwitz: 278 (1994); Sales: 75 (2002).



Figure 139.—*Cymbopogon marginatus*. Sessile and pedicelled spikelet pair (5.0–6.5 mm) Photographer: M. Koekemoer.

Tufted perennial, usually aromatic. **Leaf blade** filiform to broadly linear, flat or folded; *ligule* an unfringed or fringed membrane. **Inflorescence** of paired, short racemes ± enclosed by spatheoles, these crowded into a leafy, false panicle, which is often large and complex; raceme bases subequal, flattened, spreading or deflexed; *spikelets* paired, not secund, in long–short combinations: one sessile, the other pedicelled, each pair usually differing in sex and ± in shape (heterogamous) except those of lowest pair of lower or both racemes, which are homogamous; internodes and pedicels linear. **Sessile spikelet** variously compressed, falling with glumes; *glumes* ± equal in size, dissimilar in form and texture, ± chartaceous, usually 1–5-nerved; lower glume almost flat or slightly depressed or narrowly grooved on back, 2-keeled, keels usually lateral, with margins sharply inflexed at least from middle upwards, keels winged or wingless; upper glume ± boat-shaped, keeled upwards. **Florets** 2; *lower floret* sterile, reduced to a lemma, hyaline, awnless, 1-nerved; *upper floret* of homogamous pair usually male, rarely sterile, bisexual in heterogamous pair; *lemma* less firm than glumes, hyaline, glabrous, rarely entire, incised, 2-lobed, awned from between lobes; *awn* geniculate, glabrous; *callus* obtuse, hairy, inserted in concave or cupular top of internode; *palea* 0. **Lodicules** 2, minute, glabrous. **Stamens** 3. **Ovary** subglobose, glabrous; styles plumose above. **Caryopsis** oblong, subterete to plano-convex; hilum short; embryo large. **Pedicelled spikelet** never depressed on back, only lower lemma present, male or sterile, rarely suppressed, awnless. **Photosynthetic**



Figure 140.—*Cymbopogon caesius*. Artist: C. Smith.

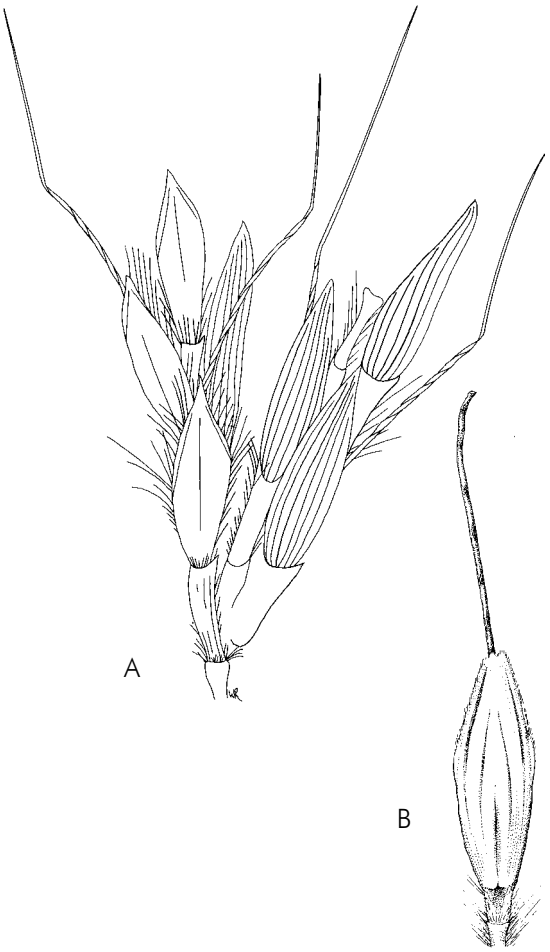



Figure 141.—*Cymbopogon caesius*. A, raceme pair showing fused lowermost pedicel and internode (21 × 11 mm); B, sessile spikelet with winged lower glume. Artists: A, W. Roux; B, C. Smith.

**pathway**: $C_4$; biochemical type NADP-ME (*C. citratus*); XyMS-. **Cytology**: $x = 5$, 10 (polyploidy).

**Species** ± 40, tropical and subtropical Africa, Asia, Australia; 6 in southern Africa, widespread.

[Note: The southern African species are greatly in need of revision.]

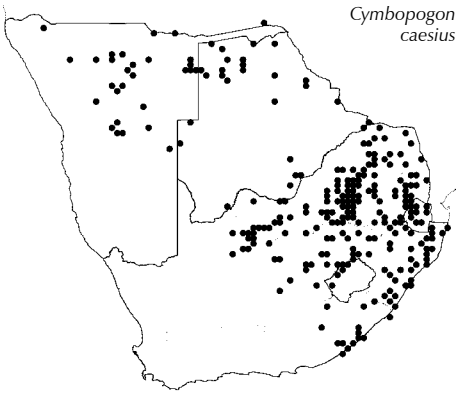
Species treatment by L. Fish.

### Quick guide to easily confused genera:

Lemma awns glabrous; fresh plant aromatic . . . . . **Cymbopogon**
Lemma awns hairy; fresh plant not aromatic . . . . . **Hyparrhenia**

### Key to species:

1. Lower raceme base internode and pedicel fused and swollen; leaf blades usually rounded to cordate at base; sessile spikelet lower glume with deep narrow median groove in lower 1/2, appearing as a rib inside, broadly winged; lowest node of old culms exposed, not clothed by leaf sheaths . . . . . **C. caesius**
   Lower raceme base not swollen; leaf blades parallel-sided at base; sessile spikelet lower glume deeply concave to flat on back, narrowly to broadly winged; lowest node of old culms clothed by leaf sheaths . . . . . 2
2. Sessile spikelet lower glume wingless or wings narrow (0.1–0.3 mm wide), back usually deeply concave (rarely only shallowly concave); leaf blades appearing setaceous . . . . . **C. pospischilii**
   Sessile spikelet lower glume broadly winged (0.3–0.7 mm wide), back flat, shallowly concave near base; leaf blades setaceous or wide and flat . . . . . 3
3. Leaf blades setaceous, to 2 mm wide; ligule 5–12 mm long, usually pointed, papery . . . . . **C. dieterleniae**
   Leaf blades flat, to 2–6 mm wide; ligule to 10 mm long, usually truncate or rounded, firm-textured . . . . . 4
4. Culms robust, 1 200–2 400 mm high; leaf blades 5–10 mm wide . . . . . **C. nardus**
   Culms slender, 450–1 200 mm high; leaf blades to 6 mm wide . . . 5
5. Inflorescence raceme internodes and pedicels densely hairy along margins and on back . . . . . **C. marginatus**
   Inflorescence raceme internodes and pedicels hairy only along margins . . . . . **C. prolixus**




**Cymbopogon caesius** (Hook. & Arn.) Stapf, in *Kew Bulletin of Miscellaneous Information,* 1906: 360 (1906). Type: India (K, holo.).

*C. excavatus* (Hochst.) Stapf ex Burtt Davy, in Prain, *Flora of tropical Africa* 9: 285 (1919). Type; South Africa, Boschmansrand-Quathalamba, *Krauss 26*.

COMMON TURPENTINE GRASS, BROAD-LEAVED TURPENTINE GRASS, LEMOENGRAS, BUCHUGRAS

Densely tufted aromatic perennial to 1 500 mm high; leaves mainly cauline; lowest culm nodes exposed, without old leaf sheaths. Leaf blade 50–300 × to 14 mm, rounded or cordate at base, apex a very long and fine point; ligule an unfringed membrane, 1–5 mm long. Inflorescence elongate; lower raceme with lowermost internode and pedicel swollen and fused together; internode and pedicel hairy along margins only. Sessile spikelet 3.5–5.0 mm long; lower glume with a deep narrow groove in lower 1/2, 2-nerved, upper part broadly winged, wing scaberulous on margin; upper lemma bifid to about middle, awn 7–14(20) mm long. Pedicellate spikelet 3–5 mm long, lower glume narrowly winged in upper part.

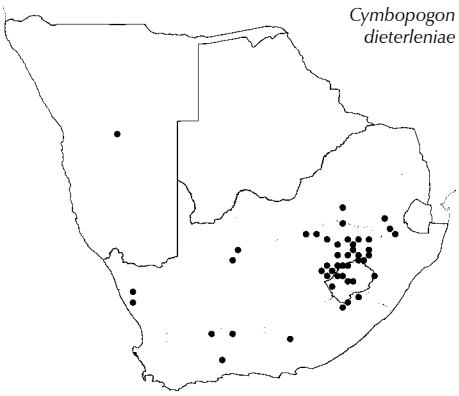
[*Diheteropogon amplectens* has similar leaf bases but it is not aromatic and lacks swollen lowest raceme base.]

*Flowering*: mostly November to May. *Ecology*: Open veld and hillsides. *Frequency in southern Africa*: Very common. *Distribution*: Northwards to Sudan and Yemen, also southern India and Sri Lanka. N, B, L, S, LIM, NW, G, M, FS, KZN, NC and EC. *Economics*: Use for thatching; smells and taste of turpentine therefore highly unpalatable; used in Lesotho to keep rodents away from grain baskets.

Illustration: Sales: 78, tab. 25, 26 (2002).
Anatomy vouchers: *Smook 2556*; *Ellis 99, 157, 402, 1318, 2047* & *5249*.
Voucher: *De Winter & Codd 467*.

**Cymbopogon dieterleniae**[1] Stapf ex E.Phillips, in *Kew Bulletin*, 1936: 325 (1936). Type: Lesotho, Leribe above Buffalo River, *Dieterlen 390AA* (K, holo.).

*Andropogon dieterlenii* (Stapf) E.Phillips, in *Annals of the South African Museum* 16: 336 (1919), nom. nud.


*Cymbopogon dieterleniae*

Tufted perennial 450–850 mm high; leaves mainly basal; lowest node of old culms clothed in leaf sheaths. Leaf blade 300–500 × to 2 mm, usually setaceous, rarely wider, parallel-sided at base; ligule an unfringed membrane 5–12 mm long, papery, pointed. Inflorescence narrow, lowest raceme base not fused and swollen; internode and pedicel hairy along margins, back glabrous. Sessile spikelet 5–6 mm long; lower glume less than 6.5 mm long, nerveless or 2-nerved, broadly winged, flat, shallowly concave at base; awn 11 mm long. Pedicellate spikelet 5.0–6.0 mm long, lower glume narrowly winged in upper part.

[Similar to *C. pospischilii*, which has leaves that appear setaceous, a short ligule, 0.5–1.5 mm long, sessile spikelet, lower glume wingless to narrowly winged and a deep median groove.]

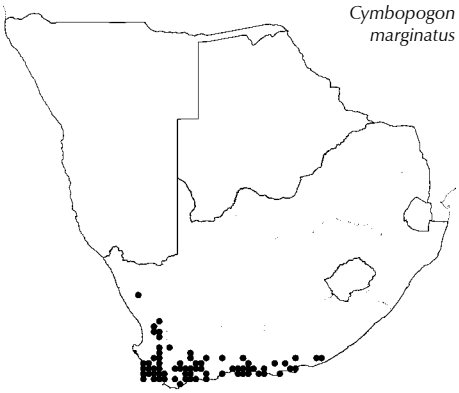
*Flowering*: November to April. *Ecology*: Open veld and rocky hillsides. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. Southern Africa. N, L, G, M, FS, KZN. NC, ?WC, EC. *Economics*: Palatable only when young; used by Basotho as medicine.

Anatomy vouchers: *Ellis 1728* & *1809*.
Voucher: *Dieterlen 390B*.

**Cymbopogon marginatus** (Steud.) Stapf ex Burtt Davy, in *Annuals of the Transvaal Museum* 3: 121 (1912). Type: South Africa, Cape, *Ecklon 920* (P, holo.).

*Andropogon marginatus* Steud., in *Flora* 12: 472 (1892).

MOTWORTELTERPENTYNGRAS, MUSKUSGRAS


*Cymbopogon marginatus*

Densely tufted perennial 300–800 mm high; leaves mainly basal; lowest node of old culms clothed by leaf sheaths. Leaf blade 150–350 × 2–5 mm, usually flat, parallel-sided at base; ligule an unfringed membrane. Inflorescence conspicuously hairy; raceme internode and pedicels sparsely to densely hairy on both margins and back, deflexed; raceme lowest internode and pedicel not swollen at base. Sessile spikelet 5.0–6.5(7.0) mm long; lower glume broadly winged above, shallowly concave on lower part, flat towards apex,

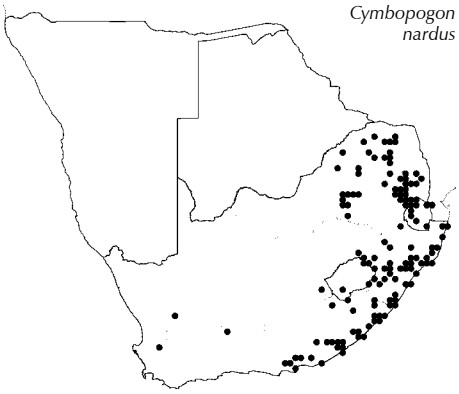
[1*dieterlenii* is probably an orthographical error as the species is most likely to have been named after Ann Dieterlin, who was the plant collector, rather than her husband, Herman (see article 60.1 McNeill et al. (2012) and Glen & Germishuizen (2010))].

2(–3)-nerved, nerves visible in upper part; awn 15 mm long. Pedicellate spikelet (4.8)5.0–7.0 mm long.

[May only be a form of *C. nardus*.]

*Flowering*: July to June. *Ecology*: Rocky hillsides. *Frequency in southern Africa*: Common. *Distribution*: Endemic. NC, WC, EC.

Anatomy vouchers: *Ellis 670, 1150* & *1161.*
Voucher: *Taylor 3197.*


*Cymbopogon nardus*

**Cymbopogon nardus** (L.) Rendle, in Hiern et al., *Catalogue of the African plants collected by Dr F. Welwitsch* 2: 155 (1899). Type: Sri Lanka.

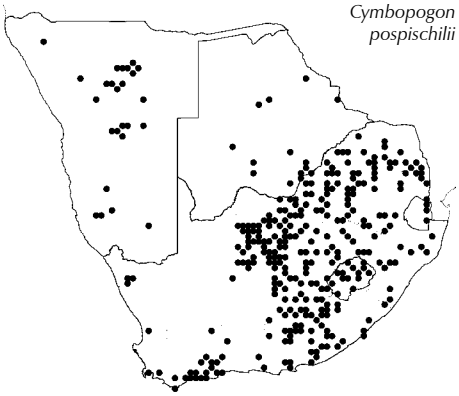
*C. validus* (Stapf) Burtt Davy, in *Annals of the Transvaal Museum* 3: 129 (1912). Type: Zimbabwe, Victoria Falls, *F.A.Rogers 5672* (K, holo.).

Giant turpentine grass, reuse terpentyngras

Robust tufted perennial 1 200–2 400 mm high; leaves mainly basal. Leaf blade 200–700 × 4–10 mm, apex thread-like, margins scabrid; ligule an unfringed membrane (2.5–)3.5–7.5 mm long, erose. Inflorescence dense, usually reddish; raceme lowermost internode and pedicel filiform, not fused together; internodes and pedicels hairy along margins, back glabrous. Sessile spikelet 3.8–6.5 mm long; lower glume shallowly grooved or flat, upper narrowly to broadly winged (may occur together on same inflorescence), nerveless or 3-nerved; upper lemma bifid, awn 6.5–11.0 mm long; anthers 1.2–3.0 mm long. Pedicellate spikelet 4.0–5.5 mm long, awnless.

*Flowering*: July to June, but usually in autumn. *Ecology*: Rocky hillsides and scrub vegetation, often in damp places. *Frequency in southern Africa*: Common. *Distribution*: Northwards to East Africa and Sudan, eastwards to southern India, Sri Lanka and Burma. L, S, LIM, NW, G, M, KZN, NC, WC , EC. *Economics*: Poor grazing grass as very aromatic and bitter; sometimes used for thatching.

Illustration: Chippindall: 507, fig. 406 (1955).
Anatomy voucher: *Ellis 5207.*
Voucher: *Moll 1665*.


*Cymbopogon pospischilii*

**Cymbopogon pospischilii** (K.Schum.) C.E.Hubb., in *Kew Bulletin* 1949: 175 (1949). Type: Mozambique, Muani, *Pospischil* (B, holo.).

*C. plurinodis* (Stapf) Burtt Davy, in *Annals of the Transvaal Museum* 3: 121 (1912). Type: South Africa, KwaZulu-Natal; Mooi River, *Wood 4318*.

Bitter turpentine grass; narrow-leaved turpentine grass

Tufted perennial 300–1 000 mm high; leaves mainly basal. Leaf blade (120)150–300 × 2–5 mm, usually folded, appearing setaceous, parallel-sided at base, margins scabrid; ligule an unfringed membrane 0.5–1.5 mm long. Inflorescence reddish; lowermost raceme internode and pedicel filiform, not fused together; internode and pedicel hairy. Sessile spikelet 4–7 mm long; lower glume with a broad median groove, wingless or narrowly winged above, 2–4-nerved; upper lemma bifid to ± middle, awn 10–20 mm long; anthers 1.6–4.0 mm long. Pedicellate spikelet 4.5–7.5 mm long, lower glume wingless.

*Flowering*: October to May. *Ecology*: In all soil types, sometimes forming dominant stands in heavier soils; grassveld. *Frequency in*

*southern Africa*: Very common. *Distribution*: Northwards to eastern Africa and Ethiopia, extending into northern Pakistan and Nepal. N, B, L, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Unpalatable due to bitter taste.

Illustration: Chippindall: 508, fig. 407 (1955).
Anatomy vouchers: *Ellis 848, 3613 & 4525*.
Voucher: *Smith 4091*.

**Cymbopogon prolixus** (Stapf) E.Phillips, in *South African Grasses*: 218 (1931). Type: South Africa, Eastern Cape, between Port Alfred and Kaffir Drift, *Burchell 3845*.

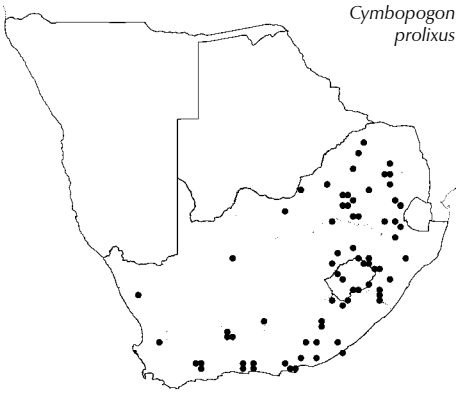
TAMBOEKIEGRAS

Tufted perennial 900–1 200 mm high; leaves mainly basal; lowest node of old culms clothed by leaf sheaths; culms slender. Leaf blade 300–500 × 3–6 mm, usually flat, parallel-sided at base; ligule an unfringed membrane, 3.0–8.5 mm long. Inflorescence reddish; raceme appearing nearly glabrous; internode and pedicel margins hairy, back glabrous; lowermost internode and pedicel filiform, not fused together. Sessile spikelet 5.0–7.5 mm long; lower glume 3-nerved, shallowly concave to flat, broadly winged; upper lemma awn 17–18 mm long. Pedicellate spikelet 5.5–7.0 mm long.

[Regarded by some to be a synonym of *C. nardus*, which is larger, much more robust and sessile spikelet lower glume is usually much more narrowly winged.]

*Flowering*: October to April. *Ecology*: Rocky hillsides. *Frequency in southern Africa*: Common. *Distribution*: Endemic. L, LIM, NW, G, M, FS, KZN, NC, WC, EC.

Anatomy vouchers: *Ellis 233* & *1444*.
Voucher: *Smith 1315*.




## **Cynodon** Rich.

Richard: 85 (1805) name conserved; Stapf: 633 (1900); Stent: 288 (1924); Stent: 274 (1927a); Hitchcock & Chase: 503 (1950); Chippindall: 198 (1955); Clayton & Harlan: 185 (1970); De Wet & Harlan: 565 (1970); De Wet & Harlan: 53 (1971); Clayton: 316 (1974); Holm et al.: 25 (1977); Clayton & Renvoize: 243 (1986); Gibbs Russell et al.: 95 (1990); Watson & Dallwitz: 281 (1994); Phillips: 174 (1995); Cope: 233 (1999); Barkworth: 235 (2003).

Perennial; often mat-forming; stoloniferous or rhizomatous. **Leaf blade** linear, flat or folded; *ligule* an unfringed membrane, a fringed membrane or a fringe of hairs. **Inflorescence** of 1–5 closely spaced 1-sided racemes; racemes in pairs, digitate or subdigitate; rachis flattened; *spikelets* solitary, sessile. **Spikelet** strongly laterally compressed, disarticulating above glumes; *glumes* ± equal to unequal, similar, narrow, shorter than or rarely as long as spikelet, acute, keeled, sometimes scabrid on keel, awnless, 1-nerved, rarely upper glume 3-nerved. **Floret** 1, bisexual, with or without a rachilla extension, sometimes bearing a second floret which is usually small and reduced, rarely well developed; *lemma* similar to firmer in texture than glumes, obtuse, 1–4-nerved, keeled, keel winged or wingless, hairy on keel and often on margins, flanks usually glabrous, awnless;




Figure 142.—*Cynodon dactylon*. Artist: W. Roux.

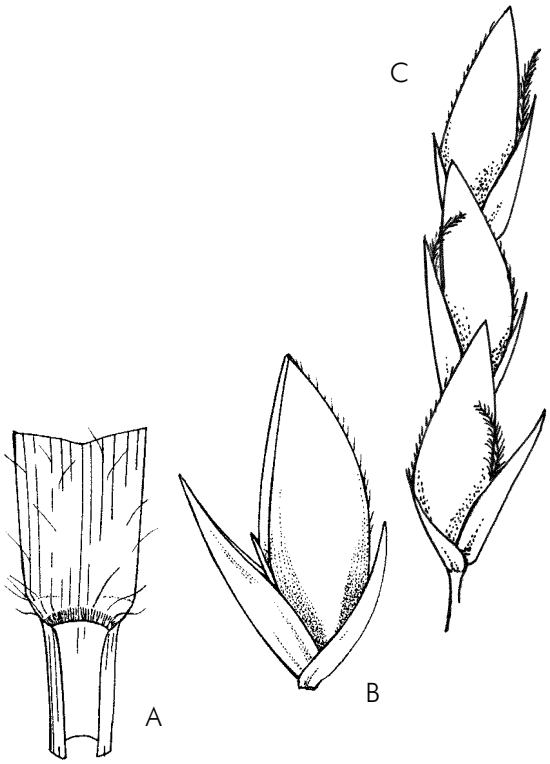



Figure 143.—*Cynodon dactylon*. A, ligule; B, spikelet; C, part of raceme. Artist: W. Roux.

*callus* glabrous; *palea* as long as or shorter than lemma, obtuse or subacute, membranous, 2-keeled. **Lodicules** 2, minute, obovate-cuneate, glabrous. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose above. **Caryopsis** ellipsoid, laterally compressed; hilum short; pericarp fused; embryo large. **Photosynthetic pathway**: $C_4$; NAD-ME (2 species); XyMS+. PCR sheath outlines even. PCR sheath extensions absent. PCR cell chloroplasts elongated; with well-developed grana; centripetal. **Cytology**: $x = 9$, 10 (polyploidy).

**Species** ± 10, warm climates of both hemispheres; 8 in southern Africa, widespread, several selected strains used for lawns and sports grounds.



Figure 145.—*Cynodon dactylon* spikelets (2.0–2.5 mm). Photographer: M. Koekemoer.

[Genus in need of revision for the FSA region.]

Species treatment by A.C. Mashau.

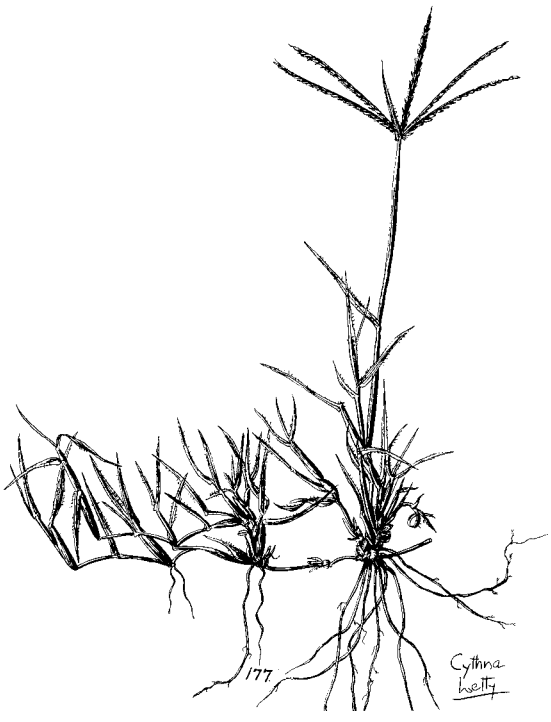
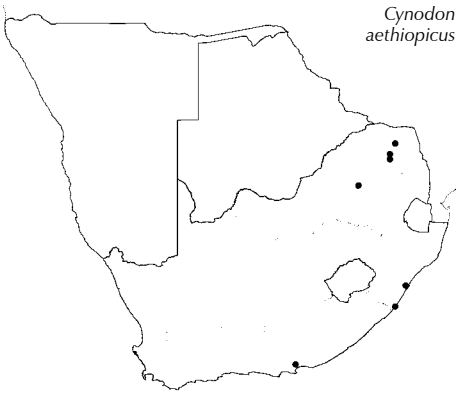



Figure 144.—*Cynodon hirsutus*. Artist: C. Letty.

**Key to species:**

1. Lemma keel winged (not clearly visible on all spikelets); rachilla not produced . . . . . 2
   Lemma keel not winged; rachilla usually produced . . . . . 3
2. Spikelet broadly ovate, 2.0–2.5 mm long; glumes more than $^1/_2$ as long as spikelet; leaf blade densely hairy . . . . . **C. hirsutus**
   Spikelet narrowly ovate, 2.5–3.0 mm long; glumes less than $^1/_2$ as long as spikelet; leaf blade glabrous or very sparsely hairy . . . . . **C. incompletus**
3(1). Racemes 2 (very rarely 1 or 4); plant rhizomatous, seldom higher than 150 mm . . . . . 4
   Racemes 3–20; plant rhizomatous and/or stoloniferous, usually 100–1 000 mm high . . . . . 5
4. Rachilla not produced; culm firm; leaf rigid, often pungent, more than 1.5 mm wide; racemes not reflexed at maturity . . . . . **C. polevansii**
   Rachilla produced, often longer than lower glume; culm delicate; leaf very fine, soft, less than 1.5 mm wide; racemes reflexed at maturity . . . . . **C. transvaalensis**
5(3). Plant stoloniferous and rhizomatous; glumes lanceolate in side view . . . . . **C. dactylon**
   Plant stoloniferous, rhizomes absent; glumes narrowly lanceolate in side view . . . . . 6
6. Lemma keel pubescent; upper glume ± $^1/_2$ as long as spikelet . . . . . **C. bradleyi**
   Lemma keel very densely silky pubescent, glabrous or with a few scattered hairs; upper glume $^1/_2$ to ± as long as spikelet . . . . . .7
7. Lemma keel glabrous or with a few scattered hairs; racemes normally stiff and tardily spreading; culm robust, often woody, hard or coarse; racemes in 2–5 whorls (rarely 1) . . . . . ***C. aethiopicus**
   Lemma keel very densely, silky pubescent; racemes normally slender to flexuous and spreading; culm fairly slender to robust, not woody, soft; racemes in 1 whorl (occasionally 2) . . . . . ***C. nlemfuensis**


*Cynodon aethiopicus*

***Cynodon aethiopicus** Clayton & Harlan, in *Kew Bulletin* 24: 187 (1970). Type: Ethiopia, Jimma (cultivated in U.S.A.), *De Wet KLA. 9224* (K, holo.).

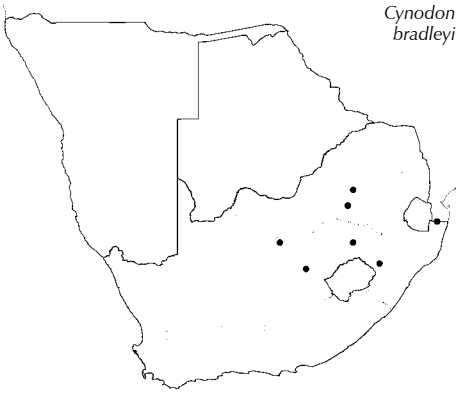
STAR GRASS, REUSE KWEEKGRAS

Robust perennial 350–900 mm high; stoloniferous; culm robust, often woody, hard or coarse. Leaf blade 30–250 × 3–7 mm; ligule a fringe of hairs to a fringed membrane. Inflorescence of racemes in multiple whorls, racemes normally stiff and tardily spreading, often red or purple. Spikelet 2.5–3.0 mm long, rachilla usually produced; glumes narrowly lanceolate in side view, 1-nerved; upper glume $^{3}/_{4}$ to ± as long as spikelet; lemma glabrous or with a few scattered hairs, keel sometimes hairy, keel not winged; palea glabrous; anther 1.3–1.6 mm long.

[Similar to *C. nlemfuensis*, which is smaller, less robust and has the lemma keel very densely silky pubescent.]

*Flowering*: January to June. *Ecology*: Rich soils; old cattle kraals and abandoned cultivation, also on moist stream banks. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from tropical Africa. LIM, G, KZN, EC. *Economics*: Erosion control on roadsides, especially embankments. Specific strains are planted as pastures in high rainfall areas. Weed.

Illustration: Clayton et al.: 320, fig. 89 (1974).
Anatomy vouchers: *Ellis 3485, 3508* & *3851*.
Voucher: *Smook 4140*.


*Cynodon bradleyi*

**Cynodon bradleyi** Stent, in *Bothalia* 2: 277, 285 (1927). Type: South Africa, Gauteng, Orange Grove, Johannesburg, *Stent* (in *Nat. Herb. Pre. H 21852*); *MacDonald* (in *Nat. Herb. Pre. H. 21849*) (syntypes).

BRADLEY GRASS

Perennial 50–100(–300) mm high; stoloniferous. Leaf blade 10–35 × to 2.5 mm, densely to sparsely hairy; ligule an unfringed or fringed membrane. Inflorescence usually of 3 racemes. Spikelet 2 to 3 mm long, rachilla sometimes produced; glumes ± $^{1}/_{2}$ as long as spikelet, narrowly lanceolate, 1-nerved; lemma keel not winged, pubescent; palea keel scabrid; anther 1.0–1.5 mm long.

[Very similar to *C. hirsutus*, which has the lemma keel winged.]

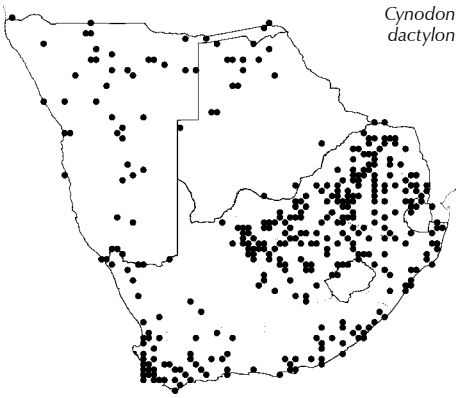
*Flowering*: December to March. *Ecology*: Fertile, well-drained soils. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. G, FS, KZN, NC. *Economics*: Lawn grass.

Voucher: *De Winter 382*.

**Cynodon dactylon** (L.) Pers., in *Synopsis plantarum* 1: 85 (1805). Type: Portugal.

COUCH GRASS, KWEEKGRAS

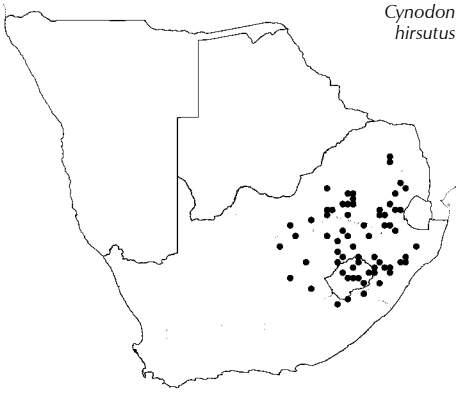
Sward-forming perennial 50–350 mm high; rhizomatous and stoloniferous. Leaf blade 10–120 × 2–4 mm; ligule a fringed membrane or a fringe of hairs. Inflorescence racemes (3–)4–5(–6), in a single whorl. Spikelet 2.0–2.5 mm long; rachilla produced; glumes lanceolate in side view, 1-nerved; upper glume $^{1}/_{2}$–$^{3}/_{2}$ as long as spikelet; lemma keel wingless, silky pubescent; palea glabrous; anther 0.8–1.2 mm long.


*Cynodon dactylon*

[A very variable species with many stains and cultivars. As there is no consensus amongst taxonomists on the variability, an in-depth world study is needed.]

*Flowering*: September to May. *Ecology*: In most soils; in disturbed areas such as along roadsides and overgrazed, trampled areas and nitrogen rich areas. *Frequency in southern Africa*: Locally dominant. *Distribution*: Worldwide in tropical and warm temperate regions. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Under natural conditions is an average to good pasture that remains green until late in winter. There are many strains known variously as quick grass, Bermuda grass, couch grass or *kweek* that are used as lawns in gardens or sports fields, other strains are planted as pasture or for erosion control as it is a hardy pioneer. Leaves are rich in vitamin C, used in traditional medicine for heartburn, wounds, indigestion or as a blood purifier; and contain the chemicals cynodin and triticin. Is a host for many fungi and viruses. Has been reported as a problem weed in cultivated lands in more than 80 countries and is difficult to eradicate because the rhizome can be up to 1 000 mm deep. But it is also one of our most valuable grasses as it protects the soil and provides grazing in areas that suffer from overstocking.

Illustrations: Chippindall: 200, fig. 175 (1955); Hitchcock & Chase: 504, fig. 737 (1950); Cope: 233, tab. 71 (1999).
Anatomy vouchers: *Ellis 269, 332, 698, 3561* & *Loxton & Ellis 979*.
Voucher: *De Winter & Hardy 8110, Brueckner 38, Smook 4751*.


*Cynodon hirsutus*

**Cynodon hirsutus** Stent, in *Bothalia* 2: 277, 286 (1927). Type: South Africa, Mpumalanga, *Burtt-Davy 9262*; *1011* (PRE)*; 2713* (PRE)*; 7245* (PRE)*; 1214* (syntypes).

RED QUICK GRASS, TRANSVAALKWEEK

Perennial 50–250 mm high; stoloniferous. Leaf blade 15–30 × 2–4 mm, densely hairy; ligule an unfringed membrane to a fringed membrane. Inflorescence usually of 3–5 racemes. Spikelet 2.0–2.5 mm long, broadly ovate; rachilla not produced; glumes more than $^1/_2$ as long as spikelet, ovate-obtuse; lower glume 1-nerved; upper glume usually 3-nerved; lemma keel winged, glabrous or shortly ciliate; palea keels scabrid; anther 1.0–1.5 mm long.

[Very similar to *C. bradleyi*, which lacks a winged lemma keel, and *C. incompletus*, which has leaves less hairy and shorter glumes (less than $^1/_2$ as long as spikelet).]

*Flowering*: October to April. *Ecology*: Well-drained loam soils. *Frequency in southern Africa*: Common. *Distribution*: Endemic. Introduced in other parts of the world, such as Australia and North America. L, LIM, NW, G, M, FS, KZN, NC, EC. *Economics*: Erosion control; traditional medicine for indigestion and as a blood purifier.

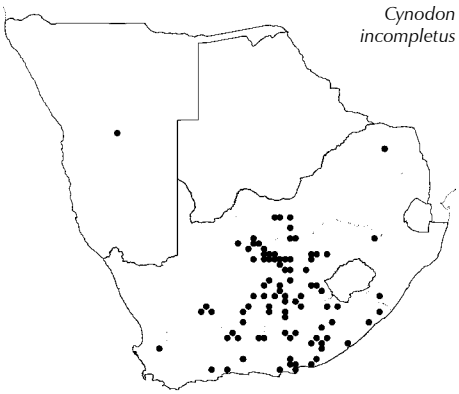

*Cynodon incompletus*

Illustration: Barkworth: 241 (2003).
Anatomy vouchers: *Ellis 435* & *A.E. Loxton & R.P. Ellis 978*.
Voucher: *Potts 3720*.

**Cynodon incompletus** Nees, in *Linnaea* 7: 301 (1832). Type: South Africa, Western Cape, Gaaup, Beaufort district. *J.F. Drège*.

KAROO QUICK GRASS, SOETKWEEK

Perennial 50–300 mm high; stoloniferous. Leaf blade 30–60 × 2–3 mm, glabrous or sparsely hairy; ligule an unfringed membrane.

Inflorescence of 3–6, but usually 3 racemes. Spikelet 2.5–3.0 mm long, narrowly ovate; rachilla not produced; glumes less than $^1/_2$ as long as spikelet; lemma keel winged, rigidly pubescent; palea keels scabrid and glabrous; anther 1.6–2.0 mm long.

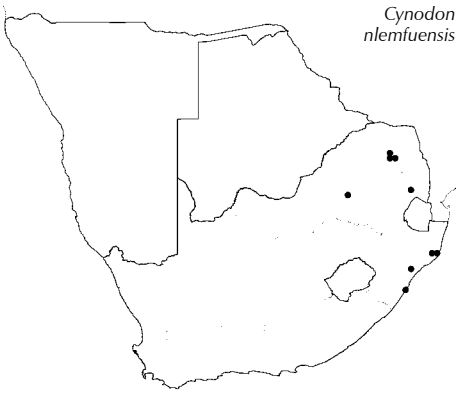
[Close to *C. hirsutus*, which has leaves more hairy and longer glumes (more than $^1/_2$ as long as spikelet).]

*Flowering*: November to May. *Ecology*: Sandy loam to turf soils. *Frequency in southern Africa*: Common. *Distribution*: Endemic. Introduced in other parts of the world such as Australia, Argentina and North America, probably as a cultivated pasture. N, LIM, NW, FS, KZN, NC, WC, EC.

Illustrations: Chippindall: 202, fig. 178 (1955); Barkworth: 241 (2003).
Anatomy voucher: *Ellis 3604* & *3624*.
Voucher: *Acocks 8479*.

***Cynodon nlemfuensis** Vanderyst, in *Bulletin agricole du Congo Belge* 13: 342 (1922). Type: DRC, Nlemfu, *Vanderyst 6095*; Kinshasa, *Vanderyst 6400* & *7672* (syntypes).

STAR GRASS, REUSE KWEEKGRAS

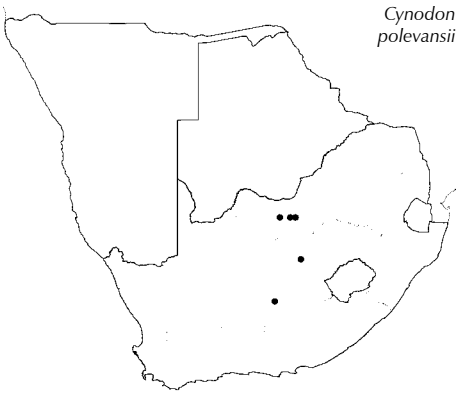

*Cynodon nlemfuensis*

Perennial 200–600 mm high; stolons stout, woody; culm fairly slender to robust, not woody, soft. Leaf blade 50–160 × 2–6 mm; ligule a fringe of hairs. Racemes 4–16, normally slender, flexuous and spreading. Spikelet 2 to 3 mm long; rachilla produced; glumes narrowly lanceolate in side view; upper glume $^1/_2$–$^3/_4$ as long as spikelet; lemma keel not winged, very densely silky pubescent; palea glabrous; anther 1.1–1.3 mm long.

[Very similar to *C. dactylon*, which has rhizomes, and *C. aethiopicus*, which is larger, more robust and has lemma keel glabrous or with a few scattered hairs. Some specimens have previously been wrongly identified as *C. plectostachyus* (K.Schum.) Pilg., originally from Kenya and Tanzania but now widely distributed in central Africa, that has tiny glumes scarcely more than $^1/_5$ as long as the spikelet.]

*Flowering*: January to March. *Ecology*: In disturbed areas and weedy places such as old lands, cattle paddocks and road verges, also moist stream sides. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to tropical Africa, introduced to many parts of Africa. Naturalised from central and east tropical Africa. LIM, G, M, KZN. *Economics*: A palatable, aggressive, leafy grass used for cultivated pasture hay; the long surface creepers make it good grass for controlling soil erosion.

Anatomy vouchers: *Ellis 1594, 2798* & *4503*.
Voucher: *Scheepers 148*.


*Cynodon polevansii*

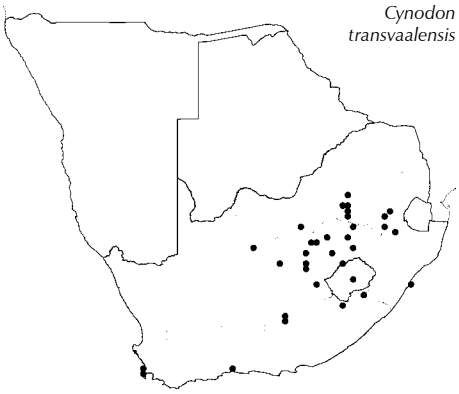
**Cynodon polevansii** Stent, in *Bothalia* 2: 278, 283 (1927). Type: South Africa, North West, Barbers Pan, Lichtenburg District, *Pole Evans 334*.

Compact perennial 50–120 mm high; rhizomatous; culm firm. Leaf blade 10–20 × ± 2 mm, rigid, often pungent; ligule an unfringed membrane. Racemes 2, not reflexed. Spikelet 2.7–3.5 mm long; rachilla not produced; glumes ± $^1/_2$ as long as spikelet, acute; lemma keel not winged, scabrid toward apex; palea keels scabrid, margins hyaline, glabrous; anther 1.0–1.7 mm long.

[The status of this species is uncertain and it has been regarded as a variety or synonym of *C. dactylon*, but more collections and research is needed.]

*Flowering*: December. *Ecology*: Moist areas. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. NW, FS, NC.

Voucher: *Pole Evans 334 (Type), Smook 10053*.


*Cynodon transvaalensis*

**Cynodon transvaalensis** Burtt Davy, in *Kew Bulletin*. 1921: 281 (1921). Type: South Africa, Gauteng, Vereeniging, *Burtt-Davy 18156* (K, holo.; PRE, iso.).

TRANSVAAL QUICK GRASS

Perennial 50–300 mm high; rhizomatous; culm delicate. Leaf blade 1.0–1.5 mm wide, delicate, very fine, soft, involute and filiform; ligule a fringed membrane. Racemes usually 2, reflexed at maturity. Spikelet 2.0–2.5 mm long; rachilla produced and is often longer than the lower glume; glumes lanceolate in side view, 1-nerved; upper glume $^1/_4$–$^1/_3$ as long as spikelet; lemma keel not winged, sparsely pubescent; palea glabrous; anther 1.4–1.7 mm long.

[The delicate, fine leaf, long rachilla, and racemes that are reflexed at maturity distinguish it from other *Cynodon* species.]

*Flowering*: November to May. *Ecology*: Roadsides and weedy places. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. Introduced to other parts of the world as a lawn grass and often escaping. L, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Lawns; weed.

Illustration: Barkworth: 239 (2003).
Voucher: *Smook 4747, Muller 1340*.

## *Cynosurus L.

Linnaeus: 72 (1753); Stapf: 689 (1900); Chippindall: 61 (1955); Chippindall & Crook: 204 (1976); Tutin: 171 (1980); Bor: 1725 (1985); Clayton & Renvoize: 98 (1986); Linder: 61 (1986); Gibbs Russell et al.: 98 (1990); Watson & Dallwitz: 282 (1994); Long: 85 (2007).

Annual or (rarely) perennial, tufted, sometimes decumbent. **Leaf blade** expanded; *ligule* a hyaline, unfringed membrane. **Inflorescence** a bristly panicle, somewhat ovoid, spike-like or capitate, ± 1-sided on central axis; spikelets clustered, dissimilar, bisexual spikelets mixed and ± concealed by sterile ones, fertile *spikelets* subsessile or shortly pedicelled. **Fertile spikelet** laterally compressed, disarticulating above glumes; *glumes* ± equal, similar, narrow, lanceolate, long-acuminate to acute, 1-nerved, scabrid on keel, awnless. **Florets** 1–5; *lemma* similar to firmer in texture than glumes, rounded on back, 5-nerved, entire or 2-lobed, awned from close below apex; *awn* straight, ± twice length of lemma body; *callus*



Figure 146.—*Cynosurus coloratus*. Inflorescence branch with fertile spikelet surrounded by sterile spikelets (16 × 15 mm). Artist: S.B. Chiliza.


Figure 147.—*Cynosurus coloratus* spikelet (10–15 mm). Photographer: M. Koekemoer.

short, glabrous; *palea* ± equal to lemma and similar in texture, acuminate, bidentate, 2-keeled. **Lodicules** 2. **Stamens** 3. **Ovary** glabrous; styles plumose above. **Caryopsis** oblong; hilum short, or long-linear; embryo small. **Sterile spikelet** consisting of rigid, lanceolate, awned glumes and lemmas which are persistent on the panicle. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$.

**Species** 8, Europe, Middle East and North and southern Africa; ± 2 in southern Africa: **Cynosurus echinatus* L. naturalised and *Cynosurus coloratus* Lehm. ex Nees, possibly indigenous, Free State and Western Cape.

[A deeper investigation and more material of the genus in southern African are needed.]

Species treatment by A.C. Mashau and L. Fish.

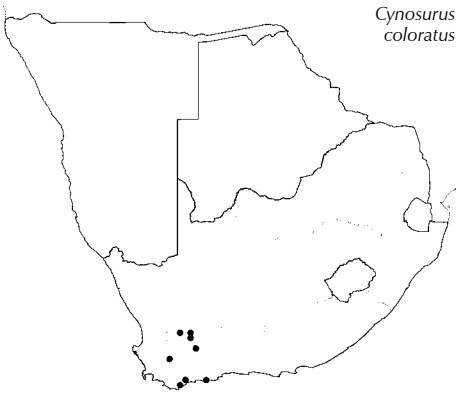


Figure 148.—*Cynosurus echinatus*.

**Key to species:**

Anther 0.4–0.8(1.0) mm long; plant 40–180 mm high . . . . . *__C. coloratus__
Anther 1.5–3.0 mm long; plant 200–700 mm long . . *__C. echinatus__

*__Cynosurus coloratus__ Lehm. ex Nees, in *Florae africanae australioris*: 439 (1841). Type: South Africa, Western Cape, Swellendam distr., *Mundt* (SAM, lecto.).



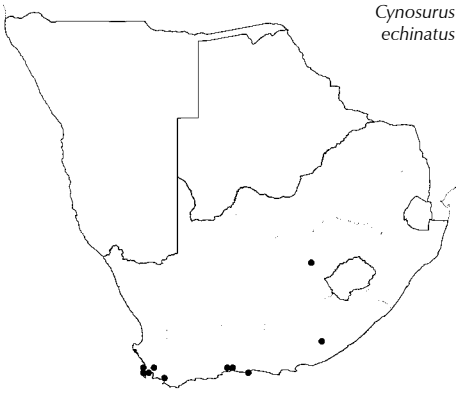
*Cynosurus coloratus*

Loosely tufted annual, 40–180 mm high; culm slender, simple. Leaf blade 10–50 × 2–3 mm. Inflorescence ovate, often appearing wedge-shaped. Fertile spikelet awns usually purple, glumes and lemmas dissimilar; glume (including awn) 4–7 mm long; lemma 2.8–4.0 mm long, back rounded, awn straight; anther 0.4–0.8(1.0) mm long. Sterile spikelet up to 16 mm long; glumes and lemmas produced into awns; awns 15–20 mm long, base purple and pale above; awns of glumes and lemmas of different lengths with the lower usually much longer than spikelet and other awns, making the spikelet not to appear regular and neat on the sides.

*Flowering*: August to November. *Ecology*: Calcareous soils on limestone flats of Bredasdorp and Riversdale, and Rhenosterveld in the mountains around Sutherland. *Frequency in southern Africa*: Rare. *Distribution*: Said to occur in Asia. Although the type is from South Africa, there is some doubt as to whether it is indigenous to South Africa or to the Mediterranean region (Linder, *Bothalia* 16: 61 [1986]). WC, NC.

Voucher: *Leistner 275*.

*__Cynosurus echinatus__ L., in *Species plantarum* 1: 72 (1753). Type: Europe.



*Cynosurus echinatus*

DOG'S TAIL

Tufted annual 200–700 mm high; culm erect or decumbent at base. Leaf blade 50–150 × 3–10 mm. Inflorescence oblong to ovate sometimes globose. Spikelet awns pale, rarely purple. Fertile spikelet 7–20 mm long; glumes and lemmas dissimilar; glume 5.5–12.0 mm long, awned; lemma 4–7 mm long (excluding awns), rounded on back; awn straight; anther 1.5–3.0 mm long. Sterile spikelet 7–13 mm long; glumes and lemmas awned; awns pale rarely purple, all appear

short and end ± at the same height or becoming shorter in a regular way up spikelet, so that spikelet sides appears neat and regular.

*Flowering*: October to December, but March in the Free State. *Ecology*: On rocky well-drained soils; and disturbed places like roadsides, often in the shade. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from Europe. Atlantic islands and Mediterranean region eastwards to India; now in the Americas and Australia. FS, WC, EC. *Economics*: Weed.

Illustration: Chippindall: 61, fig. 33 (1955); Long: 686 (2007).
Anatomy vouchers: *Ellis 5114, 5478* & *5824*.
Voucher: *Crook 2318*.

## *Dactylis L.

Linnaeus: 71 (1753); Stapf: 695 (1900); Chippindall: 49 (1955); Clayton: 43 (1970); Tutin: 170 (1980); Clayton & Renvoize: 102 (1986); Gibbs Russell et al.: 99 (1990); Watson & Dallwitz: 289 (1994); Phillips: 19 (1995); Sell & Murrell: 165 (1996); Allred: 482 (2002).



Figure 149.—*Dactylis glomerata* spikelet (5–9 mm). Photographer: M. Koekemoer.

Tufted perennial; rhizome often oblique; sheaths keeled, compressed. **Leaf blade** linear to linear-lanceolate, expanded or rolled; *ligule* an unfringed membrane. **Inflorescence** an open or contracted panicle, lobed, branches secund; *spikelets* crowded in dense, shortly pedicelled clusters at the ends of short main branches. **Spikelet** 5–9 mm long, strongly laterally compressed, disarticulating above glumes; *glumes* ± equal or unequal, similar, shorter than spikelet, lanceolate to ovate, rigid, membranous, 3-nerved, strongly keeled, glabrous or hairy on keel, acuminate to mucronate or awned, persistent. **Florets** 2–5(–7), bisexual; *uppermost floret* often sterile; *lemma* firmer in texture than glumes, lanceolate-oblong, 5-nerved, strongly keeled, keels hairy or scabrid, shortly awned; *awn* straight, shorter than body of lemma; *callus* short, glabrous; *palea* slightly shorter than lemma, 2-keeled. **Lodicules** 2, bilobed, glabrous. **Stamens** 3. **Ovary** glabrous; styles plumose. **Caryopsis** ovoid, tightly enclosed by hardened lemma and palea; hilum short; embryo small. **Cytology**: $x = 7$ (polyploidy, B-chromosomes). **Photosynthetic pathway**: $C_3$; XyMS+.

**Species** 1–5, temperate Eurasia; 1 in southern Africa: **Dactylis glomerata* L., cultivated and sometimes occurring as an escape.

Species treatment by M.J. Moeaha.

**Dactylis glomerata** L., in *Species plantarum*: 71 (1753). Type: Europe.

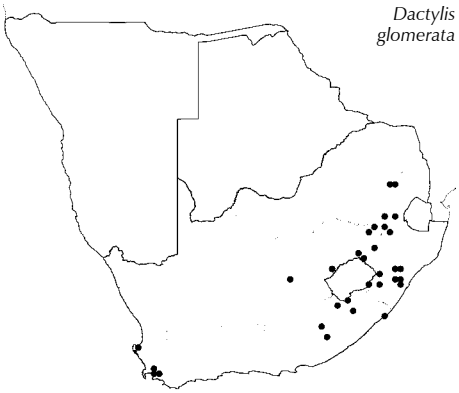
COCKSFOOT, ORCHARD GRASS

Densely, coarsely tufted perennial 150–800(–1 400) mm high; rhizome oblique. Leaf blade 100–450 × 2–14 mm, flat or folded, or involute, pilose on the upper surface; glabrous, shining and smooth on the lower surface; ligule 2–10 mm long. Inflorescence 50–300 mm long, one-sided, lowest branches usually solitary, remote and bare at the base; spikelets almost sessile, in dense one-sided clusters. Spikelet 5–9 mm long, 3–5(–7)-flowered, laterally compressed; glumes acuminate to mucronate or awned; awn short, up to 1.5 mm, strongly keeled, keels rough or hairy; lemma strongly keeled; awn 0.5–1.5 mm long, shorter than lemma body; anthers 3–4 mm long. **Chromosome number**: 2x = 14, 28 + 0–4B (Tutin 1980).

*Flowering*: July, August and November to February. *Ecology*: At high altitudes; mostly in cultivation but also in other disturbed places like roadsides. *Frequency in southern Africa*: Infrequent. *Distribution*:




Figure 150.—*Dactylis glomerata*. A, plant; B, spikelet (8.0 × 3.8 mm). A, C. Letty; B, W. Roux.



Naturalised from Europe. Introduced to most temperate areas of the world. L, M, FS, KZN, WC, EC. *Economics*: Cultivated as hay and to some extent as winter pasture grass.

Illustrations: Clayton et al.: 44, fig. 16 (1970); Allred: 483 (2007).
Voucher: *Du Toit 2543*.

## **Dactyloctenium** Willd.

Willdenow: 1029 (1809); Stapf: 646 (1900); Stent: 292 (1924); Fisher & Schweickerdt: 49 (1941); Chippindall: 131 (1955); Launert: 53 (1970); Phillips: 250 (1974); Clayton & Renvoize: 223 (1986); Gibbs Russell et al.: 99 (1990); Watson & Dallwitz: 290 (1994); Cope: 162 (1999); Hatch: 112 (2003).

Annual or perennial, tufted, mat-forming; often stoloniferous, rhizomatous or rooting from lower nodes, sometimes geniculate. **Leaf blade** linear to linear-lanceolate, expanded or rolled; *ligule* an unfringed membrane or fringe of hairs. **Inflorescence** of 2–9 spikes, digitate or subdigitate, 1-sided on a flattened rachis, tips of rachis a barren, rigid, pointed extension; *spikelets* solitary, sessile, densely imbricate, biseriate. **Spikelet** laterally compressed, disarticulating above glumes, usually not between florets; *glumes* ± equal, shorter than spikelet, membranous, strongly keeled, prominently 1-nerved, both or only upper with nerve excurrent into a rigid awn that curves outwards from back of glume; lower glume ovate, acute; upper glume elliptic-oblong. **Florets** 3–7, bisexual; *uppermost floret* rudimentary; *lemma* ovate, membranous, keeled, glabrous, 1–3-nerved, lateral nerves obscure, keeled, keels often scabrid, acute and awnless to mucronate or awned; *awn* short, straight; *palea* ± as long as lemma, membranous, ovate-lanceolate or oblong-lanceolate, 2-keeled, deeply concave between keels. **Lodicules** 2, cuneate, minute, hyaline. **Stamens** 3. **Ovary** glabrous; styles plumose above. **Caryopsis** angular, surface with ornamentation, enclosed in free, hyaline pericarp. **Photosynthetic pathway**: $C_4$; XyMS+. **Cytology**: $x = 10$, 12 (polyploidy).

**Species** 12, warm regions of the world, mainly Africa, Arabia and India; 4 in South Africa, widespread, not recorded from Western Cape.

Species treatment by L. Fish.




Figure 151.—*Dactyloctenium aegyptium*. Artist: C. Letty.

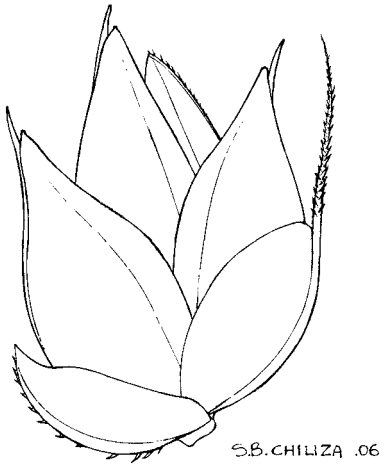



Figure 152.—*Dactyloctenium aegyptium* spikelet (5 × 3 mm). Artist: S.B. Chiliza.



Figure 153.—*Dactyloctenium giganteum* spikelet (4.0–6.2 mm). Photographer: M. Koekemoer.

## Quick guide to easily confused genera

*Dactyloctenium* easily recognised from all other taxa with digitate inflorescences by the sharp naked point at apex of each raceme.

## Key to species

1. Anthers 0.25–0.80 mm long; annual . . . . . **D. aegyptium**
   Anthers 1.0–2.4 mm long; annual or perennial . . . . . 2
2. Lemma acute, awnless or awn up to 0.4 mm long; racemes usually 2; perennial . . . . . **D. geminatum**
   Lemma acuminate, awn 0.5–2.0 mm long; racemes usually 3 or more; annual or perennial . . . . . 3
3. Stoloniferous perennial; racemes (15)25–35(50) mm long; upper glume and awn usually just shorter to slightly longer than adjacent lemma body; caryopsis apex rounded . . . . . **D. australe**
   Robust annual, occasionally rooting at nodes; racemes (25)55–75(110) mm long; upper glume and awn usually much longer than adjacent lemma body; caryopsis apex truncate or emarginate . . . . . **D. giganteum**

**Dactyloctenium aegyptium** (L.) Willd., in *Enumeratio plantarum*: 1029 (1809), as *'aegyptiacum'*. Type: Egypt & India (syntypes).

Crowfoot, duck grass

Tufted mat-forming annual 70–750 mm high; stolons often present; culms geniculately ascending, rooting at nodes. Leaf blades 30–250 × 3–8(12) mm; lower surface densely papillate. Inflorescence of (1)4–9 racemes, 12–65 mm long. Spikelet 3.5–4.5 mm long, broadly ovate; glumes ± equal; lower glume keel thick, scabrid; upper glume awned, awn 0.5–2.0 times as long as glume body; lemma keel scabrid above middle, usually with mucro or awn up to 1.2 mm long; anthers 0.25–0.80 mm long; caryopsis ± 1 mm long, broadly triangular, apex truncate to concave, transversely rugose.

*Flowering*: January to April. *Ecology*: Disturbed areas near water. *Frequency in southern Africa*: Common. *Distribution*: Throughout Africa and in tropical and warm temperate regions worldwide; introduced into America, Europe and Australia. N, B, S, LIM, NW, G, M, FS, KZN, NC, EC. *Economics*: Used as pasture; weed in rice-fields and waste ground; seed used as food in times of famine; bruised young seeds used as a fish poison; traditional medicine to treat kidney ailment and coughing; acts as host for viruses. In Australia used as a sand-binder but also regarded as a weed.

Illustration: Cope: 164, tab. 49, B1–3 (1999); Hatch: 114 (2003).
Anatomy vouchers: *Ellis 514, 919, 3861, 4714* & *5245*.
Voucher: *Du Toit 229*.

**Dactyloctenium australe** Steud., in *Synopsis plantarum glumacearum* 1: 212 (1854). Type: South Africa, *Drège* (P, holo.).

Durban grass, Natal crowfoot

Perennial 130–810 mm high; stoloniferous. Leaf blades 50–270 × 2.0–4.5 mm. Inflorescence of 2–3(6) racemes (15)25–35(50) mm long. Spikelet 3.0–4.0(5.5) mm long; upper glume and awn usually shorter to just longer than adjacent lemma body; lemma acuminate, awn 0.5–1.3 mm long, keel thick, scabrid above middle; anthers 1.3–1.7 mm long; caryopsis obovate, apex rounded to convex.

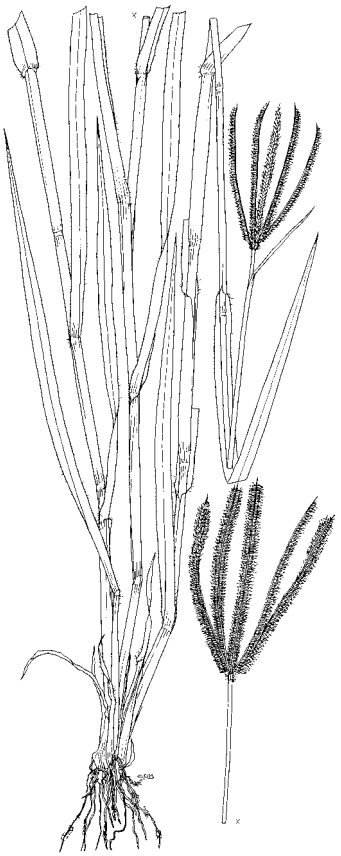
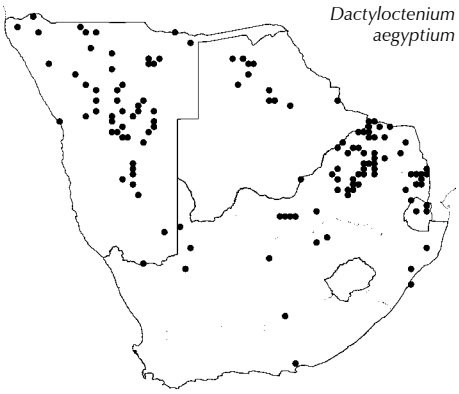
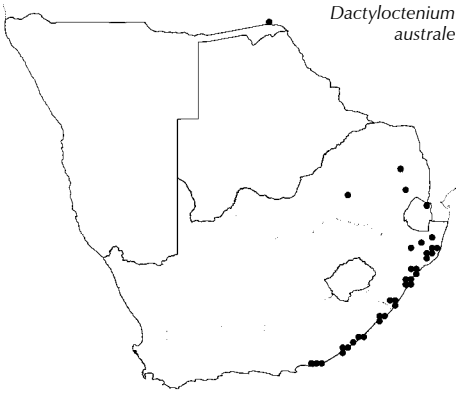


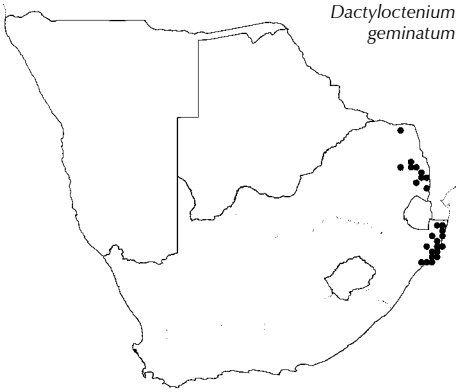
Figure 154.—*Dactyloctenium giganteum*. Artist: C.D. Bartman.



*Flowering*: January to May. *Ecology*: Sandy soils; on seashores, dunes and along forest roads, often in light shade. *Frequency in southern Africa*: Common. *Distribution*: Tropical East Africa, introduced into Australia. ?N, S, LIM, G, M, KZN, EC. *Economics*: Grazed by stock; erosion control as a good sand binder; as lawns as grows well in shade.

Anatomy vouchers: *Ellis 270* & *1111*.
Voucher: *Smook 5532*.

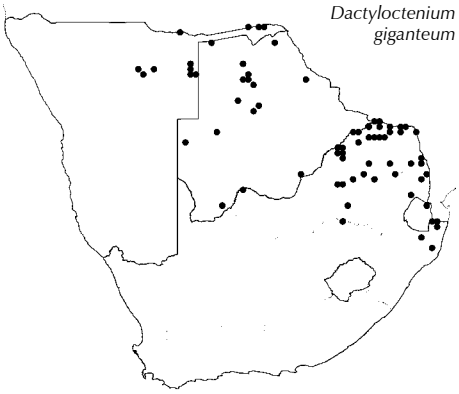

*Dactyloctenium geminatum*

**Dactyloctenium geminatum** Hack., in *Bulletin de l'Herbier Boissier* 7: 26 (1899). Type Mozambique, Baía de Maputo (Delagoa Bay), *Junod s.n.* (Z, holo.; PRE, fg.).

Mat-forming perennial 350–870 (1 000) mm high; stolons wiry. Leaf blades 40–250 × 3–6 mm. Inflorescence of usually (1)2(3) racemes; racemes 25–70 mm long, diverging. Spikelet 3.0–5.4 mm long; upper glume awn up to 1.5–2.0 times as long as body of glume; lemma apex acute, awnless, mucronate or awn up to 0.4 mm long (often in same spikelet), keel smooth or finely scaberulous; anthers 1.1–1.7 mm long; caryopsis ± 1 mm long, obovate, apex rounded to convex, transversely rugose.

*Flowering*: December to March. *Ecology*: On sandy soil; alkaline pans, sand dunes, in swamp forest undergrowth, coastal sand flats and open grassveld. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe, Malawi and along the east coast of Africa as far as Somalia. LIM, M, KZN. *Economics*: Erosion control as it is a good sand binder.

Illustrations: Clayton, Phillips & Renvoize: 257, fig. 70 (1974); Cope: 164, tab. 49, C1–7 (1999); Hatch: 114 (2003).
Anatomy vouchers: *Ellis 3412, 3574* & *4052*.
Voucher: *De Winter and Codd 545*.


*Dactyloctenium giganteum*

**Dactyloctenium giganteum** B.S.Fisher & Schweick., in *Annals of the Natal Museum* 10: 53 (1941). Type: Namibia, Grootfontein, *Schoenfelder 1018* (NH, holo.; PRE, iso.).

Giant crowfoot, sterretjiegras

Tufted, erect, robust annual 480–1 140 mm high; occasionally rooting at nodes. Leaf blades 110–450 × 5–12 mm. Inflorescence of (1)3–9 racemes, (35)55–75(110) mm long, rarely spreading. Spikelet 4.0–6.2 mm long, elliptic; lower glume keel thickened, scabrid; upper glume awn 1.5–4.0 times as long as glume body, usually glume and awn much longer than adjacent lemma body; lemma acuminate, keel scabrid, awn 0.7–2.0 mm long; anther 1.3–2.2 mm long; caryopsis triangular, apex truncate to concave; transversally rugose.

*Flowering*: November to May. *Ecology*: Open veld or disturbed areas on river banks or near water, often in shade. *Frequency in southern Africa*: Common. *Distribution*: Northwards to Kenya and Tanzania; and Angola. N, B, S, LIM, NW, G, M, KZN. *Economics*: Weed.

Illustration: Cope: 164, tab. 49, A1 & A2 (1999).
Anatomy vouchers: *Ellis 529, 1904* & *3847*.
Voucher: *Du Toit 4618*.

## **Danthoniopsis** Stapf

Stapf: t. 3075 (1916); Hubbard: 351 (1949); Chippindall: 285 (1955); Conert: 317 (1957); Phipps: 229 (1966); Clayton: 123 (1967); Launert: 127 (1970); Phipps: 417 (1972); Chippindall & Crook: 100 (1976); Clayton & Renvoize: 317 (1986); Clayton: 199 (1989); Gibbs Russell et al.: 101 (1990); Watson & Dallwitz: 298 (1994).



Figure 155.—*Danthoniopsis dinteri* spikelet (14–20 mm). Photographer: M. Koekemoer.

Perennial, rarely annual; tufted. **Leaf blade** linear or lanceolate-linear, expanded; *ligule* a fringe of hairs. **Inflorescence** an open or contracted panicle; *spikelets* paired, rarely in threes or solitary, pedicelled, pedicels free. **Spikelet** laterally compressed, disarticulating above glumes; *glumes* very unequal, dissimilar, scarious-membranous to chartaceous, rarely thinly coriaceous, 3–5-nerved, glabrous; lower glume not more than half the length of upper; upper glume lanceolate, ovate, oblong. **Florets** 2; *lower floret* male with lemma similar to upper glume, as long as or slightly shorter than spikelet, (3)5–9-nerved, awnless; palea membranous, narrow, 2-keeled with keels very narrowly winged; *upper floret* bisexual, *lemma* 5–11-nerved, similar in texture to glumes, hairy, hairs in 2–8 distinct tufts or fringes or tufts mixed with dispersed hairs or hairy but not tufted, deeply 2-lobed; lobes acute, sometimes produced into fine scaberulous awns; awned from between lobes; *central awn* geniculate, twisted below bend; *callus* short, square to oblong, obtuse; *palea* similar to that of lower floret but keels firmer and usually with wider wings; wings expanded into ± triangular or clavate appendages. **Lodicules** 2, cuneate, fleshy. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose above; hilum long-linear; embryo large. **Photosynthetic pathway**. $C_4$. The anatomical organisation conventional or unconventional. Organisation of PCR tissue when unconventional arundinella-type. XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 12$ (1 report, polyploidy).

**Species** ± 20, Africa, Arabian Peninsula; 6 in southern Africa, Namibia, Botswana, Limpopo, Mpumalanga, KwaZulu-Natal and Northern Cape.

Species treatment by M.T. Nembudani.

### Quick guide to easily confused genera:

1. Ligule a fringed membrane . . . . . **Arundinella**
   Ligule a fringe of hairs . . . . . 2
2. Lemma hairs in tufts, fringes or tufts mixed with dispersed hairs . . . . . **Danthoniopsis**
   Lemma glabrous or hairs dispersed, not tufted . . . . . **Loudetia**

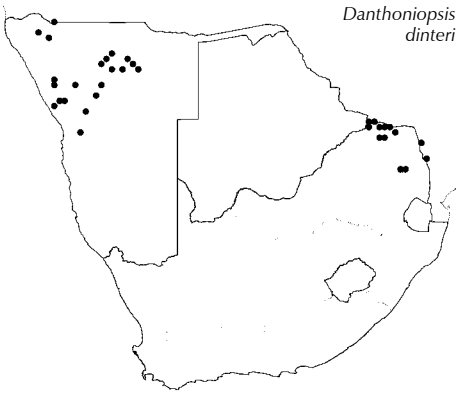
### Key to species:

1. Annual; spikelet 14–20 mm long, light green, turning yellowish, variegated with dark purple (lower glume usually almost completely purple) . . . . . **D. dinteri**




Figure 156.—*Danthoniopsis dinteri*. A, plant; B, upper floret showing front and back view (40.0 × 2.2 mm). Artists: A, C.D. Bartman; B, W. Roux.

Perennial; spikelet less than 14 mm long, mainly straw-coloured, sometimes tinged with purple, rarely whole spikelet purple . . . .2
2. Spikelets in lax triads . . . . . **D. scopulorum**
Spikelets in pairs or borne singly . . . . . 3
3. Upper lemma central awn 5.0–5.5 mm long, 11-nerved, with 8 tufts of hairs . . . . . **D. lignosa**
Upper lemma central awn 7–12 mm long, 5-nerved, with 6 tufts of hairs or hairs scattered, not tufted . . . . . 4
4. Lower lemma 5–7-nerved; upper lemma loosely hairy, without distinct tufts . . . . . **D. ramosa**
Lower lemma 3-nerved; upper lemma with 6 tufts (3 tufts of hairs on either side of central nerve) . . . . . .5
5. Upper glume 5-nerved; lower glume 3.0–3.8 mm long; spikelet 4.0–6.5 mm long; leaf blade to 50 × 3 mm . . . . . **D. parva**
Upper glume 3-nerved; lower glume 4–5 mm long; spikelet 5–9 mm long; leaf blade 100–250 × 4–12 mm . . . . **D. pruinosa**

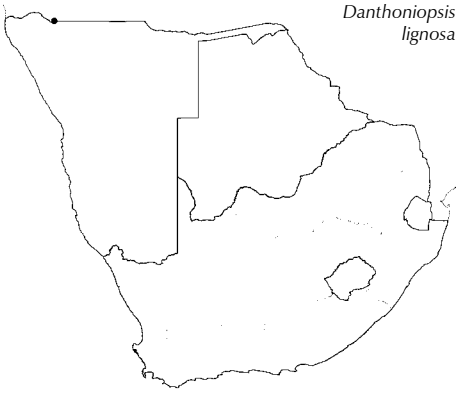

*Danthoniopsis dinteri*

**Danthoniopsis dinteri** (Pilg.) C.E.Hubb., in *Kew Bulletin* 1934: 436 (1934). Type: Namibia, Gaub, Heisib-Omo, *Dinter 2438* (PRE, fg.).

Robust, tufted annual to 2 m high; culms unbranched. Leaf blade 300–600 × 8–15 mm. Inflorescence with spikelets in lax triads; pedicels unequal, usually the 2 lower spikelets reduced. Spikelet 14–20 mm long, light green, variegated with dark purple, lower glume 6.0–7.5 mm long, usually almost completely purple; upper glume 5-nerved; both lemmas 7-nerved; upper lemma with a row of 6–8 tufts across back in upper half, loosely hairy below tufts, lobes 4 mm long, acute, central awn 10–22 mm long; anther 3.5–5.5 mm long.

*Flowering*: February to June. *Ecology*: Among rocks and in rock crevices on mountains. *Frequency in southern Africa*: Infrequent. *Distribution*: Angola, Mozambique, Zimbabwe. N, B, LIM, M. *Economics*: Natural pasture when young.

Illustrations: Chippindall: 255 (1955); Clayton: 203, tab. 55 (1989).
Anatomy vouchers: *Ellis 1580, 1942, 3206, 4754* & *Smook 5137A*.
Voucher: *Smook 5137*.


*Danthoniopsis lignosa*

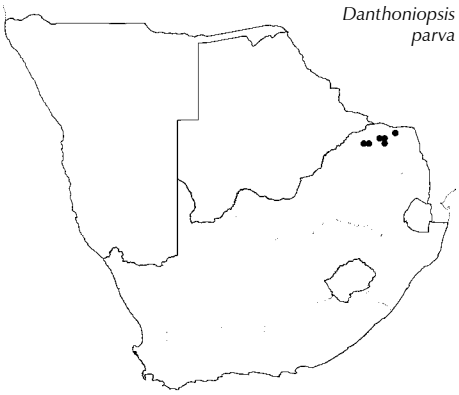
**Danthoniopsis lignosa** C.E.Hubb., in *Kew Bulletin Miscellaneous of Information* 1949: 351 (1949). Type: Angola, Huilla District, Ruacana, near River Cunene, 900 m., June 7, 1937. *Gossweiler 11051*.

Tufted, robust perennial to 2 m high; culms very thick-walled and woody. Leaf blade to 400 × 8 mm. Inflorescence dense; spikelets in pairs; pedicels unequal. Spikelet 4–6 mm long, straw coloured or tinged with light purple; lower glume 3–4 mm long; upper glume 5-nerved; lower lemma 7–9-nerved; upper lemma 11-nerved, with 8 tufts of hairs in upper half, loosely hairy below tufts; lobes 1 mm long, acute, central awn 5.0–5.5 mm long; anther 1–2 mm long.

*Flowering*: July. *Ecology*: River edges in flowing water. *Frequency in southern Africa*: Infrequent. *Distribution*: Angola. N.

Voucher: *Leistner, Oliver, Steenkamp & Vorster 316*.

**Danthoniopsis parva** (J.B.Phipps) Clayton, in *Kew Bulletin* 1967: 123 (1967). Type: South Africa, Limpopo, Soutpansberg, Williespoort, in crevices in steep krantz, 3 500 ft., *Codd & Dyer 3922* (SRGH, holo.; PRE, iso.).


*Danthoniopsis parva*

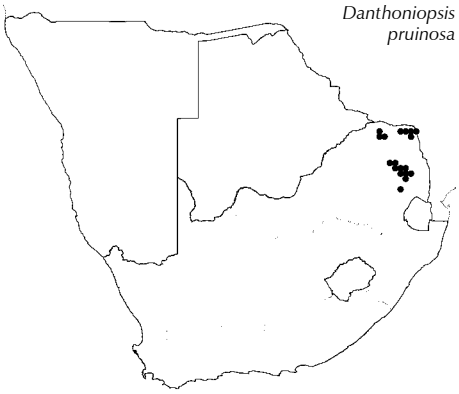
Tufted perennial 300–600 mm high; culms delicate. Leaf blade to 50 × 3 mm. Inflorescence straw coloured; spikelets in pairs; pedicels unequal. Spikelet 4.0–6.5 mm long; lower glume 3.0–3.8 mm long; upper glume 5-nerved; lower lemma 3-nerved; upper lemma 5-nerved, with 3 tufts of white hairs on either side of central nerve on upper half, loosely hairy below tufts, lobes 1.5 mm long, acute, central awn 7–10 mm long; anther 1–2 mm long.

[This species is close to *D. pruinosa*, which has a larger spikelet (5–9 mm long), and a 3-nerved upper glume.]

*Flowering*: January to May. *Ecology*: Rock crevices on cliffs. *Frequency in southern Africa*: Infrequent. *Distribution*: ?Endemic. LIM.

Anatomy voucher: *Ellis 1936*.
Voucher: *Smook 5401*.

**Danthoniopsis pruinosa** C.E.Hubb., in *Kew Bulletin* 1934: 436 (1934). Type: Zambia, Pemba, *Trapnell 997* (K, holo.).


*Danthoniopsis pruinosa*

ROCK POWDER GRASS

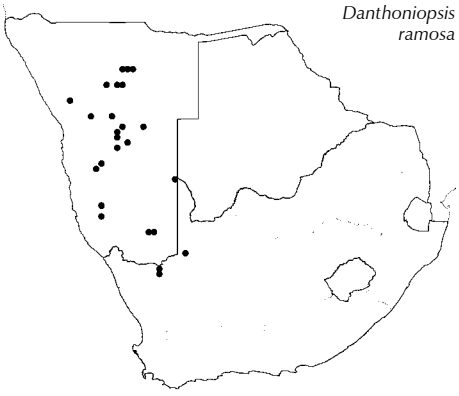
Tufted perennial 600–1 800 mm high; rhizome swollen; culm brittle, woody, often branched, with a waxy bloom below the node, nodes occasionally hairy. Leaf blade 100–250 × 4–12 mm. Inflorescence straw coloured; spikelets borne singly or in pairs; pedicels unequal. Spikelet 5–9 mm long, light to senna brown; lower glume 4–5 mm long; upper glume and lower lemma 3-nerved; upper lemma with 6 tufts of white hairs, (3 tufts on either side of central nerve), loosely hairy below tufts, 5-nerved, lobes 1.0–1.5 mm long, acute, central awn 7–12 mm long; anther 1.5–2.0 mm long.

[Resembles *D. parva*, which has a smaller spikelet (4.0–6.5 mm long) and a 5-nerved upper glume.]

*Flowering*: December to June. *Ecology*: Granite outcrops and other rock types; among rock and rock crevices on mountains. *Frequency in southern Africa*: Locally common. *Distribution*: Zambia, Zimbabwe and southern Tanzania. LIM, M.

Illustration: Chippindall: 285, fig. 256 (1955).
Anatomy vouchers: *Ellis 1570, 1924, 1888, 1889* & *3458*.
Voucher: *Raal 467*.

**Danthoniopsis ramosa** (Stapf) Clayton, in *Kew Bulletin* 1967: 123 (1967). Type: South Africa, Northern Cape, Kalahari Region, Griqualand, Klipfontein, *Burchell 2164*.


*Danthoniopsis ramosa*

*Trichopteryx ramosa* Stapf, in *Kew Bulletin* 1967: 123 (1967).

*Loudetia anomala* C.E.Hubb. & Schweick., in *Kew Bulletin of Miscellaneous Information* 1936: 324 (1936). Type: Namibia, Auros near Grootfontein, *Schoenfelder 892* (PRE, holo.).

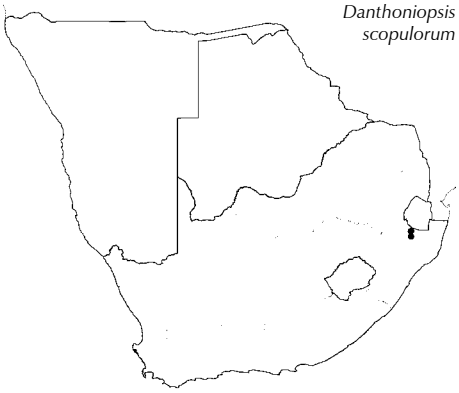
*Loudetia ramosa* (Stapf) C.E.Hubb., in *Kew Bulletin of Miscellaneous Information* 1936: 321 (1936).

Tufted shrub or dwarf shrub 450–600 mm high, culms profusely branched with many nodes. Leaf blade to 300 × 3 mm. Inflores-

cence with spikelets borne singly or in pairs. Spikelet about 10 mm long, pale green to straw coloured, usually tinged with purple sometimes whole spikelet mostly purple; lower glume 3.5–6.5 mm long; upper glume 3–5-nerved; lower lemma 5–7-nerved, glabrous; upper lemma 5-nerved, loosely hairy, but no hairy tufts, lobes 2 mm long, acute, central awn 8–12 mm long; anther about 2 mm long.

*Flowering*: December to June. *Ecology*: Among rocks on hills and in ravines. *Frequency in southern Africa*: Locally common. *Distribution*: ?Endemic. N, NC. *Economics*: Pasture.

Illustration: Müller: 175 (2007).
Anatomy vouchers: *Ellis 4771; Smook 5184 A, 5184* & *5206*.
Voucher: *De Winter 2776*.


*Danthoniopsis scopulorum*

**Danthoniopsis scopulorum** (J.B.Phipps) J.B.Phipps, in *Boletim da Sociedade Broteriana* 46: 423 (1972). Type: South Africa, KwaZulu-Natal, Louwsberg Distr., near Paulpietersburg, Farm Draai-om, steep quartzite krantzes overlooking Bivaans R., alt. ca. 3 500 ft., *L.E. Codd 4314* (UWO, holo.; PRE, iso.).

*Gazochloa scopulorum* J.B.Phipps, in *Kirkia* 5: 229 (1965).

Tufted perennial 300–400 mm high. Leaf blade to 200 × 2 mm, filiform. Spikelets arranged in lax triads, pedicels slightly equal to unequal. Spikelet about 9 mm long, straw coloured; lower glume 6 mm long; upper glume 3-nerved; lower lemma 7-nerved; upper lemma generally with 8 tufts of hairs in upper half and loosely hairy below tufts, 5–7-nerved, lobes 1.5 mm long, central awn 12 mm long; anther 2–3 mm long.

[Similar to the tropical species *D. chimanimaniensis*, which has purple spikelets and lower lemma 5-nerved.]

*Flowering*: June. *Ecology*: Growing on rock faces. *Frequency in southern Africa*: Infrequent. *Distribution*: ?Endemic. KZN.

Voucher: *Jacobson 5517*.


Figure 157.—*Deschampsia cespitosa*.

## *__Deschampsia__ P.Beauv.

Palisot de Beauvois: 91 (1812); Chippindall: 84 (1955); Clayton: 91 (1970); Hubbard: 250 (1984); Clayton & Renvoize: 129 (1986); Gibbs Russell et al.: 103 (1990); Watson & Dallwitz: 307 (1994); Sell & Murrell: 178 (1996); Barkworth: 626 (2007); Chiapella & Zuloaga: 141 (2010).

Tufted perennial, rarely annual. **Leaf blade** filiform to linear, flat or folded; *ligule* an unfringed membrane, often elongated. **Inflorescence** a panicle, lax and open, rarely contracted; *spikelets* pedicelled. **Spikelet** laterally compressed, disarticulating above glumes and between florets; rachilla pilose or


Figure 158.—*Deschampsia cespitosa* spikelet (3.5–6.0 mm). Photographer: M. Koekemoer.

rarely glabrous, distinctly elongated between florets; *glumes* ± equal, shorter to longer than spikelet, similar, sub-scarious to membranous with thin shining margins, keeled, mostly acute; lower glume 1-nerved; upper glume 1–3-nerved. **Florets** usually 2, bisexual, rarely *uppermost floret* reduced; *lemma* similar in texture to firmer than glumes, lanceolate, rounded on the back, obscurely 4–7-nerved, 2–4-lobed or lacerate-truncate at apex, awned from back near base; *awn* straight or geniculate, as long as to longer than body of the lemma; *callus* minute, obtuse, usually hairy; *palea* ± as long as lemma, 2-keeled. **Stamens** 3. **Ovary** ellipsoid, glabrous; styles plumose above. **Caryopsis** small, ellipsoid, glabrous; hilum short; embryo large (rarely) or small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$, 13 (aneuploids, high polyploidy, B-chromosomes).

**Species** ± 40, temperate regions throughout the world and high-altitude tropics; 2 naturalised in southern Africa, Lesotho, Eastern Cape region bordering Lesotho and Western Cape.

Species treatment by M.J. Moeaha.

**Key to species:**

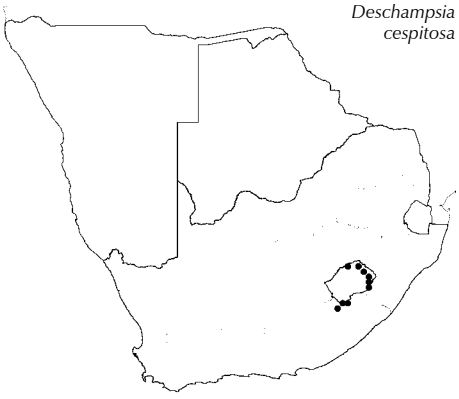
Spikelet 5–6 mm long; awn geniculate, longer than spikelet; lemma apex minutely lacerated; leaf blade filiform; ligule deeply lobed . . . . . *__D. flexuosa__

Spikelet 3–4 mm long; awn straight, ± equalling spikelet; lemma apex deeply lacerated; leaf blade expanded; ligule entire . . . . . *__D. cespitosa__




Figure 159.—*Deschampsia cespitosa* spikelet with glumes removed to show florets (6.0 × 1.2 mm). Artist: S.B. Chiliza.

***Deschampsia cespitosa** (L.) P.Beauv., in *Essai d'une nouvelle agrostographie* 91: 160 (1812). Type: Europe.




Densely tufted perennial 250–850 mm high. Leaf blade 70–200 × 2–4 mm, expanded, scabrid, pale green to light brown when dry; ligule 5.0–11.5 mm long, entire. Spikelet 3–4 mm long; lemma shiny, apex truncate, deeply lacerated; awn straight, almost equalling spikelet; anther 1–2 mm long.

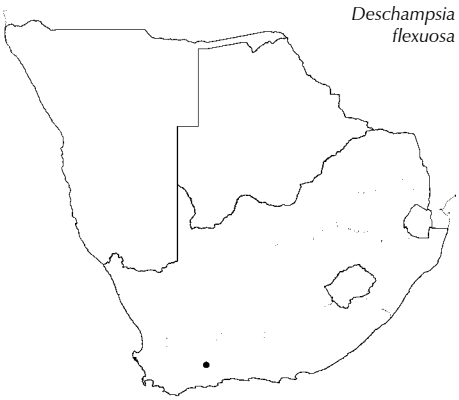
[A very polymorphic species. Easily distinguished from *D. flexuosa* by its deeply lacerated lemma apex, straight awn and leaves that are never filiform. Two varieties have been recognised in tropical East Africa based on where the awn is inserted on the back of the lemma, but there is some argument regarding the taxonomic value of this character. Consequently it has not been taken up here.]

*Flowering*: January to March. *Ecology*: Typical grassland habitat; usually damp or black, nutrient-rich soil. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards through Africa and the Mediterranean to Europe; in the temperate regions of the world. Naturalised from Europe. L, EC.

Anatomy vouchers: *Werger 1615*.
Voucher: *Hoener 1769, Du Toit 2233*.

***Deschampsia flexuosa** (L.) Trin., in *Mémoires del'Académie impériale des Sciences de St Petersbourg*, sér. 6,1: 62 (1836). Type: Sweden.

Alternate name: *Avenella flexuosa* (L.) Drejer.




Loosely to densely tufted perennial 50–500 mm high; leaves mostly basal. Leaf blade 200–1 200 × 0.5–1.5 mm, filiform, convolute,

glabrous, dark green; ligule deeply lobed, 1–2 mm long. Spikelet 5–6 mm long; lemma apex minutely lacerated; awn geniculate, longer than spikelet, it is not always clear whether the awn originates basally or from the lower $^1/_3$ of lemma; anther 1.5–2.0 mm long.

[Two subspecies subsp. *flexuosa* and subsp. *afromontana* have been recognised. Further studies are required as the characters used to distinguish these two subspecies are very obscure and as it is not clear which of these are represented in southern Africa.]

*Flowering*: January to March. *Ecology*: Uplands, dry to wet sandy loam soil, 2 200–2 300 m. *Frequency in southern Africa*: Infrequent. *Distribution*: Throughout Africa, America, and Europe. Naturalised from Europe. WC.

Illustration: Chippindall: 85, fig. 56 (1955); Barkworth: 632 (2007).
Voucher: *Esterhuysen 28262*.

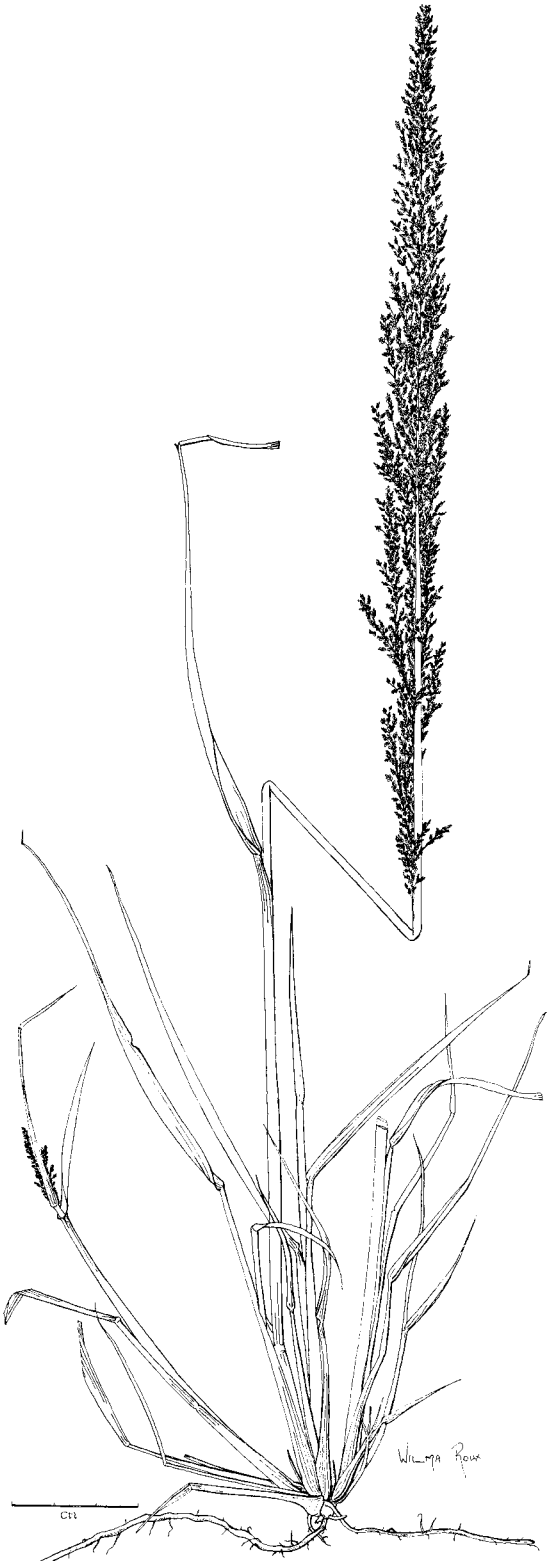



Figure 160.—*Diandrochloa namaquensis*. Artist: W. Roux.

## **Diandrochloa** De Winter

Stapf: 630 (1900) under *Eragrostis* Wolf; De Winter: 182 (1955); De Winter: 387 (1960); Clayton & Renvoize: 215 (1986), included in *Eragrostis* Wolf; Gibbs Russell et al.: 104 (1990); Watson & Dallwitz: 313 (1994); Cope: 49, 87 (1999) included in *Eragrostis* Wolf.



Figure 161.—*Diandrochloa namaquensis*. Several spikelets (2–3 mm). Photographer: M. Koekemoer.

Annual or rarely perennial, tufted; often hygrophilous. **Leaf blade** linear to linear-lanceolate, expanded; *ligule* an unfringed membrane, margins shortly fimbriate. **Inflorescence** a panicle, contracted, dense or much branched and divaricate, usually rigid, always much longer than broad; *spikelets* solitary, pedicelled. **Spikelet** laterally compressed, disarticulating above glumes and between florets; *glumes* unequal to ± equal, shorter than spikelet, ovate to lanceolate, membranous, often subhyaline, lightly keeled, 1-nerved, awnless. **Florets** 2–10, bisexual, sometimes *uppermost floret* rudimentary; *lemma* 0.5–1.0 mm long, similar to firmer in texture to glumes, usually translucent or thinly coriaceous, glabrous, strongly keeled, often depressed between keels, apex rounded, emarginate or acute or sometimes somewhat erose, 3-nerved, nerves distinct, awnless; *callus* short, truncate, glabrous; *palea* subequal to lemma, membranous, 2-keeled, nerves strongly developed in lower part of keels, apex truncate or rounded, or 3-lobed. **Lodicules** 2, truncate. **Stamens** 2. **Ovary** glabrous; styles terminal, plumose. **Caryopsis** obovate-oblong to broadly spindle-shaped, brown, smooth and semitransparent when mature, hilum short and basal; pericarp fused; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 10$.

**Species** ± 7, Americas, Australia, Asia and Africa; 2 in southern Africa, widespread, not recorded for Western Cape.

[Note: Clayton & Renvoize (1986) and Cope (1999) placed *Diandrochloa* under *Eragrostis*, but until more work has been done on the delimitation of the genera in Eragrostideae, *Diandrochloa* will be kept separate.]

Species treatment by M.J. Moeaha.

**Quick guide to easily confused genera:**

Ligule a unfringed membrane (margin shortly fimbriate) . . . . . **Diandrochloa**
Ligule a fringed membrane to a fringe of hairs . . . . . **Eragrostis**

**Key to species:**

Lemma 0.5–0.6 mm long; spikelet 0.8–1.0(1.5) mm long, 2–4-flowered . . . . . **D. pusilla**
Lemma 0.6–1.0 mm long; spikelet (1)2–3 mm long, 4–8-flowered . . . . . **D. namaquensis**

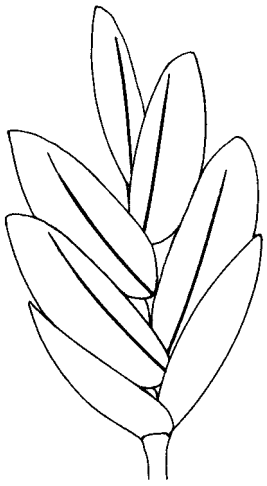


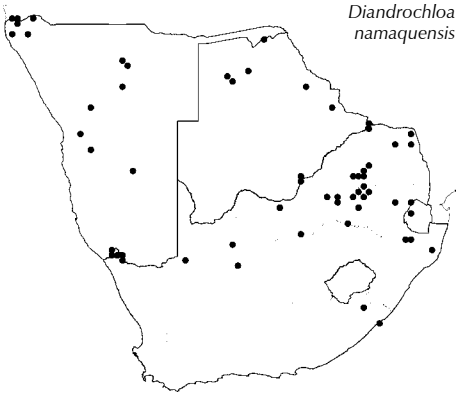
Figure 162.—*Diandrochloa namaquensis* spikelet. Artist: W. Roux.

**Diandrochloa namaquensis** (Nees) De Winter, in *Bothalia* 7: 388 (1960). Type: South Africa, Northern Cape, Namaqualand, banks of Orange River, *Drège 2569* (PRE, holo.).

*Eragrostis namaquensis* Nees ex Schrad., in *Linnaea* 12: 452 (1838).

*Eragrostis namaquensis* var. *robusta* Stapf, in *Flora capensis* 7: 630 (1900).

Alternate name: *Eragrostis japonica* (Thunb.) Trin., in *Mémmoires de'l Académie imperiale de Sciences de St. Pétersbourg*, sér. 6, Sci. Math. 1: 405 (1830). Type: Japan.



*Diandrochloa namaquensis*

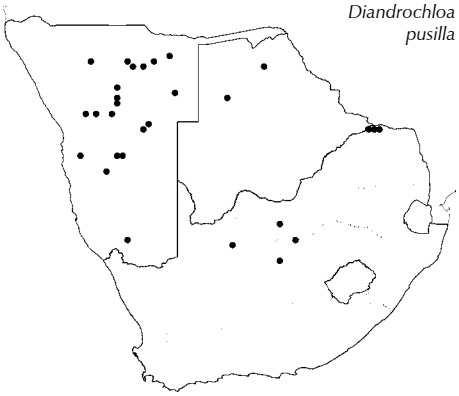
Tufted, robust annual 250–1 500 mm high. Leaf blade 60–300 × 2–6 mm. Inflorescence branches somewhat contracted, young branches often wavy. Spikelet delicate, (1)2–3 mm long, 4–8-flowered; glumes ± equal; lemma 0.6–1.0 mm long, obtuse; palea keels glabrous or scaberulous; anther 0.2–0.4 mm long; caryopsis 0.3–0.5 mm long, obovate-oblong.

*Flowering*: January to December (peaking from March to May). *Ecology*: Sandy or clayey soils; always near water. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Tanzania and Ethiopia. N, B, S, LIM, NW, G, M, KZN, NC, EC.

Illustration: Chippindall: 182, fig. 156 (1955).
Anatomy vouchers: *Ellis 2092, 3359, 3698, 3699* & *Smook 7669*.
Voucher: *Smith 1480*.

**Diandrochloa pusilla** (Hack.) De Winter, in *Bothalia* 7: 388 (1960). Type: South Africa (Kalahari), 'in stagnis exsiccates prope Urugua', May 1891, *Fleck 321*.

*Eragrostis pusilla* Hack., in *Bulletin de l'Herbier Boissier 4, Appendix 3* (*Die Pflanzenwelt Deutsch-Südwest Afrikas*): 27 (1896).



*Diandrochloa pusilla*

Tufted, delicate annual 100–420 mm high. Leaf blade 50–150 × 2–5 mm. Inflorescence branches spreading when fully developed. Spikelet very delicate, 0.8–1.0(1.5) mm long, 2–4-flowered; glumes unequal; lemma 0.5–0.6 mm long, broadly obtuse; palea keels glabrous and smooth; anther 0.3–0.4 mm long; caryopsis obovate-oblong.




Figure 163.—*Dichanthium annulatum* var. *papillosum*. A, plant; B, portion of raceme with spikelets (25.0 × 2.8 mm). Artists: A, G.E. Lawrence; B, W. Roux.

*Flowering*: March to May. *Ecology*: Sandy or clayey soils; always near water, often in shade. *Frequency in southern Africa*: Infrequent. *Distribution*: Mozambique and Angola. N, B, LIM, NW, NC.

Illustration: Chippindall: 182, fig. 157 (1955).
Anatomy voucher: *Gibbs Russell & Smook 5333*.
Voucher: *De Winter & Codd 313*.

## **Dichanthium** Willemet

Willemet: 11 (1796); Chippindall: 480, fig. 394 (1955); Clayton & Renvoize: 722 (1982); Clayton & Renvoize: 342 (1986); Gibbs Russell et al.: 105, fig. 62, pl. 57 (1990); Watson & Dallwitz: 320 (1994); Phillips: 308 (1995); Setshogo: 38 (2002).



Figure 164.—*Dichanthium annulatum* spikelet pair (2.5–5.0 mm). Photographer: M. Koekemoer.

Perennial, rarely annual, tufted; sometimes aromatic. **Leaf blade** narrow-linear, rolled or usually expanded; *ligule* an unfringed to a fringed membrane. **Inflorescence** terminal, or sometimes axillary in a spatheate, leafy, false panicle, or digitate or subdigitate racemes with or without 1 or more homogamous pairs of spikelets; internodes and pedicels linear, solid, truncate to oblique at apex; *spikelets* in pairs, secund, in long–short combinations: one sessile, the other pedicelled. **Sessile spikelet** dorsiventrally compressed, falling with glumes; *glumes* ± equal; lower glume lanceolate or elliptic-oblong, obtuse to truncate, hairy, 2-keeled, acute to broadly obtuse; upper glume somewhat thinner in texture, 1-keeled, ciliate. **Florets** 2, *lower floret* sterile, reduced to a lanceolate hyaline lemma, entire, awnless; *upper floret* bisexual; *lemma* reduced to a linear, entire, hyaline stipe, awned; *awn* geniculate, twisted, longer than body of lemma; *callus* very short, rounded, hairy; *palea* minute or suppressed. **Lodicules** 2, fleshy, minute, glabrous. **Stamens** 1–3. **Ovary** ellipsoid, glabrous; style plumose above. **Caryopsis** oblong, dorsiventrally compressed; hilum short; embryo large. **Pedicelled spikelet** similar to sessile spikelet, male or sterile. **Photosynthetic pathway**: $C_4$; XyMS-. PCR cell chloroplasts with reduced grana; centrifugal/peripheral. **Cytology**: $x = 10$ (polyploidy).

**Species** ± 20, Old World tropics; 2 in southern Africa, 1 of which is naturalised; widespread except in Northern Cape and not recorded in Western and Eastern Cape.

Species treatment by A.C. Mashau.

**Quick guide to easily confused genera:**

Lower glume of sessile spikelet acute to subacute; pedicel and internodes longitudinally grooved with a translucent median line. . . . . **Bothriochloa**

Lower glume of sessile spikelet obtuse to truncate; pedicels and internodes not grooved, a translucent median line absent . . . . . **Dichanthium**

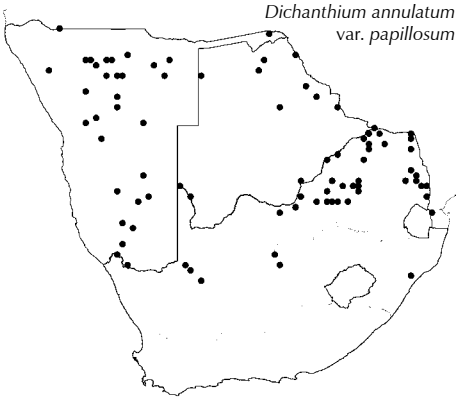
**Key to species:**

Culm glabrous below inflorescence, nodes with a ring of spreading hairs; sessile spikelet lower glume to 1.5 mm wide, lateral keels wingless . . . . . **D. annulatum** var. **papillosum**
Culm velvety hairy below inflorescence, nodes glabrous to short-woolly hairy; sessile spikelet lower glume to 2.5 mm wide, lateral keels narrowly winged near apex . . . . . ***D. aristatum**

**Dichanthium annulatum** (Forssk.) Stapf var. **papillosum** (A.Rich.) de Wet & Harlan, in *Boletin de la Sociedad Argentina de Botánica* 12: 212 (1968). Type: Ethiopia, Tschogarti, *Schimper 526* (PRE, fg.).

*D. papillosum* (A.Rich.) Stapf, in *Flora of tropical Africa* 9: 179 (1917). Type: as above.

Blue grama, blue-stem, vlei finger grass

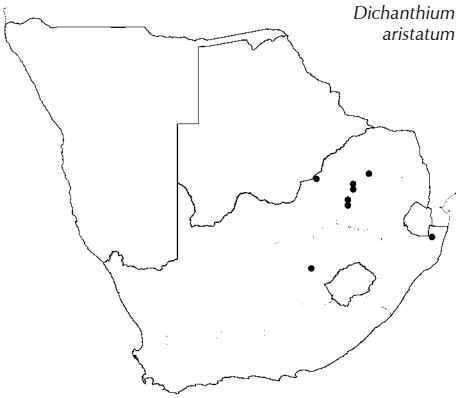

*Dichanthium annulatum* var. *papillosum*

Densely tufted perennial, 1 000 mm high; distinct short rhizomes present; culm glabrous below inflorescence; nodes with a ring of spreading hairs. Leaf blade 30–300 × 7 mm. Inflorescence with 2–9 racemes, rarely more; spikelets slightly overlapping. Sessile spikelet 2.5–5.0 × 1.0–1.5 mm; lower glume to 1.5 mm wide, long bulbous-based hairs present especially on upper half, sometime forming a fringe along margins or across back a short distance from apex, lateral keels not winged; lemma awned; awn ± 25 mm long, hairy; anther 1.3–2.3 mm long.

*Flowering*: throughout the year but mostly in late summer. *Ecology*: River banks and wet places. *Frequency in southern Africa*: Common. *Distribution*: Northwards to Ethiopia. N, B, S, LIM, NW, G, FS, M, KZN, NC. *Economics*: Palatable grass with a high leaf production that can withstand heavy grazing, often planted in other countries for stock feed.

Illustration: Setshogo: 39, tab. 15 (2002).
Anatomy vouchers: *Ellis 118, 913, 1614, 3712* & *5251.*
Voucher: *Edwards 3057.*

***Dichanthium aristatum** (Poir.) C.E.Hubb., in *Kew Bulletin* 1939: 654 (1939). Type: Mauritius, *Commerson*.


*Dichanthium aristatum*

Tufted perennial 1 100 mm high; short stolons present; culm velvety hairy below inflorescence; nodes glabrous or short-woolly hairy. Leaf blade 30–250 × 2–7 mm. Inflorescence with 1–3 racemes, rarely 4 or 5; spikelets closely overlapping. Sessile spikelet 3.0–4.5 × 2.5 mm, obovate; lower glume 2.5 mm wide, glabrous or shortly hairy above middle towards margins and apex, lateral keels narrowly winged; lemma awned; awn ± 22 mm long, hairy; anther 1.5–2.0 mm long.

*Flowering*: October to June. *Ecology*: Disturbed and moist places. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from tropical Asia. Introduced to most tropical regions. LIM, G, FS, KZN. *Economics*: Palatable with a medium leaf production.

Anatomy vouchers: *Ellis 130, 773, 1750, 1820, 3880* & *3905*.
Voucher: *Mogg 13709*.




Figure 165.—*Digitaria debilis*. A, plant; B, spikelet. Artist: C.D. Bartman.

## **Digitaria** Haller

Haller: 244 (1768) name conserved; Stapf: 372 (1898); Henrard (1950); Chippindall: 392 (1955); De Winter: 467 (1961); Veldkamp: 20 (1973); Kok: 1 (1978); Clayton & Renvoize: 619 (1982); Kok: 184 (1984); Clayton & Renvoize: 298 (1986); Webster: 209 (1987); Goetghebeur & Van der Veken: 133 (1989); Kok et al.: 141 (1989); Gibbs Russell et al.: 106 (1990); Watson & Dallwitz: 326 (1994); Wipff: 358 (2003); Van Oudtshoorn (1999).

*Digitariella* De Winter: 467 (1961).

Tufted or decumbent, annual or perennial, often rhizomatous or stoloniferous, sometimes rooting at lower nodes. **Leaf blade** usually linear and expanded; *ligule* an unfringed membrane. **Inflorescence** terminal, composed of spike-like racemes, digitate or subdigitate or rarely borne on elongated central axis or solitary, rachis flat or triangular, sometimes winged; *spikelets* abaxial, solitary, in pairs or in triplets or more, unequally pedicelled. **Spikelet** ovoid to lanceolate, dorsiventrally compressed, falling entire at maturity, variously pubescent, rarely glabrous; *glumes* unequal, dissimilar, awnless; lower glume abaxial, minute (up to quarter length of spikelet) or 0, either a triangular scale or a fragile, membranous collar, rarely clasping base of spikelet, rarely nerved; upper glume variable in length, 3–7-nerved, rarely nerveless, usually somewhat pubescent. **Florets** 2; *lower floret* sterile; lemma lanceolate, usually as long as spikelet, rarely reduced to a small scale, flat on back, 3–11-nerved, usually densely hairy; palea reduced to a minute scale or 0; lodicules occasionally developed; *upper floret* bisexual, *lemma* ± as long as spikelet, same texture to firmer than glumes, chartaceous and smooth to granulate, becoming variously coloured in fruit (pale to dark brown), minutely rounded dorsally, margins flat, thin hyaline, enfolding and enclosing most of the palea (digitaria-type), glabrous, not or faintly 3-nerved, awnless; *palea* as long as lemma, not or faintly 2-nerved. **Lodicules** cuneate, flat, 3-nerved. **Stamens** 3. **Ovary** glabrous, ovoid; styles distinct, plumose above. **Caryopsis** oblong, mainly plano-convex in section, mostly acute to subacute; hilum short; embryo large. **Cytology**: $x = 9$ (15, 17) (high polyploidy). **Photosynthetic pathway**: $C_4$; NADP-ME (*D. sanguinalis*); XyMS-. PCR cell chloroplast centrifugal/peripheral.

**Species** ± 230, cosmopolitan, mainly tropical and warm temperate; ± 36 naturalised and indigenous in southern Africa, widespread.

Species treatment by L. Fish and M.J. Moeaha.

### Quick guide to easily confused genera/taxa:

1. Inflorescence a panicle, panicle-like or racemes scattered along a common axis . . . . . 2
   Inflorescence solitary or spike-like . . . . . 4
2. Upper glume shorter than spikelet; ligule a fringed or unfringed membrane . . . . . **Digitaria** (some species)
   Upper glume as long as to longer than spikelet; ligule a fringe of hairs . . . . . 3
3. Upper lemma smooth and shiny, digitaria-type . . . . . **Melinis repens**; **M. nerviglumis**
   Upper lemma rough, paspalum-type . . . . . **Bracharia serrata**
4(1). Spikelet 2.8–3.2 mm long; spikelet pairs similar; upper lemma same texture or firmer than glumes . . . . **Digitaria monodactyla**
   Spikelet 6–14 mm long; spikelet pairs dissimilar; sessile spikelet upper lemma less firm than glumes . . . . . **Elionurus**

## Key to species

*Note:* *3 or more spikelets in a cluster can be difficult to see as 1 or more spikelet may have been lost or often the third spikelet pedicle is fused a distance up along the rachis and appears separate from the other 2 spikelets.*

1. Internode present either between the glumes, or between the glumes and the florets . . . . . 2
   Internode absent . . . . . 4
2 Internode present separating the glumes from the lemmas; upper glume nerveless; perennial . . . . . **D. gymnostachys**
   Internode present between the glumes; upper glume 7-nerved; annual or occasionally perennial . . . . . 3
3. Spikelet 7–10(15) mm long; upper glume longer than 6.0 mm; rachis narrowly winged; internode between glumes 0.7–3.0 mm long (minute lower glume remote from upper glume, internode like a long stipe between glumes) . . . . . **D. remotigluma**
   Spikelet 2.0–3.6 mm long; upper glume shorter than 4.5 mm; rachis unwinged; internode between glumes 0.1–0.3 mm long . . . . . **D. debilis**
4(1). Inflorescence a single raceme . . . . . 5
   Inflorescence paired, digitate, subdigitate or racemes up along a long central axis (may be panicle-like) . . . . . 6
5. Spikelets paired; rachis broadly winged; upper lemma light brown; upper glume and lower lemma usually densely hairy . . . . . **D. monodactyla**
   Spikelets 3 or more per cluster; rachis narrowly winged; upper lemma dark brown; upper glume and lower lemma usually glabrous or sparsely hairy . . . . . **D. eylesii**
6(4). Spikelet hairs extending 1 mm and more beyond apex of spikelet . . . . . 7
   Spikelet glabrous or hairy, hairs may extend up to only 1 mm beyond apex of spikelet . . . . . 9
7. Rhizome horizontal to oblique; rachis narrowly winged; lower lemma flat, not grooved on either side of midrib . . . . . **D. tricholaenoides**
   Rhizome, if present, not horizontal to oblique; rachis broadly winged; lower lemma deeply grooved on either side of midrib . . . . . 8
8. Annual; culm nodes glabrous; lower leaf sheaths glabrous or sparsely hairy; spikelet 2.4–2.8 mm long . . . . . **D. gayana**
   Perennial; culm nodes hairy; lower leaf sheaths densely hairy; spikelet 2.8–3.2 mm long . . . . . **D. brazzae**
9(6). Spikelets three or more per cluster (sometimes appears as solitary or 2-nate as pedicels are of varying lengths or lower part of longest pedicel is partly fused to rachis or one spikelet is reduced to a small flange) . . . . . 10
   Spikelets mostly paired (2-nate) . . . . . 20
10. Upper lemma yellow, grey or pale brown to greenish . . . . . 11
   Upper lemma dark brown, black or dark red . . . . . 13
11. Lower lemma deeply grooved on either side of midrib . . . . . **D. brazzae**
   Lower lemma not deeply grooved on either side of midrib . . . 12
12. Spikelet 2–3 mm long; lower lemma prominently 3-nerved; upper glume shorter than spikelet . . . . . **D. argyrotricha**
   Spikelet 1.2–1.8(2.2) mm long; lower lemma prominently 5–7-nerved; upper glume as long as spikelet . . . . . **D. longiflora**
13(10). Plants annual . . . . . 14
   Plants perennial . . . . . 17
14. Spikelet hairs acute . . . . . ***D. violascens**
   Spikelet with both acute and clavate-tipped hairs present . . . 15
15. Lower lemma deeply grooved on either side of midrib; lower glume a short scale; pedicel apex smooth to scaberulous . . . . . **D. comifera**
   Lower lemma not deeply grooved; lower glume an obscure cuff or absent; pedicel apex scabrous to hairy . . . . . 16
16. Pedicel with a corona of hairs; spikelet 1.5–2.7 mm long . . . . . **D. ternata**



Figure 166.—*Digitaria diagonalis* var. *diagonalis*. Artist: W. Roux.

Pedicel without a corona of hairs; spikelet 1.0–1.8 mm long . . . . . **D. thouaresiana**

17(13). Pedicel apex with stiff white hairs, overtopping the spikelet . . . . . **D. diagonalis** var. **diagonalis**

Pedicel apex with or without stiff hairs, but if present, not overtopping the spikelet . . . . . 18

18. Spikelet densely hairy, hairs usually brown; spikelet 3.0–3.8 mm long . . . . . **D. setifolia**

Spikelet glabrous or sparsely hairy, hairs pallid; spikelet 1–3 mm long . . . . . 19

19. Spikelet 1–2 mm long; creeping rhizome absent . . . . **D. maitlandii**

Spikelet 2.3–3.0 mm long; creeping, branched rhizome present . . . . . **D. eylesii**

20(9). Annual . . . . . 21

Perennial . . . . . 28

21. Inflorescence of 40–100 racemes up a long central axis (lower raceme branches usually whorled) . . . . . **D. perrottetii**

Inflorescence of up to 20 racemes, digitate, subdigitate or up a short central axis . . . . . 22

22. Lower glume 0.5–0.7 mm long, truncate to bilobed, completely clasping the spikelet; lower lemma with 2 basal tufts of woolly hairs . . . . . **D. maniculata**

Lower glume an obscure rim, a triangular to ovate scale or absent; lower lemma without 2 basal tufts of woolly hairs . . . . . 23

23. Spikelet hairs clavate-tipped . . . . . **D. ternata**

Spikelet hairs straight or acute, not clavate-tipped . . . . . 24

24. Lower lemma nerves scaberulous (may need strong lens; look near apex) . . . . . 25

Lower lemma nerves smooth . . . . . 26

25. Lower lemma as long as upper lemma, both acute . . . . . *__D. sanguinalis__

Lower lemma longer than upper lemma, both acuminate . . . . . **D. acuminatissima**

26(24). Racemes scattered on a long central axis, occasionally in pairs, sometimes in a basal whorl of 3–4 . . . . . **D. velutina**

Racemes digitate, subdigitate or with a few solitary racemes along a short central axis . . . . . 27

27. Lower glume absent or a minute obscure scale, less than 0.2 mm long; spikelet usually 1.6–2.8 mm long . . . . . *__D. nuda__

Lower glume a distinct triangular scale, 0.25–0.5 mm long; spikelet usually 2.3–3.4 mm long . . . . . ?*__D. ciliaris__




Figure 167.—*Digitaria eriantha*. A, plant; B, spikelet. Artist: C. Letty.



Figure 168.—*Digitaria eriantha* spikelets (2.2–4.0 mm). Photographer: M. Koekemoer.



Figure 169.—*Digitaria monodactyla* spikelet (2.8–3.2 mm), abaxial view. Photographer: M. Koekemoer.

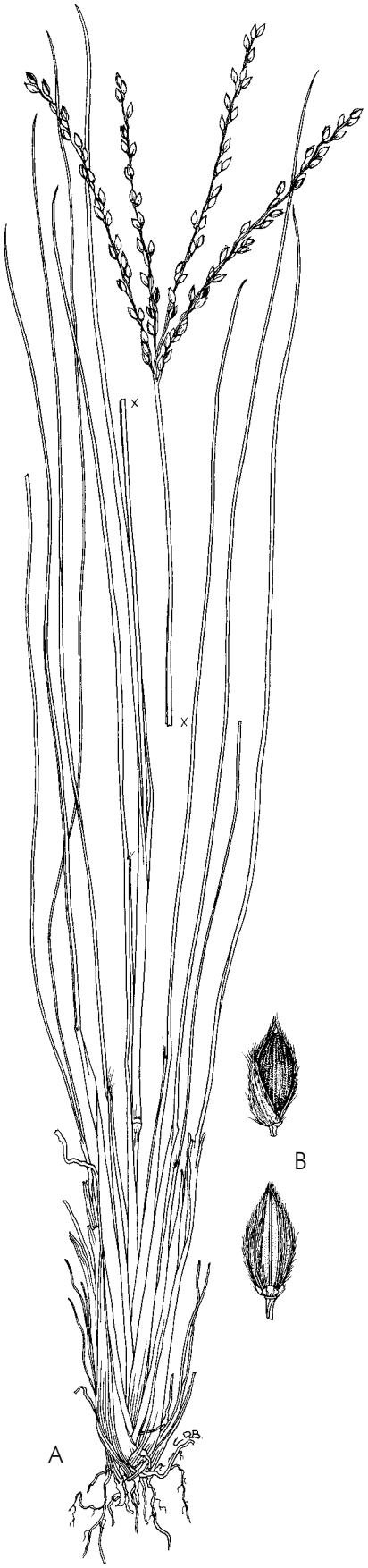



Figure 170.—*Digitaria setifolia*. A, plant; B, spikelet. Artist: C.D. Bartman.

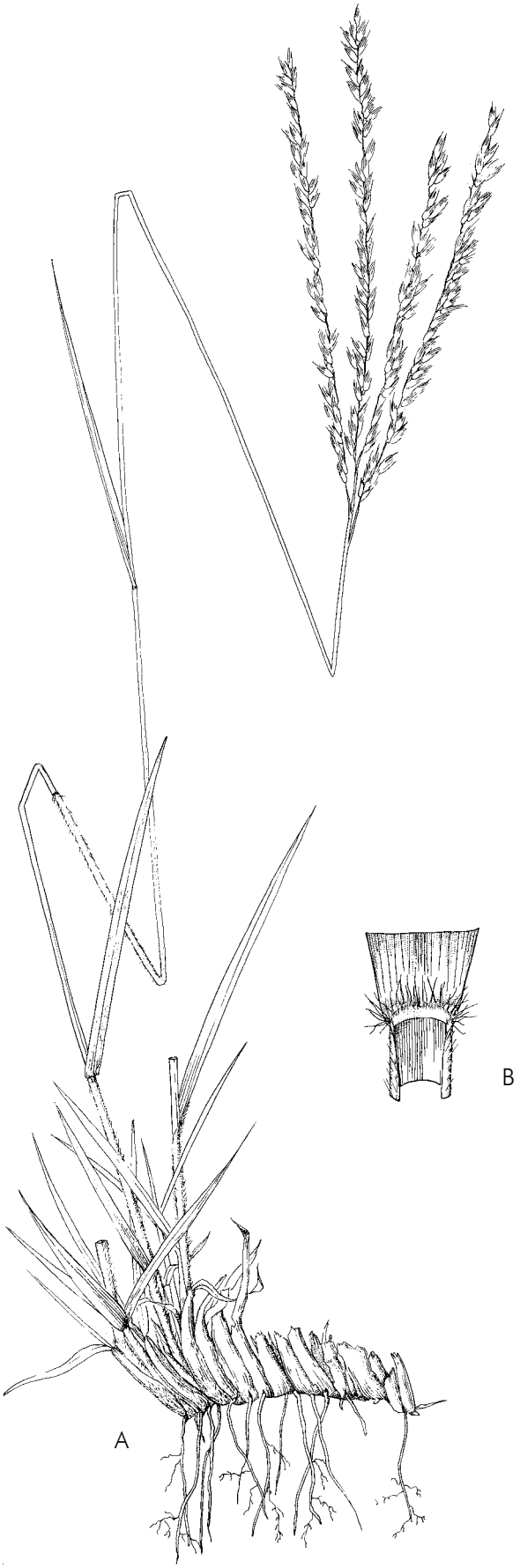



Figure 171.—*Digitaria tricholaenoides*. A, plant; B, ligule. Artist: C. Smith.

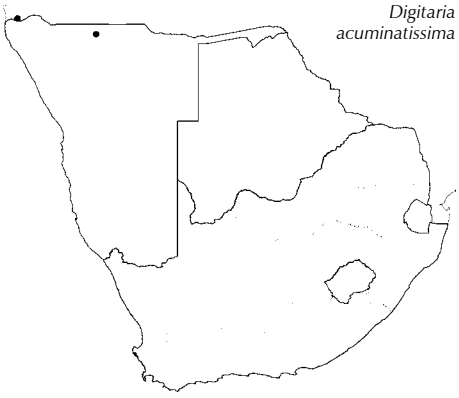
28(20). Spikelet glabrous . . . . . 29
Spikelet hairy . . . . . 30
29. Spikelet 1.6–2.4 mm long; upper glume as long and wide as spikelet, concealing upper lemma; lower glume distinctly heteromorphic . . . . . ***D. scalarum**.
Spikelet 3–4 long; upper glume $^1/_2$–$^2/_3$ spikelet length, upper lemma partially exposed; lower glume not heteromorphic . . . . . **D. diversinervis**
30(28). Inflorescence with racemes along an elongated central axis . . . 31
Inflorescence paired, digitate to subdigitate, central axis short . . . 33
31. Pedicel apex hairy; lower lemma with two tufts of long, thick hairs at middle, covering rest of glabrous upper part (except margins hairy); plant of mountain grassland . . . . . **D. flaccida**
Pedicel apex scabrid or smooth; lower lemma hairs slender, up along entire lemma, mainly between the outer lateral nerves; plant of low altitude woodlands or floodplains . . . . . 32
32. Culm nodes beaded; plant densely tufted as rhizomes very short; upper lemma yellowish to dark purple grey, concealed . . . . . **D. gazensis**
Culm nodes glabrous; plant loosely tufted as rhizomes long and obvious; upper lemma light to dark brown, partly exposed . . . . . **D. rukwae**
33(30). Lower lemma deeply grooved on either side of midrib . . . . . **D. brazzae**
Lower lemma not deeply grooved on either side of midrib . . . 34
34. Plants delicate often decumbent; rhizomatous and stoloniferous, often mat forming . . . . . 35
Plants robust and erect, tufted; rhizomes and stolons present or absent . . . . . 36
35. Spikelet 3.2–4.0 mm long; lower lemma (7)9–11-nerved . . . . . **D. diversinervis**
Spikelet 2.0–2.8 mm long; lower lemma 7-nerved . . . ***D. didactyla**
36(34). Lower lemma with narrowest interspaces adjacent to midrib; racemes often adhering to each other due to hairs becoming entangled . . . . . **D. argyrograpta**
Lower lemma with broadest interspaces adjacent to midrib, or interspaces of similar width; racemes not adhering to each other by the hairs . . . . . 37
37. Base fibrous; upper lemma usually very dark brown; upper glume and lower lemma with a brush of brown hairs at apex; spikelet with capitellate hairs, these may be inconspicuous . . . . . **D. setifolia**
Base not fibrous; if upper lemma dark brown, pin-headed hairs and brush of hairs absent . . . . . 38
38 Plant leafy, base almost leafless as lower leaf lamina reduced; culms branched from middle and upper nodes . . . . **D. polyphylla**
Plant leafy throughout or leaves mainly basal, lower leaf lamina not reduced; culms unbranched, or branched mainly at the lower nodes . . . . . 39
39. Lower culm nodes congested and swollen, with densely hairy cataphylls . . . . . **D. seriata**
Lower culm nodes without densely hairy cataphylls . . . . . 40
40. Ligule longer than 4.0 mm; lower leaf sheaths rusty brown . . . . . **D. natalensis**
Ligule shorter than 3.5 mm; lower leaf sheaths not rusty brown . . 41
41. Nerves of lower lemma scaberulous; rhizomes slender, obvious . . . . . **D. milanjiana**
Nerves of lower lemma smooth; rhizomes short, robust and knotty, not obvious . . . . . **D. eriantha**

**Digitaria acuminatissima** Stapf, in *Flora tropical Africa* 9: 441 (1919). Type: Nigeria, Abinsi, *Dalziel 907*.

*D. acuminatissima* Stapf subsp. *inermis* Goetgh., in *Bulletin Nationale Plantentium Belgie* 45: 418 (1975). Type: Botswana, Sehitwa, *Vesey-FitzGerald 3329* (SRGH, holo.).

Loosely tufted to creeping annual 600–1 200 mm high; culm nodes dark, glabrous; rooting at lower nodes. Leaf blade 30–250

× 3–10 mm, flat. Inflorescence digitate to subdigitate, of (2)4–20 racemes, each 70–250 mm long; rachis triangular, broadly winged; pedicel apex without long hairs; spikelets paired. Spikelet 2.5–4.0 mm; lower glume a minute triangular scale; upper glume ± 1/2 spikelet length, 3-nerved, glabrous or adpressed hairy with fine white hairs; internode absent; lower lemma as long as spikelet, conspicuously longer than upper lemma, acuminate, hairy, bulbous based bristles present or absent, 7-nerved, scaberulous along nerves (use a strong lens); upper lemma exposed, acuminate, pale yellow to brown; anthers 0.5–0.6 mm long.


*Digitaria acuminatissima*

[Often difficult to separate from *D. sanguinalis*, which has both lemmas acute and the same length and generally shorter spikelets (1.8–3.5 mm long).]

*Flowering*: February. *Ecology*: Riversides, floodplains; and near damp rocks. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to tropical Africa. N.

Voucher: *De Winter & Giess 7005*.

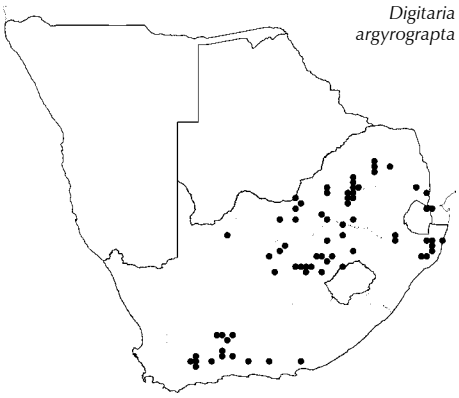
**Digitaria angolensis** Rendle

Specimens previously identified as this species are *D. argyrotricha*, which differs in having an inflorescence with a broadly winged rachis as compared to hardly winged in *D. angolensis*.

**Digitaria argyrograpta** (Nees) Stapf, in *Flora capensis* 7: 374 (1898). Type: South Africa, without precise locality, *Ecklon*? *s.n.* (B, holo.).

SILVER FINGER GRASS

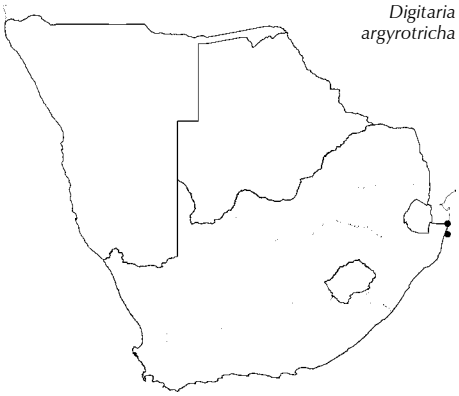
Tufted perennial 200–600 mm high; rhizomes short, knotty; culms profusely branched from lower nodes. Leaf blade 40–200 × 1–3 mm; margins scabrid. Inflorescence of 2–3 stiff erect racemes 40–100 mm long, racemes usually close together and often adhering to each other as hairs on the spikelets become entangled; rachis triquetrous, narrowly winged, scaberulous, margins scabrid; pedicels triangular; spikelets paired. Spikelet 3.0–3.8 × 0.8 mm; internode absent; lower glume ± 0.5 mm long, ovate or triangular, nerveless; upper glume 2/3–4/5 as long as spikelet, 3-nerved, adpressed hairy, hairs acute, fine, white; lower lemma as long as spikelet, 7-nerved, with 3 nerves closest together in the middle, therefore narrow interspaces adjacent to central nerve, adpressed hairy; upper lemma shorter than spikelet, partly exposed to fully exposed, pale yellow; anthers 2.0–2.2 mm long.


*Digitaria argyrograpta*

[The racemes usually adhere to each other and may even appear as a single raceme.]

*Flowering*: November to March. *Ecology*: Wide range of habitats. *Frequency in southern Africa*: Common. *Distribution*: Mozambique. S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: A highly palatable climax grass.

Illustration: Chippindall: 416, fig. 346 (1955); Goetghebeur & Van der Veken: 139, tab. 41, 54 (1989).
Anatomy vouchers: *Ellis 1345, 1784, 3886* & *4528*.
Voucher: *Smook 993*.


*Digitaria argyrotricha*

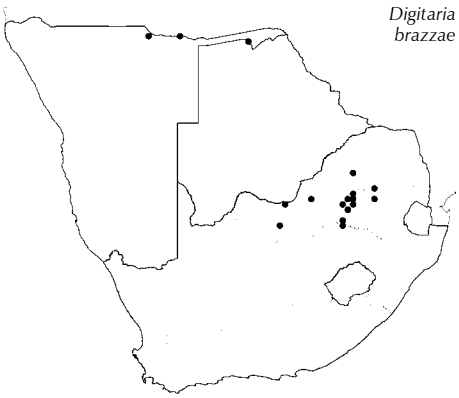
**Digitaria argyrotricha** (Andersson) Chiov., in *Resultati Scientifici della missione Stefanini-PaoliNella Somalia italiana le collezione botanishe* 1: 183 (1916). Type: Mozambique, Querimba Isl., *Peters s.n.* (B, holo.).

Loosely tufted annual or short-lived perennial, 150–400 mm high; culm nodes dark, glabrous. Leaf blade 40–90 × 4–12 mm; margins pale, thickened, scaberulous. Inflorescence digitate or subdigitate, of 2–5 racemes 50–180 mm long; rachis ribbon-like, broadly winged, smooth, margins scabrous; pedicel subterete, glabrous; spikelets in clusters of 3. Spikelet 2.0–3.0 mm long, densely hairy; internode absent; lower glume a short membranous cuff 0.1–0.3 mm long, truncate or absent; upper glume shorter than spikelet, densely covered with long silver or purple hairs, nerves 3, prominent; lower lemma 5-nerved (marginal nerves not prominent), densely long hairy; hairs overtopping spikelet by up to 1 mm; upper lemma concealed, shorter than spikelet, yellow to pale brown; anthers 0.8–1.2 mm long.

[Specimens were previously identified as *D. angolensis*, which is similar but has the rachis scarcely winged.]

*Flowering*: August. *Ecology*: Coastal forest on sandy soil; disturbed places. *Frequency in southern Africa*: Infrequent. *Distribution*: Mozambique, Kenya and Tanzania and possibly introduced in Ghana. KZN. *Economics*: Weed in cultivated lands.

Illustration: Goetghebeur & Van der Veken: 138, tab. 40, 44 (1989).
Voucher: *Smook 1324*.


*Digitaria brazzae*

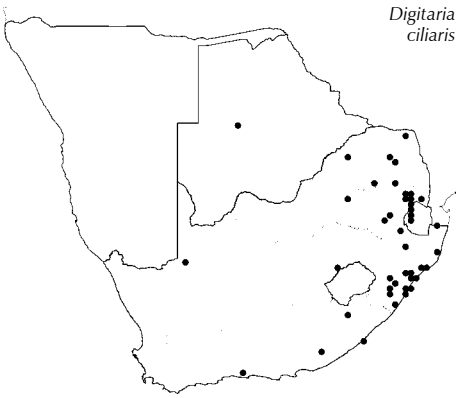
**Digitaria brazzae** (Franch.) Stapf, in *Flora tropical Africa* 9: 477 (1919). Type: The Congo, Brazzaville, *Brazza & Thollon 391*.

Brown finger grass

Densely tufted perennial 500–1 100 mm high; cataphylls and fibrous basal sheaths densely covered with silky, woolly hairs; culm nodes sparsely to densely hairy. Leaf blade 60–120 × 2–4 mm; margins scabrous. Inflorescence digitate to subdigitate, of 2–4 racemes 150–200 mm long; rachis triquetrous, broadly winged, scaberulous, margins scabrous; pedicel minutely scabrous to glabrous; spikelets in clusters of (2)3–4(–5). Spikelet 2.8–3.2 mm long; lower glume a small cuff 0.3–0.8 mm long, truncate or bilobed; upper glume $^1/_2$–$^3/_4$ as long as spikelet, triangular, 3-nerved, densely adpressed hairy, hairs white or purple; internode absent; lower lemma as long as spikelet, 5-nerved, deeply grooved on either side of midrib, margins inflated, hairs 2–4 mm long forming 2 tufts from the base and fringes on upper half of margins; hairs overtop spikelet for 0.5–1.5 mm; upper lemma shorter than spikelet, basally gibbous, obviously keeled, partially exposed, yellow to pale brown; anthers 1.8–2.2 mm long.

*Flowering*: September to April. *Ecology*: Usually sandy soil; in grassland; often on stony hillsides; frequently in disturbed sites. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to the Congo, DRC and Tanzania. N, B, ?L, LIM, NW, G, M, FS.

Illustrations: Kok fig. 8.16 (1978); Goetghebeur & Van der Veken: 137, tab. 39, 20 (1989).
Anatomy vouchers: *Ellis 1338 & 1826*.
Voucher: *Du Toit 1236*.


*Digitaria ciliaris*

**?*Digitaria ciliaris** (Retz.) Koeler, in *Descriptio Graminum in Gallia et Germania tam sponte nascentium quam humana Industria copiosus provenientium Francofurti ad Moenum*: 27 (1802). Type: China

*D. adscendens* (Kunth) Henrard, in *Blumea* 1: 92 (1934). Type: South America (many syntypes).

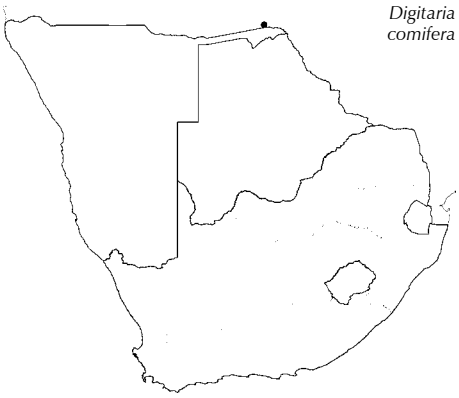
TROPICAL FINGER GRASS

Loosely tufted or solitary growing annual 200–550 mm high; culms decumbent to erect. Leaf blade 30–160 × 3–10 mm; margins scabrid. Inflorescence digitate to subdigitate, of 2–9 racemes, 40–120 mm long; rachis triquetrous, broadly winged, glabrous, margins scabrous; pedicel triangular, scabrous; spikelets paired. Spikelet 2.3–3.4 × 1 mm; lower glume a triangular scale 0.25–0.50 mm long; upper glume shorter than spikelet, 3-nerved, adpressed hairy, hairs fine, acute; internode absent; lower lemma as long as spikelet, acute, hairy, 7-nerved, nerves usually smooth, bristle hairs sometimes present; upper lemma as long as to shorter than spikelet, yellow to pale brown; anthers 0.8–1.4 mm long.

[Closely related to and intergrading with *D. nuda, D. sanguinalis* and *D. velutina*.]

*Flowering*: January to April. *Ecology*: Mainly disturbed sandy soil. *Frequency in southern Africa*: Locally common. *Distribution*: Pantropical. B, S, LIM, G, M, FS, KZN, NC, WC, EC. *Economics*: Weed in cultivated lands.

Illustrations: Kok fig. 8.23 (1978); Goetghebeur & Van der Veken: 139, tab. 41, 47 (1989).
Anatomy vouchers: *Ellis & Loxton 960, Ellis 393* & *1529*.
Voucher: *Smook 1982*.

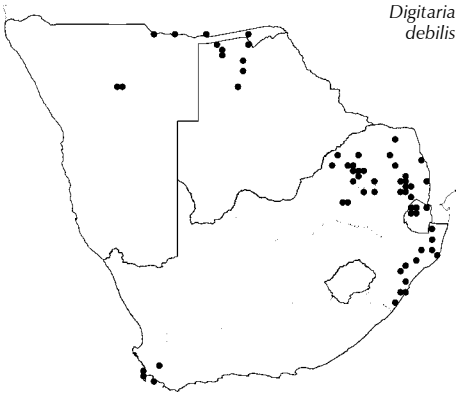

*Digitaria comifera*

**Digitaria comifera** Pilg., in *Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem* 15: 708 (1942). Type: Tanzania, Lindi District, Muera Plateau, *Schlieben 6151*.

Erect annual, loosely tufted or culm solitary (150)300–800 mm high. Leaf blade (20)40–100 × 2–6 mm; margins scabrid. Inflorescence subdigitate, of 2–7 racemes, 30–150 mm long; rachis triquetrous, broadly winged, margins scabrous; pedicel terete to subtriangular, scaberulous; spikelets in clusters of 3–5. Spikelet 2.0–2.9 mm long; lower glume a minute membranous hyaline scale up to 0.2 mm long, usually bilobed; upper glume $^{3}/_{4}$ to as long as spikelet but narrower, 3-nerved, densely hairy with rows of white clavate-tipped and straight hairs; internode absent; lower lemma as long as spikelet, glabrous or hairy, 5(–7)-nerved, 3 lateral nerves thickened, deeply grooved on either side of midrib; upper lemma exposed, as long as spikelet, dark brown; anthers 0.8–1.2 mm long.

*Flowering*: February. *Ecology*: In open sandy places; disturbed areas such as roadsides. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to Tanzania, Uganda, Burundi, DRC and Angola. N.

Illustration: Goetghebeur & Van der Veken: 136, tab. 38, 5 (1989).
Voucher: *De Winter 9125*.


*Digitaria debilis*

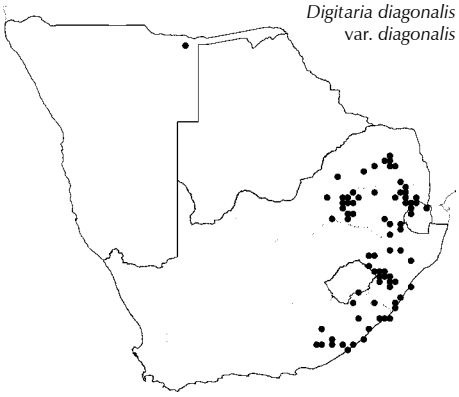
**Digitaria debilis** (Desf.) Willd., in *Enumeratio Plantarum Horti regii botanici berolinensis*. Berolini: 91 (1809). Type: Algeria, La Calle, *Desfontaines* (P, holo.).

FINGER GRASS

Tufted annual or perennial 100–500 mm high; stolons present or absent; culms decumbent at base and rooting from lower nodes. Leaf blade 20–25(70) × 2–4 mm; margins scabrid. Inflorescence subdigitate, on a central axis up to 60 mm long, of 3–12 racemes, 60–160 mm long; rachis triquetrous, unwinged, margins scabrid; pedicel scabrid; spikelets solitary or paired. Spikelet 2.0–3.6 × 1 mm, acuminate; lower glume a minute truncate scale, separated from upper glume by internode 0.1–0.3 mm long; upper glume as long as to longer than spikelet, 7-nerved, adpressed hairy between nerves; lower lemma shorter than spikelet, 7-nerved, adpressed hairy; upper lemma shorter than spikelet, not exposed, yellow to bluish-green; anthers 0.4–0.8 mm long.

*Flowering*: November to June. *Ecology*: Sandy soils; mainly damp places. *Frequency in southern Africa*: Locally dominant. *Distribution*: Africa, Madagascar and western Mediterranean. N, B, S, LIM, G, M, KZN, WC.

Illustrations: Kok fig. 8.4 (1978); Goetghebeur & Van der Veken: 138, tab. 40, 29 (1989).
Anatomy vouchers: *Ellis 323, 1545, 2064 & 3871*.
Voucher: *Smook 4183*.


*Digitaria diagonalis* var. *diagonalis*

**Digitaria diagonalis** (Nees) Stapf var. **diagonalis**, in *Flora capensis* 7: 381 (1898). Type: South Africa, Eastern Cape, Umtata [Mthatha] to Umgazana [Mgazana], *Drège 4312* (PRE, fg.).

*D. trichopodia* Stent, in *Bothalia* 3: 155 (1930). Type: South Africa, Eastern Cape, Kei Mouth, *Flanagan 987* (PRE, iso.).

BROWN SEED FINGER GRASS

Tufted perennial 400–1 500 mm high; basal leaf sheaths silky hairy, with cataphylls and fibres; culms swollen and bulbous at base. Leaf blade 90–170 × 2–3 mm, glabrous or hairy. Inflorescence a well-developed elongated axis with 10–30 racemes 80–140 mm long; racemes few together or solitary on axis; rachis triquetrous, narrowly winged, glabrous to scaberulous, margins scabrous; pedicel unequal, triangular, apex with stiff, 10–15 mm long hairs which are as long as or longer than spikelet; spikelets in clusters of 3(–6). Spikelet 1.4–2.4 mm long, glabrous; lower glume absent or reduced to small rim up to 0.6 mm long, truncate; upper glume a minute scale 0.1–0.7 mm long, membranous, nerveless; internode absent; lower lemma shorter to as long as spikelet, membranous, glabrous, 3-nerved, nerves smooth; upper lemma acute, as long as spikelet, exposed, pale to dark brown or black; anthers 0.8–1.6 mm long.

[The varieties *uniglumis* (A.Rich.) Pilg. and var. *hirsuta* (De Wild. & T.Durand) Tourpin occur in eastern and western Africa respectively while var. *diagonalis* occurs in southern Africa, and although the varieties are regarded as ill-defined they do give an indication of clinal variation. Therefore the variants are accepted here until further research has been done. May be confused with *D. eylesii*, which lacks long hairs on the pedicel and racemes are in twos or threes.]

*Flowering*: January to April. *Ecology*: Grows in open, usually sourveld grassland; often hillsides and in damp places. *Frequency in southern*

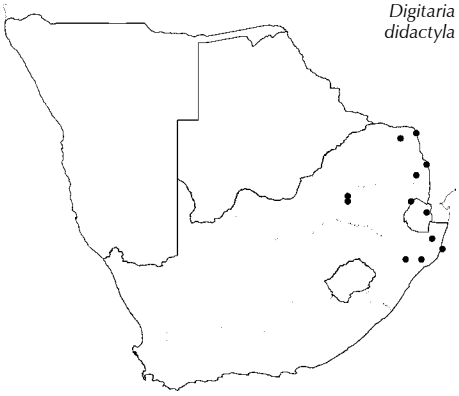
*Africa*: Locally dominant. *Distribution*: Northwards to Zambia, Zimbabwe, Malawi and Tanzania. N, S, LIM, NW, G, M, FS, KZN, EC. *Economics*: Low grazing value as leaves hard and unpalatable.

Illustrations: Chippindall: 420, fig. 349 (1955); Clayton et al.: 625, fig. 145 (1982); Goetghebeur & Van der Veken: 136, tab. 38, 1 (1989).
Anatomy vouchers: *Ellis & Loxton 791, Ellis 246, 1802* & *5202*.
Voucher: *Davidse 6759*.

***Digitaria didactyla** Willd., in *Enumeratio Plantarum Horti regii botanici berolinensis*. Berolini 91 (1809). Type: Mascarene Islands.

*D. swazilandensis* Stent, in *Bothalia* 3: 150 (1930). Type: Swaziland, Stegi, *Perkins Nat. Herb. Pretoria 7931* (PRE, iso.).

BLUE COUCH, SWAZILAND FINGER GRASS


*Digitaria didactyla*

Weakly tufted perennial 150–300 mm high; stoloniferous or with knotty rhizomes, mat forming; culms may be branched and rooting at lower nodes. Leaf blade 25–50 × 1.0–1.8 mm, ligule 0.5–0.8 mm long. Inflorescence digitate, of 2–4 racemes 30–65(100) mm long; rachis triquetrous, winged, glabrous, margins scaberulous; pedicel triangular, glabrous with scaberulous margins; spikelets paired. Spikelet (2.0)2.5–2.8 mm long; lower glume short, 0.2–0.5 mm long, triangular-ovate, usually truncate, membranous; upper glume shorter than spikelet, partly exposing upper lemma, 3-nerved, pubescent between nerves; internode absent; lower lemma as long as spikelet, 7-nerved, nerves smooth to scaberulous towards apex, two marginal tufts of hairs present; upper lemma yellow to pale brown or purple tinged; anthers 1.0–1.3 mm long.

[This species is difficult to distinguish from some slender, creeping specimens of *D. eriantha*. There are differing opinions as to whether *D. didactyla* and *D. swazilandensis* should be kept separate or not.]

*Flowering*: October to April. *Ecology*: Disturbed sandy soils. *Frequency in southern Africa*: Locally common. *Distribution*: Malawi, Mozambique and Madagascar. S, LIM, G, M, KZN. *Economics*: Cultivated worldwide as lawn.

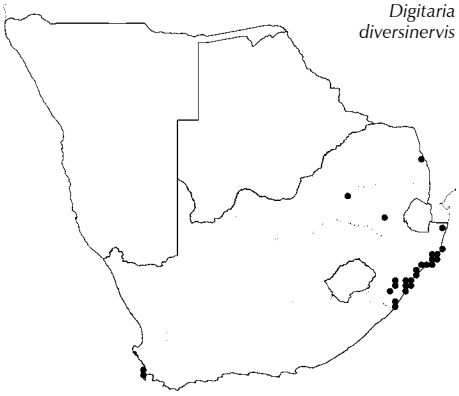
Anatomy vouchers: *Ellis 1902, 1903* & *4538*.
Voucher: *Smook 1986*.

**Digitaria diversinervis** (Nees) Stapf, in *Flora capensis* 7: 379 (1898). Type: South Africa, KwaZulu-Natal, Port Natal, *Drège*.

*D. albomarginata* Stent, in *Kew Bulletin* 3: 110 (1934). Type: South Africa, KwaZulu-Natal, Umbogintwini, *Moses* (syntype?).

*D. diversinervis* (Nees) Stapf var. *woodiana* Henrard, in *Monograph of the genus* Digitaria: 200 (1950). Type: South Africa, KwaZulu-Natal, Durban, Berea, *Medley Wood 8887*.

RICHMOND FINGER GRASS, WYNBERG FINGER GRASS

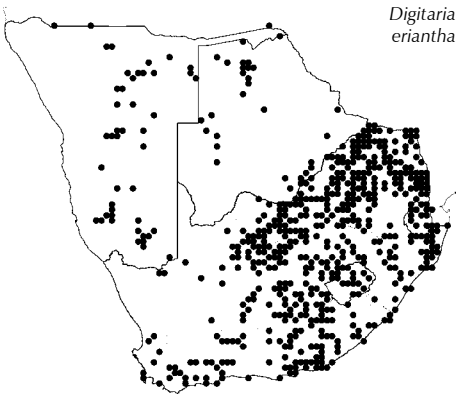

*Digitaria diversinervis*

Perennial 200–350 mm high, mat forming; rhizome knotty, much branched; stolons present. Leaf blade 20–90 × 3–8 mm, ligule absent or minute, up to 0.7 mm long. Inflorescence digitate, of 2–5 racemes, 30–77 mm long; rachis triquetrous, narrowly winged, glabrous, margins scaberulous; pedicel triangular, glabrous or scaberulous, spikelets paired. Spikelet 3–4 mm long, hairy to glabrous; lower glume a well-developed scale up to 1 mm long, broadly ovate, truncate, nerveless or 1-nerved; upper glume $^1/_2$–$^2/_3$ the spikelet length, 1(–3)-nerved, margins hairy; internode absent; lower lemma as long

as spikelet, (7)9–11-nerved, nerves smooth to scaberulous towards apex, glabrous on back, hairy along margins or glabrous; upper lemma yellowish-green to pale or dark brown, partly exposed; anthers 1.6–1.8 mm long.

*Flowering*: November to June. *Ecology*: Mainly sandy coastal areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. LIM, G, M, KZN, ?WC. [It is possible that in the WC the species is either cultivated or escaped from cultivation as this distribution is fairly out and while some specimens have no information others are recorded as cultivated; on Wynberg Hill, *Pole Evans PRE 33327* and *Esterhuysen 15750*.] *Economics*: As lawn grass, grows well in shade.

Illustration: Chippindall: 398, fig. 335 (1955).
Anatomy vouchers: *Ellis 3404, 4417, 4427* & *4486*.
Voucher: *Smook 1855*.



*Digitaria eriantha*

**Digitaria eriantha** Steud., in *Flora Jena* 12: 448 (1829). Type: South Africa, Cape, without precise locality (OXF, holo.).

*D. bechuanica* (Stent) Henrard, in *Monograph of the genus* Digitaria: 295 (1950). Type: South Africa, Northern Cape, Mafikeng, Langeberg Camp, *Pole Evans 2421*; Olifantshoek, *Pole Evans & Pentz, Nat. Herb., Pretoria 8556*; Upington, *Pole Evans 2194* (syntypes).

*D. decumbens* Stent, in *Bothalia* 3: 150 (1930). Type: South Africa, Mpumalanga, Nelspruit, *Pentz, Nat. Herb., Pretoria 8495* (PRE, holo.?).

*D. dinteri* Henrard, in *Blumea* 1: 97 (1934). Type: Namibia, Windhoek, *Müller in herb. Dinter 2573*.

*D. eriantha* Steud. subsp. *pentzii* (Stent) Kok, in *Bothalia* 13: 457 (1981). Type: South Africa, Northern Cape, Vryburg, *Pentz Nat. Herb. Pretoria 8501*.

*D. eriantha* Steud. subsp. *stolonifera* Stapf, in *Monograph of the genus* Digitaria: 544 (1950). Type: South Africa, Limpopo, Houtbosch, *Rehmann 5712, 5712/b* (syntypes).

*D. eriantha* Steud. subsp. *transvaalensis* Kok, in *Bothalia* 13: 457 (1981). Type: South Africa, North West, Silkaatsnek, *Kok 577* (PRE, holo.).

*D. geniculata* Stent, in *Bothalia* 3: 154 (1930). Type: South Africa, Eastern Cape, Dordrecht, Lady Frere, August 1927, *Pentz s.n.* (PRE, holo.?).

*D. pentzii* Stent, in *Bothalia* 3: 147 (1930). Type: South Africa, Northern Cape, Vryburg, *Pentz, Nat. Herb., Pretoria 8501, 8509, 8510* (PRE, syntypes).

*D. pentzii* Stent var. *stolonifera* (Stapf) Henrard, in *Bothalia* 13: 457 (1930). Type: South Africa, Limpopo, Houtbosch, *Rehmann 5712, 5712/b* (syntypes).

*D. setivalva* Stent, in *Bothalia* 1: 268 (1924). Type: South Africa, Limpopo, Mosdene, Naboomspruit, *Galpin 392, 390, 391, 394*; Warmbaths, *Burtt-Davy 864*; Springbok Flats, *Burtt-Davy 1122* (syntypes).

*D. smutsii* Stent, in *Bothalia* 1: 268 (1924). Type: South Africa, Gauteng, Irene, Pretoria, *Stent s.n.* (PRE, iso.).

*D. stentiana* Henrard, in *Blumea* 1: 97 (1934). Type: South Africa, Gauteng, *Pentz, Nat. Herb., Pretoria 8519*; Free State, Kroonstad, *Hall, Nat. Herb., Pretoria 8669*; Northern Cape, Gordonia, Inkruip, *Pole Evans & Pentz, Nat. Herb., Pretoria 8555* (many more syntypes).

*D. valida* Stent, in *Bothalia* 3: 148 (1930). Type: South Africa, Gauteng, Pretoria, *Pentz, Nat. Herb. Pretoria 1970*.

*D. valida* Stent var. *glauca* Stent, in *Bothalia* 3: 149 (1930). Type: South Africa, Gauteng, Hammanskraal, *Pentz, Nat. Herb. Pretoria 8499* (and many more syntypes).

COMMON FINGER GRASS

Tufted perennial 350–1 400 mm high; rhizome short, robust, knotty, unbranched, sometimes stoloniferous; basal sheaths silky hairy; culms simple or branched. Leaf blade 50–400 × 2–14 mm. Inflorescence digitate, of 3–15 racemes, 50–200 mm long; rachis

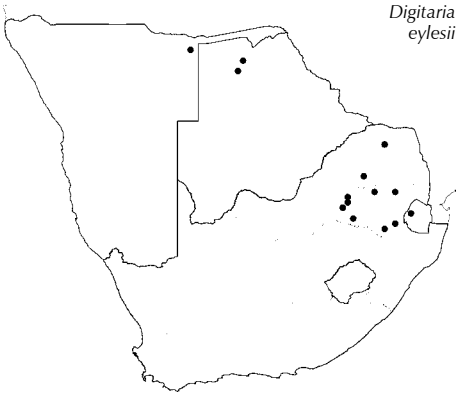
triquetrous, winged, glabrous to scaberulous, margins scabrous; pedicel scabrous, long hairs at apex absent; spikelets paired. Spikelet 2.2–4.0 mm long, hairy; lower glume a membranous scale, ovate to triangular; upper glume $^1/_3$–$^2/_3$ as long as spikelet, 3-nerved, hairy; internode absent; lower lemma as long as spikelet, 7-nerved, nerves evenly spaced or with broader central interspaces, smooth or sometimes scaberulous, bristle hairs present or absent; upper glume and lower lemma covered with purple and silvery hairs to 1 mm long; upper lemma shorter than spikelet, greenish to brown, partly exposed; anthers 1.8–2.2 mm long.

[A very variable grass with many forms; very closely related to and intergrading with *D. natalensis*, *D. milanjiana* and *D. seriata* and specimens lacking subterranean parts are often difficult to place.]

*Flowering*: January to April. *Ecology*: Occurs in a wide range of habitats. *Frequency in southern Africa*: Dominant. *Distribution*: Angola, Zimbabwe and Mozambique. Widespread in southern Africa. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Palatable and endures heavy grazing; regarded as one of best natural or cultivated pasture grasses; indicator of good veld management. Planted as pasture worldwide.

Illustration: Goetghebeur & Van der Veken: 139, tab. 41, 51 (1989).
Anatomy vouchers: *Loxton & Ellis 948, 958, 959, 966*; *Ellis 1327, 1328, 1792, 5259 & 5446*.
Voucher: *Smook & Gibbs Russell 2166*.

**Digitaria eylesii** C.E.Hubb., in *Kew Bulletin* 1926: 246 (1926). Type: Zimbabwe, Harare, on river banks, *Eyles 3277* (K, holo.).


*Digitaria eylesii*

Tufted perennial 400–650(–1 000) mm high; rhizome branched, creeping; base with cataphylls. Leaf blade 50–130 × 2–4 mm. Inflorescence of 2 or 3 racemes, rarely solitary, (80)100–180(–240) mm long; rachis triquetrous, narrowly winged, glabrous, margins scabrous; pedicel scaberulous near apex; spikelets in clusters of 3 or more. Spikelet 2.3–3.0 mm long; lower glume a minute truncate scale; upper glume about $^1/_2$ as long as spikelet, 3-nerved, glabrous or hairy, hairs clavate-tipped; internode absent; lower lemma as long as spikelet, 7-nerved, glabrous or sparsely hairy with pallid hairs; upper lemma as long as spikelet, dark, purplish-brown or black; anthers 1.4–1.6 mm long.

[Similar to *D. diagonalis*, which is distinguished by long hairs at apex of the pedicel.]

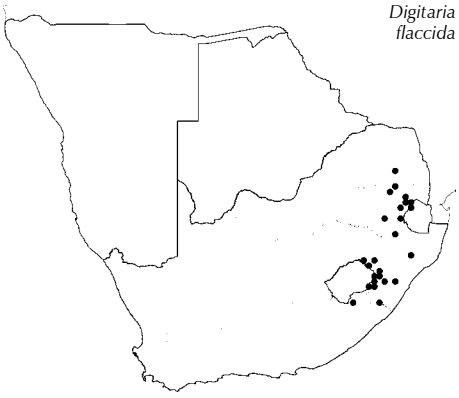
*Flowering*: January to April. *Ecology*: Grows in wet places. *Frequency in southern Africa*: Locally common. *Distribution*: Angola, Zambia and Zimbabwe. N, B, S, LIM, G, M.

Illustration: Kok fig. 8.14 (1987).
Anatomy voucher: *Ellis 2081*.
Voucher: *De Winter 739*.

**Digitaria flaccida** Stapf, in *Flora capensis* 7: 382 (1898). Type: South Africa, Eastern Cape, Amatola Mts., *Buchanan 9* and KwaZulu-Natal, Umsinga, *Buchanan 88*. (syntypes)

Flaccid finger grass

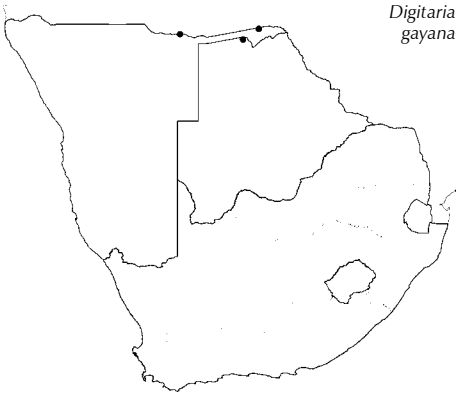
Densely tufted perennial 250–400(–600) mm high; rhizome short, knotty; basal sheaths densely adpressed long hairy. Leaf blade 40–


*Digitaria flaccida*

100 × 1.5–3.0 mm. Inflorescence panicle-like with 6–17 racemes; raceme 30–55 mm long; rachis triquetrous, glabrous; pedicel apex with long hairs not exceeding spikelet; spikelets paired. Spikelet 1–3 × 1 mm; lower glume a minute membranous cuff; upper glume shorter to as long as spikelet, 3-nerved, silky purplish hairs between nerves; internode absent; lower lemma as long as spikelet, silky purplish hairy on and between nerves below, two hairy tufts occur at about middle, these hairs cover the glabrous, except for margins, upper part of the lemma, hairs thick, straight, up to 2 mm long; upper lemma pallid; anthers 1.8–2.0 mm long.

*Flowering*: November to January. *Ecology*: Mainly on rocky ground; mountain sourveld. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic? S, LIM, M, KZN, EC.

Illustration: Kok fig. 8.17 (1978).
Anatomy vouchers: *Ellis 1857* & *2828*.
Voucher: *Smook* 1399.

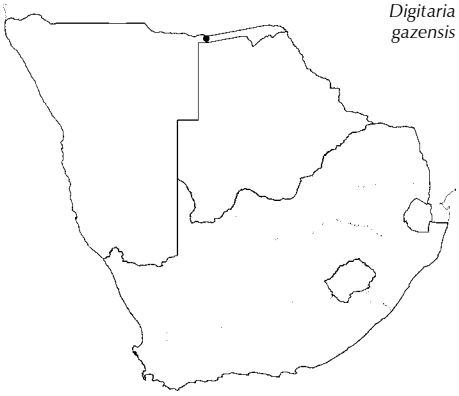

*Digitaria gayana*

**Digitaria gayana** (Kunth) A.Chev. ex Stapf, in Chev. *Sudania* 163 (1911). Type: Senegal, Kouma, *Roger 56*.

Loosely tufted annual 130–300 mm high; lower leaf sheaths glabrous or sparsely hairy; culm nodes glabrous. Leaf blade 20–70 × 3.5–6.0 mm. Inflorescence digitate, of 2–3 racemes 40–100 mm long; rachis triquetrous, broadly winged, glabrous or shortly pubescent, margins scabrous; pedicel glabrous or scaberulous; spikelets in clusters of 3(–4). Spikelet 2.4–2.8 mm long; lower glume short, truncate, membranous; upper glume $^4/_5$ the spikelet length, covered with white to silvery or purplish hairs 1 mm long, 3-nerved; internode absent; lower lemma as long as spikelet, deeply grooved on either side of midrib, 5-nerved, interspaces membranous; 2 basal tufts of hairs present; margins thickened, densely hairy, hairs purplish or silvery, 2–4 mm long, exceeding the spikelet by 2–3 mm; upper lemma yellow to light brown; anthers 0.8–1.2 mm long.

*Flowering*: February. *Ecology*: Mainly sandy soils; weedy species of disturbed areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to Senegal and east to Sudan. N, B.

Illustration: Kok fig. 8.17 (1987); Goetghebeur & Van der Veken: 155, tab. 44 (1989).
Voucher: *De Winter 9203*.


*Digitaria gazensis*

**Digitaria gazensis** Rendle, in *Journal of the Linnean Society, Botany*. 40: 228, t. 6, fig. 1–5 (1911). Type: Mozambique, Beira, *Swynnerton 1593* (BM, holo.).

Densely tufted perennial 350–700 mm high; rhizome short and knotty, rarely stoloniferous; basal sheaths soft hairy; culm nodes bearded. Leaf blade 50–135 × 3.0–4.5 mm. Inflorescence of 5–17 racemes, 30–200 mm long on an elongated central axis; rachis triquetrous, narrowly winged, glabrous, margins scaberulous; pedicel triangular, scabrous at apex; spikelets paired. Spikelet 1.8–2.6 mm long; lower glume an ovate truncate or obtuse cuff up to 0.5 mm long, membranous; upper glume as long as or slightly shorter than spikelet, 5-nerved, hairy especially between outer lateral nerves for the entire length of lemma, hairs slender and adpressed, up to 2 mm long, often purplish; internode absent; lower lemma as long as spikelet, 7-nerved, covered with 2 mm long often purplish hairs;

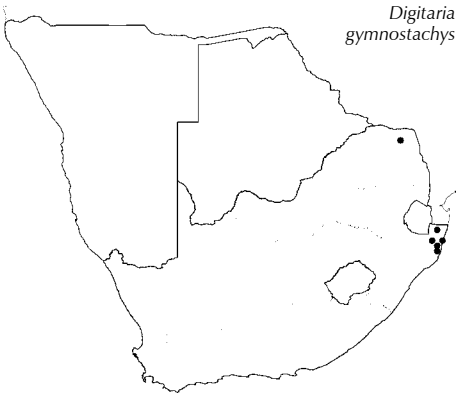
upper lemma yellowish to dark purple grey, ± concealed; anthers 1.2–1.4 mm long.

[Close to *D. rukwae*, which has a brown upper lemma and culm nodes glabrous.]

*Flowering*: January to March. *Ecology*: Mainly sandy soil but not in flood plains. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to DRC and Sudan, also Madagascar. N.

Voucher: *De Winter & Wiss 4450*.

**Digitaria gymnostachys** Pilg., in *Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem*. 15: 709 (1942). Type: Tanzania, 60 km west of Lindi, *Schlieben 6267* (PRE, iso.).

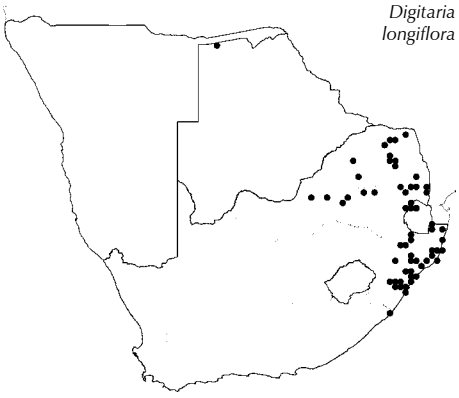

*Digitaria gymnostachys*

Loosely tufted perennial 600–1 000 mm high; basal leaf sheaths pale coloured, cataphylls present; culm nodes hairy. Leaf blade 60–300 × 7–15 mm. Inflorescence subdigitate on central axis up to 60 mm long; 6–16 racemes 100–300 mm long; rachis triquetrous, narrowly winged; pedicel scaberulous; spikelets paired. Spikelet 3 to 4 mm long, lanceolate; lower glume 0.2–0.5 mm long; upper glume 0.6–0.7 mm long, nerveless; glumes separated from rest of spikelet by an internode or stipe 0.2–0.5 mm long; lower lemma as long as spikelet, 5-nerved, glabrous on back, margins adpressed hairy; upper lemma as long as spikelet, light to dark brown, exposed; anthers 1.2–1.4 mm long.

*Flowering*: February to April. *Ecology*: Mainly coastal sandy soils. *Frequency in southern Africa*: Infrequent. *Distribution*: Mozambique and Tanzania. LIM, KZN.

Voucher: *Ward 3852*.

**Digitaria longiflora** (Retz.) Pers., in *Synopsis plantarum* 1: 85 (1805). Type: India

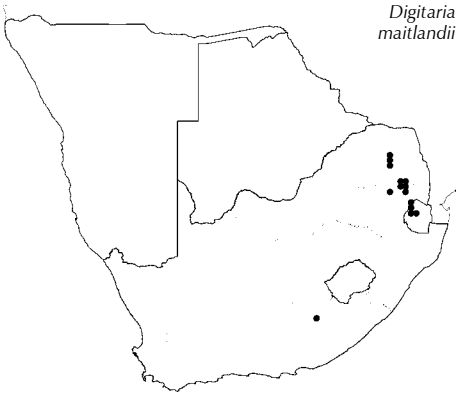

*Digitaria longiflora*

False couch finger grass

Loosely tufted annual or short-lived perennial 100–350 mm high; mat forming, stoloniferous or with short rhizomes; culm rooting at lower nodes. Leaf blade 18–70 × 1.6–4.5 mm. Inflorescence digitate, of 2(–4) racemes 30–70 mm long; rachis with low rounded midrib, broadly winged, glabrous, margins scaberulous; pedicels glabrous; spikelets 3 per cluster and these tend to bend outwards. Spikelet 1.2–1.8(2.2) mm long, hairy; lower glume absent or reduced to short truncate membrane; upper glume as long as spikelet, 3–5-nerved, hairy between nerves; internode absent; lower lemma as long as spikelet, 5–7 nerved, covered with hairs 0.2 mm long; upper lemma as long as spikelet, yellow or grey to purplish, mostly concealed; anthers 0.8–1.2 mm long.

*Flowering*: October to June. *Ecology*: Mainly sandy soils; disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Pantropical. B, S, LIM, NW, G, M, KZN. *Economics*: Used as lawns; weed.

Illustrations: Kok fig. 8.10 (1987); Goetghebeur & Van der Veken: 138, tab. 40, 43 (1989).
Anatomy vouchers: *Ellis 74, 456 & 463*.
Voucher: *Smook 3157*.


*Digitaria maitlandii*

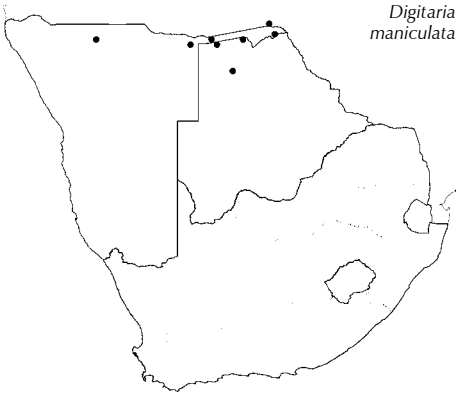
**Digitaria maitlandii** Stapf & C.E.Hubb., in *Kew Bulletin* 1927: 266 (1927). Type: Uganda, Masaka, *Maitland 766* (K, holo.).

*D. apiculata* Stent, in *Bothalia* 3: 155 (1930). Type: Swaziland, *Burtt-Davy 2820* (PRE, holo.).

Densely tufted perennial 220–410 mm high; without rhizomes; basal leaf sheaths light coloured, cataphylls present. Leaf blade (20)40–130 × 2–4 mm. Inflorescence subdigitate on a short central axis, of 3–8 racemes 50–90 mm long; rachis triquetrous, narrowly winged, glabrous, margins scaberulous; pedicel scabrous; spikelets in groups of 3(4). Spikelet 1.0–2.2 mm long, glabrous or sparsely hairy; lower glume a small scale 0.2–0.3 mm long or absent; upper glume $^1/_4$–$^1/_2$ as long as spikelet, 1–3-nerved, hairy or glabrous, hairs club-shaped; internode absent; lower lemma shorter to as long as spikelet, 3–7-nerved, hairy or glabrous, hairs club-shaped; upper lemma as long as spikelet, purplish to dark brown or black, exposed; anthers 0.8–1.0 mm long.

*Flowering*: November to May. *Ecology*: Mountain grassland. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to East Africa, Burundi, Rwanda and DRC. S, LIM, M, ?EC.

Illustration: Kok fig. 8.15 (1987); Goetghebeur & Van der Veken: 136, tab. 38, 9 (1989).
Voucher: *Scheepers 831*.

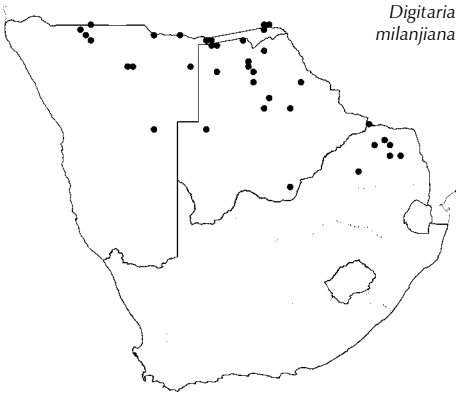

*Digitaria maniculata*

**Digitaria maniculata** Stapf, in *Flora tropical Africa* 9: 466 (1919). Type: DRC, Stanley Pool District, on sand banks near Chenul, *Vanderyst 5177* & *5179* (syntypes).

Slender annual 80–150 mm high; partially mat forming; stoloniferous; culm rooting from lower nodes. Leaf blade 10–40 × 1.5–3.0 mm, margins usually white and thickened. Inflorescence digitate, 2–3 racemes 40–80 mm long; rachis triquetrous, asymmetrically winged, glabrous; pedicel triangular, glabrous; spikelets paired. Spikelet 2.5–2.7 mm long; lower glume 0.5–0.7 mm long, truncate to bilobed, membranous, clasping spikelet; upper glume as long as spikelet, 5-nerved, long, fine, adpressed hairy; internode absent; lower lemma as long as spikelet, 7-nerved, hairy, two tufts of 1.2 mm long woolly hairs at base, partly enclosed by lower glume (need to look carefully); upper lemma shorter than spikelet, green to bluish-green; anthers 0.8–1.0 mm long.

*Flowering*: December to March. *Ecology*: Sandy flats near rivers. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to Zimbabwe, Zambia and DRC. N, B.

Illustrations: Kok fig. 8.8 (1978); Goetghebeur & Van der Veken: 139, tab. 40, 39 (1989).
Anatomy voucher: *Ellis 3727*.
Voucher: *De Winter & Marais 4638*.


*Digitaria milanjiana*

**Digitaria milanjiana** (Rendle) Stapf, in *Flora tropical Africa* 9: 430 (1919). Type: Malawi, Mulanje [Mlanje], *Whyte* (BM, holo.).

Milanje finger grass

Loosely tufted perennial 500–1 300 mm high, rhizomatous and stoloniferous; rhizomes branched, slender, elongate; culms usually straight, erect, nodes glabrous. Leaf blade 60–300 × 2–8 mm, sheaths mostly glabrous. Inflorescence digitate, 3–12 racemes 80–250 mm long; rachis triquetrous, winged, glabrous or scabrous; pedicel scabrous; spikelets paired. Spikelet 2.5–3.2 mm long; lower glume 0.2–0.5 mm long, ovate-triangular; upper glume shorter to as long as

spikelet, 3-nerved, hairy; internode absent; lower lemma as long as spikelet, 7-nerved, nerves evenly spaced or with broader central interspaces, usually scabrid (look carefully); upper lemma partly exposed, pale brown, grey or purple; anthers 1.8–2.4 mm long.

[A variable tropical species, separated from its southern allies, *D. eriantha* and *D. didactyla*, by scabrid nerves on the lower lemma and slender rhizomes, but these characters are not reliable. Closely related to and intergrading with *D. natalensis* and *D. seriata* and specimens lacking subterranean parts are often difficult to place.]

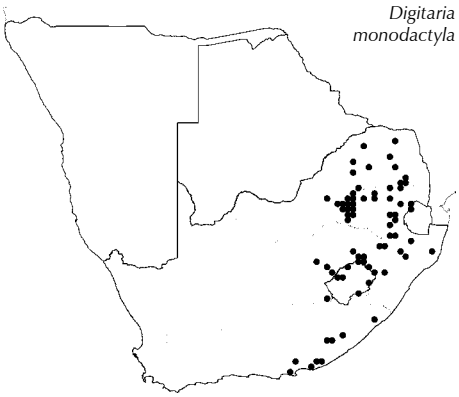
*Flowering*: January and February. *Ecology*: Occurs in a wide range of habitats, often in disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Tropical and subtropical Africa. N, B, LIM. *Economics*: Natural pasture.

Illustration: Kok fig. 8.31 (1978).
Anatomy voucher: *Vorster 2779*.
Voucher: *Rains 26*.

**Digitaria monodactyla** (Nees) Stapf, in *Flora capensis* 7: 373 (1898). Type: South Africa, Eastern Cape, Uitenhage, *Ecklon*; and Witteberg, *Drège* (syntypes).

*D. monodactyla* Stapf var. *explicata* Stapf, in Prain, *Flora tropical Africa* 9: 442 (1919). Type: Angola, near Luilanga, *Welwitsch 2823*.

One finger grass


*Digitaria monodactyla*

Densely tufted perennial 200–550 mm high; rhizome short, hairy cataphylls present. Leaf blade 20–60 × 1.8–2.2 mm, often rolled. Inflorescence a solitary raceme, 40–180 mm long; rachis triquetrous, broadly winged, undulating, margins scaberulous; pedicel hairy; spikelets paired. Spikelet 2.8–3.2 mm long, hairy, hairs usually overtopping apex; lower glume reduced to small scale up to 0.2 mm long or absent; upper glume shorter than spikelet, 3-nerved, hairy; internode absent; lower lemma as long as spikelet, 5-nerved, densely hairy with white to yellowish hairs 1 mm long; upper lemma as long as spikelet, light brown, exposed; anthers 1.4–1.6 mm long.

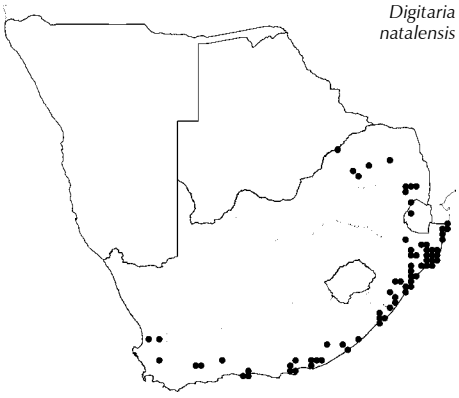
*Flowering*: November to February. *Ecology*: Open grassland; usually highland sourveld. *Frequency in southern Africa*: Locally dominant. *Distribution*: Zambia, Zimbabwe, Angola, DRC and Tanzania. N?, S, L, LIM, NW, G, M, FS, KZN, EC. *Economics*: Relatively palatable with average grazing value; useful for erosion control in mountainous regions.

Illustrations: Chippindall: 417, fig. 347 (1955); Goetghebeur & Van der Veken: 137, tab. 39, 23 (1989).
Anatomy vouchers: *Ellis 147, 244, 418* & *714*.
Voucher: *Smook 4789*.

**Digitaria natalensis** Stent, in *Bothalia* 3: 152 (1930). Type: South Africa, KwaZulu-Natal, Umkomaas, Port Shepstone, *Nat. Herb., Pretoria*, *Van Rensburg s.n* (PRE, iso.).

*D. macroglossa* Henrard, in *Monograph of the genus* Digitaria: 404 (1950). Type: South Africa, Eastern Cape, Albany Div., Grahamstown; *Schonland 3739* (PRE, iso.).

*D. macroglossa* Henrard var. *prostrata* (Stent) Henrard, in *Monograph of the genus* Digitaria: 419 (1950). Type: South Africa, Eastern Cape, Albany, Grahamstown, *Pentz, Nat. Herb., Pretoria, 8021* (and many other syntypes).



*Digitaria natalensis*

*D. natalensis* Stent subsp. *stentiana* Henrard, in *Monograph of the genus* Digitaria: 482 (1950). Type: Zimbabwe, Matopos Pasture Station, *Stent s.n.* (L, holo.).

*D. rigida* Stent, in *Bothalia* 3: 151 (1930). Type: South Africa, Limpopo, *Pole Evans s.n* (PRE, ?iso.).

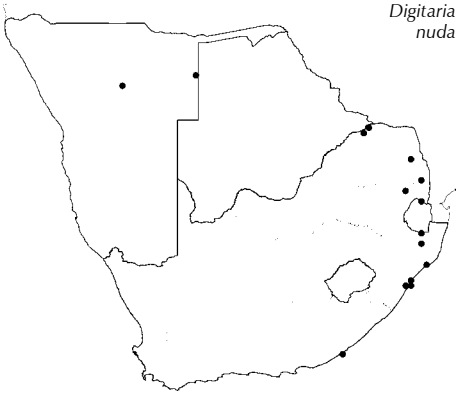
COAST FINGER GRASS

Loosely to densely tufted perennial 600–1 500 mm high; rhizomes short, knotty; basal sheaths sometimes persistent, rusty brown; culm nodes dark, glabrous. Leaf blade 80–250 × 2–6 mm; ligule membranous, 3–12 mm long. Inflorescence digitate, of 4–13 racemes 100–200 mm long; rachis triquetrous, winged, scaberulous; pedicel triangular, scaberulous; spikelets paired. Spikelet 2.8–3.5(4.2) mm long, hairy; lower glume minute, ovate to triangular; upper glume shorter than spikelet, 3-nerved; internode absent; lower lemma as long as spikelet, 7-nerved, nerves scaberulous or sometimes nearly smooth, hairy, bristle hairs sometimes present; upper lemma slightly shorter than spikelet, partly exposed, pale yellow to pale brown or purplish; anthers 1.6–1.8 mm long.

[Closely related and intergrading with *D. eriantha*, *D. milanjiana* and *D. seriata* and specimens lacking subterranean parts are often difficult to place.]

*Flowering*: December to June. *Ecology*: Mainly sandy ground. *Frequency in southern Africa*: Locally dominant. *Distribution*: Mozambique. S, LIM, M, KZN, WC, EC.

Illustrations: Kok fig. 8.32 (1987); Goetghebeur & Van der Veken: 139, tab. 41, 55 (1989).
Anatomy vouchers: *Ellis 274, 740, 3411* & *4510*.
Voucher: *Smook 5759*.



*Digitaria nuda*

***Digitaria nuda** Schumach., in *Beskrivelse af Guineeriske planter*: 65 (1827). Type: Ghana, *Thonning* (C, holo.).

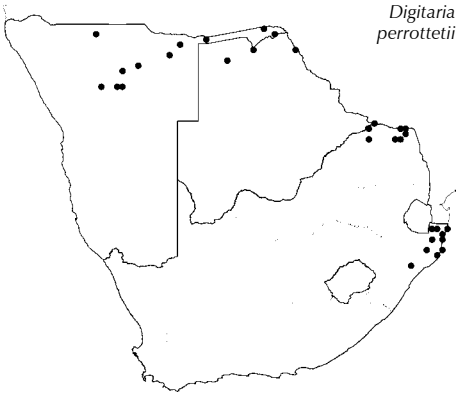
Tufted annual 200–500 mm high; sometimes mat-forming; culms decumbent or creeping, geniculate, rooting at lower nodes. Leaf blade 20–135 × 2–10 mm. Inflorescence digitate or subdigitate, of 3–10 racemes 40–120 mm long; rachis triquetrous, winged, margins scabrid; pedicel triangular, scaberulous; spikelets paired. Spikelet 1.6–2.8 mm long; lower glume absent, or a minute obscure rim less than 0.2 mm long; upper glume shorter to as long as spikelet, narrow, 3-nerved; internode absent; lower lemma as long as spikelet, adpressed hairy, 5–7-nerved, nerves smooth; upper lemma slightly shorter to as long as spikelet, exposed, yellow, brown to greyish; anthers 0.6–0.8 mm long.

[Closely related to and intergrading with *D. ciliaris*, *D. sanguinalis* and *D. velutina*.]

*Flowering*: November to April. *Ecology*: Open disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards and mainly in tropical Africa, introduced into tropics worldwide. N, S, LIM, M, KZN, EC. *Economics*: Ruderal weed; problem in cultivated lands.

Illustrations: Goetghebeur & Van der Veken: 139, tab. 41, 48 (1989).
Voucher: *Du Toit PRE 58243*.

**Digitaria perrottetii** (Kunth) Stapf, in *Flora tropical Africa* 9: 435 (1919). Type: Senegal, Walo, *Roger*.


*Digitaria perrottetii*

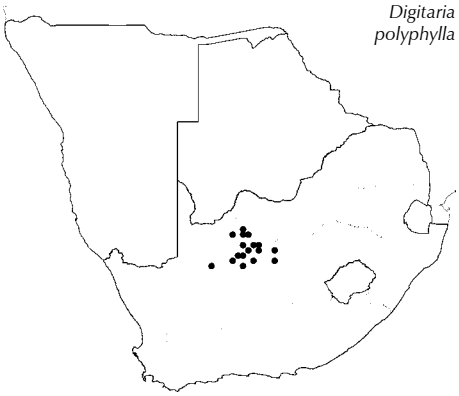
WHORLED FINGER GRASS

Loosely tufted annual 400–800 mm; culm decumbent, rooting at lower nodes. Leaf blade 20–100 × 3–15 mm. Inflorescence 80–200 mm long, racemes arranged in 8–12 whorls on a central axis, each whorl consists of 4–8 racemes 20–80 mm long; rachis triquetrous, not winged, scaberulous with few bulbous-based hairs at base; pedicel triangular, scaberulous; spikelets solitary or in pairs, widely spaced on axis. Spikelet 1.5–2.5 mm long, hairy, hairs slightly exceeding spikelet; lower glume absent; upper glume shorter than spikelet, 3-nerved, hairy; internode absent; lower lemma as long as spikelet, 5-nerved, hairy; upper lemma shorter than spikelet, pale to dark brown; anthers 1.2–1.4 mm long.

*Flowering*: January to June. *Ecology*: Damp, shady, sandy areas. *Frequency in southern Africa*: Locally common. *Distribution*: Angola and northwards to East Africa, Burundi, DRC, possibly introduced to Senegal and Madagascar. N, B, LIM, KZN.

Illustrations: Kok fig. 8.20 (1987); Goetghebeur & Van der Veken: 139 & 177, tab. 41, 59 & 46 (1989).
Anatomy vouchers: *Ellis 3220, 3437* & *4487*.
Voucher: *Smook 1985*.

**Digitaria polyphylla** Henrard, in *Blumea* 1: 97 (1934). Type: South Africa, Northern Cape, Gordonia, Vuilnek, *Pentz Nat. Herb. Pretoria, 8527*.


*Digitaria polyphylla*

Densely tufted perennial 300–500 mm high; stolons present; rhizome knotty; hairy cataphylls present; culm lower nodes unbranched, middle and upper nodes profusely branched forming leafy tufts. Leaf blade 50–130 × 2.5–5.0 mm, lower leaves with reduced lamina. Inflorescence digitate, of 2–6 racemes 20–80 mm long; rachis triquetrous, winged**,** glabrous, margins scaberulous; pedicel triangular, scaberulous; spikelets paired. Spikelet 2–3 mm long; lower glume short, ovate-triangular, tinged purplish; upper glume shorter than spikelet, 3-nerved, pubescent; internode absent; lower lemma as long as spikelet, 7-nerved, nerves equidistant, hairs purplish; upper lemma as long as spikelet, partly exposed, pale brown; anthers 0.8–1.2 mm long.

[Spikelet characters similar to *D. eriantha* but differs in habit.]

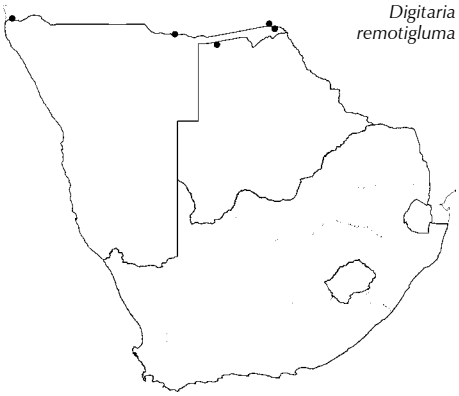
*Flowering*: February to April. *Ecology*: Sandy and stony ground; low rainfall areas. *Frequency in southern Africa*: Locally common. *Distribution*: Mozambique (at PRE the specimen, *Myre & Balsihas 767*, cited in FZ is *D. eriantha*). NC.

Illustrations: Chippindall: 417, fig. 345 (1955); Goetghebeur & Van der Veken: 139, tab. 41, 53 (1989).
Anatomy voucher: *Esterhuyzen 2394*.
Voucher: *Acocks 2078*.

**Digitaria remotigluma** (De Winter) Clayton, in *Kew Bulletin* 29: 520 (1974). Type: Namibia, Tondoro to Lupala, *De Winter 3978* (PRE, holo.).

*Digitariella remotigluma* De Winter, in *Bothalia* 7: 467 (1961).

Tufted to creeping annual 80–400 mm high; culm decumbent at base, rooting at lower nodes. Leaf blade 15–80 × 1–3 mm. Inflores-

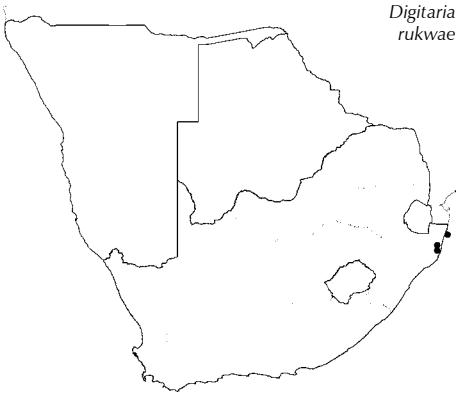

*Digitaria remotigluma*

cence digitate, of 2–5 racemes 25–120 mm long on a short central axis; rachis triquetrous, narrowly winged, glabrous, margins scaberulous; pedicel scaberulous; spikelets in pairs. Spikelet 7–10(15) × 1 mm, hairy; lower glume short, truncate, membranous, remote from upper glume; upper glume as long as spikelet, 7–10 mm long, 7-nerved, glabrous, apex acuminate to filiform, awn-like; internode between glumes 0.7–3.0 mm long; lower lemma 13–16 mm long, finely acute, 7-nerved, hairy; upper lemma acuminate, pale yellow to greenish or bluish-purple, not exposed; anthers 1.8–2.2 mm long.

[The awn-like tip to the upper glume and lower lemma are characteristic for this species.]

*Flowering*: November to February. *Ecology*: Damp, sandy soils. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to Tanzania and DRC. N, B.

Illustrations: Kok fig. 8.5 (1978); Goetghebeur & Van der Veken: 138, tab. 40, 30 (1989).
Anatomy voucher: *Ellis 1772*.
Voucher: *Smith 2659*.


*Digitaria rukwae*

**Digitaria rukwae** Clayton, in *Kew Bulletin* 29: 520 (1974). Type: Tanzania, Mpanda District, Tumba, *Siame* 602 (K, holo.).

Loosely tufted perennial 250–1 200 mm high; rhizomes scaly; basal sheaths glabrous or silky hairy; culm nodes dark, glabrous. Leaf blade 50–300 × 2–7 mm. Inflorescence of 6–25 racemes 20–110 mm long, borne irregularly or in untidy whorls upon an elongated axis 40–200 mm long; rachis triquetrous, narrowly winged, glabrous to scaberulous, margins scaberulous; pedicel apex scaberulous; spikelets paired. Spikelet 2.0–2.9 × 0.8 mm; lower glume ovate-triangular, margins often membranous; upper glume $^{3}/_{4}$ as long to equalling spikelet but narrower, 3-nerved, hairy; internode absent; lower lemma as long as spikelet, hairs slender and adpressed, 7-nerved, widest spacing either side of midrib, hairy especially between outer lateral nerves for the entire length of lemma; upper lemma ellipsoid, shorter than spikelet, partly exposed, light to dark brown; anthers 1.2–1.4 mm long.

[Close to *D. gazensis*, which has the upper floret pale grey or yellowish to dark purplish-grey and culm nodes hairy.]

*Flowering*: March. *Ecology*: Flood plains and alluvial soils. *Frequency in southern Africa*: Infrequent. *Distribution*: Mozambique, Zambia and Tanzania. KZN.

Illustration: Goetghebeur & Van der Veken: 138, tab. 40, 36 (1989).
Anatomy vouchers: *Ellis 4516* & *4517*.
Voucher: *Ellis 4517*.

***Digitaria sanguinalis** (L.) Scop., in *Flora carniolica*, ed. 2,1: 52 (1771). Type: cultivated at Leiden, Holland.

Crab finger grass

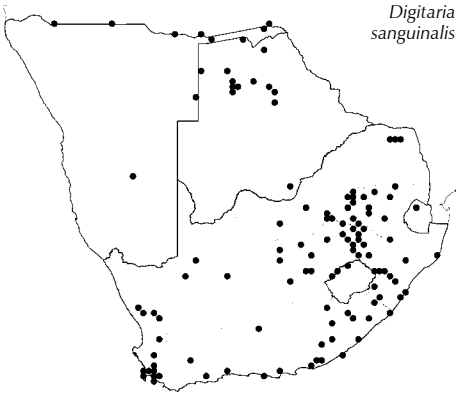
Tufted annual 200–600 mm high; culms branched, decumbent, rooting from lower nodes, nodes dark, glabrous. Leaf blade 27–170 × 3–10 mm. Inflorescence digitate or subdigitate, of 3–12 racemes 40–120 mm long; rachis triquetrous, broadly winged, glabrous to

scaberulous; pedicel triangular, scaberulous; spikelets paired. Spikelet (1.8)2.3–3.5 mm long, acute; internode absent; lower glume a small ovate-triangular scale 0.2–0.3 mm long; upper glume shorter to nearly as long as spikelet, 3-nerved, adpressed hairy, hairs fine, acute; lower lemma equalling or just shorter than spikelet, acute, 7-nerved, scaberulous along nerves (may need a strong lens and easier to see near apex); upper lemma exposed, as long as spikelet, acute, pale yellow to pale brown; anthers 0.7–1.2 mm long.

[Closely related to and intergrading with *D. ciliaris*, *D nuda* and *D. velutina*.]

*Flowering*: November to May. *Ecology*: Disturbed areas. *Frequency in southern Africa*: Locally dominant. *Distribution*: Naturalised from Europe. Warm temperate and tropical regions having been introduced in many parts of the world. Widespread in South Africa. N, B, L, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Weed especially in cultivated lands and is a big problem in maize lands in southern Africa.

Illustrations: Kok fig. 8.22 (1987); Goetghebeur & Van der Veken: 139, tab. 41, 45 (1989).
Anatomy voucher: *Ellis 3747*.
Voucher: *Smook 4674*.


*Digitaria sanguinalis*

***Digitaria scalarum** (Schweinf.) Chiov., in *Resultati Scientifici della missione Stefanini-PaoliNella Somalia italiana le collezione botanishe* 1: 225 (1916). Type: Ethiopia, Memsah and Ouodgerate, *Quartin Dillon & Petit*; Adua, *Schimper* 95 (syntypes).

*D. vestita* Fig. & De Not. var. *scalarum* (Schweinf.) Henrard, in *Monograph of the genus* Digitaria: 785 (1950).

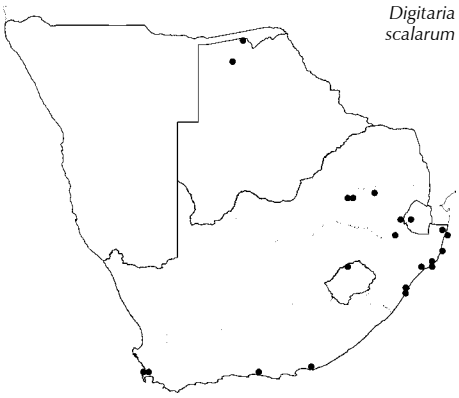
Abyssinian finger grass

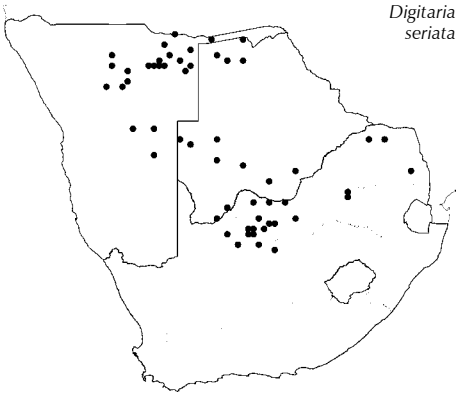
Perennial 200–350 mm high; mat forming; rhizomes long, wiry; culms branched at nodes, nodes dark, glabrous or hairy. Leaf blade 40–100 × 3–6 mm. Inflorescence panicle-like on long central axis or subdigitate, 3–12 racemes 20–100 mm long; rachis triquetrous, narrowly winged, smooth or scaberulous, margins scaberulous; pedicel scaberulous; spikelets paired rarely solitary. Spikelet (1.6)1.8–2.2(2.4) mm long; lower glume short, scale-like, distinctly heteromorphic, outer edges hyaline except on apex, often erose or truncate, glabrous, sometimes tinged purplish; upper glume about as long and as wide as spikelet, glabrous or shortly sparsely hairy on margins, often tinged with purple, 5(–7)-nerved, internode absent; lower lemma as long as spikelet, 7-nerved, glabrous or minutely hairy on margin; upper lemma as long as spikelet, brown, grey or purple, ± concealed, anthers 0.6–0.8 mm long.

[Previously specimens at PRE were placed under *D. abyssinica*, from Zambia, DRC, and Nigeria to Ethiopia, which grows on forest edges and differs in shape and texture of the lower glume.]

*Flowering*: November to June. *Ecology*: Mainly disturbed ground; often areas of high moisture content such as sandy flood plains. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Cameroon and Ethiopia. B, L, S, G, M, KZN, WC, EC. *Economics*: Cultivated pasture or lawns. Weed in gardens.

Illustration: Goetghebeur & Van der Veken: 160, tab. 45 (1989).
Anatomy vouchers*: Ellis 1237, 3757, 4053, 4067* & *Smook 3573*.
Voucher: *Smook 3573*.


*Digitaria scalarum*


*Digitaria seriata*

**Digitaria seriata** Stapf, in Prain, *Flora tropical Africa* 9: 432 (1919). Type: Angola, country of the Ganguellas and Ambuellas, *Gossweiler 3756*; in Mamua woods, *Gossweiler 3761* (syntypes).

*D. polevansii* Stent, in *Bothalia* 3: 149 (1930). Type; South Africa, North West, Kuruman, *Pole Evans 2418, 2419* (many syntypes).

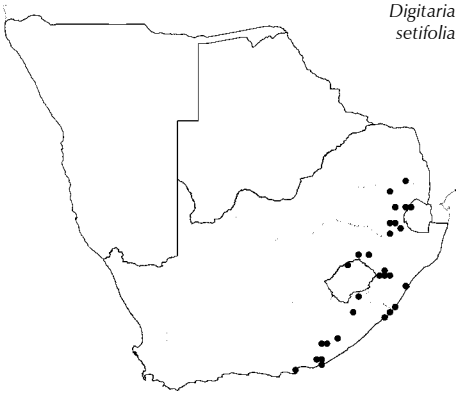
KURUMAN FINGER GRASS

Loosely or densely tufted perennial 500–1 200 mm high; rhizomes thick, knotty, branched, woody; stolons present; base bulbous, densely covered with hairy scales or cataphylls. Leaf blade 100–350 × 3–9 mm. Inflorescence digitate to subdigitate, of 3–12 racemes 100–230 mm long; rachis triquetrous, broadly winged, glabrous, margins scaberulous; pedicel triangular, glabrous, scaberulous; spikelets paired. Spikelet 2.5–3.5 mm long, densely hairy; lower glume a triangular scale; upper glume 3-nerved, hairy; internode absent; lower lemma as long as spikelet, 7-nerved, nerves evenly spaced or with broader central interspaces, smooth or slightly scaberulous, hairy; hairs 1 mm long, purple to silvery, extending beyond spikelet; upper lemma as long as spikelet, partly exposed, brown to purplish; anthers 1.5–1.7 mm.

[Closely related and intergrading with *D. eriantha*, *D. natalensis* and *D. milanjiana*; specimens lacking subterranean parts are often difficult to place.]

*Flowering*: January to April. *Ecology*: Mainly sandy soil. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe. N, B, LIM, NW, G, NC.

Anatomy vouchers: *Smook 5191* & *Barker 83*.
Voucher: *De Winter 7377*.


*Digitaria setifolia*

**Digitaria setifolia** Stapf, in *Flora capensis* 7: 376 (1898). Type: South Africa, Eastern Cape, Albany Division, on mountain slopes near Grahamstown, *MacOwan 1300* (PRE, fg.); Tembuland, moist spots near Bazeia, *Baur 287* (syntypes).

FINE-LEAVED FINGER GRASS

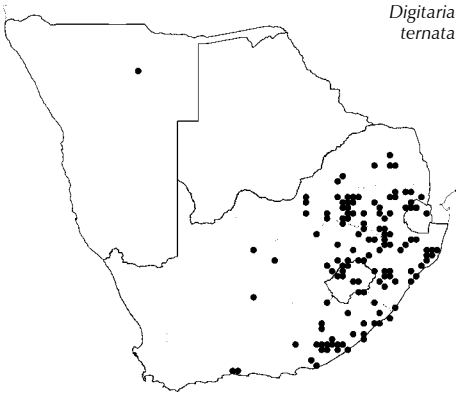
Densely tufted perennial 200–500 mm high; old leaf sheaths break up into brown fibres at base, often burnt; culm nodes glabrous to hairy. Leaf blade 50–150 × 1.5–3.0 mm, usually rolled. Inflorescence subdigitate on a short central axis, of 2–4(–5) racemes, 40–200 mm long; rachis triquetrous, not to scarcely winged, glabrous to slightly scaberulous; pedicel triangular, scaberulous; spikelets in pairs or threes. Spikelet 3–4 mm, densely hairy, hairs often capitate, lower glume short 0.3–0.5 mm long, truncate; upper glume shorter to almost equalling spikelet, 3-nerved, pubescent, hairs sometimes capitate; internode absent; lower lemma as long as spikelet, 7-nerved, conspicuous rows of bright brown, capitate hairs present; upper lemma as long as spikelet, light to dark brown; anthers 1.3–1.6 mm long.

*Flowering*: September to January. *Ecology*: Grows in mountain sourveld areas, usually in damp places or vleis. *Frequency in southern Africa*: Locally common. *Distribution*: Mozambique, Zambia, Zimbabwe, Angola and DRC. L, S, M, FS, KZN, EC.

Illustrations: Kok fig. 8.13 (1987); Goetghebeur & Van der Veken: 136, tab. 38, 11 (1989).
Anatomy vouchers: *Ellis 43, 56, 61, 3175* & *3781*.
Voucher: *Smook 2570*.

**Digitaria ternata** (A.Rich.) Stapf, in *Flora capensis* 7: 376 (1898). Type: Ethiopia, Adua [Adoua], *Schimper 76*.

BLACK SEED FINGER GRASS


*Digitaria ternata*

Loosely tufted annual 200–600 mm high. Leaf blade 20–200 × 1–7 mm. Inflorescence in pairs or subdigitate on short central axis, of 2–6 racemes 40–200 mm long; rachis triquetrous, broadly winged, glabrous, margin glabrous or scaberulous; pedicels with a corona of short hairs at apex; spikelets in clusters of 2 or 3. Spikelet 1.5–2.7 mm long, oblong, densely hairy, hairs clavate; lower glume reduced to small obscure cuff or absent; upper glume $^2/_3$ as long as spikelet, 3-nerved, clavate hairs between nerves; internode absent; lower lemma as long as spikelet, not deeply grooved, 5-nerved, nerves smooth, hairs clavate-tipped; upper lemma as long as spikelet, dark brown or purplish black; anthers 1.0–1.4 mm long.

[Similar to *D. thouarsiana*, which has smaller obovate to broadly elliptic spikelets 1.0–1.8 mm long.]

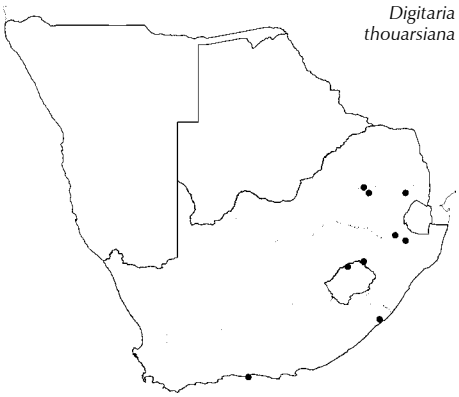
*Flowering*: November to May. *Ecology*: Damp and disturbed areas such as roadsides. *Frequency in southern Africa*: Locally dominant. *Distribution*: Northwards to tropical Africa, east to China and Indonesia; also Australia. ?N, L, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Palatable but with low leaf production. Weed on roadsides, gardens and cultivated lands.

Illustrations: Chippindall: 418, fig. 348 (1955); Goetghebeur & Van der Veken: 136 & 143, tab. 38, 3 & 42 (1989).
Anatomy vouchers: *Loxton & Ellis 941; Ellis 212, 215, 388, 1472, 1509* & *3888*.
Voucher: *Smook 4712*.

**Digitaria thouarsiana** (Flüggé) A.Camus, in *Bulletin de la Société botanique de France* 75: 914 (1928). Type: Madagascar, *Dupetit-Thouars*.

*D. melanochila* Stapf, in *Flora tropical Africa* 9: 453 (1919). Type: Uganda, near Kiwafu, *Dummer 1068* (K, lecto.).

*D. tricostulata* (Hack.) Henrard, in *Blumea* 1: 101 (1934). Type: South Africa, KwaZulu-Natal, Griffinshill, *Rehmann 7306* (W, holo.).

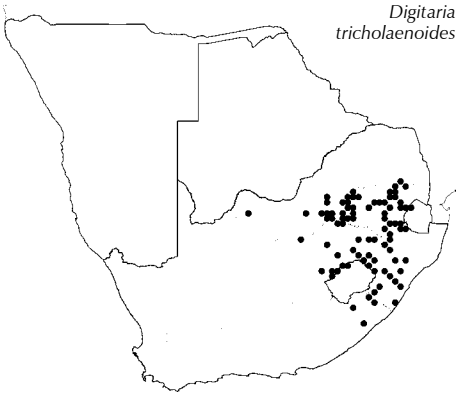

*Digitaria thouarsiana*

Tufted annual 200–800 mm high. Leaf blade 30–200 × 2–8 mm. Inflorescence subdigitate, of 2–14 racemes 20–120 mm long; rachis triquetrous, broadly winged, margin scabrous; pedicels without corona of hairs, only a few hairs at apex; spikelets in clusters of 3 to 4. Spikelet 1.0–1.8 mm, hairy or glabrous, hairs clavate; lower glume absent; upper glume shorter to as long as spikelet, 3-nerved, hairy or glabrous, hairs clavate; internode absent; lower lemma 5-nerved, 3 central nerves close together, nerves thickened, not deeply grooved, glabrous or hairy, hairs clavate; upper lemma dark brown to black; anthers 0.3–0.6 mm long.

[Similar to *D. ternata*, which has a distinct corona of hairs at pedicel apex.]

*Flowering*: February to May. *Ecology*: Marshy places and disturbed sites. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Cameroon and Kenya. ?L, M, FS, KZN, EC, WC.

Illustration: Goetghebeur & Van der Veken: 136, tab. 38, 4 (1989).
Voucher: *Smook 3071*.


*Digitaria tricholaenoides*

**Digitaria tricholaenoides** Stapf, in *Flora capensis* 7: 381 (1898). Type: South Africa, Eastern Cape, King William's Town Division, Amatola Mountains, *Buchanan 11*; Eastern Region, Tembuland, Tabase near Bazeia, *Baur, 317*; KwaZulu-Natal, Umsinga and base of the Biggars Bergs, *Buchanan 87* (syntypes).

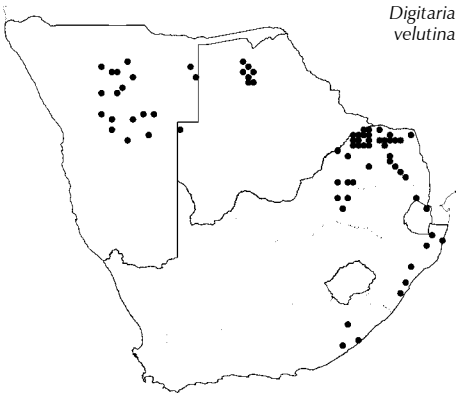
PURPLE FINGER GRASS

Tufted perennial 200–550 mm high; rhizome oblique, up to 100 mm long; base sparsely to moderately hairy, covered with persistent, overlapping bases of old leaf-sheaths. Leaf blade 40–200 × 2–7 mm. Inflorescence subdigitate, of 2–3(–7) racemes 30–130 mm long; rachis triquetrous, narrowly winged, glabrous, margins scaberulous; pedicel scaberulous; spikelets in clusters of 2–5. Spikelet 3–5 mm; lower glume 0.5–1.8 mm long, truncate, membranous; upper glume $^1/_2$–$^2/_3$ length of spikelet, 3-nerved, covered with silvery or purplish hairs 1–2 mm long; internode absent; lower lemma as long as spikelet, 5-nerved, covered except for central interspace with silvery or purplish hairs 2–4 mm long; upper lemma shorter than spikelet, pale yellow; anthers 2.2–2.4 mm long.

[Similar to *D. brazzae*, which does not have an oblique rhizome and the annual *D. gayana*.]

*Flowering*: November to March. *Ecology*: In open, sourveld grassland mainly on stony soil. *Frequency in southern Africa*: Locally dominant. *Distribution*: Endemic. L, S, NW, G, M, FS, KZN, EC. *Economics*: An extremely palatable grass and therefore seldom seen in flower; indicator of good veld management.

Illustration: Chippindall: 402, fig. 337 (1955).
Anatomy vouchers: *Ellis 744, 1447, 1520, 1746, 1799 & 4080*.
Voucher: *Smook 4932*.


*Digitaria velutina*

**Digitaria velutina** (Forssk.) P.Beauv., in *Essai d'une nouvelle agrostographie*: 51 (1812). Type: Yemen, Hadie, *Forsskål* (C, holo.).

*D. zeyheri* (Nees) Henrard, in *Blumea* 1: 105 (1934).

LONG-PLUMED FINGER GRASS

Very loosely tufted or creeping annual 150–800 mm high; culms decumbent at base, rooting from lower nodes. Leaf blade 30–150 × 3–10 mm. Inflorescence subdigitate on a relatively long central axis 25–50 mm long, with 5–15 racemes 35–100 mm long; rachis triquetrous, broadly winged, glabrous to scaberulous; pedicel triangular, scaberulous; spikelets paired. Spikelet 1.5–2.2 mm, hairy; lower glume obscure or an ovate scale up to 0.2 mm long; upper glume shorter to as long as spikelet, 3-nerved, pubescent; internode absent; lower lemma as long as spikelet, 7-nerved, nerves smooth, hairy; upper lemma light to dark brown, tinged purple; anthers 1.2–1.4 mm long.

*Flowering*: December to May. *Ecology*: Open disturbed areas. *Frequency in southern Africa*: Locally dominant. *Distribution*: Northwards to Egypt. N, B, S, LIM, NW, G, M, KZN, EC. *Economics*: Weed in cultivated lands; palatable.

Illustrations: Chippindall: 401, fig. 336 (1955); Goetghebeur & Van der Veken: 139, tab. 41, 49 (1989).
Anatomy vouchers: *Smook 5085, Ellis 192 & 4720*.
Voucher: *Smook 2655*.

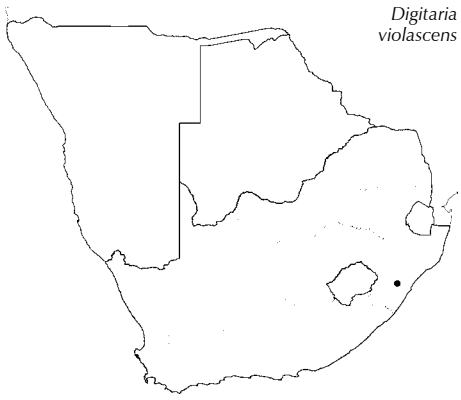
***Digitaria violascens** Link., in *Hortus regius botanicus berolinensis* 1: 229 (1827). Type: cultivated at Berlin, seed from Brazil.

Tufted annual to 900 mm high; culms erect or decumbent, rooting from lower nodes. Leaf blade 40–220 × 2–7 mm. Inflorescence digitate to subdigitate, of (2)3–9 racemes 30–140 mm long; rachis ribbon-like, broadly winged; spikelets in clusters of 3. Spikelet 1.2–2.1 mm, hairy; lower glume a membranous obscure cuff or absent; upper glume equalling to as long as spikelet, 3-nerved, hairy between nerves; internode absent; lower lemma as long as spikelet, 5-nerved, glabrous or with minute hairs, green veins very distinctive; upper lemma dark brown to almost black; nearly completely concealed; anthers 0.3–0.6 mm long.

[Similar to *D. longiflora*, which has upper lemma pale yellow to green.]

*Flowering*: March. *Ecology*: Disturbed areas and woodland margins. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised. Tanzania and tropical Asia and America. KZN. *Economics*: Weed.

Illustration: Wipff: 373 (2003).
Anatomy voucher: *Ellis 4416*.
Voucher: *Ellis 4416*.




## **Diheteropogon** (Hack.) Stapf

Stapf: t. 3093 (1922); Chippindall: t. 922 (1944); Chippindall: 518 (1955); Anderson: 7 (1966) under *Andropogon* L.; Clayton: 73 (1966a); Clayton & Renvoize: 783 (1982); Clayton & Renvoize: 353 (1986); Gibbs Russell et al.: 114 (1990); Watson & Dallwitz: 330 (1994); Sales: 91 (2002).

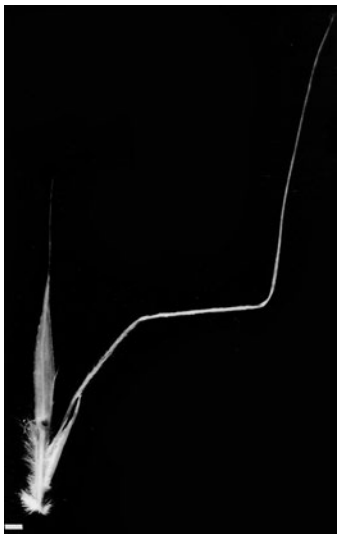


Figure 172.—*Diheteropogon amplectens* spikelet pair (7–9 mm). Photographer: M. Koekemoer.

Tufted perennial, rhizomatous. **Leaf blade** linear or tapering, base amplexicaul or not; *ligule* an unfringed membrane. **Inflorescence** of paired, spike-like racemes, shortly peduncled, terminal or in a spatheate false panicle, racemes not deflexed, bases subterete, with 1–many homogamous spikelets in lower part, remaining spikelets heterogamous; internodes and pedicels linear; *spikelets* paired, in long–short combinations: one sessile, one pedicellate. **Sessile spikelet** dorsiventrally compressed, falling with glumes; *glumes* ± equal, subcoriaceous, awnless, dissimilar, 2–7-nerved; lower glume usually with a deep groove on the back, 2-keeled, keels dorsal and ± rounded; upper glume not 2-keeled. **Florets** 2; *lower floret* sterile, reduced to a lemma, hyaline, hairy, 2-nerved; *upper floret* bisexual (except at base of raceme), glabrous; *lemma* less firm than glumes, hyaline, 2-lobed, awned from sinus; *awn* stout, geniculate, column hairy; *callus* long, densely tomentose, acute to pungent, deeply inserted into hollow top of internode; *palea* short, narrow, hyaline, 2-nerved. **Lodicules** 2, cuneate.




Figure 173.—*Diheteropogon amplectens* spikelet pair. Artist: S.B. Chiliza.




Figure 174.—*Diheteropogon amplectens*. A, plant; B, ligule. Artist: C. Smith.

**Stamens** 3. **Ovary** glabrous; styles terminal, plumose. **Caryopsis** lanceolate to oblanceolate. **Pedicelled spikelet** larger than sessile spikelet, male, awned or awnless. **Photosynthetic pathway**: $C_4$; XyMS-. PCR sheath extensions absent. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 10$ (polyploidy).

**Species** 5, tropical Africa; 2 in southern Africa, Namibia (rarely), Botswana, Lesotho, Swaziland, North West, Limpopo, Gauteng, Mpumalanga, KwaZulu-Natal, Eastern Cape and Northern Cape.

Species treatment by L. Fish.

**Quick guide to easily confused genera/taxa:**

**A**

1. Callus oblique on apex of internode, not inserted . . . **Elymandra**
   Callus inserted into apex of internode . . . . . 2
2. Both spikelets of the spikelet pair have upper lemmas long awned . . . . . 3
   Only sessile spikelet with upper lemma long awned . . . . . 4
3. Sessile or subsessile spikelet lower palea well developed. . . . . **Ischaemum**
   Sessile spikelet lower palea absent or reduced . . . . . **Eulalia**

4(2). Callus pungent; pedicelled spikelet lower glume usually awned, awn 0.5–12.0 mm long . . . . . **Diheteropogon**
Callus obtuse; pedicelled spikelet lower glume awnless or awn not longer than 0.5 mm . . . . . **Andropogon schirensis**

**B**

Lowermost internode of raceme pair fused and swollen; fresh plant aromatic . . . . . **Cymbopogon caesius**
Lowermost internode of raceme pair not fused; fresh plant not aromatic . . . . . **Diheteropogon amplectens**

**Key to species:**

Callus hairy only near the point; leaves expanded, usually wider than 3 mm, base, at least of upper leaves, rounded or cordate . . . . . **D. amplectens**
Callus hairy along entire callus; leaves usually filiform, up to 4 mm (unrolled), base straight . . . . . **D. filifolius**.

**Diheteropogon amplectens** (Nees) Clayton, in *Kew Bulletin* 20: 75 (1966). Type: South Africa, Eastern Cape, Umtata to Umgazana, *Drège*.

*Andropogon amplectens* Nees, in *Florae Africanae australioris* III: 104 (1841). Type as above.

Broad-leaved blue stem, breëblaar andropogon

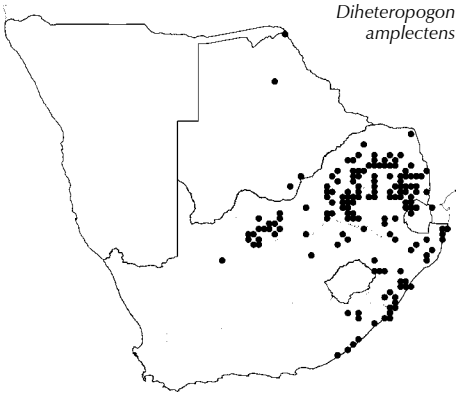
Perennial 300–2 000 mm high, usually glaucous; rhizomatous; basal sheath glabrous, inner often shiny. Leaf blade 150–300 × to 20 mm, expanded, usually more than 3 mm wide, rarely densely hairy; bases, at least of upper leaves, narrowly to broadly rounded or cordate, clasping stem; young growth waxy. Inflorescence of 2 racemes, racemes 50–100 mm long; internodes and pedicels hairy; internode hollow at apex. Sessile spikelet 7–9 mm long; lower glume rounded on either side of deep central groove, apex lobed; upper glume acute, mucronate; lemma awn 20–70 mm long, hairy; callus 1–5 mm long, hairy only towards the point; anthers 4–6 mm long. Pedicellate spikelet 9–13 mm; lower glume with or without awn

up to 11.5 mm long (variable on same inflorescence), keeled, keels rounded, not winged; upper glume acuminate, awnless.

[*D. amplectens* is a very variable species and two varieties have been recognised: var. *amplectens* with leaf base 2.5–5.5 mm wide and leaf gradually tapering to apex; var. *catangensis* with leaf base 5.5–26.0 mm wide and leaf apex abruptly tapering. As the specimens at PRE show no clear cut boundary between the two varieties, these have not been recognised until further studies have been done for this region.]

*Flowering*: November to April. *Ecology*: Shallow soils; on stony slopes and in woodland. *Frequency in southern Africa*: Common. *Distribution*: Northwards to East Africa, DRC and Senegal. B, S, LIM, NW, G, M, FS, KZN, NC, EC. *Economics*: High to average grazing value but low in leaf production.

Illustration: Chippindall: pl. 21 (1955); Sales: 94, tab. 30 (2002).
Anatomy vouchers: *Ellis 127, 481, 1227, 1777, 4435* & *5256*.
Voucher: *Moll 617*.


*Diheteropogon amplectens*

**Diheteropogon filifolius** (Nees) Clayton, in *Kew Bulletin* 20: 75 (1966). Type: South Africa, Eastern Cape, Uitenhage, Zuurebergen, northern slopes, *Drège s.n.* (S, lecto.).

*Andropogon filifolius* (Nees) Steud., in *Synopsis plantarum glumacearum* 1: 374 (1855). Type as above.

*Heteropogon filifolius* Nees, in *Florae Africanae australioris*: 102 (1841).

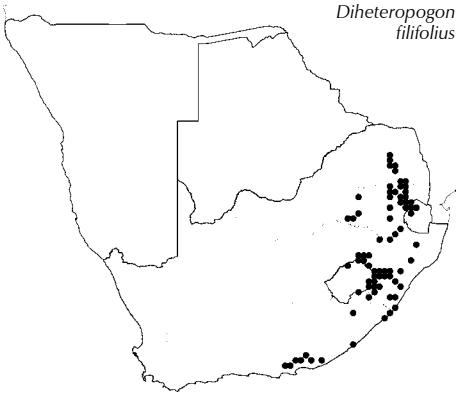
THREAD-LEAVED ANDROPOGON, DRAADBLOUSTAM

Tufted perennial 150–600 mm high; basal sheaths often breaking up into fibres, glabrous; prophylls hairy; basal parts often showing where burnt; leaves mostly basal. Leaf blade 100–500 × to 4 mm, usually filiform, thread-like; apex acute. Inflorescence of paired racemes 75–90 mm long; internode and pedicel margins hairy, sometimes only basally, internode apex lobed, long hairs of callus exserted from apex. Sessile spikelet 6–8 mm long; lower glume acutely folded on either side of deep central longitudinal groove, apex obtuse; upper glume boat-shaped, apex acute, awned, awn 1.3–1.5 mm long; lemma awn 20–110 mm long; callus 1–5 mm long, ± linear, subacute or pungent, deeply inserted in internode apex, hairy along entire length; anthers 4–7 mm long. Pedicellate spikelet 9–20 mm long, longer and wider than sessile spikelet; male; lower glume flat or rounded on back, acuminate, keels winged, awn (0.5)1.0–2.5 mm long, ribbed due to many equidistant nerves; upper glume apex finely acuminate, awn 0.5–14.0 mm long; anthers 5–7 mm long.

[*Andropogon schirensis* is very similar, but has expanded leaf blades and a shorter obtuse callus up to 2 mm long.]

*Flowering*: October to April. *Ecology*: Sour open grassveld; often on rocky hillsides and disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Zimbabwe, Zambia, Malawi and Angola; and Tanzania, DRC and Nigeria. L, S, LIM, G, M, FS, KZN, EC. *Economics*: Leaves hard and not palatable therefore of low grazing value.

Illustration: Chippindall: 498, fig. 401 (1955).
Anatomy vouchers: *Ellis 2814, 3176, 3310, 3344, 3537, 4471, 4472, 6014* & *6166*.
Voucher: *Pole Evans 1009*.


*Diheteropogon filifolius*

## **Dinebra** Jacq.

Jacquin: 77 (1809); Stent: 291 (1924); Chippindall: 185 (1955); Phillips: 411 (1973); Phillips: 272 (1974); Clayton & Renvoize: 214 (1986); Gibbs Russell et al.: 116 (1990); Watson & Dallwitz: 336 (1994); Cope: 45 (1999); Snow & Pieterson (2012).



Figure 176.—*Dinebra retroflexa*. Several spikelets (5.7–9.0 mm). Photographer: M. Koekemoer.

Annual, tufted to decumbent. **Leaf blade** expanded, linear, glabrous; *ligule* a narrow fringed membrane. **Inflorescence** narrow with few to many dense, short, very compact secund racemes on a central axis, these becoming deflexed at maturity or persistent but with deciduous branchlets; *spikelets* solitary, closely overlapping, subsessile, biseriate. **Spikelet** laterally compressed, disarticulating above glumes and between florets, wedge-shaped; *glumes* ± equal, as long as to longer than spikelet, lanceolate, glabrous, long-acuminate, tapering into a short, straight awn, 1-nerved, keeled, scabrid on keels. **Florets** 1–3, bisexual; *uppermost floret* reduced; *lemma* less firm to similar in texture to glumes, membranous, lanceolate, acute, 3-nerved, keeled, glabrous or pilose around lower half of back and along lateral nerves, usually minutely 2-lobed and mucronate at apex; *palea* as long as lemma, bidentate, 2-keeled, membranous, pilose on flaps alongside keels. **Lodicules** 2. **Stamens** 3. **Ovary** glabrous; styles distinct, short, plumose. **Caryopsis** ellipsoid-oblong; hilum short; pericarp fused; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines uneven. PCR sheath extensions absent. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 10$.

**Species** 3, Africa to India and Madagascar; 1 in southern Africa: *Dinebra retroflexa* (Vahl) Panz. var. *condensata* S.M.Phillips, Namibia, Botswana, Swaziland, North West, Limpopo, Mpumalanga, Gauteng, Free State, KwaZulu-Natal.

Species treatment by M.T. Nembudani.



Figure 175.—*Dinebra retroflexa* var. *condensata*. Artist: H.W. du Toit.



Figure 177.—*Dinebra retroflexa* var. *condensata* spikelets, variable. Artist: W. Roux.

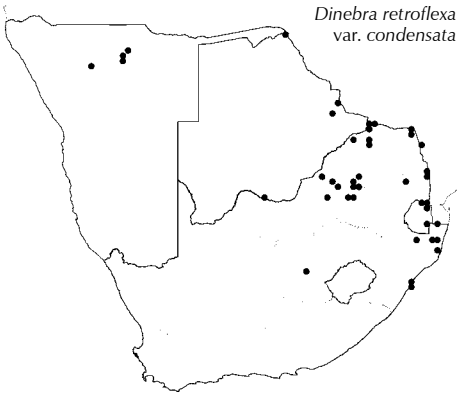
**Dinebra retroflexa** (Vahl) Panz. var. **condensata** S.M.Phillips, in *Kew Bulletin* 28: 412 (1973). Type: Tanzania, 100 km on Handeni–Kibaya road, *Procter 3209* (K, holo.).

CAT'S-TAIL VLEI GRASS, KATTESTERTGRAS

Loosely tufted annual, 130–820 mm high, straggling, base usually procumbent; culm much branched, usually rooting from nodes. Leaf blade 45–280 × 4–8 mm. Inflorescence up to 240 mm long; racemes up to 50 mm long, oblong to cuneate, rachis narrowly winged. Spikelet 5.7–9.0 mm long; glumes 6.0–8.2 mm long, spreading, acuminate with aristate apices, awn scabrid, keels glandular; lemma narrowly ovate, hairy on lateral nerves and towards base on back, sometimes glabrous; anther 0.4–0.5 mm long, light brown.

*Flowering*: December to May. *Ecology*: Usually on disturbed clay soil and on black turf or waterlogged soils; in moist weedy places, often in shade. *Frequency in southern Africa*: Common. *Distribution*: Northwards to East Africa while var. *retroflexa* occurs in West Africa east to Sudan, Ethiopia to Egypt and Iraq to India. N, B, S, LIM, NW, G, M, FS, KZN. *Economics*: Weed, often in cultivated fields such as rice.

Illustration: Chippindall: fig. 160 (1955); Clayton et al.: fig. 75 (1974); Cope: tab. 21 (1999).
Anatomy vouchers: *Ellis 566, 3429, 3744, 3864, 3903 & 4532*.
Voucher: *Acocks 16804*.




## **Dregeochloa** Conert

Stapf: 530 (1899) under *Danthonia* Stapf; Chippindall: 245 (1955) under *Danthonia* Stapf; Conert: 335 (1966); Launert: 68 (1970a); Ellis: 209 (1977); Clayton & Renvoize: 177 (1986); Gibbs Russell et al.: 118 (1990); Watson & Dallwitz: 345 (1994).

*Danthonia* Stapf: 516 (1899) in part.



Figure 178.—*Dregeochloa pumila* spikelet (9–13 mm). Photographer: M. Koekemoer.

Perennial, tufted, with short branched rhizomes, often forming low cushions. **Leaf blade** linear or ovate-lanceolate to ovate, usually folded, sometimes rigid or succulent; *ligule* a minute fringe of hairs. **Inflorescence** usually a single raceme, rarely a dense, contracted panicle; *spikelets* solitary, on hairy pedicels. **Spikelet** 10–15 mm long, ± laterally compressed, lanceolate, disarticulating above glumes; *glumes* ± equal, as long as to longer than spikelet, similar, lanceolate to broadly lanceolate, membranous, rounded, flat or with more than one keel, 5–7-nerved, minutely hairy, acute, awnless. **Florets** 3–9; bisexual; *uppermost floret* reduced and sterile; *lemma* similar in texture to glumes, membranous, 7–9-nerved, hairy, hairs mixed, in tufts or not tufted, tufts usually in a transverse row at base of lobes with 1 or 2 larger marginal tufts below these on the margins, 2-lobed, lobes triangular, acute or nerve excurrent into an awn or bristle; central *awn* geniculate, loosely twisted in lower third, ± as long as body of lemma; *callus* long, narrowly obtuse, hairy; *palea* hyaline (thinner than lemma), narrow-elliptic, rounded to emargin-



Figure 179.—*Dregeochloa pumila*. Artist: G. Condy.




Figure 180—*Dregeochloa* spp. A, *D. pumila* spikelet; B, C, lemmas; B, *D. calviniensis*; C, *D. pumila*. Artist: S.B. Chiliza.

ate, 2-keeled, 2-nerved, nerves prominent, hairy in upper half. **Lodicules** 2, glabrous. **Stamens** 3. **Ovary** glabrous; styles short, shortly plumose. **Fruit** an achene with free pericarp. **Photosynthetic pathway**: $C_3$, but *D. calviniensis* appears intermediate as anatomy shows that most cells, except those at the tops of adaxial ribs, are not more than one cell apart; XyMS+. **Cytology**: $x = 7$.

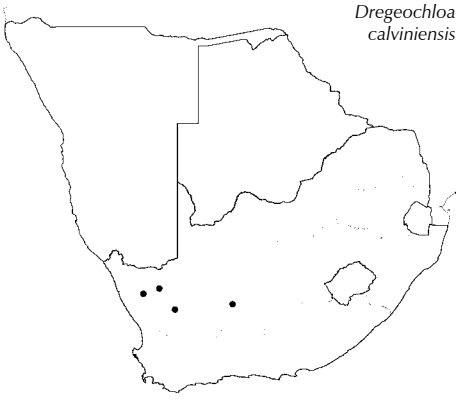
**Species** 2, southern Africa: southern Namibia to Northern Cape.

Species treatment by L. Fish.

### Key to species

Lemma back densely hairy beneath the transverse tufts of hairs below the lobes; leaf blade apices rounded with a minute spine . . . . . **D. pumila**

Lemma glabrous except for tufts of hairs below lobes; leaf blade apices acute to acuminate ending with a sharp, long pungent point . . . . . **D. calviniensis**



*Dregeochloa calviniensis*

**Dregeochloa calviniensis** Conert, in *Senckenbergiana Biologica* 47: 340–342 (1966). Type: South Africa: Calvinia dist., Handelskraal, ENE of Loeriesfontein, *Dekkers s.n.* (M, holo.; PRE, iso.).

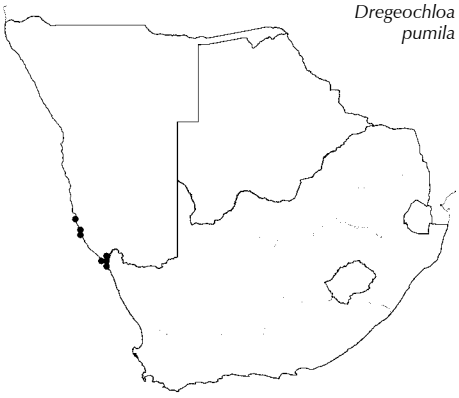
Perennial 150–250 mm tall; shortly rhizomatous; plant base somewhat swollen, covered by old leaf sheaths. Leaf blades 10–120 × 1.6–2.3 mm, glabrous or inconspicuously hairy, pungent; sheath mouth with short, inconspicuous hairs. Inflorescence a contracted panicle, 30–50 mm long. Spikelet 12–15 mm long; glumes 3–5-nerved; 4–5-flowered, uppermost floret reduced; lemma 4.5–6.0 mm long, including lobes, glabrous except for transverse row of tufts of long white hairs below lobes and short hairs between tufts under point of insertion of central awn; lobes acuminate, apically awned; central awn 8–10 mm long, geniculate.

*Flowering*: October. *Ecology*: Limestone outcrops. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic (a relatively unknown species from a poorly collected area). NC.

Illustration: Conert: 339, Abb. 7–12 (1966).
Anatomy voucher: *Erasmus PRE 22708*.
Voucher: *Acocks 19040*.

**Dregeochloa pumila** (Nees) Conert, in *Senckenbergiana Biologica* 47: 340–342 (1966). Type: Klein Namaqualand, am Garieps-mond, *Drège 2562* (B, holo.; PRE, fg.).

*Danthonia pumila* Nees, in *Florae Africanae australioris*: 323 (1841). Type: as above.


*Dregeochloa pumila*

Perennial, 40–70 mm tall. shortly rhizomatous; plant base covered in broad scales. Leaf blades 10–25 × 1.6–3.5 mm, succulent in appearance, minutely but densely pubescent, apex rounded, spiny apiculate; sheath mouth pubescent. Inflorescence a raceme (occasionally a panicle). Spikelets 9–13 mm long; glumes 5(–7)-nerved; 6–10-flowered; lemma 3.0–3.5 mm long, including lobes, hairy all over below transverse row of small tufts of hairs under each lobe, with 1 to 2 larger tufts long hairs on margins; lobes small, truncate; central awn 4–7 mm long.

*Flowering*: August to January (but also later). *Ecology*: Rocky areas; in crevices or loose sand; in areas subject to sea mists. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic, restricted to coastal belt. N, NC.

Illustration: Chippindall: 246, fig. 217 (1955); Conert: 339, Abb. 1–6 (1966).
Anatomy vouchers: *Giess & Van Vuuren 653*; *Ellis 1813, 5071a, 5076* & *Dinter 4018*.
Voucher: *Ellis 5076*.

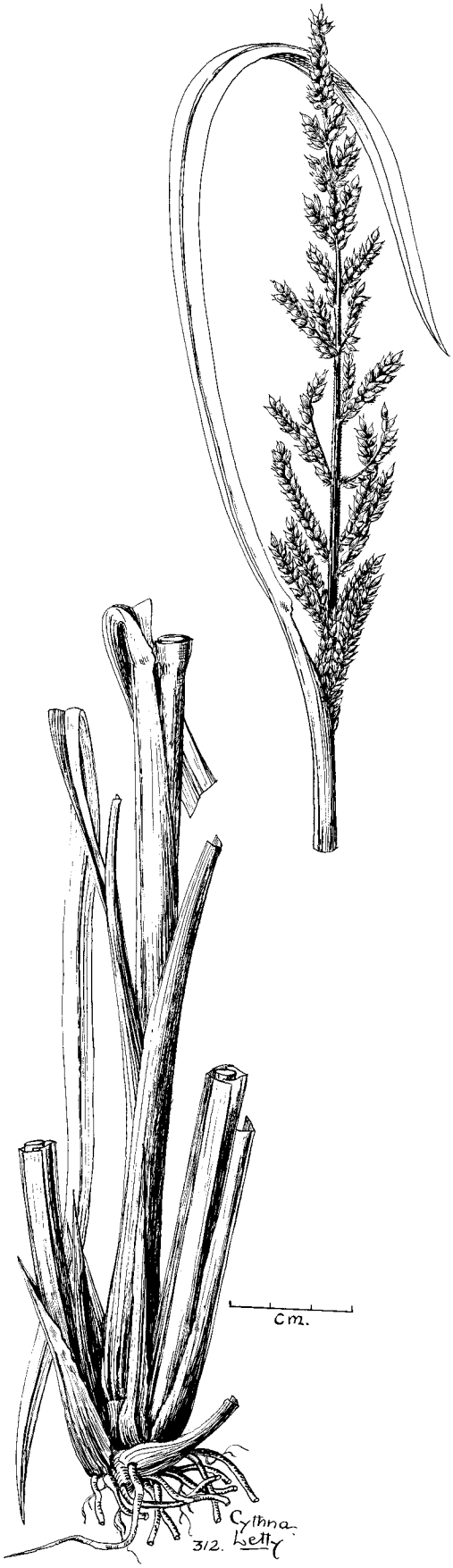



Figure 181.—*Echinochloa crus-galli*. Artist: C. Letty.

## **Echinochloa** P.Beauv.

Palisot de Beauvois: 53 (1812); Stapf: 384 (1898); Stent: 263 (1924); Chippindall: 358 (1955); Launert: 69 (1970a); Chippindall & Crook: 132 (1976); Haefliger & Scholz: 56 (1980); Clayton & Renvoize: 554 (1982); Clayton & Renvoize: 280 (1986); Clayton: 50 (1989); Gibbs Russell et al.: 119 (1990); Watson & Dallwitz: 354 (1994); Michael: 390 (2003); Ward: 2171 (2005); Michael: 1366 (2009).



Figure 182.—*Echinochloa crus-galli* spikelet (3–7 mm). Photographer: M. Koekemoer.

Annual or perennial; tufted to decumbent or floating; sometimes rhizomatous. **Leaf blade** usually expanded; *ligule* a fringe of hairs (sometimes present on lower leaves only) or absent. **Inflorescence** of few to many spike-like racemes crowded or scattered on a central axis, sometimes spike-like; racemes usually 1-sided and dense, rachis triquetrous; *spikelets* paired or clustered on short branchlets forming (2)4 or more rows, subsessile or shortly pedicelled, adaxial. **Spikelet** dorsiventrally compressed, gibbous on one side and flat on other (plano-convex), ± hispidulous or hispid, rarely minutely softly hairy, cuspidate to awned, falling with glumes; *glumes* unequal, membranous; lower glume usually much smaller than upper, ovate, with a clasping base, usually distinctly 0–3-nerved, acute to acuminate, often mucronate; upper glume as long as spikelet, ovate, 5–7-nerved, nerves usually hispid, mucronate (cuspidate) or shortly awned. **Florets** 2; *lower floret* male or sterile; lemma similar to upper glume, 5-nerved, awnless or awned; *awn* as long as or up to 3× as long as lemma, palea hyaline or 0; *upper floret* bisexual; *lemma* firmer than glumes, coriaceous, smooth and shiny, glabrous, convex, entire, margins inrolled and clasping only edges of palea (paspalum-type), awnless; *palea* similar to lemma, indurated with infolded margins, acute apex briefly reflexed and ± protuberant between lemma margins. **Lodicules** 2, cuneate, fleshy. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose above. **Caryopsis** broadly ellipsoid, dorsally flattened; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; NADP-ME (3 species); XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 9$ (high polyploidy).

**Species** 30–40, tropical and warm temperate regions of the world; 9 in southern Africa, widespread.

[*Echinochloa* is in need of a revision. It is a taxonomically difficult genus that rarely has clear-cut boundaries between species. The species themselves are variable as they react to differences in the environment.]

Species treatment by A.C. Mashau.

**Key to species:**

1. Ligule absent in all leaves . . . . . 2
   Ligule a fringe of hairs, present, at least in lower leaves . . . . . 5

2. Racemes distinctly compound with short secondary branchlets, inflorescence untidily ovate; spikelet often with a short curved awn . . . . . **E. crus-pavonis**
Racemes not or inconspicuously compound; spikelet awnless, or sometimes with a short curved awn . . . . . 3
3. Plant perennial, rhizomatous . . . . . **E. haploclada**
Plant annual, not rhizomatous . . . . . 4
4. Raceme untidily 2 to several rowed, 20–100 mm long, base usually with secondary branchlets; spikelet 3–4(–7) mm long; lower lemma awnless or sometimes with an awn 5–35 mm long . . . . . *__E. crus-galli__
Raceme neatly 4-rowed, usually 10–25 mm long, base with no secondary branchlets; spikelet 1.5–3.0 mm long; lower lemma awnless (acuminate apex may be up to 1 mm long) . . . **E. colona**
5(1). Raceme neatly 4-rowed; lower floret sterile . . . . . **E. ugandensis**
Raceme not neatly 4-rowed; lower floret male or sterile . . . . . 6
6. Spikelet rarely over 2.5 mm long, subglobose to elliptic . . . . . **E. haploclada**
Spikelet rarely under 3 mm long, elongated, ovate to narrowly ovate, elliptic, narrowly or broadly elliptic . . . . . 7
7. Lower lemma awnless (rarely with a subulate awn up to 3 mm long) . . . . . 8
Lower lemma awn usually longer than 5 mm . . . . . 9
8. Plant not reed-like; culm 500–900 mm high, erect or geniculate; rhizome slender; leaf 180–220 mm long; spikelet elliptic to elongated, pubescent . . . . . **E. holubii**
Plant reed-like; culm 1 000–4 000 mm high; rhizome robust; leaf 200–600 mm long; spikelet narrowly ovate to broadly elliptic, glabrous to hispid . . . . . **E. pyramidalis**
9(7). Inflorescence open; spikelet 4–6 mm long (excluding awn), narrowly ovate . . . . . **E. stagnina**
Inflorescence dense; spikelet 3.0–3.5(–4.0) mm long (excluding awn), narrowly elliptic . . . . . **E. jubata**

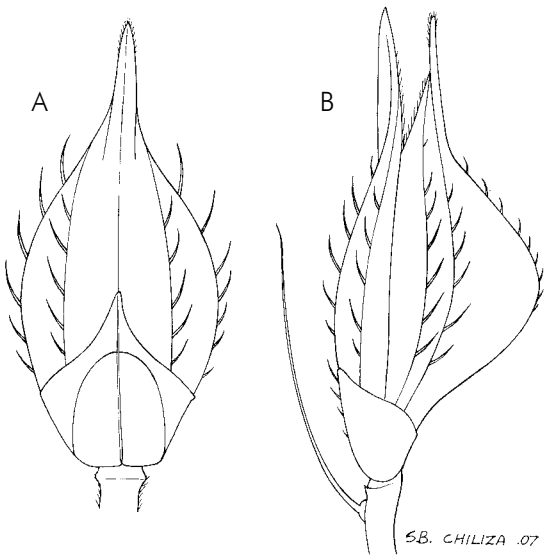


Figure 183.—*Echinochloa crus-galli* spikelet. A, dorsal view; B, lateral view. Artist: S.B. Chiliza.

**Echinochloa colona** (L.) Link, in *Hortus regius botanicus berolinensis, descriptus* 2: 209 (1833). Type: Jamaica.

[Note: Whether '*colona*' or '*colonum*'; see Ward (2005) & Michael (2009).]

*E. subverticillata* Pilg., in *Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem* 15: 451 (1941). Type: Namibia, Tsumeb, *Dinter 2490* (B, holo.).

JUNGLE RICE

Tufted annual 100–1 000 mm high; hygrophyte; stoloniferous. Leaf blade 50–300 × 2–8 mm; ligule absent. Inflorescence 10–150 mm long, elongated; racemes 10–25 mm long, neatly 4-rowed, without secondary branchlets at base, not or inconspicuously compound. Spikelet 1.5–3.0 × 1.0–1.5 mm, subglobose to ovate-elliptic, pubescent; glumes and lower lemma minutely hairy on surface, nerves with or without long, rigid hairs; lower floret male or sterile; lower lemma awnless; upper lemma 2 to 3 mm long; anther 0.6–1.4 mm long.

[This species hybridises with *E. crus-galli* and *E. haploclada*.]

*Flowering*: January to April. *Ecology*: Muddy or swampy places. *Frequency in southern Africa*: Common. *Distribution*: Northwards. Worldwide in tropics and subtropics. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: A palatable grass giving good leaf production if sufficient moisture is available, sometimes used for making hay and silage; seed used as a cereal, especially in times of famine; a weed.

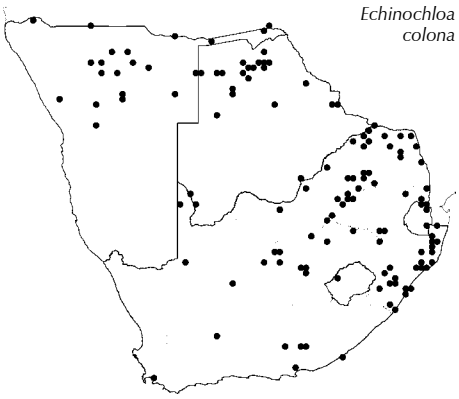
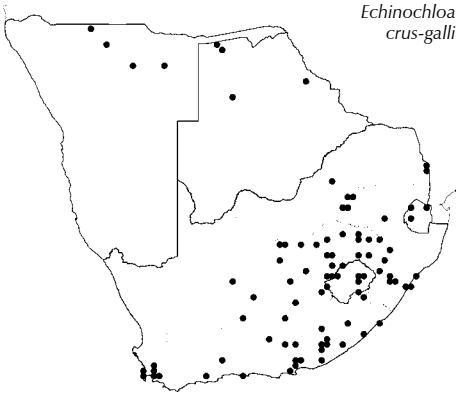



Illustration: Clayton et al.: 558, fig. 134 (1982).
Anatomy vouchers: *Botha & Panagos 1*; *Ellis 1615, 2908, 3848* & *3892*.
Voucher: *Smook 4398*.


*Echinochloa crus-galli*

***Echinochloa crus-galli** (L.) P.Beauv., in *Essai d'une nouvelle agrostographie*: 53, 161 (1812). Type: Europe (typification undecided).

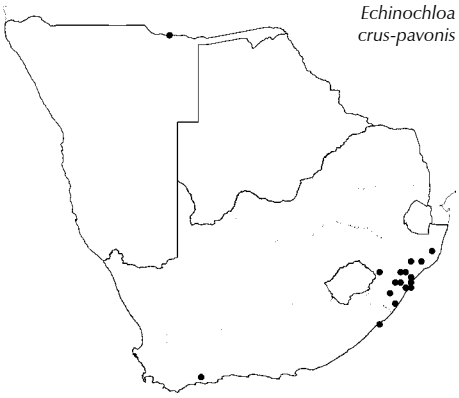
Barnyard millet

Tufted annual 250–1 000 mm high; hygrophyte; stoloniferous. Leaf blade 70–350 × 4–20 mm, ligule absent. Inflorescence 60–220 mm long, elongated; raceme 20–100 mm long, untidily 2 to several-rowed, usually with short secondary branchlets at the base, not or inconspicuously compound. Spikelet 3–4(–7) × 1 to 2 mm, ovate-elliptic; glumes and lower lemma minutely hairy, nerves with long, rigid hairs; lower floret sterile; lower lemma usually awnless, sometimes with a awn 5–35 mm long; upper lemma 2 to 3 mm long (including short herbaceous apex); anther 0.7–1.1 mm long.

[A very variable and polymorphic species; may be confused with *E. colona*, which has neat 4-rowed racemes and *E. crus-pavonis*, which has a larger inflorescence and racemes with many short secondary branchlets.]

*Flowering*: January to April. *Ecology*: Swampy areas, wet places of cultivation. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from temperate Eurasia. Worldwide, in temperate and subtropical regions. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Food as a cereal or drink; weed, especially in rice fields.

Anatomy vouchers: *Ellis 1485, Smook 4686 & 4688*.
Voucher: *Smook 5871*.


*Echinochloa crus-pavonis*

**Echinochloa crus-pavonis** (Kunth) Schult., in *Mantissa in Volumen primum Systematis Vegetabilium* 2: 269 (1824). Type: Venezuela (whereabouts uncertain).

Gulf barnyard grass

Tufted annual, rarely perennial 500–2 000 mm high; hygrophyte; stoloniferous. Leaf blade 150–600 × 5–25 mm; ligule absent. Inflorescence 100–300 mm long, untidily ovate; raceme 30–150 mm long, distinctly compound with many short secondary branchlets; spikelets in dense clusters. Spikelet 2.0–3.5 × 1.0–1.5 mm, elliptic; glumes and lower lemma minutely hairy, nerves with long, rigid hairs; lower floret male or sterile; lower lemma acute or with a short curved awn 1–3(–7) mm long; upper lemma 2.0–2.5(3.0) mm long; anther 0.5–1.3 mm long.

*Flowering*: February to March. *Ecology*: Along stream banks and swamps. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical Africa; also tropical America. N, KZN, ?WC (cultivated?), EC.

Illustration: Haefliger & Scholz: 56 (1980).
Voucher: *Pole-Evans PRE 34612*.

**Echinochloa haploclada** (Stapf) Stapf, in *Flora of tropical Africa* 9: 613 (1920). Type: Kenya, Mombasa, *Hildebrandt 2022*; Tanzania, Singida/Dodoma Districts, Turu, *Grant* (many syntypes).

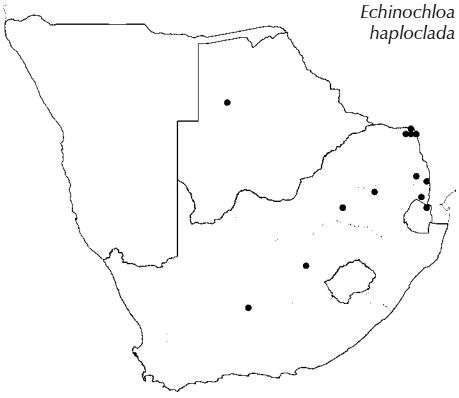
Tufted perennial 300–3 000 mm high; hygrophyte; rhizomatous. Leaf blade 50–100 × 3–10(–20) mm; ligule absent or a fringe of hairs in at least the lower leaves. Inflorescence 70–250 mm long, lanceolate, occasionally linear; raceme 10–50 mm long, not or incon-

spicuously compound, densely crowded with adpressed spikelets. Spikelet 1.5–2.5(–3.0) × 1.0–1.5 mm, subglobose to elliptic; glumes and lower lemma minutely hairy, nerves with long, rigid hairs; lower floret male; lower lemma acute or with awn 5(–15) mm long; upper lemma 1.5–2.3 mm long; anther 0.5–1.1 mm long.

[This species is said to hybridise with *E. colona*.]

*Flowering*: March to April. *Ecology*: Stream banks, dry river beds. *Distribution*: Northwards to Sudan and Ethiopia. B, S, LIM, G, M, FS, NC.

Anatomy vouchers: *Ellis 557, 1892 & 3854*.
Voucher: *Davidse & Ellis 5869*.


*Echinochloa haploclada*

**Echinochloa holubii** (Stapf) Stapf, in *Flora tropical Africa* 9: 606 (1920). Type: North West, Kuruman, *Burchell 2128/7*; Limpopo, Bosh Veld [bushveld/savanna] at Klippan, *Rehmann 5369*; and without precise locality, *Holub*; also on the upper Zambesi, *Holub* (syntypes).

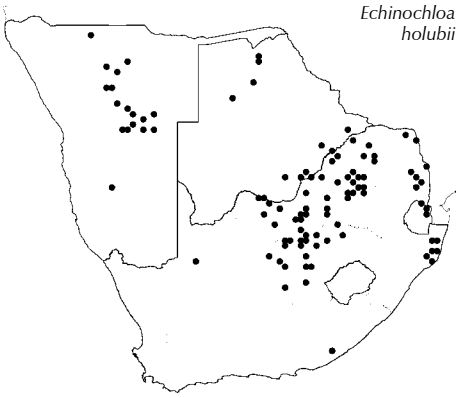
KALAHARI WATER GRASS

Tufted perennial 500–900 mm high; plant not reed-like; hygrophyte; rhizome slender; culm erect or geniculate. Leaf blade 180–220 × (2–)4(–8) mm; ligule a fringe of hairs, may be absent in upper leaves. Inflorescence (80–)120(–180) mm long, raceme 15–40 mm long, not neatly 4-rowed, distant, often reduced to small clusters of spikelets towards apex of the central axis. Spikelet 2.5–3.5 × 1.0–1.5 mm, elliptic to elongated; glumes and lower lemma shortly hairy sometimes mixed with a few longer rigid hairs, nerves with rigid hairs; lower floret male or sterile; lower lemma awnless, apex 3 mm long, acute to acuminate; upper lemma 2.4–3.5 mm long; anther 0.8–2.0 mm long.

[Clayton & Renvoize (1982) regards this species as a synonym of *E. pyramidalis*. This has not been adopted for the FSA region where the two species are distinguishable, as *E. pyramidalis* has a robust stout erect culm, firm leaf and plump, awnless spikelets.]

*Flowering*: December to April. *Ecology*: Swampy areas, pans and vleis. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe. N, B, S, LIM, NW, G, M, FS, KZN, NC, EC.

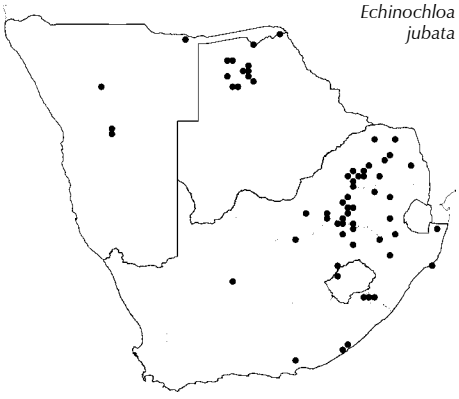
Illustration: Chippindall: 359, fig. 309 (1955).
Anatomy vouchers: *Ellis 2015, 3587, 3923, 5229 & Botha & Panagos 28*.
Voucher: *Smook 4415*.


*Echinochloa holubii*

**Echinochloa jubata** Stapf, in *Flora tropical Africa* 9: 619 (1920). Type: Malawi, Mwaremba, *McClounie 20* (K, holo.).

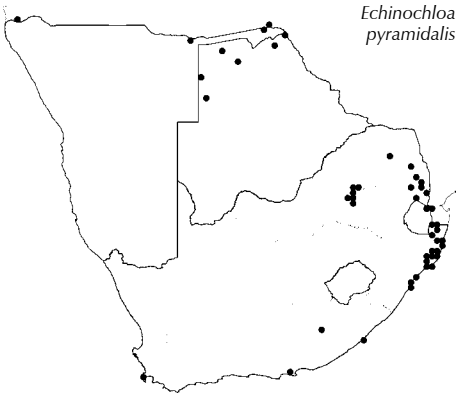
Perennial or rarely annual 500–2 000 mm high; hydrophyte; rhizomatous and stoloniferous. Leaf blade 100–250 × 3–15 mm; ligule a fringe of hairs, may be absent from upper leaves. Inflorescence dense, 80–200 mm long, linear to lanceolate; raceme 20–40 mm long, not neatly 4-rowed, simple, not clearly secund; spikelets closely packed. Spikelet 3.0–3.5(–4.0) × 1 mm, narrowly elliptic; lower floret male or sterile; glumes and lower lemma minutely hairy, nerves with long, rigid hairs; lower lemma with awn 3–25 mm long; upper lemma 2.5–3.0 mm long; anther 0.8–1.1 mm long.

[*E. jubata* is possibly a southern variant of *E. stagnina*.]


*Echinochloa jubata*

*Flowering*: November to May. *Ecology*: Growing in water and stream sides, often floating in water. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to DRC. N, B, L, LIM, NW, G, M, FS, KZN, NC, EC.

Anatomy vouchers: *Ellis 252, 4713, 4716 & Smook 4735*.
Voucher: *Zambatis 1376*.


*Echinochloa pyramidalis*

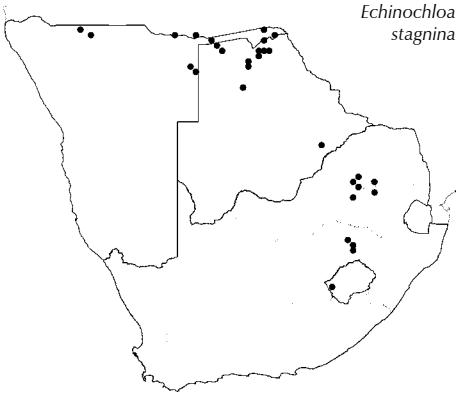
**Echinochloa pyramidalis** (Lam.) Hitchc. & Chase, in *Contributions from the United States National Herbarium*. Smithsonian Institution 18: 345 (1917). Type: Senegal, *Roussillon* (P, holo.).

LIMPOPO GRASS, ANTELOPE GRASS, OLIFANTSGRAS

Reed-like, tufted perennial 1 000–4 000 mm high; hydrophyte; rhizomatous and stoloniferous; culm robust. Leaf blade 80–600 × 5–20 mm; ligule a fringe of hairs, may be absent in upper leaves. Inflorescence (150–)200(–400) mm long, ovate to narrowly lanceolate; racemes 25–35 mm long, not neatly 4-rowed, simple or compound. Spikelet 2.5–4.0 × 1.0–1.8 mm, narrowly ovate to broadly elliptic, glabrous to hispid; glumes and lower lemma minutely hispid at least near margins, nerves usually with long, rigid hispid hairs; lower floret male; lower lemma awnless, apex 3 mm long, acute to acuminate; upper lemma 2 to 3 mm long; anther 0.6–2.1 mm long.

*Flowering*: December to May. *Ecology*: Swamps and riversides, usually standing in water and may be floating. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical Africa and Madagascar. N, B, S, LIM, G, M, KZN, WC, EC. *Economics*: Used as a cereal and as natural or cultivated pastures.

Illustration: Chippindall: 360, fig. 310 (1955).
Anatomy vouchers: *Ellis 3680, 3739, 3897 & 4507*.
Voucher: *Smook 1882*.


*Echinochloa stagnina*

**Echinochloa stagnina** (Retz.) P.Beauv., in *Essai d'une nouvelle agrostographie*: 161 (1812). Type: India.

LONG-AWNED WATER GRASS, WATER GRASS

Perennial and rarely annual 800–1 500 mm high; hydrophyte; rhizomatous and stoloniferous. Leaf blade 100–450 × 4–15 mm; ligule a fringe of hairs, often absent in upper leaves. Inflorescence open, 80–250 mm long, ovate to narrowly lanceolate, of spike-like racemes; raceme 20–80 mm long, not neatly 4-rowed, branches clearly secund. Spikelet 4–6 × 1.0–1.8 mm, narrowly ovate; glumes and lower lemma minutely hispid on surface, nerves with long, rigid, sometimes tubercle-based hairs; lower floret male or sterile; lower lemma with awn (1–)3–20(–50) mm long; upper lemma 3–5 mm long; anther 1.8–2.9 mm long.

*Flowering*: December to May. *Ecology*: Growing in water; streamsides and often floating in water. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical Africa and Madagascar; Assan to Indo-China. N, B, L, LIM, G, M, FS. *Economics*: Pasture.

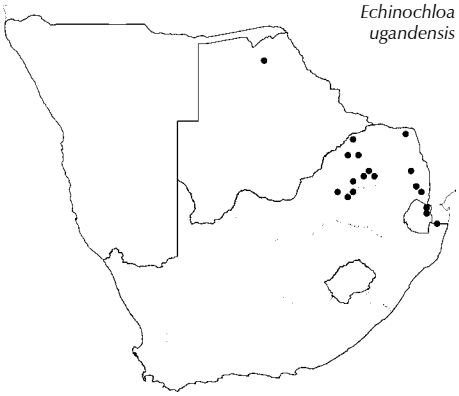
Illustration: Chippindall: 362, fig. 311 (1955).
Anatomy vouchers: *Ellis 2910, 3728, 3926, 3927 & Smook 4677*.
Voucher: *Jacobsen 2978*.

**Echinochloa ugandensis** Snowden & C.E.Hubb., in *Kew Bulletin* 1936: 315 (1936). Type: Uganda, Teso District, Abela, *Liebenberg 851* (K, holo.).

Tufted annual 250–800 mm high; hygrophyte; stoloniferous. Leaf blade 70–200 × 3–6 mm; ligule a fringe of hairs. Inflorescence erect, 50–200 mm long, lax, linear, raceme up to 30 mm long, neatly 4-rowed, simple. Spikelet 2.3–3.0 × 1.5 mm, elliptic; glumes and lower lemma minutely hairy, nerves with long, rigid hairs; lower floret sterile; lower lemma acute or with awn up to 6 mm long; upper lemma 2.0–2.5 mm long; anther 0.6–1.0 mm long.

*Flowering*: January. *Ecology*: Swampy areas, shallow pools. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical East Africa. B, S, LIM, NW, G, M, KZN.

Voucher: *Smook 5337*.




## **Ehrharta** Thunb.

Thunberg: 217 (1779) name conserved; Stapf: 660 (1900); Stent: 275 (1924); Chippindall: 34 (1955); Clayton: 38 (1970); Launert: 39 (1971); Gibbs Russell: 145, 149 (1984); Clayton & Renvoize: 76 (1986); Gibbs Russell: 67, 191 (1987); Gibbs Russell & Ellis: 51 (1987); Gibbs Russell & Ellis: 165 (1988); Gibbs Russell & Ellis: 189 (1989); Gibbs Russell et al.: 121 (1990); Watson & Dallwitz: 361 (1994); Verboom et al.: 1008 (2003).

Annual or perennial, sometimes dwarf shrubs; tufted or decumbent; rhizomatous or stoloniferous; sometimes with a 'bulb' or 'corm'. **Leaf blade** linear to linear-lanceolate, expanded, folded or rolled, rarely much reduced; *ligule* a fringed or unfringed membrane, or a fringe of hairs. **Inflorescence** a panicle or reduced to a raceme with a few spikelets, or to a single spikelet; open or contracted, sometimes spike-like, rarely secund; *spikelets* solitary or sometimes clustered, pedicelled. **Spikelet** laterally to not noticeably compressed, disarticulating above glumes; *glumes* ± equal to unequal, shorter to longer than spikelet, membranous, similar, lanceolate or ovate-lanceolate, hairy or glabrous, 5-nerved, sometimes shortly mucronate, awnless. **Florets** 3; *lower* 2 *florets* sterile, reduced to lemmas, usually of similar size and differing from smaller bisexual lemma, occasionally first sterile lemma short and glume-like and second sterile lemma resembling bisexual lemma; sterile lemmas stiffly membra-




Figure 185.—*Ehrharta calycina*. A, plant; B, ligule. Artist: C. Smith.

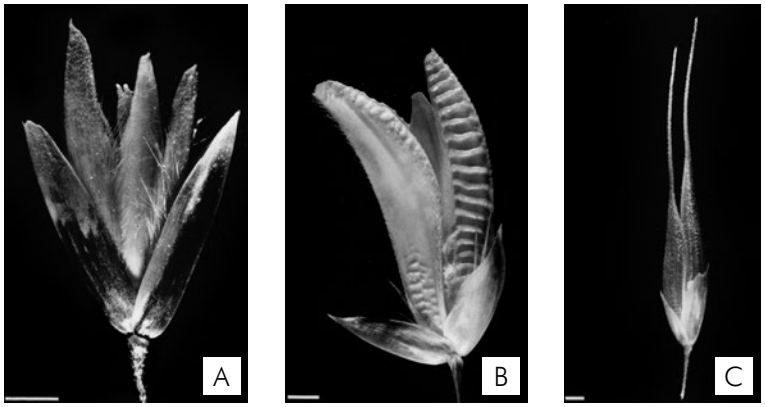



Figure 184.—Spikelets. A, *Ehrharta calycina* (4.0–8.5 mm); B, *E. capensis* (8–12 mm); C, *E. longiflora* (10–25 mm incl. awns). Photographer: M. Koekemoer.

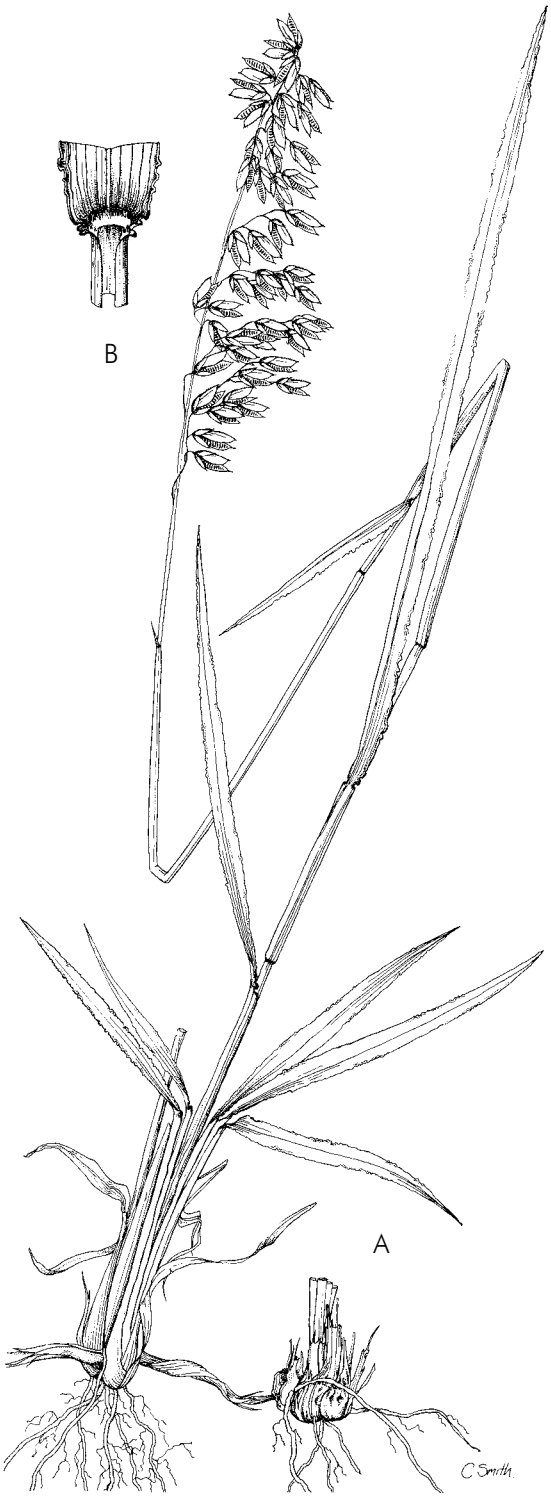



Figure 186.—*Ehrharta capensis*. A, plant; B, ligule. Artist: C. Smith.

nous, usually scabrid, one or both transversely rugose, ribbed or corrugated, tuberculate or smooth, hairy or glabrous, awnless or mucronate or awned from back or tapering into awn; *awn* longer or shorter than lemma body, sometimes bases of second sterile lemma and bisexual lemma coming together in a hinge-like joint, which may have a membranous appendage resembling an earlobe; *uppermost floret* bisexual; *lemma* firmer than glumes, smaller and more laterally compressed than sterile lemmas, 5–7-nerved, usually glabrous, rarely long-villous, sometimes mucronate, awnless; *callus* 0; *palea* linear or boat-shaped, almost as long as lemma, keeled, finely 2-nerved. **Lodicules** 2, large and flat, usually ovate or 2-lobed. **Stamens** 6 (5, 4, 3 or 1). **Ovary** obovoid; styles free, plumose or brush-like above. **Caryopsis** ellipsoid; hilum long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 12$ (polyploidy).

**Species** ± 35, southern Africa to Ethiopia and Yemen, naturalised in Indonesia, New Zealand and Australia; 23 in southern Africa, mainly southern and western areas of the Cape region, a few widespread.

Species treatment by A.C. Mashau.

**Key to species:**

1. First sterile lemma thin, triangular, less than $^1/_2$ as long as 2nd sterile lemma (can be minute); 2nd sterile lemma and bisexual lemma similar in texture, apices canoe-shaped . . . . . 2
   First sterile lemma similar in texture and $^1/_2$ as long as to equalling to 2nd sterile lemma; bisexual lemma differing from 2nd sterile lemma . . . . . 8
2. Glumes ± $^1/_2$ as long as spikelet . . . . . 3
   Glumes longer than $^1/_2$ as long as spikelet . . . . . 5
3. Inflorescence of 1–4 spikelets, barely overtopping the leaves; plant delicate, herbaceous, less than 250 mm high . . . . . **E. rupestris** subsp. **dodii**
   Inflorescence of 4–9 spikelets, considerably overtopping the leaves; plant not delicate, herbaceous to suffrutescent, 200–450 mm high . . . . . 4
4. Leaf blade erect, rolled, appearing setaceous, or expanded and nearly spreading, apex not hooded; spikelet to 2 mm wide, oblong to linear; culm node conspicuous, not enclosed by leaf sheath; leaf sheaths not overlapping; plant thin and wiry . . . . . **E. rupestris** subsp. **tricostata**
   Leaf blade folded, somewhat thickened and ascending, apex hooded; spikelet to 2.5 mm wide, outline oblong to nearly square; culm nodes inconspicuous, enclosed by leaf sheath; leaf sheaths overlapping; plant usually robust . . . . **E. rupestris** subsp. **rupestris**

5(2). Inflorescence of 5–15 spikelets; glumes $^2/_3$–$^3/_4$ as long as spikelet, rarely more, adpressed to florets at maturity; plant erect, 250–400 mm high . . . . . 6
   Inflorescence of 1–4 spikelets; glumes slightly shorter but usually slightly longer than spikelet, gaping widely at maturity; plant sprawling, or if erect then less than 250 mm high . . . . . 7

6. Spikelet 5.5–6.5 mm long; leaf blade tightly rolled, appearing setaceous, rigid, erect or curved slightly outward from middle, smooth . . . . . **E. setacea** subsp. **setacea**
   Spikelet (6.5–)7.0–8.0 mm long; leaf blade expanded, base to 6 mm wide, rolled near apex, held ascending, scabrous . . . . . **E. setacea** subsp. **scabra**

7(5). Culm herbaceous, lowest nodes bearing leaves with blades; spikelet 4.5–6.5 mm long; glumes usually slightly longer than spikelet; plant sprawling or trailing . . . . . **E. setacea** subsp. **uniflora**
   Culm suffrutescent below, lowest nodes usually leafless; spikelet 4–5 mm long; glumes slightly shorter than spikelet; plant erect . . . . . **E. setacea** subsp. **disticha**

8(1). Culm lowest node swollen, hard and 'bulb-like' . . . . . 9
   Culm lowest node not swollen, hard or 'bulb-like' . . . . . 13

9. Sterile lemmas keels with a fringe of long hairs; 'bulbs' fusiform, ivory coloured; basal sheaths dark purple . . . . . **E. eburnea**
Sterile lemmas keels fringed with short hairs; 'bulbs' spherical or cylindrical, white or orange; basal sheaths not dark purple . . . 10
10. First sterile lemma broadest at middle, margins inrolled at basal $^1/_3$; glumes often less than $^1/_2$ as long as spikelet; 1st sterile lemma strongly transversely ribbed, at least on the basal $^1/_2$ . . . . . 11
First sterile lemma margins straight from base to apex; glumes $^1/_2$–$^2/_3$ as long as spikelet; 1st sterile lemma weakly transversely ribbed . . . . . 12
11. 'Bulbs' higher than wide, light orange, polished/shining, crowded; spikelet 8–12 mm long; 1st sterile lemma with transverse ribs on lower $^1/_2$ or $^1/_3$ only; leaf blade expanded, marginal veins pale, thickened, usually undulate . . . . . **E. capensis**
'Bulbs' chalky white, not polished/shining, well separated on a thin rhizome; spikelet 7–10 mm long; 1st sterile lemma with transverse ribs throughout; leaf blade rolled or sometimes expanded, marginal vein usually not prominent or undulate . . . . . **E. bulbosa**
12(10). Spikelet 8–10 mm long; 'bulbs' dark orange, polished, crowded . . . . . **E. ottonis**
Spikelet 10–12 mm long; 'bulbs' pale orange, dull, obscurely punctuate . . . . . **E. longifolia**
13(8). Sterile lemmas without long hairs on sides, keel or margins, glabrous to strongly scabrous (sometimes base with a tuft of hairs) . . . . . 14
Sterile lemmas with long hairs on sides, keels or margins . . . . 30
14. Sterile lemmas apices drawn out into an awn at least $^1/_3$ as long as lemma body, but usually equalling or longer than lemma body . . 15
Sterile lemmas not awned (sometimes mucronate or minutely awned, if mucro or awn $^1/_3$ or longer than lemma, then lemma with long hairs on sides or keel) . . . . . 18
15. First sterile lemma more than $^2/_3$ as long as 2nd sterile lemma; bisexual lemma shorter than both sterile lemmas; annual; basal sheaths thin, loose, not flabellate . . . . . 16
First sterile lemma $^1/_2$–$^2/_3$ as long as 2nd sterile lemma; bisexual lemma longer than 1st sterile lemma (excluding awn); perennial, tufted, rhizomatous; basal sheaths hard, flabellate . . . . . 17
16. First sterile lemma shorter than 2nd sterile lemma; spikelet (7)10–25 mm long (including awn); sterile lemmas always with tufted hairs at the base, sides with 6–12 weak transverse ribs . . . . **E. longiflora**
Sterile lemmas ± equal; spikelet 6–11(–14) mm long (including awn); sterile lemmas tufted hairs usually absent at the base, sides with 4–8 strong transverse ribs . . . . . **E. triandra**
17(15). Second sterile lemma with a tuft of hairs at the base; awn 2–16 mm long; leaf blade expanded, 4–10 mm wide, lanceolate; basal sheaths persistent, hard, reddish-brown . . . . . **E. dura**
Second sterile lemma without a tuft of hairs at the base; awn 13–25 mm long; leaf blade reduced, setaceous, to 1 mm wide; basal sheaths eventually deciduous, membranous, light brown or whitish; . . . . . **E. microlaena**
18(14). Sterile lemmas up to 5.5 mm long (or rarely to 7 mm) . . . . . 19
Sterile lemmas longer than 5.5 mm . . . . . 26
19. Glumes $^1/_2$–$^3/_4$ as long as lemmas; sterile lemmas with transverse ribs . . . . . 20
Glumes as nearly as long as to longer than spikelet; sterile lemmas smooth, shining . . . . . 23
20. Spikelet 2–3 mm long; glumes $^2/_3$–$^3/_4$ as long as spikelet; 2nd sterile lemma with an ear-like appendage at the hinge-like joint at base . . . . . **E. delicatula**
Spikelet 3–6(–7) mm long; glumes $^1/_2$–$^2/_3$ as long as spikelet; 2nd sterile lemma without an ear-like appendage at the hinge-like joint at base . . . . . 21
21. Spikelet 5–7 mm long; sterile lemmas gradually tapering to an acute apex . . . . . **E. erecta** var. **abyssinica**
(doubtfully occurring in southern Africa)
Spikelet less than 5 mm long; sterile lemmas tapering gradually to a subacute or abruptly rounded apex . . . . . 22
22. Spikelet (4.0)4.2–5.0 mm long; sterile lemmas tapering gradually to subacute apices; 2nd sterile lemma base with a tuft of hairs, sides shallowly transversely ribbed . . . . . **E. erecta** var. **natalensis**



Figure 187.—*Ehrharta eburnea*. Artist: W. Roux.

Spikelet 3.0–4.2 mm long; sterile lemmas abruptly rounded at apices; 2nd sterile lemma base without a tuft of hairs, sides usually deeply transversely ribbed, especially on the distal 1/2 . . . . . **E. erecta** var. **erecta**

23(19). First sterile lemma shorter than 2nd sterile lemma . . . . . 24
First sterile lemma ± as long as 2nd sterile lemma . . . . . 25

24. Glumes 0.5–2.0 mm longer than spikelet; spikelet 4.0–7.5 mm long; Drakensberg mountainsides . . . . . **E. longigluma**
Glumes nearly as long as to up to 0.5 mm longer than spikelet; spikelet 3.5–4.0 mm long; dry places in southwestern and northwestern Cape regions . . . . . **E. melicoides**

25(23). Culm much branched and often woody at base; leaf blades small or absent; pedicels shortly hairy . . . . . **E. ramosa** subsp**. aphylla**
Culm not branched and woody at base; leaf blades well developed; pedicels glabrous . . . . . **E. rehmannii** subsp. **filiformis**

26(18). Plant robust, strongly suffrutescent; leaf blade absent or reduced; sterile lemmas usually mucronate; pedicels shortly hairy . . . . 27
Plant not robust, usually herbaceous; leaf blades present, expanded; sterile lemmas usually muticous; pedicels glabrous . . . . . 28

27. Glumes usually slightly shorter than sterile lemmas; culm to 5 mm wide; inflorescence usually contracted; pedicels erect to ascending; leaves usually bladeless . . . . . **E. ramosa** subsp. **ramosa**
Glumes slightly to considerably longer than sterile lemmas; culm to 2.5 mm wide; inflorescence usually open; pedicels spreading to reflexed; leaves rarely with small blades . . . . **E. ramosa** subsp. **aphylla**

28(26). Inflorescence contracted; pedicels and spikelets erect; glumes subcoriaceous . . . . . **E. rehmannii** subsp. **subspicata**
Inflorescence open; pedicels spreading to reflexed, spikelets spreading to nodding; glumes membranous . . . . . 29

29. Inflorescence of fewer than 20 spikelets; leaf blade narrower than 4 mm wide; sterile lemmas glabrous . . . . . **E. rehmannii** subsp. **filiformis**
Inflorescence of more than 20 spikelets; leaf blade to 6 mm wide; sterile lemmas sometimes shortly hairy on sides or apex and/or strongly scabrous on keels . . . . . **E. rehmannii** subsp. **rehmannii**

30(13). Second sterile lemma with an ear-like appendage at base; spikelet usually less than 8.5 mm long (rarely to 11 mm) . . . . . 31
Second sterile lemma without an ear-like appendage at base; spikelet longer than 8.5 mm . . . . . 34

31. First sterile lemma more than 2/3 as long as 2nd sterile lemma . . .32
First sterile lemma about 1/2 as long as 2nd sterile lemma . . . . . 33

32. Sterile lemmas apices rounded to truncate, with a mucro or awn arising abruptly from central nerve; plant perennial (rarely annual) . . . . . **E. calycina**
Sterile lemmas apices running out gradually into awn 1–2 mm long; plant annual . . . . . **E. pusilla**

33(31). Sterile lemmas apices rounded; 2nd sterile lemma inflated; spikelet 2.7–3.5 mm long, ± terete . . . . . **E. brevifolia** var. **brevifolia**
Sterile lemmas apices aristate; 2nd sterile lemma sides not inflated; spikelet 3.5–4.5 mm long, laterally compressed . . . . . **E. brevifolia** var. **cuspidata**

34(30). Sterile lemmas hairy only on keels and margins; leaf blade hairy, expanded; culm node often with a ring of retrorse hairs; rhizome short, woody, knotted . . . . . **E. barbinodis**
Sterile lemmas profusely hairy on sides; leaf blade glabrous, usually rolled; culm node lacking retrorse hairs; rhizomes long, no thicker than culms . . . . . 35

35. Glumes 1/2–3/4 as long as spikelet, 5-nerved; upper glume up to 8 mm long; spikelet 8–10 mm long; rhizomes densely covered with hairy cataphylls, sub-bulbous . . . . . **E. thunbergii**
Glumes 3/4 as long as to ± equalling spikelet, 5–9-nerved, upper glume 8–13 mm long; spikelet (10–)11–18 mm long; rhizomes naked, slender, not sub-bulbous . . . . . 36

36. Inflorescence exserted from uppermost leaf sheath, this sheath usually not inflated; upper glume 9–13 mm long; culm to 3 mm wide . . . . . **E. villosa** var. **villosa**
Inflorescence closely subtended or enveloped by inflated uppermost leaf sheath; upper glume (10–)13–18 mm long; culm to 5 mm wide . . . . . **E. villosa** var. **maxima**

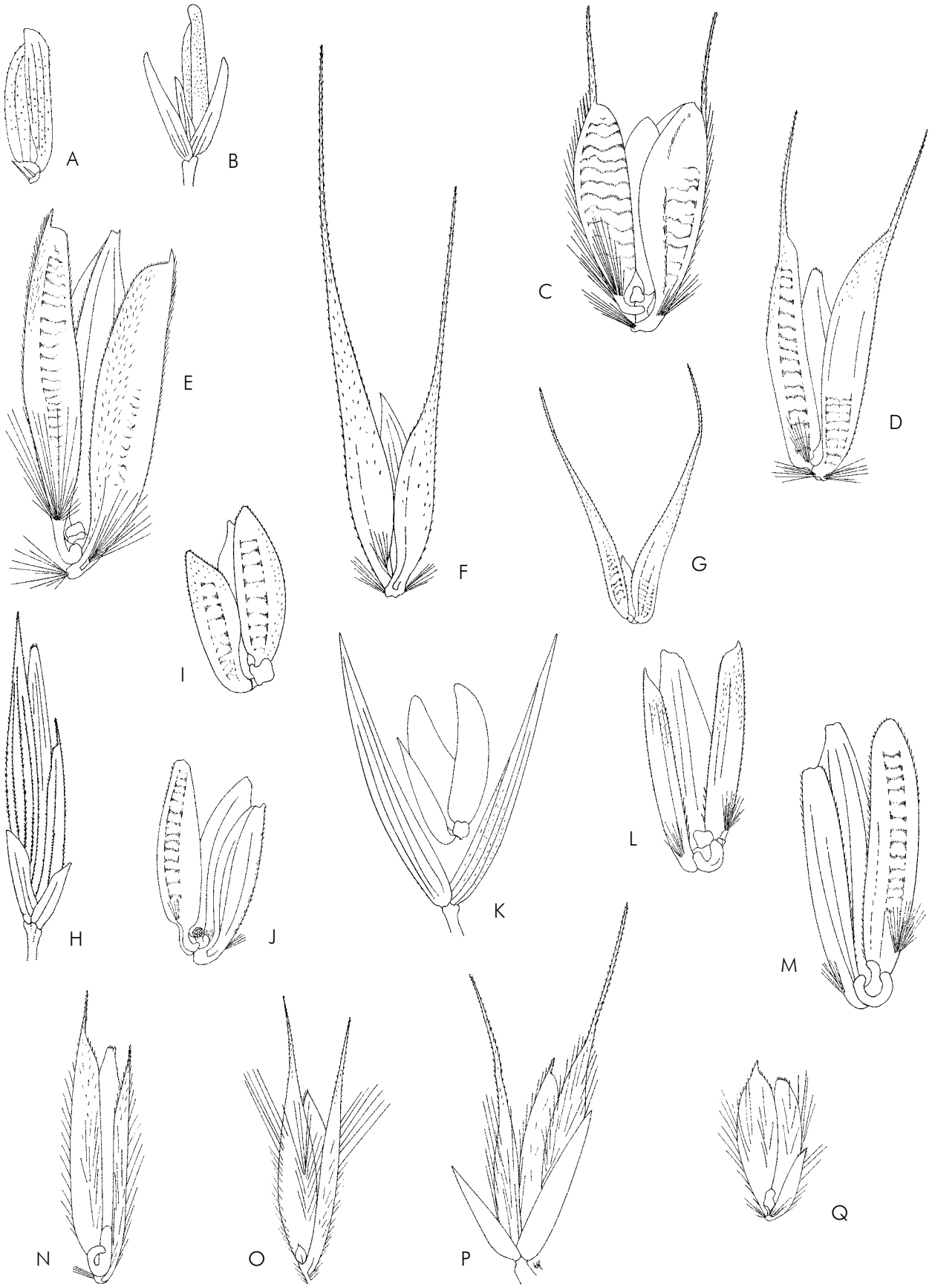
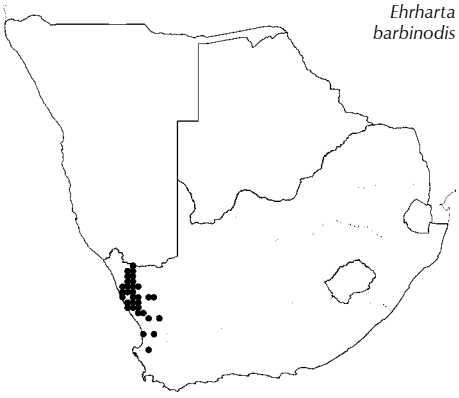



Figure 188.—*Ehrharta* spikelets or florets. A, *E. rupestris*; B, *E. setacea*; C, *E. bulbosa*; D, *E. capensis*; E, *E. ottotis*; F, *E. longiflora*; G, *E. triandra*; H, *E. dura*; I, *E. delicatula*; J, *E. erecta* var. *natalensis*; K, *E. longigluma*; L, *E. ramosa*; M, *E. rehmannii*; N, *E. calycina*; O, *E. pusilla*; P, *E. thunbergii*; Q, *E. brevifolia*. Plate donated by the artist W. Roux and dedicated by her to G.E. Gibbs Russell.

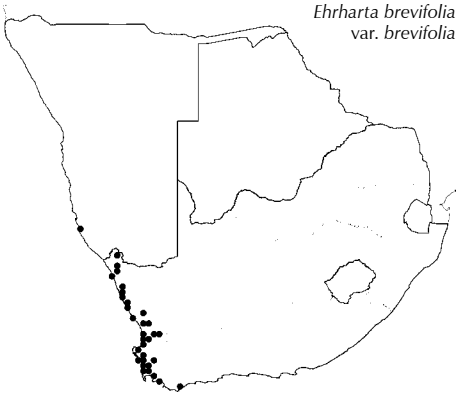

*Ehrharta barbinodis*

**Ehrharta barbinodis** Nees ex Trin., in *Phalaridea*, *Mémoires de l'Académie imperiale des Science de St. Pétersbourg*, sér. 6,5: 13 (of reprint) 66 (1839). Type: South Africa, Northern Cape, Little Namaqualand, Kamies Bergen; Vallei Fontein and near mouth of Orange river, *Ecklon*; Kaus Mountain, Goedemanskraal, near Rustbank, *Drège* (syntypes).

Tufted perennial, shrub or dwarf shrub 300–900 mm high; rhizome short, knotted; culms several, branched, woody, lowest nodes not swollen and hard ('bulb-like'), nodes retrorsely hairy. Leaf blade short, 10–100 × to 4 mm, expanded, hairy. Spikelet 10–13 × ± 3 mm; glumes almost equal or lower shorter, both shorter than spikelet; sterile lemmas similar, smooth, with hairs on keels and margins only, apices produced into a short awn (especially 2nd lemma); 1st sterile lemma shorter and narrower; 2nd sterile lemma without an ear-like appendage at base, sometimes faintly transversely ribbed; anther 4.4–6.5 mm long.

*Flowering*: July to October. *Ecology*: Rocky hillsides, often growing through bushes. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Endemic. WC, NC.

Illustration: Chippindall: 36, 44, fig. 4(11) & 14 (1955).
Anatomy vouchers: *Ellis 1732, 2158, 5079, 5087 & 5409*.
Voucher: *Acocks 16439*.


*Ehrharta brevifolia* var. *brevifolia*

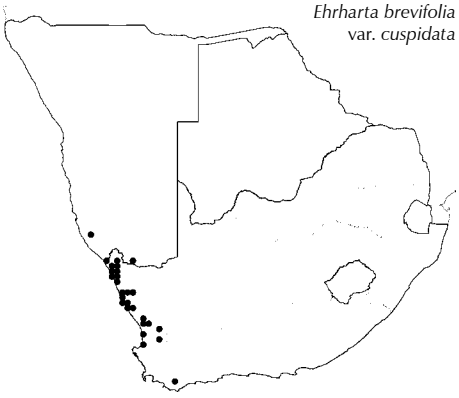
**Ehrharta brevifolia** Schrad. var. **brevifolia**, in *Göttingen Anziegen von gelehrten Sachen unter der Aufsicht der Königel. Gesellschaft der Wissenschaften* 3: 2077 (1821). Type: South Africa, Western Cape, Cape of Good Hope, *Hesse*.

Erect annual 180–300 mm high; culm not swollen and hard ('bulb-like') at lowest node. Leaf blade 25–90 × 3–5 mm, expanded or folded. Spikelet 2.7–3.5 mm long, ± terete; glumes equal, slightly longer than 2nd sterile lemma; sterile lemmas similar in texture, apices rounded, sides long-hairy; 1st sterile lemma about half as long as 2nd sterile lemma; 2nd sterile lemma sides inflated, with a pair of ear-like appendages at base; upper bisexual lemma awnless, differing from 2nd sterile lemma in texture; anther 1.3–1.5 mm long.

[A few specimens have sterile lemmas with apiculate apices and somewhat flattened sides and are apparently intermediate between the two varieties. In both varieties the mature sterile lemmas sometimes have dark blotches.]

*Flowering*: August to October. *Ecology*: Sandy soil of coastal Fynbos and Strandveld. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. Introduced into Australia. N, NC, WC.

Illustration: Chippindall: 36, fig. 4(6) (1955).
Anatomy vouchers: *Ellis 691, 1693, 4641, 5085 & 5408*.
Voucher: *Smith 3031*.


*Ehrharta brevifolia* var. *cuspidata*

**Ehrharta brevifolia** Schrad. var. **cuspidata** Nees, in *Florae Africae australioris* 1: 205 (1841). Type: South Africa, Northern Cape, near mouth of Orange River, *Drège 2563* (PRE, fg.).

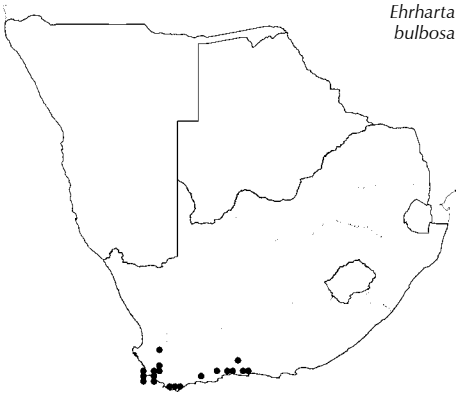
Erect annual 200–500 mm high; culm not swollen and hard ('bulb-like') at lowest node. Leaf blade 25–100 × 3–5 mm, expanded or folded. Spikelet (3.2)3.5–4.5 mm long (including awn), sides laterally compressed; glumes equal, slightly shorter than 2nd sterile lemma; sterile lemmas similar in texture, sides long-hairy; 1st sterile lemma about $^1/_2$ as long as 2nd sterile lemma; 2nd sterile lemma apex awned,

sides not inflated, with a pair of ear-like appendages at the base; upper bisexual lemma awnless, differing from 2nd sterile lemma in texture; anther 0.7–1.0 mm long.

*Flowering*: August to November (only rarely in November). *Ecology*: Sandy soils; hillsides and Strandveld. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. Introduced into Australia. N, NC, WC.

Anatomy vouchers: *Ellis 2186, 4638, 4639 & 5397.*
Voucher: *Goldblatt 2279.*

**Ehrharta bulbosa** Sm., in *Plantarum icones hactenus ineditae* pl. 33 (1790). Type: South Africa, Western Cape, Cape of Good Hope.


*Ehrharta bulbosa*

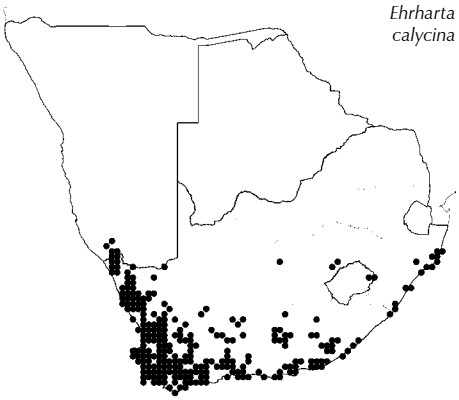
Tufted perennial 700 mm high; rhizome long, thin; lowest culm node bulbous; 'bulb' spherical, whitish, not polished/shining, well separated on rhizome. Leaf blade 60–350 × to 8 mm, rolled, sometimes expanded, marginal nerve usually not prominent or undulate, ascending. Spikelet 7–10 mm long; glumes ± equal, shorter than spikelet; sterile lemmas similar in texture, equal in length; 1st sterile lemma transversely ribbed throughout; 2nd sterile lemma broadest at middle, inrolled below; anther 2.5–4.0 mm long.

*Flowering*: October to November. *Ecology*: Hillsides and flats, alt. 50–250 m. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

Illustration: Chippindall: 36, fig. 4(24) (1955).
Voucher: *Manson 205*.

**Ehrharta calycina** Sm., in *Plantarum icones hactenus ineditae*. Pl. 33. (1790). Type: South Africa, Cape.

*E. geniculata* Thunb., in *Prodromus plantarum capensium*: 192 (1800).

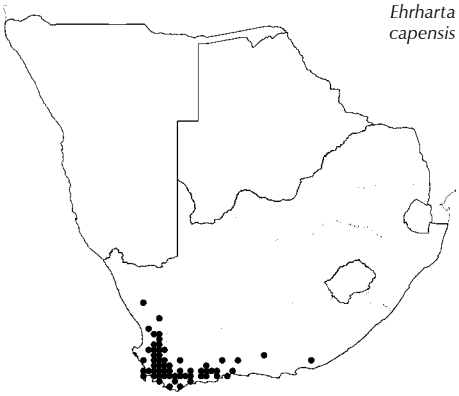

*Ehrharta calycina*

Very variable perennial, rarely annual 300–700(–1 800) mm high; often rhizomatous. Leaf blade to 7 mm wide, expanded or rolled and filiform. Spikelet 4.0–8.5 mm long; glumes ± equal, shorter than spikelet; sterile lemmas similar in texture, sides long-hairy; 1st sterile lemma more than $^2/_3$ as long as 2nd sterile lemma; 2nd sterile lemma with apex acute or truncate, commonly with a mucro or minute awn arising abruptly from central nerve, a pair of ear-like appendages present at base; anther 2.8–6.0 mm long.

[This widespread and variable entity is a species complex showing polyploidy and probably aneuploidy. Many ecotypes and regional variants can be recognised and some have been formally described, e.g. var. *angustifolia* and var. *versicolor*, but their status requires a full biosystematic study and they are therefore not treated here.]

*Flowering*: July to June (but usually in spring). *Ecology*: Many habitats and soil types. *Frequency in southern Africa*: Common. *Distribution*: Endemic. Introduced into many countries mainly as a pasture grass, now naturalised to Australia and USA. N, L, FS, KZN, NC, WC, EC. *Economics*: A good grazing grass in more arid regions. Local strains have been tested for forage value and are one of the few winter-rainfall grasses potentially valuable for grazing. In the past was used to rehabilitate mine dumps.

Illustration: Chippindall: 36, 43, fig. 4(14) & 12 (1955).
Anatomy vouchers: *Ellis 696, 1203, 1642, 1685, 1727, 2145, 2151, 2160, 2200, 2204, 4649, 4650, 4659, 5089, 5113, 5157 & 5395*.
Voucher: *Anderson 46*.

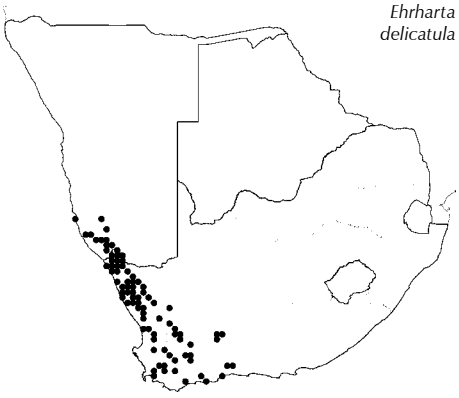

*Ehrharta capensis*

**Ehrharta capensis** Thunb., in *Kungliga Svenska vetenskapsakademiens handlingar* 40: 217, pl. 8 (1779). Type: in Herb. *Thunberg* (UPS, holo.).

Tufted perennial 400–1 000 mm high; rhizome long; lowest culm node bulbous, 'bulb' cylindrical, orange, polished/shining. Leaf blade 50–220 × to 10 mm, expanded, spreading, with thickened undulate marginal nerves. Spikelet 8–12 mm long; glumes ± equal, shorter than spikelet; sterile lemmas similar in texture; 1st sterile lemma as long as 2nd sterile lemma, transversely ribbed only in lower $^1/_2$ or $^1/_3$; 2nd sterile lemma broadest at middle, inrolled below; anther 3.2–5.5 mm long.

*Flowering*: September to November. *Ecology*: On a variety of soils; mountains and hillsides. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Endemic. NC, WC, EC.

Illustration: Chippindall: 36, 38, fig. 4(25) & 6 (1955).
Anatomy vouchers: *Ellis 645, 1172, 1188, 1697, 4644, 4691, 4692, 5522* & *5776*.
Voucher: *Adamson 3040*.

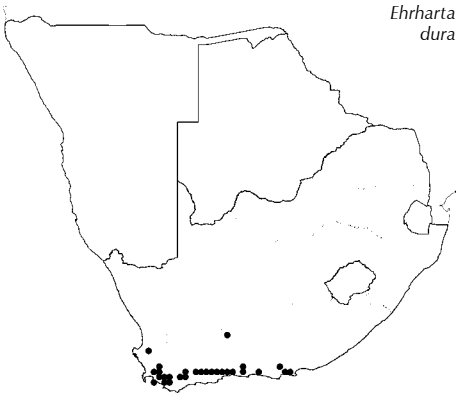

*Ehrharta delicatula*

**Ehrharta delicatula** Stapf, in *Kew Bulletin of Miscellaneous Information* 1897: 288 (1897). Type: South Africa, Northern Cape, Little Namaqualand, near Mieren Kasteel, among shrubs, *Drège 508*; Western Cape, Tulbagh Division, Roodezand, *Drège* (syntypes).

Leafy annual 45–250 mm high. Leaf blade 20–160 × 1–11 mm, expanded, thin. Spikelet 2–3 mm long; glumes $^1/_2$–$^3/_4$ as long as spikelet; sterile lemmas similar, sides not long-hairy, with 2–3 transverse ribs; 1st sterile lemma more than $^2/_3$ as long as 2nd sterile lemma; 2nd sterile lemma with a pair of ear-like appendages at hinge-like joint at base; anther 0.7–1.1 mm long.

*Flowering*: July to October. *Ecology*: In mesic microhabitats in arid areas; between rocks on outcrops; in shade of shrubs and in stream beds. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NC, WC.

Illustration: Chippindall: 36, 41, fig. 4(9) & 10 (1955).
Anatomy vouchers: *Ellis 2147* & *4615*.
Voucher: *Goldblatt 2463*.


*Ehrharta dura*

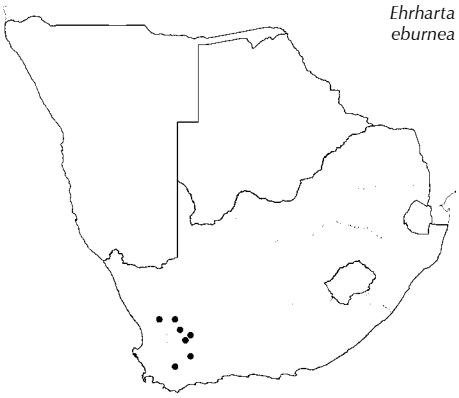
**Ehrharta dura** Nees ex Trin., in *Phalaridea*, *Mémoires de l'Académie imperiale des Science de St. Pétersbourg*, sér. 6,5: 13 (of reprint) 59 (1839). Type: South Africa, Western Cape, Du Toit's Kloof, *Drège* (LE, lecto.).

Tufted, erect perennial to 800 mm high; rarely long-rhizomatous; basal sheaths flattened, reddish-brown. Leaf blade 90–320 × 4–10 mm, expanded. Spikelet 10–12 × 3 mm; glumes unequal, much shorter than spikelet; sterile lemmas similar, sub-glabrous, scabrous, awn 2–12 mm long; 2nd sterile lemma with tufted hairs at base; anther 3.3–6.5 mm long.

*Flowering*: September to December. *Ecology*: On sandstone or granite-derived soils; in Mountain Fynbos in seasonally moist, open habitats; alt. 430–1 300 m. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. WC, EC.

Illustration: Chippindall: 36, fig. 4(17) (1955).
Anatomy vouchers: *Taylor 10256*; *Ellis 4695, 4696, 5457, 5554, 5568* & *5615*.
Voucher: *Taylor 4211*.

**Ehrharta eburnea** Gibbs Russ., in *Bothalia* 15: 145 (1984). Type: South Africa, Northern Cape, 15 miles from Sutherland on Calvinia road, *Story 4441* (PRE, holo.).


*Ehrharta eburnea*

Tufted perennial 200–500 mm high; basal sheaths purple; lowest 1 or 2 culm nodes bulbous, 'bulbs' fusiform, whitish, smooth, shiny. Leaf blade 40–150 × to 5 mm. Spikelet 9–13 × 3–4 mm; glumes unequal, $^1/_3$ as long as spikelet; sterile lemmas similar, smooth, with long hairs on keels and margins; anther 5.2–6.5 mm long.

*Flowering*: September to November. *Ecology*: Mountainsides; often in Renosterbos-veld; alt. 1 000–1 400 m. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. NC, WC.

Anatomy vouchers: *Agric. Collage Grootfontein 5* & *Ellis 5413*.
Voucher: *Acocks 15129*.

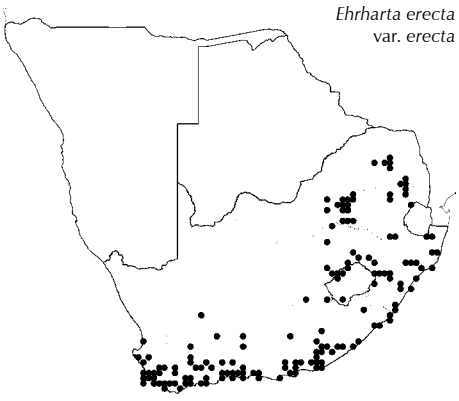
**Ehrharta erecta** Lam. var. **abyssinica** (Hochst.) Pilg., in *Notizblatt des Botanishen Gartens und Museums zu Berlin-Dahlem* 9: 508 (1926). Type: Ethiopia, Tigre, Aman-Eski, *Schimper 1460* (P, holo.).

Loosely tufted or rambling perennial. Leaf blade 60–180 × 2–9 mm, flat. Spikelet 5–7 mm long; glumes unequal, ± $^1/_2$ as long as spikelet; sterile lemmas rarely transversely ribbed, gradually tapering to acute apices; 2nd sterile lemma with a tuft of hairs and a 'hinge' at base; anther 2.3 mm long.

*Flowering*: throughout the year, but especially August to May. *Ecology*: Forest glades and forest margins; 1 500–2 600 m. *Distribution*: This variety occurs in tropical Africa and is doubtfully present in the northeastern regions of South Africa.

Illustration: Clayton et al.: 39 (1970).
Voucher: *Smook 10903* (collected in Malawi).

**Ehrharta erecta** Lam. var. **erecta**, in *Encyclopédie méthodique Bothanique* 2: 347 (1786). Type: South Africa**.**


*Ehrharta erecta* var. *erecta*

SHADE EHRHARTA

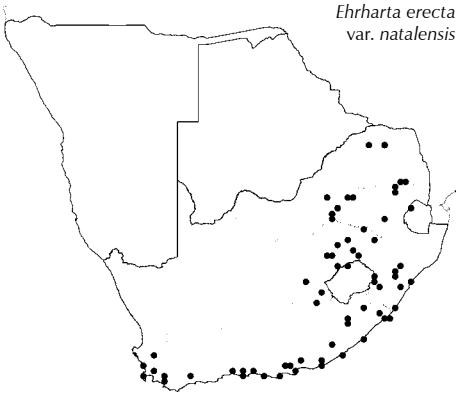
Loosely tufted perennial 200–600 mm high. Leaf blade 30–150 × 3–12 mm, soft. Spikelet 3.0–4.2 mm long; glumes unequal, $^1/_2$–$^3/_4$ as long as spikelet; sterile lemmas similar in texture, sides not long-hairy, usually deeply transversely ribbed especially on upper $^1/_2$, apex abruptly rounded, tufted hairs absent at base; 2nd sterile lemma without an ear-like appendage at hinge-like joint at base; anther 0.7–1.3 mm long.

[*E. erecta* is the most widespread of all ehrhartas and its spikelet size and basal hairiness gradually increases northwards from the south-western Cape.]

*Flowering*: July to June (most commonly October to January). *Ecology*: Shady moist places; often at forest margins, coastal sand; disturbed areas such as roadsides, gardens. *Frequency in southern*

*Africa*: Locally common. *Distribution*: The species extends through East Africa to India, and is also naturalised in Europe, Australia and North America. L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: It is an average grazing grass that is probably palatable, but only delivers a very low leaf production; weed.

Illustration: Chippindall: 36, 41, fig. 4(19) & 9 (1955).
Anatomy vouchers: *Ellis 292, 620, 1631, 4656, 4657* & *5187*.
Voucher: *Adamson 760*.



*Ehrharta erecta* var. *natalensis*

**Ehrharta erecta** Lam. var. **natalensis** Stapf, in *Flora capensis* 7: 671 (1900). Type: South Africa, KwaZulu-Natal, Umsinga & base of Biggarsberg, *Buchanan & MacOwan 94* (PRE, fg.).

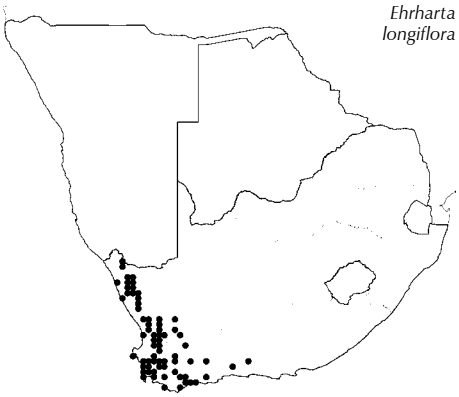
SHADE EHRHARTA

Loosely tufted or rambling perennial to 900 mm high. Leaf blade to 270 × to 16 mm. Spikelet 4.2–5.0 mm long; glumes unequal, $^{1}/_{2}$–$^{3}/_{4}$ as long as spikelet; sterile lemmas similar in texture, sides not long-hairy, shallowly transversely ribbed, tapering gradually to subacute apex; 2nd sterile lemma with a tuft of hairs at base, without an ear-like appendage at the hinge-like joint at base; anther 1.3–1.6 mm long.

[It is an intermediate between var. *erecta*, which has a spikelet 3.0–4.2 mm long, and var. *abyssinica* with a spikelet 5–7 mm long and hairy tufts at base of the upper sterile lemma.]

*Flowering*: October to April (occasionally to June). *Ecology*: Shady moist places, especially forest margins. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. S, LIM, NW, G, M, FS, KZN, WC, EC.

Anatomy vouchers: *Ellis 345, 413, 582, 4458, 4985, 5185* & *5200*.
Voucher: *Moll 4475*.



*Ehrharta longiflora*

**Ehrharta longiflora** Sm., in *Plantarum icones hactenus ineditae* t. 32 (1789). Type: South Africa, Western Cape, Cape of Good Hope.

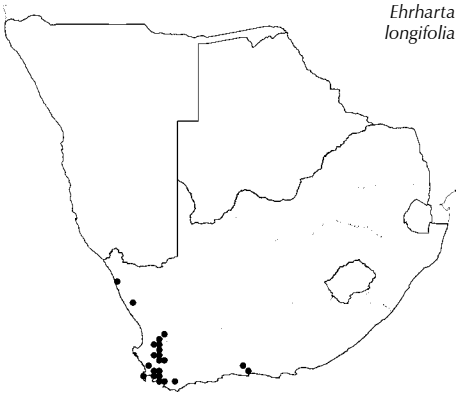
Leafy annual 150–600 mm high. Leaf blade to 200 × 5–15 mm, expanded, collar often dark. Spikelet 10–25(–35) mm long (including awns); glumes unequal, $^{1}/_{3}$ as long as spikelet; sterile lemmas similar, sub-glabrous, always with tufted hairs at base, sides with 6–12 weak transverse ribs, apices awned; 2nd sterile lemma without an ear-like appendage at hinge-like joint at base; anther 1.0–2.1 mm long.

[Some specimens from Namaqualand have sterile lemmas, which are more deeply transversely ribbed on sides and tend toward *E. triandra*.]

*Flowering*: July to November. *Ecology*: Hill slopes; in the shade of rocks and shrubs; wet places and often in disturbed areas such as roadsides and gardens. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. NC, WC, EC. *Economics*: It is probably palatable with a good leaf production; weed.

Illustration: Chippindall: 36, fig. 4(10) (1955).
Anatomy vouchers: *Ellis 1154, 1713, 2201, 5093* & *De Winter 9528*.
Voucher: *Crook 1028*.

**Ehrharta longifolia** Schrad., in *Göttingen Anziegen von gelehrten Sachen unter der Aufsicht der Königel Gesellschaft der Wissenschaften* 3: 2077 (1821). Type: South Africa, Western Cape, Cape of Good Hope.

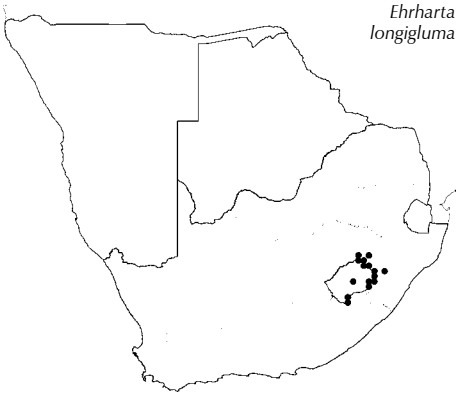

*Ehrharta longifolia*

Tufted perennial to 1 200 mm high; rhizomatous; lowest culm node bulbous, 'bulb' spherical, pale orange, dull. Leaf blade 70–200 × to 5 mm, rolled, erect. Spikelet 10–12 mm long; glumes ± equal, $^2/_3$ as long as spikelet; sterile lemmas similar, tufted hairs at base, weakly transversely ribbed, margins straight from base to apex; 2nd sterile lemma without an ear-like appendage at base; anther 4.8–5.2 mm long.

*Flowering*: November and December. *Ecology*: Mountainsides, alt. 100–1 800 m; sandy areas and favours areas that had been burnt. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. Introduced into Australia. NC, WC, ?EC.

Illustration: Chippindall: 36, fig. 4(16) (1955).
Anatomy vouchers: *Ellis 5444* & *5592*.
Voucher: *Liebenberg 4047*.

**Ehrharta longigluma** C.E.Hubb., in *Kew Bulletin of Miscellaneous Information*. 1933: 501 (1933). Type: South Africa, KwaZulu-Natal, Mont aux Sources, common in grassland on mountain slopes, *Bayer & McClean 270* (PRE, iso.).

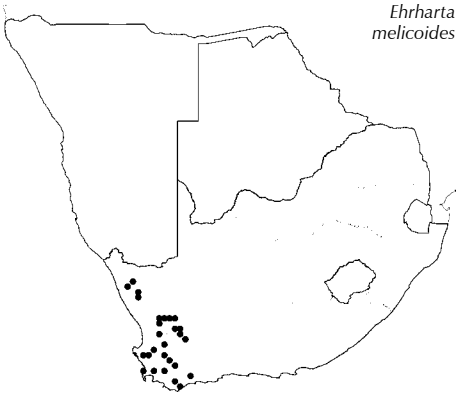

*Ehrharta longigluma*

Tufted perennial 300–600 mm high, erect; rhizomes long, slender. Leaf blade 25–120 × 2–4 mm, expanded. Spikelet 4.0–7.5 mm long; glumes equal, 0.5–2.0 mm longer than spikelet; sterile lemmas similar, glabrous, awnless; 1st sterile lemma shorter than 2nd sterile lemma; 2nd sterile lemma with a pair of ear-like appendages at base; anther 1.8–2.2 mm long.

*Flowering*: November to March. *Ecology*: Often in peaty soils; mountain grassland at 2 300–3 300 m. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. This is the only southern African species of *Ehrharta* whose range does not include the southwestern or northwestern Cape areas. L, FS, KZN.

Illustration: Chippindall: 36, 42, fig. 4(1) & 11 (1955).
Anatomy vouchers: *Ellis 2384* & *5709*.
Voucher: *Killick 1478*.

**Ehrharta melicoides** Thunb., in *Prodromus Plantarum Capensium*: 192 (1800) Type: South Africa, Western Cape, Cape of Good Hope.


*Ehrharta melicoides*

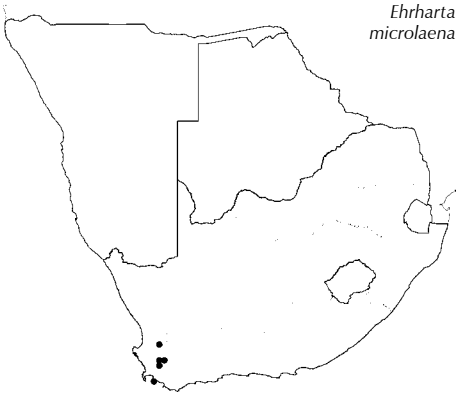
Haasgras

Densely tufted perennial 300–700 mm high; rhizomes stout; culm bases tightly clad by thick old leaf sheaths and may appear bulbous, but are not swollen. Leaf blade 50–250 × 4 mm, tightly rolled or sometimes expanded. Spikelet 3.5–4.0 mm long; glumes equal, ± as long as spikelet; sterile lemmas similar, glabrous, awnless; 1st sterile lemma shorter than 2nd sterile lemma; 2nd sterile lemma with a pair of ear-like appendages at base; anther 2.0–2.5 mm long.

*Flowering*: August to November. *Ecology*: Often in rocky places among dolerite or shale; mountainsides; in Rhenosterveld and in

overgrazed grassland. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. NC, WC.

Illustration: Chippindall: 36, fig. 4(15) (1955).
Anatomy vouchers: *Acocks 17303, 23768*; *Ellis 4624, 4645, 5091, 5108* & *5404*.
Voucher: *Acocks 17303*.


*Ehrharta microlaena*

**Ehrharta microlaena** Nees ex Trin., in *Phalaridea*, *Mémoires de l'Académie imperiale des Science de St. Pétersbourg*, sér. 6,5: 13 (of reprint) (1839). Type: South Africa, Western Cape, Du Toit's Kloof, *Drège* (LE, lecto.; PRE, fg.).

Tufted perennial to 1 100 mm high; erect; basal sheaths pallid. Leaf blade 70–150 × to 1 mm, setaceous. Spikelet 13–15 (excluding awn) × to 2.5 mm; glumes unequal, $^1/_3$ as long as spikelet; sterile lemmas similar, sub-glabrous, scabrous, with awn 5–25 mm long; 2nd sterile lemma without tufted hairs at base; anther 6.2–6.5 mm long.

*Flowering*: December to February. *Ecology*: Mountain Fynbos along streams and in damp peaty places, alt. 400–1 330 m. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

Illustration: Chippindall: 36, fig. 4(18) (1955).
Anatomy voucher: *Ellis 5524*.
Voucher: *Esterhuysen 28427*.

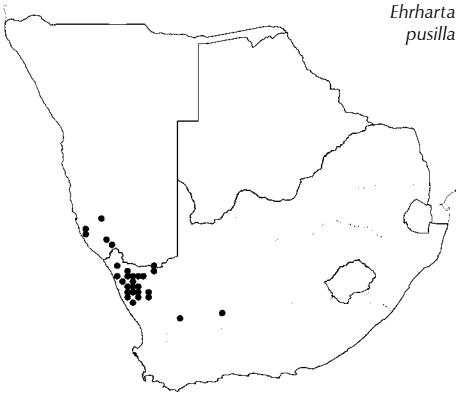

*Ehrharta ottonis*

**Ehrharta ottonis** Kunth ex Nees, in *Florae Africae australioris* (1841). Type: South Africa, Cape.

Tufted perennial to 1 200 mm high; rhizomatous; lowest culm node bulbous, 'bulb' cylindrical, orange, shining. Leaf blade to 600 × to 5 mm, rolled, erect. Spikelet 8–10 mm long; glumes ± equal, $^2/_3$ as long as spikelet; sterile lemmas similar, margins straight from base to apex, tufted hairs at base; 2nd sterile lemma without an ear-like appendage at base; anther 4.0–5.5 mm long.

*Flowering*: September to November. *Ecology*: Hills and mountains, and on flats; in disturbed places, alt. 50–800 m. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Endemic. EC, WC.

Illustration: Chippindall: 36, fig. 4(23) (1955).
Anatomy vouchers: *Ellis 2257, 2297, 4666, 4672, 4674* & *5569*.
Voucher: *Lamb 111*.


*Ehrharta pusilla*

**Ehrharta pusilla** Nees ex Trin., in *Phalaridea*, *Mémoires de l'Académie imperiale des Science de St. Pétersbourg*, sér. 6,5: 13 (of reprint) 68 (1839). Type: South Africa, Western Cape, Cape of Good Hope.

Sprawling annual 50–350 mm high. Leaf blade 15–110 × 2–7 mm, expanded or folded; sheaths often inflated. Spikelet (5.6–)6.5–8.5 mm long; glumes equal, $^2/_3$ as long as to equalling spikelet; sterile lemmas similar, sides long-hairy, apices gradually running out into an awn 1–2 mm long; 1st sterile lemma more than $^2/_3$ as long as 2nd sterile lemma; 2nd sterile lemma with a pair of ear-like appendages at base; anther 1.0–1.3 mm long.

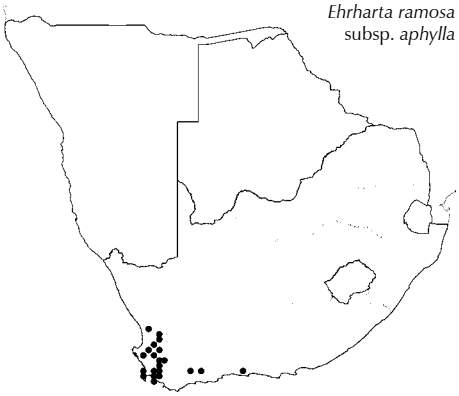
*Flowering*: July to October. *Ecology*: Sandy soils; usually in dry stream beds. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. Introduced into Australia. N, NC, ?WC.

Illustration: Chippindall: 36, 44, fig. 4(8) & 13 (1955).
Anatomy vouchers: *Ellis 1712, 1735, 1768, 2148, 5084, 5090* & *5398*.
Voucher: *Goldblatt 5678*.

**Ehrharta ramosa** (Thunb.) Thunb. subsp. **aphylla** (Schrad.) Gibbs Russ., in *Bothalia* 19: 191 (1989). Type: *Hesse* apparently lost; neotype designated: *Ecklon 914* (specimen in K with suffrutescent culms and bladeless leaves).

*E. aphylla* Schrad., in *Göttingische gelehrte Anzeigen* 1821: 2077 (1821).

*E. ramosa* (Thunb.) Thunb. var. *aphylla* (Schrad.) Gluckman ex Adamson, in *Journal of South African Botany* 8: 273 (1942).


*Ehrharta ramosa* subsp. *aphylla*

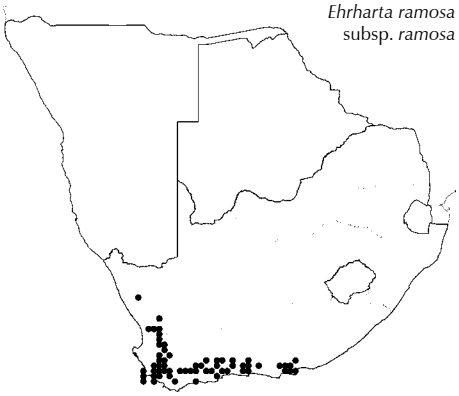
Shrub or dwarf shrub, perennial 300–800 mm high; rhizomes woody, branched; culm to 2.5 mm wide, much branched and often woody at base. Leaf blade to 30 × to 1 mm, often absent, or reduced blades sometimes present. Inflorescence usually open; pedicels spreading to reflexed, shortly hairy. Spikelet (5.5–)6.0–7.5(–9.0) mm long; glumes ± equal, usually somewhat longer than spikelet; sterile lemmas similar, sides hairless, apices usually mucronate; 1st sterile lemma ± as long as 2nd sterile lemma; 2nd sterile lemma with a pair of ear-like appendages at base; anther 2.6–3.5 mm long.

*Flowering*: September to January. *Ecology*: On Table Mountain Sandstone-derived soils; Mountain Fynbos; between rocks; often in dry microhabitats. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC, ?EC.

Anatomy vouchers: *Ellis 2235, 4634* & *4673*.
Voucher: *Esterhuysen 28110*.

**Ehrharta ramosa** (Thunb.) Thunb. subsp. **ramosa**, in *Bothalia* 19: 191 (1989). Type: South Africa, *Thunberg* (sheet 8855), (UPS, lecto.).

*E. ramosa* Thunb. var. *ramosa,* in *Flora capensis* 7: 335 (1811).

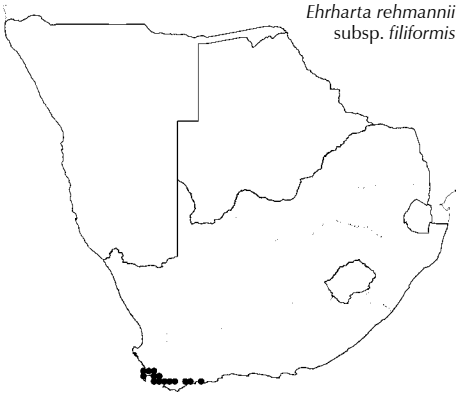

*Ehrharta ramosa* subsp. *ramosa*

Perennial, shrub or dwarf shrub 300–1 000 mm high; rhizomes woody, branched; culm to 5 mm wide, woody. Leaf blade absent. Inflorescence usually contracted; pedicels erect to ascending. Spikelet (5.5–)6.0–7.5(–9.0) × 2–3 mm; glumes usually slightly shorter than spikelet; sterile lemmas similar, sides hairless, apices usually mucronate, 2nd sterile lemma with a pair of ear-like appendages at base; anther 2.7–4.0 mm long.

[Intermediates between subsp. *ramosa* and *E. rehmannii* exist. The robust leafless culms are similar to *E. thunbergii* and *E. villosa*, but these species have profusely hairy sterile lemmas.]

*Flowering*: October to January. *Ecology*: On sandy or stony Table Mountain Sandstone or lateritic soils; in Mountain or Grassy Fynbos; often in rocky places. *Frequency in southern Africa*: Locally common at high altitudes. *Distribution*: Endemic. NC, WC, EC.

Illustration: Chippindall: 40, fig. 8 (1955).
Anatomy vouchers: *Ellis 634, 1632, 4694* & *5525*.
Voucher: *Taylor 4235*.


*Ehrharta rehmannii* subsp. *filiformis*

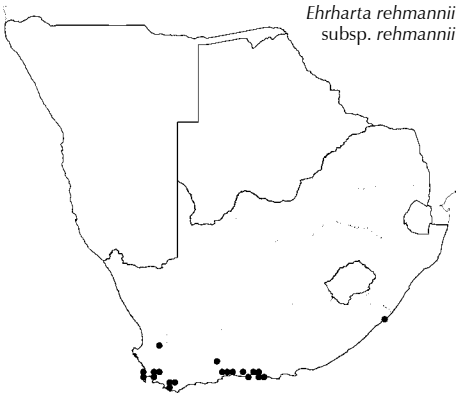
**Ehrharta rehmannii** Stapf subsp. **filiformis** (Stapf) Gibbs Russ., in *Bothalia* 19: 193 (1989). Type: South Africa,? *Ecklon 914* (in part) neotype (specimen in K with thin culms and small leaf blades).

*E. rehmannii* Stapf var. *filiformis* Stapf, in *Flora capensis* 7: 677 (1900).

Tufted, sometimes delicate perennial 120–800 mm high; erect or straggling, often growing in dense masses; culm not branched and woody at base. Leaf blade 15–100 × to 4 mm, well developed, usually soft and thin. Inflorescence an open raceme with 1–15(–24) spikelets, pedicels spreading to reflexed, glabrous. Spikelet 4.0–6.5 (–8) mm long; glumes ± equal, about as long as spikelet, membranous; sterile lemmas similar, sides hairless, apices usually muticous; 1st sterile lemma ± as long as 2nd sterile lemma; 2nd sterile lemma with a pair of ear-like appendages at base; anther 1.5–2.3 mm long. Intermediates link this subspecies to the other two subspecies.

*Flowering*: October to February. *Ecology*: Sandy (Table Mountain Sandstone) and humic soils; streamsides, in moist places and in shade of rocks. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. WC.

Anatomy vouchers: *Ellis 2288, 2289, 4660, 4671* & *4676*.
Voucher: *Acocks 22484*.


*Ehrharta rehmannii* subsp. *rehmannii*

**Ehrharta rehmannii** Stapf subsp. **rehmannii**, in *Bothalia* 19: 193 (1989). Type: South Africa, Western Cape, Outeniqua Mountains, Montagu Pass, *Rehmann 74* (K, lecto.; PRE, fg.).

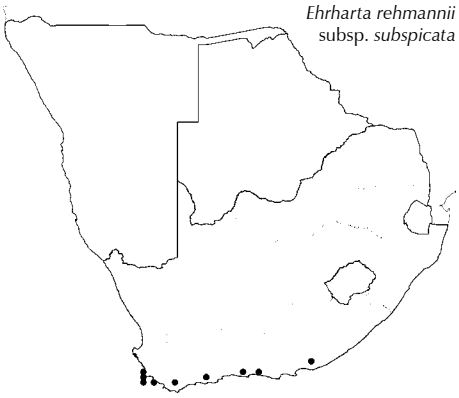
*E. rehmannii* Stapf var. *rehmannii*, in *Kew Bulletin* 1897: 288 (1897).

Tufted erect perennial 300–1 000 mm high. Leaf blade 60–300 × to 6 mm. Inflorescence an open raceme or verticillate panicle, with more than 20 spikelets. Spikelet (5)6–8 × ± 2 mm; glumes ± equal, about as long as spikelet, membranous; sterile lemmas similar, scabrous to shortly hairy, apices usually muticous; 2nd sterile lemma with a pair of ear-like appendages at base; anther 2.8–3.9 mm long.

[A particularly tall, long-leaved form with thick but soft culms and numerous short spikelets (5.5–6.0 mm long) occurs in forests and on rocky ground at George and Knysna.]

*Flowering*: August to December. *Ecology*: Mountain slopes, streamsides and in rocky places, sometimes under trees. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. EC, WC.

Illustration: Chippindall: 36, fig. 4(21) (1955).
Anatomy vouchers: *Ellis 618, 4697, 4698, 4699* & *6001*.
Voucher: *Compton 23076*.


*Ehrharta rehmannii* subsp. *subspicata*

**Ehrharta rehmannii** Stapf subsp. **subspicata** (Stapf) Gibbs Russ., in *Bothalia* 19: 194 (1989). Type: South Africa, Western Cape, stream from Retreat to Muizenberg, *Wolley-Dod 3519* (K, lecto.).

*E. subspicata* Stapf, in *Flora capensis* 7: 676 (1900).

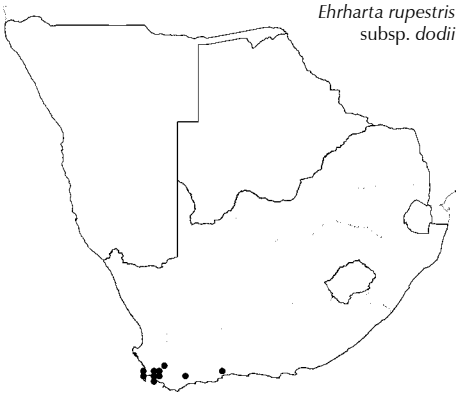
Tufted, erect perennial 300–600 mm high. Leaf blade 30–120(–170) × 4.0–8.5 mm, erect. Inflorescence a narrow raceme of 12–36, erect, adpressed spikelets. Spikelet 6.0–8.5 mm long; glumes ± equal, about as long as spikelet, subcoriaceous; sterile lemmas similar, sides hairless, apices usually muticous; 2nd sterile lemma with a pair of ear-like appendages at base; anther 2.0–3.8 mm long.

*Flowering*: October to December. *Ecology*: Sandy or gravelly soils; in moist places; near sea level. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC, EC.

Illustration: Chippindall: 36, 39, fig. 4(22) & 7 (1955).
Anatomy voucher: *Taylor 7667*.
Voucher: *Esterhuysen 33720*.

**Ehrharta rupestris** Nees ex Trin. subsp. **dodii** (Stapf) Gibbs Russ., in *Bothalia* 15: 150 (1984). Type: South Africa, Western Cape, rocks on Constantia Berg, *Wolley-Dod 1961* (K, holo.).

*E. dodii* Stapf, in *Flora capensis* 7: 670 (1900).

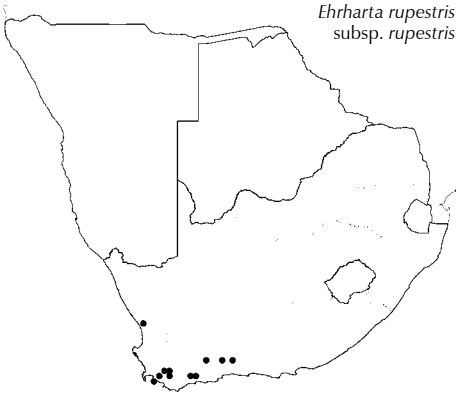

*Ehrharta rupestris* subsp. *dodii*

Delicate perennial less than 250 mm high; trailing, rarely erect; rhizomatous. Leaf blade rolled, erect. Inflorescence a raceme of 1–4 spikelets. Spikelet 4.5–5.0 × to 2 mm; glumes equal, $^1/_3$ as long as spikelet; 1st sterile lemma short, glume-like; 2nd sterile lemma without an ear-like appendage at base, apex canoe-shaped; anther 1.7–2.6 mm long.

*Flowering*: November to January. *Ecology*: Wet places on mountainsides, among rocks and at cliff bases; alt. 660–1 660 m. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

Illustration: Chippindall: 36, fig. 4(2) (1955).
Anatomy vouchers: *Ellis 2286* & *2287*.
Voucher: *Esterhuysen 33084*.

**Ehrharta rupestris** Nees ex Trin. subsp. **rupestris**, in *Bothalia* 15: 150 (1984). Type: South Africa, Western Cape, Caledon Distr., Grenadenthal, *Drège* (many syntypes).


*Ehrharta rupestris* subsp. *rupestris*

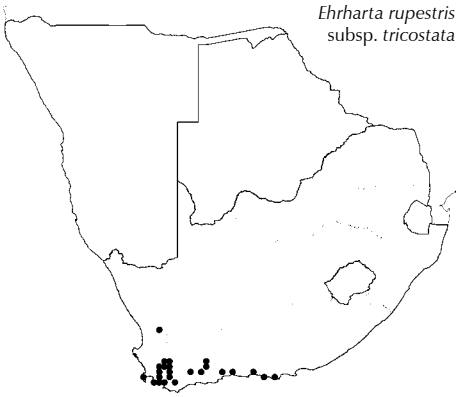
Suffrutescent perennial to 300 mm high; usually robust; long rhizomatous; culm nodes inconspicuous, enclosed by leaf sheaths; leaves distinctly distichous, leaf sheaths overlapping. Leaf blade 20–30 × 2–4 mm, folded, distichous, apex hooded. Inflorescence a raceme of 4–8 spikelets. Spikelet 4.5–6.0 × to 2.5 mm, nearly square; glumes ± equal, $^1/_3$ as long as spikelet; 1st sterile lemma short, glume-like; 2nd sterile lemma without an ear-like appendage at base, apex canoe-shaped; anther 1.3–3.0 mm long.

*Flowering*: October to January. *Ecology*: Mountain slopes among rocks; alt. 910–1 970 m. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

Illustration: Chippindall: 36, fig. 4(3) (1955).
Anatomy vouchers: *Ellis 4685, 5567* & *Van Breda 4436*.
Voucher: *Esterhuysen 21044*.

**Ehrharta rupestris** Nees ex Trin. subsp. **tricostata** (Stapf) Gibbs Russ., in *Bothalia* 15: 150 (1984). Type: South Africa, Western Cape, French Hoek, *Schlechter 9292* (K, holo.).

*E. tricostata* Stapf, in *Flora capensis* 7: 669 (1900).

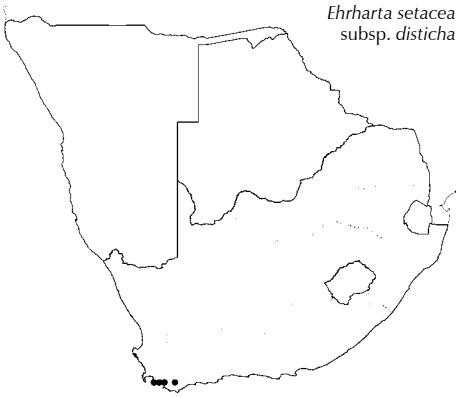

*Ehrharta rupestris* subsp. *tricostata*

Suffrutescent perennial 200–450 mm high; plant thin, wiry; rhizomatous; culm nodes conspicuous, not enclosed by leaf sheaths; leaf sheaths not overlapping, lowest leaf sheaths blade-bearing. Leaf blade to 100 × to 2.5 mm, usually rolled, setaceous, rarely expanded. Inflorescence a raceme of 4–9 spikelets. Spikelet 4.6–6.3 × to 2 mm; glumes ± equal, $^1/_3$ as long as spikelet; 1st sterile lemma

short, glume-like; 2nd sterile lemma without an ear-like appendage at base, apex canoe-shaped; anther 2.5–3.2 mm long.

*Flowering*: October to February. *Ecology*: Wet places on mountain slopes and at base of cliffs; alt. 300–2 030 m. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. NC, WC, EC.

Illustration: Chippindall: 36, fig. 4(4a) (1955).
Anatomy voucher: *Ellis 2547, 4690, 4700* & *5526*.
Voucher: *Fourcade 3132*.

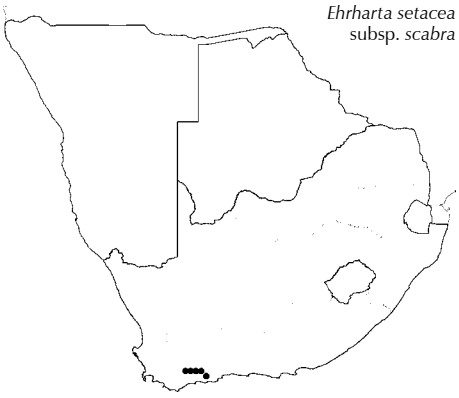

*Ehrharta setacea* subsp. *disticha*

**Ehrharta setacea** Nees subsp. **disticha** (Stapf) Gibbs Russ., in *Bothalia* 15: 151 (1984). Type: South Africa, Western Cape, Caledon District, Maanschynkop, Rocklands Peak, *Esterhuysen 31735* (PRE, holo.).

Delicate, suffrutescent perennial to 250 mm high; rhizomatous, cushion-forming; lowest culm nodes usually leafless. Leaf blade to 30 mm long, distichous, hard, rolled. Inflorescence a raceme of 1–2 spikelets. Spikelets 4–5 mm long; glumes ± equal, slightly shorter than spikelet; 1st sterile lemma short, glume-like; 2nd sterile lemma without an ear-like appendage at base, apex canoe-shaped; anther 2.6 mm long.

*Flowering*: October to November. *Ecology*: Dry rocky places on mountain slopes; alt. 580–1 225 m. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

Anatomy voucher: *I. Williams 3086* (epidermis only).
Voucher: *Esterhuysen 31735*.


*Ehrharta setacea* subsp. *scabra*

**Ehrharta setacea** Nees subsp. **scabra** (Stapf) Gibbs Russ., in *Bothalia* 15: 151 (1984). Type: South Africa, Western Cape, Swellendam Div., in mountain peak near Swellendam, *Burchell 7312* (K, holo.; PRE, fg.).

*E. setacea* Nees var. *scabra* Stapf, in *Flora capensis* 7: 669 (1900).

Suffrutescent perennial 250–600 mm high; long-rhizomatous and stoloniferous. Leaf blade 30–110 × to 6 mm, scabrous, expanded at base, rolled near apex. Inflorescence a raceme of 5–15 spikelets. Spikelet (6.5–)7.0–8.0 mm long; glumes almost equal, $^{2}/_{3}$–$^{3}/_{4}$ as long as spikelet; 1st sterile lemma short, glume-like; 2nd sterile lemma without an ear-like appendage at base, apex canoe-shaped; anther 2.0–3.9 mm long.

*Flowering*: October to January (sporadically to March). *Ecology*: Mountainsides; among rocks, in seepage areas and in disturbed places; alt. 350–1 212 m. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

Anatomy vouchers: *Ellis 1678, 1679, 2544, 4652, 4653, 4689, 5544* & *5555*.
Voucher: *Haynes 868*.

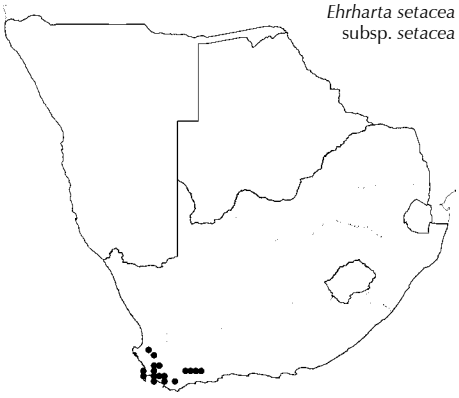
**Ehrharta setacea** Nees subsp. **setacea**, in *Flora capensis* 7: 668 (1900). Type: South Africa, Western Cape, 'in monte tabulari', *Drège* (PRE, fg.).

Suffrutescent perennial 250–400 mm high; rhizomes long; lowest leaf sheaths bladeless. Leaf blade 50–80(–110) mm long, setaceous,

hard, smooth. Inflorescence a raceme of 5–15 spikelets. Spikelet 5.5–6.8 mm long; glumes almost equal, $^{2}/_{3}$ or more as long as spikelet; 1st sterile lemma short, glume-like; 2nd sterile lemma without an ear-like appendage at base, apex canoe-shaped; anther 2.5–3.5 mm long.

*Flowering*: September to December (sporadically to April). *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. WC.

Illustration: Chippindall: 36, 37, fig. 4(4) & 5 (1955).
Anatomy vouchers: *Ellis 2273, 2294* & *4679*.
Voucher: *Esterhuysen 28669*.


*Ehrharta setacea* subsp. *setacea*

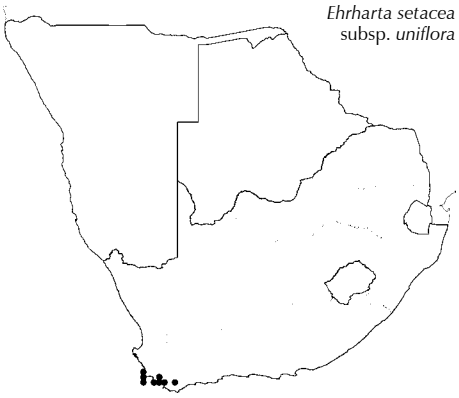
**Ehrharta setacea** Nees subsp. **uniflora** (Burch. ex Stapf) Gibbs Russ., in *Bothalia* 15: 151 (1984). Type: South Africa, Western Cape, Cape flats near Rondebosch, *Burchell 182* (K, holo.).

*E. uniflora* Burch. ex Stapf, in *Flora capensis* 7: 670 (1900).

Delicate perennial, trailing, forming dense masses; rhizomatous; lowest culm nodes bearing sheaths with leaf blades. Leaf blade 50–80 × to 2 mm, soft, expanded, not distichous. Inflorescence a raceme of 1–4 spikelets. Spikelet 4.5–6.5 mm long; glumes almost equal, usually slightly longer than spikelet; 1st sterile lemma short, glume-like; 2nd sterile lemma without an ear-like appendage at base, apex canoe-shaped; anther 1.5–2.2 mm long.

*Flowering*: September to December (occasionally to March). *Ecology*: Wet places and forest margins; alt. 10–500 m. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

Illustration: Chippindall: 36, fig 4(5) (1955).
Anatomy vouchers: *Ellis 4670* & *5538*.
Voucher: *Esterhuysen 34039*.


*Ehrharta setacea* subsp. *uniflora*

**Ehrharta thunbergii** Gibbs Russ., in *Bothalia* 17,2: 191 (1987). Type: South Africa, *Thunberg*, (sheet 8851, UPS, holo.).

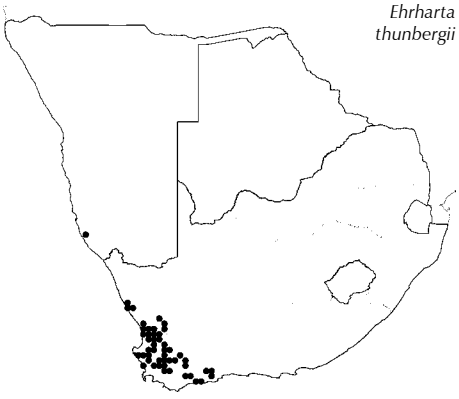
*E. gigantea* Thunb., in *Prodromus plantarum capensium*: 192 (1800).

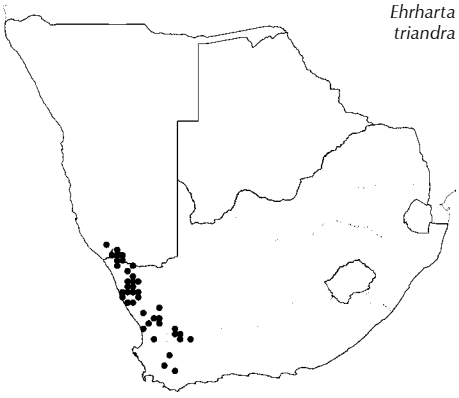
*E. virgata* Launert, in *Mitteillungen der Botanischen Staatssammlung München* 4: 162 (1961). Type: Namibia, Klinghart Mts., *Dinter 3968* (PRE, iso.).

Tufted, erect perennial to 1 500 mm high; rhizome long; base sub-bulbous, with overlapping hairy cataphylls. Leaf blade 30–100 × to 5 mm, rolled, often deciduous. Spikelet 8–10 × 2–3 mm; glumes almost equal, $^{1}/_{2}$–$^{3}/_{4}$ as long as spikelet, translucent, 5-nerved; sterile lemmas similar, profusely hairy, awned; 2nd sterile lemma without an ear-like appendage at base; anther 4.0–5.1 mm long.

*Flowering*: September to December. *Ecology*: Hill slopes in sandy or gravelly soil, occasionally in coastal sand. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Endemic. N, NC, WC.

Anatomy vouchers: *Ellis 708, 1152, 4633, 4635, 4640, 4642, 4648, 4693* & *5413*.
Voucher: *Acocks 23393*.


*Ehrharta thunbergii*

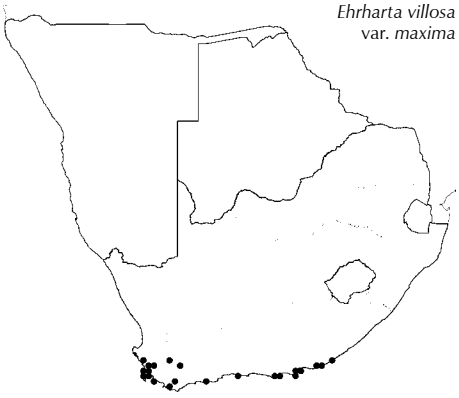

*Ehrharta triandra*

**Ehrharta triandra** Nees ex Trin., in *Phalaridea*, *Mémoires de l'Académie imperiale des Science de St. Pétersbourg*, sér. 6,5: 13 (of reprint) 61 (1839). Type: South Africa, Western Cape, Cape of Good Hope.

Leafy annual 60–450 mm high. Leaf blade 30–120 × 2–6 mm, expanded, thin. Spikelet 6–11(–14) mm long (including awns); glumes ± equal, more than $^2/_3$ as long as spikelet (excluding awn); sterile lemmas similar, sub-glabrous, tufted hairs usually absent at base, sides with 4–8 strong transverse ribs, apices awned; 2nd sterile lemma without an ear-like appendage at base; anther 1.0–1.5 mm long.

*Flowering*: July to October. *Ecology*: Hillsides in shade of rocks and shrubs and in wet places, sometimes in disturbed places and roadsides. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NC, WC.

Illustration: Chippindall: 36, fig. 4(7) (1955).
Anatomy voucher: *Ellis 5088*.
Voucher: *Goldblatt 2819*.

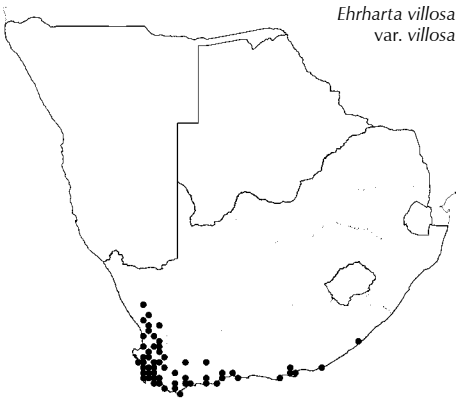

*Ehrharta villosa* var. *maxima*

**Ehrharta villosa** J.H.Schult. var. **maxima** Stapf, in *Flora capensis* 7: 681 (1900). Type: South Africa, without precise locality, *Ecklon & Zeyher 409* (PRE, iso.).

Tufted robust, erect perennial to 1 500 mm high; long, rhizomes naked; culm to 5 mm wide. Leaf blade 15–130 × to 8 mm rolled, often deciduous. Inflorescence subtended by inflated leaf sheath. Spikelet (10–)12–18 × to 4 mm; glumes almost equal, $^3/_4$ as long to about equalling spikelet; sterile lemmas similar, profusely hairy; 2nd sterile lemma without an ear-like appendage at base; anther 6.7–8.9 mm long.

*Flowering*: September to March (sporadically). *Ecology*: Seaside dunes. *Frequency in southern Africa*: Rare. Locally dominant. *Distribution*: Endemic. WC, EC. *Economics*: Erosion control.

Illustration: Chippindall: 36, fig. 4(12) (1955).
Anatomy voucher: *Ellis 601*.
Voucher: *Boucher 1689*.


*Ehrharta villosa* var. *villosa*

**Ehrharta villosa** J.H.Schult. var. **villosa**, in *Flora capensis* 7: 681 (1900). Type: South Africa, 'promont. b. spei, in arenosis maritimis', *Ecklon* (P, holo.).

Tufted, erect, robust perennial to 1 500 mm high; rhizomes long, naked; culm to 3 mm wide. Leaf blade 30–130 × to 8 mm, rolled, often deciduous. Inflorescence exserted from uppermost leaf sheath. Spikelet 11–14 × to 3 mm; glumes almost equal, $^3/_4$ as long to about equalling spikelet; sterile lemmas similar, profusely hairy; 2nd sterile lemma without an ear-like appendage at base; anther 5.0–7.0 mm long.

*Flowering*: October to December. *Ecology*: Seaside dunes, to 1 km inland. *Frequency in southern Africa*: Rare. Locally dominant. *Distribution*: Endemic. Introduced into Australia. NC, WC, EC. *Economics*: Erosion control.

Illustration: Chippindall: 36, fig. 4(12) (1955).
Anatomy vouchers: *Ellis 1686, 1284, 4665 & 5472*.
Voucher: *Cleghorn 3122*.

## **Eleusine** Gaertn.

Gaertner: 7 (1788); Stapf: 644 (1900); Stent: 291 (1924); Hitchcock & Chase: 499 (1950); Chippindall: 129 (1955); Kennedy-O'Byrne: 65 (1957); Launert: 74 (1970a); Phillips: 251 (1972); Phillips: 260 (1974); Hilu & De Wet: 199 (1976); Hilu & De Wet: 1311 (1976); De Wet et al.: 550 (1984); Clayton & Renvoize: 221 (1986); Gibbs Russell et al.: 129 (1990); Watson & Dallwitz: 364 (1994); Hilu: 410 (1994); Phillips: 138 (1995); Cope: 156 (1999); Hilu: 109 (2003).

Annual or perennial, tufted; sometimes stoloniferous. **Leaf blade** linear, expanded or folded, strongly keeled, blunt at apex; sheaths keeled, margins free; *ligule* a fringed membrane, rarely an unfringed membrane. **Inflorescence** of 2–many racemes, digitate or subdigitate, sometimes compact clusters; *spikelets* solitary, subsessile, arranged in 2 rows on one side of a flattened rachis. **Spikelet** laterally compressed, disarticulating above glumes and between florets or not disarticulating (cultivated races); *glumes* very unequal, shorter than spikelet, keeled, scabrid on keels, awnless; lower glume 1–3-nerved; upper glume 3–7-nerved, herbaceous with membranous margins, narrowly winged on keel. **Florets** 2–15, bisexual or *uppermost floret* reduced; *lemmas* similar, membranous, glabrous, strongly keeled, keel sometimes thickened, 3-nerved, sometimes with 1–3 closely spaced additional nerves, lateral nerves often shorter than lemma, awnless to mucronate; *palea* slightly shorter than lemma, notched at apex, 2-keeled with keels winged. **Lodicules** 2, minute, cuneate, glabrous. **Stamens** 3. **Ovary** glabrous; styles slender from a broadened base, distinct, plumose above. **Caryopsis** ellipsoid to subglobose, surface ornamented, enclosed in a free pericarp; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; NAD-ME (2 species); XyMS+. PCR sheath outline even. PCR sheath extensions absent. PCR cell chloroplasts with well-developed grana; centripetal. **Cytology**: $x = 9$ (polyploidy).

**Species** 9, mainly Africa; 4 in southern Africa, widespread.

Species treatment by A.C. Mashau.




Figure 189.—*Eleusine coracana* subsp. *africana*. A, plant; B, spikelet. Artist: B. Connell.

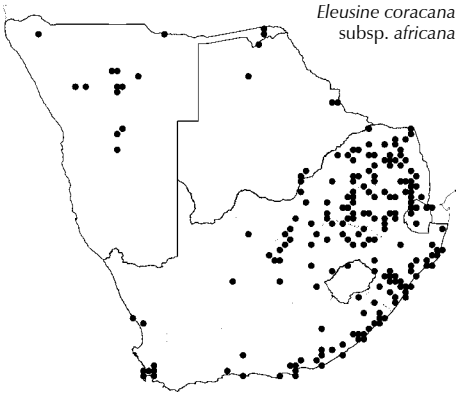
**Key to species:**

1. Perennial; inflorescence digitate; lemma narrowly oblong-lanceolate . . . . . ***E. tristachya**
   Annual; inflorescence subdigitate, sometimes in compact clusters, alternating on a short axis; lemma lanceolate, broadly lanceolate to narrowly ovate . . . . . 2
2. Lemma apex cuspidate or obtuse and mucronate; inflorescence of compact clusters, alternating on a short axis . . . . . ***E. multiflora**
   Lemma apex acute to subacute; inflorescence subdigitate . . . . 3
3. Spikelet 2.0–2.5 mm wide; upper glume 1.8–2.9 mm long; lemma 2.1–3.6 mm long; ligule a sparsely fringed membrane . . . . ***E. indica**
   Spikelet 3–4 mm wide; upper glume 3.0–4.7 mm long; lemma 3.5–5.0 mm long; ligule a densely fringed membrane . . . . . **E. coracana** subsp. **africana**

*Eleusine coracana* subsp. *coracana* is a cultivated form commonly known as *rapoko* or finger millet. It is often found as an escape in Mozambique, Malawi and Zimbabwe and other tropic and subtropical regions of the Old World but has not yet been recorded for the FSA region. It is thought to be derived from *E. coracana* subsp**.** *africana* and has been in cultivation for at least 5 000 years.



Figure 190.—*Eleusine coracana* subsp. *africana* spikelet (5–8 mm). Photographer: M. Koekemoer.


*Eleusine coracana* subsp. *africana*

**Eleusine coracana** (L.) Gaertn. subsp. **africana** (Kenn.-O'Byrne) Hilu & de Wet, in *Economic Botany* 30: 202 (1976). Type: South Africa, Northern Cape, Warrenton-on-Vaal, *Wilman H.K.1* (K, holo.; PRE, iso.).

*E. africana* Kenn.-O'Byrne, in *Kew Bulletin* 1957: 56 (1957).

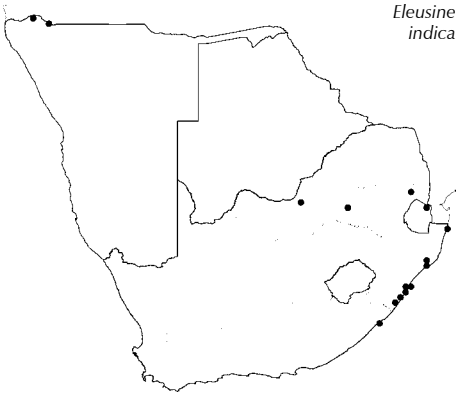
*E. indica* (L.) Gaertn. subsp. *africana* (Kenn.-O'Byrne) S.M.Phillips, in *Kew Bulletin* 27: 259 (1972).

African finger millet, osgras

Tufted annual 210–620 mm high; culm moderately robust, geniculately ascending, frequently rooting at lower nodes. Leaf blade 220–500 × 6–10 mm; ligule a distinctly fringed membrane. Inflorescence subdigitate; racemes 3–13, 60–170 × 4–10 mm, slender. Spikelet 5–8 × 3–4 mm, 2–6-flowered; lower glume acute, 2–3-nerved; upper glume 3.0–4.7 mm long, acute; lemma 3.5–5.0 mm long, lanceolate, apex acute to subacute, keel scabrid; palea keels scabrid along the wings; anther 0.5–1.0 mm long; caryopsis oblong, uniformly granular and obliquely ridged.

*Flowering*: October to May. *Ecology*: Ruderal, on many soil types. *Frequency in southern Africa*: Common. *Distribution*: Northwards mainly in the east, rare in West Africa; also Arabia; introduced in Japan and Australia. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Grains are ground up for porridge or left to germinate for beer while eaten as a vegetable in Indonesia; used for plaiting bracelets. Used in traditional medicine as an internal remedy for leprosy or liver diseases; the hydrocyanic acid is used in the chemical industry. Weed in cultivated lands and disturbed places.

Illustration: Chippindall: 131, fig. 103 (1955).
Anatomy vouchers: *Ellis 392, 728, 550, 739 & 3692*.
Voucher: *Smook 5427*.


*Eleusine indica*

***Eleusine indica** (L.) Gaertn., in *De fructibus et seminibus plantarum* 1: 8 (1788). Type: Sri Lanka.

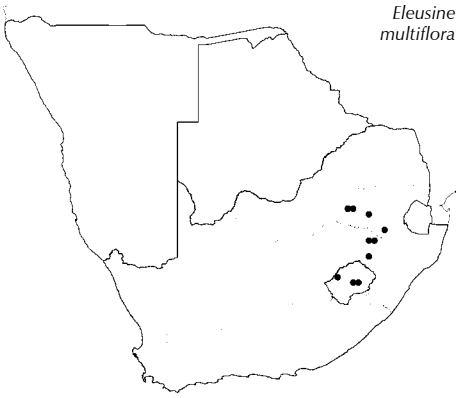
Osgras, goose grass

Tufted annual 230–400 mm high; culm slender, often branching at the lower nodes. Leaf blade 50–350 × 2.5–6.0 mm; ligule a sparsely fringed membrane. Inflorescence subdigitate; racemes 1–14, 20–120 × 3.0–5.5 mm, slender. Spikelet 4–5 × 2–3 mm, 4–9-flowered; lower glume lanceolate to narrowly lanceolate-oblong, acute, 1-nerved; upper glume 1.8–2.9 mm long, acute; lemma 2.1–3.6 mm long, lanceolate, apex acute to subacute, keel scabrid; palea keels scabrid along the wings; anther 0.6–1.1 mm long; caryopsis elliptic or lanceolate-elliptic, obliquely striate and with fine close lines perpendicular to the striae.

*Flowering*: November to February. *Ecology*: Ruderal; on rocky or turf soils. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Naturalised from India. Worldwide in tropics and subtropics; mainly in western Africa and along eastern and southeastern African coast. N, S, NW, G, M, KZN, EC. *Economics*: Grown occasionally as grain; used as a cough remedy in traditional medicine, or the hydrocyanic acid is used in the chemical industry. Reported from Australia and elsewhere as being poisonous as young plants sometimes contains hydrogen cyanide and are responsible for deaths of calves and sheep. Serious weed worldwide, also host for numerous fungi, nematodes and viruses.

Illustration: Chippindall: 130, fig. 102 (1955); Hitchcock & Chase: 500, fig. 734 (1950); Hilu: 111 (2003).
Voucher: *Stirton 8781*.

***Eleusine multiflora** A.Rich., in *Tentamen Florae Abyssinicae* 2: 412 (1851). Type: Ethiopia, near Adoa, *Schimper 110* (P, holo.).

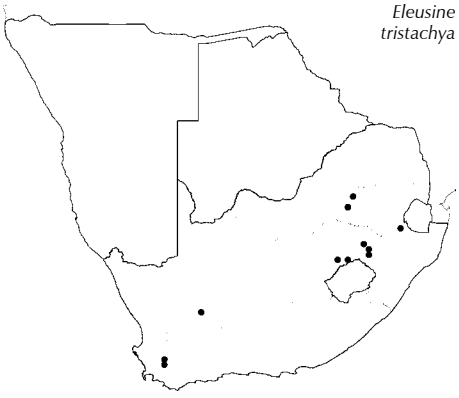

*Eleusine multiflora*

Tufted annual 120–400 mm high; culm fairly slender and ascending. Leaf blade 60–260 × 3–6 mm; ligule a fringed membrane. Inflorescence of compact clusters; racemes 2–8, 15–25 × 8–15 mm, stout, alternating on a short axis. Spikelet 7–11 mm long, 5–15-flowered, disarticulating above the glumes and between the florets at maturity; lower glume narrowly oblong, 1-nerved, apex subacute; upper glume 2.8–4.2 mm long, oblong, acute to obtuse; lemma 3.3–5.2 mm long, broadly lanceolate to narrowly ovate, apex cuspidate or obtuse and mucronate, keel scabrid; palea keels scabrid along the wings; anther 0.6–1.0 mm long; caryopsis laterally compressed, surface obliquely rugose and finely granular.

*Flowering*: February to April. *Ecology*: Disturbed places in bush or grassveld. *Frequency in southern Africa*: Rare. *Distribution*: Tropical East Africa to Ethiopia. L, G, M, FS. *Economics*: Weed in cultivated lands.

Voucher: *Smook 5050*.

***Eleusine tristachya** (Lam.) Lam., in *Tableau Encyclopédique et méthodique des trois Régnes de la Nature. Botanique* 1: 203 (1791). Type: Uruguay.


*Eleusine tristachya*

Goose grass

Tufted perennial 70–180 mm high; culm slender. Leaf blade 50–180 × 3–5 mm; ligule a fringed membrane. Inflorescence digitate; racemes 1–4, 10–25 × 4–11 mm, stout. Spikelet 4–7 mm long; 2 to 3-flowered, disarticulating above the glumes and between the florets at maturity; lower glume oblong-lanceolate, 1-nerved, apex subacute; upper glume 3–4 mm long, acute to subacute; lemma 4–5 mm long, narrowly oblong-lanceolate, apex obtuse or subacute, keel scabrid; palea keels scabrid; anther 0.5–0.8 mm long; caryopsis broadly trigonous, surface coarsely striate.

*Flowering*: February to April. *Ecology*: Disturbed weedy places. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from tropical America, rarely occurs in eastern North America and tropical Africa. G, M, FS, NC, WC.

Illustration: Hilu: 111 (2003).
Anatomy voucher: *Ellis 3127*.
Voucher: *Acocks 23824*.

## **Elionurus** Kunth ex Willd.

Willdenow: 901 (1806) as *Elyonurus*; Stapf: 332 (1898); Phillips & Bredell: 259 (1937); Chippindall: 518 (1955); Clayton & Renvoize: 835 (1982); Clayton & Renvoize: 362 (1986); Gibbs Russell et al.: 130 (1990); Watson & Dallwitz: 366 (1994); Cope: 156 (2002).

Perennial or annual, tufted, often aromatic. **Leaf blade** folded or flat; *ligule* a very short, fringed membrane or a fringe of hairs. **In-**




Figure 191.—*Elionurus muticus*. A, plant; B, ligule. Artist: C. Smith.



Figure 192.—*Elionurus muticus*. Spikelet pair (6–14 mm). Photographer: M. Koekemoer.

**florescence** a solitary spike-like raceme, terminal or sometimes axillary forming a spatheate, leafy false panicle; racemes flexuous, dorsally flattened; internodes columnar to subclavate; joints oblique; *spikelets* secund, in pairs, in long–short combinations: one sessile, the other pedicelled, pedicels free of rachis. **Sessile spikelet** lanceolate, dorsiventrally compressed, falling with glumes, hairy to sparsely hairy; *glumes* ± equal to unequal, dissimilar, awned to awnless; lower glume laterally 2-keeled, keels not winged, hairy or glabrous, usually bordered by a brown oil streak, entire or with a cuspidate to bifid apex; upper glume lanceolate, acute, membranous, 1-keeled, usually hairy. **Florets** 2; *lower floret* sterile, reduced to a hyaline lemma; *upper floret* bisexual; *lemma* hyaline, less firm in texture than glumes, awnless; *callus* cuneate, large, hairy, hairs white or silver, less than half the spikelet length; *palea* minute or 0. **Lodicules** 2, cuneate, fleshy, glabrous. **Stamens** 3. **Ovary** glabrous; styles plumose above. **Caryopsis** ellipsoid, dorsiventrally compressed; hilum short; embryo large. **Pedicelled spikelet** well developed, acute to acuminate or with short awn-point, glabrous or hairy. **Florets** 2, male only, rarely reduced and sterile; lemma awnless. **Photosynthetic pathway**: $C_4$; XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x$ = 5, 10.

**Species** 15, cosmopolitan, tropical and subtropical; 2 in southern Africa: *Elionurus muticus* (Spreng.) Kuntze, widespread except Western Cape; and *E. tripsacoides* Willd., northeast Namibia.

Species treatment by A.C. Mashau.

**Quick guide to easily confused taxa:**

1. Sessile spikelet upper lemma long awned . . . . . **Schizachyrium ursulus**, **S. jeffreysii**
   Sessile spikelet upper lemma awnless . . . . . 2
2. Spikelets in clusters, with outer glumes hard and forming an involucre . . . . . **Anthephora pubescens**
   Spikelets in pairs, hard involucre absent . . . . . 3
3. Spikelets in pairs, dissimilar . . . . . **Elionurus muticus**
   Spikelets all similar . . . . . **Digitaria monodactyla**

**Key to species:**

Leaves basal; lower glume of sessile spikelet with dense long hairs on back; inflorescence conspicuously hairy . . . . . **E. muticus**
Leaves mostly cauline; lower glume of sessile spikelet glabrous or with a few sparse hairs on back; inflorescence glabrous except for short hairs on rachis and pedicels . . . . . **E. tripsacoides**

**Elionurus muticus** (Spreng.) Kuntze, in *Revision generum plantarum* 3: 350 (1898). Type: Uruguay.

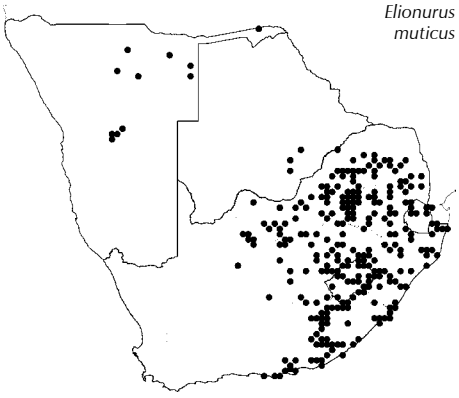
*E. argenteus* Nees, in *Florae Africanae australioris* 1: 95 (1841). Type: South Africa, Eastern Cape, Wittenbergen, *Drège* (many syntypes).

*E. glaber* E.Phillips, in *Bothalia* 3: 261 (1937). Type: South Africa, Gauteng, Pretoria, *Liebenberg 3241* (PRE, holo.).

*E. glaber* E.Phillips var. *villosus* E.Phillips, in *Bothalia* 3: 261 (1937). Type: South Africa, Gauteng, *Moss 6852* (many syntypes).

*E. pretoriensis* E.Phillips, in *Bothalia* 3: 262 (1937). Type: South Africa, Gauteng, Pretoria, *Mogg in Nat. Herb. 20576* (PRE, holo.).

SILKY GRASS, WIRE GRASS, KOPERDRAAD, SUURPOL, WILDEBEESTEGRAS

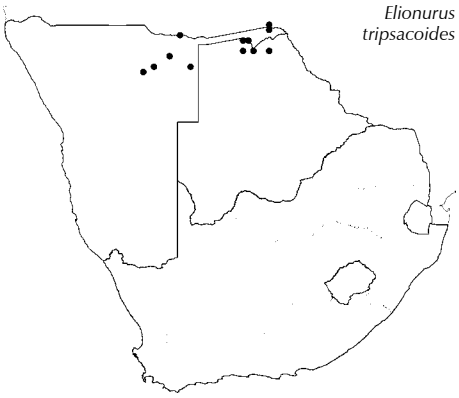

*Elionurus muticus*

Densely tufted perennial 200–1 200 mm high; leaves mainly basal. Leaf blade 10–150 × 1–2 mm, setaceous; bitter tasting, sometimes aromatic when fresh; green, becoming copper coloured late in the season. Mature inflorescence brown or straw coloured, typically curled like a sickle; rachis internodes densely hairy with spreading hairs. Sessile spikelet 6–14 mm long, 2-flowered, awnless; lower glume with long dense, silky, white hairs, apex bidentate or entire; anther 2.6–3.8 mm long. Pedicellate spikelet 4–7 mm long, lanceolate, pubescent to villous, acuminate or with a short awn-point.

*Flowering*: September to May. *Ecology*: In open grassland, especially sourveld. *Frequency in southern Africa*: Common to dominant. *Distribution*: Tropical and subtropical Africa, Yemen and Americas. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, EC. *Economics*: A very unpalatable grass which is utilised mainly in spring; being one of the first grasses to sprout. Appears to increase with regular burning and disappear if not grazed; indicator of veld mismanagement; also a ruderal weed.

Illustrations: Chippindall: 465, pl. 27 (1955); Clayton et al.: 836, fig. 195 (1982); Cope: 157, tab. 51 (2002).
Anatomy vouchers: *Ellis 51, 718, 2807* & *2822*.
Voucher: *De Winter 2551*.

**Elionurus tripsacoides** Humb. & Bonpl. ex Willd., *Species plantarum*, ed. 4,4: 941 (1806). Type: Venezuela.


*Elionurus tripsacoides*

Tufted perennial 600–1 500 mm high; leaves mostly cauline. Leaf blade 200–300 × 1–3 mm. Inflorescence rachis internode glabrous or adpressed hairy. Sessile spikelet 5–8 mm long; lower glume glabrous or with few hairs, apex entire or shortly bidentate; anther 1.8–2.3 mm long. Pedicellate spikelet 4 to 5 mm long, lanceolate, glabrous, acute.

[Occasionally intergrades with *E. muticus* and plants with sparingly branched culms and slightly hairy spikelets are a particular problem. Specimens from Caprivi Strip with glabrous inferior spikelets are regarded as forms of *E. tripsacoides*.]

*Flowering*: October to May. *Ecology*: Open places in savanna. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to East Africa and tropical America. N, B.

Anatomy voucher: *Ellis 3721*.
Voucher: *Ellis 2997*.



Figure 193.—*Ellisochloa rangei* specimen.

## **Ellisochloa** P.M.Peterson & N.P.Barker

Nees: 333 (1841) under *Danthonia*; Pilger: 386 (1909) under *Danthonia*; Conert: 129 (1970) under *Merxmuellera*; Peterson et al.: 1113 (2011).

Tufted perennial; basal sheaths glabrous. **Leaf blade** filiform or flat to folded, sometimes pungent; *ligule* a fringe of hairs. **Inflorescence** a contracted panicle, lanceolate to oblong. **Spikelet** cuneate, laterally compressed; disarticulating between florets and above glumes; *glumes* equal, longer than spikelet, lanceolate, apex acute to acuminate, keel absent, 1–3-nerved. **Florets** 2–3; *lemma* oblong, chartaceous, 9-nerved, hairs in 4–6 tufts in a transverse row; lobed; central awn 9–18 mm long, geniculate, column twisted; *palea* same length as lemma, hairy. **Lodicules** 2, truncate, fleshy, glabrous. **Stamens** 3. **Ovary** ovoid, glabrous; styles 2, long and plumose. **Caryopsis** pericarp fused.

**Species** 2, southern Africa; Namibia and Eastern Cape.

Species treatment by L. Fish.

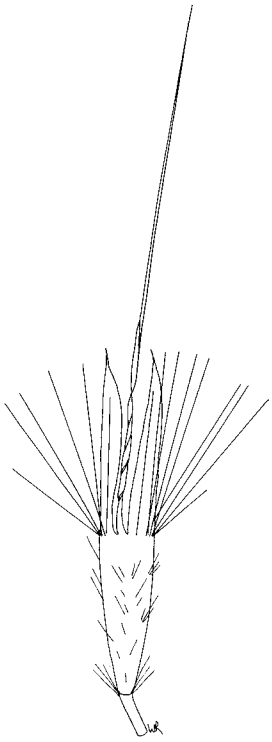
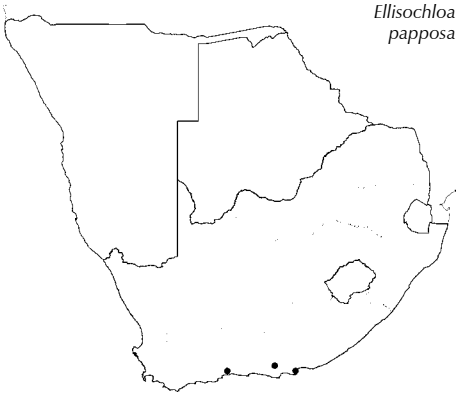


Figure 194.—*Ellisochloa rangei* lemma. Artist: W. Roux.

**Key to species:**

Spikelet 11–14 mm long (including awns); glumes 9–12 mm long; lemma awn 9–12 mm long; inflorescence 40–60 mm long . . . . . **E. rangei**

Spikelet 20–25 mm long (including awns); glumes 13–18 mm long; lemma awn 15–18 mm long; inflorescence 120–150 mm long . . . . . **E. papposa**



*Ellisochloa papposa*

**Ellisochloa papposa** (Nees) P.M.Peterson & N.P.Barker, in *Taxon* 60: 1113 (2011). Type: South Africa, Eastern Cape, Uitenhage, Zwartkopsrivier, *Ecklon 137* (lectotype).

*Merxmuellera papposa* (Nees) Conert, in *Senckenbergiana Biologica* 51: 133.

*Danthonia papposa* Nees, in *Florae africae australioris*: 333 (1841).

Tufted perennial to 500 mm high; base of plant glabrous. Leaf blade 120–300 mm long. Inflorescence 120–150 mm long, dense. Spikelet 20–25 (including awns) × 5–7 mm; glumes 13–18 mm long, acuminate, 3-nerved; 2–3-flowered; lemma 9–10 mm long; lobes 5 mm long, free from the central awn; tufts of 5–7 mm long white hairs near apex, tufts of shorter hairs just below on the margins; rest of lemma hairy, hairs up to 1 mm long; central awn 15–18 mm long, geniculate; anther 2.2–4.0 mm long.

*Flowering*: December and January. *Frequency in southern Africa*: Rare, known from only a few localities between Uitenhage and Grahamstown and possibly near George. *Distribution*: Endemic. WC?, EC.

Voucher: *Barker & Mafa* 1759, *Acocks 23073*.

**Ellisochloa rangei** (Pilg.) P.M.Peterson & N.P.Barker, in *Taxon* 60: 1113 (2011). Type: Namibia, Buscheln wachsend, *Range 89*.

*Merxmuellera rangei* (Pilg.) Conert, in *Senckenbergiana Biologica* 51: 133.

*Danthonia rangei* Pilg., in *Botanische Jahrbücher*, 43: 386 (1909).

Tufted perennial 120–300 mm high; base of plant glabrous or only woolly at the very base; upper 2 nodes of culm often conspicuously dark brown or black; basal sheaths persistent and papery. Leaf blade 35–140 × to 1.3 mm, cylindrical with small adaxial groove, pungent. Inflorescence 40–60 mm long, contracted and partially enclosed by uppermost sheath. Spikelet 11–14 (including awns) × to 2 mm; glumes 9–12 mm long, 1–3-nerved; 2-flowered; lemma 7 mm long, lobes 4 mm long, tufts of 3–4 mm long white hairs near apex, rest of lemma hairy, hairs up to 0.8 mm long; central awn 9–10 mm long, geniculate; anther 3.0–3.8 mm long.

*Flowering*: August to October. *Ecology*: Dry, sandy areas; between hills and koppies. *Frequency in southern Africa*: Has very restriction distribution, occurring between Aus and the Orange River. *Distribution*: Endemic. N. *Economics*: Natural pasture for sheep and goats.

Anatomy vouchers: *Ellis 5069, Merxmüller & Giess 28264 & 28796, Schlieben 11599 & De Winter & Giess 6323*.
Voucher: *De Winter & Giess 6323*.

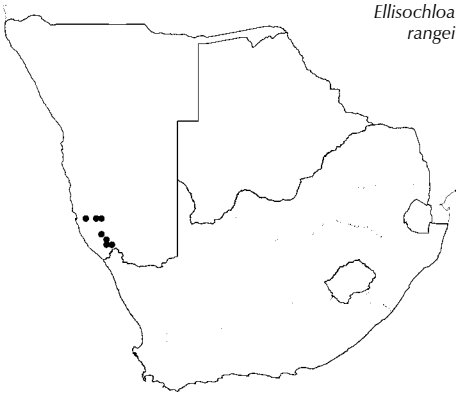





Figure 196.—*Elymandra grallata* specimen.

## **Elymandra** Stapf

Stapf: 407 (1919); Clayton: 287 (1966b); Clayton & Renvoize: 823 (1982); Clayton & Renvoize: 357 (1986); Gibbs Russell et al.: 131 (1990); Watson & Dallwitz: 367 (1994); Cope: 138 (2002).



Figure 195.—*Elymandra grallata* spikelet pair (6.5–12.0 mm). Photographer: M. Koekemoer.

Tufted perennial or annual. **Leaf blade** linear, expanded, long tapering to a fine apex; *ligule* an unfringed membrane, truncate. **Inflorescence** of paired or rarely solitary racemes, long exserted from narrow spatheoles and gathered into a false panicle; raceme bases filiform, unequal, rarely deflexed; internodes and pedicels linear; racemes with 1–10 homogamous spikelet pairs but often only the lower spikelet homogamous and sessile; *spikelets* in pairs or triplets, usually in long–short combination. **Sessile spikelet** linear-oblong, ± terete, falling with the glumes; *glumes* ± equal, coriaceous, awned, dissimilar; lower glume rounded on back and sides, not grooved, obtuse or truncate, at length dark brown; upper glume 3-nerved, back rounded and grooved, obliquely awned. **Florets** 2; *lower floret* sterile, reduced to a hyaline lemma; *upper floret* bisexual; *lemma* hyaline, often with a deeply bilobed apex, awned from sinus; *awn* stout, geniculate, column hairy; *callus* pungent; *palea* 0. **Lodicules** 2, glabrous, small. **Stamens** 3. **Ovary** glabrous; styles plumose, laterally exserted. **Caryopsis** narrowly ellipsoid. **Pedicelled spikelet** male or sterile, narrowly lanceolate, usually as long as sessile



Figure 197.—*Elymandra grallata*. Spikelet pair; awned sessile and unawned pedicelled spikelets. Artist: W. Roux.

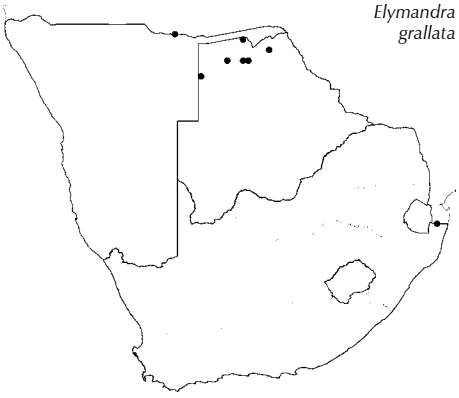






Figure 198.—*Elytrigia repens*. A, plant; B, spikelet (20 × 5 mm). Artist: W. Roux.

spikelet, white-villous; *callus* well developed. **Photosynthetic pathway**: $C_4$; XyMS-. **Cytology**: $x = 10$.

**Species** ± 6, tropical Africa; 1 in southern Africa: *Elymandra grallata* (Stapf) Clayton, Namibia (Caprivi area) and northern Botswana.

Species treatment by M.J. Moeaha.

**Quick guide to easily confused genera:**

1. Sessile spikelet lower glume with a median longitudinal groove . . . . . **Hyperthelia**
   Sessile spikelet lower glume convex on the back and without a longitudinal groove . . . . . 2
2. Sessile spikelet upper glume mucronate or awnless . . . . . **Hyparrhenia**
   Sessile spikelet upper glume awned . . . . . **Elymandra**

**Elymandra grallata** (Stapf) Clayton, in *Kew Bulletin* 20: 292 (1966). Type: Angola, *Gossweiler 8739* (syntype).

*Hyparrhenia grallata* Stapf, in *Flora tropical Africa* 9: 320 (1918). Type: Angola, *Gossweiler 1842, 2781, 4040* (syntypes).

*H. eylesii* C.E.Hubb., in *Bulletin of Miscellaneous Information, Kew* 1928: 37 (1928). Type: Zimbabwe, *Eyles 4880* (K, holo.).

Tufted perennial 500–2 000 mm high. Leaf blade to 300 × 4–6 mm. Inflorescence narrow; spatheoles linear, green to purplish; homogamous spikelet pairs 1 at base of lower raceme, usually olive-green. Sessile spikelet 6.5–12.0 mm long, dark brown; upper glume awn 6–18 mm long; upper lemma awn 30–50 mm long; callus pungent; anther up to 4 mm long. Pedicellate spikelet 6–10, ± as long as sessile spikelet; anthers as long as sessile ones.

*Flowering*: February to May. *Ecology*: Sandy soils; in woodland. *Frequency in southern Africa*: Rare. *Distribution*: Mozambique and northwards to central Africa. N, B, KZN.

Illustration: Cope: 139, tab. 44 (2002).
Voucher: *De Winter & Marais 4721*.

## *Elytrigia Desv.

Desvaux: 190 (1810); Hitchcock & Chase: 231 (1950); Chippindall: 69 (1955); Dewey: 209 (1984); Löve: 484 (1984); Bor: 1817 (1985); Clayton & Renvoize: 150 (1986) included in *Elymus* L.; Gibbs Russell et al.: 132 (1990); Watson & Dallwitz: 370 (1994); Assadi: 267 (1996).

Alternative genus: *Elymus* L.

Perennial, tufted, rhizomatous. **Leaf blade** linear, expanded or rolled; *ligule* an unfringed membrane. **Inflorescence** a single spike, rachis not disarticulating; *spikelets* solitary, sessile to subsessile, alternately arranged (distichous), usually overlapping. **Spikelet** disarticulating above or falling with the glumes; *glumes* slightly shorter than spikelet, similar, ovate, oblong to lanceolate, awned. **Florets** 3–8(–10), bisexual, *uppermost floret* reduced; *lemma* blunt, 5-nerved, nerves confluent towards apex, shortly awned, *awn* straight; *palea* present. **Lodicules** 2, membranous, ciliate. **Stamens** 3. **Ovary** hairy. **Caryop-**

**sis** hairy at apex; hilum long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (high polyploidy).

**Species** ± 8, north and south temperate regions; 1 naturalised in southern Africa: **Elytrigia repens* (L.) Nevski, Limpopo, Western and Eastern Cape.

Species treatment by A.C Mashau.

**Quick guide to easily confused taxa:**

1. Spikelet with one floret . . . . . **Hainardia cylindrica*
   Spikelet with two to many florets . . . . . 2
2. Glume 1, shorter than to as long as spikelet, obtuse to acute, awnless; lower glume usually absent, when present much reduced . . . . . **Lolium rigidum*
   Glumes 2, slightly shorter than spikelet, ovate, oblong to lanceolate, awned; lower glume present . . . . . **Elytrigia repens*

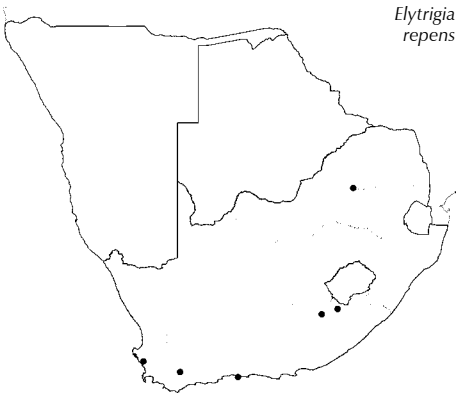


Figure 199.—*Elytrigia repens* spikelet (10–20 mm). Photographer: M. Koekemoer.

***Elytrigia repens** (L.) Nevski, in *Trudy Botanicheskogo Instituta Akademii Nauk S.S.S.R.,* Ser. 1: 18. (1933). Type: Europe.

*Agropyron repens* (L.) P.Beauv., in *Essai d'une nouvelle agrostographie*: 102, 146, 180, t. 20, f. 2. (1812).

Alternate name: *Elymus repens* (L.) Gould




Tufted perennial 500–1 000(–1 200) mm high; rhizomatous. Leaf blade 150–240 × 6–12 mm. Inflorescence a 100–200(–300) mm long spike, erect, rachis not breaking up, spikelets alternately arranged, usually overlapping. Spikelet 10–20 mm long, 3–8-flowered; glumes shorter than spikelet, awnless or awn up to 3 mm long; lemma 8–13 mm long, awnless or awned, awn straight usually less than 4 mm long occasionally much longer; anther 2.0–2.2 mm long.

*Flowering*: December and March. *Ecology*: In waste places, gardens and cultivated lands. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from Europe and Mediterranean area; introduced to many parts of the world. LIM, WC, EC. *Economics*: Introduced as forage or lawn; also a weed of cultivation in many temperate countries.

Illustration: Hitchcock & Chase: 233, fig. 442 (1950).
Voucher: *Acocks 17852*.

## **Elytrophorus** P.Beauv.

Palisot de Beauvois: 67 (1812); Schweickerdt: 191 (1942); Chippindall: 186 (1955); Clayton: 135 (1970); Launert: 76 (1970a); Clayton & Renvoize: 170 (1986); Ellis: 243 (1986); Gibbs Russell et al.: 133 (1990); Watson & Dallwitz: 372 (1994); Cope: 2 (1999).

Annual, tufted; hydrophytic. **Leaf blade** linear, expanded; *ligule* an unfringed to minutely fringed membrane. **Inflorescence** a false spike, with clusters of *spikelets* arranged in dense, globose clusters (glomerules) at intervals on a central axis or confluent and forming a cylinder; usually clusters subtended by enlarged, spreading bracts or glumes (of lower spikelets), these linear and tapering into acuminate apices. **Spikelet** laterally compressed, disarticulating above glumes; *glumes* ± equal to slightly unequal, shorter than to as long as spikelet, lanceolate, membranous, glabrous, 1-nerved, keeled, acuminate to aristate, awned or awnless. **Florets** 2–6; *lower floret* bisexual; *uppermost floret* sterile or male; *lemma* 3-nerved, keeled,

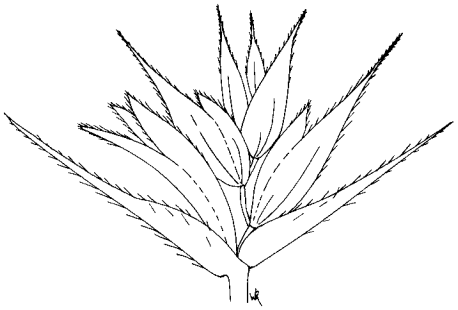
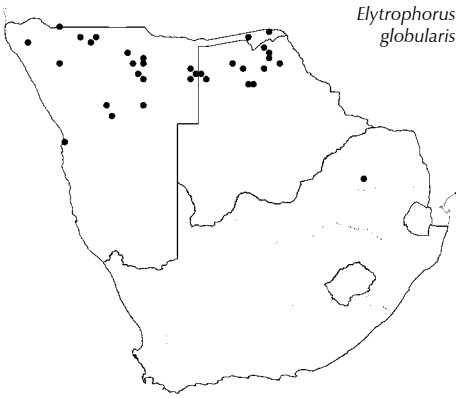


Figure 200.—*Elytrophorus globularis* spikelet (5.7 × 5.0 mm). Artist: W. Roux.



Figure 201.—*Elytrophorus globularis*. Artist: W. Roux.




hairy or glabrous, short central awn present; *awn* straight, shorter than to equal to the body of the lemma; *palea* shorter than lemma, variously lobed at apex, 2-keeled, keels narrowly to broadly winged, wings entire or variously notched. **Lodicules** 1 or 2, glabrous. **Stamens** 1–3. **Ovary** glabrous; styles 2; stigmas scantily plumose. **Caryopsis** with free pericarp; hilum short; embryo large. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 13$.



Figure 202.—*Elytrophorus globularis* spikelet (4–7 mm). Photographer: M. Koekemoer.

**Species** 2–4, tropical Africa, Asia and Australia; 2 in southern Africa, Namibia, Botswana and Limpopo.

Species treatment by M.T. Nembudani.

**Key to species:**

Spikelets in globose clusters 8–12 mm wide and 10–25 mm apart; clusters are subtended by 2 to many acuminate bracts up to 12 mm long, these longer than the spikelets; glumes 4–6 mm long, long hairy; lemma 3.5–5.0 mm long (including awn), hairy; awn stiff; palea wings conspicuous, projecting from lemma . . . . . **E. globularis**

Spikelets in cylindrical clusters 5–8 mm wide; clusters usually confluent; cluster subtending bracts, if present, are shorter than the spikelets; glumes 1.5–2.5 mm long, scabrid; lemma 2.0–3.5 mm long (including awn), glabrous; awn slender; palea wings inconspicuous, enclosed by the lemma . . . . . **E. spicatus**

**Elytrophorus globularis** Hack., in *Bulletin de l'Herbier Boissier*, sér. 2,2: 935 (1902). Type: Namibia, Amboland, Olukonda, *Rautanen s.n.* (Z, holo.).

Annual hygrophyte to 500 mm high; leaves often overtopping the inflorescence. Leaf blade 30–500 × 3–8 mm. Inflorescence to 200 mm long, narrow, interrupted; spikelets clustered into dense, globose aggregations 8–12 mm wide and spaced at intervals of 10–25 mm apart up the axis, sometimes confluent near apex; clusters subtended by 2 to many acuminate bracts, each to 12 mm long, longer than spikelets. Spikelet 4–6 mm long (including awns), hairy; glumes 4–6 mm long, long hairy; floret firm; lemma 3.5–5.0 mm long (including stiff awn), acuminate, awned, awn up to 2.5 × longer than lemma body; palea wings conspicuous, projecting from lemma; anther 0.5–2.0 mm long.

*Flowering*: October to June. *Ecology*: In shallow water or damp places; vleis, pans. *Frequency in southern Africa*: Common. *Distribution*: Zambia, Zimbabwe, Tanzania and Angola. N, B, LIM. *Economics*: Good pasture, especially while soft and green.

Illustration: Chippindall: 187, fig. 163 (1955); Cope: 3, tab. 1 (1999).
Anatomy vouchers: *Gibbs Russell & Smook 5330A*; *Ellis 2899, 2904, 3705* & *3714*.
Voucher: *Smith 2010*.

**Elytrophorus spicatus** (Willd.) A.Camus, in Lecomte, *Flore Générale de l'Indo-China* 7: 547 (1923). Type: India.

Annual hygrophyte to 350 mm high; leaves generally shorter than the inflorescence. Leaf blade to 250 × 2–4 mm. Inflorescence 20–250 mm long, narrow, cylindrical, sometimes shortly branched; spikelets not densely clustered, clusters 5–8 mm wide, often confluent; subtending bracts, when present are shorter than the spikelets. Spikelet 2.0–3.5 mm long (including awns), glabrous to scabrid; glumes 1.5–2.5 mm long, scabrid; floret very delicate; lemma 2.0–3.5 mm long (including slender awn), awn 1.0–2.5 times as long as lemma; palea wings inconspicuous, enclosed by lemma; anther 0.3–0.4 mm long.

*Flowering*: January to December. *Ecology*: Vleis and pans. *Frequency in southern Africa*: Common. *Distribution*: Northwards throughout tropical Africa; India, Indo-China and Australia. N, B.

Illustration: Chippindall: 187, fig. 162 (1955), Clayton: 136, fig. 45 (1970); Cope: 3, tab. 1 (1999).
Anatomy vouchers: *Ellis 2913* & *3718*.
Voucher: *Schweickerdt 2089*.

## **Enneapogon** Desv. ex P.Beauv.

Palisot de Beauvois: 81 (1812); Stapf: 654 (1900); Stent: 293 (1924); Chippindall: 234 (1955); Renvoize: 393 (1968); Launert: 77 (1970a); Renvoize: 167 (1970); Launert: 145 (1971); Clayton & Renvoize: 189 (1986); Gibbs Russell et al.: 134 (1990); Watson & Dallwitz: 375 (1994); Cope: 166 (1995).



Figure 203.—*Enneapogon cenchroides* spikelet (3–5 mm). Photographer: M. Koekemoer.

Annual or perennial, (sometimes short-lived perennial), densely tufted or rarely decumbent, sometimes rhizomatous or stoloniferous. **Leaf blade** expanded or rolled, sometimes setaceous, hairs, when present, usually gland-tipped; sheaths in a few species sometimes enclosing cleistogenes; *ligule* a fringe of hairs. **Inflorescence** a panicle, usually contracted, often dense and spike-like, rarely open, feathery; *spikelets* subsessile or shortly pedicelled. **Spikelet** variably compressed, disarticulating above glumes; *glumes* unequal or ± equal, usually ± equal to spikelet, lanceolate, similar, membranous, 3–7-nerved, sometimes hairy on nerves, frequently pilose, awnless. **Florets** 3–5; *lower florets* 1–3, bisexual; *upper floret* sterile or rudimentary, often reduced to a tuft of minute awns; *lemma* firmer than glumes, firm or leathery, not keeled, 9-lobed, scabrid or plumose below lobes, prominently 9-nerved, nerves excurrent into awns from tips of lobes; *awns* straight, glabrous, scabrous or hairy (plumose); *callus* short; *palea* linear or lanceolate, longer than lemma, sometimes ciliate on keels, hyaline. **Lodicules** 2, minute, fleshy, membranous. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose. **Hilum** short; pericarp fused; embryo large. **Cytology**: $x = 9$, 10 (polyploidy). **Photosynthetic pathway**: $C_4$; NAD-ME (7 species); XyMS+.

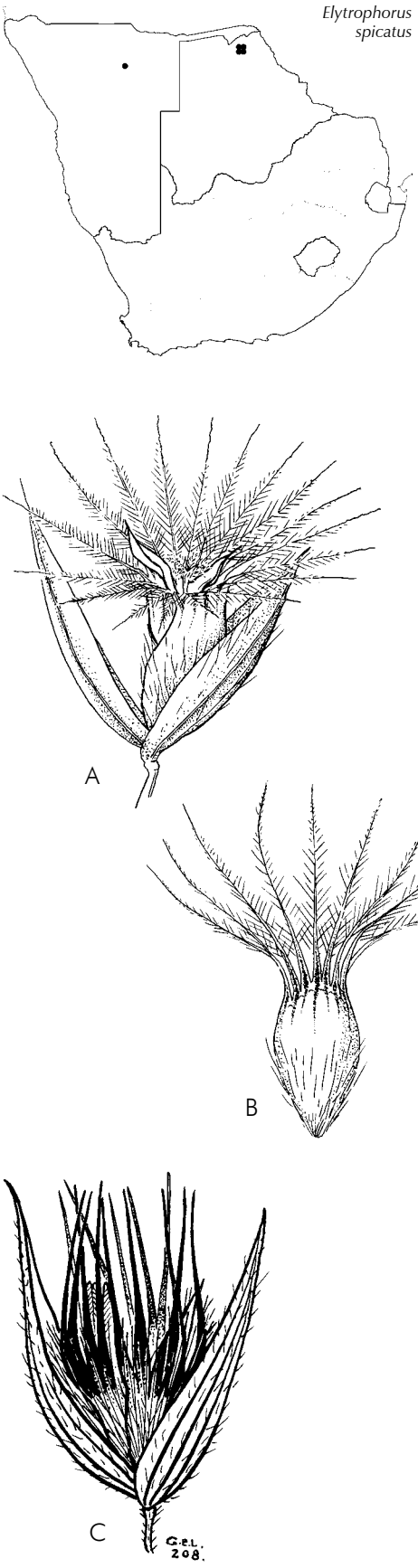



Figure 204.—*Enneapogon cenchroides*. A, spikelet; B, lemma; C, *Enneapogon scaber* spikelet. Artists: A, B, C. Smith; C, G.E. Lawrence.




Figure 205.—*Enneapogon cenchroides*. A, plant; B, ligule. Artist: C. Smith.

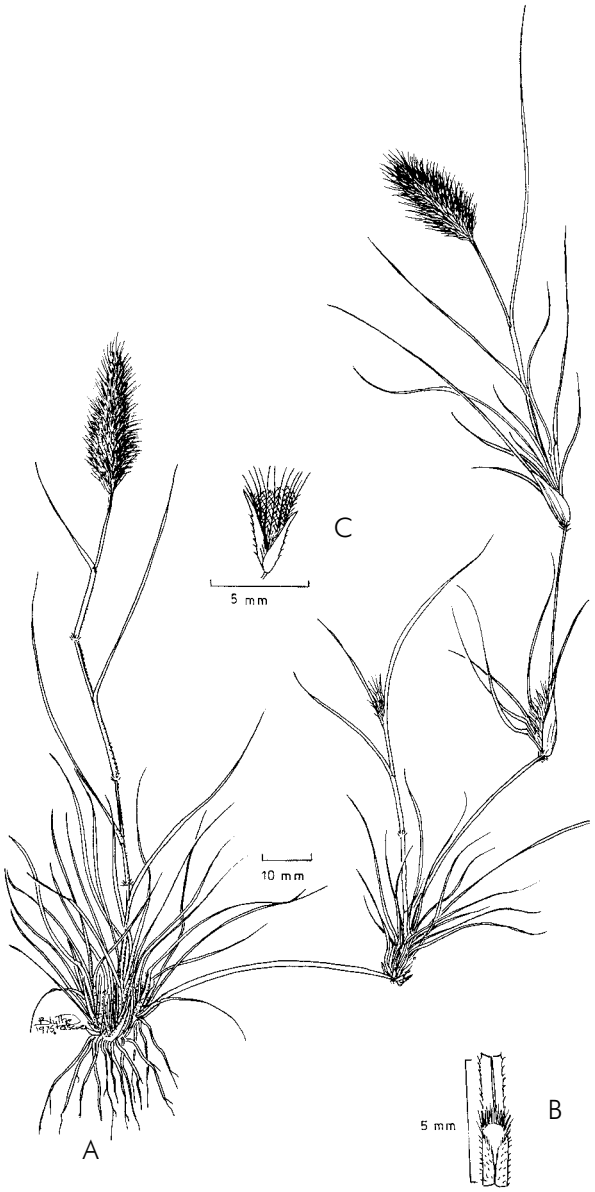



Figure 206.—*Enneapogon desvauxii*. A, plant; B, ligule; C, spikelet. Artist: B. Loutit (née Pascoe).

**Species** ± 30, warm, dry regions of the world, especially Australia and Africa; ± 7 in southern Africa, widespread.

Species treatment by M.T. Nembudani and L. Fish.

### Quick guide to easily confused genera:

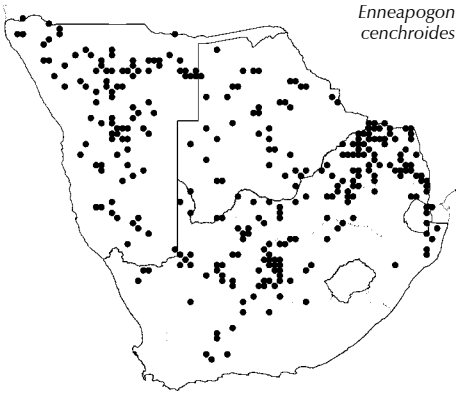
Lemma 5-awned, awns scabrid, awned lobes alternating with unawned lobes . . . . . **Schmidtia**
Lemma 9-awned, awns plumose or scabrid, without alternating unawned lobes . . . . . **Enneapogon**

### Key to species:

1. Lemma awns scabrous, never plumose . . . . . **E. scaber**
   Lemma awns plumose for most of their lengths . . . . . .2
2. Hairs at lemma base and around callus up to 1.0–1.5 mm long (at least a few hairs very long); third floret smaller but well developed . . . . . **E. spathaceus**
   Hairs at lemma base and around callus up to 0.8 mm long, usually less; third floret vestigial, tiny, usually only consisting of tufts of awns . . . . . 3
3. Glume apex reddish-brown, often shining . . . . . **E. pretoriensis**
   Glume apex grey or pallid not reddish-brown . . . . . 4
4. Plant loosely tufted, densely hairy; base usually not dense, never bulbous; mostly annual . . . . . **E. cenchroides**
   Plant densely tufted, glabrous or hairy but not densely; base very dense, often bulbous; mainly perennial . . . . . 5
5. Plants usually not taller than 300 mm; base densely leafy; often stoloniferous; basal leaf-sheaths often persistent, breaking into fibres . . . . . **E. desvauxii**
   Plants usually taller than 300 mm; culms much branched and densely leafy from a few centimetres above the base; basal leaf-sheaths persistent but not breaking into fibres . . . . **E. scoparius**

**Enneapogon cenchroides** (Licht. ex Roem. & Schult.) C.E.Hubb., in *Bulletin of Miscellaneous Information, Kew* (1934): 119 (1934). Type: South Africa, ?, near Vaal River [Kaigerieb], *Lichtenstein s.n.* (B, holo.).

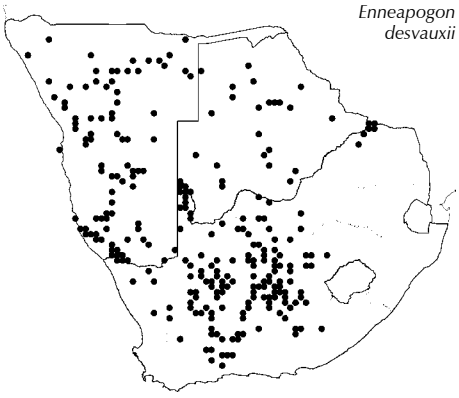
NINE-AWNED GRASS


*Enneapogon cenchroides*

Loosely tufted robust annual or short-lived perennial to 1 000 mm high; very densely hairy with short gland-tipped hairs (often feels wet to touch when young and fresh); culms often geniculate. Leaf blade 30–250 × 3–8 mm. Inflorescence contracted, usually dense, spike-like, sometimes more open or interrupted or lobed, especially basally. Spikelet 3–5 mm long (including awns); 3-flowered, third floret tiny, represented by only a tuft of awns; glumes usually grey only in the upper part especially the apex, if totally grey then apex darker; lemma awns plumose hairy for up to $^{2}/_{3}$ their length; hairs at base of lemma and callus up to 0.8 mm long, usually shorter; anther 1.0–1.5(2.3) mm long.

*Flowering*: January to December, usually in summer, but occasionally in winter in the north. *Ecology*: Sandy soils; in disturbed places and overgrazed veld. *Frequency in southern Africa*: Common. *Distribution*: Angola and northwards to East Africa and Sudan; through Arabia to India; N, B, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: A useful pioneer grass as it quickly colonises and forms dense stands thereby protecting disturbed areas from erosion.

Illustration: Chippindall: 238, fig. 211 (1955); Launert: 146, tab. 39 (1971); Gibbs Russell et al.: 365, pl. 73 (1990); Müller: 127 (2007).
Anatomy vouchers: *Ellis 197, 409, 547, 1550, 1585, 2031 & 2888*.
Voucher: *De Winter & Wiss 4434*.


*Enneapogon desvauxii*

**Enneapogon desvauxii** P.Beauv., in *Essai d'une nouvelle agrostographie*: 82, t. 16/11 (1812). Type: An illustration.

*E. brachystachyum* (Jaub. & Spach) Stapf, in *Flora capensis* 7: 654 (1900). Type: Arabia.

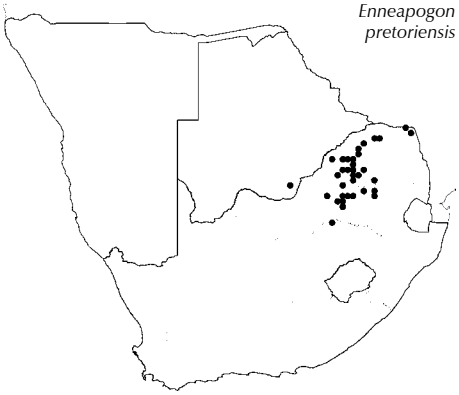
EIGHT DAY GRASS, KALKGRAS, WONDERGRAS

Densely tufted, compacted annual or perennial 30–300 mm high; often stoloniferous; base may be bulbous; densely hairy with gland-tipped hairs; leaf sheaths persistent, fibrous; culms simple or branched, then often at swollen nodes, geniculate or decumbent. Leaf blade 25–250 × 7 mm, filiform. Inflorescence spike-like, dense, light coloured to dark grey. Spikelet 3.5–5.5 mm long (including awns), 3-flowered, upper floret reduced to tuft of awns; glumes pallid to dark grey; lemma awns plumose for $^2/_3$ their length; anther 0.2–0.7(–1.4) mm long.

[Often produces cleistogamous spikelets in the basal leaf sheaths which germinate in place so that seedlings grow out of the old plant.]

*Flowering*: January to December, usually in summer but rarely in winter in the north. *Ecology*: Many habitats and soil types, often in calcrete areas; frequently in overgrazed veld. *Frequency in southern Africa*: Common. *Distribution*: throughout Africa, and in southern Asia, Central and South Americas. N, B, LIM, NW, FS, NC, WC, EC. *Economics*: Average palatability; a good indicator of overgrazed veld.

Illustration: Chippindall: 238, fig. 212 (1955).
Anatomy vouchers: *Ellis 842, 856, 869, 897, 1812, 2030 & 4347.*
Voucher: *Pole Evans 2066*.


*Enneapogon pretoriensis*

**Enneapogon pretoriensis** Stent, in *Bothalia* 1: 174 (1922). Type: South Africa, Gauteng, Pretoria, Wonderboom, *Burtt-Davy 8905* (PRE); ? Northern slopes of Magaliesberg, *Fouché 1* (syntypes).

Densely tufted perennial 300–650 mm high, wiry; rhizomatous; minutely sparsely hairy to glabrous; base erect, clad in hard, shiny, yellowish persistent sheaths; leaves mainly basal; culms unbranched. Leaf blade 50–250 × 3 mm, flat or setaceous. Inflorescence usually open or contracted but never spike-like. Spikelet 5.5–7.0 mm long (including awns), 3-flowered, third tiny, represented by only by a tuft of awns; glumes pallid to grey, apex reddish-brown, often shining; lemma awns plumose hairy for at least $^2/_3$ their length; hairs at base of lemma and around callus up to 0.8 mm long, mostly shorter; anther 2.0–2.5 mm long.

*Flowering*: November to May. *Ecology*: Rocky hillsides, often on northern aspect. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. B, LIM, G, M, FS.

Anatomy vouchers: *Ellis 835, 1228, 1788, 1796 & 2062*.
Voucher: *Wasserfall 23-11-1944*.

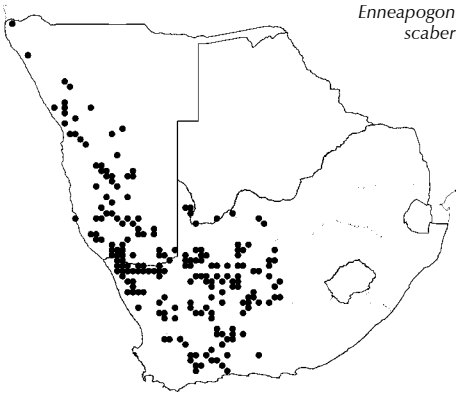
**Enneapogon scaber** Lehm., in *Novarum et minus cognitarum stirpium pugillus* 3: 41 (1828). Type: South Africa, Cape of Good Hope?

*E. benguellense* Rendle, in *Catalogue of the African plants collected by Dr F. Welwitsch* 2: 230 (1899). Type Angola, *Welwitsch 2303 & 2304* (syntypes).

ROCK NINE-AWNED GRASS

Densely, tufted perennial or annual 70–350 mm high, densely hairy with short and gland-tipped hairs; culms often geniculate. Leaf blade

50–170 × 2–5 mm, sheaths persistent. Inflorescence open, not spike-like. Spikelet 3.0–6.5 mm long (including awns), 3-flowered; glumes light to dark grey or pale green often tinged with purple; lemma awns glabrous or scabrous; anther 0.8–2.0 mm long. Usually strong smelling when fresh.


*Enneapogon scaber*

[In Namibia from Henties Bay, inland to Spitzkoppe to Brandberg and into Angola, a very small soft annual with tiny spikelets (± 3 mm long) has been recorded. These match photographs seen of the type of *E. benguellense* and although very different to *E. scaber*, there appears to be a continuum in spikelet size and there is no justification for it to be described as a variant as suggested by Gibbs Russell (1990) or kept separate as *E. benguellense*; at least not until further studies have been done.]

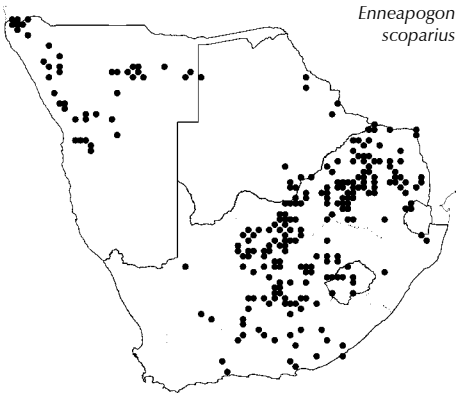
*Flowering*: January to December in summer rainfall areas but during winter in winter rainfall areas. *Ecology*: Hillsides among rocks, rock crevices, gravel plains and dry sandy riverbeds, along roadsides. *Frequency in southern Africa*: Infrequent. *Distribution*: N, B, NW, FS, NC, WC, EC. *Economics*: Poor grazing value and because of smell and obvious bad taste is often avoided; important for erosion control.

Anatomy vouchers: *Ellis 861, 875, 880, 2157 & 4762.*
Voucher: *Compton 23907.*

**Enneapogon scoparius** Stapf, in Harv. & Sond., in *Flora capensis* 7: 656 (1900). Type: South Africa. Limpopo, Bosch Veld Klippan, *Rehmann 5361*; Free State, *Buchanan 248, 271*; Eastern Cape, Graaff Reinet Div., stony hills near Graaff Reinet, *Bolus 691*; Northern Cape, Colesberg Div., Colesberg, *Shaw s.n.* and Philipstown Div., by the Orange River near Vissersdrift, *Burchell 2674*; ?Albert Div., *Cooper 651*? (syntypes).

*E. filifolius* (Pilg.) Stapf ex Garab., in *Annals of the South African Museum*. Cape Town 16: 424 (1925). Type: Namibia, Otjitjika, 35 miles from Grootfontein, *Engler 6347.*

BOTTLEBRUSH GRASS


*Enneapogon scoparius*

Densely tufted usually wiry, sometimes reed-like perennial 300–650(1 100) mm high; base usually bulbous; culms erect, unbranched basally, profusely branching above , upper parts appear very leafy; basal internodes long and sheaths tight. Leaf blade 50–200(–250) × 4 mm, filiform or flat. Inflorescence dense, usually spike-like rarely open but narrow. Spikelet 4.0–7.0 mm long (including awns); 3-flowered, third tiny, reduced to a tuft of awns; glumes pallid or grey only in the lower part; lemma awns plumose for $^{2}/_{3}$ of their length; hairs at base of lemma around callus up to 0.8 mm long, mostly shorter; anther 1.0–3.0 mm long.

[A tall reed-like form, with broad robust culms, *Enneapogon* sp. (=*Ellis 3208*) by Gibbs Russell (1990), also *Ellis 1905* & *1906* are from the Pafuri area (2231CB) and also match specimens from Zimbabwe from the grid 2131. This form appears to be restricted to soil overlying the Malvernia limestone formation. As the specimens show a gradation from the robust to narrow slim culms of the usual *E. scoparius*; until further studies have been done, this form remains under *E. scoparius*.]

*Flowering*: January to December, in summer, but in winter in northern Namibia. *Ecology*: Often in areas with calcrete; dry grassland and among rocks on hillsides. *Frequency in southern Africa*: Common. *Distribution*: Angola, Zimbabwe, Mozambique and Ethiopia,

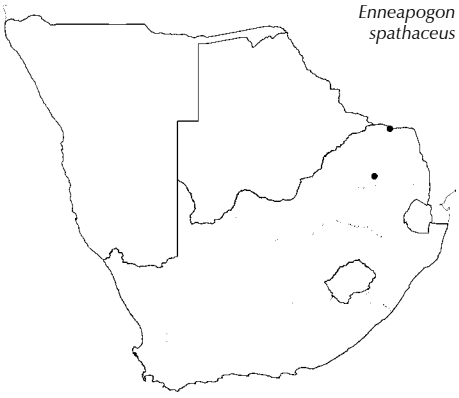





Figure 207.—*Enteropogon macrostachyus*. Artist: W. Roux.

Somalia and Yemen. N, B, S, L, NW, LIM, G, M, FS, KZN, NC, WC, EC. *Economics*: Unpalatable; hardy therefore prevents erosion.

Illustration: Chippindall: 237, fig. 210 (1955).
Anatomy vouchers: *Ellis 195, 1605, 1502, 2060* & *Ellis 3208*.
Voucher: *Theron 586* & *Ellis 1938*.

**Enneapogon spathaceus** Gooss., in *Bulletin of Miscellaneous Information, Kew*. 1934: 200 (1934). Type: South Africa, Limpopo: Zoutpansberg District; Messina, in Botanical Reserve, *Pole Evans 110083***,** (*110084* cultivated from 110083).

Tufted, wiry perennial 650–900 mm high, sparsely hairy with gland-tipped hairs to nearly glabrous; rhizome short; rootstock with hairy cataphylls; culm much branched and leafy a distance above the base, geniculate, densely hairy on nodes and for a short distance below node (± 2 mm). Leaf blade to 200 × 3–4 mm. Inflorescence usually open, central axis exposed, branched. Spikelet 6.0–8.5 mm long (including awns), (3)4 or 5-flowered, third reduced in size, male or sterile but otherwise resembling lowest floret; lemma awns apparently of distinctly shorter, finer ones alternating with longer more robust ones, this occurs occasionally in other species but not as distinctly, plumose for at least $^1/_2$ their length, sometimes slightly more; hairs at base of lemma and around the callus up to 1.5 mm long (at least a few hairs this long); anther 1.5–2.5 mm long.

*Flowering*: November to March. *Ecology*: Sandveld. *Distribution*: Endemic. LIM.

Voucher: *Fisher & Schweickerdt 543*, *Smook 8761*.

## **Enteropogon** Nees

Nees: 448 (1836); Chippindall: 192 (1955); Clayton: 105 (1967c); Launert: 79 (1970a); Renvoize: 331 (1974); Clayton: 419 (1982); Clayton & Renvoize: 238 (1986); Gibbs Russell et al.: 136 (1990); Watson & Dallwitz: 376 (1994); Phillips: 171 (1995); Cope: 216 (1999).



Figure 208.—*Enteropogon macrostachyus* spikelet (8–10 mm). Photographer: M. Koekemoer.

Perennial, rarely annual, robust, usually 600 or more mm tall, rarely less; tufted. **Leaf blade** long-linear, folded; *ligul*e a short fringed membrane. **Inflorescence** a long, slender, 1-sided, spike-like raceme, usually solitary, sometimes 2–8 present and digitate; *spikelets* solitary, subsessile, adpressed to rachis in 2 rows. **Spikelet** dorsiventrally compressed, disarticulating above glumes and between florets; *glumes* unequal, hyaline, 1-nerved, lanceolate, acuminate to acute, terminating in a short awn-point; lower glume ± half as long as upper. **Florets** 2–6; *lowest floret* bisexual, *upper floret* sterile or reduced, remaining floret(s) male or sometimes bisexual; *lowest lemma* firmer than glumes, membranous, lanceolate, rounded to flat on back, glabrous, 3-nerved, shortly 2-lobed, awned from between lobes; *awn* straight, glabrous; *callus* obtuse, short, hairy; *palea*

lanceolate, shortly 2-lobed, 2-keeled, concave between keels, minutely hairy on keels above. **Lodicules** 2. **Stamens** 3. **Ovary** oblong, glabrous; styles distinct, plumose above. **Caryopsis** ellipsoid; hilum short; pericarp fused; embryo small to large, up to $^1/_3$ the length of grain. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines even, sheaths extensions present or absent. Maximum number of extension cells when present 1–2. PCR cell chloroplasts centrifugal. **Cytology**: $x = 10$.

**Species** ± 6–17, tropical; 4 in southern Africa, Namibia, Botswana, North West, Limpopo, Gauteng, Mpumalanga and KwaZulu-Natal.

Species treatment by L. Fish and M.J. Moeaha.

### Quick guide to easily confused taxa:

Lemma keeled; spikelet dorsiventrally compressed . . . . . **Enteropogon prieurii**
Lemma flat or rounded; spikelet laterally compressed . . . . **Chloris**

### Key to species:

1. Inflorescence digitate, of 4–9 racemes; annual; spikelet 4–6-flowered; lemma hairy on upper margins . . . . . **E. prieurii**
   Inflorescence solitary or rarely racemes paired; perennial; spikelet 2–3-flowered; lemma scabrid on upper margins . . . . . 2
2. Lowest lemma awn 10–18 mm long; leaf sheaths margins glabrous . . . . . **E. macrostachyus**
   Lowest lemma awn 1–5(8) mm long; leaf sheaths margins glabrous or hairy . . . . . 3
3. Leaf sheath strongly keeled, margins hairy; lower glume 1.8–2.4 mm long; upper glume ± 5 5 mm long . . . . . **E. monostachyos** subsp. **africanus**
   Leaf sheath usually not strongly keeled, margin glabrous; lower glume 3.0–5.5 mm long; upper glume 6.0–9.0 mm long . . . . . **E. rupestris**

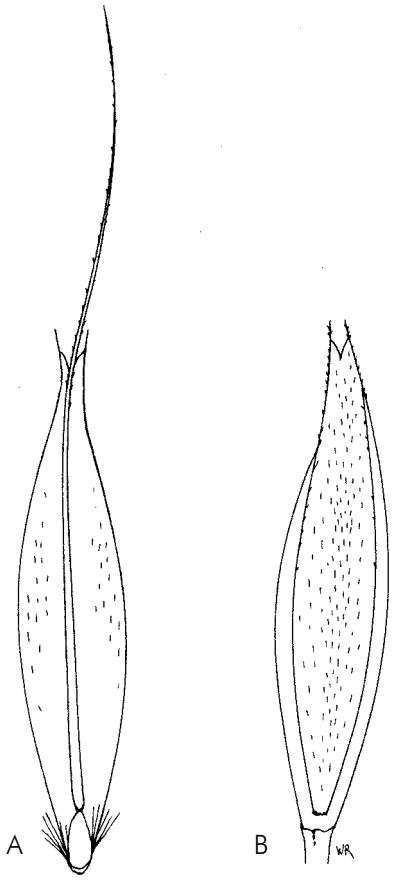
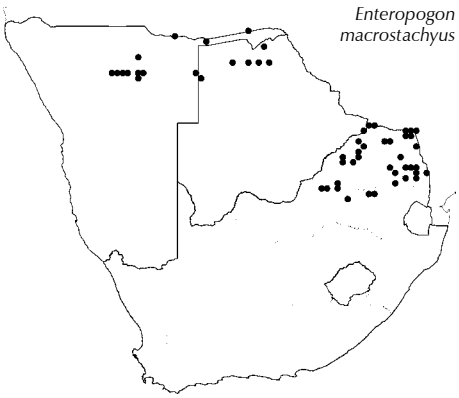



Figure 209.—*Enteropogon macrostachyus*. A, lemma (17.5 × 1.6 mm); B, palea held by lemma (7.7 × 1.3 mm). Artist: W. Roux.

**Enteropogon macrostachyus** (Hochst. ex A.Rich.) Munro ex Benth., in *The Journal of the Proceedings of the Linnean Society. Botany.* London 19: 101 (1881). Type: Ethiopia, Tigre, Mai-Mezano, *Schimper 1477*.

*E. simplex* (Schumach. & Thonn.) A.Chev., in *Revue internationale de botanique appliquée et agriculture tropicale* 14: 125 (1934). Type: Ghana, *Thonning* (C, holo.).

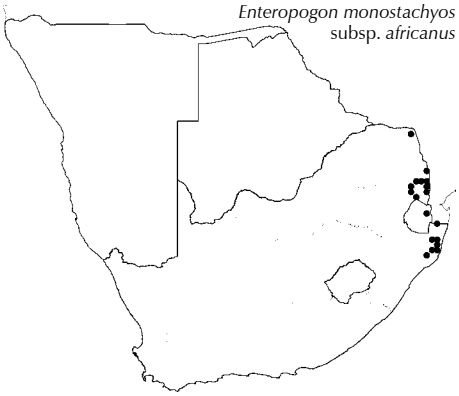
MOPANE GRASS




Tufted perennial 500–1 200 mm high; rhizomes short; sheaths rounded or lightly keeled, margins glabrous. Leaf blade 100–600 × (1)3–7 mm. Inflorescence a solitary spike-like raceme, 100–200 mm long. Spikelet 8–10 mm long, 3-flowered, upper 2 florets sterile; lowest lemma 7–10 mm long, scabrid across back, margins not hairy, awn 10–18 mm long; anthers 2.2–3.2 mm long; other two lemmas with awns progressively shorter, awns from 6–10 mm long.

*Flowering*: November to June. *Ecology*: In sandy loam soils; light shade under trees, often associated with mopane; disturbed places. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical Africa. N, B, LIM, NW, G, M. *Economics*: A valuable grazing grass.

Illustration: Phillips: 173, fig. 71 (1 & 2) (1995).
Anatomy vouchers: *Ellis 545, 1912, 1931, 1932, 1941, 2078* & *3205*.
Voucher: *Dinter 5702*.

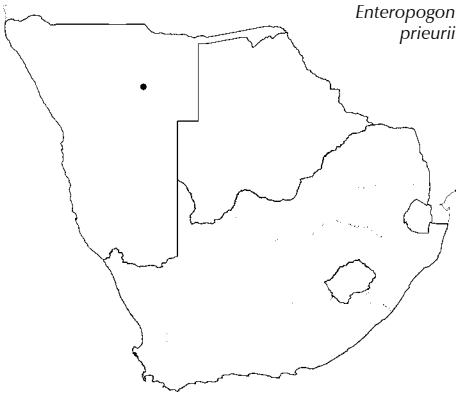

*Enteropogon monostachyos* subsp. *africanus*

**Enteropogon monostachyos** (Vahl) K.Schum. subsp. **africanus** Clayton, in *Kew Bulletin* 21: 109 (1967). Type: South Africa, Mpumalanga, Komatipoort, *Liebenberg 6065* (K, holo.; PRE, iso.).

Tufted perennial 400–1 000 mm high; rhizome short; sheaths strongly keeled, hairy especially on margins. Leaf blade 150–300 × 2–4 mm. Inflorescence a solitary spike-like raceme up to 120 mm long. Spikelet 2-flowered, lower floret fertile, upper sterile; lower glume 1.8–2.4 mm long; upper glume ± 5.5 mm long; lowest lemma 5.8–8.0 mm long, scabrid across back, margins not hairy, awn 2.5–8.0 mm long; anthers 2.2–3.0 mm long; sterile floret shorter in all aspects.

*Flowering*: November to April. *Ecology*: Grey granite flats and sandy soil near rivers, often in the shade. *Frequency in southern Africa*: Locally common. *Distribution*: Mozambique, Zambia, also Tanzania and Somalia. S, LIM, M, KZN.

Anatomy vouchers: *Ellis 1938, 3552, 3553* & *4527.*
Voucher: *Ward 3666*.


*Enteropogon prieurii*

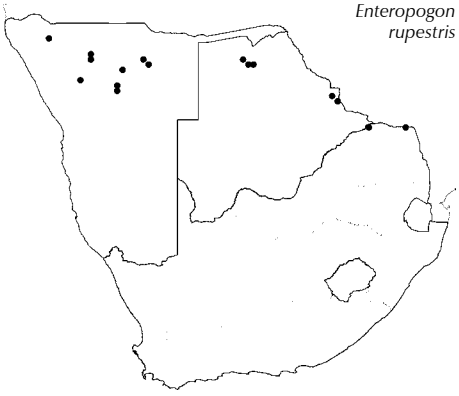
**Enteropogon prieurii** (Kunth) Clayton, in *Kew Bulletin* 37: 417 (1982). Type: Senegal, St Louis, *Leprieur* (P, holo.).

*Chloris prieurii* Kunth., in *Rèvision des Graminées* 2: 441 (1831). Type as above.

Tufted annual 200–500 mm high; sheaths strongly keeled, margins hairy; culms geniculate. Leaf blade to 300 × 2–5 mm. Inflorescence digitate, with 2–9 spike-like racemes, 50–120 mm long. Spikelet 3–5 mm long, 4–6-flowered; upper glume mucronate; lowest lemma glandular along midrib, only hairy on upper part of margins, glabrous on back, awn 7–10(25) mm long; upper lemmas reduced.

*Flowering*: February. *Ecology*: Deep white sand on palm flats. *Frequency in southern Africa*: Rare. *Distribution*: West tropical Africa, Sudan, Tanzania and Ethiopia; also Arabia to India. N.

Voucher: *De Winter & Marais 4724*.


*Enteropogon rupestris*

**Enteropogon rupestris** (J.A.Schmidt) A.Chev., in *Revue internationale de botanique appliquée et agriculture tropicale* 15: 1048 (1935). Type: Cape Verde Islands, *Schmidt*.

*Ctenium rupestre* J.A.Schmidt, in *Beiträge zur Flora der Cap Verdischen Inseln*: 149 (1852). Type as above.

Tufted, bushy perennial 500–1 000 mm high; short woody rhizome; sheaths rounded, not keeled, margins glabrous; culms wiry, much branched. Leaf blade 50–250 mm long. Inflorescence a solitary spike-like raceme, 110–130 mm long. Spikelet 4–8 mm long, 2-flowered rarely 3; lower glume 3–5 mm long; upper glume 6–9 mm long; lowest lemma 4.5–8.0 mm long, scabrid across back, margins not hairy, awn 1–5 mm long; anthers 2.4–3.0 mm long; upper lemmas reduced.

*Flowering*: March to May. *Ecology*: Black clay or humiferous loam; among rocks and often on north-facing slopes. *Frequency in southern Africa*: Locally common. *Distribution*: Cape Verde Islands, Mauritania and East Africa, Sudan and Somalia. N, B, LIM.

Anatomy voucher: *Ellis 2893*.
Voucher: *Giess & Loutit 14142*.

## **Entolasia** Stapf

Stapf: 739 (1920); Clayton & Renvoize: 573 (1982); Clayton & Renvoize: 278 (1986); Clayton: 46 (1989); Gibbs Russell et al.: 137 (1990); Watson & Dallwitz: 378 (1994).

Perennial, tufted or decumbent and rooting at nodes below; sometimes with long creeping rhizomes. **Leaf blade** flat, papery; *ligule* a fringe of hairs. **Inflorescence** of spike-like racemes scattered up and adpressed to central axis, or a contracted panicle; *spikelets* solitary, or paired. **Spikelet** lanceolate-oblong, dorsiventrally compressed, falling with glumes; *glumes* unequal, dissimilar, awnless; lower glume a minute, nerveless, hyaline scale; upper glume membranous, similar to spikelet in shape and size, obscurely 3–7-nerved. **Florets** 2; *lower floret* sterile; lemma resembling upper glume, 5-nerved, awnless, palea 0; *upper floret* bisexual, *lemma* similar to firmer in texture than glumes, papery to membranous, obtuse, densely hairy, faintly 3–5-nerved, margins inrolled and clasping edges of palea (paspalum-type), awnless; *palea* equalling lemma, 2-nerved. **Lodicules** 2, broadly cuneate. **Stamen**s 3. **Ovary** glabrous; styles distinct, plumose. **Caryopsis** small, ellipsoid, dorsiventrally compressed; hilum short; embryo large. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 9$.

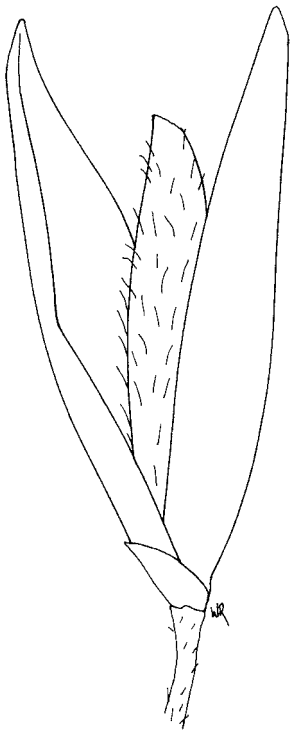


Figure 210.—*Entolasia imbricata* spikelet. Artist: W. Roux.

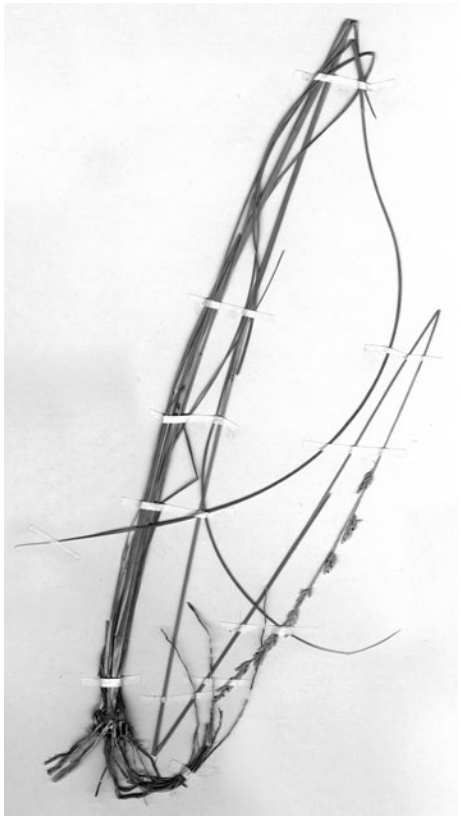


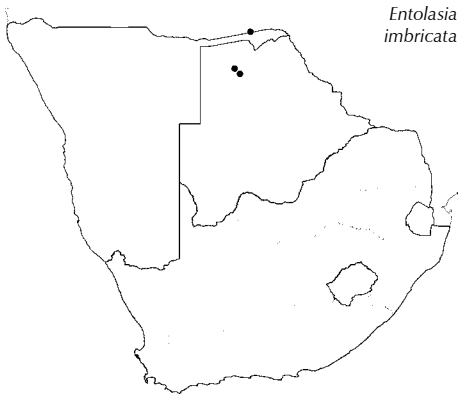
Figure 211.—*Entolasia imbricata* specimen.

**Species** 5, tropical Africa and eastern Australia; 2 in southern Africa: *Entolasia imbricata* Stapf and *E. olivacea* Stapf, northern Namibia, Botswana and Limpopo Province.

Species treatment by M.J. Moeaha.

**Key to species:**

Spikelet 2.2–2.5 mm long; anthers 0.5 mm long; leaves linear-lanceolate, acutely acuminate; pedicel terete . . . . . .*?**E. olivacea**
Spikelet 4.5–6.5 mm long; anthers 3.0–3.5 mm long; leaves linear, tapering to an acute point; pedicel strongly flattened . . . . . **E. imbricata**




**Entolasia imbricata** Stapf, in *Flora tropical Africa* 9: 739 (1920). Type: Tanzania, Unyamwezi, *Grant* (K, holo.).

Tufted perennial up to 1 500 mm high; basal sheaths sparsely hairy; culms erect, stout at base. Leaf blade to 500 × 2–8 mm, linear, tapering to an acute apex. Inflorescence 100–450 mm long, pedicels strongly flattened. Spikelet 4.5–6.5 × 1.5 mm; pale straw-coloured; lower glume small, cuff-like; upper glume 5 mm long, obtuse; upper lemma hairy all over; anthers 3.0–3.5 mm long.

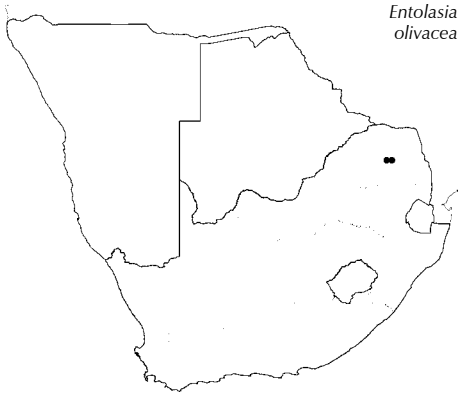






Figure 212.—*Entoplocamia aristulata*. A, plant; B, spikelet (23 × 13 mm). Artists: A, G.E. Lawrence; B, W. Roux.

*Flowering*: January to March. *Ecology*: Flood plains seasonally flooded to 1 m. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to East Africa. N, B.

Illustration: Clayton: 49, fig. 137 (1989).
Anatomy voucher: *Smith 1876*.
Voucher: *P.A. Smith 1876*.

***?Entolasia olivacea** Stapf, in *Flora tropical Africa* 9: 740 (1920). Type: DRC, Lutschina, *Vanderyst 2855*.

Decumbent perennial up to 1 000 mm high; rhizomatous; culms geniculate, branched. Leaf blade 50–100 × 5–15 mm, linear-lanceolate, constricted at base, acutely acuminate. Inflorescence 70–150 mm long; pedicel terete. Spikelet 2.2–2.5 × 1 mm, dull green; upper glume 2.5 mm long; upper lemma hairy; anthers 0.5 mm long.

*Flowering*: January to March. *Ecology*: In shade, moist places. *Frequency in southern Africa*: Infrequent. *Distribution*: Tanzania, Uganda, west to Cameroon. LIM.

Voucher: *Johannsmeier 372*.

## **Entoplocamia** Stapf

Stapf: 318 (1898); Stapf: 710 (1900); Chippindall: 189 (1955); Launert: 81 (1970a); Clayton & Renvoize: 201 (1986); Gibbs Russell et al.: 138 (1990); Watson & Dallwitz: 379 (1994).

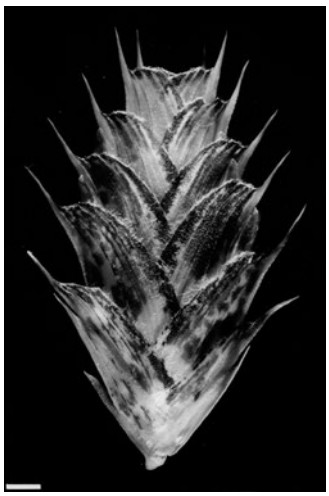


Figure 213.—*Entoplocamia aristulata* spikelet (9–17 mm). Photographer: M. Koekemoer.

Robust annual, tufted. **Leaf blade** linear-lanceolate, expanded or rolled, glaucous; *ligule* a fringe of short and long hairs. **Inflorescence** a spike, raceme, or contracted panicle, sometimes spike-like, often in glomerate racemes; *spikelets* solitary or clustered, sessile or subsessile. **Spikelet** rather large, spiny, laterally compressed, becomes twisted when mature, disarticulating with glumes, whole spikelet falling; *glumes* unequal to ± equal, much shorter than spikelet, membranous, ovate, acuminate, hairy or glabrous, awnless; lower glume 3-nerved; upper glume 5-nerved. **Florets** few to many; *lower 2 florets* sterile; *uppermost floret* reduced, male or sterile; *remaining florets* bisexual, keeled, woolly at base near margins; sterile lemma 6–8-nerved; bisexual *lemma* firmer than glumes, 9–11-nerved in upper half, almost nerveless below, entire, hairy, mucronate to awned; *awn* straight, stout, deflexed, shorter than body of lemma; *palea* as long as lemma, shortly 2-lobed, 2-keeled, keels winged and ciliate on back, woolly at base. **Lodicules** 0. **Stamens** 3. **Ovary** glabrous; styles connate at base, plumose above. **Caryopsis** 2 mm long, ellipsoid; hilum short; pericarp free; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines even. PCR sheath extensions absent. PCR cell chloroplasts centripetal. **Cytology**: $x = 10$.

**Species** 1, Africa: *Entoplocamia aristulata* (Hack. & Rendle) Stapf, Namibia.

Species treatment by M.T. Nembudani.

**Entoplocamia aristulata** (Hack. & Rendle) Stapf, in *Flora capensis* 7: 711 (1900). Type: South Africa, Northern Cape, Little Namaqualand, *Scully*. Note: Locality of type maybe incorrect as has not been recorded for this area again.

Robust, tufted annual (200–)400–1 100 mm high. Leaf blade 75–150 × 2–7 mm. Spikelet 9–17 mm long, robust, sometimes twisted; lemma chartaceous, awn short, deflexed; anther 3.4–4.7 mm long.

*Flowering*: February to May. *Ecology*: On brackish or calcareous soil; rocky outcrops or open plains, occasionally in dense stands in moist depressions. *Frequency in southern Africa*: Infrequent to sometimes locally common. *Distribution*: Angola. N.

Illustration: Chippindall: 188, fig. 165 (1955).
Anatomy vouchers: *Gibbs Russell & Smook 5124, Ellis 938 & 4361.*
Voucher: *Du Toit 258*.

## **Eragrostis** Wolf

Wolf: 23 (1776); Stapf: 594 (1900); Stent: 296 (1924); De Winter: 132 (1955); Launert: 81 (1970a); Clayton: 188 (1974); Phillips: 133 (1982); Clayton & Renvoize: 215 (1986); Gibbs Russell et al.: 139 (1990); Watson & Dallwitz: 382 (1994); Cope: 49 (1999).

Annual or perennial, tufted, sometimes geniculate, occasionally mat-forming, rhizomatous or stoloniferous; often glandular, particularly on leaf sheath and inflorescence; culms sometimes rooting at nodes. **Leaf blade** linear, expanded or rolled, rarely folded or setaceous; *ligule* a short fringe of hairs or a fringed membrane. **Inflorescence** a panicle or raceme, open to very dense, contracted or spike-like; primary branches, especially lowermost, solitary, opposite, clustered or whorled on central axis; *spikelets* pedicelled or subsessile. **Spikelet** usually laterally compressed, variously disarticulating: usually above glumes, either from apex downwards and rachilla falling with florets; or florets disarticulating from below upwards with rachilla remaining, then either lemma and palea falling together or palea remaining after the lemma has fallen; or, rarely, entire spikelet falling with glumes (*E. superba*, *E. pilgeriana*); *glumes* equal or unequal, shorter than spikelet, usually membranous, 1- to rarely 3-nerved, keeled to not noticeably keeled, usually glabrous, awnless to rarely minutely mucronate or awned. **Florets** 2–many, rarely 1, bisexual or *uppermost floret* reduced; *lemmas* ± imbricate, similar to firmer in texture to glumes, membranous to chartaceous, ovate, elliptic to oblong or almost orbicular, entire or rarely deeply lobed, acute or obtuse, 3-nerved, laterals faint or occasionally suppressed, keeled or rounded, glabrous or rarely with stiff hairs or cilia on keels, rarely nerves (laterals and central) excurrent into short mucros or awns; *awn* straight; *palea* equal to, or shorter than lemma, glabrous, sometimes gland-dotted, scabrous-ciliate or winged on keels, membranous, 2-keeled. **Lodicules** 2 or 0, small, cuneate, ± fleshy. **Stamens** 1–3. **Ovary** glabrous; styles distinct, plumose. **Caryopsis** globose to ellipsoid, sometimes pericarp free. **Cytology**: *x* = 10 (high polyploidy).

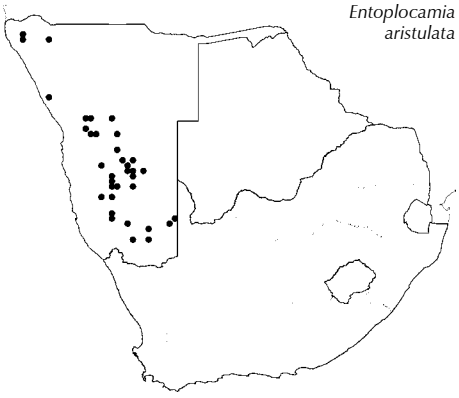






Figure 214.—*Eragrostis biflora*. Artist: W. Roux.




Figure 215.—*Eragrostis curvula*. A, plant; B, inflorescence variant. Artist: W. Roux.

**Species** ± 350, cosmopolitan, mainly subtropical; ± 90 in southern Africa, widespread.

Species treatment by L. Fish.

[A number of different types of glands occur in *Eragrostis*: punctate, dots, crateriform, annular, sunken glands and glandular patches. As the latter are often difficult to pick up, look for different colour and/or texture, usually on branches or pedicels on the inflorescence. Note that the distinction is not necessarily made in the key as to which type of gland is being referred to.]

**Key to species:**

1. Spikelet disarticulating below glumes, falling as an entire unit . . . 2
   Spikelet breaking up, at maturity, above glumes in various ways or not at all . . . 3
2. Perennial; palea wings broad, entire; lemma narrowly ovate in side view . . . **E. superba**
   Annual; palea wings very broad, usually lacerate (unevenly jagged); lemma lanceolate in side view . . . **E. pilgeriana**
3(1). Lemma lateral nerves excurrent into distinct mucros or awns . . 4
   Lemma lateral nerves not excurrent into distinct mucros or awns . . . 5
4. Lemma keel excurrent into a mucro or awn, less than 0.4 mm long; plant perennial; caryopsis subglobose . . . **E. crassinervis**
   Lemma central awn 0.8–1.5 mm long; plant annual; caryopsis oblong . . . **E. aristata**
5(3). Palea keel hairs bulbous-based, 0.1–1.3 mm long, usually exserted from lemma (for exserted but not bulbous-based hairs or prickles go to 11) . . . 6
   Palea keels glabrous, scabrid or ciliate with non-bulbous-based hairs shorter than 0.3 mm, and usually not exserted from lemma . . . 11
6. Rachilla persistent, lemmas and/or paleas breaking up from the base upwards; plant perennial; spikelet (4)5–17 mm long . . . 7
   Rachilla fragile, lemma, paleas and part of rachilla internode breaking off as units from the apex downwards; plant annual; spikelet 1.5–4.5 mm long . . . 8
7. Lemma lateral nerves and sometimes the keel with hairs 0.3–1.2 mm long . . . **E. lappula**
   Lemma lateral nerves and keel glabrous or hairs less than 0.3 mm long . . . **E. hierniana**
8(6). Lemma keel hairs stiff, 0.2–0.4 mm long, especially towards base (best seen in upper lemmas of spikelet); anthers 2 . . . **E. ciliaris**
   Lemma keel smooth, scabrid or scaberulous; anthers usually 3 . . . 9
9. Plant especially below culm node with sticky glands (noticeable due to particles adhering to the glandular areas) . . . **E. viscosa**
   Plant eglandular or if glands present then not sticky . . . 10
10. Inflorescence contracted, dense, branches adpressed to main axis; spikelets crowded; glumes and lemmas 1–2 mm long . . . **E. arenicola**
    Inflorescence open, branches spreading; spikelets distant; glumes and lemmas 0.5–1.0 mm long . . . **E. amabilis**
11(5). Plant annual . . . 12
    Plant perennial . . . 55
12. Rachilla fragile; spikelet disarticulating from apex downwards . . . 13
    Rachilla persistent (upper may soon become fragile); spikelet disarticulating from base upwards . . . 18
13. Anthers to 0.55 mm long . . . 14
    Anthers 0.6–1.5 mm long . . . 16
14. Caryopsis subglobose; inflorescence open, effuse, pedicels 5–25 mm long; spikelet 1.0–1.8 mm wide . . . **E. aspera**
    Caryopsis oblong-lanceolate to oblong-elliptic; inflorescence contracted, spikelets densely condensed on inflorescence branches, pedicels 0.5–1.0 mm long; spikelet 3–4 mm wide . . . 15

15. Glumes longer than lemmas directly above; inflorescence branches, pedicels and glumes with glands . . . . . **E. macrochlamys** var. **macrochlamys**
Glumes shorter to as long as lemmas directly above; inflorescence branches, pedicels and glumes eglandular . . . . . **E. macrochlamys** var. **wilmaniae**

16(13). Lemma lateral nerves and palea keels with glandular dots; lemma 1.6–1.8 mm long . . . . . **E. brizantha**
Lemma lateral nerves and palea keels eglandular; lemma 3.2–5.0 mm long . . . . . 17

17. Lemma acuminate, often awned . . . . . **E. dinteri**
Lemma acute to subacute, sometimes a mucro present, never awned . . . . . **E. rogersii**

18(12). Spikelets sessile, in wedge-shaped clusters, these coalescent into a dense spike-like inflorescence . . . . . **E. patens**
Spikelets pedicellate or sessile, distant or crowded, or clustered but clusters not wedge-shaped; inflorescence open or contracted . . . . . 19

19. Lemma with bulbous-based hairs 0.3–0.6 mm long along lateral nerves . . . . . **E. venustula**
Lemma scabrid, scaberulous or smooth, glabrous, if hairy, hairs less than 0.1 mm long . . . . . 20

20. Inflorescence lowest branches whorled to sub-whorled . . . . . 21
Inflorescence lowest branches not whorled; may be clustered . . . 34

21. Inflorescence appearing dense with branches ± adpressed to main axis, spikelets close together . . . . . 22
Inflorescence open with branches spreading away from main axis, spikelets distant . . . . . 23

22. Lemma obliquely lanceolate, apex subacute to obtuse, 1.8–2.2 mm long . . . . . **E. omahekensis**
Lemma broadly elliptic to broadly oblong-ovate, apex obtuse to broadly rounded, 1.4–1.9 mm long . . . . . **E. glandulosipedata**

23(21). Anthers to 0.50 mm long . . . . . 24
Anthers 0.55–1.50 mm long . . . . . 30

24. Florets 1–3 per spikelet . . . . . **E. biflora**
Florets 4 to many per spikelet . . . . . 25

25. Lower glume reaching less than $^1/_2$ way up the lemma above . . 26
Lower glume reaching $^1/_2$ to longer up the lemma above . . . . 29

26. Lemmas on the same side of the rachilla not to barely reaching the lemma above . . . . . **E. remotiflora**
Lemmas on the same side of the rachilla distinctly overlapping the lemma above . . . . . 27

27. Lowest lemma 0.7–1.0 mm long; lemmas hardly diminishing in length towards apex of spikelet; inflorescence branches and pedicels densely scaberulous . . . . . **E. aethiopica**
Lowest lemma 1.0–1.7 mm long; lemmas becoming conspicuously shorter towards apex of spikelet; inflorescence branches and pedicels smooth or scabrid but not densely so and not scaberulous . . . . . 28

28. Inflorescence lowest branches axils hairy . . . . . **E. pilosa**
Inflorescence lowest branches axils glabrous . . . . . *__E. mexicana__ subsp. __virescens__

29(25). Lowest lemma 1.3–1.7 mm long. . . . *__E. mexicana__ subsp. __virescens__
Lowest lemma 2.0–2.7 mm long . . . . . ***E. tef**

30(23). Glumes unequal; lowest lemma 2.0–2.7 mm long . . . . . 31
Glumes equal to subequal; lowest lemma 1.0–1.9 mm long . . . 32

31. Anthers 0.8–1.2 mm long; pedicel eglandular; lemma glossy . . . . . **E. membranacea**
Anthers 0.3–0.6 mm long; pedicel with annular gland; lemma dull . . . . . ***E. tef**

32(30). Palea margins wide apart for entire length; leaf sheaths densely covered with bulbous-based hairs . . . . . **E. porosa**
Palea margins touching or overlapping; leaf sheathes glabrous, rarely sparsely covered with bulbous-based hairs . . . . . 33

33. Lemma distinctly keeled; plant slender, inflorescence delicate; florets mostly 2–4 per spikelet . . . . . **E. micrantha**
Lemma lightly keeled or only obviously keeled near apex; plant and inflorescence robust; florets (4)7–10 per spikelet . . . . . **E. cylindriflora**

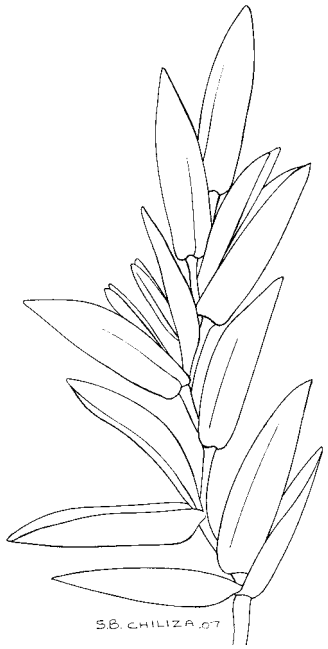



Figure 216.—*Eragrostis curvula* spikelet (opened to show parts). Artist: S.B. Chiliza.




Figure 217.—*Eragrostis lehmanniana*. A, plant; B, spikelet. Artist: C. Letty.




Figure 218.—*Eragrostis patentissima*. Artist: C.D. Bartman.

34(20). Caryopsis subglobose to subrotund . . . . . 35
Caryopsis not as above . . . . . 37
35. Lemma apex obtuse to truncate . . . . . **E. cilianensis**
Lemma apex acute . . . . . 36
36. Pedicels and branches stout, up to 2.8 mm long; plant up to 70 mm high; lemma keel thickened and prominent; anthers 3 . . . . . **E. pygmaea**
Pedicels and branches filiform, 3–15 mm long; plant 800 mm high; lemma keel not thickened and prominent; anthers 2 . . **E. gangetica**
37(34). Anthers 0.1–0.3 mm long . . . . . 38
Anthers 0.4–1.2 mm long . . . . . 49
38. Lemma and palea keels scabrid, prickles large along entire length . . . . . **E. leersiiformis**
Lemma and palea keels smooth or scabrid near apices only, prickles medium to small . . . . . 39
39. Palea margins wide apart for entire length . . . . . 40
Palea margins nearly touching to touching or overlapping for entire length or at least at apex . . . . . 46
40. Leaf margins and/or midrib with glands . . . . . 41
Leaf margins without glands . . . . . 43
41. Inflorescence open or contracted but not densely so . . . . ***E. minor***
Inflorescence densely contacted . . . . . 42
42. Inflorescence sparsely branched, with few spikelets, these not too densely crowded; lowest lemma 1.4–1.8 mm long; spikelet 1.0–1.5(1.8) mm wide . . . . . **E. kingesii**
Inflorescence much branched, with many spikelets densely crowded; lowest lemma (1.5)2.0–2.5 mm long; spikelet (1.3)2.0–2.5 mm wide . . . . . **E. procumbens**
43(40). Lower glume usually minute, not to lightly keeled, apex obtuse; inflorescence branches and pedicels gland dotted . . . . . **E. homomalla**
Lower glume large, distinctly keeled, apex acute; inflorescence branches and pedicels with or without glands . . . . . 44
44. Inflorescence densely contracted, side branches usually adpressed to main axis . . . . . **E. procumbens**
Inflorescence open, side branches not adpressed to main axis . . . 45
45. Lemma 1.7–2.3 mm long, apex obtuse . . . . . **E. barrelieri**
Lemma 1.2–1.7 mm long, apex acute to subacute . . . . . ***E. mexicana*** subsp. ***virescens***
46(39). Glumes subequal; lemma 1.7–2.0 mm long . . . . . **E. gangetica**
Glumes very unequal; lemma 0.7–1.8 mm long . . . . . 47
47. Lemmas hardly diminishing in length towards the apex of the spikelet; lowest lemma 0.7–1.0 mm long . . . . . **E. aethiopica**
Lemmas conspicuously becoming shorter towards the apex of the spikelet; lowest lemma 1.0–1.8 mm long . . . . . 48
48. Caryopsis shallowly grooved on the back . . . . . **E. remotiflora**
Caryopsis rounded on the back . . . . . **E. pilosa**
49(37). Lemma lateral nerves with minute glandular dots (may appear lumpy) . . . . . **E. laevissima**
Lemma lateral nerves without glandular dots . . . . . 50
50. Lower glume reaching up to 1/3 of lemma above . . . . . 51
Lower glume reaching up to 1/2 and more of lemma above . . . 52
51. Lemmas on same side of rachilla either not or just overlapping one another; lemma broadly ovate to oblong in side view . . . . . **E. remotiflora**
Lemmas on same side of rachilla distinctly overlapping one another; lemma narrowly ovate in side view . . . . . **E. tenuifolia**
52(50). Palea margins nearly touching to overlapping along entire length or at least touching at the apex . . . . . 53
Palea margins far apart for entire length . . . . . 54
53. Spikelet 2–4(5)-flowered; inflorescence without crateriform glands . . . . . **E. micrantha**
Spikelet 5–8-flowered; inflorescence with crateriform glands . . . . . **E. subglandulosa**
54(52). Inflorescence always with glands on branches just below junction of a spikelet pair or triad and on pedicels but annular glands absent; leaf margins without glands; culms often branched . . . . . **E. phyllacantha**

Inflorescence with distinct annular glands on pedicels; leaf margins with glands; culms not branched . . . . . **E. annulata**

55(11). Inflorescence of 2–8 dense, usually globose, ovoid to elliptic spikelet clusters, distant on main axis except near apex and at the base . . . . . *?**E. congesta**

Inflorescence not as above . . . . . 56

56. Lemma lateral nerves with elongated black oil glands alongside . . . . . **E. caesia**

Lemma without elongated black oil glands . . . . . 57

57. Sheaths and culms, below nodes with sticky glandular patches, obvious due to adhering sand grains . . . . . **E. gummiflua**

Culms and sheaths without glands or if present, glands not sticky . . . . . 58

58. Glumes acuminate, thickened, awn-like or awned to 1 mm long; leaves usually cauline and often pungent . . . . . **E. walteri**

Glumes acuminate, acute to obtuse but never awn-like, awn, if present, less than 0.2 mm long; leaves cauline or basal . . . . . 59

59. Rachilla fragile; spikelet disarticulating from apex downwards . . . 60

Rachilla persistent (upper may become fragile); spikelet disarticulating from base upwards . . . . . 69

60. Lemma apex acute to acuminate . . . . . **E. nindensis**

Lemma apex subacute, obtuse, rounded to truncate . . . . . 61

61. Lemma lateral nerves prominent . . . . . 62

Lemma lateral nerves indistinct or obscure . . . . . 67

62. Palea keels broadly winged below and with tooth-like appendages . . . . . 63

Palea keels entire, winged or not winged, tooth-like appendages absent . . . . . 64

63. Palea keel wings only shallowly notched near base; palea apex rounded; lemma keel and lateral nerves eglandular . . . . . **E. × pseud-obtusa**

Palea keel wings deeply notched near base; palea apex acute; lemma keel and lateral nerves gland dotted . . . . **E. echinochloidea**

64(62). Palea margins touching to overlapping at apex . . . **E. gummiflua**

Palea margins wide apart at apex . . . . . 65

65. Rhizomes absent; palea keels long hairy; basal sheaths glabrous, rarely hairy then not woolly hairy . . . . . **E. obtusa**

Rhizomes present; palea keels scaberulous; basal sheaths woolly hairy . . . . . 66

66. Lowest lemma truncate . . . . . **E. truncata**

Lowest lemma broadly obtuse . . . . . **E. bergiana**

67(61). Spikelet 1.5–2.4 mm wide; anthers 1.0–1.4 mm long . . . **E. pallens**

Spikelet 0.8–1.4 mm wide; anthers 0.6–0.8 mm long . . . . . 68

68. Lemma hairy (often only near base on margins) . . . . **E. leptotricha**

Lemma glabrous . . . . . **E. habrantha**

69(59). Lemma keel and/or lateral nerves with glands (may appear lumpy) . . . . . 70

Lemma without glands . . . . . 72

70. Glume keel gland dotted; caryopsis subglobose; palea margins apart (may only be slightly but definitely) . . . . . **E. crassinervis**

Glume keel eglandular; caryopsis oblong to elliptic; palea margins touching to overlapping entire length . . . . . .71

71. Glumes very unequal; upper glume shorter than adjacent rachilla internode or just reaching base of lemma above; rhizome absent . . . . . **E. plana**

Glumes subequal to unequal; upper glume reaching up $^1/_2$–$^3/_4$ of lemma above; rhizome short, oblique . . . . . **E. laevissima**

72(69). Culms straggling; leaves cauline, reflexed; palea conspicuously winged; spikelet ovate . . . . . **E. volkensii**

Characters not in above combination . . . . . 73

73. Basal sheaths and/or prophylls woolly hairy . . . . . 74

Basal sheaths glabrous or hairy, often silky-hairy, never woolly hairy (often hairy at very base only) . . . . . .77

74. Inflorescence primary branches adpressed to main axis . . . . . 75

Inflorescence open or contracted, primary branches not adpressed to main axis . . . . . 76

75. Spikelet yellowish, often flushed purple; leaf blade up to 2 mm wide . . . . . **E. stenothyrsa**

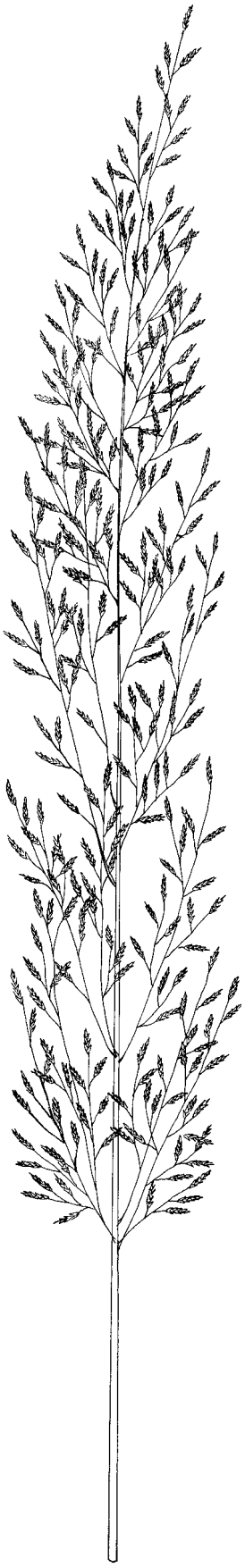


Figure 219.—*Eragrostis planiculmis* inflorescence. Artist: H. du Toit.

Spikelet dark olive-green; leaf blade 2–6 mm wide . . . . . **E. sclerantha** subsp. **villosipes**

76(74). Spikelet 0.8–1.0 mm wide; palea margins close along entire length, sometimes touching at apex; lemma green to grey-green, apex whitish, often emarginate; stolons present . . . . . **E. sabinae**
Spikelet 1.5–3.0 mm wide; palea margins wide apart; lemma dark olive-green, apex acute to subacute; stolons absent . . . . . **E. sclerantha** subsp. **sclerantha**

77(73). Inflorescence sparsely branched, branches from main axis distant, adpressed to main axis and usually not overlapping . . . **E. elatior**
Inflorescence sparsely to much branched, branches from main axis overlapping (if not then much branched), open to contracted . . . 78

78. Obvious rhizome (stout or long and slender) present; leaves often mainly cauline . . . . . 79
Rhizome absent or not obvious; leaves usually mainly basal. . . . . 91

79. Inflorescence primary branches adpressed to main axis . . . . . 80
Inflorescence open or contracted, primary branches not adpressed to main axis . . . . . 83

80. Palea margins wide apart at apex . . . . . 81
Palea margins overlapping to touching or nearly touching, especially at apex . . . . . 82

81. Spikelet 1.5–1.7 mm wide; lowest lemma 1.3–1.5 mm long; anthers 0.2–0.4 mm long . . . . . **E. sarmentosa**
Spikelet 3–7 mm wide; lowest lemma 2.5–4.0 mm long; anthers 1–2 mm long . . . . . **E. capensis**

82(80). Rhizome slender; inflorescence up to 40 mm long, usually less; lemma lateral nerves not distinct . . . . . **E. sabulosa**
Rhizome stout; inflorescence 50–250 mm long; lemma lateral nerves distinct . . . . . **E. inamoena**

83(79). Rhizomes long, slender . . . . . **E. mildbraedii**
Rhizomes short, often stout . . . . . 84

84. Palea winged; lemma awned . . . . . **E. walteri**
Characters not in above combination . . . . . 85

85. Palea keels obscure, sometimes indicated by minute prickles only . . . . . 86
Palea keels distinct and prominent along entire length . . . . . 88

86. Spikelet 4–6 mm wide; lemma 4–5 mm long . . . . **E. pseudopoa**
Spikelet 0.6–2.0 mm wide; lemma 1.3–1.7 mm long . . . . . 87

87. Rhizome knotty; lemma dark olive; longest pedicel much longer than spikelet; inflorescence 250–320 mm long, oblong . . . . . **E. comptonii**
Rhizome not knotty; lemma variegated, usually deep purple to violet, yellowish at apex with whitish margins, occasionally pallid with yellow; longest pedicel as long as or shorter than spikelet; inflorescence 25–180 mm long, ovate to ovate-oblong . . . . . **E. bicolor**

88(85). Most pedicels per inflorescence longer than 2.5× the spikelet length . . . . . **E. patentissima**
Most pedicels per inflorescence 2× or less the spikelet length . . . . . 89

89. Lemma 2.5–4.0 mm long; spikelet 3–7 mm wide, ovate to suborbiculate . . . . . **E. capensis**
Lemma 1.6–2.5 mm long; spikelet 1.0–3.5 mm wide, narrowly oblong to oblong . . . . . 90

90. Culms slender . . . . . **E. inamoena**
Culms robust. . . . . **E. friesii**

91(78). Spikelet to 2.1 mm wide . . . . . 92
Spikelet 2.2 mm and wider . . . . . 120

92 Inflorescence contracted, spikelets dense, primary branches adpressed to main axis, or primary branches racemose and if open branches short with only a few spikelets . . . . . 93
Inflorescence open, branches usually spreading away from main axis . . . . . 96

93. Lower glume narrowly ovate in side view, apex obtuse . . . . . **E. racemosa**
Lower glume lanceolate in side view, apex acute . . . . . 94

94 Basal sheaths densely long hairy in furrows between prominent ridges formed by the nerves . . . . . **E. curvula**

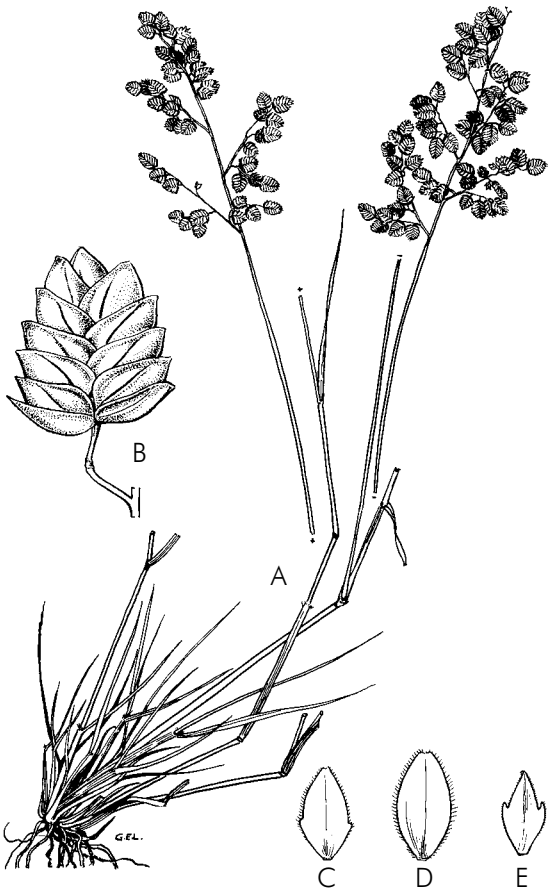



Figure 220.—A–C, *Eragrostis* × *pseud-obtusa*. A, habit; B, spikelet; C, palea; D, *E. obtusa* palea; E, *E. echinochloidea* palea. Artist: G.E. Lawrence.

Basal sheaths glabrous or obscurely hairy, nerves if distinct or prominent without deep furrows . . . . . 95
95. Plant slender; spikelet linear; inflorescence spike-like; anthers 2, 0.3–0.8 mm long . . . . . **E. chapelieri**
Plant robust; spikelet oblong to lanceolate-oblong; anthers 3, 1.2–1.7 mm long . . . . . **E. acraea**
96(92). Basal sheaths densely hairy in furrows between prominent ridges formed by nerves . . . . . 97
Basal sheaths glabrous, obscurely to densely hairy but, nerves if distinct or prominent without deep furrows . . . . . 98
97. Culms easily compressed; leaf blade usually 4–10 mm wide, flat . . . . . **E. jeffreysii**
Culms not easily compressed; leaf blade to 3 mm wide, usually rolled, appearing setaceous . . . . . **E. curvula**
98(96). Palea margins apart for entire length, maybe close but not touching at apex . . . . . 99
Palea margins close to touching along entire length, definitely touching to overlapping at apex . . . . . 107
99. Inflorescence lowest branches whorled . . . . . 100
Inflorescence lowest branches not whorled . . . . . 102
100. Inflorescence branchlets and/or pedicels with a glandular ring . . . . . **E. glandulosipedata**
Inflorescence without a glandular ring on the branchlets and/or pedicels . . . . . .101
101. Plants robust; leaf blades narrowing abruptly into a long thin apex, usually curling when dry, nerves distinct on lower surface . . . . . **E. rigidior**
Plants slender, wiry; leaf blades narrowing gradually to the apex, not curling when dry . . . . . **E. trichophora**
102(99). Glands always present on inflorescence branchlets just below junction of spikelet pair or triad and on pedicels or an annular gland present on the pedicels . . . . . 103
Glands if present not as above . . . . . 104
103. Glands always present on inflorescence branchlets just below junction of spikelet pair or triad and on pedicels . . . . . **E. phyllacantha**
Annular gland present on some pedicels . . . **E. moggii** var. **moggii**
104(102). Culm nodes barbate . . . . . **E. barbinodis**
Culm nodes glabrous, if hairy then not barbate . . . . . 105
105. Leaf blades narrowing into a long, thin apex, usually curling when dry . . . . . **E. rigidior**
Leaf blades narrowing gradually to apex, not curling when dry . . . . . 106
106. Culm internodes glabrous . . . **E. lehmanniana** var. **lehmanniana**
Culm internodes hairy . . . . . **E. lehmanniana** var. **chaunantha**
107(98). Basal sheaths densely hairy; lowest inflorescence branches whorled; branches densely scaberulous . . . . . **E. rotifer**
Basal sheaths glabrous or obscurely hairy; lowest inflorescence branches whorled or not whorled; branches smooth, scabrid or scaberulous . . . . . 108
108. Anthers 0.2–1.0 mm long; glumes to $^1/_3$ up lemma above, upper glume sometimes not reaching the base of the lemma above. . . 109
Characters not in the above combination . . . . . 110
109. Lemma 1.0–1.8 mm long, broadly ovate-oblong in side view, apex broadly obtuse to rounded; spikelet to 1 mm wide . . . **E. remotiflora**
Lemma 1.7–2.5 mm long, ± narrowly semi-ovate in side view, apex acute to narrowly obtuse; spikelet 1–3 mm wide . . . . . **E. tenuifolia**
110(108). Lemma lightly keeled, keel obscure or only prominent in the upper part of the lemma . . . . . 111
Lemma strongly keeled, keel prominent and obvious along the entire length . . . . . 115
111. Lemma variegated, usually deep purple to violet, yellowish at the apex with whitish margins, occasionally pallid with yellow; inflorescence lowest branches not whorled . . . . . **E. bicolor**
Lemma dark green to greyish-green or leaden or pale yellowish grey-green; inflorescence lowest branches whorled to not obviously whorled or in clusters . . . . . 112



Figure 221.—*Eragrostis racemosa*. Artist: W. Roux.

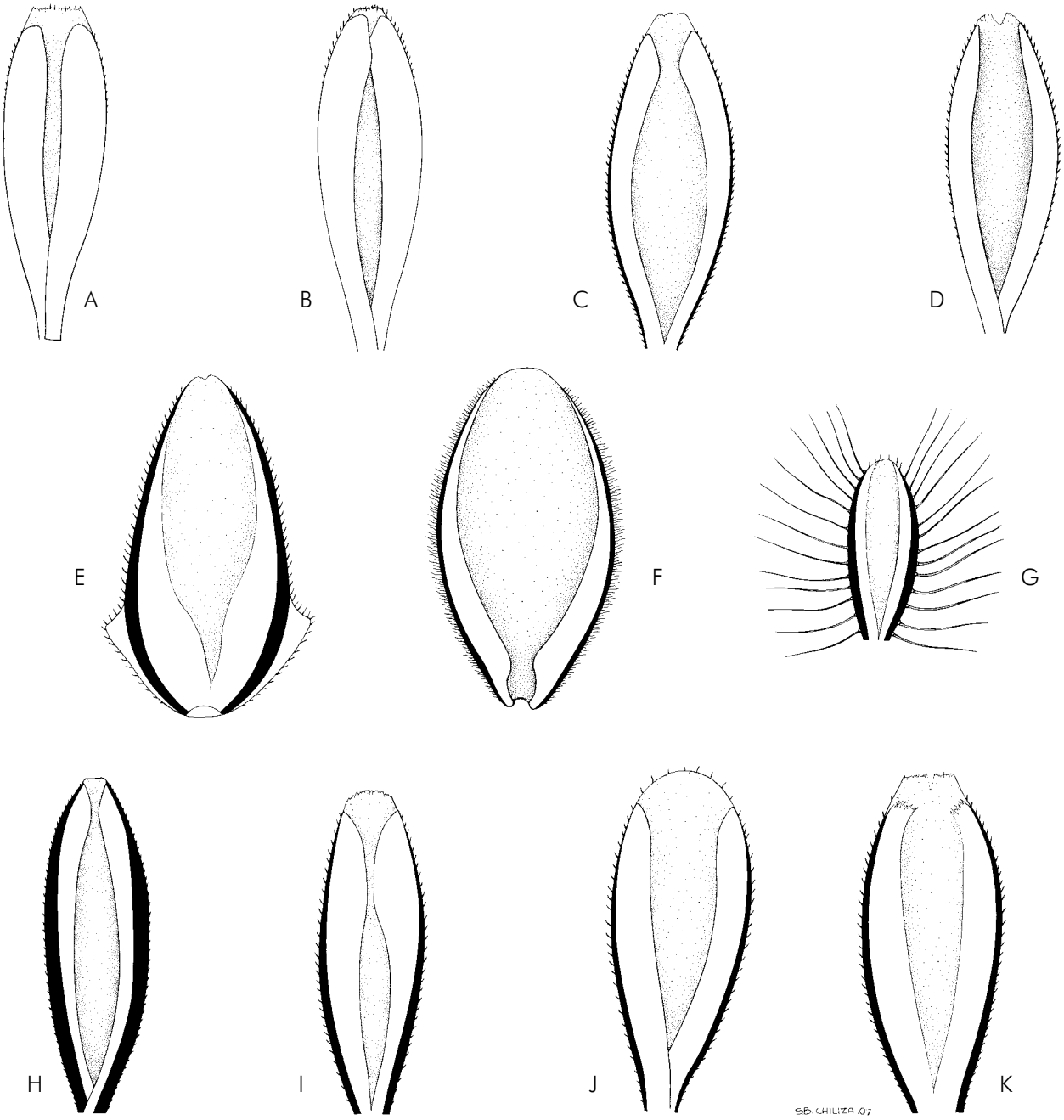



Figure 222.—*Eragrostis* paleas. A, *E. bicolor*; B, *E. trichophora*; C, *E. racemosa*; D, *E. lehmanniana*; E, *E.* × *pseud-obtusa*; F, *E. obtusa*; G, *E. ciliaris*; H, *E. nindensis*; I, *E. inamoena*; J, *E. sclerantha*; K, *E. pallens*. Artist: S.B. Chiliza.

112. Leaves mainly cauline, flat, up to 5 mm wide; culms often branched and geniculate . . . . . **E. rigidior**
Leaves basal, mostly involute and setaceous, up to 2 mm wide; culms unbranched . . . . . 113
113. Inflorescence lowest branches whorled; spikelet 2–3(–5)-flowered . . . . . **E. stapfii**
Inflorescence lowest branches not whorled, may be clusters; spikelet 4–11-flowered . . . . . 114
114. Leaves very curly . . . . . **E. chloromelas**
Leaves straight or drooping, long thin apex may curl . . . . . **E. planiculmis**
115(110). Plant robust, up to 2 000 mm high . . . . . 116
Plant slender, up to 1 000 mm high . . . . . 117

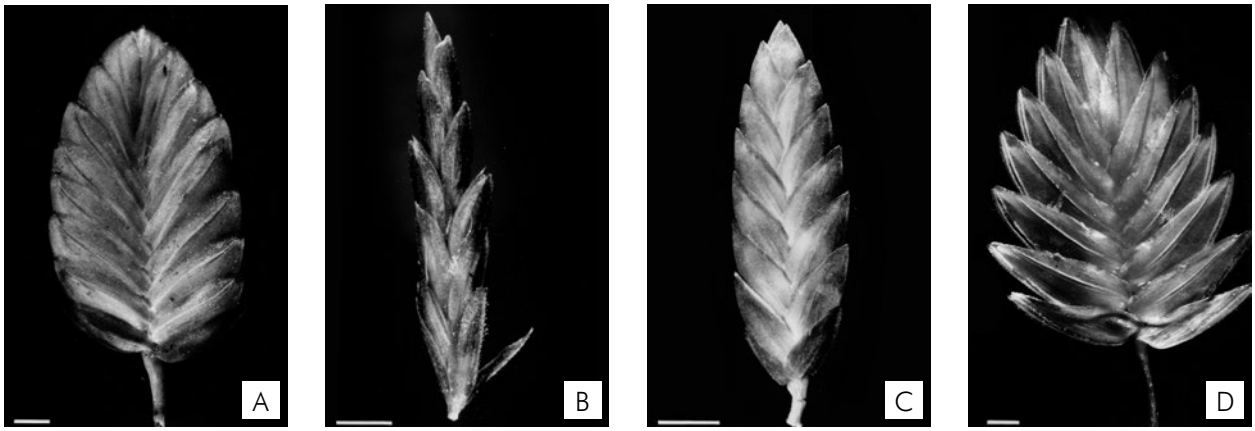



Figure 223.—*Eragrostis* spikelets. A, *E. capensis* (3.5–15.0 mm); B, *E. curvula* (4–10 mm); C, *E. racemosa* (3–10 mm); D, *E. superba* (6–16 mm). Photographer: M. Koekemoer.

116. Leaf blade 5–15 mm wide, usually flat; anthers 1.2–1.7 mm long . . . . . **E. acraea**
Leaf blade to 4(–5) mm wide, usually involute; anthers 0.9–1.1 mm long . . . . . **E. friesii**

117(115). Lemma usually purple to violet to green, often yellow especially near apex; palea distinctly boat-shaped . . . . . **E. heteromera**
Lemma dark green, greyish, yellowish-grey, green, maybe flushed purple at base or along lateral nerves; palea not distinctly boat-shaped . . . . . 118

118. Strong perennial; leaves setaceous, very curly . . **E. chloromelas**
Weak to moderate perennial; leaves if setaceous not strongly curling . . . . . 119

119. Inflorescence effuse, much branched; florets 3 to 4; lower glume reaching $^{1}/_{2}$–$^{2}/_{3}$ up lemma above; lemma greyish to yellowish-green, matt; plant base not strongly compressed . . . . . **E. micrantha**
Inflorescence not much branched; florets 3–16; lower glume usually barely reaching base of lemma above, never reaching up to $^{1}/_{2}$ of lemma above; lemma dark green, shiny; plant base strongly compressed . . . . . **E. tenuifolia**

120(91). Lemma apex awn-like or awned, awn 0.3–0.5 mm long . . . . . **E. walteri**
Lemma apex awnless or with minute (less 0.2 mm long) awn or mucro . . . . . 121

121. Glume and lemma keels with glandular dots; lemma lateral nerves extending to margins and usually into small mucros; caryopsis subglobose . . . . . **E. crassinervis**
Glume and lemma keels eglandular; lemma lateral nerve not extending to margin; caryopsis not subglobose . . . . . 122

122. Lemma dorsally rounded . . . . . 123
Lemma keeled (maybe only in upper part) . . . . . 126

123. Palea keels winged . . . . . ***E. thollonii**
Palea keels wingless . . . . . 124

124. Glume lanceolate in side view . . . . . **E. pseudopoa**
Glume ovate to ovate elliptic . . . . . 125

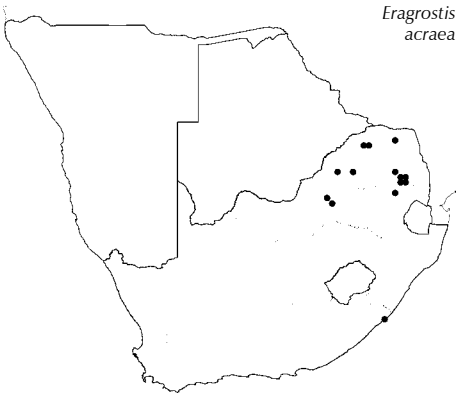
125. Palea membranous, flange between margins and keels gradually narrowing towards apex; pedicels usually stiff and short . . . . . **E. capensis**
Palea hard, cartilaginous, flange between margins and keels ± same width throughout; pedicels usually flexuous and long . . . . . **E. cimicina**

126(122). Lower glume ovate to narrowly ovate . . . . . 127
Lower glume lanceolate . . . . . 128

127. Culms much branched, dwarf shrub, wiry; leaves mainly cauline; glume apex acute to subacute . . . . . **E. scopelophila**
Culms unbranched; leaves mainly basal; glume apex obtuse . . . . . **E. racemosa**

128(126). Inflorescence spike-like (often interrupted below); palea keels narrowly winged; spikelet usually reddish-brown . . . . . **E. chapelieri**

Inflorescence open, if contracted not spike-like; palea keels wingless; spikelet dark green to greenish-grey . . . . . 129
129. Culms stout; plant to 2 000 mm high; spikelets crowded on branches; inflorescence eglandular . . . . . **E. acraea**
Culms slender; plant up to 700 mm high; spikelets spread out; inflorescence with or without glands . . . . . 130
130. Spikelet linear; lemma narrowly ovate . . . . . **E. tenuifolia**
Spikelet elliptic to elliptic-oblong, sometimes narrowly so; lemma ovate to elliptic-ovate in side view . . . . . 131
131. Glumes unequal; lower glume never reaching middle of lemma above; pedicels with annular glands . . . . . **E. patentipilosa**
Glumes subequal; lower glume $^{2}/_{3}$–$^{3}/_{4}$ up the lemma above; branches and pedicels with crateriform, punctate and annular glands . . . . . **E. desolata**

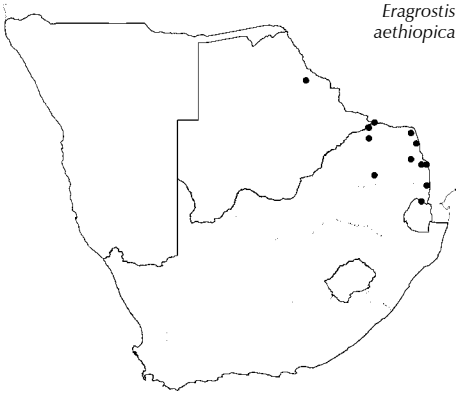

*Eragrostis acraea*

**Eragrostis acraea** De Winter, in *Kirkia* 1: 100 (1961). Type: Zimbabwe, Vumba Mts., *Obermeyer 2046* (PRE, holo.).

Densely tufted robust perennial to 2 000 mm high; basal sheaths glabrous or obscurely hairy at base; culm without glands. Leaf blade 200–300(–600) × 5–15 mm; eglandular. Inflorescence moderately branched, usually contracted; lowest branches not whorled, or clustered to subwhorled; axils glabrous; spikelets crowded on branches; most pedicels shorter than spikelets. Spikelet 3–7 × 1.5–2.5 mm, oblong to oblong-elliptic, 5–7(12)-flowered; rachilla persistent; lemmas and/or paleas breaking up from base upwards; glumes unequal, keeled, lanceolate in side view, usually scaberulous, opaque; lower glume acute, reaching $^{1}/_{3}$ or more up lemma above; upper glume reaching $^{1}/_{2}$–$^{2}/_{3}$ up lemma above; lemma 2.0–2.8 mm long, acute to subacute, strongly keeled, keel prominent for entire length of lemma, lateral nerves distinct to ± indistinct; palea long and narrow, keels a thin obscure line, entire, scabrid to smooth, margins touching along entire length (sometimes apart near middle) and overlapping at apex, falling with or soon after lemma; anthers 3, 1.2–1.7 mm long, caryopsis oblong-elliptic, dorsally grooved.

*Flowering*: November to April. *Ecology*: Mountainous areas; often between rocks and in disturbed places. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe and Mozambique. LIM, NW, M, EC. *Economics*: Used as temporary thatching only as it does not last long; grazed when young but unpalatable when old, green in winter.

Illustration: Cope: 57, tab. 24, 12 (1999).
Anatomy vouchers: *Ellis 2848* & *5205*.
Voucher: *Codd & Dyer 9074*.


*Eragrostis aethiopica*

**Eragrostis aethiopica** Chiov., in Robecchi-Bricchetti, *Somalia & Benedir*: 726 (1899). Type: Somalia, 'Ubei', *Bricchetti 192, 247* & *254* (syntypes).

Erect, loosely tufted annual to 600 mm high; culm nodes eglandular below. Leaf blade 30–200 × 1–3 mm. Inflorescence delicate, open, loose; branches slender, axils glabrous; lowest branches whorled to not whorled; pedicels slender, flexible; spikelets distant, evenly spaced. Spikelet 1.7–5.0 × 0.7–1.0 mm, linear to oblong, 6–28 florets; glumes unequal; lower glume to $^{1}/_{3}$ the length of lemma above, weakly keeled; rachilla persistent, lemmas and/or paleas breaking up from base upwards; lemmas on same side of rachilla overlapping lemma above and hardly diminishing in length towards apex of spikelet; lemma broadly ovate, lateral nerves faintly visible, apex ob-

tuse to subacute, lowest lemma 0.7–1.0 mm long; palea falling with or soon after lemma, keels slender, wingless, usually smooth, margins close to touching along entire length; anthers 3, 0.1–0.2 mm long; caryopsis ellipsoid.

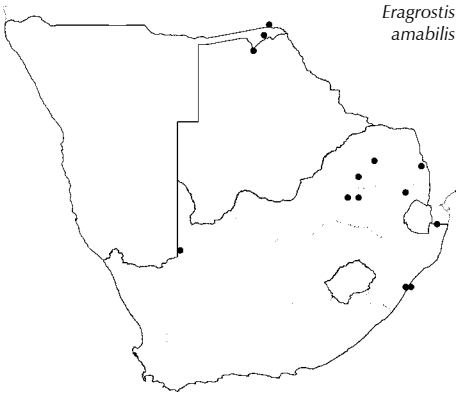
[Resembles *E. pilosa*, which has lemmas conspicuously shorter towards the apex of the spikelet; and *E. remotiflora*, with lemmas on the same side of the rachilla not overlapping the base of the lemma above.]

*Flowering*: January to May. *Ecology*: Damp sand or black clay; in small vleis, pan edges and riverbeds. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to East Africa and Ethiopia. B, S, LIM, M.

Illustration: Cope: 57, tab. 24, 12 (1999).
Anatomy vouchers: *Ellis 1893* & *3198*.
Voucher: *Theron 2955*.

**Eragrostis amabilis** (L.) Hook. & Arn., in *The Botany of Captain Beecheys' Voyage*: 251 (1838). Type: India.

*E. tenella* (L.) Roem. & Schult., in *Systema vegetabilium* 2: 576 (1817). Type: India.


*Eragrostis amabilis*

Tufted annual to 500 mm tall, erect, geniculate; culm with yellowish non-sticky glands below nodes. Leaf blade 10–90 × 2–4 mm. Inflorescence dense or open, branches spreading; lowest branches not whorled; spikelets distant, evenly spaced; eglandular or non-sticky glands present on branches and pedicels. Spikelet 1.5–2.5 mm long; rachilla fragile, breaking up from apex downwards; glumes subequal, 0.5 –1.0 mm long, glabrous; lemma broadly obtuse, 0.7–l.0 mm long, lateral nerves distinct, keel smooth or scabrid; palea wingless, keel hairs 0.1–0.4 mm long, bulbous-based; hairs exserted from lemma; anthers variable, 2–3, (on the same inflorescence), 0.15–0.40 mm long; caryopsis elliptic.

[Distinguished from *E. viscosa*, which has sticky glandular areas on the inflorescence, but the boundary is not sharp and intermediates are found. Similar to *E. ciliaris*, in which the lemma keel has long stiff hairs; and *E. arenicola*, which has the inflorescence contracted and spikelets densely adpressed to branches.]

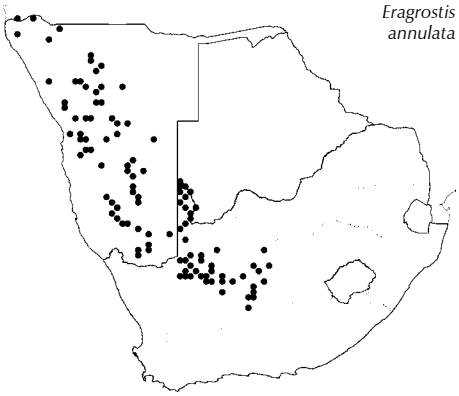
*Flowering*: January to April. *Ecology*: Bare, moist, sandy soils; in disturbed places like paths and cultivated lands. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards and throughout the tropics. N, B, LIM, G, M, KZN, NC. *Economics*: Weed.

Anatomy vouchers: *Ellis 3691, 3750* & *4425*.
Voucher: *Smook 4142*.

**Eragrostis annulata** Rendle ex Scott-Elliot, in *The Journal of Botany, British & foreign*. London 29: 72 (1891). Type: South Africa, Northern Cape, O'kiep, *Scully*.

RINGED LOVE GRASS

Tufted annual to 350 mm high; vegetative parts with glandular hairs with swollen apices; culm with glandular ring below nodes. Leaf blade 50–100 × to 3 mm; short glandular tipped hairs mixed with long slender hairs present, margins with crateriform glands and mid-

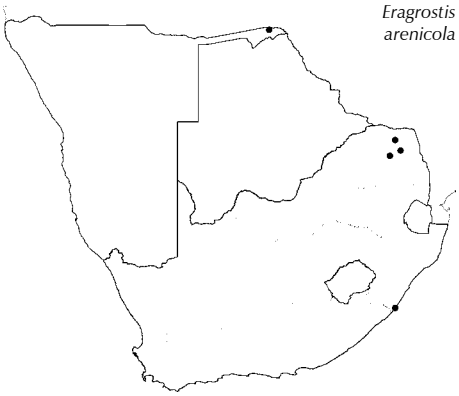

*Eragrostis annulata*

rib with sunken glands. Inflorescence open, occasionally contracted; lowest branches not whorled; spikelets spreading; pedicel long, flexible, a single annular gland present. Spikelet (3)5–15 × 1.3–2.5 mm, eglandular, upper part of rachilla fragile, lower part persistent, breaking up from the base upwards; glumes subequal, reaching to ½ up lemma above; lemma 1.2–2.0 mm long, broadly obtuse to truncate, keel glabrous or scabrid, lateral nerves distinct; palea wingless, keels glabrous or scabrid, margins wide apart, narrowing between keels and margins towards apex, persistent; anthers 3, 0.6–1.0 mm long; caryopsis broadly oblong to broadly ovate.

[Resembles *E. cilianensis*, which lacks swollen-tipped glandular hairs and has a subglobose caryopsis.]

*Flowering*: February to May. *Ecology*: On a variety of soils, especially sandy or stony ground and calcareous soil; where the water table is high, and in disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Angola. N, B, NC.

Illustrations: Chippindall: 177, fig. 150 (1955); Müller: 177 (2007).
Anatomy vouchers: *Botha & Panagos 17, 27*; *Ellis 874, 4372, 4377, 4730, 4764, 5250* & *Smook 3504*.
Voucher: *Acocks 12639; Theron 1967.*


*Eragrostis arenicola*

**Eragrostis arenicola** C.E.Hubb., in *Kew Bulletin* 1949: 345 (1949). Type: Zimbabwe, Harare (Salisbury), *Eyles* 2190 (K, holo.; PRE, iso.).

Loosely tufted, erect annual to 350 mm high; culm with yellowish, non-sticky glands below nodes. Leaf blade 30–100 × to 4(6) mm. Inflorescence contracted, dense; branches adpressed to main axis, lowest branches not whorled; spikelets close to one another but evenly spaced, glands if present not sticky. Spikelet 2.0–4.5 × 1.0–1.8(2.5) mm; rachilla fragile, lemmas and paleas breaking up from apex downwards; glumes unequal, 1–2 mm long; lemma 1.0–1.5 mm long, broadly obtuse, mucro present or absent, keel smooth or scaberulous, lateral nerves distinct; palea keels wingless, hairs 0.3–0.8 mm long, bulbous-based; hairs exserted from lemma; anthers 2–3 (number variable in the same inflorescence), 0.3–0.4(1.0) mm long; caryopsis elliptic.

[Centre of a cluster of closely related species: *E. amabilis*, with the inflorescence open and spikelets spreading; *E. ciliaris*, with lemma keel hairs long and stiff; and *E. viscosa*, with sticky glands.]

*Flowering*: April. *Ecology*: Sandy soil; in disturbed areas such as cultivated lands and roadsides. *Frequency in southern Africa*: Infrequent. *Distribution*: Throughout tropical Africa but mainly in the south. N, LIM, KZN. *Economics*: Weed of cultivated lands.

Illustration: Cope: 73, tab. 28 (1999).
Anatomy voucher: *Ellis 3723*.
Voucher: *Scheepers 630*.

**Eragrostis aristata** De Winter, in *Bothalia* 7: 468 (1961). Type: Namibia, Brandberg, *Schweickerdt 2252* (PRE, holo.?).

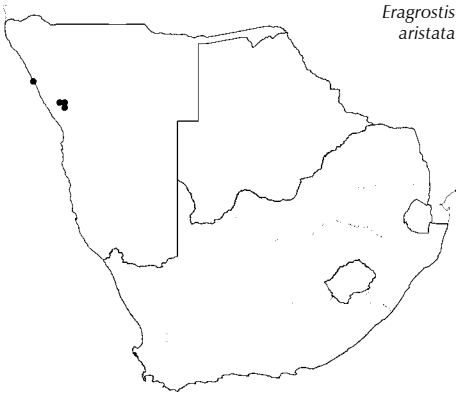
AWNED LOVE GRASS

Tufted annual to 750 mm high, erect to geniculate. Leaf blade to 200 or longer × to 6.5 mm; margins scabrid and with crateriform glands. Inflorescence open; lowest branches not whorled, crateri-

form glands present; spikelets clustered on branches. Spikelet to 6 × 1.5–3.0 mm (excluding awns), glands present, rachilla persistent at first, becoming fragile, lemmas and/or paleas breaking up from base upwards; glumes unequal to subequal; lemma deeply 2-lobed at apex, keeled, central awn 0.8–1.5 mm long, lateral nerves shortly awned or mucronate; palea keels scabrid; anthers 3, 0.6–0.8 mm long; caryopsis oblong.

*Flowering*: August and April to May. *Ecology*: Moist places. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N (Brandberg and Unjab mouth).

Voucher: *Oliver, Muller & Steenkamp 6688*.


*Eragrostis aristata*

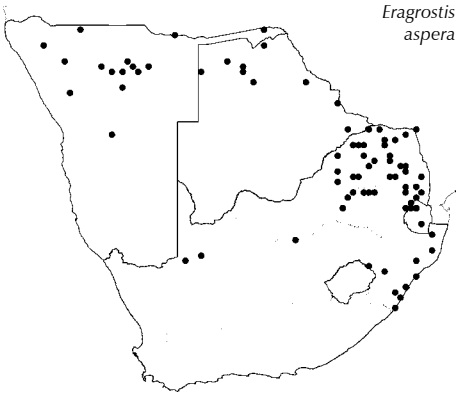
**Eragrostis aspera** (Jacq.) Nees, in *Florae africae australioris illustrations monographicae*: 408 (1841). Type: Cultivated in Europe with seed from India.

ROUGH LOVE GRASS, GROOTPLUIM ERAGROSTIS

Tufted, erect annual to 800 mm high; culm nodes eglandular. Leaf blade to 300 × to 10 mm; glands present on nerves. Inflorescence open, effuse; branches ascending at 45° angles; lowest branches whorled or not whorled; axils long hairy; pedicels 5–25 mm long, slender. Spikelet 3–10 × 1.0–1.5(1.8) mm; rachilla fragile; lemmas and/or paleas breaking up from apex downwards; glumes subequal; lowest glume reaching ½ way and more up lemma above, upper glume reaching almost to middle and higher on lemma above; lemma 1.2–1.5 mm long, obtuse to truncate, lateral nerves prominent; palea keels scabrid, margins very wide apart; anthers 3, 0.2–0.3(0.6) mm long; caryopsis subglobose.

[Similar to *E. leersiiformis*, which has an ovate-elliptic caryopsis.]

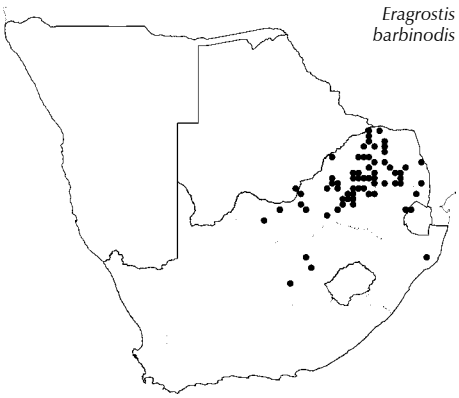
*Flowering*: February to June. *Ecology*: On sandy soil in dolomite areas; in disturbed places and old cultivated areas. *Frequency in southern Africa*: Locally common. *Distribution*: Tropical Africa; Arabia to India; also Mascarene Islands. N, B, S, LIM, NW, G, M, KZN, NC. *Economics*: Low leaf production therefore of poor grazing value; weed.


*Eragrostis aspera*

Illustrations: Chippindall: 160, fig. 128 (1955); Cope: 57, tab. 24, 5; 95, tab. 32 (1999).
Anatomy vouchers: *Ellis 3685, 3910, 3922* & *Smook 5180*.
Voucher: *Killick 1714*.

**Eragrostis barbinodis** Hack., in *Bulletin de l'Herbier Boissier* 3: 390 (1895). Type: South Africa, Limpopo, Klippan, *Rehmann 5362* & *5364* (syntypes).

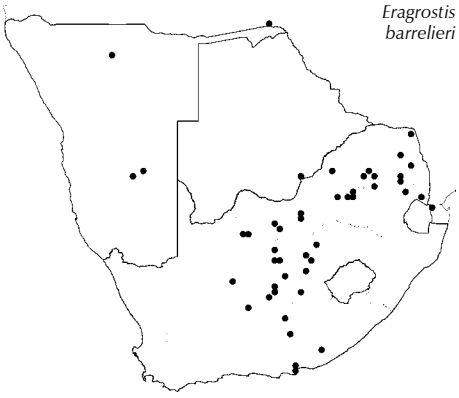
Tufted perennial; geniculate to decumbent; stolons present; lower sheath hairy at base; culm to 1 000 mm long, often rooting at nodes, nodes at least some densely to sparsely hairy all around node; internodes glabrous or hairy. Leaf blade 100(–150) × 2–6 mm. Inflorescence open, branches spreading; lowest branches not whorled, may be clustered; axils glabrous. Spikelet 4–7 × 1.0–1.5 mm, linear to oblong; rachilla persistent, sometimes becoming fragile above; lemmas and paleas breaking up from base upwards; glumes subequal, lanceolate in side view, ½–¾ the length of lemmas directly above, apex acute; lemma 1.5–1.7 mm, obtuse, keeled, lateral nerves distinct; palea persistent, margins wide apart, not touching, keels a narrow obscure line, wingless, scaberulous; anthers 3, 0.8–1.0 mm long; caryopsis oblong to broadly elliptic.


*Eragrostis barbinodis*

[Hybridises with *E. rigidior*, which is more erect and has the unbranched culm nodes glabrous.]

*Flowering*: December to May. *Ecology*: Red sandy loam, gritty to sandy soils and black turf. *Frequency in southern Africa*: Locally common. *Distribution*: Introduced to East Africa. B, S, LIM, NW, G, M, FS, KZN. *Economics*: Introduced as a forage grass in other parts of Africa.

Anatomy vouchers: *Ellis 760, 1353, 1574* & *1749*.
Voucher: *Smook 4454*.


*Eragrostis barrelieri*

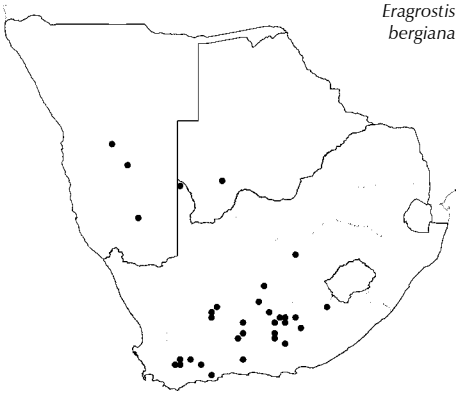
***Eragrostis barrelieri** Daveau, in *Journal de botanique* (Morot) 8: 289 (1894). Type: Algeria, Egypt (many syntypes).

Laxly tufted annual to 300(600) mm high, erect to geniculate; culm nodes with or without glands below. Leaf blade to 100 × to 3.5 mm; margins eglandular, scabrid. Inflorescence open, primary branches usually not longer than 40 mm, spreading, not whorled; axils glabrous; pedicels stout, crateriform glands usually present. Spikelet 5–15 × 1.0–2.2 mm, rachilla persistent, lemmas and/or paleas breaking up from base upwards; glumes unequal sometimes almost equal on same inflorescence, apex acute; lemma 1.7–2.3 mm long, obtuse, keeled, lateral nerves distinct, glabrous, scaberulous; palea persistent, keels slender, scabrid, margins very wide apart; anthers 3, 0.2–0.3 mm long; caryopsis oblong-elliptic.

[Similar to *E. cilianensis*, which has a subglobose caryopsis and wider spikelets (1.5–4.0 mm); and *E. minor*, which has subequal glumes.]

*Flowering*: December to January. *Ecology*: On sand; in disturbed areas such as road verges and in gardens. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised and invader from southern Europe. Northwards throughout tropical Africa, and North Africa through the Middle East to India; and North America. N, B, S, LIM, NW, G, M, FS, NC, EC. *Economics*: Weed.

Illustration: Chippindall: 157, fig. 125 (1955).
Anatomy vouchers: *Ellis 771, 3749, Smook 2744* & *3188*.
Voucher: *De Winter 267*.


*Eragrostis bergiana*

**Eragrostis bergiana** (Kunth) Trin., *Bulletin scientifique publié par l'Académie imperiale des Sciences de Saint-Pétersbourg* 1: 70 (1836). Type: South Africa, prope (near) Gamkas Karree ?*Bergius*.

KALKKWEEK

Mat-forming to tufted perennial to 400 mm high; long rhizomatous; basal sheaths with dense, long, woolly-tomentose hairs. Leaf blade 4–8 mm × 1.0–1.5 mm. Inflorescence sparsely branched; branches slightly spreading from main axis; spikelets densely clustered on side branches. Spikelet 4–8 × 2.2–3.8 mm, completely pallid or flushed dark purple, rachilla fragile, lemmas and/or paleas breaking up from apex downwards; lowest lemma broadly obtuse, lateral nerves conspicuous; palea wingless, keel scaberulous; anthers 3, 1.5 mm long; caryopsis elliptic to oblong-elliptic.

[Barely distinguishable from *E. truncata* and a detailed study is needed in this group. Resembles *E. annulata*, which has glandular hairs with swollen tips and a broadly oblong to broadly ovate car-

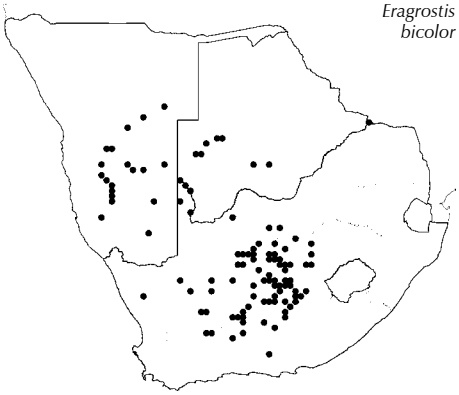
yopsis; and *E. barrelieri* and *E. minor*, which have oblong caryopses and narrower spikelets.]

*Flowering*: September, December and February. *Ecology*: Limestone soils; especially in pans and eroded places. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, B, FS, NC, WC, EC. *Economics*: Drought and frost resistant pasture; erosion control as good soil binder.

Illustration: Chippindall: 177, fig. 149 (1955).
Anatomy voucher: *Smook 3923A*.
Voucher: *Smook 3923*.

**Eragrostis bicolor** Nees, in *Florae africae australioris illustrations monographicae*: 407 (1841). Type: South Africa, Eastern Cape, in Nieuwe Hantom montibus ad Leeuenfontein, et ad Wonderheuvel, *Drège* (syntypes).

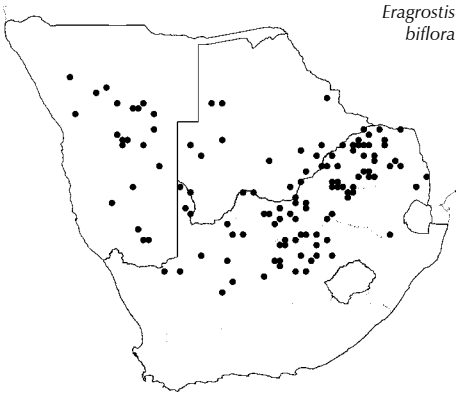
TWO-COLOURED LOVE GRASS, SPECKLED VLEI GRASS, FYNVLEIGRAS


*Eragrostis bicolor*

Densely tufted, perennial to 600 mm high, usually a hygrophyte; rhizome short; leaves mainly basal; basal sheaths glabrous or obscurely hairy at very base; culm with scattered glands. Leaf blade to 200 × to 2.5 mm, flat or involute, usually glaucous. Inflorescence 25–120(180) mm long, open, lax, branches and spikelets spreading, rarely contracted, rarely with scattered glands; lowest branches solitary or 2–3, not whorled; pedicels shorter to as long as spikelet. Spikelet 2–8 × 1–2 mm linear to narrowly oblong; rachilla persistent or upper part fragile and florets breaking off in groups, lemmas and/or paleas breaking up from base upwards; glumes subequal, $^1/_2$–$^2/_3$ the length of lemmas above, lanceolate in side view, lightly keeled; lemma 1.4–1.6 mm long, lightly keeled, deep purple or violet and green, apex yellowish, sometimes mostly yellowish but usually variegated, lateral nerves distinct to indistinct, apex obtuse; palea margins very close for entire length, touching to overlapping at least at apex, keels a thin obscure line, entire, smooth or scaberulous, wingless, falling with or just after lemma; anthers 3, 0.6–1.2 mm long; caryopsis oblong.

*Flowering*: October to May. *Ecology*: Often in brackish areas, in water or on wet soil around seasonal pans, and in dry riverbeds. *Frequency in southern Africa*: Locally common. *Distribution*: Mozambique and Zimbabwe. N, B, NW, FS, NC, WC, EC. *Economics*: Grazed by game; average palatability but often grazed because it's the only greenery around.

Illustration: Cope 56, tab. 23, 9 (1999); Müller: 179 (2007).
Anatomy vouchers: *Smook & Gibbs Russell 2410*; *Ellis 3608, 4325, 4375* & *4776*.
Voucher: *Smook 3385, Bryant 645a*.


*Eragrostis biflora*

**Eragrostis biflora** Hack. ex Schinz, in *Bulletin de l'Herbier Boissier* 3: 390 (1895). Type: South Africa, Free State, Bloemfontein, *Rehmann 3759*; Limpopo, Bosveld, Klippan *Rehmann 5364* (syntypes).

TWO-FLOWERED LOVE GRASS, SHADE ERAGROSTIS

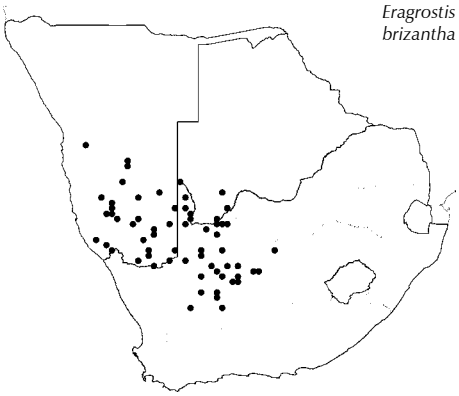
Tufted annual to 700 mm high; culm eglandular. Leaf blade 90–300 × 1.5–8 mm. Inflorescence delicate, open, much branched; lowest branches usually whorled, axils glabrous; pedicels long, slender. Spikelet 1.5–2.5 × 0.5–1.2 mm, narrowly elliptic when young

to broadly ovate when mature, florets 1–2(–3); rachilla persistent, becoming fragile in upper part, lemmas and/or paleas breaking up from base upwards; glumes subequal; lemma 1.0–1.5 mm long, keeled, lateral nerves not prominent, usually faint but visible near base; palea persistent, keels wingless, glabrous to scabrid; anthers 3, 0.2–0.3 mm long; caryopsis obovate.

[Can be confused with the genus *Sporobolus*, which has 1-flowered spikelets. Resembles the perennial *E. habrantha*.]

*Flowering*: September to May. *Ecology*: Moist disturbed areas, especially under trees. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe. N, B, LIM, NW, G, M, FS, NC. *Economics*: Weed.

Illustration: Chippindall: 151, fig. 118 (1955); Müller: 181 (2007).
Anatomy vouchers: *Ellis 429, 889* & *3619*.
Voucher: *Ellis 2617, Gubb 314-47*.


*Eragrostis brizantha*

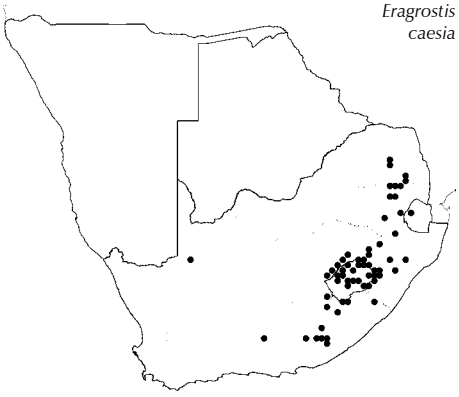
**Eragrostis brizantha** Nees, in *Florae africae australioris illustrations monographicae*: 411 (1841). Type: South Africa, Northern Cape, in collibus arenosus ad Gariep fluvium, Klein Namaqualand, *Drège*.

Tufted, annual to 500 mm high; erect to geniculate; basal sheaths glabrous or with long scattered hairs; culm internodes often with glands. Leaf blade to 150 × to 4.5 mm; glands present or absent. Inflorescence branches slightly spreading to widely spreading; lowest branches not whorled; central axis glandular; spikelets densely crowded. Spikelet 3.5–5.0 × 2.0–4.0 mm, ovate to very broadly oblong; rachilla fragile, breaking up from apex downwards; glumes subequal, keeled; upper glume $^{2}/_{3}$–$^{3}/_{4}$ length of lemma above; lemma 1.6–1.8 mm long, keeled, broadly obtuse, dull, same texture throughout, often flushed purple, lateral nerves distinct with small glandular dots; palea keels entire, glabrous, with small glandular dots, margins wide apart, narrowing between keels and margin from base upwards to apex; anthers 1.0–1.2 mm long; caryopsis obovate.

[Resembles the perennial *E. echinochloidea*, which has lower glume acuminate, palea keels very broad, deeply notched and protruding in the lower part.]

*Flowering*: February to May, also July to November. *Ecology*: Sandy and calcareous soils; around rivers and in disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, B, NC.

Illustrations: Chippindall: 175, fig. 146 (1955); Müller: 183 (2007).
Anatomy vouchers: *Ellis 910, 4342, 4365, 4374* & *5532*.
Voucher: *Giess & Müller 12268*.


*Eragrostis caesia*

**Eragrostis caesia** Stapf, *Flora capensis* 7: 599 (1900). Type: South Africa, KwaZulu-Natal, Riet Vley, *Buchanan 240*.

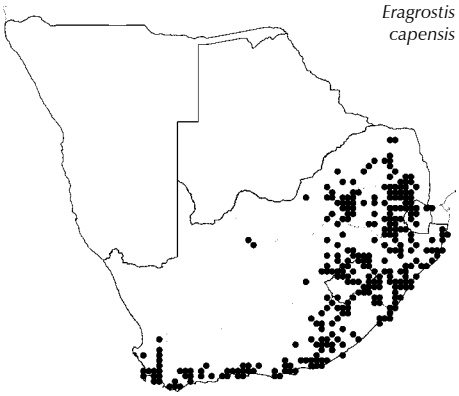
Densely tufted perennial 450–600 mm high; basal sheaths glabrous; culm without glands below nodes. Leaf blade to 200 × to 3 mm; eglandular. Inflorescence dense, contracted, branches usually adpressed to main axis, occasionally spreading; lowest branches not whorled. Spikelet 4–7 × 1.5–2.4 mm, rachilla persistent; lemma and paleas tardily breaking up from base upwards; glumes unequal, acute to subacute, reaching $^{1}/_{4}$–$^{1}/_{2}$ up lemma above; lemma acute to acuminate, mucro sometimes present, lateral nerves distinct due to

elongated black oil glands alongside; palea keels wingless, hairs less than 0.1 mm long; anthers 3, 1.0–1.4 mm long.

*Flowering*: November to June. *Ecology*: Cave sandstone; moist areas on shallow soil, and seepage areas in mountain grassland. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe. S, L, LIM, M, FS, KZN, ?NC, EC. *Economics*: Eagerly grazed pasture that remains green in winter.

Anatomy vouchers: *Ellis 441, 443, 3178, 3449, 3454 & 3455.*
Voucher: *Smook 1060, Schmitz 4167A.*

**Eragrostis capensis** (Thunb.) Trin., in *Mémoires de l'Académie Impérial des Sciences de Saint Pétersbourg Sér 6, Science & Maths.*: 400 (1830). Type: South Africa, *Thunberg 2330* (UPS, holo.).


*Eragrostis capensis*

HEART-SEED LOVE GRASS, HARTJIE ERAGROSTIS

Tufted perennial to 900 mm high; rhizome short, horizontal; basal sheaths glabrous to hairy but not woolly-hairy; leaves mainly basal; culm without glands. Leaf blade 70–350 × 2–5 mm, eglandular. Inflorescence sparsely branched or unbranched, contracted or open and spreading; lowest branches not whorled; axils glabrous; spikelets adpressed; pedicels stiff, usually short. Spikelet 3.5–15.0 × 3–7 mm, plump, opposite row of florets overlapping and closely packed; rachilla not visible, persistent, lemmas and/or paleas breaking up from base upwards; glumes subequal, apex acute to obtuse, back rounded, reaching ± $^4/_5$ up lemma above, ovate in side-view; lemma 2.5–4.0 mm long, obtuse to subobtuse, back rounded, dull and granular, greenish to greenish-brown, strongly flushed purple, lateral nerves distinct; palea narrowly obovate, keels entire, wingless, membranous to subcartilaginous between the keel and margin, margins nearly touching to touching in lower parts to widely separated in upper parts, narrowing between keel and margin from base to apex, falling with or soon after lemma; anthers 3, 1–2 mm long; caryopsis elliptic, dorsally flattened.

[Similar to *E. cimicina*, which has a smooth, shiny lemma, and palea between keels and margins ± same width throughout. Sometimes confused with *E. superba*, with spikelets very strongly flattened, edges jagged, and entire spikelet disarticulating as a unit below glumes.]

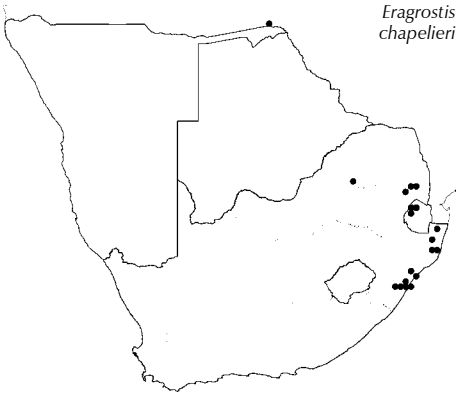
*Flowering*: September to April. *Ecology*: Sandy to clayey soils; in moist areas on slopes, rocky and disturbed places. *Frequency in southern Africa*: Widely common, especially after fire. *Distribution*: Northwards to DRC, Kenya, Tanzania, Madagascar and Thailand. L, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Only utilised in early spring as it has low leaf production.

Illustrations: Chippindall: 169, fig. 140 (1955); Cope: 58, tab. 25, 2 (1999).
Anatomy vouchers: *Ellis 11, 27, 59, 155, 284, 372, 2817, 4070 & 5201.*
Voucher: *Kluge 1119, Balsinhas 3201, Smook 2027.*

**Eragrostis chapelieri** (Kunth) Nees, in *Florae africae australioris illustrations monographicae*: 392 (1841). Type: Madagascar, Chapelier (P, holo.).

SPIKY LOVE GRASS, BRUINSAADGRAS

Erect, densely tufted perennial to 900 mm high; basal sheaths glabrous to obscurely hairy; culm eglandular. Leaf blade to 400 × 5 mm; eglandular. Inflorescence 40–200 mm long, narrow, dense,

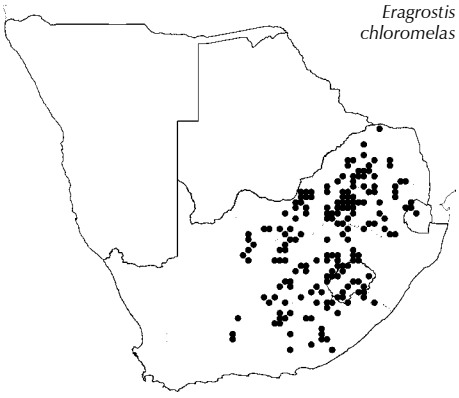

*Eragrostis chapelieri*

often spike-like, branches adpressed to main axis, overlapping but often distant in lower part; lowest branches not whorled; axils glabrous; spikelets densely contracted on branches, sessile or pedicels short. Spikelet 6–24(30) × 2–3 mm, linear, usually reddish-brown, occasionally green; rachilla persistent, lemmas and/or paleas breaking up from base upwards; glumes subequal, lanceolate in side view, apex acute; lower glume nearly as long as lemma above; lemma 1.9–3.2 mm long, apex acute-acuminate, keeled, lateral nerves distinct but not raised; palea persistent, between keel and margins narrowing upwards and running into the keel near apex, margins not touching, at least not in upper part, keels obvious, entire, narrowly winged to wingless, minutely ciliolate, flattened; anthers 2, 0.3–0.8 mm long; caryopsis broadly ellipsoid.

[Similar to the annual *E. patens*; to *E. elatior*, which has 2–6 dark olive green spikelets in clusters distant from one another on the main axis; and *E. inamoena*, which has palea margins slightly apart to touching along entire length, spikelets greyish-green, often flushed purple.]

*Flowering*: March to August. *Ecology*: Poor sandy soils or occasionally on clays; in disturbed areas such as old lands and path sides. *Frequency in southern Africa*: Rare. Locally common. *Distribution*: Northwards to east tropical Africa, Sudan and Congo; also Madagascar. N, S, LIM, M, KZN. *Economics*: Weed in cultivated lands.

Illustrations: Chippindall: 171, fig. 142 (1955); Cope: 125, tab. 40, B (1999).
Voucher: *Codd 5456*.


*Eragrostis chloromelas*

**Eragrostis chloromelas** Steud., in *Synopsis Plantarum glumacearum* 1: 271 (1854). Type: South Africa, Eastern Cape, Schiloh, *Drège ?3895*.

NARROW CURLY LEAF

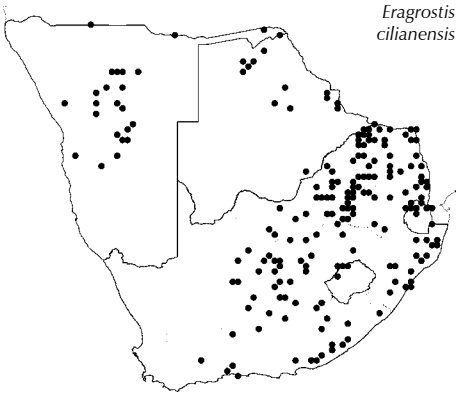
Tufted perennial to 800 mm high; basal sheaths glabrous or obscurely hairy at very base, nerves maybe shallowly ridged but not prominent or forming furrows between; culms strongly compacted, not easily separated individually; culm nodes glabrous. Leaf blade to 300 mm long, setaceous, tapering to very long filiform tip, very curly especially when old. Inflorescence open, much branched, branches and pedicels spreading; lowest branches usually solitary, not whorled; axils usually long hairy, rarely glabrous. Spikelet 4–6 × 1.0–1.5 mm, narrowly obovate to oblong, pale greenish-grey to dark green; florets (4)6–8; glumes translucent, usually smooth, longer than $^1/_3$ up lemma above; rachilla persistent in lower part, usually becoming fragile in upper part; lemmas and/or paleas breaking up from base upwards; lemma lightly keeled, greenish-grey to yellowish, base and lateral nerves may be flushed purple; palea margins nearly touching to touching along entire length; anthers 3, 0.6–0.8 mm long; caryopsis ellipsoid.

[Here *E. chloromelas* has been kept separate from *E. curvula*, which has the base prominently ridged and densely hairy in deep furrows between ridges. As the type for *E. chloromelas* has not been seen, this may represent a new species.]

*Flowering*: December to May. *Ecology*: On sandy soil, loam and often dolomite; on hill slopes, rocky ridges or in disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Endemic. S, L, LIM, NW, G, M, FS, NC, WC, EC. *Economics*: Reasonably palatable only early in the season.

Illustrations: Chippindall: 145 fig. 112 (1955).
Anatomy vouchers: *Ellis 12, 123, 137, 250* & *Smook 2146*.
Voucher: *Smook 5825, De Winter 626*.

**Eragrostis cilianensis** (All.) Vignolo ex Janch., in *Mitteilungen des Naturwissenschaften Vereins der Universität*, Wein, n.s., 5: 110 (1907). Type: Italy.


*Eragrostis cilianensis*

STINK LOVE GRASS, STINKGRAS

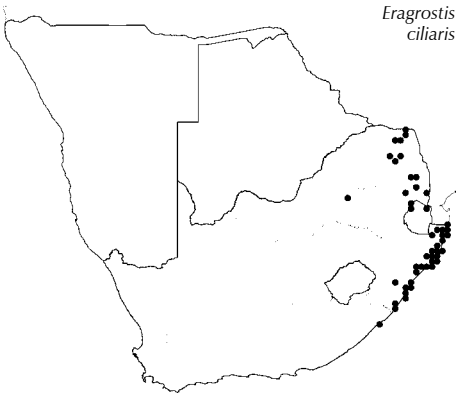
Loosely tufted annual to 900 mm high; often geniculate; basal sheaths glabrous, if hairy not densely woolly-hairy; culm often with glands below nodes. Leaf blade to 250 × to 10 mm; margin with or without crateriform glands. Inflorescence dense, side branches usually 40 mm or shorter, spreading to adpressed; lowest branches not whorled; branches and pedicels stout, crateriform glands present. Spikelet 3–20 × 1.5–4.0 mm, narrowly ovate to narrowly oblong, rachilla persistent to sub-persistent; lemmas and/or paleas breaking up from base upwards; glumes subequal, reaching to $^{3}/_{4}$ up lemma above; crateriform glands often on keels; lowest lemma 1.7–2.8 mm long, narrowly to broadly obtuse in profile, keeled, keel often with crateriform glands, lateral nerves distinct; palea keels entire, scabrid, persistent, margins wide apart and not reaching apex, narrowing from base to apex between keels and margins; anthers 3, 0.2–0.3 mm long; caryopsis subglobose.

[Resembles *E. annulata*, which has glandular hairs with swollen tips and a broadly oblong to broadly ovate caryopsis; *E. barrelieri* and *E. minor*, which have oblong caryopsis and generally narrower spikelets.]

*Flowering*: October to June. *Ecology*: Sandy soils; often in moist places, also disturbed areas such as cultivated lands, alongside of paths and overgrazed places. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards throughout Africa and in tropical and warm temperate regions of the Old World. Introduced to the New World. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Due to low leaf production and unpleasant smell not a good grazing grass; ruderal weed.

Illustration: Chippindall: 158, fig. 126 (1955); Cope: 58 & 136, tab. 25, 10 & 41 (1999); Peterson: 84 (2003).
Anatomy vouchers: *Ellis 107, 406, 527, 888* & *3911*.
Voucher: *Ross 1916*

**Eragrostis ciliaris** (L.) R.Br., in Tuckey, in *Narrative of an Expedition to explore the river Zaire*. App. 5: 478 (1818). Type: Jamaica.


*Eragrostis ciliaris*

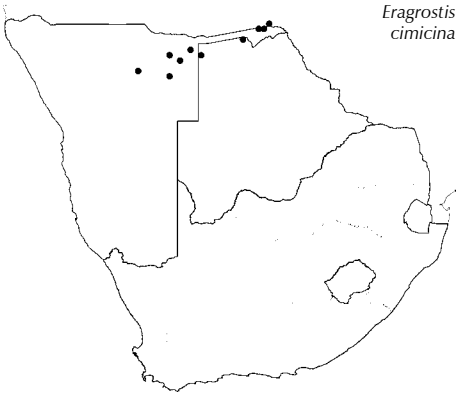
WOOLLY LOVE GRASS

Erect, tufted annual to 650(750) mm high; culm eglandular. Leaf blade to 120 × to 5 mm. Inflorescence woolly, contracted, often interrupted, lowest branches not whorled; spikelets densely clustered. Spikelet 2.0–4.5 × 1.5–2.2 mm, usually flushed purple, rachilla fragile, breaking up from apex downwards; glumes subequal, keels scabrid; lemma 0.9–1.5 mm long, keel (at least upper lemmas in spikelets) with stiff hairs 0.2–0.4 mm long, especially towards base, lateral nerves distinct; palea keel hairs 0.5–0.7 mm long, bulbous-based, exserted from lemma; anthers 2, 0.20–0.25 mm long; caryopsis elliptic.

[Belongs to a group of related species, which includes; *E. amabilis*, with an open inflorescence and spreading branches; *E. viscosa*, with sticky glandular patches; and *E. arenicola*, with the lemma keel smooth or scabrid.]

*Flowering*: January to December. *Ecology*: Moist sandy soils; in disturbed places such as human habitation, cultivated lands, overgrazed and trodden places. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards through tropical Africa to Arabia, Mascarene Islands to India; also tropical America. B [specimen not at SANBI, see *Flora Zambesiaca* 10,2], S, LIM, G, M, KZN, EC. *Economics*: Eaten by stock in Mozambique; weed in garden or cultivated lands.

Illustration: Chippindall: 179, fig. 153 (1955).
Anatomy vouchers: *Ellis 3227, 3415, 3487* & *4066*.
Voucher: *Smook 5737*.


*Eragrostis cimicina*

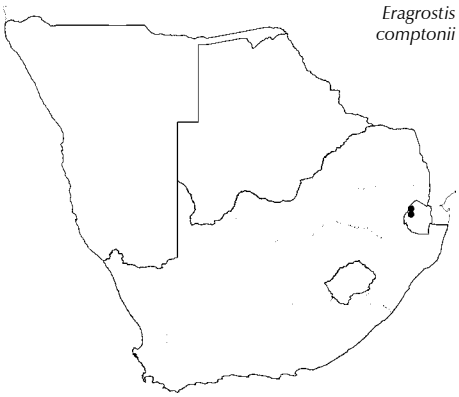
**Eragrostis cimicina** Launert, in Merxmüller, in *Prodromus einer Flora Südwestafrika* 160: 221 (1970). Type: Angola, Vale do Rio Tiengo. *Cuilo 9* (COI, holo.).

Densely tufted perennial to 1 500 mm high; basal sheaths glabrous or hairy at base but not woolly-hairy; often breaking up into fibres. Leaf blade 50–320 × to 5 mm; eglandular. Inflorescence open; branches and pedicels long flexuous; lowest branches not whorled; pedicels slender; sticky glandular patch on culm below inflorescence present or absent. Spikelet 3–6(–9) × 3–5 mm, broadly ovate, plump; opposite rows of florets closely packed and overlapping basally; rachilla not visible, persistent; lemmas and/or paleas breaking up from base upwards; glumes ovate-elliptic in side view, obtuse, reaching from ± $^1/_2$ to $^2/_3$ up lemma above; lemma 2.5–3.0 mm long, smooth and shiny, obtuse to subobtuse, lateral nerves distinct to indistinct, not raised, median keel with long cilia on lower $^1/_3$; palea elliptic, thickly cartilaginous, especially between keels and margins, keels wingless, long hairs present or absent at base, hairs not bulbous-based, falling with lemma, flange between keels and margins same width ± along entire length; anthers 3, 1.5–2.0 mm long; caryopsis broadly oblong with a deep pit dorsally.

[Similar to *E. capensis*, which has a contracted inflorescence and spikelets dull, granular; and *E. thollonii*, which has the palea winged.]

*Flowering*: January to March. *Ecology*: Sandy loam; on floodplains. *Frequency in southern Africa*: Infrequent. *Distribution*: southern Angola, Zambia and Zimbabwe. N, B.

Voucher: *De Winter 9204*.


*Eragrostis comptonii*

**Eragrostis comptonii** De Winter, in *Bothalia* 20: 208 (1990). Type: Swaziland, northeast of Mbabane, *Compton 26766* (PRE, holo.).

Perennial up to 700(1 000) mm; rhizomes short, knotty; cataphylls present; basal sheath glabrous; leaves mainly cauline; culms wiry. Leaf blade 300–500 × 4 mm, usually rolled, apex filiform. Inflorescence 250–320 mm long, open; branches and pedicels filiform; lowest branches not whorled; spikelets not clustered; longest pedicel much longer than spikelet. Spikelet 2–4 × 0.6–1.5 mm; rachilla persistent to sub-persistent, visible; glumes unequal to subequal; lower glume lanceolate, reaching to $^1/_2$ or more up lemma above; upper glume just covering base of lemma above; lemma 1.3–1.7 mm long, subacute, broadly ovate, lateral nerves obscure, dark grey to greenish; palea margins touching or overlapping for entire length,

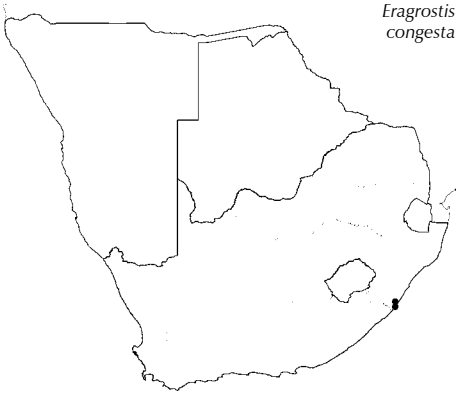
usually longer than lemma, keels obscure, smooth to obscurely scaberulous in upper part; anthers 1.0–1.2 mm long; caryopsis ovoid to ovoid-oblate.

[Very similar to *E. curvula* with which it is said to hybridise (De Winter 1990).]

*Flowering*: February to March. *Ecology*: Shady places. *Distribution*: Endemic. S.

Voucher: *Braun 60*.

*?**Eragrostis congesta** Oliv., in *Transactions of the Linnean Society of London* 29: 175, t. 115A (1875). Type: Tanzania, Tabora (kazeh), *Grant* (K, holo.).

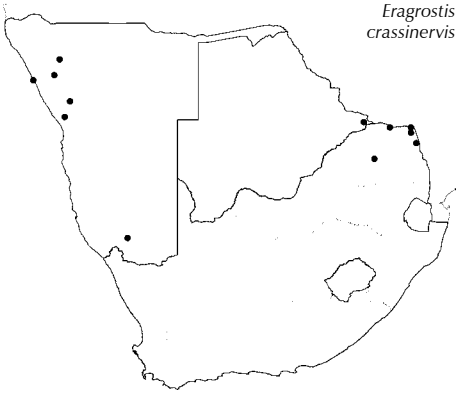

*Eragrostis congesta*

Weak tufted perennial to 800(1 200) mm high; erect or geniculate; culm without glands below nodes, internodes glabrous to hairy. Leaf blade 100–200 × 3–4 mm; blade and sheath often densely covered with long bulbous-based hairs. Inflorescence consisting of 2–8 dense, usually globose, ovoid to elliptic spikelet clusters, distant on main axis except near apex and at the base; lowest branches not whorled; pedicel short, hairy. Spikelet 3–10 × 1.2–2.0 mm, elliptic to narrowly oblong; breaking up from base upwards, rachilla fragile, breaking off above glumes soon after lemmas begin to fall; glumes subequal, lanceolate in side view; lowest lemma 1.5–2.0 mm long, acuminate, awn present (up to 0.5 mm long) or absent, lateral nerves distinct; palea persistent, keels slender, wingless, scaberulous to scabrid; anthers 3, 0.3–0.4 mm long; caryopsis elliptic.

*Flowering*: May to July. *Ecology*: Moist areas and disturbed places like roadsides. *Frequency in southern Africa*: Infrequent. *Distribution*: Zambia, Zimbabwe, Malawi to East Africa. To date only a few specimens have been collected from one small area in the FSA region. KZN.

Illustration: Chippindall: 138, fig. 106 (1955).
Anatomy vouchers: *Ellis 3796 & 6015*.
Voucher: *Strey 10947*.

**Eragrostis crassinervis** Hack., in *Bulletin de l'Herbier Boissier*, Sér. 2, 1: 774 (1901). Type: Namibia, Inachab, *Dinter 1099*.

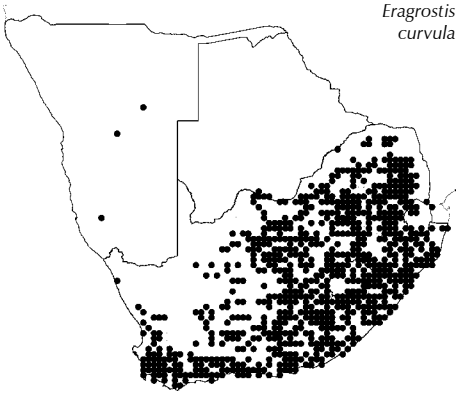

*Eragrostis crassinervis*

Densely tufted perennial to 600 mm high; occasionally hydrophyte; oblique rhizome sometimes present; culm egandular. Leaf blade to 100 × to 2.5 mm, glands present. Inflorescence narrow, unbranched to only sparsely branched; small glandular dots present; spikelets crowded, adpressed to main axis or branches; pedicels short, stout. Spikelet 4.5–8.0(–15.0) × 2–3 mm, light green to straw coloured or purple or at least flushed purple; rachilla persistent; lemmas and/or paleas breaking up from base upwards; glumes subequal, oblong-lanceolate in side view, acute, keels gland-dotted; lemma usually truncate to concave between keel and lateral nerves, keel extending into a short mucro or awn up to 0.4 mm long; lateral nerves raised, distinct, usually excurrent into minute mucros, glandular dots present; palea moderately wide between margins and keels; margins not touching, equally wide between keels and margins for entire length; anthers 3, 0.4–0.6 mm long; caryopsis subglobose.

[Resembles *E. walteri*, which has palea keels very broad in lower $^{2}/_{3}$, narrowing sharply to apex where they are excurrent into a small, soft mucro.]

*Flowering*: January to April. *Ecology*: Moist places such as river beds and vleis, sometimes on brackish soils. *Frequency in southern Africa*: Infrequent. *Distribution*: Zimbabwe. N, B, LIM.

Anatomy vouchers: *Ellis 567, 568 & 4760*.
Voucher: *Giess 8108, 9566*.


*Eragrostis curvula*

**Eragrostis curvula** (Schrad.) Nees, in *Florae africae australioris illustrations monographicae* Ill: 397 (1841). Type: South Africa 'Cape of Good Hope', *Hesse*.

*E. robusta* Stent, in *Bothalia* 2: 288 (1927). Type: South Africa, KwaZulu-Natal, *Angus 3* (*Govt. Herb. 13862*).

OULANDSGRAS, WEEPING LOVE GRASS

Densely tufted perennial to 1 200 mm high, erect, wiry; basal sheaths densely hairy for quite a way up from base, with long hairs in the deep furrows between prominent, squarish ridges formed by closely packed nerves; culms unbranched, not easily compressed, nodes glabrous. Leaf blade to 500 × to 3 mm, rolled or flat, appearing setaceous, long tapering to filiform apex. Inflorescence much branched, variable, open and spreading to contracted and dense with branches adpressed to main axis; lowest branches whorled or not whorled; pedicels smooth or with prickles distant from one another; spikelets adpressed to branches. Spikelet 4–10 × 1.0–1.5 mm, linear to oblong; rachilla persistent or upper part often fragile, lemmas and/or paleas breaking up from base upwards; glumes lanceolate, translucent, of variable length but longer than $^1/_3$ the length of lemma above, apex acute, smooth or scaberulous at apex and along keels; lemma 1.4–2.6 mm long, lateral nerves indistinct, pale green to dark green to greyish; palea persistent, margins touching or overlapping for entire length or if not touching, very close especially at the apex; keels a thin narrow line or appearing as only folded; anthers 3, 0.6–1.2 mm long; caryopsis ellipsoid.

[A very variable grass, with several ploidy levels, which appears to be close to other species such as *E. chloromelas, E. barbinodis, E. caesia, E. lehmanniana*, *E. planiculmis* and *E. rigidior*, but the deeply ridged hairy base separates it from these. This complex is in need of investigation.]

*Flowering*: August to June. *Ecology*: In high rainfall areas on sandy or acid to loamy soils; often in disturbed or badly managed areas. *Distribution*: Northwards to East Africa, introduced throughout the tropics. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Widely cultivated pasture; erosion control rehabilitation of road verges and ground cover; weed where it has escaped from cultivation and in some areas of the world where it has been introduced.

Illustration: Chippindall: 143, 144, fig. 110 & 111 (1955).
Anatomy vouchers: *Ellis 1787, 3349, 3360 & 4050*.
Voucher: *Smook 3839, Smook 3254, Retief 129, S. van Wyk 114.*

**Eragrostis cylindriflora** Hochst., in *Flora* 38: 324 (1855). Type: Ethiopia, Semien, *Schimper* in *Herb. Buchinger 772* (STR, holo.).

*E. horizontalis* Peter, in *Feddes Repertorium Specierum novarum Regi vegetabilis, beihefte* 40 (1930). Type: Tanzania, Dodoma, *Peter 46834* (B, holo.).

Usually erect, loosely tufted annual to 800 mm high; culm nodes dark, glandular ring present below nodes. Leaf blade 30–150 × 2–4 mm; sheaths with or without oblong glands. Inflorescences lowest branches whorled, axils hairy. Spikelet 3–8 × 0.5–1.5 mm, eglandular; rachilla

persistent in the lower part and fragile above; lemmas and/or paleas breaking up from the base upwards; lower glume at least $^4/_5$ up lemma above, upper glume up to $^1/_2$ of lemma above; lowest lemma 1.5–1.7 mm long, chartaceous to membranous, broadly elliptic, obtuse to subacute, lateral nerves obscure or distinct, occurring towards base where lemma folds; palea keels minutely scaberulous; margins very close for entire length, almost touching at apex, wide between keel and margin; anthers 3, 0.8–1.0 mm long; caryopsis ellipsoid.

[Resembles *E. trichophora*, a perennial species and the two have been placed in synonymy but this has not been accepted until more work has been done on the complex in the FSA region.]

*Flowering*: January to August. *Ecology*: Sand, clayey loam or black turf; in river beds, depressions and in disturbed areas such as overgrazed places. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical Africa. N, B, S, LIM, G, M, NC, WC, EC.

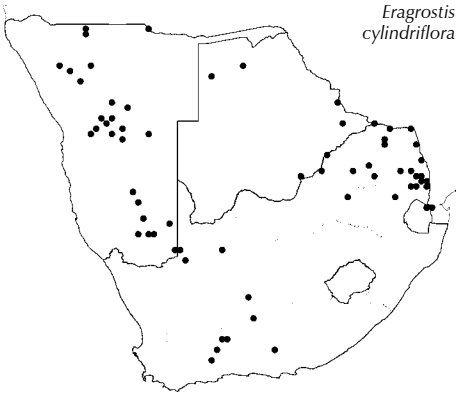
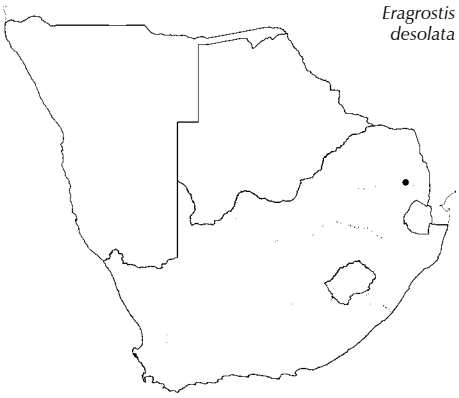

*Eragrostis cylindriflora*

Illustration: Clayton et al.: 241, fig. 66 (1974).
Anatomy vouchers: *Ellis 115, 5239a* & *Gibbs Russell & Smook 5107.*
Voucher: *De Winter 2731, De Winter 2284*.

**Eragrostis desolata** Launert, in *Boletim da Sociedade Broteriana*, ser. 2, 35: 18 (1961). Type: Zimbabwe, Chimanimani Mts., *West 3638* (SRGH, holo.).

Tufted perennial up to 700 mm high; basal sheaths hairy to nearly glabrous; culm with punctate or crateriform glands; nodes glabrous and with annular glandular patch below. Leaf blade 50–140 × 0.5–2.0(4.5) mm, involute or expanded; eglandular. Inflorescence 100–300 mm long, open, branches stiff, punctate or crateriform glands present; lowest branches not whorled; pedicels with annular glands; spikelets evenly distributed. Spikelet 5–10 × 2.5–4.0 mm; rachilla persistent, breaking up from below upwards; glumes subequal, lanceolate in side view, apex acute, reaching $^2/_3$–$^3/_4$ up lemma above; lemma 1.8–2.1 mm long, subacute, olive-green to grey, membranous, keeled, lateral nerves indistinct; palea keels wingless, margins wide apart, narrowing upwards between keels and margins; anthers 1.0–1.3 mm long; caryopsis oblong.


*Eragrostis desolata*

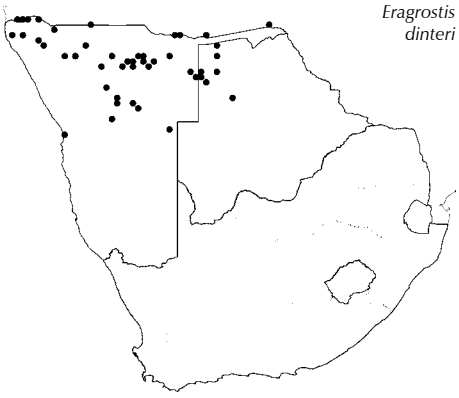
[Similar to *E. sclerantha*, which has anthers 0.7–1.0 mm long and basal sheaths densely woolly hairy.]

*Flowering*: April. *Ecology*: Mountain grassland. *Frequency in southern Africa*: Infrequent. *Distribution*: Zimbabwe (Chimanimani Mts). M.

Voucher: *Codd 7882*.

**Eragrostis dinteri** Stapf, in *Bulletin of Miscellaneous Information, Kew* 1906: 29 (1906). Type: Namibia, Ossire, *Dinter 484* (PRE, iso.).

Erect tufted annual to 750 mm high; occasionally geniculate; basal sheaths glabrous or with bulbous-based hairs on margins; rooting at nodes, internodes with crateriform glands, culm with ring of glands present below node. Leaf blade to 150 × to 8 mm; margins with glands. Inflorescence open; lowest branches not whorled; glands present; spikelets evenly distributed. Spikelet 7–17 × 3–6 mm; glumes subequal, keeled; upper glume $^2/_3$–$^4/_5$ as long as lemma above; rachilla fragile in upper part, sub-persistent below, breaking up from apex downwards; lemma 3.2–5.0 mm long, same texture

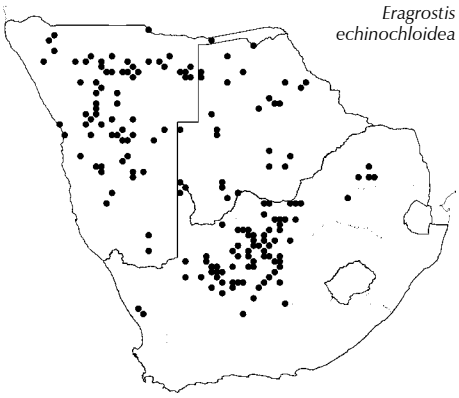

*Eragrostis dinteri*

throughout, acuminate to awned, keeled, lateral nerves distinct; palea keels entire, scabrid; anthers 3, 1.2–1.5 mm long; caryopsis subglobose to broadly elliptic. A strong smell has been recorded.

[Similar to *E. rogersii*, which has acute lemmas with or without a short mucro.]

*Flowering*: February to June. *Ecology*: Deep, red sandy soils; disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Angola. N, B.

Anatomy voucher: *Smook 5220*.
Voucher: *Smook 5220; Biegel, Muller & Gibbs Russell 4999*.


*Eragrostis echinochloidea*

**Eragrostis echinochloidea** Stapf, in *Flora capensis* 7: 627 (1900). Type: South Africa, Free State, between Kimberley and Bloemfontein, *Buchanan 284*.

TICK GRASS, BOSLUISGRAS, KRUMMELGRAS

Tufted perennial to 900 mm tall, erect or geniculate; rhizome short, oblique; basal sheaths glabrous or long-hairy at extreme base only, glandular pits scattered; culm node often glandular below. Leaf blade to 500 × to 6 mm; glands present or absent. Inflorescence sparsely branched; lowest branches not whorled; pedicels short, stout, annular and crateriform glands present; spikelets densely congested, secund on branches. Spikelet 2–6 × 2.2–3.5 mm; rachilla very fragile, easily disarticulating between florets from apex downwards; glumes subequal, as long as to longer than lemma above, lanceolate in profile, acuminate, glands present on nerves; lemma subacute, keeled, nerves distinct, keel and nerves gland-dotted; palea acute, keels scaberulous in upper part, lower portion very broadly winged, upper part of wing deeply notched forming a large tooth-like appendage; anthers 3, 0.5–0.7 mm long; caryopsis elliptic to oblong-elliptic.

[Resembles the annual *E. brizantha*, which has glumes obtuse to subacute in profile and palea keels entire. Hybridises with *E. obtusa*, the resultant hybrid *E.* × *pseud-obtusa* has a palea apex rounded as *E. obtusa* and keels notched ± like *E. echinochloidea*.]

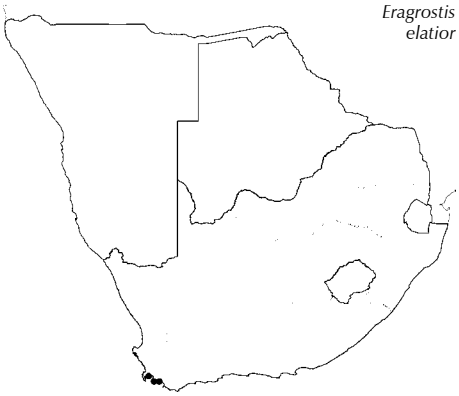
*Flowering*: November to May. *Ecology*: Prefers shallow moist calcrete soils; especially around pans; also disturbed sandy places such as cultivated lands. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Endemic; naturalised in USA mainly Arizona. N, B, LIM, NW, G, FS, NC, WC. *Economics*: Drought resistant palatable pasture when young and green but has low leaf production; indicator of denuded veld.

Illustrations: Chippindall: 174, fig. 145 (1955); Müller: 189 (2007).
Anatomy vouchers: *Botha & Panagos 4, 38*; *Gibbs Russell & Smook 5261*; *Ellis 854, 1607, 2207* & *3593*.
Voucher: *De Winter & Wiss 4427, Retief 1530*.

**Eragrostis elatior** Stapf, in *Flora capensis* 7: 617 (1900). Type: South Africa, Western Cape, Cape Flats, near Doorn Hoogte, *Zeyher 1839*; Berg River near Paarl, *Drège* (syntypes).

Densely tufted perennial to 500 mm high; rhizome present or absent; leaves mainly cauline. Leaf blade to 200 × to 3.5 mm. Inflorescence slender, 50–200 mm long, unbranched or sparsely branched;

branches from main axis distant, hardly overlapping, not whorled; branches and spikelets adpressed to main axis; spikelets solitary or in distant clusters of 2–6 spikelets along main axis. Spikelet 5–8 × 2.0–2.5 mm, linear, dark olive-green, lemmas hardly diminishing in length towards apex; rachilla sub-persistent, fragile in upper part; glumes unequal, cartilaginous; lanceolate to oblong, acute; lower glume ½ to more up lemma above; lemma acute to subacute, lateral nerves distinct, lowest lemma 2.5–3.0 mm long, keeled; palea margins nearly touching or touching for entire length or at least touching at the apex, keels a slender raised ridge, scabrid; anthers 3, 0.6–1.0 mm long; caryopsis oblong-elliptic.

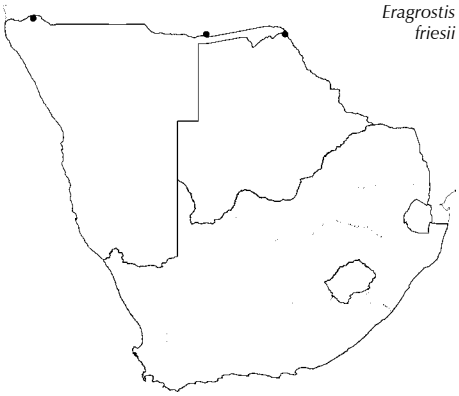

*Eragrostis elatior*

[Resembles *E. chapelieri*, which has many spikelets, and spikelets and branches overlapping except lower branches which are sometimes distant.]

*Flowering*: December and March. *Ecology*: Rocky banks of rivers and periodically inundated areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic (coastal areas of Western Cape). WC.

Voucher: *Kruger 1177.*

**Eragrostis friesii** Pilg., Fries, in *Wissenschaftliche Ergebnisse der Schwedische Rhodesia-Kongo Expedition*: 212 (1916). Type: Zambia, Lake Bangweulu, *Fries 975* (B, holo.).


*Eragrostis friesii*

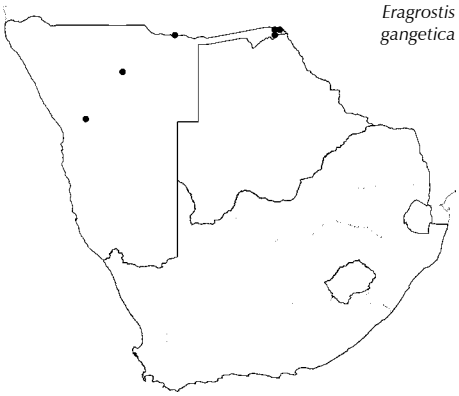
Robust, usually reed-like perennial up to 2 000 mm; rhizome present or absent; basal sheaths glabrous; culms stout, soft, eglandular. Leaf blade up to 300 × 4(5) mm; involute. Inflorescence 150–300 mm long, open; lowest branches not whorled; most pedicels shorter to as long as spikelets; spikelets clustered on upper half of branches. Spikelet 5.5–13.0 × 1.8–2.0 mm, dark olive-green; rachilla persistent, spikelet disarticulating from below upwards; glumes unequal, lanceolate in side view, apex acute; lemma 1.7–2.2 mm long, keeled, lateral nerves distinct, apex subacute; palea keels slender, distinct, wingless, distinctly scaberulous along entire length, margins touching at least at base and apex; anthers 0.9–1.1 mm long; caryopsis narrowly elliptic to linear.

[Similar to and intergrading with *E. inamoena*, which is less robust.]

*Flowering*: January, May and July. *Ecology*: Wet places along dams and rivers, swamp margins; often rooted in water. *Frequency in southern Africa*: Infrequent. *Distribution*: Angola, Zambia and Zimbabwe. N.

Voucher: *Killick & Leistner 3324, Volk 2163.*

**Eragrostis gangetica** (Roxb.) Steud., in *Synopsis Plantarum glumacearum* 1: 266 (1854). Type: India.

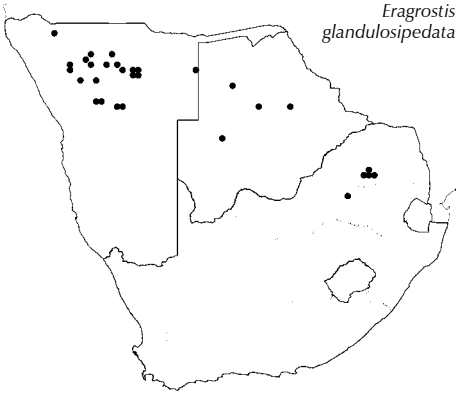

*Eragrostis gangetica*

Tufted annual to 800 mm high, erect; culm without glands below nodes. Leaf blade to 600 × 1–3 mm. Inflorescence usually open, ovate, lowest branches not whorled; axils glabrous; pedicels long, slender, not furrowed. Spikelet 3–10 × 1.0–1.7 mm; rachilla persistent, lemmas and/or paleas breaking up from base upwards; glumes subequal, keeled; upper glume reaching to at least middle of lemma above; lemma 1.2–1.7 mm long, acute to subacute, lateral nerves distinct to faint; palea keels scaberulous, margins almost to touching for entire length except near apex, falling soon after lemma; anthers 2, 0.1–0.3 mm long; caryopsis subrotund to oblong-elliptic.

[Resembles the more slender forms of *E. membranacea*, which has anthers 3, 0.8–1.3 mm long.]

*Flowering*: January, April and May. *Ecology*: Open areas near marshes or temporary vleis. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards throughout tropical Africa and India. N.

Anatomy vouchers: *Ellis 3719, 3726* & *3735*.
Voucher: *Schweickerdt 2194*.


*Eragrostis glandulosipedata*

**Eragrostis glandulosipedata** De Winter, in *Bothalia* 7: 469 (1961). Type: South Africa, Limpopo, Singapore Cash Store, Grass Valley, *De Winter 2332* (PRE, holo.).

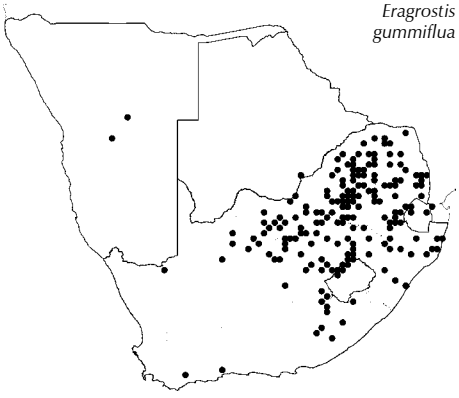
GLANDULAR LOVE GRASS

Tufted annual to short-lived perennial, to 1 000 mm high, geniculate; culm node glandular below. Leaf blade to 300–800 × to 5.5 mm, eglandular. Inflorescence open to dense; lowest branches whorled; branches and pedicels with glands in a glandular ring. Spikelet 3–6 × 1–2 mm; rachilla persistent, sometimes fragile in upper part; lemmas and/or paleas breaking up from base upwards; glumes subequal; lowest lemma 1.4–1.9 mm long, broadly elliptic to broadly oblong-ovate, apex obtuse to broadly rounded, lateral nerves raised, obscure or prominent (can be in same spikelet); palea persistent, keels scaberulous, margins apart for entire length but nearly touching at apex; anthers 3, 0.7–1.0 mm long; caryopsis oblong to broadly oblong.

[Resembles *E. cylindriflora*, which has no glandular ring on pedicels; and *E. omahekensis*, which has lowest lemma 1.8–2.2 mm long.]

*Flowering*: February to June. *Ecology*: Sand, gravel, turf and calcareous soils; in areas of high moisture and disturbance. *Frequency in southern Africa*: Locally common. *Distribution*: Zambia, Zimbabwe, Mozambique. N, B, LIM, G. *Economics*: Probably good for grazing.

Anatomy vouchers: *Ellis 5264; Gibbs Russell & Smook 5340 & 5340A*.
Voucher: *De Winter 2290; Giess, Volk & Bleissner 6413*.


*Eragrostis gummiflua*

**Eragrostis gummiflua** Nees, in *Florae africae australioris illustrations monographicae*: 393 (1941). Type: South Africa, Eastern Cape, Uitenhage, *Ecklon*; Zwartkops River, *Zeyher 1841* (many other syntypes).

GUM GRASS, GOMGRAS

Densely tufted perennial to 900 mm high; basal leaf sheath glabrous, sometimes thinly hairy; culms usually with sticky glandular patches below nodes and on leaf sheaths below collar (noticeable because soil particles adhere to patches), occasionally non-sticky. Leaf blade to 500 × to 5 mm. Inflorescence dense, sparsely branched, lowest branches not whorled; spikelets many, densely clustered. Spikelet 2.5–4.0 × 1.0–2.3 mm; rachilla fragile, lemmas and/or paleas breaking up from apex downwards; glumes unequal; lemma 1.3–1.7 mm long, obtuse to subacute, lateral nerves distinct; palea keels distinct, slender, scaberulous, wingless, margins close to touching and overlapping near apex; anthers 3, 0.5–0.8 mm long; caryopsis oblong-elliptic.

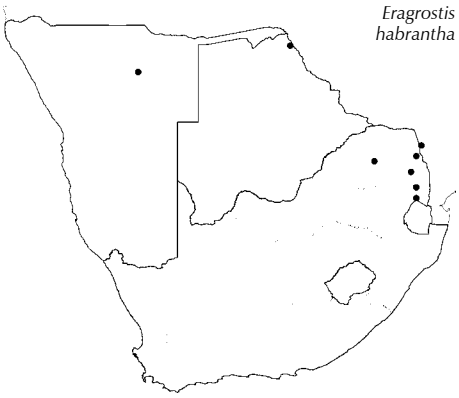
[Included are a few specimens from northern KwaZulu-Natal and southern Mozambique that are non-sticky and have a few other differences. (See Fish (2005) in *Bothalia* 35: 80).]

*Flowering*: September to April. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe and Mozambique. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Not grazed; indication of overgrazed veld; used for brooms in Lesotho.

Illustration: Chippindall: 179, fig. 152 (1955).
Anatomy vouchers: *Loxton & Ellis 939, Ellis 156, 262, 515, 1335* & *1375*.
Voucher: *Smook 3009, Smook 5716* (non-sticky form).

**Eragrostis habrantha** Rendle, in *Catalogue of the African plants collected by Dr F. Welwitsch* 2: 246 (1899). Type: Angola, Huila, near Lopollo, *Welwitsch 7493*.

STARRY LOVE GRASS


*Eragrostis habrantha*

Tufted, erect, wiry, perennial to 1 300 mm high; basal sheaths hairy; culm nodes usually not visible. Leaf blade 50–400 × 1–5 mm. Inflorescence effuse, linear, delicate, much branched, branches fine, flexible; lowest branches not whorled but sometimes clustered; axils hairy. Spikelet 1–2 × to 0.8–1.2 mm, ovate; 2–3-flowered; rachilla fragile, lemmas and/or paleas breaking up from apex downwards; glumes subequal, reaching ± $^1/_2$ or longer up lemma above, lanceolate, hardly keeled; lemma 0.9–1.3 mm long, back rounded or lightly keeled, membranous, lateral nerves obscure, apex subacute to obtuse; palea keels smooth to scaberulous, wingless, margins touching; anthers 3, 0.6–0.8 mm long; caryopsis oblong-elliptic to narrowly elliptic.

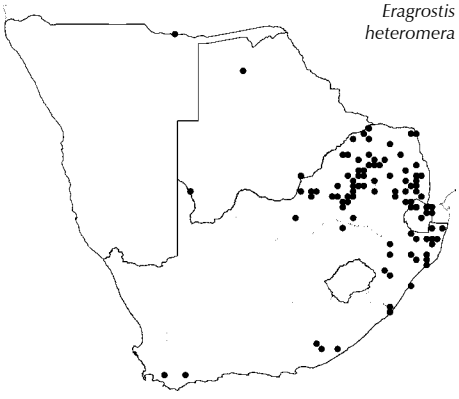
[Resembles *E. leptotricha*, which has lemma hairy; *E. micrantha*, with a linear to oblong spikelet; and *E. biflora* an annual with a similar inflorescence.]

*Flowering*: January to May. *Ecology*: Sandy and clayey soils; in open damp areas along rivers and around vleis. *Frequency in southern Africa*: Locally common. *Distribution*: Angola and northwards to Zambia, Zimbabwe and Mozambique. N, B, LIM, M.

Anatomy vouchers: *Ellis 3207* & *3461*.
Voucher: *Gertenbach 7027, Volk A39*.

**Eragrostis heteromera** Stapf, in *Flora capensis* 7: 610 (1900). Type: South Africa, KwaZulu-Natal, near Durban, *Drège*; near Pietermaritzburg, *Krauss 43*; Tugela River, *Buchanan 241, 245a* (syntypes).

BRONZE LOVE GRASS


*Eragrostis heteromera*

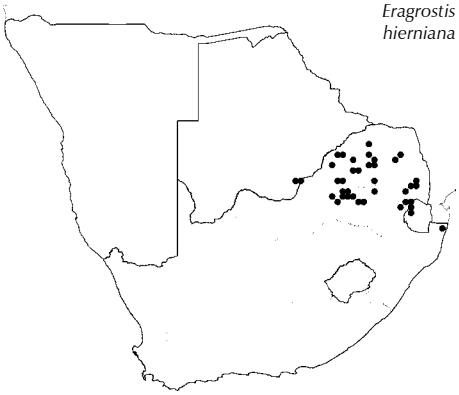
Tufted moderately slender, erect perennial to 1 000 mm high; basal sheaths glabrous or obscurely hairy, often flushed red; culms not densely compacted at base and easily separable, nodes glabrous. Leaf blade to 150 × 2–4 mm, apex long-tapering. Inflorescence open, moderately branched; lowest branches 1–8, whorled or not whorled; pedicels slender; spikelets adpressed to branches. Spikelet 4–9 × 1.5 mm, linear to oblong; rachilla persistent; lemmas and paleas breaking up from the base upwards; glumes unequal, translucent, lanceolate, keels and apex smooth or scaberulous, $^1/_3$–$^3/_4$ the

length of lemma above; lemma 1.6–2.2 mm long, purple to violet to green, often yellow especially near apex, nerves usually prominent, strongly keeled, keel prominent along entire length, apex obtuse; palea boat-shaped in profile, margins touching or overlapping along entire length, keels a distinct thin line, scabrid, wingless; anthers 3, 0.8–1.0 mm long; caryopsis narrowly oblong to linear.

[Similar to *E. rotifer*, which has densely hairy basal sheaths.]

*Flowering*: December to May. *Ecology*: On moist sand or black clay; in depressions, seasonal pan margins and in disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Zambia, Zimbabwe, Malawi and Mozambique and northwards to Ethiopia. N, B, S, LIM, NW, G, M, FS, KZN, WC, EC. *Economics*: It is of average fodder value.

Illustration: Chippindall: 155, fig. 123 (1955).
Anatomy vouchers: *Ellis 1499, 2087, 3324* & *5243*.
Voucher: *De Winter & Codd 498*.


*Eragrostis hierniana*

**Eragrostis hierniana** Rendle, in *Catalogue of the African plants collected by Dr F. Welwitsch* 2: 237 (1899). Type: Angola, Pungo Andronga, *Welwitsch 2798*.

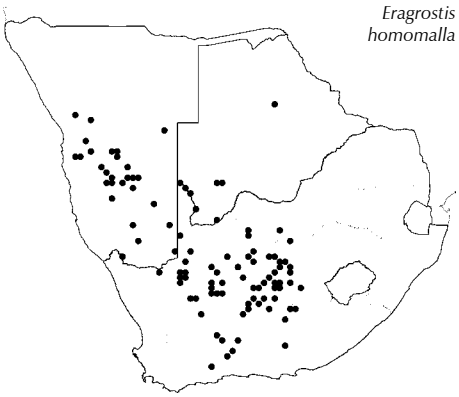
*E. uniglumis* Hack., in *Proceedings of the Rhodesia Scientific Association* 7: 66 (1908). Type: Zimbabwe, Bulawayo, *Jefferys 48* (W, holo.).

Tufted perennial to 1 200 mm high, sometimes geniculate; occasionally rhizomatous; culm unbranched, eglandular. Leaf blade 100–250 × 2–4 mm. Inflorescence open to dense; lowest branches not whorled. Spikelet (4)5–12(17) × 1.0–2.5 mm; rachilla persistent; lemmas and/or paleas breaking up from base upwards; glumes unequal, keeled; lemma keeled, glabrous or with hairs of less than 0.3 mm long, lateral nerves distinct, not reaching beyond margins; palea falling with or soon after lemma, keels wingless, hairs bulbous-based, 0.3–2.0 mm long, extending beyond lemma; anthers 3, 0.8–1.2 mm long; caryopsis linear.

[Resembles *E. lappula*, which has lemma lateral nerve hairs longer than 0.3 mm; and *E. inamoena*, with palea keels scabrid.]

*Flowering*: August to April. *Ecology*: Moist sandy soils; in hollows on hills, along rivers and in disturbed areas such as old cultivated lands. *Frequency in southern Africa*: Locally common. *Distribution*: Angola and northwards to Tanzania. B, S, LIM, NW, G, M, KZN.

Anatomy vouchers: *Ellis 1356* & *3488*.
Voucher: *Godfrey & Acocks SH 1601*.


*Eragrostis homomalla*

**Eragrostis homomalla** Nees, in *Florae africae australioris illustrations monographicae*: 406 (1841). Type: South Africa, 'Cape Colony', Ebenezar, *Drège*.

*E. hygrophila* C.E.Hubb. & Schweick., in *Bulletin of Miscellaneous Information, Kew* 1939: 651 (1939). Type: South Africa, Northern Cape, Kimberley, *Acocks 4189* (cited as *Acocks 1897* in *McGregor Museum 4186*).

Reëngrassie

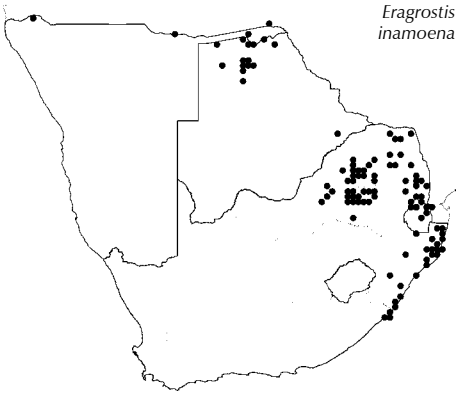
Tufted annual to 500 mm high, erect to decumbent; culm nodes with or without glands below. Leaf blade 20–100 × 1–4 mm; margins smooth or scaberulous. Inflorescence condensed or open, branches spreading or adpressed to main axis, rigid; lowest branches not whorled; axils glabrous, crateriform glands present; spikelets ir-

regularly and densely condensed along primary branches even when spreading; pedicels 0.5–2.0 mm long, stout, crateriform glands usually present. Spikelet 2–7 × 0.7–1.0 mm, linear to oblong; rachilla sub-persistent; lemmas and/or paleas breaking up from the base upwards; lemmas on same side of rachilla distinctly overlapping lemma above; glumes unequal; lower glume minute, up to $^1/_3$ the length of lemma above, not to lightly keeled; lemma 1.0–1.5 mm long, ovate-elliptic in side view, apex obtuse, keel scabrid at least in upper part, lateral nerves distinct, keel and lateral nerves with or without tiny glandular dots (may appear lumpy) usually dark green and reddish to purple upwards; palea keels smooth below to scabrid near apex, margins apart except towards base; anthers 3, 0.2–0.3 mm long; caryopsis ellipsoid.

*Flowering*: January to May. *Ecology*: Moist, sandy loam or clay; in brackish depressions or seasonally wet pans. *Frequency in southern Africa*: Locally common. *Distribution*: Zambia and Kenya. N, B, NW, FS, NC, WC, EC.

Illustration: Chippindall: 153, fig. 121 (1955).
Anatomy vouchers: *Botha & Panagos 35, 40*; *Gibbs Russell & Smook 5472, 5548*; *Ellis 936, 1074, 4335, 4376, 4743 & 4780*.
Voucher: *Smook & Gibbs Russell 2454a, Leistner 1762*.

**Eragrostis inamoena** K.Schum., in Engler, *Plannzenwelt Ost-Afrikas* C (verzeichnis der bis jetz aus Ost-Afrika bekannt gewodenen pflanzen): 115 (1895). Type: Tanzania, Bagamoyo, *Hildebrandt 1080*; Uzaramo district, Pugu, *Holst 4143* (syntypes).

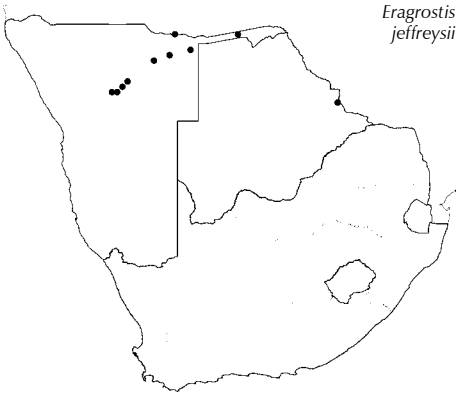

*Eragrostis inamoena*

Loosely tufted perennial to 1 000 mm high; rhizome short, oblique to long and branched; basal sheaths glabrous; leaves mainly cauline; culm eglandular. Leaf blade 40–250 × 2–4 mm. Inflorescence 50–250 mm long, broadly ovate, variable, grading from open with spreading branches to contracted with branches overlapping one another and adpressed to main axis; lowest branches not whorled; axils glabrous; pedicels (except the terminal ones) shorter than or as long as spikelets. Spikelet 5–20 × 2.0–3.5 mm, 7–40-flowered, dull, greyish-green to dark green, frequently flushed purple; rachilla persistent; lemmas and/or paleas breaking up from base upwards, lemmas hardly becoming shorter towards apex; glumes subequal, keeled; upper glume apex acute; lemma 1.6–2.5 mm long, acute to subacute, keeled, lateral nerves distinct; palea narrowly obovate, membranous except for keel, apex truncate to obtuse, margins touching to nearly touching for almost entire length, keels narrow, flat, but distinct, wingless, entire, scabrid, falling with or soon after lemma; anthers 3, 0.6–1.3 mm long; caryopsis narrowly elliptic.

[In the past the name *E. atrovirens* (Desf.) Steud. (widespread in tropical Africa to India and Philippines) was used, but this species is not rhizomatous. Resembles *E. lappula* and *E. hierniana*, which have palea keels hairs longer than 0.3 mm; and *E. chapelieri*, which has palea margins not touching and spikelets reddish-brown.]

*Flowering*: November to May. *Ecology*: Sandy to organically rich soils; on seasonally flooded areas and marshy places. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards into East Africa. N, B, S, LIM, NW, G, M, KZN, EC.

Illustration: Chippindall: 163, fig. 132 (1955).
Anatomy vouchers: *Ellis 154, 313, 319, 334, 1473, 1475, 1793, 3407, 3423, 3803, 5241 & Smook 5432*.
Voucher: *Smook 5708, 5710*.


*Eragrostis jeffreysii*

**Eragrostis jeffreysii** Hack., in *Proceedings of the Rhodesia Science Association* 7: 68 (1908). Type: Zimbabwe, Bulawayo, *Jeffreys 42* (W, holo.).

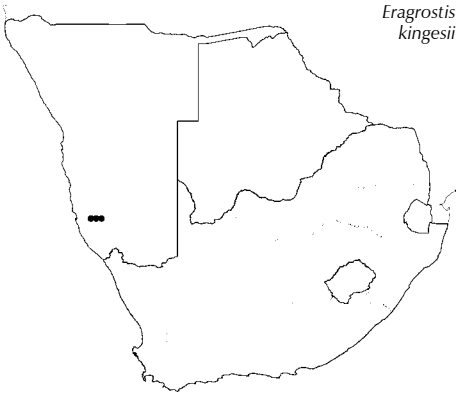
GEELHOUTPLUIMGRAS

Robust, tufted perennial to 2 000 mm high; basal sheaths hairy at the base, in furrows formed by wide and robust nerves; leaves mainly basal; culms easily compressed. Leaf blade to 1 000 × to 10 mm, flat, not filiform. Inflorescence open, branches spreading; branches and pedicels yellow, scabrid, not thickly covered with prickles; lowest branches whorled to not whorled. Spikelet 5–8 × 1.0–1.5 mm, linear to oblong; rachilla persistent in lower portion, often fragile in upper part, lemmas and/or paleas breaking up from base upwards; glumes $^1/_2$–$^2/_3$ the length of lemma above, lanceolate; lower glume not wide enough to cover lemma; lemma 1.4–1.9 mm long, pallid to pale greyish-green; palea margins close but not touching, may touch at apex, keels obscure, smooth to scaberulous; anthers 3, 0.8 mm long.

[Close to and has been placed under synonymy of *E. curvula*, which has culms that are not easily compressed and filiform leaves to 3 mm wide. A detailed study is needed in this complex.]

*Flowering*: February and June. *Ecology*: Sandy moist areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Zimbabwe. N, B.

Anatomy voucher: *Smook 5203*.
Voucher: *Volk 1019*.


*Eragrostis kingesii*

**Eragrostis kingesii** De Winter, in *Bothalia* 7: 470 (1961). Type: Namibia, Luderitz dist, Klein-Aus, *Kinges 2236* (PRE, holo.).

Tufted annual to 100 mm tall, erect to decumbent; basal leaf sheaths glabrous or with a few scattered, bulbous-based hairs near apex; culm glandular below nodes. Leaf blade to 20 × to 3 mm, margins with raised crateriform glands, midrib with glandular dots. Inflorescence moderately to densely contracted, side branches less than 40 mm long, rigid; lowest branches not whorled, glandular; pedicels stout. Spikelet to 5 × 1.0–1.5 mm, lanceolate; rachilla persistent; lemmas and/or paleas breaking up from base upwards; glumes subequal, glands sometimes present; lower glume $^1/_2$–$^2/_3$ the length of lemma above, strongly keeled; lemma 1.5–1.8 mm long, acute to subacute, lateral nerves distinct, glands present on nerves; palea margins wide apart, keels scabrid, persistent; anthers 3, 0.1–0.3 mm long; caryopsis oblong-elliptic.

[Similar to *E. procumbens*, which has spikelets 2.0–2.5 mm wide; and *E. pygmaea*, which has many bulbous-based hairs on basal leaf sheaths and caryopsis subglobose.]

*Flowering*: February to May. *Ecology*: Disturbed soils along roadsides and in farmyards. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N. *Economics*: Weed.

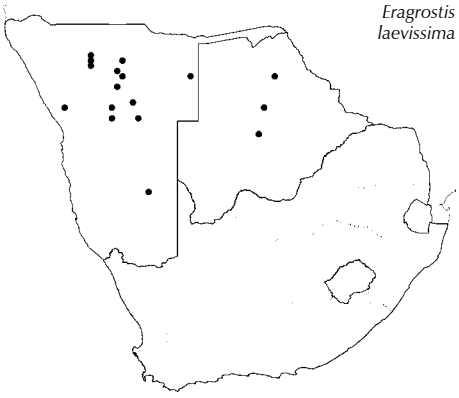
Voucher: *De Winter & Giess 6083*.

**Eragrostis laevissima** Hack., in *Repertorium Specierum novarum Regni vegetabilis* 10: 170 (1911). Type: Namibia, Otavifontein, *Heering*.

*E. stentiae* Bremek. & Oberm., in *Annals of the Transvaal Museum* 16: 406 (1935). Type: Botswana, Kuke Pan, *Von Son, TM 28620* (PRE, holo.?).

Densely tufted perennial, or occasionally annual, up to 800 mm high, erect to occasionally geniculate; rhizome short, oblique; culm with or

without glands below nodes. Leaf blade to 150 × 1–2 mm; eglandular. Inflorescence open, spikelets condensed on branches; lowest branches 1–2, not whorled, crateriform glands present or absent; pedicels short, stout. Spikelet 2–8 × 1.3–2.0 mm, oblong to ovate, glandular; rachilla persistent; lemmas and/or paleas breaking up from base upwards; glumes $^1/_2$–$^2/_3$ the length of lemma directly above, keel scabrid; lemma 1.4–2.0 mm long, acute to subacute, lateral nerves and keel with small round glands and this sometimes giving a lumpy appearance to the spikelet; palea falling with or soon after lemma, margins touching along entire length, keels slender, glandular or scabrid; anthers 3, 0.5–1.2 mm long; caryopsis oblong-elliptic.

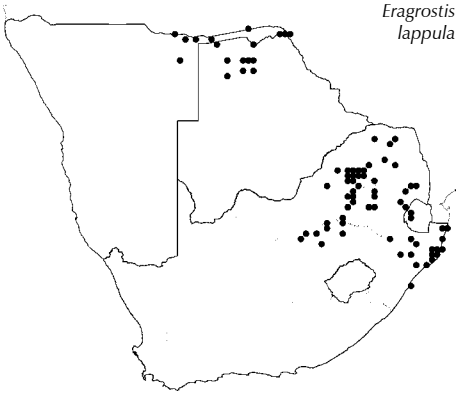

*Eragrostis laevissima*

[Resembles forms of *E. sabinae*, which has lemma lateral nerves eglandular.]

*Flowering*: February to March. *Ecology*: Sandy and brackish calcareous soils; around edges of pans and vleis. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. N, B.

Anatomy voucher: *Smook 5131*.
Voucher: *Giess & Mueller 13961, Giess & Loutit 14127, De Winter 2940*.

**Eragrostis lappula** Nees, in *Florae africae australioris illustrations monographicae*: 412 (1941). Type: South Africa, KwaZulu-Natal, Port Natal (Durban), *Drège*.


*Eragrostis lappula*

Densely tufted perennial to 1 200 mm high, erect; rhizome short; culm unbranched, eglandular. Leaf blade to 250 × 2–4 mm. Inflorescence spreading or contracted; lowest branches not whorled, axils hairy. Spikelet 5–10 × 1.9–4.0 mm, rachilla persistent; lemmas and/or paleas breaking up from base upwards; glumes unequal, keeled, acute; lemma keeled, lateral nerves distinct, not excurrent from margins; lateral nerves and sometimes keel hairy, hairs 0.3–1.2 mm long; palea falling with or soon after lemma, keels wingless, hairs 0.3–1.2 mm long, bulbous-based, hairs extend beyond lemma; anthers 3, 1.2 mm long.

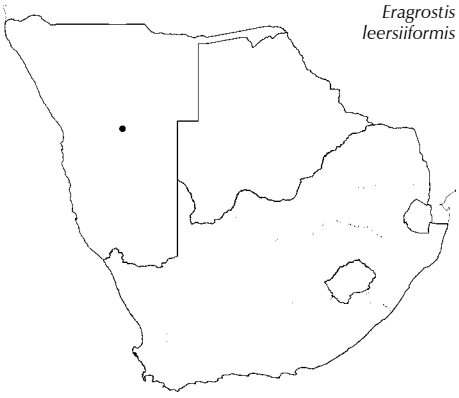
[Two varieties have been recognised: var. *lappula* with inflorescence branches adpressed to the central axis; var. *divaricata* with inflorescence branches lax. As intermediates have been found, the varieties have not been upheld in this treatment. Similar to *E. hierniana*, which has lemma lateral nerves glabrous, and *E. inamoena*, which has palea keels scabrid.]

*Flowering*: December to May. *Ecology*: Moist sandy soils; annually flooded areas and river beds. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Kenya and Tanzania. N, B, S, LIM, NW, G, M, FS, KZN. *Economics*: Palatable as grazing when young.

Anatomy vouchers: *Gibbs Russell & Smook 1956*; *Ellis 333, 1340, 1377, 2014, 2810 & 3419*.
Voucher: *Smook 1935; Smith 2675*.

**Eragrostis leersiiformis** Launert, in Merxmüller, *Prodromus einer Flora von Südwestafrika* 160: 224 (1970). Type: Zambia, Muckle Neuk, *Robinson 576* (K, holo.; PRE, iso.).

Tufted annual to 500 mm high, erect to geniculate; culm eglandular below nodes. Leaf blade to 170 × to 2.7 mm; margins scabrid. Inflorescence open, branches spreading; lowest branches not whorled

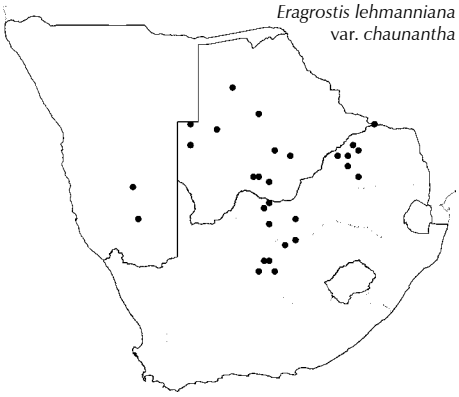

*Eragrostis leersiiformis*

to whorled, axils glabrous; pedicels slender, 2–10 mm long. Spikelet 3–5 × 0.6–1.0 mm; rachilla persistent; lemmas and/or paleas breaking up from base upwards; glumes unequal, minute; upper glume 0.4–0.7 mm long, barely reaching lower part of rachilla; lemma 1.3–1.5 mm long, ovate to broadly ovate in profile, apex acute to subacute, keel scabrid with large prickles, sides scaberulous, lateral nerves distinct; palea margins overlapping entire length, keels scabrid with large prickles along entire length, falling with or soon after lemma; anthers 3, 0.1–0.2 mm long; caryopsis ovate-elliptic.

[Resembles the perennial *E. micrantha*; and *E. aspera*, which has a subglobose caryopsis.]

*Flowering*: February. *Ecology*: Edges of vleis. *Frequency in southern Africa*: Infrequent. *Distribution*: Zambia. N.

Voucher: *Van Vuuren* 1035.


*Eragrostis lehmanniana* var. *chaunantha*

**Eragrostis lehmanniana** Nees var. **chaunantha** (Pilg.) De Winter, Chippindall in Meridith, *Grasses & Pastures of South Africa*. Type: Namibia, Kalahari, zwischen Kokong und Kang, *Schultze 290*.

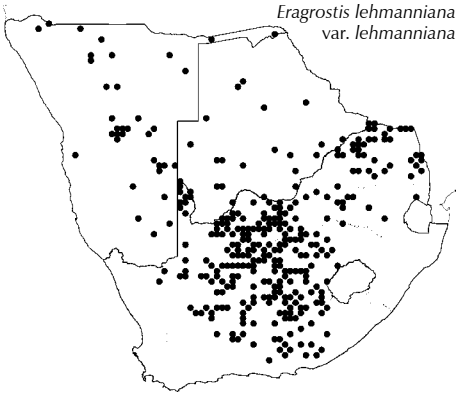
*E. chaunantha* Pilg., in *Botanischer Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 40: 84 (1907).

Tufted perennial to 600 mm high, erect; culm nodes and internodes hairy. Leaf blade to 250 × 1.5–2.0 mm. Inflorescence open, lax; lowest branches 1–2, not whorled. Spikelet 4–8 × to 1.5 mm, linear to oblong, neat; rachilla sub-persistent, usually fragile in upper part; lemmas and/or paleas breaking up from the base upwards; glumes $^1/_2$–$^2/_3$ the length of lemma above; palea margins wide apart (except sometimes at base), keels a narrow thin line, scaberulous; anthers 3, 1 mm long; caryopsis oblong.

[Separated from var. *lehmanniana*, which has culm internodes glabrous, but a detailed study is needed to determine if the taxa are really different.]

*Flowering*: December to April. *Ecology*: Kalahari sand. *Frequency in southern Africa*: Infrequent. *Distribution*: Possibly Zimbabwe. N, B, LIM, NW, FS, NC.

Voucher: *Barker 198*.


*Eragrostis lehmanniana* var. *lehmanniana*

**Eragrostis lehmanniana** Nees var. **lehmanniana,** in *Florae africae australioris illustrations monographicae*: 402 (1941). Type: South Africa, Eastern Cape, Slengerfontein in collibus ad Nieuwe Hantom, *Drège*.

Lehmann's love grass, knietjiesgras

Tufted perennial to 900 mm high, erect, geniculate, sometimes stoloniferous or rooting at lower nodes; basal sheaths papery, nerves round, not close together or forming prominent ridges, glabrous or hairy at extreme base only; culm nodes (those without branches) and internodes glabrous. Leaf blade to 250 × 1.5–2.8(3.5) mm, gradually narrowing to the apex. Inflorescence open, lowest branches not whorled. Spikelet 4–8(11) × 1.0–1.5 mm, linear to oblong, dark green, grey-green to red with yellow, neat; rachilla sub-persistent,

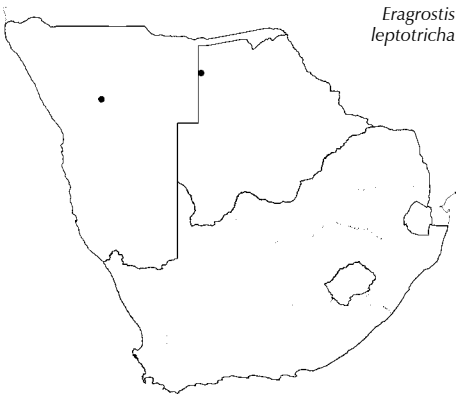
fragile in upper portion; lemmas and/or paleas breaking up from the base upwards; glumes subequal, $^1/_2$–$^2/_3$ the length of lemma above; lemma 1.8–2.0 mm long, lightly keeled, lateral nerves distinct; palea usually persistent, margins wide apart, especially at apex, keels thin, narrow, wingless, glabrous or scaberulous; anthers 3, 0.7–1.0 mm long; caryopsis oblong to elliptic.

[Separated from var. *chaunantha*, which has culm internodes hairy, but a detailed study is needed to determine if the taxa are really different.]

*Flowering*: November to June. *Ecology*: Sand or sandy loam usually over limestone; often in disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe, Zambia, Mozambique and Angola. Introduced into East Africa, India and North America. N, B, LIM, NW, G, M, FS, NC, WC, EC. *Economics*: Hardy, palatable pasture, especially when young but has low leaf production; indicator of denuded veld; useful as erosion control as it colonises bare, eroded or denuded ground.

Illustration: Chippindall: 146, fig. 113 (1955).
Anatomy vouchers: *Botha & Panagos 44; Ellis 3580, 3594, 3600, 3614* & *4368*.
Voucher: *Smook 2928, Van Vuuren & Giess 1127*.

**Eragrostis leptotricha** Cope, in *Kew Bulletin* 53: 147 (1998). Type: Botswana, Qangwa River, *Smith 3657*.


*Eragrostis leptotricha*

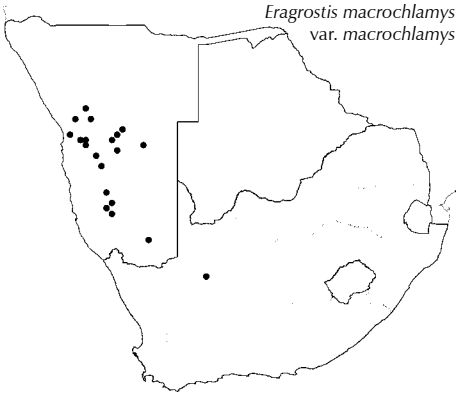
Short-lived wiry perennial up to 800 mm high; basal sheaths shortly hairy; culm nodes mostly not visible. Leaf blade 60–300 × 1.0–2.5 mm, involute, eglandular. Inflorescence open, effuse; branches and pedicels capillary; axils hairy; lowest branches not whorled, but may be clustered. Spikelet 1.4–2.0 × 0.8–1.0 mm, ovate, rachilla fragile, breaking up from apex downwards; glumes subequal, reaching to or just more than $^1/_2$ up lemma above, lanceolate in side view; lemma 0.9–1.2 mm long, back rounded or lightly keeled, membranous, apex obtuse to subacute, lateral nerves obscure, hairy between nerves and margins, hairs long and slender; palea keels slender, wingless; anthers 0.6–0.8 mm long.

[Similar to *E. habrantha*, which has lemmas glabrous.]

*Flowering*: April. *Ecology*: Sandy soils in open grassland. *Distribution*: Zimbabwe. N, B.

Illustration: Cope: 98, tab. 33, B (1999).
Voucher: *Smith 3657* (K, SRGH, not PRE), *De Winter 8347A* (from Zimbabwe).

**Eragrostis macrochlamys** Pilg. var. **macrochlamys**, in *Botanischer Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 48: 346 (1912). Type: Namibia, Bullsporte Fläche, *Dinter 2140*; südlich Kubub, *Range 269*; Kamms, *Range 900* (syntypes).


*Eragrostis macrochlamys* var. *macrochlamys*

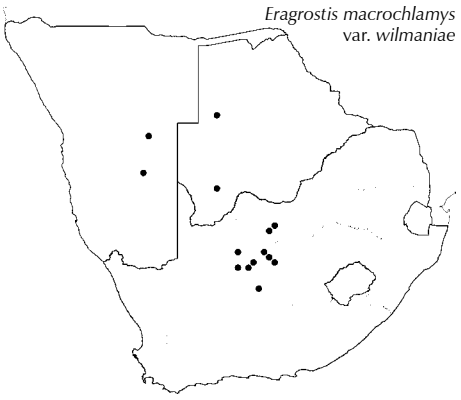
Tufted annual to 300 mm high, erect or geniculate to procumbent; basal sheaths glabrous or with a few scattered hairs, mainly along margins. Leaf blade to 200 × to 3 mm. Inflorescence branches usually adpressed to main axis, occasionally spreading in lower part, glands present; spikelets many, crowded. Spikelet 4–5 × 3–4 mm; rachilla fragile, breaking up from apex downwards; glumes longer than lemma above, keels with glands; lemma acute, mucro present

or absent; palea keels entire, scabrid; anthers 3, 0.2–0.4 mm long; caryopsis oblong-lanceolate to oblong-elliptic.

[Resembles var. *wilmaniae*, which has an eglandular inflorescence, glumes shorter than or equal to lemma directly above; and *E. procumbens*, which has a persistent rachilla (becoming fragile in upper part), breaking up after lower lemmas have started to fall.]

*Flowering*: October to May. *Ecology*: Sandy or calcrete soils; in river courses, also disturbed places like roadsides. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NC.

Illustration: Chippindall: 176, fig. 147 (1955).
Anatomy vouchers: *Gibbs Russell & Smook 5436*, *Ellis 4731* & *4768*.
Voucher: *Giess 1743, Müller 218*.


*Eragrostis macrochlamys* var. *wilmaniae*

**Eragrostis macrochlamys** Pilg. var. **wilmaniae** (C.E.Hubb. & Schweick.) De Winter, in Chippindall in Meridith, *Grasses & Pastures of South Africa*. Type: South Africa, Northern Cape, Honeyneskloof, *Wilman in McGregor Museum 558*.

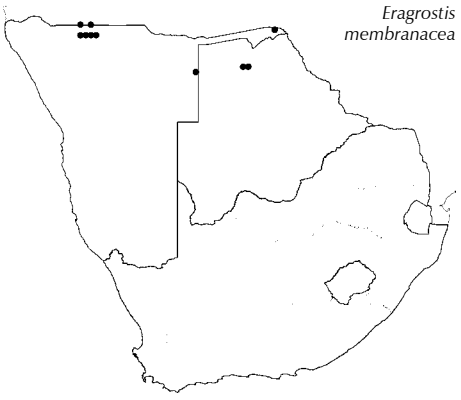
*E. wilmaniae* C.E.Hubb. & Schweick., in *Bulletin of Miscellaneous Information, Kew* 1939: 652 (1939). Type: as above.

Tufted annual to 300 mm high, erect, geniculate to procumbent; basal sheaths glabrous or with scattered hairs. Leaf blade to 150 × to 2.5 mm. Inflorescence branches usually adpressed to main axis, eglandular; spikelets many, usually densely crowded. Spikelet 4–5 × 3–4 mm broadly oblong to broadly ovate, eglandular; rachilla fragile, breaking up from the apex downwards; glumes $^{2}/_{3}$–$^{4}/_{5}$ the length of lemma above; lemma acute to subacute; palea keels entire, scabrid; anthers 3, 0.2–0.4 mm long; caryopsis oblong-lanceolate to oblong-elliptic.

[Differs from var. *macrochlamys*, which has glands on the inflorescence, glumes equal to or longer than lemmas directly above. Resembles *E. procumbens*, which has the spikelet oblong to elliptic and rachilla persistent, though the upper portion often becomes fragile, lemmas and/or paleas breaking up from base upwards.]

*Flowering*: February to April. *Ecology*: On calcrete soils; especially around pans; moist areas and in disturbed places. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, B, NW, NC.

Voucher: *Henri 32*.


*Eragrostis membranacea*

**Eragrostis membranacea** Hack. ex Schinz, in *Verhandlungen des Botanischen Vereins für die Provinz Brandenburg* 30: 148 (1888). Type: Namibia, Olukonda, *Schinz 614* (PRE, iso.).

Tufted, erect annual to 1 100 mm high, occasionally hydrophyte; basal sheaths glabrous, glandular dots present or absent; culm with or without glands. Leaf blade to 400 × to 5 mm; eglandular. Inflorescence open; lowest branches in whorls or subwhorls; spikelets apart; pedicel with a glandular annular ring. Spikelet 3–15 × 1.9–4.0 mm, oblong; rachilla persistent; lemmas and/or paleas breaking up from the base upwards; glumes unequal, keeled, obtuse; upper glume $^{1}/_{4}$–$^{1}/_{2}$ the length of lemma above; lemma 2.0–2.6 mm long, very broadly ovate to almost oblate, apex obtuse, coriaceous, glossy, margins broadly hyaline, membranous in upper part, not folded, lat-

eral nerves indistinct to distinct, flat; palea keels wingless, slender, glabrous to minutely scaberulous, falling soon after lemma, wide between keel and margins, margins moderately apart, touching at base and nearly so at apex; anthers 3, 0.8–1.2 mm long; caryopsis elliptic.

[The more delicate forms resemble *E. gangetica*, which has anthers 2, 0.1–0.2 mm long.]

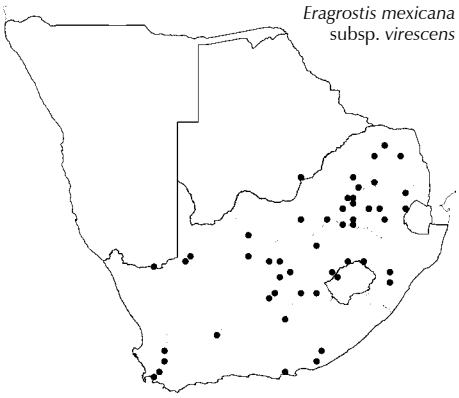
*Flowering*: January to March. *Ecology*: Sandy soils; in moist areas around pans and water courses, occasionally in shallow water. *Frequency in southern Africa*: Infrequent. *Distribution*: Zimbabwe and Zambia. N, B.

Voucher: *De Winter 9153, Soini PRE 56810*.

***Eragrostis mexicana** (Hornem.) Link subsp. **virescens** (J.Presl) S.D.Koch & Sánchez Vega, in *Phylogia* 58: 380 (1985). Type: Chile.

*E. virescens* J.Presl, in *Reliquiae haenkeanae* 1: 276 (1830).

CHILEAN LOVE GRASS

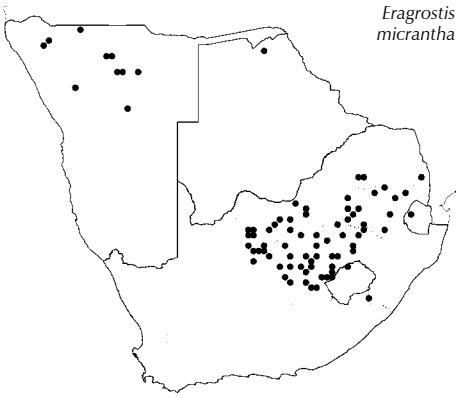

*Eragrostis mexicana* subsp. *virescens*

Tufted annual to 700 mm high, erect or geniculate; basal leaf sheaths glabrous; culm nodes eglandular. Leaf blade to 250 × 3.5–7.0 mm; margins eglandular, scabrid; midrib eglandular. Inflorescence open, ovate, side branches spreading; lowest branches whorled or not whorled; axils glabrous; pedicels long and slender, angled and furrowed; spikelets tend to be adpressed to branches. Spikelet 3.0–4.5 × 1.0–1.7 mm, oblong; rachilla persistent; lemmas and/or paleas breaking up from the base upwards; glumes subequal; lower glume $^1/_3$ to just over $^1/_2$ the length of lemma above; lemma 1.2–1.7 mm long, acute to subacute, lateral nerves distinct; palea keels scabrid, margins well apart except sometimes near base; anthers 3, 0.2–0.3 mm long; caryopsis oblong.

*Flowering*: December to March. *Ecology*: Sandy soils; in cultivated and disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from South America and parts of North America; introduced elsewhere. B, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Weed in gardens and lands.

Illustrations: Peterson: 80 (2003).
Anatomy vouchers: *Botha & Panagos 37, 51*; *Smook 3189*; *Ellis 758, 772, 3489, 3899 & 3921*.
Voucher: *Smook 3835, 2839*.

**Eragrostis micrantha** Hack., in *Bulletin de l'Herbier Boissier* 3: 389 (1895). Type: South Africa, Free State, *Rehmann 3645 & 3675* (syntypes).

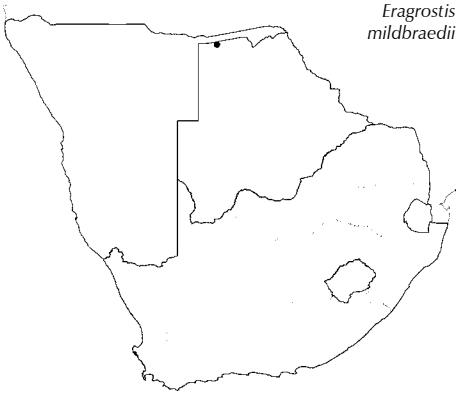

*Eragrostis micrantha*

Tufted, erect weak perennial or annual to 1 000 mm high; basal sheaths glabrous; culms not densely compacted at base, easily separated into individual culms. Leaf blade to 600 × to 3 mm, tapering to a filiform tip. Inflorescence 100–300 mm long, effuse, much branched; lowest branches clustered, not obviously whorled, branches and spikelets spreading, shortest pedicel of spikelet pair usually as long as or longer than spikelet. Spikelet 2–4 × to 1.2 mm; florets 2–4(5); rachilla persistent in lower portion, usually fragile in upper portion; lemmas and/or paleas breaking up from base upwards; glumes unequal, translucent, smooth or scaberulous around

apex and along keel, $^1/_2$–$^2/_3$ the length of lemma above; upper glume membranous, often crinkled in ± the middle; lemma 1.4–1.9 mm long, narrowly oblong to oblong-lanceolate, light greenish to green-grey or yellowish-grey, keeled along entire length, lateral nerves obscure, may be distinct towards base; palea margins touching or overlapping along entire length or at least at apex, keels a thin line; anthers 3, 0.6–1.0 mm long; caryopsis lanceolate.

*Flowering*: January to May. *Ecology*: Sands, loams and calcareous soils; in disturbed areas and moist places around vleis and pans, and in semi-shade. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, B, L, S, LIM, NW, G, M, FS, KZN, NC.

Anatomy vouchers: *Ellis 1531, 3585*; *Smook 2768 & 5230*.
Voucher: *Smook & Gibbs Russell 2425*.

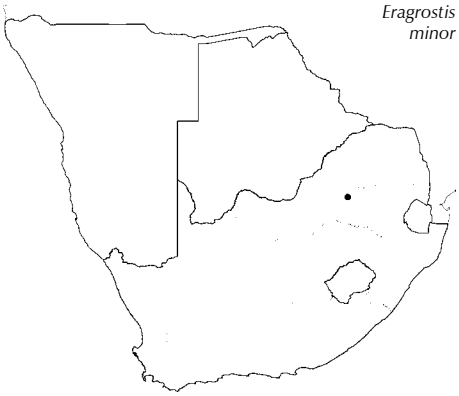

*Eragrostis mildbraedii*

**Eragrostis mildbraedii** Pilg., in *Botanischer Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 43: 95 (1909). Type: Tanzania, Bukoba, mouth of Kanoni River, *Mildbraed 29* (B, holo.).

Mat-forming, perennial up to 600 mm high; rhizomes long, slender; leaves mainly cauline; basal sheaths hairy or glabrous; culms branched, eglandular. Leaf blade 20–80 × 1–3 mm, distichous. Inflorescence 20–80 mm long, open, branches stiff; lowest branches not whorled. Spikelets 3–10 × 1.0–1.5 mm, often curved; rachilla soon fragile, tardily breaking up from below upwards; glumes subequal, reaching up to ± $^1/_2$ lemma above, lanceolate-ovate in side view, keeled; lemma 1.5–1.9 mm long, apex acute, keeled, lateral nerves distinct; palea persistent, keels slender, distinct, slightly thickened, wingless, scaberulous, margins close but not touching, apex acute to subacute; anthers 0.6–0.9 mm long; caryopsis elliptic.

*Flowering*: February. *Ecology*: Sandy floodplains and swampy grasslands, Kalahari sands. *Distribution*: East Africa and DRC. ?N, B.

Voucher: *Smith 2680*.


*Eragrostis minor*

***Eragrostis minor** Host, in *Icones et descriptions gramineum austriacorum* 4: 15 (1809). Type: Italy.

*E. poaeoides* P.Beauv. ex Roem. & Schult., in *Systema vegetabilium* 2: 574 (1817).

Little love grass

Loosely tufted annual to 600 mm high, often geniculate. Leaf blade to 120 × to 5 mm; margins and midrib with crateriform glands. Inflorescence open or contracted, side branches usually less than 40 mm long; lowest branches not whorled, glands present or absent; pedicels stout. Spikelet 3–9 × 1.3–2.0 mm; lemmas and/or paleas breaking up from base upwards; glumes subequal, reaching $^1/_2$ and more up lemma above; rachilla persistent; lemma 1.2–2.0 mm long, obtuse to acute; palea margins wide apart, keels scabrid; anthers 3, 0.3 mm long; caryopsis broadly oblong.

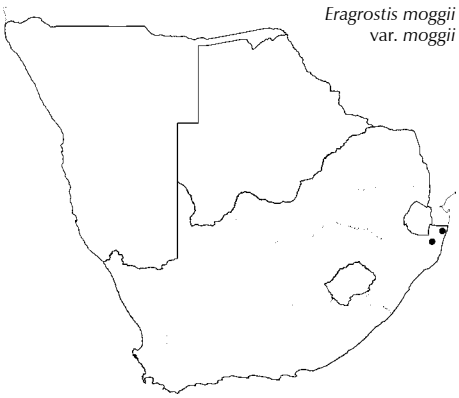
[Intergrades with *E. cilianensis* and *E. procumbens*, and resembles *E. barrelierii*, which has unequal glumes.]

*Flowering*: November. *Ecology*: Disturbed, weedy places. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from south-

ern Europe, warm temperate and subtropical regions of the Old World, occasionally found as an introduction in the New World tropics. G. *Economics*: Weed.

Voucher: *Smith 6166*.

**Eragrostis moggii** De Winter var. **moggii**, in *Bothalia* 9: 137 (1966). Type: Mozambique, Inhaca Isl., *Mogg 28616* (PRE, holo.).


*Eragrostis moggii* var. *moggii*

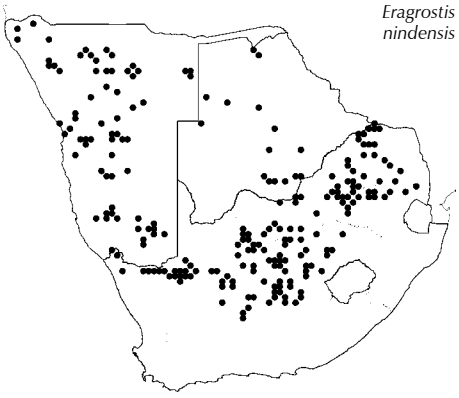
Erect, tufted perennial 400–900 mm high, geniculate to decumbent; basal sheaths glabrous; culms usually branched, rooting at nodes, nodes glabrous, glands present or absent. Leaf blade to 200 × to 3 mm. Inflorescence lanceolate to oblong, open, branches spreading; lowest branches not whorled but maybe paired or loosely clustered; axils glabrous; pedicel long to very long, with an annular gland. Spikelet 4–7 × 1.0–1.5 mm, linear to oblong, green to greyish-green; rachilla persistent; lemmas and/or paleas tardily breaking up from base upwards; glumes subequal, to $^{2}/_{3}$ the length of lemma above, apex obtuse, often flushed purple; lemma 1.4–1.6 mm long, narrowly oblong-ovate in side view, lateral nerves distinct, apex obtuse to truncate; palea apex truncate, margins close but not touching for entire length, except sometimes at base, keels a thin line, entire, scaberulous, persistent; anthers 3, 0.5–0.7 mm long; caryopsis oblong to almost square.

*Flowering*: December and April. *Ecology*: Sandy soils; especially in open forests. *Frequency in southern Africa*: Infrequent. *Distribution*: Mozambique. KZN.

Anatomy vouchers: *Ellis 3633* & *4535*.
Voucher: *Smook 5720*.

**Eragrostis nindensis** Ficalho & Hiern, in *Transactions of the Linnean Society*. London, ser. 2, Botany 2: 32 (1881). Type: Angola, upper course of River Ninda, *Serpa Pinto 51* (LISU, holo.).

*E. denudata* Hack., in *Bulletin de l'Herbier Boissier* 3: 392 (1895). Type: South Africa, Limpopo, Klippan, *Rehmann 5360*.


*Eragrostis nindensis*

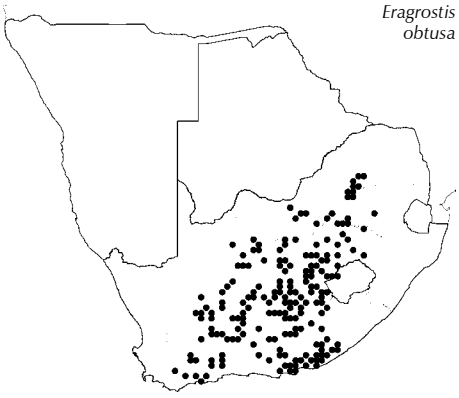
WETHER LOVE GRASS, PERENNIAL LOVE GRASS, AGTDAE-PLUIMGRAS

Densely tufted, slender perennial to 900 mm high; rhizome short, oblique; basal sheaths glabrous or hairy, but not densely woolly-hairy; leaves mainly basal; culms to 2 mm wide, eglandular. Leaf blade 50–300 × 2–3 mm. Inflorescence sparsely branched; branches stiff and spreading or contracted; lowest branches not whorled; spikelets solitary or in clusters, subsessile on main axis or side branches; pedicels stout. Spikelet 4–20 × 1.5–4.0 mm, strongly laterally compressed, yellowish-green to leaden, outline serrated; rachilla fragile, breaking up from apex downwards; glumes subequal, keeled, lanceolate to ovate in side view, apex acute; glumes reaching up to just past middle of lemma above; lemma 2.0–3.5 mm long, lateral nerves indistinct to distinct, not raised, or reaching margin, apex acute to acuminate; palea keels entire, flat, narrowly winged, margins nearly touching to touching especially at base and apex; anthers 3, 1.0–1.5 mm long; caryopsis ellipsoid.

[A polymorphic species varying in shape and size of inflorescence and spikelets, often confused with *E. racemosa*, which has olive to dark green spikelets with margin outline usually entire, rachilla persistent and lemmas and/or paleas breaking up from base upwards; palea wingless.]

*Flowering*: October to June. *Ecology*: Prefers bare exposed areas and stony sandy soils. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Tanzania, DRC and Angola. N, B, LIM, NW, G, M, FS, NC. *Economics*: Palatable and drought resistant grazing grass.

Illustration: Chippindall: 140 & 167, fig. 108 (16) & 137 (1955).
Anatomy vouchers: *Gibbs Russell & Smook 5437*; *Ellis 900, 901, 904, 1559, 1805* & *4740*.
Voucher: *Skarpe 539, Smook 2824*.


*Eragrostis obtusa*

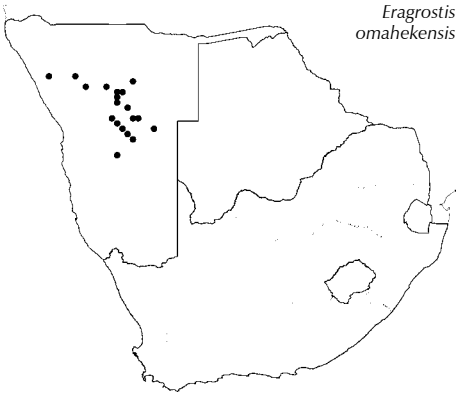
**Eragrostis obtusa** Munro ex Ficalho & Hiern, in *Transactions of the Linnean Society*, ser. 2: 32 (1881). Type: South Africa, without precise locality, *Thunberg*.

Tufted perennial to 400 mm high, geniculate; basal sheaths glabrous or hairy but not woolly-hairy at base. Leaf blade to 150 × to 4.5 mm. Inflorescence open, lax to somewhat contracted; pedicels slender; spikelets distant to not densely crowded. Spikelet 3–5 × 3–4 mm, broadly ovate to oblong, pallid, green to dark grey; rachilla extremely fragile, breaking up from apex downwards; glumes broadly obtuse; lemma obtuse to rounded, lateral nerves distinct; palea broadly elliptic to round; keels distinct, entire, shortly ciliolate, margins wide apart, narrowing upwards; anthers 3, 0.8–1.3 mm long; caryopsis broadly elliptic.

[Similar to *E.* × *pseud-obtusa*, which has the lower part of palea keels broader and projecting from the upper part and ending in a round or shallow notch at the top.]

*Flowering*: July to May. *Ecology*: Sandy or limestone soils; in disturbed places such as roadsides and overgrazed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. L, LIM, NW, G, M, FS, NC, WC, EC. *Economics*: Indicator of heavily grazed areas.

Illustration: Chippindall: 173, fig. 144 (1955).
Anatomy vouchers: *Botha & Panagos 45*; *Ellis 1626, 3329, 3627* & *Smook 2147*.
Voucher: *Smook & Gibbs Russell 2412; Smook 3015*.


*Eragrostis omahekensis*

**Eragrostis omahekensis** De Winter, in *Bothalia* 7: 473 (1961). Type: Namibia, 12.7 miles west of Gobabis, *De Winter 2498* (PRE, holo.). (A second *De Winter 2498*, cited in *Bothalia* 7, was collected 25 m west of Gobabis and is not designated as a type).

SANDVELD LOVE GRASS, SANDVELDPLUIMGRAS

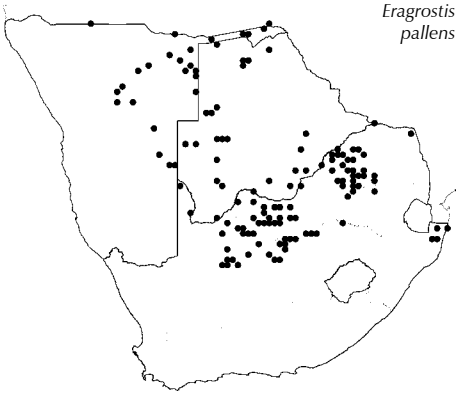
Tufted annual 600–800 mm high, erect, geniculate. Leaf blade to 300 mm long; sheaths with or without bulbous-based hairs. Inflorescence contracted, lowest branches whorled or sub-whorled; few hairs present or absent in axils; glandular patches where pedicel and branch meet; pedicels eglandular or with glands but glands not forming a ring; spikelets densely clustered on side branches. Spikelet 5–7 × 0.8–1.5 mm; rachilla persistent; lemmas and/or paleas breaking up from base upwards; glumes subequal, apex subobtuse to acute; lowest lemma 1.8–2.2 mm long, obliquely lanceolate in side view, apex subacute to obtuse, chartaceous, keeled, slightly folded along lateral nerves, lateral nerves distinct, raised; palea falling slightly after lemma, keels wingless, scaberulous, margins very wide apart, may touch basally, palea narrow between keel and margin; anthers 3, 0.5–1.3 mm long; caryopsis obovate-oblong.

[Resembles *E. cylindriflora* and *E. glandulosipedata*, both which have the lowest lemma up to 1.7 mm long.]

*Flowering*: February to May. *Ecology*: On sand; in disturbed places such as roadsides and cultivated lands. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N. *Economics*: Possibly good hay when grown in quantity.

Illustration: De Winter: 472, fig. 2 (1961).
Anatomy voucher: *Smook 5221*.
Voucher: *De Winter 2498, Liebenberg 4663*.

**Eragrostis pallens** Hack., in *Bulletin de l'Herbier Boissier* 3: 392 (1895). Type: South Africa, Limpopo, bushveld between Elands River and Klippan, *Rehmann*.


*Eragrostis pallens*

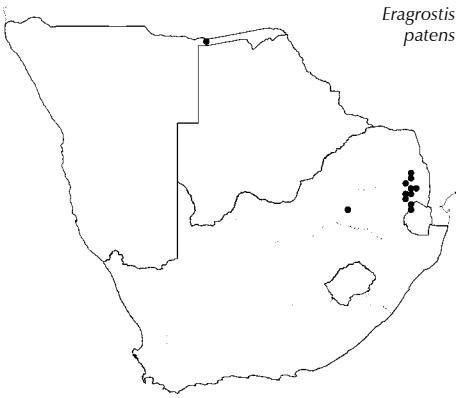
BROOM GRASS, BESEMGRAS

Densely tufted, robust, erect perennial to 2 000 mm high; stolons sometimes present (Mkuzi Game Reserve, KZN); basal sheaths glabrous or thinly hairy; leaves mainly basal; culms erect, 2–4 mm wide. Leaf blade to 1 000 × to 8 mm, linear, involute. Inflorescence variable, much branched or sparsely branched, open with branches spreading or grading to contracted with branches adpressed to main axis; lowest branches not whorled; spikelets subsessile to shortly pedicelled. Spikelet 5–15(–25) × 1.5–2.0 mm, glossy, greenish-grey to yellowish; rachilla fragile, breaking up from apex downwards, upper portion sometimes breaking off as a whole; glumes unequal; lower glume lanceolate to elliptic, reaching up to $^1/_2$ the lemma above; upper glume $^2/_3$ up lemma above; lowest lemma 1.4–2.2 mm long, broadly obtuse, subcoriaceous, lateral nerves obscure; palea obovate, usually protruding from lemma, keels broad, flat, scaberulous, margins close but not touching except usually at base; anthers 3, 1.0–1.4 mm long; caryopsis elliptic.

*Flowering*: December to May. *Ecology*: Sandy soils, especially with a high moisture content such as around seasonal pans. *Frequency in southern Africa*: Locally common. *Distribution*: Zambia, Zimbabwe, Mozambique and Angola. N, B, LIM, NW, G, M, FS, KZN, NC. *Economics*: In Namibia used for playing musical instruments, for timber or as thatching grass.

Illustration: Chippindall: 168, fig. 138 (1955); Müller: 201 (2007).
Anatomy vouchers: *Ellis 1611, 2075, 3557, 3591, 4077 & 4519*.
Voucher: *De Winter 7380*.

**Eragrostis patens** Oliv., in *Transactions of the Linnean Society*. London, 29: 175, t. 113 (1875). Type: Uganda, Bunyoro (Unyoro), *Grant* (K, holo.).


*Eragrostis patens*

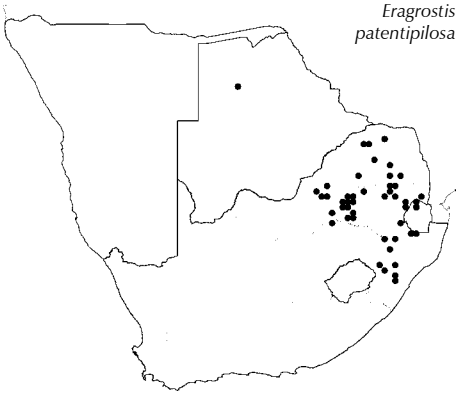
ANNUAL LOVE GRASS

Tufted annual to 400 mm high; erect to procumbent; culm eglandular. Leaf blade 30–100 × 23 mm. Inflorescence dense, spike-like; spikelets in wedge-shaped clusters, lowest cluster often distant; lowest branches not whorled. Spikelet 7–40 × 1–2 mm, lemmas and/or paleas breaking up from base upwards, rachilla becoming fragile soon after lower lemmas start to fall, often flushed red or purple; glumes subequal, keeled; lemma keeled, mucro or awn to 0.5 mm long present, lateral nerves distinct, not reaching margins; palea per-

sistent, keels slender, wingless, hairs to 0.2 mm long; anthers 3, 0.1–0.3 mm long; caryopsis elliptic, laterally compressed.

*Flowering*: February to June. *Ecology*: Usually on sandy soils but also recorded on dolerite and clayey loam; in disturbed places such as paths and overgrazed veld. *Frequency in southern Africa*: Common but rare in Namibia. *Distribution*: Northwards to tropical Africa. N, S, LIM, ?G, M. *Economics*: Indicator of overgrazed veld.

Illustrations: Chippindall: 172, fig. 143 (1955); Clayton et al.: 226, fig. 64 (1974).
Voucher: *Dahlstrand 881*.


*Eragrostis patentipilosa*

**Eragrostis patentipilosa** Hack., in *Proceedings of the Rhodesia Scientific Association* 7 (2): 67 (1908). Type: Zimbabwe, Bulawayo, *Gardner 33* (cited as *Jeffreys*) (W, holo.).

*E. pseudosclerantha* Chiov., in *Missione Biologia nel paese den Borana Racca Botanique, Angiospermae-Gymnospermae*: 285 (1939). Type: Ethiopia, Javello, *Cufodontis 538* (FT, holo.).

*E. lamprospicula* De Winter, in *Bothalia* 7: 471 (1961). Type: South Africa, Limpopo, Mosdene farm near Naboomspruit, *De Winter 734* (PRE, holo.).

FOOTPATH LOVE GRASS

Short-lived sprawling perennial 300–400 mm high; sometimes stoloniferous; leaves mainly forming a dense basal tuft; basal sheaths glabrous or sparsely hairy at extreme base; culm geniculate, rooting at the nodes, nodes often with glands below. Leaf blade to 90 × to 4.5 mm; eglandular. Inflorescence to 75(100) mm long, ovate to broadly ovate, open; lowest branches usually not whorled, maybe clustered; axils glabrous or hairy; pedicel ± slender, long glandular patches present, these often sticky; spikelets evenly distributed. Spikelet 4.0–10.5 × 1.5–3.0 mm, narrowly elliptic, greyish-green; rachilla persistent; lemmas and/or paleas breaking up from base upwards; glumes unequal, keeled, narrowly lanceolate in side view; lower glume to $^1/_2$ the length of the lemma above; upper glume $^1/_2$–$^2/_3$ the length of lemma above; lemma 1.8–2.4 mm long, keeled, apex subacute to obtuse, lateral nerves indistinct, dark grey to green, apex always dark; palea persistent, same width between keel and margins, margins far apart, keels a narrow line, entire, scaberulous; anthers 3, 0.7–1.3 mm long; caryopsis ellipsoid.

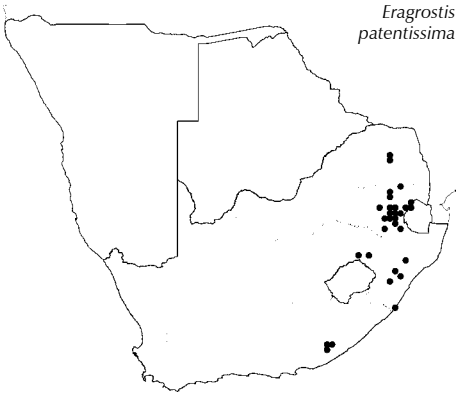
*Flowering*: September to April. *Ecology*: Stony ground; in open places in short grassland or under trees, in disturbed places and roadsides. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards through to East Africa and Ethiopia. ?B, S, LIM, NW, G, M, FS, KZN. *Economics*: Weed.

Illustration: Chippindall: 168, fig. 138 (1955).
Anatomy vouchers: *Ellis 37, 1221, 1776, 3817 & 3887*.
Voucher: *Smook 3158, Chippindall 18, De Winter 734*.

**Eragrostis patentissima** Hack., in *Bulletin de l'Herbier Boissier* 3: 391 (1895). Type: South Africa, Limpopo, Houtbosch, *Rehmann 5684*.

Tufted perennial, 500–700 mm high; rhizomes stout; basal sheaths glabrous at base; culm geniculate at base. Leaf blade to 250 × to 4 mm. Inflorescence 140–260 mm long, open, ovate to orbicular, branches fairly rigid, spreading; lowest branches not whorled; pedi-

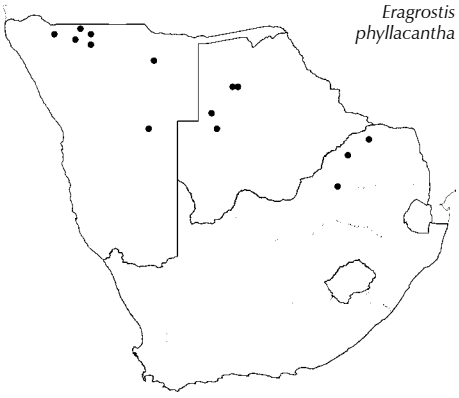
cels slender (8)10–40 mm long, much longer than spikelets, spreading, spikelets distant from one another. Spikelet 6–8(–15) × 1.5–3.0 mm, grey-green; rachilla persistent, becoming fragile in upper portion after lemmas have started to fall, lemmas and/or paleas breaking up from base upwards; glumes acute to acuminate, lanceolate in side view; lower glume nearly reaching apex of lemma above; lemma 2–3 mm long, acuminate, lateral nerves ± distinct; palea oblanceolate, apex acute to subacute, keels entire, forming a prominent ridge, scaberulous, margins touching from base to ± ½ way up, then touching or slightly apart; anthers 3, 0.8–1.0 mm long; caryopsis elliptic.


*Eragrostis patentissima*

*Flowering*: November to March. *Ecology*: Sandy to loamy soils; open areas in damp places and disturbed areas. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Endemic. S, LIM, M, FS, KZN, EC. *Economics*: Eagerly grazed by cattle.

Illustration: Chippindall: 163, fig. 131 (1955).
Anatomy vouchers: *Ellis 440, 1530, 1847, 3369, 4443* & *Smook 4821*.
Voucher: *Acocks 9515*.

**Eragrostis phyllacantha** Cope, in *Kew Bulletin* 53: 162 (1998). Type: Botswana, Ghanzi, *Story 5035* (K, holo.).

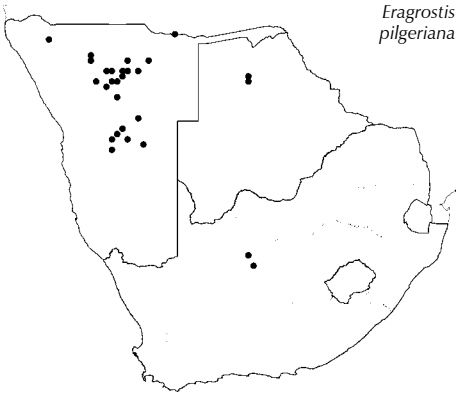

*Eragrostis phyllacantha*

Annual or short-lived perennial up to 30 mm high; culms often branched, eglandular. Leaf blade 10–35 × 1.0–1.5 mm, usually involute, lower surface often with long bulbous based hairs, margins scabrid, eglandular. Inflorescence open, lowest branches not whorled, glabrous to hairy in axils (sometimes on same inflorescence); branches and pedicels with sunken glands; a gland is always present on branch just below junction of spikelet pair and one midway on each pedicel. Spikelet 3–4 × ± 1.0–1.3 mm; rachilla persistent below, fragile above; lemmas disarticulating from the base upwards; glumes subequal, reaching ½–¾ up lemma above; lemma 1.5–2.4 mm long, keeled, lateral nerves distinct, glabrous, subacute; palea persistent, keels slender, scaberulous, wingless, margins wide apart; anthers 0.6–0.8 mm long; caryopsis broadly elliptic.

*Flowering*: January. *Ecology*: Sandy soils and limestone; outcrops in open areas. *Distribution*: Zimbabwe. N, B, LIM, NW.

Illustration: Cope: 160, fig. 7 a–c (1998).
Voucher: *Kreulen 541*.

**Eragrostis pilgeriana** Dinter ex Pilg., in *Botanischer Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 51: 420 (1914). Type: Namibia, Okahandja, *Dinter 1657*.

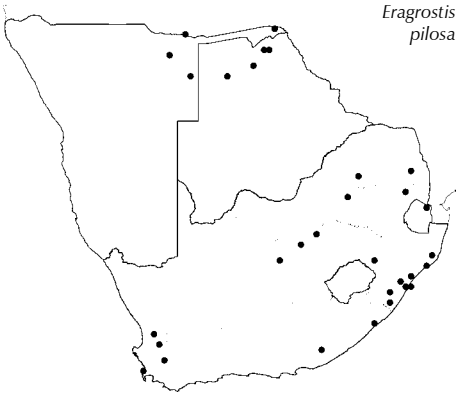

*Eragrostis pilgeriana*

Tufted annual to 400 mm high. Leaf blade to 150 × to 4 mm. Inflorescence 30–80 mm long; lowest branches not whorled; pedicels stout. Spikelet to 8 × 6–7 mm; strongly laterally flattened, sides appear jagged; disarticulating below glumes at maturity, falling entire as a unit; glumes subequal, keeled; lemma lanceolate in profile, keel winged, scabrid, lateral nerves distinct; palea keels ± thickened, broadly winged, usually irregularly lacerate (jagged), protruding laterally from lemma; anthers 3, 0.5 mm long; caryopsis elliptic to broadly elliptic.

[This species and the perennial *E. superba* are the only species in *Eragrostis* in the FSA region in which the spikelets disarticulate below glumes at maturity, and fall as entire units.]

*Flowering*: February to May. *Ecology*: Soil specific, growing on disturbed ground with calcrete and usually a high moisture content. *Frequency in southern Africa*: Locally common. *Distribution*: Angola. N, B, ?NC.

Anatomy voucher: *Smook 5105*.
Voucher: *Giess 12542*.



*Eragrostis pilosa*

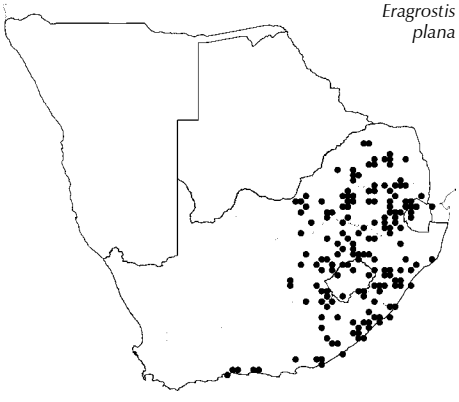
**Eragrostis pilosa** (L.) P.Beauv., in *Essai d'une nouvelle agrostographie*: 162, 175 (1812). Type: Italy.

Loosely tufted annual to 700 mm high; erect, occasionally geniculate; culm with glands present or absent. Leaf blade 20–200 × 1–4 mm. Inflorescence delicate, open, branches and pedicels slender, usually flexible; lowest branches usually whorled (except small specimens), axils hairy; crateriform glands present or absent; spikelets distant, pedicels 2–6 mm long. Spikelet 3–7 × 0.7–1.2 mm, linear to oblong; florets 4–14; rachilla persistent; lemmas and/or paleas breaking up from base upwards; lemmas on same side of rachilla distinctly overlapping lemma above; glumes very unequal, obtuse; lower glume to $^1/_3$ up lemma above, weakly keeled; upper glume 0.7–1.0 mm long, reaching at least ± $^1/_4$ way up lemma above; lemma narrowly ovate in profile, becoming conspicuously shorter towards apex of spikelet; lowest lemma 1.0–1.8 mm long, obtuse to acute, lateral nerves distinct to faint, keels scabrid; palea keels glabrous to scabrid, falling soon after lemma; margins touching for most of the length, definitely overlapping at apex; anthers 3, 0.2–0.3 mm long; caryopsis ellipsoid, back rounded.

[Similar to *E. aethiopica*, which has lowest lemma 0.7–1.0 mm long; and *E. remotiflora*, which has lemmas on same side of the rachilla not overlapping the lemma directly above.]

*Flowering*: October to May. *Ecology*: Sandy soils; in wet areas such as pan edges, vleis and river banks, disturbed places, often in the shade. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Tropical and warm temperate regions of Old World, introduced to New World. N, B, S, LIM, G, M, FS, KZN, WC, EC. *Economics*: Weed.

Illustration: Chippindall & Crook no 164 (1976); Peterson: 82 (2003).
Voucher: *Smook 1765, Hilliard 5383*.



*Eragrostis plana*

**Eragrostis plana** Nees, in *Florae africae australioris illustrations monographicae*: 390 (1941). Type: South Africa, Kachu & Zandiplaat…..et inter Geckau et Bashe, *Drège* (many syntypes).

TOUGH LOVE GRASS, TAAIPOL ERAGROSTIS

Densely tufted perennial to 1 000 mm high; basal sheaths strongly compressed, smooth, shiny, glabrous; culm without glands. Leaf blade to 800 × to 4 mm; glands present or absent. Inflorescence branches spreading or ascending; lowest branches not whorled, sometimes clustered; spikelets adpressed to branches. Spikelet 6.0–10.0(13.5) × 0.5–2.0 mm, linear to oblong; rachilla persistent; lemmas and/or paleas breaking up from base upwards; glumes unequal, oblong-lanceolate; lower glume scale-like, reaching up to $^1/_3$ the length of lemma above; upper glume barely reaching or just touch-

ing base of lemma above, shorter than rachilla internode; lemma 1.8–2.5 mm long, glabrous, lateral nerves prominent, glandular dots present; palea keels entire, glabrous to scabrid, thickened or not, glandular dots present or absent, margins touching to overlapping, especially at apex; anthers 3, 1.6–2.0 mm long; caryopsis oblong to elliptic.

[Similar to *E. tenuifolia*, which is weak perennial or an annual, has an identical caryopsis but no glands on the lemma lateral nerves. Vegetatively very similar to *Sporobolus pyramidalis*, which has one floret per spikelet.]

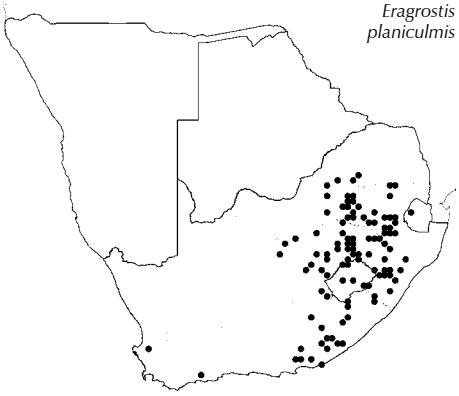
*Flowering*: November to May. *Ecology*: In high rainfall regions in waterlogged, overgrazed, burnt or disturbed areas. In dry areas it favours wet soils around vleis and rivers. *Frequency in southern Africa*: Locally common to locally dominant. *Distribution*: Zimbabwe, Zambia, Malawi, Mozambique; introduced to India and North America. S, L, LIM, NW, G, M, FS, KZN, WC, EC. *Economics*: Used for weaving of hats, baskets, necklaces and bangles; occasionally grazed in autumn; is an indicator of overgrazed and burnt areas; a traditional medicine in Lesotho.

Anatomy vouchers: *Ellis 224, 248, 277, 775 & 1360.*
Voucher: *Smook 4714, Hanekom 1701.*

**Eragrostis planiculmis** Nees, in *Florae africae australioris illustrations monographicae*: 391 (1941). Type: South Africa, Quaggasvlakte, *Ecklon*.

*E. nebulosa* Stapf, in *Flora capensis* 7: 603 (1900).

Besem-eragrostis

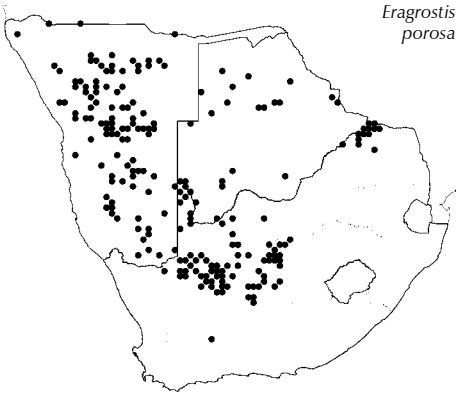

*Eragrostis planiculmis*

Tufted, erect perennial to 1 200 mm high; base with culms densely and strongly compacted, not easily separated; basal sheaths glabrous, inner sheaths often yellow and outer reddish; leaves mainly basal; culm nodes glabrous. Leaf blade to 900 × to 1.5 mm, setaceous, long-tapering at apex, straight or drooping. Inflorescence 100–700 mm long, open, much branched; lowest branches whorled or not whorled, maybe clustered; pedicels long. Spikelet 4–8 × 0.5–2.0 mm, linear, 5–11-flowered; rachilla persistent in lower portion, fragile in upper part, lemmas and paleas breaking up from base upwards; glumes subequal, lanceolate, translucent, smooth or scaberulous around apex and along nerves, up $^1/_3$ to $^3/_4$ the length of lemma above; lemma 2.0–2.5 mm long, dark green to greenish-grey, not strongly keeled, keel obscure in lower part, lateral nerves obscure; palea falling soon after lemma, keel a narrow line, margins nearly touching to touching along entire length, overlapping at apex; anthers 3, 0.6–1.2 mm long; caryopsis oblong.

[Resembles forms of *E. curvula*, which has basal sheaths densely hairy.]

*Flowering*: November to April. *Ecology*: Clay or dolerite soils; in depressions, vlei margins or disturbed areas. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Zimbabwe and Mozambique. S, L, LIM, NW, G, M, FS, KZN, WC, EC.

Anatomy vouchers: *Ellis 153, 298 & 3330.*
Voucher: *Dieterlen 317, Smook & Gibbs Russell 2169a.*


*Eragrostis porosa*

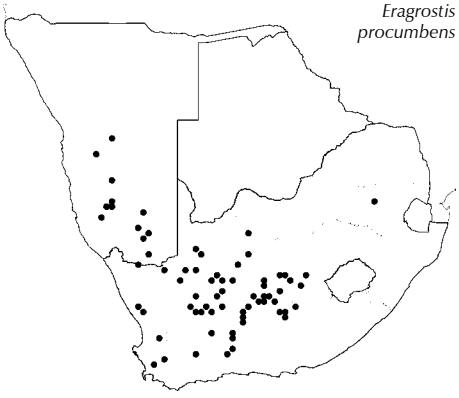
**Eragrostis porosa** Nees, in *Florae africae australioris illustrations monographicae*: 401 (1941). Type: South Africa, Western Cape, Gamka River, *Drège*; Eastern Cape, Camdeboo, *Drège* (syntypes).

Loosely tufted annual to 800 mm high, usually erect; leaf sheaths usually densely pilose with bulbous-based hairs; culm nodes glandular below. Leaf blade 40–150 × 2–5 mm; eglandular. Inflorescence open; lowest branches whorled; pedicels eglandular; spikelets distant from one another, evenly spaced on branches. Spikelet 3–5(8) × 1.0–1.5 mm; rachilla persistent in lower part, fragile above; lemmas and/or paleas breaking up from base upwards; glumes subequal; lower glume reaching up from middle and more up lemma above; upper glume up to ± $^1/_3$ of lemma above; lemma 1.0–1.5 mm long, obovate-elliptic, truncate to broadly rounded, lateral nerves indistinct; palea persistent, keels wingless, minutely scaberulous, margins wide apart, narrow between keel and margin; anthers 3, 0.55–0.90 mm long; caryopsis ellipsoid.

[Similar to *E. cylindriflora*, which has the lowest lemma broadly elliptic, obtuse to subacute and 1.5–1.7 mm long.]

*Flowering*: January to July. *Ecology*: Stony or sandy soils often on limestone; around rivers and pans, also in disturbed areas. *Frequency in southern Africa*: Infrequent to common. *Distribution*: Zimbabwe to Kenya, with a few records from Chad and Ethiopia. N, B, LIM, NW, FS, NC, WC.

Anatomy vouchers: *Botha & Panagos 6, 12B*; *Gibbs Russell & Smook 5197, 5291*; *Ellis 894, 923, 2887, 4369, 4715, 4735*; *Smook 3503* & *5073*.
Voucher: *De Winter 7472, De Winter & Codd 284, Mostert 1637.*


*Eragrostis procumbens*

**Eragrostis procumbens** Nees, in *Florae africae australioris illustrations monographicae*: 386 (1941). Type: South Africa, Eastern Cape, Camdeboo, *Drège* (syntype).

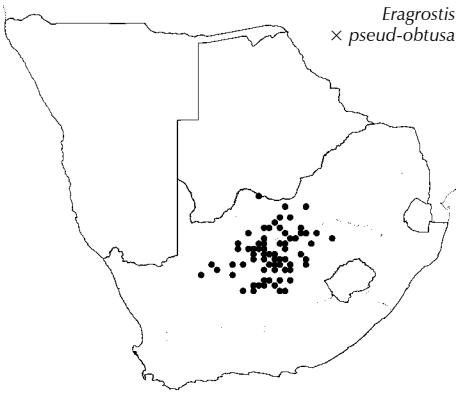
Tufted annual to 500 mm high, geniculate or procumbent; basal sheath glabrous or hairy, hairs not woolly; culm glandular or not below nodes. Leaf blade to 200 × to 3.5 mm; margins scabrid, crateriform glands present or absent. Inflorescence oblong to elliptic, densely contracted; side branches usually adpressed to main axis, though lower branches sometimes spreading, not whorled, maybe clustered; pedicels with crateriform glands present or absent; spikelets many, densely congested, adpressed to branches. Spikelet 5.5–7.0 × (1.3–)2.0–2.5 mm, oblong to elliptic; rachilla persistent, sometimes becoming fragile in upper part; lemmas and/or paleas breaking up from base upwards; glumes subequal, reaching $^1/_2$ or more up lemma above, keel with crateriform glands present or sometimes absent; lemma (1.5–)2.0–2.5 mm long, acute, minute mucro present or absent, keeled, keel with or without glands, lateral nerves distinct; palea margins wide apart, keels entire, scabrid; anthers 3, 0.2–0.3 mm long; caryopsis oblong.

[Similar to *E. kingesii*, which is a smaller plant with spikelet 1.0–1.5 mm wide; and *E. macrochlamys* var. *macrochlamys*, with a fragile rachilla and spikelet breaking up from apex downwards.]

*Flowering*: October to June. *Ecology*: Moist gravel or sandy soils; in depressions, along water courses and disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe. N, NW, ?M, FS, NC, WC, EC. *Economics*: Weed.

Illustration: Chippindall: 159, fig. 127 (1955).
Anatomy vouchers: *Botha & Panagos 13, 24*; *Ellis 866* & *Smook 3390*.
Voucher: *Zietsman 1666, Smook 3262*.

**Eragrostis × pseud-obtusa** De Winter, in *Bothalia* 7: 474 (1961). Type: North West, Vryburg dist., Tiger Kloof, *Brueckner 320* (PRE, holo.).


*Eragrostis × pseud-obtusa*

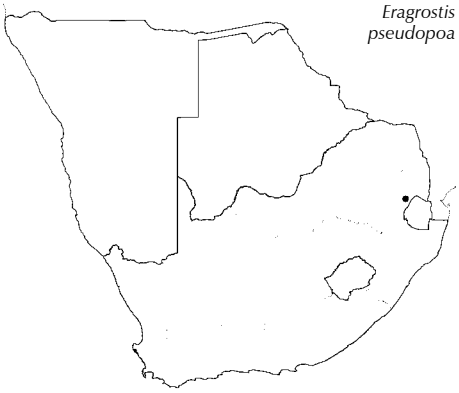
Tufted perennial to 600 mm high, erect; basal sheaths glabrous, or hairy for a distance up along sheaths, hairs not long-woolly. Leaf blade to 150 × 2–3 mm. Inflorescence lax to dense, sparsely branched, gland-dotted; pedicels often with a annular ring, spikelets congested. Spikelet 3–5 × 2.5–3.5 mm, broadly oblong-ovate, plump; rachilla fragile; lemmas and/or paleas breaking up from apex downwards; glumes subequal, boat-shaped, acute to subacute, keel gland-dotted; lemma boat-shaped, lateral nerves prominent, raised, margins hyaline; palea obtuse to rounded, keels upper part shortly minutely hairy, lower portion very broadly winged, wing very shallowly notched forming small tooth-like appendage; anthers 3, 0.7–0.8 mm long; caryopsis elliptic.

[Intermediate between *E. obtusa*, which has palea entire, and *E. echinochloidea*, which has the palea acute, and keels deeply notched forming a large tooth-like appendage; spikelet resembles *E. obtusa*.]

*Flowering*: November to May. *Ecology*: Sandy loam, shallow sandy soils, sand over limestone; in moist areas such as ditches, along streambeds and dams, also in disturbed places. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. NW, FS, NC.

Illustration: De Winter: 476 (1961).
Anatomy vouchers: *Smook & Gibbs Russell 2419*; *Botha & Panagos 4*; *Ellis 838, 839 & 3577*.
Voucher: *Smook 2785*.

**Eragrostis pseudopoa** C.E.Hubb., in *Kew Bulletin* 1934: 115 (1934). Type: Tanzania, Iringa dist., Ifunda, *Haarer 1659* (K, holo.).

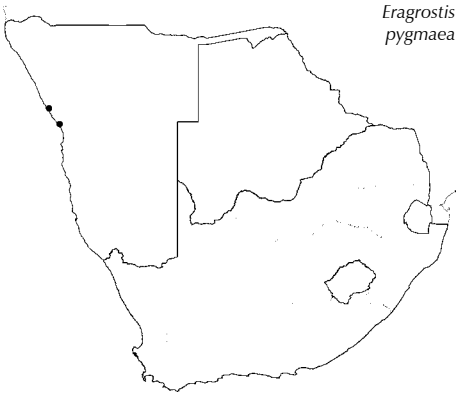

*Eragrostis pseudopoa*

Tufted, erect, perennial up to 600 mm; rhizome short. Leaf blade 100 × 3 mm flat. Inflorescence lax, open, glandular, branches and pedicels slender, flexuous, nodding; pedicels 4–12 mm long. Spikelet 6–9 × 4–6 mm, ovate, purple; rachilla persistent, lemma and/or palea breaking up from base upwards; glumes subequal, lanceolate in side view, acute; lower glume nearly reaching to apex of lemma above; lemma 4–5 mm long, back rounded, membranous, apex obtuse to truncate; palea falling soon after lemma, keels smooth, wingless, margins not touching, narrowing upwards between keels and margins; anthers 2.5 mm long.

[Similar to *E. capensis*, which has panicle contracted, pedicel 1–2 mm long and lemma 2.5–4.0 mm long, cartilaginous.]

*Flowering*: November. *Ecology*: Swampy places. *Frequency in southern Africa*: Infrequent. *Distribution*: Tanzania. M.

Voucher: *Heymans 114*.


*Eragrostis pygmaea*

**Eragrostis pygmaea** De Winter, in *Bothalia* 10: 72 (1969). Type: Namibia, Swakopmund dist., Cape Cross, *Giess 8706* (PRE, holo.).

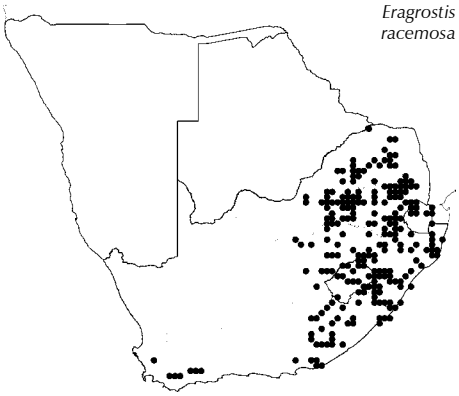
Tufted annual to 70 mm high, erect or decumbent; basal sheaths densely covered with long, bulbous-based hairs; vegetative parts have glandular hairs with swollen apices. Leaf blade to 40 × to 2 mm; margin scaberulous. Inflorescence contracted; lowest branches not whorled, glands usually present; pedicels stout up to 2.8 mm long. Spikelet 4–7 × 1.0–1.5 mm, narrowly lanceolate; rachilla persistent, zigzag; lemmas and/or paleas breaking up from base upwards; glumes unequal; lower

glume $^1/_2$ the length of the lemma above; lemma 1.0–1.6 mm long, acute, keel prominent, thickened, lateral nerves distinct, glabrous or hairs up 0.1 mm long, or scaberulous; palea persistent, keels scabrid; anthers 3, 0.2 mm long; caryopsis subglobose.

[Similar to *E. kingesii*, which has leaf sheaths without bulbous-based hairs and an oblong-elliptic caryopsis.]

*Flowering*: March to May. *Ecology*: Shallow depressions on sandy flats. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N.

Voucher: *De Winter & Hardy 8050*.



*Eragrostis racemosa*

**Eragrostis racemosa** (Thunb.) Steud., in *Synopsis plantarum glumacearum* 1: 271 (1854). Type: South Africa, 'Cape of Good Hope', *Thunberg* (UPS, holo.).

*E. chalcantha* Trin., in *Mémoires de l'Académie Impériale des Sciences de Saint Peterbourg, ser. 6, Science & Maths*. 1: 401 (1830). Type: South Africa, 'Cape of Good Hope', *Drège* (LE, holo.).

NARROW HEART LOVE GRASS, SMALHARTJIE-ERAGROSTIS

Densely tufted perennial to 800 mm high; basal sheaths glabrous or thinly silky-hairy; leaves mainly basal; culms unbranched, eglandular. Leaf blade 60–100 × 2–5 mm; eglandular. Inflorescence open or contracted, sparsely branched, secondary branches present or absent; primary branches stiff, with 2–4 spikelets, lowest branches not whorled to sub-whorled; pedicels short, stout. Spikelet 3–10 × 1.5–4.5 mm, dark greenish-grey, olive or brownish-grey, outline usually smooth; rachilla persistent; lemmas and/or paleas breaking up from base upwards; glumes subequal, reaching $^1/_3$–$^1/_2$ up lemma above, ovate in side-view, boat-shaped, apex obtuse, cartilaginous; lemma 1.7–3.8 mm long, apex obtuse to subacute, keeled, lateral nerves indistinct to ± distinct; palea persistent, keels a narrow thickened ridge, entire, wingless, scaberulous, margins wide apart, ± same width between keels and margins; anthers 3, 0.7–1.6 mm long; caryopsis almost square.

[Often confused with *E. nindensis*, which has yellowish-green spikelets with a serrate outline, fragile rachilla, breaking up from apex downwards; palea narrowly winged. Similar to *E. sclerantha* subsp. *sclerantha*, which has basal sheaths densely woolly hairy.]

*Flowering*: August to May. *Ecology*: On shallow sandy, stony or clayey soils. *Frequency in southern Africa*: Common and widespread. *Distribution*: Northwards to Sudan, and DRC, also Madagascar and Arabia. S, L, LIM, NW, G, M, FS, KZN, WC, EC. *Economics*: Erosion control as useful coverage on shallow soils and in heavily grazed areas.

Illustration: Chippindall: 165, fig. 135 (1955); Cope: 125, tab. 40A (1999).
Anatomy vouchers: *Ellis 4, 135, 221, 231, 306, 369, 1361, 1361, 1791, 1791, 3170, 3481* & *3496*.
Voucher: *Smook 4792, Kluge 1098*.

**Eragrostis remotiflora** De Winter, in *Bothalia* 7: 477 (1961). Type: South Africa, Free State, 7.5 m northwest of Bethulie, *Acocks 13521* (PRE, holo.).

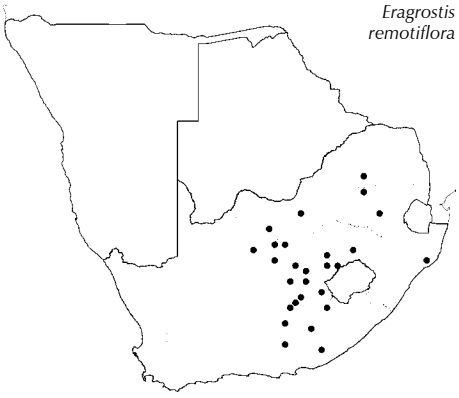
Tufted weak perennial, or annual to 600 mm high; hygrophyte; basal sheaths glabrous; culms erect or some geniculate. Leaf blade to 250 × to 2.5 mm; margins scaberulous. Inflorescence open, branches spreading, lowest branches not whorled to subwhorled; glands present or ab-

sent; axils hairy or glabrous; pedicels slender. Spikelet to 5 × to 1 mm, oblong to linear, florets 4–6; rachilla persistent; lemmas and/or paleas breaking up from base upwards; lemmas on same side of rachilla either not or just overlapping one above; glumes unequal; lower glume reaching to $^1/_4$–$^1/_3$ up lemma above; upper glume sometimes not reaching lemma above, weakly keeled; lowest lemma 1.0–1.8 mm long, lemmas becoming shorter in length upwards, broadly ovate to oblong in side view, apex obtuse to rounded, lateral nerves indistinct to faint on some lemmas in same spikelet or inflorescence; palea keels scabrid to glabrous, margins nearly touching to overlapping entire length; anthers 3, 0.2–0.4 mm long; caryopsis oblong, back shallowly grooved.

[Similar to *E. pilosa* and *E. aethiopica*, which have the lemmas on same side of rachilla overlapping the lemma above.]

*Flowering*: January to April. *Ecology*: Wet and damp areas in pans, vleis and river floodplains, also disturbed areas in semi-arid regions. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. LIM, NW, G, M, FS, NC, EC. *Economics*: Grazing grass.

Illustration: De Winter: 478, (1961).
Anatomy vouchers: *Ellis 1844* & *Smook 3241*.
Voucher: *Acocks 14016, Smook & Gibbs Russell 2371*.


*Eragrostis remotiflora*

**Eragrostis rigidior** Pilg., in *Botanischer Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 48: 347 (1912). Type: Namibia, Okahandja, Grosshart in herb. *Dinter 1532*; *Dinter 1635*; Waterberg, *Dinter 1821* (syntypes).

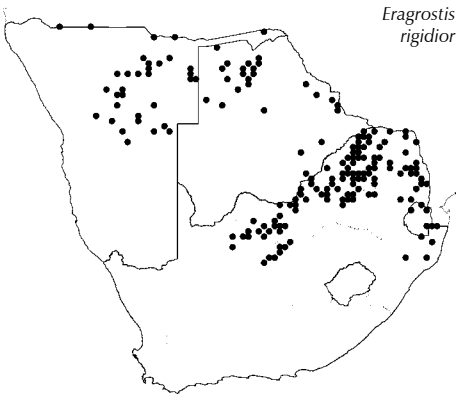
CURLY LEAF, KRULBLAAR

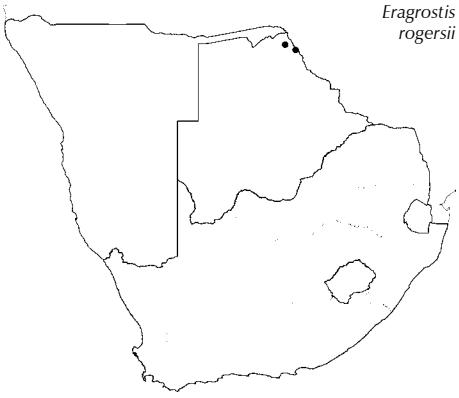
Loosely tufted, robust perennial to 1 000 mm high, erect to geniculate; branched to unbranched; basal sheaths papery, nerves rounded, well apart, glabrous to slightly hairy at very base only; leaves mainly cauline; culm nodes glabrous. Leaf blade to 200 × to 5 mm, narrowing abruptly into a long tapering apex, curly when dry, nerves distinct on lower surface. Inflorescence open, branches spreading; lowest branches whorled, rarely not whorled (can occur on same plant); spikelets usually contracted along branches. Spikelet 3.5–7.0 × 1.0–1.5 mm, linear to oblong; rachilla fragile in the upper portion; lemmas and/or paleas breaking up from the base upwards; 3–5 florets; lower glume $^2/_3$ to longer than lemma above; upper glume $^1/_2$–$^3/_4$ length of lemma above; lemma 1.6–1.8 mm long, lightly keeled, lateral nerves distinct; palea margins close, not touching, occasionally nearly touching at apex, keels a thin line, smooth to scaberulous; anthers 3, 0.8–1.2 mm long.

[Resembles *E. lehmanniana*, which has leaf blades that gradually narrow to apex, do not curl when dry and inflorescence lowest branches never whorled; *E. barbinodis*, which has hairy nodes. The species has been placed in synonymy together with *E. trichophora* and *E. cylindriflora*, but an in-depth study is needed for this complex for FSA before this is accepted.]

*Flowering*: September to May. *Ecology*: Sand, loam, humus loam or calcrete soils; in open patches, disturbed areas and old cultivation sites. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Kenya, Tanzania and Uganda. N, B, S, LIM, NW, G, M, FS, KZN, NC. *Economics*: A valuable fodder in dry areas.

Illustrations: Chippindall: 148, fig. 115 (1955); Müller: 205 (1999).
Anatomy voucher: *Ellis 1347*.
Voucher: *Smook 5300*.


*Eragrostis rigidior*


*Eragrostis rogersii*

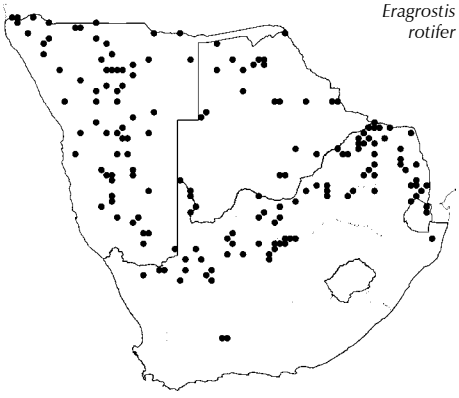
**Eragrostis rogersii** C.E.Hubb., in *Bulletin of Miscellaneous Information, Kew* 1934: 115 (1954). Type: Zambia, Livingstone, *Rogers 7027* (K, holo.).

Tufted annual to 700 mm high; geniculate; basal sheaths glabrous or with bulbous-based hairs along margins or scattered near leaf blades; culms rooting at nodes, crateriform glands present. Leaf blade to 90 × to 4 mm, glands present. Inflorescence branches slightly spreading, crateriform glands usually present; lowest branches not whorled; pedicels stiff; spikelets few, distant. Spikelet 6–12 × 2.5–4.2 mm; rachilla fragile, breaking up from apex downwards; glumes subequal, keel scabrid; upper glume $^{2}/_{3}$–$^{3}/_{4}$ the length of lemma above; lemma 3.2–3.5 mm long, acute to subacute, mucro present or absent, lateral nerves distinct; palea keels entire, scaberulous; anthers 3, 1.0–1.5 mm long; caryopsis broadly elliptic to subglobose.

[Resembles *E. dinteri*, which has acuminate and usually awned lemmas. Either rare or poorly collected in FSA area, more common in Zimbabwe.]

*Flowering*: March. *Ecology*: Disturbed sandy soils. *Frequency in southern Africa*: Infrequent. *Distribution*: Mozambique, Zambia and Zimbabwe. B.

Voucher: *Ellis 2752*.


*Eragrostis rotifer*

**Eragrostis rotifer** Rendle, in Hiern, *Catalogue of African plants collected by Dr F. Welwitsch* 2: 242 (1899). Type: Angola, Quicuxe to Cacuaco, *Welwitsch 7284* (syntype).

*E. margaritacea* Stapf, in *Flora capensis* 7: 604 (1900). Type: South Africa, Limpopo, Klippan, *Rehmann 5372;* Northern Cape, between Kimberley and Bloemfontein, *Buchnan 282* (syntypes).

VLEI LOVE GRASS, VLEIPLUIMGRAS

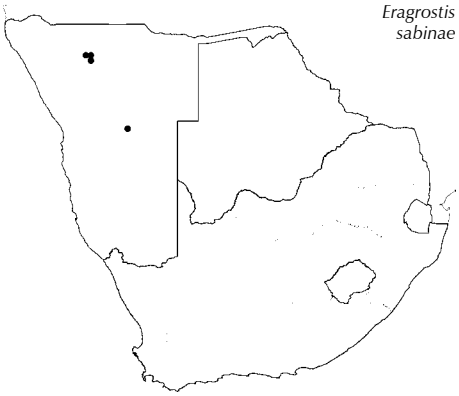
Tufted perennial to 1 500 mm high, erect, occasionally decumbent, basal sheaths densely silky hairy; culm with glands present or absent below nodes. Leaf blade to 300 × to 4 mm. Inflorescence open, branches spreading; lowest branches whorled; branches and pedicels densely covered with prickles giving a greenish-white appearance; spikelets contracted to branches. Spikelet 4–10 × to 1 mm, linear to oblong; rachilla persistent; lemmas and/or paleas breaking up from base upwards; glumes subequal, lanceolate-elliptic in side view, apex obtuse; lower glume $^{1}/_{2}$–$^{2}/_{3}$ the length of the lemma above; upper glume reaching up $^{1}/_{4}$–$^{1}/_{2}$ of lemma above; lemma 1.0–1.6 mm long, greyish-green, usually flushed purple in upper portion above which is a yellow portion, apex with a white membranous margin, lateral nerves indistinct, apex acute to obtuse; palea keels an obscure line, smooth or scaberulous, wingless, margins close but slightly apart around middle, touching to overlapping at apex, falling soon after lemma; anthers 3, 0.5–1.1 mm long; caryopsis ellipsoid.

[Similar to *E. heteromera*, which has basal sheaths glabrous or obscurely hairy at very base.]

*Flowering*: November to July. *Ecology*: Mainly sandy soils; in moist areas like vleis, pan edges and river beds, also disturbed areas; often forming pure stands in damp places. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Tanzania; also Angola. N, B, S, LIM, NW, G, M, KZN, NC, WC. *Economics*: Remains green for a long time, also a valuable fodder in dry areas.

Illustration: Müller: 207 (2007).
Anatomy vouchers: *Botha & Panagos 18, 49*; *Ellis 496, 922, 2018, 2842, 2907, 4521, 4781 & Smook 5160*.
Voucher: *De Winter 2397*.

**Eragrostis sabinae** Launert, in Merxmüller, *Prodromus einer Flora Südwestafrika* 160: 225 (1970). Type: Namibia, Vley vor Okandeka, Brack, *Sabine Bleissner 58*.


*Eragrostis sabinae*

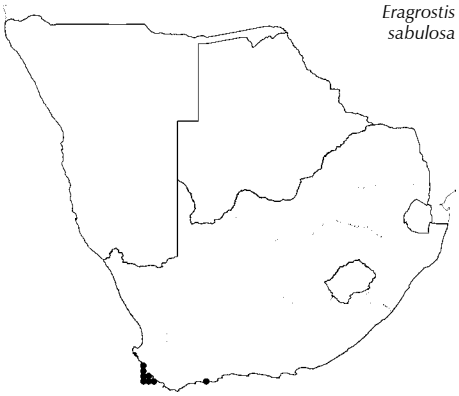
Densely tufted perennial 90–150 mm high; stoloniferous; leaves short, mainly basal; basal sheaths densely woolly-hairy to long hairy, sometimes only at the very base or only the prophylls; culm nodes usually with long spreading white hairs. Leaf blade to 250 × to 1.5 mm, only slightly tapering to apex. Inflorescence 25–80 mm long, open, moderately branched; lowest branches not whorled; spikelets in loose clusters at ends of branches or spreading. Spikelet 4–7 × 0.8–1.0 mm; rachilla persistent in lower portion and fragile in upper part; lemmas and/or paleas breaking up from base upwards; glumes unequal, translucent, smooth or scaberulous along keel, $^1/_2$–$^2/_3$ the length of the lemma above; lower glume lanceolate, apex eroded to entire, obtuse; lemma 1.2–1.7 mm long, green to grey-green, apex usually whitish, often emarginate, lateral nerves faint but distinct, without glands; palea keels a thin line, margins close along entire length, may touch near apex and base; anthers 3, 0.4–0.8 mm long.

[Resembles some forms of *E. laevissima*, which has glandular dots on the lemma lateral nerves.]

*Flowering*: February to May. *Ecology*: Brackish or saline soils; around vleis, pans and springs. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N.

Anatomy voucher: *Smook 5128A*.
Voucher: *Müller 1474, Smook 5128*.

**Eragrostis sabulosa** (Steud.) Schweick., in *Repertorium sp. nov., Fedde* 43: 91 (1938). Type: South Africa, Eastern Cape, *Ecklon 944*.

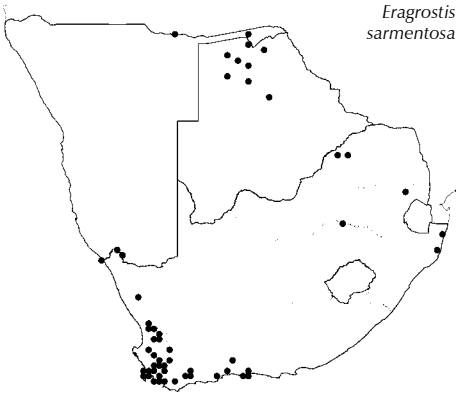

*Eragrostis sabulosa*

Tufted perennial 60–150 mm high, rhizome long, creeping; leaves mainly cauline; culm internodes short and exceeded by the leaf sheaths. Leaf blade 10–40 × to 3 mm. Inflorescence usually less than 40 mm long, very dense; branches adpressed to main axis; spikelets densely crowded, adpressed to branches. Spikelet to 7 × 1.5–2.0 mm, dark olive-grey; rachilla tardily breaking up between florets; glumes unequal, acute to obtuse, jagged; lower glume $^3/_4$ up lemma above; lowest lemma 1.6–2.5 mm long, keeled, lateral veins ± indistinct; palea keels with cilia less than 0.1 mm long, margins overlapping entire length; anthers 3, 1.2 mm long; caryopsis ellipsoid.

[Resembles *Sporobolus virginicus* in habit and habitat, but this has only one floret per spikelet. Similar to *E. sarmentosa*, which has lowest lemma 1.5 mm long and anthers 0.2–0.3 mm long.]

*Flowering*: March, and October to November. *Ecology*: Sandy soils especially beach sand. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC.

Illustration: Chippindall: 161, fig. 129 (1955).
Voucher: *Crook 1040*.


*Eragrostis sarmentosa*

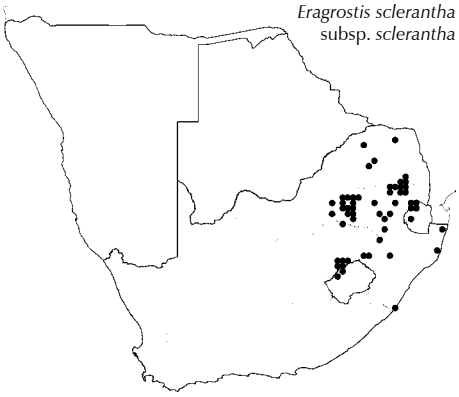
**Eragrostis sarmentosa** (Thunb.) Trin., in *Mémoires de l'Académie Impériale des Sciences de Saint Peterbourg, ser. 6, Science & Maths* 1: 398 (1830). Type: South Africa, *Thunberg*.

Tufted mat-forming perennial to 400 mm high; shortly rhizomatous, sometimes stoloniferous; leaves mainly cauline; culms occasionally geniculate, decumbent, rooting at nodes. Leaf blades to 100 × to 4.5 mm. Inflorescence 60–150 mm long, narrow, contracted, branches adpressed to main axis; lowest branches not whorled; pedicels stout; spikelet groups often distant on main axis; spikelets adpressed to branches. Spikelet 3–7 × 1.5–1.7 mm, greyish-green to purple; rachilla persistent, upper part often becoming fragile; lemmas and/or paleas breaking up from base upwards; glumes unequal, lanceolate; upper glume acute; lowest lemma 1.3–1.5 mm long, keeled, lateral nerves distinct, usually not reaching margins, never excurrent into a mucro; palea keels slender but obvious, wingless, scaberulous, margins close, not touching, apart at apex; anthers 3, 0.2–0.3 mm long; caryopsis ellipsoid to ovoid.

[Similar to *E. sabulosa*, which has the lowest lemma 1.6–2.5 mm long and anthers 0.6–1.3 mm long.]

*Flowering*: July to May. *Ecology*: Moist, sandy areas; edges of riverine vegetation, along floodplains and dams, also in disturbed overgrazed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Zambia, Zimbabwe, Mozambique. N, B, LIM, M, FS, KZN, NC, WC.

Illustration: Chippindall: 162, fig. 130 (1955).
Anatomy vouchers: *Ellis 322 & Smook 4212*.
Voucher: *De Winter & Vahlmeijer 8584, Smith 773*.


*Eragrostis sclerantha* subsp. *sclerantha*

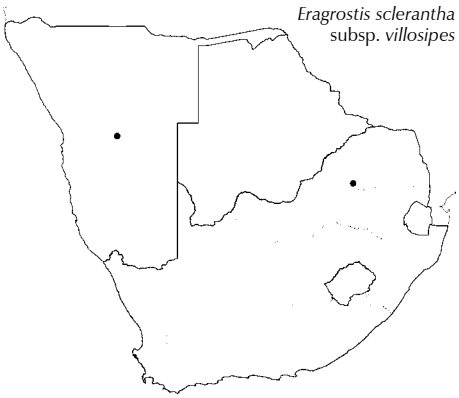
**Eragrostis sclerantha** Nees subsp. **sclerantha**, in *Kirkia* 8: 28 (1971). Type: South Africa, KwaZulu-Natal, Umtento (Omtendo) River to Umzimkulu (Omsamculo) River, *Drège 4328*.

Densely tufted perennial to 700 mm high; base slightly swollen; basal sheaths densely tomentose long woolly-hairy (sometimes only visible on inner sheaths and also sometimes not curly); culm nodes eglandular. Leaf blade 15–250 × 2.0–6.5 mm; eglandular. Inflorescence 60–350 mm long, open, branches spreading, lowest branches not whorled, axils glabrous, branches hairy; spikelets many, either adpressed to branches or spreading; pedicels stout. Spikelet 2–5 × 1.5–3.0 mm, dark olive-green; rachilla persistent, lemmas and/or paleas breaking up from base upwards; glumes subequal, lanceolate in side view, keeled, acute, ± up to middle of lemma above; lemma 1.5–2.0 mm long, acute to subacute, lateral nerves indistinct; palea persistent, keels entire, wingless, scabrid, margins wide apart, same width between margins and keels; anthers 3, 0.7–1.0 mm long; caryopsis ellipsoid.

[Differs from subsp. *villosipes*, which has a contracted inflorescence with branches adpressed to main axis. Resembles *E. desolata*, which has basal sheaths glabrous or hairy, but not woolly-hairy, leaf blades 0.5–2.5 mm wide and anthers 1.2–1.3 mm long. Similar to *E. racemosa*, which has basal sheaths glabrous or hairy, but not densely woolly-hairy.]

*Flowering*: January to May. *Ecology*: Sandy soils and sandy loams between rocks (often quartzite). *Frequency in southern Africa*: Infrequent but widespread. *Distribution*: Zimbabwe, Angola. S, L, LIM, G, M, NW, FS, KZN.

Illustration: Chippindall: 166, fig. 136 (1955).
Anatomy vouchers: *Ellis 445, 461, 1224, 1533, 1864 & 3450*.
Voucher: *Cohen 862, Burtt Davy 9240*.


*Eragrostis sclerantha* subsp. *villosipes*

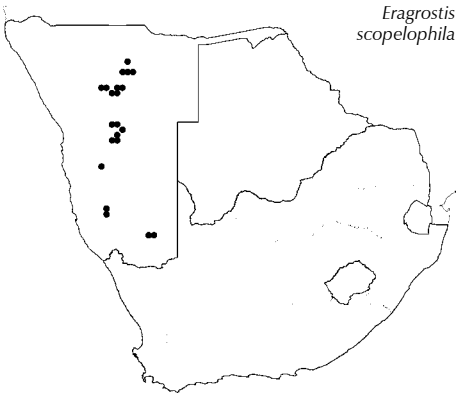
**Eragrostis sclerantha** Nees subsp. **villosipes** (Jedwabn.) Launert, in *Boletin da Sociedade broteriana*, ser. 2: 35 (1961). Type: Angola, Huila, Monhino, *Dekindt 417* & *422* (syntypes).

Densely tufted perennial to 600 mm high, erect; leaves forming a dense basal tuft; basal sheaths with dense, tomentose woolly hairs that are usually long and curly, sometimes ± straight. Leaf blade to 200 × 2–6 mm; eglandular. Inflorescence narrow, sparsely branched, branches adpressed to main axis; spikelets adpressed, solitary or in groups of 2–3; pedicels short. Spikelet 2–8 × 1.5–2.0 mm, olive-green; glumes cartilaginous, as long as middle of lemma above; upper glume ovate, boat-shaped; rachilla persistent, lemmas and/or paleas breaking up from base upwards; lemma lateral nerves indistinct, not reaching margins, subacute; palea keels a narrow line, scaberulous; anthers 3, 0.7–1.0 mm long; caryopsis ellipsoid.

[Differs from subsp. *sclerantha*, which has a spreading inflorescence.]

*Flowering*: February. *Ecology*: Wooded grassland. *Frequency in southern Africa*: Infrequent. *Distribution*: Zambia, Zimbabwe, Malawi, Mozambique, Tanzania and Angola. N, LIM.

Voucher: *Bell PRE 5985*.


*Eragrostis scopelophila*

**Eragrostis scopelophila** Pilg., in *Botanischer Jahrbücher* 51: 421 (1914). Type: Namibia, Wilhelmsberg, *Dinter 2564*.

MOUNTAIN LOVE GRASS, BERGPLUIMGRAS

Tufted wiry, much-branched shrub or dwarf shrub to 1 000 mm high; forming dense bushes; basal sheaths glabrous; leaves mainly cauline; culms branched. Leaf blade to 250 × to 5 mm; margins with or without crateriform glands. Inflorescence open, lowest branches not whorled; pedicels (excluding terminal ones) shorter than or to as long as spikelets, slender, annular glands present or absent; spikelets distant. Spikelet 3–10 × 2.2–3.3 mm, green to dark greenish-grey, opposite rows of florets hardly overlapping; rachilla visible, subpersistent, upper portion fragile; glumes ovate in side view, acute to subacute, reaching to $^1/_2$ up lemma above; lemma 1.8–2.0 mm long, acute to obtuse, keeled, lateral nerves raised, distinct; palea margins wide apart along entire length, width between margins and keels narrowing upwards, keels entire, narrow, rounded, scaberulous, wingless; anthers 3, 1.3–1.5 mm long; caryopsis broadly oblong.

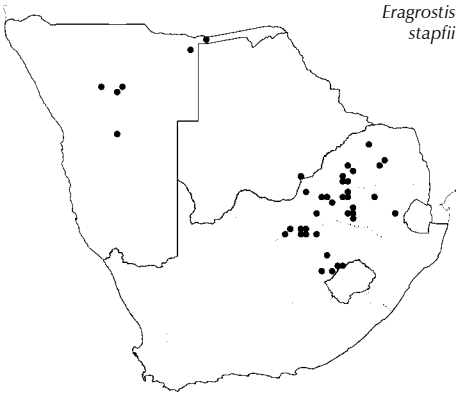
*Flowering*: December to April, also August and October. *Ecology*: Often associated with dolomite; mountainous areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N. *Economics*: Fairly palatable pasture as stays green in winter.

Illustration: Müller: 209 (2009).
Anatomy vouchers: *Smook 5183, 5232* & *Ellis 4357*.
Voucher: *De Winter 2342*.

**Eragrostis stapfii** De Winter, in Chippindall, *Grasses and Pastures of South Africa*: 152 (1955). Type: South Africa, Limpopo, Houtbosch, *Rehmann 5686, 5695* (syntypes).

*E. sporoboloides* Stapf, in *Flora capensis* 7: 607 (1900).

Densely tufted perennial to 500–900 mm high, erect; basal sheaths glabrous; leaves forming a dense basal tuft. Leaf blade to 200 × to 2 mm, usually tightly rolled and curling. Inflorescence 50–140 mm

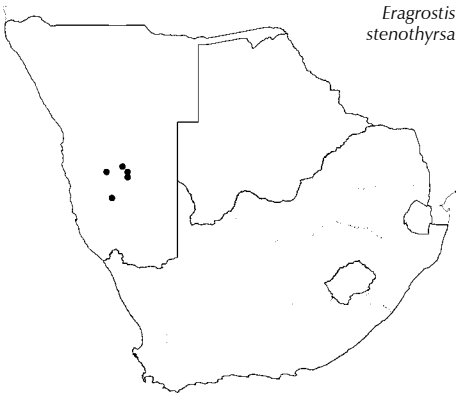

*Eragrostis stapfii*

long, open, delicate, lowest branches whorled. Spikelet to 4 × 0.5–1.0 mm, 2–3(–5) florets; glumes unequal; lower glume to $^{3}/_{4}$ the length of lemma above; upper glume $^{1}/_{3}$–$^{4}/_{5}$ as long as lemma above; rachilla sub-persistent, upper part fragile; lemmas and/or paleas breaking up from the base upwards; lemma 1.7–2.0 mm long, pale yellowish grey-green, back rounded and keel obscure at base or lightly keeled; palea margins almost touching along entire length, overlapping at apex, keels an obscure line, smooth or scaberulous; anthers 3, 0.7–1.0 mm long.

[Resembles *E. micrantha*, which is a weak perennial with lemmas strongly keeled; and *E. habrantha*, which has ovate spikelets.]

*Flowering*: November to April. *Ecology*: Shallow sand or coarse sandy soils; sometimes in wet disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Zambia, Zimbabwe and Angola. N, B, LIM, NW, G, M, FS.

Illustration: Chippindall: 152, fig. 119 (1955).
Anatomy vouchers: *Ellis 493, 1352 & Smook 2085*.
Voucher: *Giess 14219, Pole Evans 3141*.

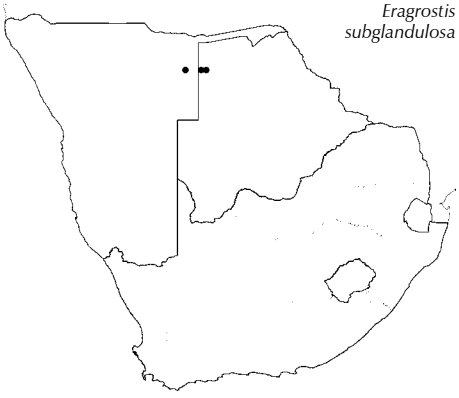

*Eragrostis stenothyrsa*

**Eragrostis stenothyrsa** Pilg., in *Botanischer Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 51: 421 (1914). Type: Namibia, Hoachanas, *Dinter 1966*.

Tufted perennial to 500 mm high; leaves in a dense basal tuft; basal sheaths densely tomentose woolly, hairs medium length. Leaf blade to 100 × to 2 mm. Inflorescence 50–150 mm long, contracted, branches closely adpressed to main axis. Spikelet 4–8 × 0.8–1.5(1.7) mm, lanceolate to narrowly ovate, yellowish, often flushed purple; rachilla persistent; lemmas and/or paleas breaking up from the base upwards; lemmas on same side of the rachilla overlapping lemma above by $^{2}/_{3}$ or more; glumes chartaceous; lemma 1.6–1.8 mm long, obtuse to subacute, lightly keeled, lateral nerves hardly raised or distinct, not reaching margins; palea truncate, margins wide apart, keels a narrow line less than 0.1 mm wide, scaberulous; anthers 3, 1.3 mm long.

*Flowering*: March to April. *Ecology*: Moist areas around pans. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. N.

Voucher: *Volk 12473*.


*Eragrostis subglandulosa*

**Eragrostis subglandulosa** Cope, in *Kew Bulletin* 53: 151 (1998). Types: Botswana, Qangwa River, near Qangwa village, *Smith 3618* (K, holo.).

Tufted annual up to 400 mm high; culm nodes without glands below. Leaf blade 35–110 × 0.6–0.8 mm, setaceous, glabrous, without glands. Inflorescence open, ovate, lowest branches not whorled; axils glabrous; crateriform glands present (may be obscure) on branches and pedicels. Spikelet 4.0–7.5 × ± 1 mm; rachilla tough but becoming fragile; florets 5–8; glumes unequal, keeled; lower glume reaching from $^{2}/_{3}$–$^{3}/_{4}$ way up lemma above; upper glume $^{1}/_{4}$ way up lemma above; lemma 1.6–1.9 mm long, keeled, lateral nerves indistinct, apex obtuse; palea margins touching to overlapping entire length, usually falling with or soon after lemma; keels thin, wingless; anthers 1.0–1.2 mm long; caryopsis elliptic.

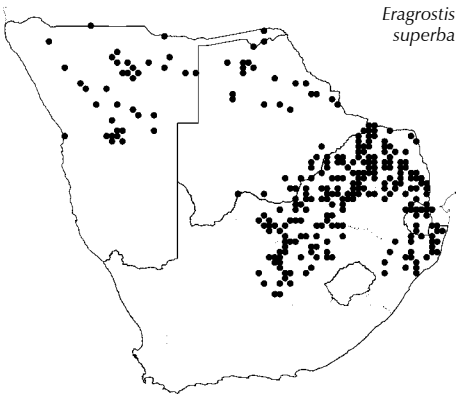
[Similar to *E. homomalla* with anthers 0.2 to 0.3 mm long and lemma 1.0–1.5 mm long.]

*Flowering*: March to April. *Ecology*: In limestone areas; seasonally flooded pans and watercourses. *Distribution*: N, B.

Illustration: Cope: 101, tab. 34, B (1999).
Voucher: *Hines 403, Smith 3470*.

**Eragrostis superba** Peyr., in *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche* Classe 38: 584 (1860). Type: Angola, Benguela, *Wawra 244* (W, holo.).

SAWTOOTH LOVE GRASS, HEART-SEED LOVE GRASS, BOSLUISGRAS, WEERLUIS ERAGROSTIS


*Eragrostis superba*

Densely tufted perennial to 1 000 mm high; culms often geniculate. Leaf blade to 400 × 3–12 mm. Inflorescence branches and pedicels stout; lowest branches not whorled; axils glabrous. Spikelet 6–16 × 3–10 mm, strongly laterally flattened, sides jagged, disarticulating below glumes at maturity, falling as an entire unit; glumes lanceolate in side view; lemma narrowly ovate in profile, lateral nerves distinct, keel winged and scaberulous; palea keels thickened, broadly winged, entire, minutely ciliolate, projecting laterally from lemma; anthers 3, 1.5–2.5 mm long; caryopsis elliptic.

[This species and the annual *E. pilgeriana* are the only *Eragrostis* species in the FSA region in which spikelets disarticulate below glumes at maturity and fall as entire units.]

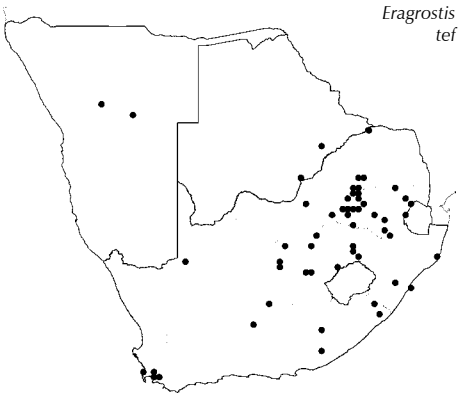
*Flowering*: August to May. *Ecology*: Sandy and stony soils; in disturbed places or drainage areas. *Frequency in southern Africa*: Widely common. *Distribution*: Northwards through East Africa to Sudan. Naturalised in North America and Australia. N, B, S, LIM, NW, G, M, FS, KZN, NC. *Economics*: Fairly palatable and readily grazed; drought resistant; used as hay; as erosion control by reseeding denuded areas

Illustrations: Chippindall: 170, fig. 141 (1955); Müller: 211, (2007).
Anatomy vouchers: *Ellis 96, 112, 339, 1350, 1553, 2886*.
Voucher: *Wederman & Oberdieck 2773, Kinges 1426*.

***Eragrostis tef** (Zuccagni) Trotter, in *Bullettino della Società botanica italiana* 1918: 62 (1918). Type: cult. in Florence from seed collected in Ethiopia.

*E. abyssinica* (Jacq.) Link, in *Hortus regius botanicus berolinensis* 1: 192 (1827). Type: not specified.

TEFF

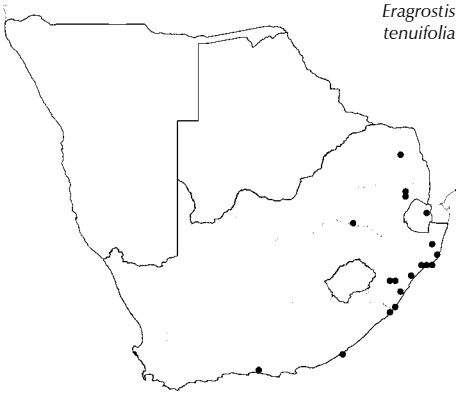

*Eragrostis tef*

Loosely tufted annual to 600 mm high, erect. Leaf blade to 300 × to 4 mm. Inflorescence open or contracted; branches usually more than 40 mm long, flexible, slender; lowest branches whorled; pedicels slender, flexuous. Spikelet 5.5–9.0 × 1.5–2.0 mm; rachilla persistent, tardily deciduous; lemmas and paleas remaining intact for a time; glumes unequal; lower glume reaching from $^1/_2$ to longer up lemma above; upper glume $^1/_2$–$^2/_3$ the length of lemma above; lemma 2.0–2.7 mm long, lateral nerves distinct; apex acute to suba-

cute, membranous; palea keels scaberulous; anthers 3, 0.3–0.6 mm long; caryopsis oblong, turgid.

*Flowering*: November to May and July and September. *Ecology*: Naturalised or as an escape from cultivation, grows in weedy places, along roadsides. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Naturalised from Ethiopia. Introduced as grain or hay and become naturalised in many tropical countries. N, B, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: As a grain for food and drink, and is a staple cereal crop in Ethiopia; planted as hay; used in erosion control, and as rehabilitation of road reserves.

Anatomy vouchers: *Loxton & Ellis 961*; *Ellis 1836, 3336, 3507 & 3885*.
Voucher: *Smook 5423*.



*Eragrostis tenuifolia*

**Eragrostis tenuifolia** (A.Rich.) Steud., in *Synopsis plantarum glumacearum* 1: 268 (1854). Type: Ethiopia, Adwa, *Schimper 92* (P, holo.).

Loosely tufted weak perennial or annual to 400 mm high; base strongly compressed; basal sheaths glabrous; culm without glands below nodes. Leaf blade 40–300 × 1–3 mm; margins smooth, with or without small sunken glands. Inflorescence open; lowest branches not whorled, axils glabrous or hairy; pedicels slender, annular gland present or absent. Spikelet 4–16 × 1–3 mm, linear, outline coarsely serrate; rachilla persistent; lemmas and/or paleas breaking up from the base upwards; glumes unequal, lanceolate in side view, apex acute; lower glume usually reaching up to just above base of lemma above, never up to middle; upper glume usually barely reaching to just covering base to rarely reaching the middle of lemma above; lemmas on same side of rachilla distinctly overlapping lemma above; lowest lemma 1.7–2.5 mm long, narrowly ovate in side view, acute to narrowly obtuse, lateral nerves not distinct, except sometimes near base; palea keels scaberulous, margins touching to overlapping entire length; anthers 3, 0.4–1.0 mm long; caryopsis oblong, strongly laterally flattened.

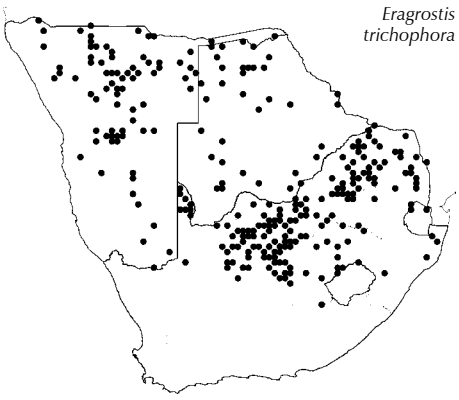
[Allied to *E. plana*, which has an identical caryopsis but is a strong perennial with glands on the lateral nerves of the lemma.]

*Flowering*: January to April. *Ecology*: On sandy soils, gravels, clays and loams; usually areas of high moisture, also in disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards and throughout tropical Africa, Madagascar, India, New Guinea, Australia and South America. S, LIM, M, KZN, EC. *Economics*: Weed.

Illustration: Cope: 83, tab. 30 (1999).
Anatomy voucher: *Ellis 4424*.
Voucher: *Acocks 23487, Smook 1857*.

***Eragrostis thollonii** Franch., in *Bulletin de la Société d'Histoire Naturelle d'Autun* 8: 383 (1895). Type: Congo (Brazzaville).

Densely tufted perennial similar to *E. cimicina* but with broadly winged palea keels. Occurs on Kalahari sands in open woodland. Distribution is DRC, Congo (Brazzaville), Zambia and Angola and possibly in Namibia.


*Eragrostis trichophora*

**Eragrostis trichophora** Coss. & Durieu, in *Bulletin de la Société botanique de France* 2: 311 (1855, publ. 1856). Type: Algeria, *Durieu de Maisonneuve* (P, holo.).

*E. atherstonei* Stapf, in *Flora capensis* 7: 607 (1900). Type: South Africa, Mpumalanga, near Lydenburg, *Atherstone*.

*E. henrardii* Jansen, in *Blumea*, supplement 3: 42 (1946). Type: Namibia, Okahandja, *Dinter 2572*.

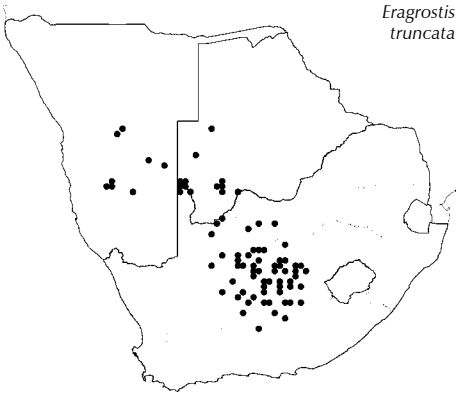
HAIRY LOVE GRASS, BLOUSAADGRAS

Slender, wiry perennial, to 600 mm high; tufted, erect to geniculate, rooting at nodes; stoloniferous; basal sheaths glabrous or hairy, papery, nerves rounded, well apart at base; round glandular dots usually flushed purple occur below leaf blade collar or around culm nodes; culms usually branched above, nodes glabrous. Leaf blade to 150 × to 4 mm, usually rolled. Inflorescence open, spreading; lowest branches whorled; long hairs in axils or glabrous; branches purplish-yellow, large prickles present. Spikelet 3.5–5.0 × 1.0–1.2 mm, oblong to narrowly oblong, 3–5 florets, rachilla sub-persistent, fragile in upper part; lemmas and/or paleas breaking up from base upwards; glumes subequal, lanceolate, $^4/_5$ as long to longer than lemma above, lower glume wide and covering most of lemma above; lemma 1.5–2.0 mm long, pale greenish-grey to dark grey, apex usually membranous, whitish, lateral nerves indistinct; palea margins apart for most of its length, touching at apex, keels a narrow line, smooth to scaberulous; anthers 3, 0.8–1.0 mm long; caryopsis elliptic.

[Similar to *E. cylindriflora*, which is annual, and forms of *E. lehmanniana*, in which the lowest inflorescence branches are 1–2 but not whorled.]

*Flowering*: November to May. *Ecology*: On sand and loam, often on shallow soils and dolomite; in moist places, road verges and other disturbed or overgrazed areas. Can form dense stands and acts as precursor for climax grasses. *Frequency in southern Africa*: Common. *Distribution*: Northwards to Zambia, also North Africa. Introduced and now invasive in Australia. N, B, S, LIM, NW, G, M, FS, KZN, NC. *Economics*: Only utilised if nothing else available and has very little leaf matter but well grazed by goats.

Illustration: Chippindall: 149, fig. 116 (1955); Müller: 213, fig. 85 (2007).
Anatomy vouchers: *Botha & Panagos 46*; *Loxton & Ellis 945*; *Ellis 405, 1354, 1760, 2906, 3331* & *3581*.
Voucher: *Smook 6243, De Winter & Giess 6823*.


*Eragrostis truncata*

**Eragrostis truncata** Hack., in *Botanischer Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 11: 405 (1889). Type: South Africa, ?Northern Cape, in lapidosis ad fontem Kachum (Flagfontein, near Kuruman), *Marloth 1023*.

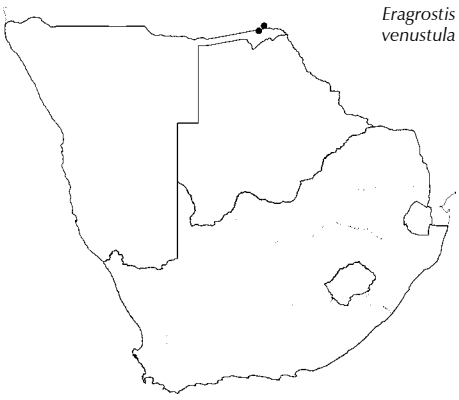
Mat-forming tufted perennial to 400 mm tall; forms raised cushions and characteristic rings; rhizome short, branched; basal sheaths densely, long woolly hairy; culm eglandular. Leaf blade 10–40 mm (lower), upper blade to 100 mm long × 1.0–1.5 mm; glaucous. Inflorescence open to dense; lowest branches not whorled; axils glabrous; pedicels short, stout; spikelets densely crowded. Spikelet 5–7 × 2.0–3.5 mm, completely pallid to flushed dark purple; rachilla very fragile, breaking up from apex downwards, florets shed with rachilla internode; glumes obtuse to subacute, reaching to about middle of lemma above; lemma truncate, lateral nerves distinct; palea wingless, keel scaberulous, margins wide apart at base, flange be-

tween keels and margins width narrowing upwards; anthers 3, 0.8–1.2 mm long; caryopsis elliptic to oblong-elliptic.

[Barely distinguishable from *E. bergiana*, and an in-depth study is needed for these two taxa.]

*Flowering*: October to May. *Ecology*: Mainly in limestone soils; especially in and around pans. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, B, NW, FS, NC, WC, EC. *Economics*: Palatable grass, grazed by game.

Illustration: Chippindall: 176, fig. 148 (1955); Müller 135 (2007).
Anatomy vouchers: *Smook & Gibbs Russell 2411*; *Ellis 855, 3606, 3620* & *Smook 2794*.
Voucher: *Ellis 2630, Smook 3487*.


*Eragrostis venustula*

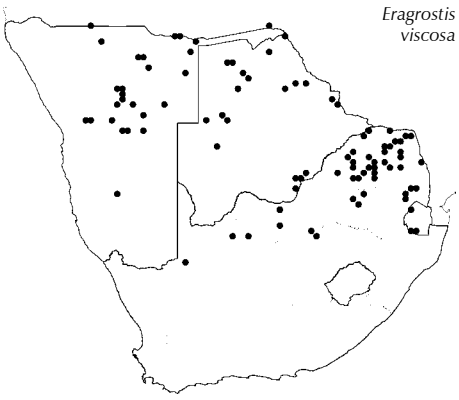
**Eragrostis venustula** Launert ex Cope, in *Kew Bulletin* 53: 160 (1998). Type: Zambia, Barotseland, Mongu, *Robinson 6821* (K, holo.).

Loosely tufted annual up to 400 mm high; sheath midrib with glandular pits; culm nodes with or without elongated glands below; internodes with or without glands. Leaf blade 20–80 × 1.0–3.5 mm, flat. Inflorescence open; lowest branches not whorled; axils glabrous; pedicels with a glandular swelling. Spikelet 2.0–3.5 × 1.2–1.8 mm, breaking up from below upwards; rachilla persistent, sometimes fragile above; glumes unequal; lemma lateral nerves prominent, hairy on either side of lateral nerves, hairs bulbous-based, 0.3–0.6 mm long; palea persistent, keels thin, wingless; anthers 0.15–0.30(0.50) mm long; caryopsis subrotund, with sides ± flattened.

[Previously specimens were identified as *E. vacillans* from Angola, but this has anthers ± 1 mm long, glumes and lemmas longer and spikelets wider.]

*Flowering*: January to April. *Ecology*: Kalahari sand; in open grassland or in forest shade. *Distribution*: Zambia, Zimbabwe and Angola. N.

Voucher: *De Winter 9124*.


*Eragrostis viscosa*

**Eragrostis viscosa** (Retz.) Trin., in *Mémoires de l'Académie Impériale des sciences de saint Petersbourg, ser. 6, Sciences & Math*. 1: 397 (1830). Type: India.

STICKY LOVE GRASS

Tufted annual to 500 mm high, erect, geniculate; sticky glands present all over plant, especially just below nodes (noticeable due to particles adhering to them); strong smelling when fresh. Leaf blade 40–100 × 2–5 mm. Inflorescence dense, branches spreading; lowest branches not in whorls; sticky glandular patches present; spikelets distant. Spikelet 2–3 × 1.0–1.5 mm; rachilla fragile, breaking up from apex downwards; glumes subequal, keels glandular; lemma keel glabrous, lateral nerves distinct; palea keel hairs 0.4–0.5 mm long, hairs bulbous-based, exserted from lemma; anthers 3, 0.1–0.3 mm long; caryopsis elliptic.

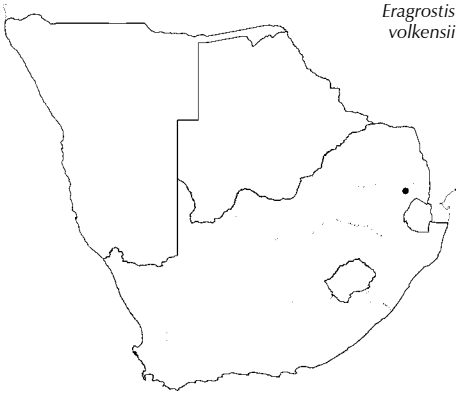
[The boundary between *E. viscosa* and *E. amabilis*, which has the inflorescences eglandular or with non-sticky glands, is not always sharp and intermediates are found. Similar to *E. arenicola*, which has

the inflorescence contracted; and *E. ciliaris*, which has lemma keel with long hairs.]

*Flowering*: February to August. *Ecology*: Sandy or shallow soils; disturbed and open places. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards through East Africa to Nigeria; to India, Thailand and Philippines, with a few records from tropical America. N, B, S, LIM, NW, G, M, FS, NC. *Economics*: Weed; indicator of poor soil condition and overgrazing. Unpalatable as it is hard and the strong smell may also deter the animals.

Illustration: Chippindall: 181, fig. 155 (1955); Müller: 215 (2007).
Anatomy vouchers: *Ellis 530, 1557, 2889* & *3683*.
Voucher: *Muller 1298*.

**Eragrostis volkensii** Pilg., in *Botanischer Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 43: 95 (1909). Type: Tanzania, Kilimanjaro, Marengo, *Volkens 713*.

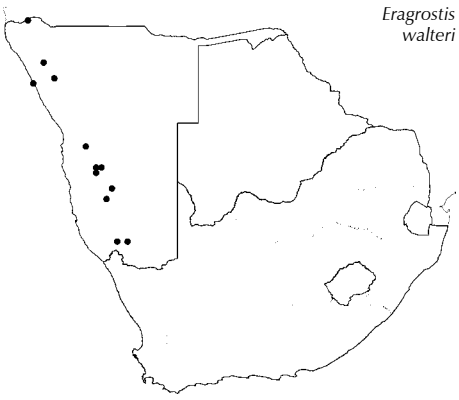

*Eragrostis volkensii*

Densely tufted perennial 400–1 200 mm high; leaves cauline; culms straggling, matted, wiry; often procumbent, eglandular. Leaf blade 20–80 × 1–5 mm, reflexed; eglandular. Inflorescence open, sparsely branched; primary branches stiffly spreading; lowest branches not whorled; pedicels short, stout. Spikelet 3.5–7.0 × 1.5–4.0 mm, olive-green, ovate; rachilla persistent; lemmas and/or paleas breaking up from base upwards; glumes subequal, reaching to about $^1/_2$ up lemma above, ovate inside view, apex obtuse; lemma 1.3–2.5 mm long, broadly ovate in side view, apex obtuse, lateral nerves indistinct; palea keels entire, conspicuously winged, scaberulous, falling with or soon after lemma, margins wide apart, ± same width between keels and margins; anthers 3, 1 mm long; caryopsis narrowly ovate.

*Flowering*: October to January. *Ecology*: Damp soils; in mountainous areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to East Africa, Cameroon and DRC. M.

Voucher: *De Winter & Codd 216, Kluge 439*.

**Eragrostis walteri** Pilg., in *Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem* 15: 452 (1940). Type: Namibia, Kleiner Naukluftrivier, *Walter 458*.


*Eragrostis walteri*

Tufted perennial to 1 140 mm high (or long); occasionally hydrophyte; sometimes rhizomes present; leaves usually cauline; culms erect to geniculate, semi-decumbent or floating, either straggling, matted and separate and not matted. Leaf blade to 100 × to 4.5 mm, often pungent. Inflorescence narrow, sparsely branched, branches spreading from or adpressed to main axis; pedicels short, stout; spikelets close together. Spikelet to 7 × 1.5–3.0 mm (excluding awns) light green to purple, granular; rachilla sub-persistent, fragile in the upper portion; glumes long acuminate, apex thick, awn-like or awned to 1 mm long; lemma 1.6–2.2 mm long, lanceolate, acute to acuminate, awned, awn 0.2–0.6 mm long; palea keels flat, winged, very broad in lower $^2/_3$, narrowing sharply to apex, excurrent into a soft mucro, margins not touching, anthers 3, 0.6–1.0 mm long; caryopsis elliptic.

*Flowering*: January to December. *Ecology*: In damp, sandy and brackish soils; around seepage areas or stagnant pools or in running water,

especially that of springs and often associated with calcium and carbonate. *Frequency in southern Africa*: Locally common (only in a few specific moist areas). *Distribution*: Endemic. N.

Anatomy vouchers: Ellis (1984) in *South African Journal of Botany* 3,6 (380) reports the first record for the sub-family Chloridoideae of non-Kranz leaf anatomy, which implies it utilises the $C_3$ photosynthetic pathway. *Ellis 4344, 4346, 4350, 4351, 4352, 4756, 4759 & 4773*.
Voucher: *Giess 8104, Müller 1285*.

## **Eriochloa** Kunth

Kunth: 94 (1816); Stent: 258 (1924); Chippindall: 369 (1955); Gibbs Russell: 457 (1981); Clayton & Renvoize: 568 (1982); Clayton & Renvoize: 285 (1986); Clayton: 84 (1989); Gibbs Russell et al.: 164 (1990); Watson & Dallwitz: 393 (1994).

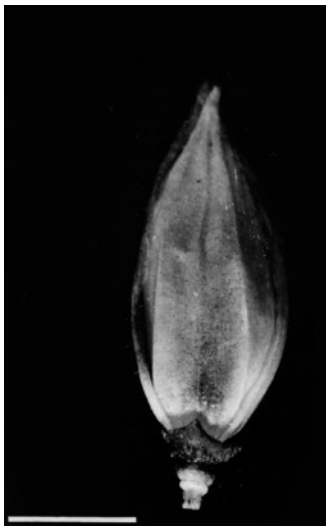


Figure 225.—*Eriochloa meyeriana* subsp. *meyeriana* spikelet (2.5–3.5 mm). Photographer: M. Koekemoer.

Perennial or annual. **Leaf blade** linear, expanded, tapering to a fine apex; *ligule* a reduced fringed membrane or fringe of hairs. **Inflorescence** of few to many spike-like racemes arranged on a central axis, or paniculate; *spikelets* either solitary, in pairs, or in short clusters, supported on a bead-like swelling. **Spikelet** lanceolate to elliptic, dorsiventrally compressed, acute to aristate, falling with the glumes; *glumes* usually unequal, dissimilar; lower glume reduced or apparently absent; upper glume as long as spikelet, ovate-elliptic, 5-nerved, glabrous or hairy, mucronate or usually shortly awned. **Florets** 2; *lower floret* sterile or male; lemma similar in shape and texture to upper glume; palea similar to lemma or reduced, or 0; *upper floret* bisexual; *lemma* firmer than glumes, elliptic with inflexed margins, finely rugose, 5-nerved, glabrous, abruptly mucronate, awned or awnless; *awn* straight, shorter than body of lemma; *palea* elliptic, obtuse with inflexed margins. **Lodicules** 2, broadly cuneate, sometimes somewhat suppressed. **Stamens** 3. **Ovary** glabrous; styles distinct or united at base, plumose. **Caryopsis** oblong-ellipsoid, dorsiventrally compressed, obtuse. **Photosynthetic pathway**: $C_4$. The anatomical organisation is conventional. **Biochemical type**: PCK (5 species); XyMS+. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 9$ (high polyploidy).



Figure 224.—*Eriochloa meyeriana* subsp. *meyeriana*. Artist: F. Lauth.

**Species** 30, tropics; 5 in southern Africa, Namibia, Botswana, Swaziland, North West, Mpumalanga and KwaZulu-Natal.

Species treatment by M.T. Nembudani.

### Quick guide to easily confused genera:

1. Spikelet with a bead-like swelling at the base . . . . . **Eriochloa**
   Spikelet passing smoothly into pedicel without a bead-like swelling, sometimes with a cylindrical stipe . . . . . 2

2. Lower glume turned away from rachis . . . . . **Urochloa**
Lower glume adjacent to rachis . . . . . **Brachiaria**

**Key to species:**

1. Lower glume present (may be minute, 0.5 mm long); upper glume acute, not mucronate or awned . . . . . 2
Lower glume absent; upper glume acuminate, awned . . . . . .3
2. Lower glume a short (up to 0.5 mm long) truncate, in-turned cuff . . . . . **E. meyeriana** subsp. **meyeriana**
Lower glume $^1/_4$–$^1/_2$ spikelet length, acute . . . . . **E. meyeriana** subsp. **grandiglumis**
3(1). Lower palea absent; lower floret sterile . . . . . 4
Lower palea present; lower floret male, rarely sterile . . . . . 5
4. Spikelet 2.0–2.5 mm long (including bead, excluding awn); perennial; inflorescence branches few, adpressed to main axis . . . . . **E. parvispiculata**
Spikelet (2.5–)3.0–4.0 mm long (including bead, excluding awn); annual; inflorescence branches several to many, ascending, not adpressed to main axis . . . . . **E. fatmensis**
5(3). Perennial; spikelet narrowly ovate, 3–4 mm long; upper glume awn to 1 mm long; upper lemma awn 0.3–0.7 mm long; raceme rachis rarely hairy, hairs short . . . . . **E. stapfiana**
Annual; spikelet lanceolate, 3.5–5.0 mm long; upper glume awn 1–3 mm long; upper lemma awn 1–2 mm long; raceme rachis usually hairy, hairs long . . . . . **E. macclounii**

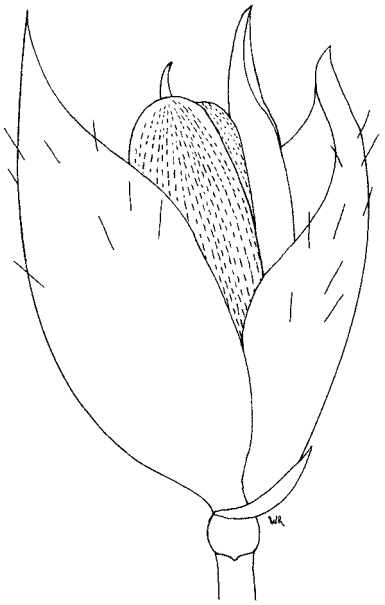
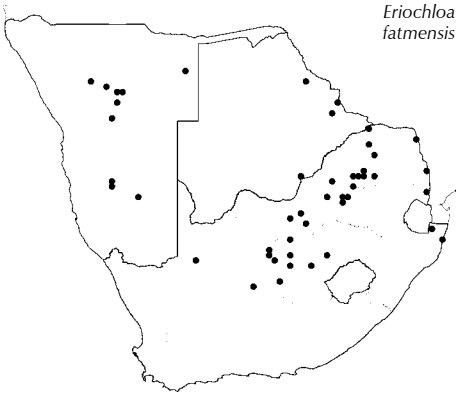


Figure 226.—*Eriochloa meyeriana* subsp. *meyeriana* spikelet (3.6 × 1.8 mm). Artist: W. Roux.

**Eriochloa fatmensis** (Hochst. & Steud.) Clayton, in *Kew Bulletin* 30: 108 (1975). Type: Saudi Arabia.

*E. nubica* (Steud.) Hack. & Stapf ex Thell., in *Vierteljahrsschrift der Naturforschenden Gesellschaftin*, Zürich 52: 435 (1907). Type: Sudan.

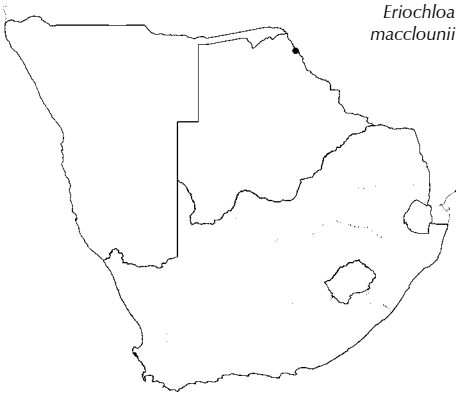


*Eriochloa fatmensis*

Annual 100–1 200 mm high, culms erect or geniculate. Leaf blade 30–300 × 2–10 mm. Inflorescence with several to many spike-like, ascending, one-sided racemes, not adpressed to main axis; rachis puberulous, occasionally pilose; spikelets paired. Spikelet (2.5–)3.0–5.0 mm long, sparsely pubescent; lower glume absent; upper glume with a short awn 0.5–4.0 mm long; lower floret sterile, palea absent; upper lemma awn 0.3–1.0 mm long; anther 0.5–1.0 mm long.

*Flowering*: January to April. *Ecology*: Usually on black clay; wet places, also by ephemeral water on other soils. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards throughout tropical Africa, Arabia and India. N, B, LIM, NW, G, M, FS, KZN, NC. *Economics*: Weed.

Illustration: Clayton: 87, tab. 21 (1989).
Anatomy vouchers: *Ellis 774, 3617, 3618, 3862, 3908* & *Smook 3512*.
Voucher: *Merxmüller & Giess 1560*.



*Eriochloa macclounii*

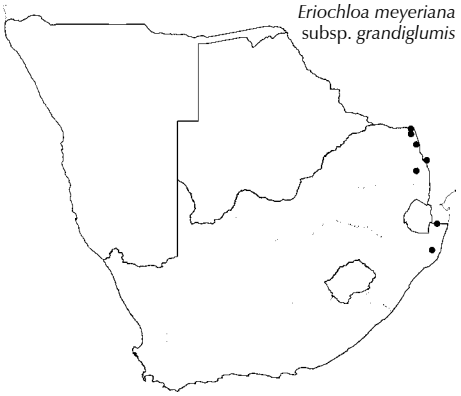
**Eriochloa macclounii** Stapf, in *Flora tropical Africa* 9: 501 (1919). Type: Malawi, Mwanemba, *McClounie 8* (K, holo.).

Tufted annual to 1 200 mm high. Leaf blade 80–600 × 3–12 mm. Inflorescence branches several to many, ascending; raceme rachis with long hairs; spikelets paired. Spikelet 3.5–5.0 mm long, pubescent to pilose; lower glume absent; upper glume awn 1–3 mm long; lower floret male, palea present, almost as long as lemma; upper lemma awn 1–2 mm long; anther 1.5–2.5 mm long.

[Similar to the more robust perennial *E. stapfiana*.]

*Flowering*: April. *Ecology*: Floodplain grassland. *Frequency in southern Africa*: Rare. *Distribution*: Zambia; Zimbabwe, Mozambique, Malawi and Tanzania. B.

Voucher: *P.A. Smith 4299*.


*Eriochloa meyeriana* subsp. *grandiglumis*

**Eriochloa meyeriana** (Nees) Pilg. subsp. **grandiglumis** (Stent & J.M.Rattray) Gibbs Russ., in *Bothalia* 13: 435 (1981). Type: Zimbabwe, Hunyani, *Eyles 3138* (SRGH, holo.; PRE, iso.).

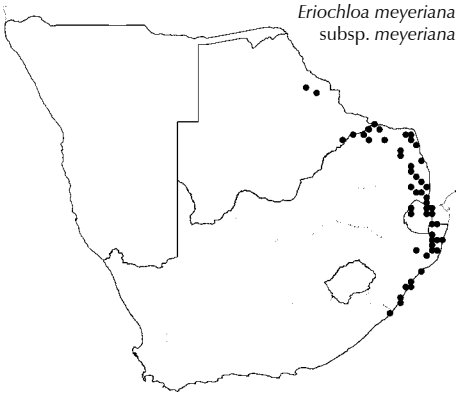
*Panicum meyerianum* Nees var. *grandegluma* Stent & J.M.Rattray, in *Proceedings of the Rhodesia Scientific Association* 32: 28 (1933).

Robust perennial 300–1 500 mm high; sometimes almost woody; culms geniculate, often rambling, rooting at lower nodes. Leaf blade 50–250 × 3–15 mm. Inflorescence a panicle, bearing spikelets on branchlets adpressed to the primary branches, rachis scabrid; spikelets paired or more often densely clustered on short secondary branchlets. Spikelet 2.5–3.5 mm long, glabrous or occasionally sparsely pubescent; lower glume up to 2 mm long, extending $^1/_4$–$^1/_2$ the spikelet length, acute; upper glume acute, not mucronate or awned; lower floret male, palea present, almost as long as lemma; upper lemma obscurely mucronate; anther 1.4–1.7 mm long.

[Intergrades with subsp. *meyeriana*, which has a shorter lower glume (up to 0.5 mm long).]

*Flowering*: October to June. *Ecology*: Lowveld river banks and floodplains. *Frequency in southern Africa*: Rare. *Distribution*: Zimbabwe. LIM, KZN.

Voucher: *Codd 5421*.


*Eriochloa meyeriana* subsp. *meyeriana*

**Eriochloa meyeriana** (Nees) Pilg. subsp. **meyeriana**, in Engl. & Prantl., *Pfanzenfamilien*, ed. 2, 14e: 56 (1940). Type: South Africa, KwaZulu-Natal, Omsamculo, *Drège s.n.*

*E. borumensis* sensu Hack., non Stapf, in *Bulletin de l'Herbier Boissier* Sér. 2, 1: 765 (1901).

*Panicum meyerianum* Nees var. *meyerianum*, in *Florae Africae australioris*: 32 (1841).

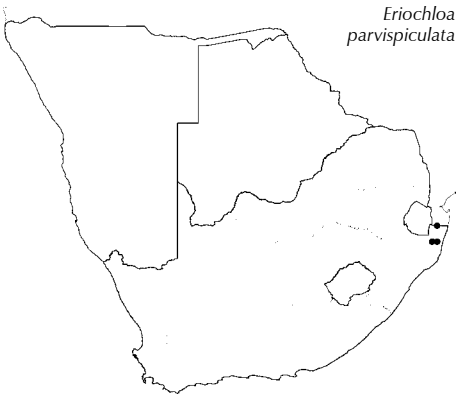
Robust perennial 300–1 500 mm high; sometimes almost woody; culms geniculate, often rambling, rooting at lower nodes. Leaf blade 50–250 × 3–15 mm. Inflorescence a panicle, bearing spikelets on branchlets adpressed to the primary branches, rachis scabrid; spikelets paired or more often densely clustered on short secondary branchlets. Spikelet 2.5–3.5 mm long, glabrous or occasionally sparsely pubescent; lower glume produced above the beadlike swelling as a short, truncate in-turned cuff up to 0.5 mm long; upper glume acute, not mucronate or awned; lower floret male, palea present, almost as long as lemma; upper lemma obscurely mucronate; anther 1.0–1.5 mm long.

[Intergrades with both subsp. *grandiglumis* and *E. stapfiana*.]

*Flowering*: October to May. *Ecology*: On sandy or clay soils; river banks and wet places. *Frequency in southern Africa*: Locally common. *Distribution*: Tropical Africa. B, S, LIM, M, KZN.

Anatomy vouchers: *Ellis 500, 536, 1882, 1922, 3460, 3784 & 5453*.
Voucher: *De Winter & Codd 544*.

**Eriochloa parvispiculata** C.E.Hubb., in *Kew Bulletin of Miscellaneous Information* 1934: 111 (1934). Type: Zanzibar, Mwera, *Vaughan 1607* (K, holo.).


*Eriochloa parvispiculata*

Tufted perennial 300–1 200 mm high. Leaf blade 80–300 × 3–10 mm. Inflorescence branches few, adpressed to main axis, rachis puberulous; spikelets densely imbricate. Spikelet 2.0–2.5 mm long, sparsely pubescent; lower glume absent; upper glume mucronate or with an awn point up to 0.5 mm long; lower floret sterile, palea absent; upper lemma awn 0.1–0.5 mm long; anther 0.5–1.0 mm long.

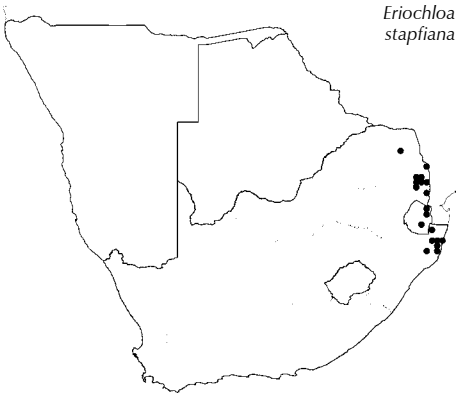
[Intergrades with *E. stapfiana*, which has a longer spikelet (3–4 mm long); some specimens are difficult to distinguish from the annual *E. fatmensis* with upper glume awn 0.5–4.0 mm long.]

*Flowering*: January to April. *Ecology*: River banks and floodplain pans. *Frequency in southern Africa*: Rare. *Distribution*: Tropical East Africa. KZN.

Anatomy vouchers: *Ellis 3554, 4514* & *4524*.
Voucher: *Liebenberg 4390*.

**Eriochloa stapfiana** Clayton, in *Kew Bulletin* 30: 109 (1975). Type: Mozambique, Messalo [Msalu] R., *Allen 122* (K, holo.).

*E. borumensis* sensu Stapf, non Hack., in *Flora tropical Africa* 9: 500 (1919).


*Eriochloa stapfiana*

Robust, tufted perennial 600–1 700 mm high. Leaf blade 40–200 × 3–8 mm. Inflorescence branches several to many, ascending; raceme rachis usually glabrous, sometimes with short hairs; spikelets unequally paired or on short adpressed side branches. Spikelet 3–4 mm long, densely pubescent; lower glume absent; upper glume awn up to 1 mm long; lower floret male, palea almost as long as lemma; upper lemma awn 0.3–0.7 mm long; anther 1.0–1.5 mm long.

[Intergrades with *E. meyeriana*, which has the upper lemma obscurely mucronate.]

*Flowering*: October to May. *Ecology*: On heavy soils; river banks and wet places. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to East Africa. S, LIM, M, KZN.

Anatomy vouchers: *Ellis 5242, 5248* & *Smook 1896*.
Voucher: *De Winter & Codd 552*.

## **Eriochrysis** P.Beauv.

Palisot de Beauvois: 8 (1812); Stapf: 321 (1898) under *Saccharum* L.; Stapf: 91 (1917); Chippindall: 475 (1955); Clayton & Renvoize: 706 (1982); Clayton & Renvoize: 331 (1986); Gibbs Russell et al.: 165 (1990); Watson & Dallwitz: 395 (1994); Clayton: 4 (2002).

Perennial, tufted. **Leaf blade** narrow, usually expanded; *ligule* a long-fringed membrane or fringe of hairs. **Inflorescence** contracted, fulvous or rufous, of several short, spike-like racemes ± adpressed along the elongated central axis; rachis fragile, internodes and pedicels linear to clavate; *spikelets* paired, in long–short combinations: one sessile, the other pedicelled, pedicels free. **Sessile spikelet** elliptic, deciduous with contiguous joint of rachis and pedicel, dorsiventrally compressed, falling with the glumes; *glumes* ± equal, hairy, dissimi-

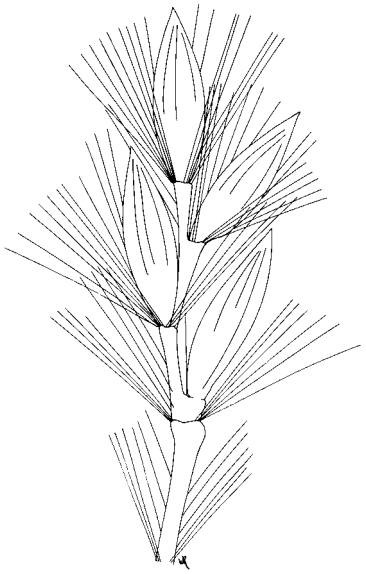


Figure 227.—*Eriochrysis pallida*. Portion of raceme showing spikelet pairs (sessile and pedicelled), internodes and pedicels (14 × 4 mm). Artist: W. Roux.




Figure 228.—*Eriochrysis pallida*. Artist: C. Letty.



Figure 229.—*Eriochrysis pallida* spikelet pair (3.5–5.5 mm). Photographer: M. Koekemoer.

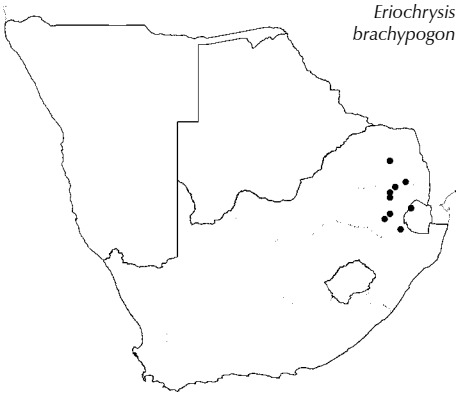
lar; lower glume indurated, broadly rounded on back, ± 2-keeled with inflexed margins, nerves generally indistinct; upper glume thinner, not 2-keeled, 1–3-nerved. **Florets** 2; *lower floret* reduced to a hyaline, lanceolate lemma, awnless; *upper floret* bisexual; *lemma* less firm than glumes, hyaline, muticous or mucronate; *callus* short, truncate, hairy; hairs usually tawny, half as long as to longer than spikelet; *palea* small, hyaline, nerveless. **Lodicules** 2, cuneate. **Stamens** 3. **Ovary** glabrous; styles 2, plumose. **Caryopsis** ellipsoid; hilum short; embryo large. **Pedicelled spikelet** slightly smaller than sessile one, deciduous with pedicel; female; palea small. **Photosynthetic pathway**: $C_4$; XyMS- but the PCR sheath cell walls very thick and pitted, resembling a mestome sheath; PCR cell chloroplasts peripheral. **Cytology**: $x = 10$.

**Species** 7, Africa and tropical America, 1 species in India; 2 in southern Africa, northern Botswana, Swaziland, Gauteng, Limpopo, Mpumalanga, KwaZulu-Natal and Northern Cape.

Species treatment by M.T. Nembudani.

**Key to species:**

Callus hairs longer than spikelet; sessile spikelet 3.5–5.0 mm long . . . . . **E. pallida**
Callus hairs shorter than spikelet; sessile spikelet 5–6 mm long . . . . . **E. brachypogon**




**Eriochrysis brachypogon** (Stapf) Stapf, in *Flora tropical Africa* 9: 93 (1917). Type: Mali, Tabacoroni, *Chevalier 716*; Nigeria, Nupe, *Barter 1351*; Central African Republic, Télé, *Chevalier 8251* (syntypes).

*E. brachypogon* (Stapf) Stapf subsp. *australis* J.G.Anders., in *Bothalia* 8: 170 (1964). Type: Swaziland, Forbes Reef, *Compton 30488*.

Tufted perennial 600–900 mm high. Leaf blade 70–300 × 1–3 mm. Inflorescence 45–120 mm long. Sessile spikelet 5–6 mm long; callus hairs golden, shorter than spikelet; anther 2.5–3.0 mm long.

*Flowering*: November to March. *Ecology*: Vleis and river banks. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to East Africa. S, LIM, M.

Illustration: Clayton et al.: 708, fig. 162 (1982).
Anatomy voucher: *Ellis 3536*.
Voucher: *Compton 30488*.

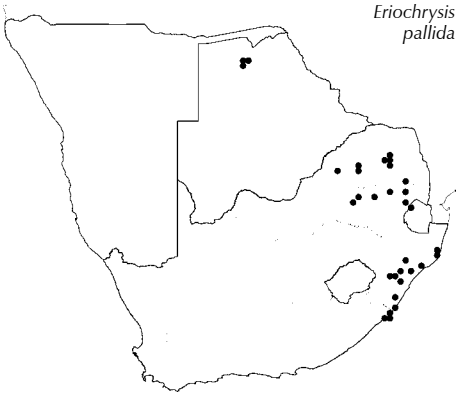
**Eriochrysis pallida** Munro, in Harvey, *The genera of South African plants*, ed. 2: 440 (1868). Types: South Africa, Gauteng, Magaliesburg, *Burke 75* & *Zeyher 1793* (syntypes).

Tufted perennial 400–900 mm high. Leaf blade 100–240 × 1–4 mm. Inflorescence 45–80 mm long; racemes 10–25 mm long.

Sessile spikelet 3.5–5.0 mm long; callus hairs golden, longer than the spikelet; anther 1.5–2.0 mm long.

*Flowering*: July to June. *Ecology*: Vleis and river banks. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to Zambia, Zimbabwe, Malawi, Angola and Tanzania. B, S, LIM, G, M, KZN, EC.

Anatomy vouchers: *Ellis 3393, 3793, 3794, 4318, 4475, 5198, 6018* & *6172*.
Voucher: *Killick 251*.




## **Eulalia** Kunth

Kunth: 160 (1829); Stapf: 324 (1898) under *Pollinia* Trin.; Chippindall: 485 (1955); Clayton & Renvoize: 711 (1982); Clayton & Renvoize: 333 (1986); Gibbs Russell et al.: 166 (1990); Watson & Dallwitz: 401 (1994); Clayton: 12 (2002).

Perennial or annual, tufted, erect, often decumbent; rhizomatous. **Leaf blade** linear, gradually passing into sheath, convolute at first, becoming expanded; *ligule* an unfringed to a fringed membrane. **Inflorescence** of 2–many, terminal, spike-like, silky hairy racemes, digitate, subdigitate or scattered on a central axis; dense with spikelets closely packed; internodes and pedicels linear, slender; *spikelets* similar, in pairs, in long–short combinations: one sessile, the other pedicelled, pedicels free and hairy. **Sessile and pedicelled spikelets** alike, dorsiventrally compressed, falling with glumes; *glumes* ± equal, dissimilar, hairy, usually awnless; lower glume concave to ± flattened, with inflexed margins, hairy or glabrous, nerveless or faintly 2–3-nerved, 2-keeled; upper glume often narrower, keeled, acute. **Florets** 2; *lower floret* reduced to a lemma, sometimes a small scale or 0, awnless; *upper floret* bisexual; *lemma* less firm than glumes, hyaline, linear to cordate, 2-lobed, awnless or awned from between lobes; *awn* geniculate, twisted, usually glabrous; *callus* obtuse, hairy; *palea* small, hyaline or 0. **Lodicules** 2, fleshy. **Stamens** 3. **Ovary** glabrous; styles 2, plumose. **Caryopsis** oblong; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; XyMS-. PCR cell chloroplasts with reduced grana; centrifugal/peripheral. **Cytology**: $x = 5, 10$ (polyploidy).



Figure 230.—*Eulalia villosa* spikelet pair (5–7 mm). Photographer: M. Koekemoer.




Figure 231.—*Eulalia villosa*. A, portion of raceme showing internodes, pedicels and pedicelled spikelet pair (32.0 × 3.8 mm); B, sessile and pedicelled spikelets (25.0 × 2.1 mm). Artist: W. Roux.

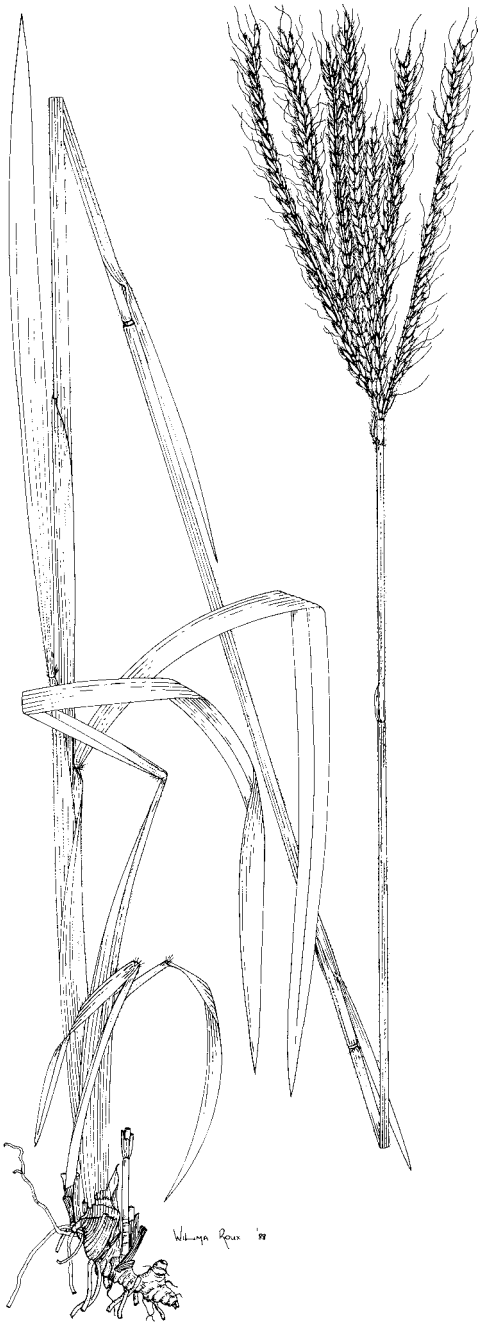


Figure 232.—*Eulalia villosa*. Artist: W. Roux.

**Species** ± 30, tropical and subtropical regions of Africa, Asia and Australia; 2 in southern Africa, Swaziland, Mpumalanga to KwaZulu-Natal and southwards to Eastern Cape.

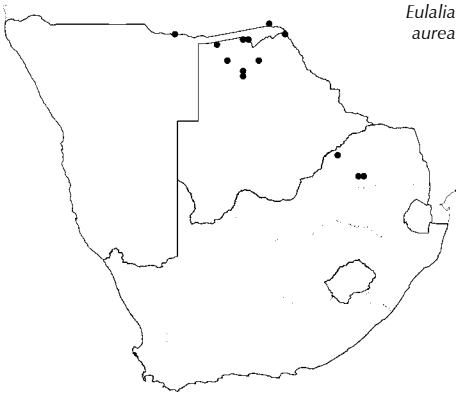
Species treatment by A.C. Mashau.

**Quick guide to easily confused taxa:**

Sessile spikelet lemma awn 15–20 mm long . . . . . **Eulalia villosa**
Sessile spikelet lemma awn 5–10 mm long . . . . . **Ischaemum fasciculatum**

**Key to species:**

Spikelet 5–7 mm long; raceme hairs white; leaf sheath hairy; culms erect . . . . . **E. villosa**
Spikelet 3.5–4.0 mm long; raceme hairs golden-brown; leaf sheath glabrous; culms often decumbent . . . . . **E. aurea**


*Eulalia aurea*

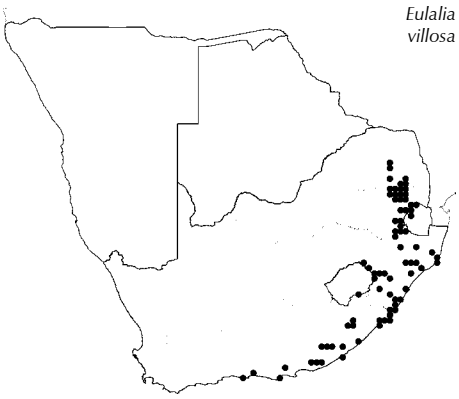
**Eulalia aurea** (Bory) Kunth, in *Révision des graminèes* 1: 359 (1830). Type: Réunion.

*E. geniculata* Stapf, in *Flora of tropical Africa* 9: 101 (1917).

Perennial 1 000 mm high; rhizomes creeping; culm often decumbent. Leaf blade 30–150 × 3–6 mm; sheath glabrous; ligule a fringed membrane. Inflorescence of 2–3(5) racemes, hairs golden-brown. Sessile and pedicellate spikelets alike, 3.5–4.0 mm long, densely hairy, usually 1-flowered; glumes ± equal; lower glume convex on back, keel with long scattered hairs; upper lemma awn 7–12 mm long, awn almost twisted throughout, usually strongly geniculate, hairy; anther 2.5–3.0 mm long.

*Flowering*: December to March. *Ecology*: River banks and floodplains. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to Uganda and Kenya; Reunion and Australia. N, B, LIM.

Illustration: Chippindall: 304, pl. 16 (1955).
Anatomy voucher: *Ellis 3738*.
Voucher: *De Winter & Marais 4484*.


*Eulalia villosa*

**Eulalia villosa** (Thunb.) Nees, in *Florae africanae australioris*: 91 (1841). Type: South Africa, Cape, *Thunberg* (UPS, holo.).

Tufted perennial 300–1 400 mm high; culm erect. Leaf blade 50–250 × 3–8 mm; sheath hairy; ligule a fringed membrane. Inflorescence of (2–)3–5(10) racemes, hairs white. Sessile and pedicellate spikelets alike, 5–7 mm long, 2-flowered; lower glume concave to ± flat on back, only keel conspicuously hairy; upper lemma awn 15–20 mm long; awn geniculate and twisted, glabrous; anther 2.3–3.3 mm long.

*Flowering*: September to May. *Ecology*: Open grassland on hillsides. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards through eastern tropical Africa; and Madagascar to India. S, LIM, M, KZN, WC, EC. *Economic*: An unpalatable grass eaten only early in spring as it soon becomes hard and unacceptable to grazers.

Illustrations: Chippindall: 485, fig. 397 (1955); Clayton et al.: 714, fig. 165 (1982); Clayton: 14, tab. 5 (2002).
Anatomy vouchers: *Ellis 1443, 3270, 5199 & 6171*.
Voucher: *Devenish 1282*.

## **Eustachys** Desv.

Desvaux: 188 (1810); Stapf: 643 (1900); Chippindall: 194 (1955); Launert: 116 (1970a); Renvoize: 335 (1974); Chippindall & Crook: 23 (1976); Clayton & Renvoize: 237 (1986); Gibbs Russell et al.: 167 (1990); Watson & Dallwitz: 404 (1994); Cope: 214 (1999).



Figure 233.—*Eustachys paspaloides* spikelet (1.5–2.5 mm). Photographer: M. Koekemoer.

Tufted perennial; rhizomatous; culms often strongly compressed, sometimes geniculate. **Leaf blade** linear, flat, folded, keeled, usually obtuse; sheaths strongly keeled, flabellate; *ligule* a fringe of hairs. **Inflorescence** of 2–many, 1-sided, digitate spike-like racemes; *spikelets* densely packed in two rows on rachis, solitary, sessile. **Spikelet** obovate, dark to golden brown, laterally compressed, disarticulating above glumes; *glumes* unequal, dissimilar, shorter than spikelet, ± boat-shaped, membranous, glabrous; lower glume obliquely ovate, obtuse, awnless; upper glume elliptic, obtuse to bilobed, keeled, awned from below apex with awn up to half as long as body of glume. **Florets** 2 or 3; *lower floret* bisexual; *upper floret* sterile, rarely male, lemma cuneate, truncate; rachilla terminating in a little clavate lemma; lemmas dissimilar, 2- to 3-nerved, brown to blackish, *lower lemma* broadly elliptic, ovate, or elliptic-oblong, keeled, long-hairy on margins and nerves, shortly 2-lobed, without mucro or awn, or mucronate or awned from below apex; *awn* short; *palea* ± same length as lemma, oblanceolate, 2-keeled, of same texture or thinner than lemma. **Lodicules** 2, minute. **Stamens** 3. **Ovary** glabrous; style distinct, plumose. **Caryopsis** small, plump, ellipsoid-obovoid; hilum short; pericarp fused; embryo large. **Photosynthetic pathway**: $C_4$; NAD-ME (distichophylla); XyMS+. PCR sheath outlines uneven, or even; sheath extensions absent. PCR cell chloroplasts centrifugal/peripheral, or centripetal. **Cytology**: $x = 10$ (polyploidy).

**Species** 10, tropics, mostly America; 1 in southern Africa: *Eustachys paspaloides* (Vahl) Lanza & Mattei, widespread.

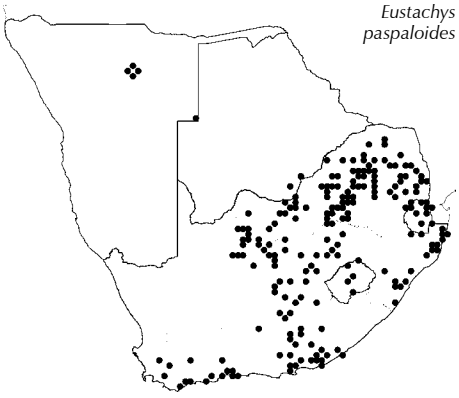
Species treatment by M.J. Moeaha.

### Quick guide to easily confused genera/taxa:

1. Lemma rounded or flat on back; ligule an unfringed membrane . . . . . **Lintonia**
   Lemma keeled; ligule a fringed membrane or a fringe of hairs . . 2
2. Upper glume awned; second lemma awnless, glabrous; ligule a fringe of hairs . . . . . **Eustachys**
   Upper glume awnless; second lemma awned, usually hairy on lateral nerves and keels; ligule a fringed membrane . . . . . 3
3. Inflorescence solitary, rarely paired . . . . . **Tetrapogon**
   Inflorescence few to many, digitate or densely crowded on an elongated axis . . . . . **Chloris mossambicensis**




Figure 234.—*Eustachys paspaloides*. A, plant; B, ligule; C, spikelet. Artist: C. Smith.


*Eustachys paspaloides*

**Eustachys paspaloides** (Vahl) Lanza & Mattei, in *Bolletino Reale Orto Bot. Giardino Colon. Palermo* 9: 56 (1910). Type: South Africa, Cape Province, *Bulow* (C, holo.).

Red Rhodes grass, bruinhoenderspoor

Tufted perennial 200–950 mm high, erect or geniculately ascending; rhizomatous; basal sheath strongly compressed. Leaf blade 20–180 × 2–5 mm, folded, apex blunt. Inflorescence (3–)4–10(–15) × 50–150 mm. Spikelet 1.5–2.5 mm long, golden-brown to dark brown; lower glume broad, ovate, boat-shaped; upper glume oblong-elliptic, awn 0.5–1.5 mm long; lemma 1.5–2.4 mm long, with or without a awn up to 1 mm long; anthers 1.0–1.5 mm long.

*Flowering*: October to May. *Ecology*: Sandy and stony soils, occasionally on clay; undisturbed open grassland but seldom in sweet bushveld. *Frequency in southern Africa*: Common. *Distribution*: Northwards to east tropical Africa; also Arabia. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Highly palatable but is one of the first grasses to disappear with overgrazing.

Illustrations: Chippindall: 195, fig. 170 (1955); Cope; 215, tab. 62 (1999).
Anatomy vouchers: *Ellis 116, 1329, 1754* & *4068*.
Voucher: *Smook 3124*.

## **Festuca** L.

Linnaeus: 73 (1753); Stapf: 719 (1900); Chippindall: 53 (1955); Clayton: 56 (1970); Launert: 54 (1971); Clayton & Renvoize: 93 (1986); Linder: 61 (1986); Gibbs Russell et al.: 168 (1990); Darbyshire: 239 (1993); Kerguélen et al.: 6 (1993); Watson & Dallwitz: 409 (1994); Darbyshire: 445 (2007).

*Pseudobromus* K.Schum.: 108 (1895); Clayton: 53 (1970); Clayton: 40 (1985).



Figure 235.—*Festuca costata* spikelet (10–20 mm). Photographer: M. Koekemoer.

Annual or perennial, tufted or decumbent, rhizomatous; sometimes dioecious. **Leaf blade** expanded, folded or rolled, linear to linear-lanceolate, often auricled; sheaths often splitting into fibres at base with age; *ligule* an unfringed membrane, often conspicuous. **Inflorescence** an open or contracted panicle, sometimes spike-like; *spikelets* solitary, not secund, pedicelled. **Spikelet** laterally compressed, disarticulating above glumes, rachilla extension sometimes present; *glumes* unequal, shorter than spikelet, similar, membranous, awnless, lanceolate to ovate-lanceolate, acute or obtuse, 1–3-nerved or upper glume (1–)3–5-nerved, keeled to rounded, often scabrid on keel. **Florets** (rarely 1)2–14, bisexual or *uppermost floret* reduced and sterile; *lemma* similar to firmer than glumes, lanceolate, rounded on back, at least at base, membranous, usually glabrous, rarely shortly hairy, 3–7-nerved, tip firm, acute, entire, awnless or awned at apex or rarely below; *awn* straight, usually shorter than body of lemma; *callus* short and obtuse, minutely hairy; *palea* ± equal to lemma, lanceolate, 2-keeled, almost hyaline, keels ± scaberulous. **Lodicules** 2, unequally 2-lobed, hyaline. **Stamens** 3. **Ovary** minutely hairy upwards or only at apex or glabrous; styles distinct, very short, terminal or subterminal, plumose. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (high polyploidy).

**Species** ± 450, temperate areas throughout the world, extending through tropics on mountaintops; 9 indigenous and naturalised in southern Africa, mainly high eastern regions.

Species treatment by L. Fish and M.J. Moeaha.

### Quick guide to easily confused genera/taxa:

**A**

1. Ovary with conspicuous apical appendage . . . . . **Bromus**
   Ovary without conspicuous apical appendage . . . . . 2
2. Glumes, at least upper, nearly to as long as spikelet . . . **Koeleria**
   Glumes shorter than spikelet . . . . . 3
3. Lemma back rounded, at least at base . . . . . **Festuca**
   Lemma keeled entire length . . . . . **Poa**

**B**

Lemma glabrous; rachilla extension present; glumes shorter than spikelet . . . . . **Festuca africana**

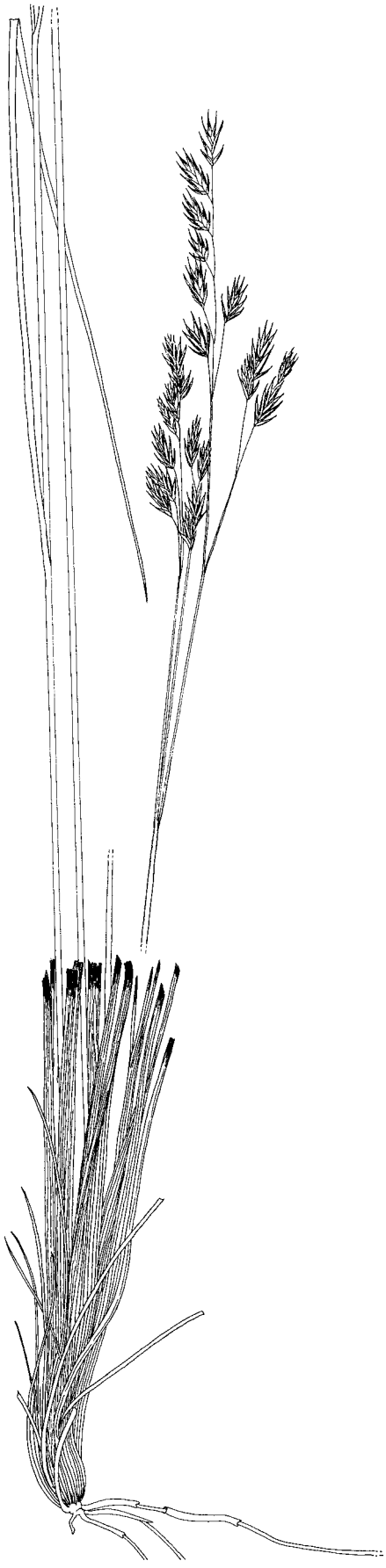


Figure 236.—*Festuca costata*. Artist: R. Holcroft.

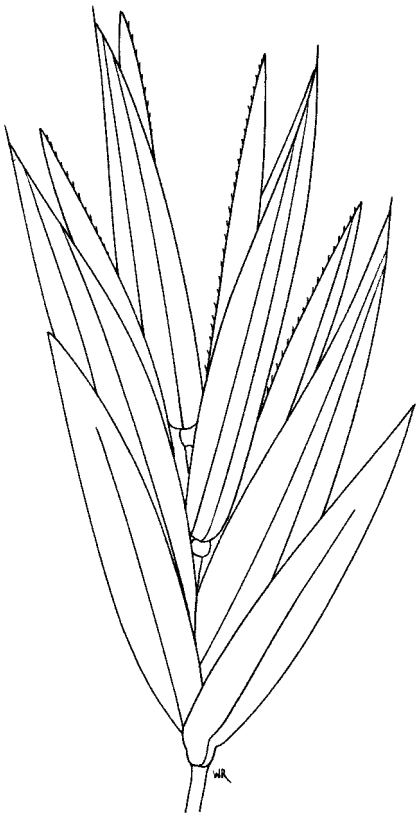


Figure 237.—*Festuca costata* spikelet. Artist: W. Roux.

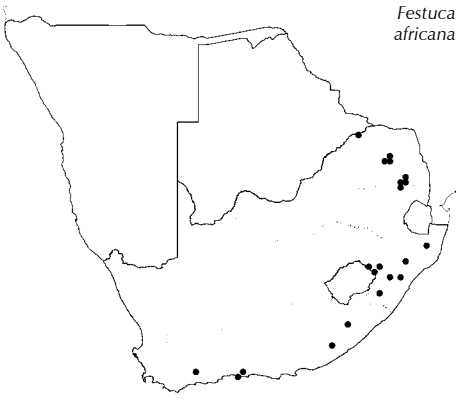
Lemma hairy; rachilla extension absent; glumes longer than spikelet . . . . . **Stipa dregeana**

**Key to species:**

1. Spikelet 1-flowered, prominent rachilla extension present; lemma awn 10–20 mm long . . . . . **F. africana**
   Spikelet 3–10-flowered, rachilla extension absent; lemma acute or with awn up to 6 mm long . . . . . 2
2. Inflorescence very open, almost candelabrum-shaped (subcorymbose), lowest branches ± as long as to longer than central axis; branches long, rigid, straight, naked as spikelets congested terminally . . . . . **F. longipes**
   Inflorescence open or contracted, lowest branches less than half the length of central axis; branches flexuous or rigid, either bare in lower third or with spikelets from ± the base upwards . . . . . 3
3. Inflorescence branchlets and pedicels usually densely strigose or scabrid all over . . . . . **F. killickii**
   Inflorescences branchlets and pedicels smooth or prickles sparse, prickles usually on ridges only . . . . . 4
4. Basal sheaths splitting into coarse, broad fibres . . . . . **F. costata**
   Basal sheaths splitting into fine, slender fibres or not splitting at all . . . . . 5
5. Leaf auricles not well developed or absent, leaf sheath and/or ligule may extend beyond leaf base . . . . . 6
   Leaf auricles well developed, usually as a large undulating flange with an ear-like extension on either side of sheath (but may be absent as it breaks off easily) . . . . . 7
6. Ligule less than 1 mm long; leaves to 1.5 mm wide, involute, filiform, folded; awn 1–4 mm long; basal sheaths glabrous . . . . . **F. caprina**
   Ligule longer than 1.5 mm long; leaves 1–10 mm wide, rolled or expanded; awn up to 1.2 mm long; basal sheaths white velvet-hairy . . . . . **F. scabra**

7(5). Inflorescence open, branches flexuous, spikelets well separated . . . . . **F. dracomontana**
   Inflorescence usually contracted, branches stiff, erect, compressed to central axis, spikelets dense . . . . . 8

8. Robust densely tufted plant . . . . . ***F. arundinacea**
   Plant slender with open tufts and culms separated. . . .**F. vulpioides**



*Festuca africana*

**Festuca africana** (Hack.) Clayton, in *Kew Bulletin* 40: 727 (1985). Type: South Africa, Limpopo, Letaba dist, Houtbosch, *Rehmann 5732*.

*Pseudobromus africanus* (Hack.) Stapf, in *Flora capensis* 7: 763 (1900). Type as above.

*Pseudobromus silvaticus* K.Schum., in Engler *Die Pflanzenwelt Ost-Afrikas und der Nachargebiete*: 108 (1895). Type: Tanzania, Kilimanjaro, *Volkens 1285*.

Perennial 500–1 200(–1 600) mm high; rhizomatous; leaves mainly cauline. Leaf blade 250–500 × 8–15 mm; auricles poorly developed or absent; ligule 3–8 mm long. Inflorescence open, lax, branches slender, flexuous; spikelets solitary at apices. Spikelet 7–9 mm long, 1-flowered, rachilla extension prominent, sometimes a rudimentary floret present; glumes ± equal, 1–3-nerved; lemma glabrous, scaberulous, awn 10–20 mm long; anthers 3.2–4.0 mm long.

*Flowering*: January to April (occasionally in other months). *Ecology*: Open patches in forests, usually in shade. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to East Africa and Sudan. LIM, M, KZN, WC, EC.

Illustration: Chippindall: 61, fig. 34 (1955).
Anatomy vouchers: *Ellis 1459, 2096, 2102, 4459* & *De Winter 9398*.
Voucher: *Schweickerdt 1563*.

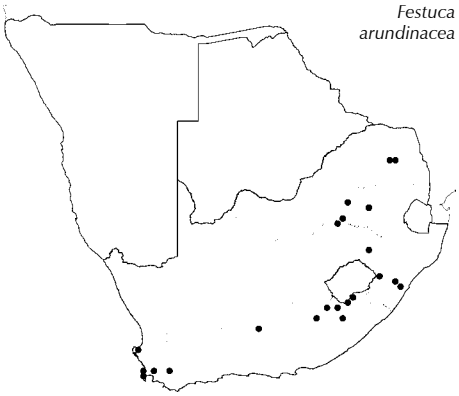
*__Festuca arundinacea__ Schreb., in *Spicilegium Florae lipsicae*: 57 (1771). Type: Germany, *Schreber* (M, holo.).

*F. elatior* L., in *Species plantarum*: 75 (1753). Type: Europe.

*Schedonorus arundinaceus* (Schreb.) Dumort., in *Observations sur les Graminées de la Flore Belgique*: 106 (1812).

*Lolium arundinaceum* (Schreb.) Darbysh., in *Novon* 3: 241 (1993).

MEADOW FESCUE, ENGLISH BLUEGRASS


*Festuca arundinacea*

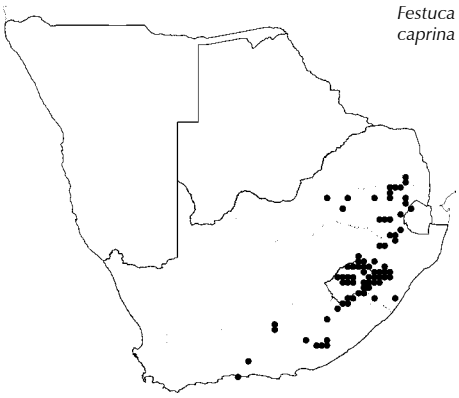
Densely tufted, robust perennial 800–2 000 mm high; rhizomatous; sheaths glabrous, not breaking into fibres. Leaf blade 100–600 × 3–12 mm; auricles (best seen in young leaves) well developed, undulating with ear-like extension on either side, to 5 mm wide, minutely hairy; ligule to 2 mm long. Inflorescence 100–500 mm long, open to contracted, lanceolate to ovate, branches erect, stiff ± adpressed to central axis; branches smooth or with scattered prickles; spikelets congested. Spikelet 10–18 mm long; 3–10-flowered; glumes ± equal, lower 1-nerved, upper 3-nerved; lemma acute or awned; awn 0.5–4.0(6.0) mm long; anthers 3–5 mm long.

*Flowering*: September to April. *Ecology*: Disturbed places near streams, reservoirs and on roadsides. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from Europe, temperate Asia and northwest Africa; widely introduced elsewhere. LIM, G, M, FS, KZN, WC, EC. *Economics*: Winter pasture and in experimental cultivation.

Illustration: Chippindall: 57, fig. 27 (1955); Darbyshire: 447 (2007).
Anatomy voucher: *Ellis* 5604.
Voucher: *Smook 5977*.

**Festuca caprina** Nees, in *Florae Africae australioris*: 443 (1841). Type: South Africa, Eastern Cape, Los-Tafelberg near Queenstown, *Drège s.n.* (K, lecto.).

GOAT-BEARD GRASS, BOKBAARDGRAS

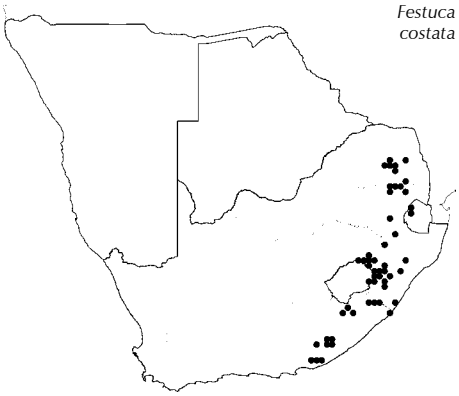

*Festuca caprina*

Weakly to densely tufted perennial 250–1 000 mm high, rhizomatous; basal sheaths glabrous; old leaf sheaths persistent, splitting into fine fibres; ribs distinct, intercostal spaces broad, membranous, brown. Leaf blade 40–250 × to 1.5 mm, involute, filiform, folded (rarely expanded), usually not more than half the culm length; auricles absent or poorly developed; ligule shorter than 1 mm. Inflorescence open, lax, 50–200 mm long; branches bare in lower third, smooth or with scattered prickles. Spikelet 7–15 mm long, 4–6(–9)-flowered; glumes unequal, glabrous, scabrid on margins, lower 1-nerved, upper 3-nerved; lemma glabrous to rarely hairy, scabrid, awned; awn 1–4 mm long; anthers 1–4 mm long.

[In the past different varieties were recognised, but these are not upheld here because of the variability in the species and leaf anatomy, which is constant throughout.]

*Flowering*: September to March. *Ecology*: Moist or wet areas near vleis in high altitude mountain grassveld. *Frequency in southern Africa*: Common to locally dominant. *Distribution*: Northwards to Tanzania. S, L, NW, G, M, FS, KZN, WC, EC.

Illustration: Chippindall: 55, fig. 25 (1955).
Anatomy vouchers: *Ellis 241, 1396, 1402, 2379, 2383, 2386, 2390 & 5816*.
Voucher: *Hoener 2114*.


*Festuca costata*

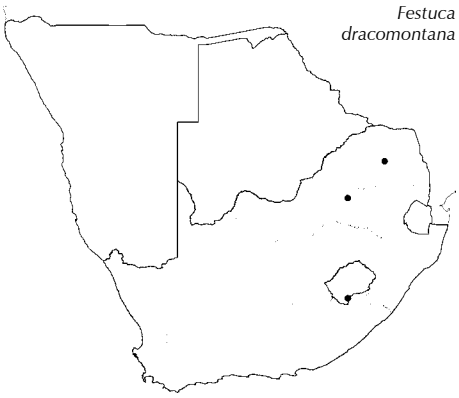
**Festuca costata** Nees, in *Florae Africae australioris* 447 (1841). Type: South Africa, Eastern Cape, Katberg, *Drège s.n.*; Windvogelberg, *Drège s.n.*; Winterberg near Phillistown, *Zeyher s.n.* (syntypes).

TUSSOCK FESCUE, POLSWENKGRAS

Tufted, erect, coarse perennial 600–1 700 mm high; rhizomes short and stout or long and deeply burrowed; mostly with burnt-off traces of basal sheaths; basal sheaths persistent, splitting into course fibres that form a protective layer around young shoots. Leaf blade 700–1 000 × 3.5–6.0 mm; auricles absent or poorly developed; ligule 1–12 mm long. Inflorescence an open panicle, 120–240 mm long; branches usually long, lower half bare, branches and pedicels glabrous, smooth or scabrid due to scattered prickles. Spikelet 10–20 mm long, 3–7-flowered; glumes ± equal, 3-nerved, glabrous; lemma scaberulous, acute or with a minute awn up to 1 mm long, rarely longer; anthers 3.5–5.0 mm long.

*Flowering*: September to January. *Ecology*: Moist places in high altitude mountain grassland; encouraged by frequent burning. *Frequency in southern Africa*: Common to locally dominant. *Distribution*: Throughout eastern Africa to Kenya. S, L, LIM, M, FS, KZN, EC.

Illustration: Chippindall: 57, fig. 28 (1955).
Anatomy vouchers: *Ellis 1423, 1480, 2844* & *2853*.
Voucher: *Mohle 47*.

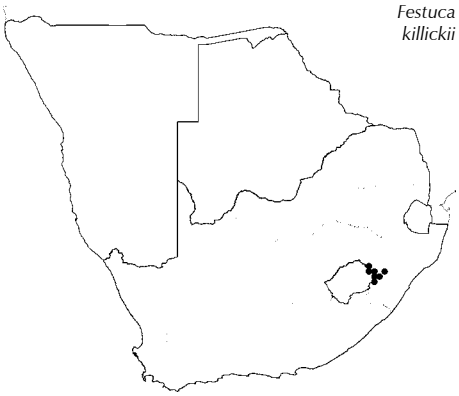

*Festuca dracomontana*

**Festuca dracomontana** H.P.Linder, in *Bothalia* 16: 59 (1986). Type: Lesotho, Letsing la Letsie slopes (3028AC), *Du Toit 2714* (PRE, holo.).

Perennial 500–800 mm high; base sometimes swollen; rhizomatous; leaves cauline. Leaf blade 80–200 × 2–8 mm, expanded; auricles develop usually as a undulating flange with an ear-like extension on either side (this may appear absent as it breaks off easily); ligule shorter than 1 mm. Inflorescence a open panicle, to 250 mm long; branches flexuous, smooth or with scattered prickles, bare for the longest part, with 1–5 spikelets near apices; spikelets remote. Spikelet 10–12 mm long; 3–7-flowered, without rachilla extension; glumes unequal, lower 1(3)-nerved, upper 3-nerved; lemma scaberulous above, awned; awn 2–4 mm long; anthers 2.8–3.0 mm long.

[A more in-depth study of this species and *F. vulpioides* is needed to see if these two are really separate species.]

*Flowering*: October. *Ecology*: Sour grassveld in high mountains. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. L, LIM, ?G. [As this is a mountainous species, the Pretoria locality is doubtful].


*Festuca killickii*

Anatomy voucher: *Ellis 1874*.
Voucher: *Du Toit 2714*.

**Festuca killickii** Kenn.-O'Byrne, in *Kew Bulletin* 16: 461, fig. 1 (1963). Type: South Africa, KwaZulu-Natal, Cathedral Peak, *Killick 2282* (K, holo.; PRE, iso.).

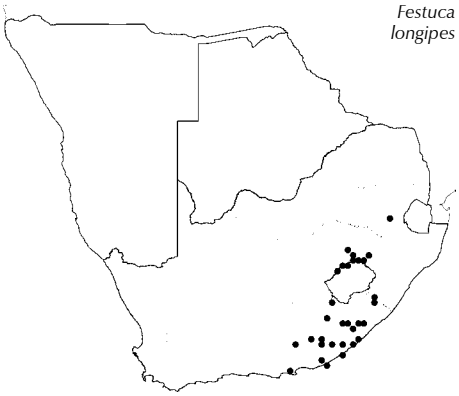
Tufted, erect, coarse perennial 500–950 mm high; rhizomatous; leaves and sheaths glabrous. Leaf blade 200–600 × 3–6 mm, erect, in-rolled; auricles absent or poorly developed; ligule 2–3(–4) mm long. Inflorescence a lax pyramidal panicle to 200 × 20–60 mm, branches bare on lower half; spikelets shortly pedicelled; pedicels and branches densely

strigose or scabrid. Spikelet 6–9 mm long, 4–6-flowered; glumes unequal, lower 1-nerved, upper 3-nerved; lemma acute or with awn shorter than 0.5 mm; anthers 0.8–3.5 mm long.

*Flowering*: December to February. *Ecology*: Subalpine grassveld at high altitudes up to 3 000 m, on cave sandstone and basalt; amongst boulders, along streams and on ledges. *Frequency in southern Africa*: Locally common to locally dominant. *Distribution*: Endemic. KZN.

Illustration: Kennedy-O'Byrne: 462, fig. 1 (1963).
Anatomy vouchers: *Ellis 5712* & *5717*.
Voucher: *Du Toit 2320*.

**Festuca longipes** Stapf, in *Flora capensis* 7: 721 (1900). Type: South Africa, Eastern Cape, Winterberg, *Ecklon*.


*Festuca longipes*

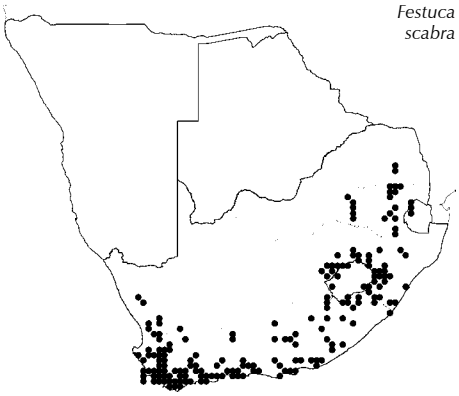
Perennial 300–750 mm high; rhizome long, slender. Leaf blade 100–300 × 2–6 mm; auricle absent or poorly developed; ligule 2–3 mm long. Inflorescence almost candelabrum-shaped, 150–330 mm long, branches rigid, flattened on the inner side, borne in remote pairs, unbranched and bare for most of their length, lower branches ± as long to longer than central axis; branches with 1–6 spikelets at apex. Spikelet 8–12 mm long, 3–6-flowered, without rachilla extension; glumes unequal to ± equal, 1–3-nerved; lemma acute, awnless; anthers 2.5–3.0 mm long.

[The panicle shape distinguishes this species from other southern African *Festuca* species, which have open or contracted panicles with flexuous branches less than half the length of the central axis.]

*Flowering*: November to April. *Ecology*: Moderate to steep grassy slopes and sandstone ridges, often on the edges of forests in partial shade, at altitudes higher than 1 500 m. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. L, M, FS, KZN, EC.

Anatomy vouchers: *Ellis 1103, 1845* & *2608*.
Voucher: *Mullins PRE56847*.

**Festuca scabra** Vahl, in *Symbolae Botanicae* 2: 21 (1791). Type: South Africa, Cape Province, herb., *Thunberg* (UPS, holo.).

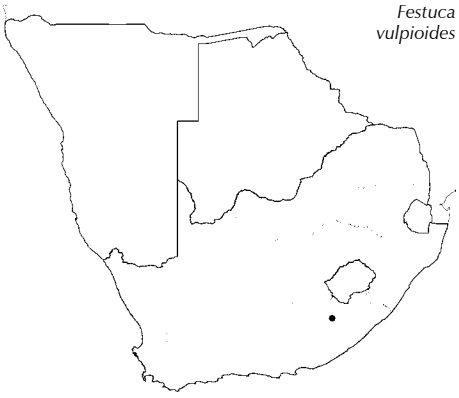

*Festuca scabra*

MUNNIK FESCUE, MUNNIK SWENKGRAS

Perennial 300–1 000 mm high; dioecious; rhizomes long or oblique; culm base usually bulbous at maturity; basal sheaths white velvet-hairy, old sheaths splitting into fine fibres. Leaf blade 50–300 × to 10 mm, in-rolled or expanded; auricles absent or poorly developed; ligule 1.5–7.0 mm long. Inflorescence 50–300 × 10–30 mm, narrow, contracted, sometimes spike-like or interrupted; branches smooth or with scattered prickles. Spikelet 7–15 mm long, 3–7-flowered; glumes 1–3-nerved; lemma awnless or awn up to 1.2 mm long; anthers 1.8–2.0 mm long.

[Morphologically very variable. If the bulbous culm bases and fibrous leaf sheaths are not distinct in young plants, it can be distinguished by the velvet-hairy basal part of the leaf sheaths and ± dense panicle.]

*Flowering*: September to February. *Ecology*: Sandy soils; in undisturbed, high altitude mountain grassveld and extending into valley bushveld, often in moist places and partial shade; stimulated by fire. *Frequency in southern Africa*: Common to locally dominant. *Distri-*




*bution*: Endemic. S, L, LIM, G, M, FS, KZN, NC, WC, EC. *Economics*: Although a poor grazing grass it is a useful natural or cultivated pasture.

Illustration: Chippindall: 56, fig. 26 (1955).
Anatomy vouchers: *Ellis 591 1639, 1703, 5145* & *5794*.
Voucher: *Hoener 1923*.

**Festuca vulpioides** Steud., in *Synopsis plantarum glumacearum* 1: 305b (1854). Type: South Africa, without precise locality, *Drège s.n.*

Open, tufted or sprawling slender perennial 500–1 000 mm high; rhizomatous; leaves cauline. Leaf blade 100–250 × 3–7 mm, expanded; auricles usually a large undulating flange with an ear-like extension on either side (this maybe absent as it breaks off easily) less than 1 mm wide; ligule shorter than 1 mm. Inflorescence narrow, to 300 mm long; branches smooth or with scattered prickles; spikelets borne either solitary on long pedicels or on short branches with up to five widely spaced spikelets. Spikelet (8)15–20 mm long, 5–8-flowered; glumes unequal, lower 1-nerved, upper 3-nerved; lemma acute or awned, awn 1–5 mm long; anthers 2–3 mm long.

[A more in-depth study of this species and *F. dracomontana* is needed to see if these two are really separate species.]

*Flowering*: January. *Ecology*: Grassland at high altitudes. *Frequency in southern Africa*: Rare. Locally common. (Species not well known). *Distribution*: Endemic. EC.

Voucher: *Acocks 20228*.

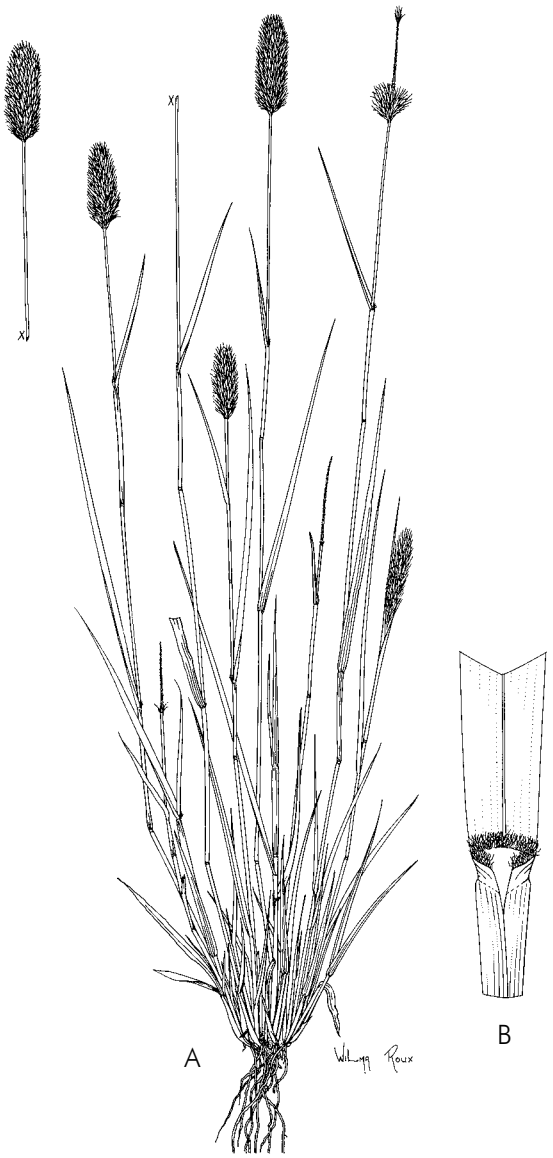



Figure 238.—*Fingerhuthia africana*. A, plant; B, ligule. Artist: W. Roux.

## **Fingerhuthia** Nees

Nees: 7 (1834); Stapf: 690 (1900); Stent: 294 (1924); Chippindall: 206 (1955); Launert: 116 (1970a); Clayton & Renvoize: 201 (1986); Gibbs Russell et al.: 171 (1990); Watson & Dallwitz: 413 (1994); Cope: 17 (1999).



Figure 239.—*Fingerhuthia africana* spikelet (4.0–5.5 mm). Photographer: M. Koekemoer.

Perennial, rarely annual in desert areas, tufted; rhizomatous. **Leaf blade** long-linear, expanded or folded; *ligule* a fringe of long hairs. **Inflorescence** a compact, cylindrical, spike-like panicle, usually oblong in outline, central axis terete; *spikelets* solitary, pedicelled, pedicels remaining after spikelets have fallen. **Spikelet** strongly laterally compressed, disarticulating with the glumes; *glumes* ± equal, shorter to longer than spikelet, similar, membranous, lanceolate, 1-nerved, sparsely to densely hairy on keels, awned or mucronate. **Florets** 2–4; *lowest floret* bisexual; *remaining florets* male, sterile or reduced; *lower lemma* lanceolate or linear-oblong, similar to firmer in texture to glumes, membranous, glabrous or hairy, (3)5–7-nerved, keeled, entire, apex rounded or acuminate, shortly awned or mucronate; uppermost lemma smaller; *palea* slightly shorter

than lemma, ovate-lanceolate, membranous. **Lodicules** 2, cuneate. **Stamens** 3. **Ovary** slightly constricted below apex, glabrous; styles distinct, finely plumose. **Caryopsis** ellipsoid. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines even. PCR sheath extensions absent. PCR cell chloroplasts centripetal. **Cytology**: $x = 10$ (polyploidy).

**Species** 2, Afghanistan, Arabian Peninsula, southern Africa; 2 in southern Africa, widespread.

Species treatment by M.T. Nembudani.

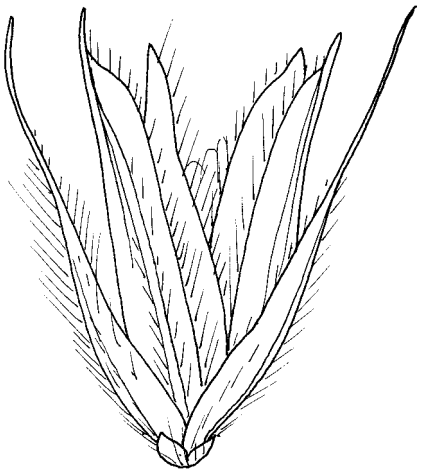


Figure 240.—*Fingerhuthia africana* spikelet. Artist: H.W. du Toit.

### Quick guide to easily confused genera:

Spikelet strongly laterally compressed, not suspended by bristles; lowest floret bisexual . . . . . **Fingerhuthia**
Spikelet dorsiventrally compressed, subtended by bristles; lowest floret male or sterile . . . . . **Pennisetum**

### Key to species:

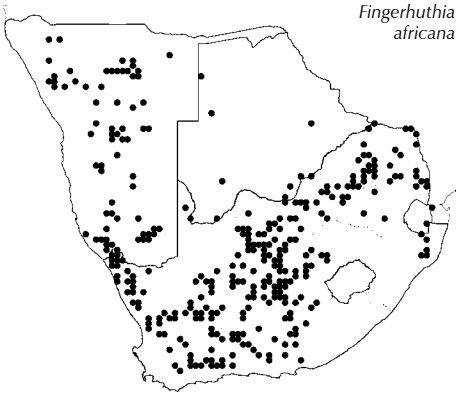
Lemma awned from a rounded apex; glume keel densely long hairy, the long hairs are up most of the glume; basal sheaths dull; roots slender; growing in well-drained, often calcareous soils . . . . . **F. africana**
Lemma awned from a acuminate apex; glume keel sparsely hairy, the longest hairs usually near the base only; basal sheaths glossy; roots robust; growing in waterlogged and poorly-drained soils . . . . . **F. sesleriiformis**

**Fingerhuthia africana** Lehm., in *Semina in horto botanica hamburgensis* 1834: 7 (1834). Type: South Africa, Western Cape, Riversdale Div., in the Karoo, near the Gauritz River, *Ecklon*.

THIMBLE GRASS, VINGERHOEDGRAS

Perennial or sometimes annual (in arid areas), 100–910 mm high; roots slender; basal sheaths dull. Leaf blade 25–400 × 2–4 mm. Inflorescence spike-like, 15–50 mm long; pedicels short, thick. Spikelet 4.0–5.5 mm long; glume keel densely long hairy, these hairs up most of the keel; lemma apex rounded, awned; anther 2.0–2.5 mm long.

*Flowering*: September to May. *Ecology*: Well-drained sandy or gravelly soils, often on limestone outcrops. *Frequency in southern Africa*: Common. *Distribution*: Disjunct distribution between the FSA area and Afghanistan and Arabia. N, B, S, ?L, LIM, NW, G, M, FS, KZN, NC, WC, EC.



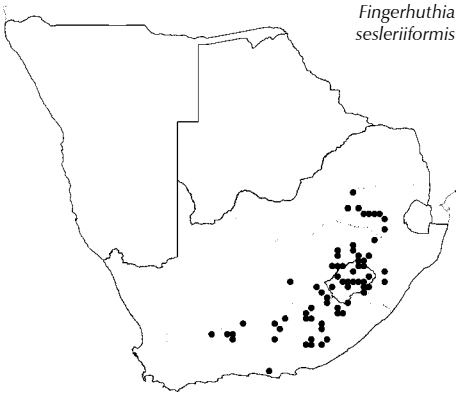
*Fingerhuthia africana*

Illustration: Chippindall: 207, fig. 184 (spikelet) (1955); Cope: 18, tab. 8 (1999).
Anatomy vouchers: *Ellis 117, 504, 1608 & 1723*.
Voucher: *Smook 2887*.

**Fingerhuthia sesleriiformis** Nees, in *Florae Africae australioris* 1: 138 (1841). Types: South Africa, Eastern Cape, Albany Div., Glenfilling; Queenstown Div.; Swart Kei Flats; Northern Cape, Richmond Div., Winter Veld, between Nieuwjaars Fontein and Ezelsfontein; Colesberg Div., Wonderhuivel, all *Drège* (syntypes).

THIMBLE GRASS, VINGERHOEDGRAS

Tufted perennial 300–1 170 mm high, forming large tussocks; roots robust, well developed; base smooth, shiny. Leaf blade 120–240 × 3–5 mm. Inflorescence spike-like, to 80 mm long. Spikelet 5–6 mm



*Fingerhuthia sesleriiformis*

long; glume keels sparsely hairy, long hairs at base becoming shorter upwards; lemma apex acuminate, awned; anther 1.0–1.2 mm long.

*Flowering*: November to April. *Ecology*: Black clay in vleis or clayey soils near rivers. *Frequency in southern Africa*: Common, often in dense, pure stands. *Distribution*: Endemic. L, G, M, FS, KZN, NC, WC, EC. *Economics*: Erosion control or domestic use such as brooms; only palatable when young.

Illustration: Chippindall: 206, fig. 183 (1955).
Anatomy vouchers: *Loxton & Ellis 962* & *Ellis 1841*.
Voucher: *Smook 5886*.

## *Gastridium P.Beauv.

Palisot de Beauvois: 21 (1812); Chippindall: 96 (1955); Hubbard: 100 (1970); Tutin: 236 (1980); Clayton & Renvoize: 138 (1986); Gibbs Russell et al.: 172 (1990); Watson & Dallwitz: 416 (1994); Sell & Murrell: 195 (1996).

Annual. **Leaf blade** linear, flat; *ligule* an unfringed membrane. **Inflorescence** a contracted or spike-like panicle, often cylindrical; *spikelets* unequally pedicelled; pedicel with a thickened tip. **Spikelet** linear-oblong, laterally compressed, rachilla produced as a fine hairy bristle or absent; *glumes* unequal, longer than the spikelet, dissimilar, lanceolate, usually membranous above and base indurated, swollen and rounded on back near base, keeled above, 1-nerved, acuminate. **Floret** 1, bisexual, *lemma* elliptic, rounded dorsally, less firm than glumes, hyaline, finely 5-nerved, hairy, awned from back; *awn* capillary, geniculate and twisted in lower half, much longer than body of lemma; *palea* as long as lemma, elliptic, 2-lobed, 2-nerved, pilose dorsally. **Lodicules** 2, hyaline, glabrous. **Stamens** 3. **Ovary** subglobose, glabrous; styles plumose. **Caryopsis** ellipsoid; hilum short; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$.



Figure 241.—*Gastridium phleoides*. Two spikelets (5–7 mm). Photographer: M. Koekemoer.

**Species** 2, mainly Mediterranean; 1 naturalised in southern Africa: **Gastridium phleoides* (Nees & Meyen) C.E.Hubb., Western Cape.

Species treatment by A.C. Mashau.

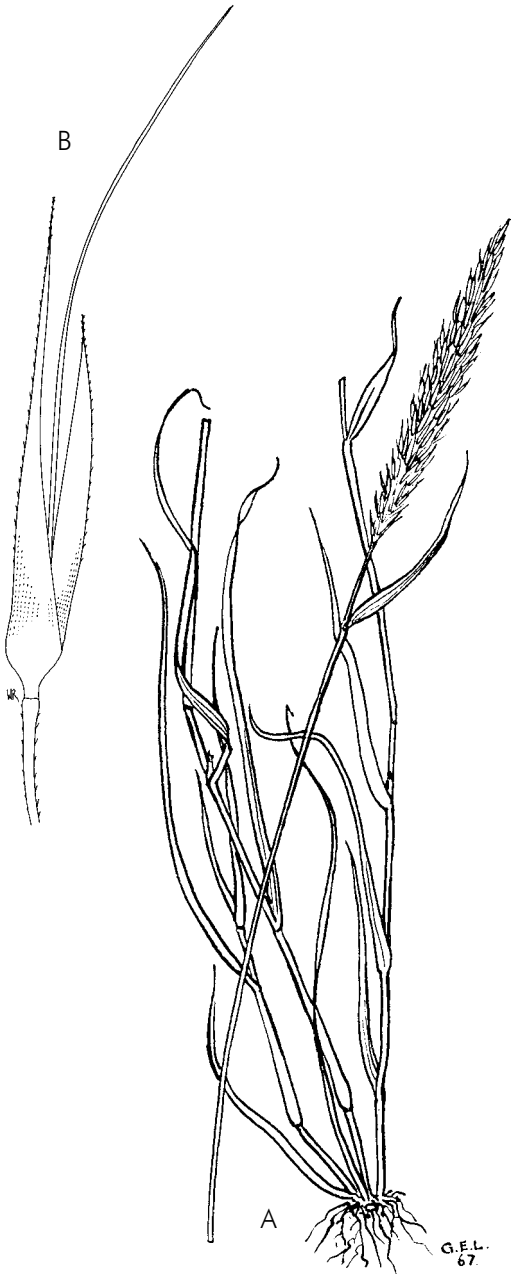



Figure 242.—*Gastridium phleoides*. A, plant; B, spikelet (7.6 × 0.6 mm). Artists: A, G.E. Lawrence; B, W. Roux.

**Gastridium phleoides* (Nees & Meyen) C.E.Hubb., in *Kew Bulletin* 9: 375 (1954). Type: Chile.

Annual 100–600 mm high. Leaf blade 15 × 1–4 mm. Inflorescence narrow, spike-like. Spikelet 5–7 mm long, awned; glumes swollen at base around floret; anther 0.5–1.0 mm long.

*Flowering*: October to December. *Ecology*: Open veld. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from North Africa, the Mediterranean region and Iran; also in Australia and the Americas. WC. *Economics*: Introduced worldwide often with wool.

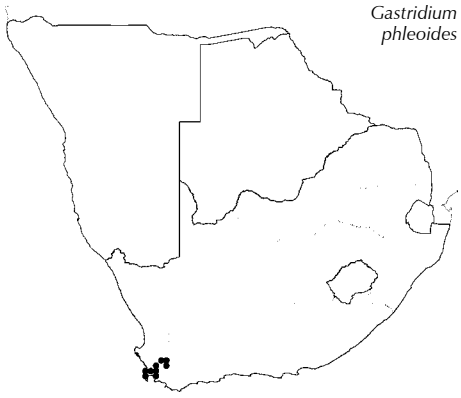



Illustration: Hubbard: 101, fig. 34 (1970).
Anatomy voucher: *Ellis 1254*.
Voucher: *Loxton 237*.




Figure 243.—*Geochloa decora*. Artist: G.E. Lawrence.

## **Geochloa** H.P.Linder & N.P.Barker

Stapf: 516 (1899) under *Danthonia* DC.; Phillips: 120 (1951) under *Danthonia* DC.; Chippindall: 241 (1955) under *Danthonia* DC.; Conert: 129 (1970); Conert: 299 (1971) under *Merxmuellera*; Ellis: 197 (1983); Clayton & Renvoize: 175 (1986) under *Rytidosperma* Steud.; Gibbs Russell et al.: 213 (1990) under *Merxmuellera*; Watson & Dallwitz: 593 (1994); Linder et al.: 322 (2010).

*Danthonia* DC., in part, Stapf: 516 (1899).

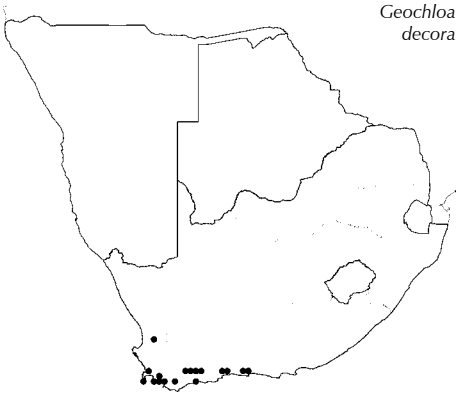
Tufted perennial, geophyte; rhizomes short, with swollen nodes; base bulbous; basal sheaths usually woolly. **Leaf blade** linear, rolled or expanded; *ligule* a short fringe of hairs. **Inflorescence** a panicle, usually contracted, rarely open; branches usually shorter than spikelets. **Spikelet** laterally compressed; disarticulating above glumes and between florets; *glumes* ± equal, similar, ± as long as spikelet, chartaceous, margins and apex hyaline, 1–5-nerved, median nerve prominent, lateral nerves usually only prominent in lowermost part, awnless. **Florets** 2–7; bisexual; *lemma* rounded on back, similar in texture to glumes, 9-nerved, hairy, hairs scattered dorsally; 2-lobed, lobes usually free, usually finely awned; central awn from sinus; *awn* usually geniculate, column twisted many times or straight; *callus* rounded, hairy; *palea* shorter to overtopping lemma, 2-keeled, lanceolate, similar in texture to lemma, margins hairy. **Lodicules** 2, long, membranous, glabrous. **Stamens** 3. **Ovary** ovoid, glabrous; styles 2, long and plumose. **Caryopsis** obovate, shiny. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $2n = 48$. (Only known for *G. decora*).

**Species** 3, southern Africa, Western Cape.

Species treatment by A.C. Mashau and L. Fish.

**Key to species:**

1. Spikelets not densely clustered, panicle branches and pedicels are partly visible; glumes occasionally pubescent . . . . . **G. decora**
   Spikelets densely clustered, panicle branches and pedicels are obscured; glumes never pubescent . . . . . 3
2. Glume 3–5-nerved; lemma 7–12 mm long, including lobes; lemma central awn 6–16 mm long, usually geniculate; spikelet 4–7-flowered . . . . . **G. rufa**
   Glume 1(–3)-nerved; lemma 6–8 mm long, including lobes; lemma central awn 4–8 mm long, seldom geniculate; spikelet 2–5-flowered . . . . . **G. lupulina**



*Geochloa decora*

**Geochloa decora** (Nees) N.P.Barker & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 324 (2010). Type: South Africa, Western Cape, Cape of Good Hope, *Drège 5651* (B, holo.).

*Merxmuellera decora* (Nees) Conert, in *Mitteilungen der Botanischen Staatssammlung München* 10: 299 (1971).

*Danthonia zeyheriana* Steud. var. *trichostachya* Stapf, in *Flora capensis* 7: 522 (1899). Type: South Africa, Western Cape, between Slangkop and Red Hill, *Woolly-Dod 3003*.

*Danthonia zeyheriana* Steud. var. *zeyheriana*, in *Synopsis plantarum glumacearum* 1: 244 (1854). Type: South Africa, Western Cape, Puspas Valley, *Zeyher 4555, 3556*.

Tufted perennial 250–700 mm high; culm base bulbous, surrounded by old, woolly, persistent leaf sheath. Leaf blade to 200 × to 1.5 mm. Inflorescence 50–130 mm long, loosely contracted, inter-

rupted, branches visible. Spikelet 18–25 × to 12 mm, 4–7-flowered; glumes 15–22(–25) mm long, 5-nerved, sometimes densely pubescent; lemma 9–15 mm long, back covered from base to middle in short, dense hairs, and with a row of white hairs across middle of back, glabrous above this; 2-lobed; lobes 5–8 mm long, adnate to the central awn for $^1/_3$–$^1/_2$ their length, ending in a short, soft awn; central awn 12–20 mm long; anther 2.8–4.5 mm long.

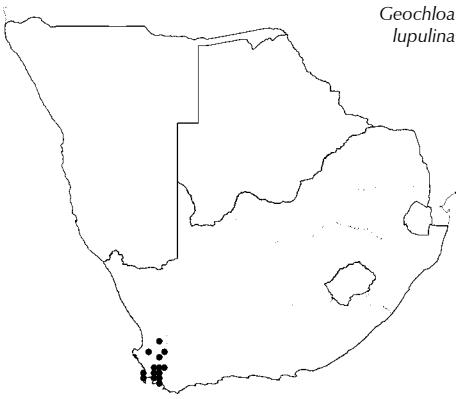
*Flowering*: August to December. *Ecology*: Sandy soils; mountain slopes of southwestern Cape. Typically flowering first year after fire. *Frequency in southern Africa*: Locally common in naturally burnt areas and firebreaks. *Distribution*: Endemic. WC.

Anatomy vouchers: *Ellis 5456, 5543* & *5547*. Ellis (1983) distinguishes three anatomical forms. Type 1: *Ellis 657* & *2543*; Type 2: *Ellis 2552* & *2553*; Type 3: *Fourcade 4986*.
Voucher: *du Toit 2023*.

**Geochloa lupulina** (L.f.) N.P.Barker & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 324 (2010).

*Merxmuellera lupulina* (L.f.) Conert, in *Mitteilungen der Botanischen Staatssammlung München* 10: 299 (1971). Type: South Africa, Western Cape, Cape of Good Hope, *Thunberg s.n.* (UPS 2604, lecto.).

*Danthonia lupulina* (Thunb.) P.Beauv. ex Roem. & Schult., in *Systema vegetabilium* 2: 690 (1817).


*Geochloa lupulina*

Tufted perennial 400 mm high; culm base bulbous, covered in old, persistent, densely woolly leaf sheaths. Leaf blade 75–150 × to 3 mm. Inflorescence 20–35 mm long, densely contracted, branches obscured. Spikelet 9–12 × 6–8 mm; glumes 7–10 mm long, 1(–3)-nerved; 2–5-flowered; lemma 6–8 mm long, back densely covered from base to middle by short hairs, and a row of long, white hairs across the middle, glabrous above; lobes 2.5–3.5 mm long, adnate to the central awn for part of their length, usually ending in a short, soft awn; central awn 4–8 mm long, straight, seldom geniculate; anther 2.4–3.7 mm long.

*Flowering*: October to January. *Ecology*: Sandy; mountain slopes of southwestern Cape. Typically flowering first year after fire. *Frequency in southern Africa*: Locally common especially in naturally burnt areas and firebreaks. *Distribution*: Endemic. WC.

Anatomy vouchers: *Ellis 2254, 2255* & *2256*; *Van Rensburg 199*; *Taylor 4513* & *5477*. [According to Ellis (1983), this species is anatomically similar to *G. rufa*, *Pentameris argentea* and *P. viscidula*.]
Voucher: *Taylor 5477*.

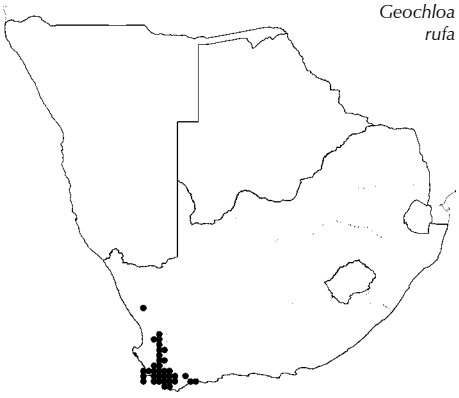
**Geochloa rufa** (Nees) N.P.Barker & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 324 (2010).

*Merxmuellera rufa* (Nees) Conert, in *Mitteilungen der Botanischen Staatssammlung München* 10: 299 (1971). Type: South Africa, Western Cape, Cedar Mts. *Drège 2559* (PRE?).

*Danthonia lanata* (Schrad.) Schrad., in Schultes, *Mantissa* 2: 386 (1824). Type: South Africa, Western Cape, *Hesse* (GOET 2522, holo.).

*Danthonia lanata* (Schrad.) Schrad. var. *major* Nees, in *Florae Africae australioris*: 329 (1841).

*Danthonia macrocephala* Stapf, in *Flora capensis* 7: 522 (1899). Type: South Africa, Western Cape, *Thom s.n.* (K, holo.).


*Geochloa rufa*

Tufted perennial to 400 mm high; base bulbous, covered in old persistent, woolly sheaths. Leaf blade to 200 × to 4.5 mm. Inflo-



Figure 244.—*Glyceria maxima* specimen.

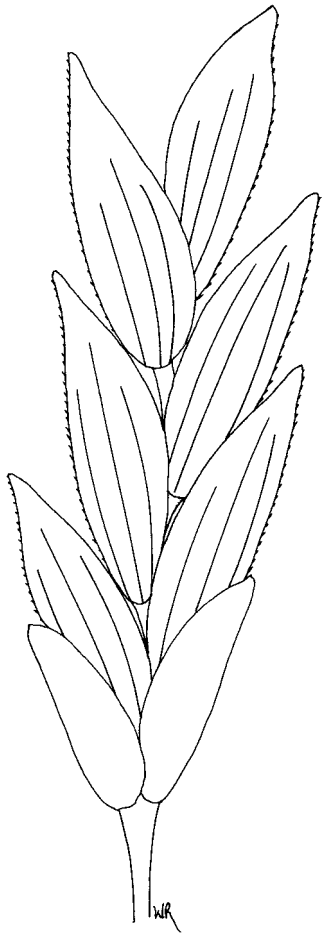


Figure 245.—*Glyceria maxima* spikelet. Artist: W. Roux.

rescence 30–70 mm long, globose or cylindrical; spikelets densely clustered. Spikelet to 25 × to 15 mm; glumes 10–18(25) mm long, 3–5-nerved; 4–7-flowered; lemma 7–12 mm long, back shortly and densely pubescent from base to middle region, a row of white hairs present across the middle, glabrous above; lobes 3.0–6.5 mm long, adnate to the central awn for part of their length, usually ending in a short, soft awn; central awn 6–16 mm long, geniculate; anther 2.5–4.5 mm long.

*Flowering*: September to December. *Ecology*: Sandy soils on mountain slopes in southern and southwestern Cape. Typically flowering first year after fire. *Frequency in southern Africa*: Locally common in naturally burnt areas and fire breaks. *Distribution*: Endemic. WC.

Anatomy vouchers: *Ellis 5427, 5446, 5487, 5495, 5521* & 5557 (types?). [Ellis (1983) described three anatomical forms of this species and states that the anatomy is very variable and integrates with both Types 1 & 2 of *G. decora* as well as *G. lupulina*. Type 1 has shorter glumes (10–12 mm) with 3 indistinct nerves near the base, and a central lemma awn 6–9 mm long; *Ellis 2324* & *Taylor 5243*. Type 2 is larger, with glumes 16–18 mm long, 3–5 obvious basal nerves, and a central lemma awn 11–16 mm long; 2; *Kruger 199, Taylor 4130* & *Ellis 2517*. Type 3 is anatomically similar to *G. lupulina*: *Ellis 1190, 2298, 2483*; *Kruger 491*; *Esterhuizen 22128*; *Edwards 158* & *Compton 12014*.]
Voucher: *du Toit 1375*.

## *Glyceria R.Br.

Brown: 179 (1810); Hubbard: 122 (1984); Sell & Murrell: 169 (1996); Barkworth & Anderton: 73 (2007).

Perennial, tufted to decumbent, glabrous, mainly hygrophytic; rhizomatous to stoloniferous; culm nodes glabrous. **Leaf blade** linear, broad or narrow, flat or folded, cross venations sometimes present; *ligule* an unfringed membrane. **Inflorescence** a panicle, simple to much branched. **Spikelet** laterally compressed, glabrous, disarticulating above glumes and between florets; *glumes* ± equal to very unequal, shorter than adjacent lemma, 1(–3)-nerved, awnless. **Florets** 3–16, bisexual, uppermost reduced; *lemma* similar to firmer in texture than glumes, membranous to thinly coriaceous, entire or shallowly lobed, rounded on back, 5–11-nerved, nerves prominent; *callus* short, blunt; *palea* ± equal to lemma, membranous, 2-nerved, 2-keeled. **Lodicules** sometimes joined, truncate, glabrous, fleshy. **Stamens** 2 or 3. **Ovary** glabrous; styles free, stigmas 2, white. **Caryopsis** free; hilum long linear; embryo small. **Photosynthetic pathway**. $C_3$; XyMS+. **Cytology**: $x = 10$.

**Species** ± 40, in temperate regions throughout the world; 1 naturalised in southern Africa: *Glyceria maxima* (Hartm.) Holmb., KwaZulu-Natal.

Species treatment by M.T. Nembudani.

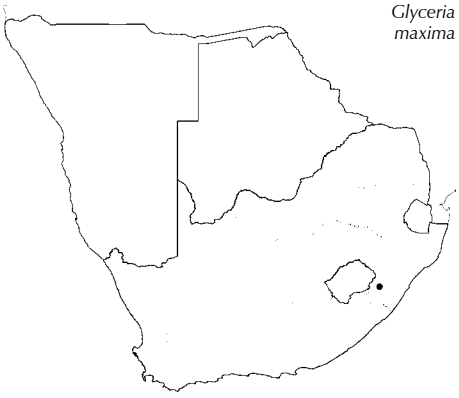
***Glyceria maxima** (Hartm.) Holmb., in *Botaniska Notiser* 1919: 97 (1919). Type: ?Europe.

*G. aquatica* (L.) Wahlenb. non J. & C.Presl., in *Flora gothoburgensis* 18 (1820).

REED SWEET GRASS

Robust, erect perennial 900–2 500 mm high; rhizomes stout, spreading; culm stout to robust. Leaf blade 300–600 × 7–20 mm, abruptly

pointed, margins rough, cross nerves sometimes present (may not be easy to see) on the lower surface. Inflorescence 150–450 mm long, open or becoming contracted and dense, broadly ovate to oblong, much branched, branches clustered, rough. Spikelet 5–12 × 2.0–3.5 mm, 4–10-flowered, green or tinged with yellow or purple, slightly compressed; glumes 1-nerved, lower 2–3 mm long, upper 3–4 mm long; lemma 3–4 mm long, apex very obtuse, membranous, prominently 7-nerved, nerves minutely scabrid; palea ± equal to lemma, keels hairy; anther (1.0–)1.5–2.0 mm long; caryopsis 1.5–2.0 mm long, dark brown, ellipsoid.


*Glyceria maxima*

*Flowering*: January. *Ecology*: Permanently flooded areas, banks of slow-running rivers, canals, ponds, dams, marshy areas; disturbed wet areas. *Frequency in southern Africa*: First recorded in 2005/6 where it was starting to invade wetlands in the Boston–Bulwer–Underberg area of KwaZulu-Natal. *Distribution*: Naturalised from Europe. Throughout most of Europe and temperate Asia; introduced into Australia, New Zealand, North America and South Africa. KZN. *Economics*: Used as nutritious fodder and for prevention of erosion on river banks in its native countries. Cyanide poisoning has been reported. Recorded as one of the most invasive grasses worldwide in countries where it has been introduced, spreading rapidly vegetatively to form dense stands in wetlands.

Illustration: Hubbard: 122 (1984); Barkworth & Anderton: 74 (2007).
Voucher: *D. Kotze 136*.

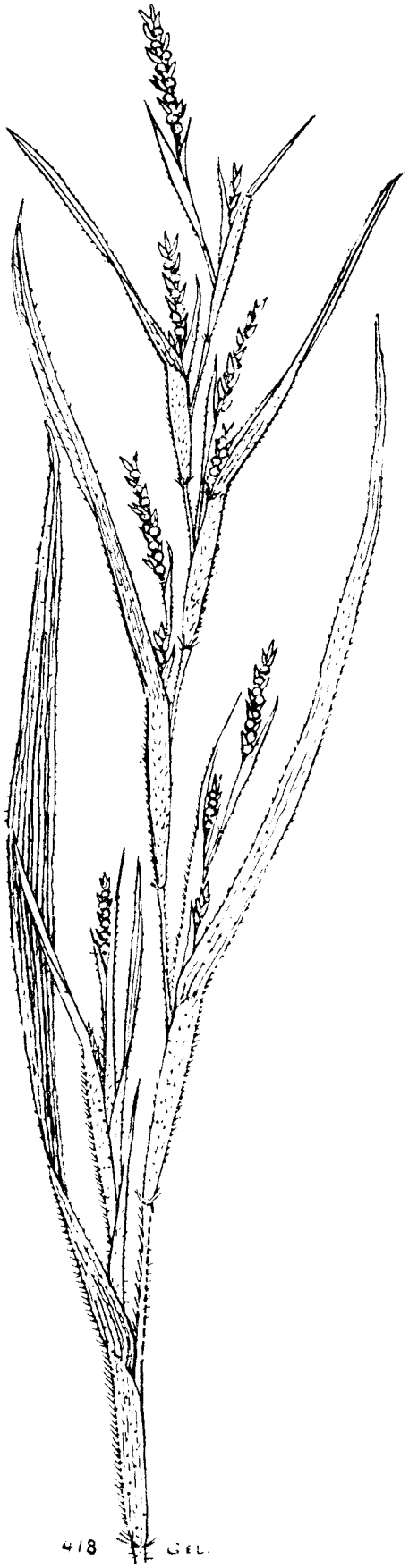


Figure 246.—*Hackelochloa granularis* inflorescence. Artist: G.E. Lawrence.

## **Hackelochloa** Kuntze

Kuntze: 776 (1891); Chippindall: 523 (1955); Veldkamp et al.: 294 (1986); Clayton & Renvoize: 847 (1982); Clayton & Renvoize: 366 (1986); Gibbs Russell et al.: 172 (1990); Watson & Dallwitz: 438 (1994); Cope: 178 (2002).

Annual, tufted. **Leaf blade** linear-lanceolate, expanded, ± cordate at base; *ligule* a fringed membrane. **Inflorescence** of many solitary racemes aggregated into a spatheate false panicle, raceme dorsally compressed, internodes flattened, oblong and fused to adjacent pedicels, disarticulating obliquely; *spikelets* in pairs, in long–short combinations: one sessile, the other pedicelled, appearing sessile due to fusion of pedicel with rachis. **Sessile spikelet** globose, falling with the glumes; *glumes* ± equal, dissimilar, awnless; lower glume hemispherical to globose, cartilaginous, rugose, conspicuously pitted or tuberculate, wingless; upper glume ovate-lanceolate, smooth, partly adhering to enclosing internode. **Florets** 2; *lower floret* sterile, reduced to a small hyaline lemma, awnless; *upper floret* bisexual; *lemma* less firm than glumes, hyaline, much shorter than glumes, entire, glabrous, awnless; *callus* obliquely truncate with a central boss; *palea* hyaline, similar to lemma. **Lodicules** 2, fleshy, broadly cuneate. **Stamens** 3. **Ovary** glabrous; styles distinct, short, plumose. **Caryopsis** oblate, slightly dorsally flattened; hilum short; embryo large. **Pedicelled spikelet** slightly longer than sessile spikelet, ovate, narrowly winged, bisexual, male or sterile; lower lemma present or 0, pedicel scarcely distinguishable from internode. **Photosynthetic pathway**: $C_4$; XyMS-. **Cytology**: $x = 7$.

**Species** 2, tropics, Africa, India, southern China and southern United States of America; 1 in southern Africa: *Hackelochloa granularis* (L.) Kuntze, Mpumalanga.

Species treatment by M.T. Nembudani.

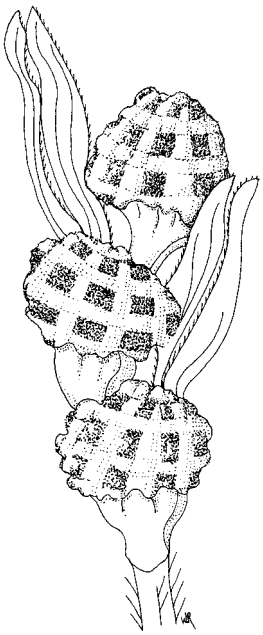


Figure 247.—*Hackelochloa granularis*. Portion of raceme with spikelet pairs: globose sessile and long pedicelled spikelets. Artist: W. Roux.



Figure 248.—*Hackelochloa granularis*. Spikelet pairs (1.0–1.5 mm). Photographer: M. Koekemoer.

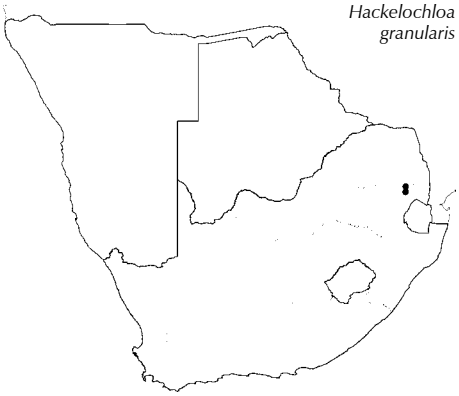
**Hackelochloa granularis** (L.) Kuntze, in *Revisio generum plantarum* 2: 776 (1891). Type: 'India Orientalis'.

LIZARD-TAIL GRASS

Annual 50–1 000 mm high, rough with tubercle-based, hispid hairs. Leaf blade 20–150 × 6–12 mm, rough. Sessile spikelet 1.0–1.5 mm long, pitted, tuberculate. Pedicelled spikelet 1.5–2.5 mm long.

*Flowering*: March to April. *Ecology*: Disturbed places. *Frequency in southern Africa*: Rare. *Distribution*: Throughout tropics. M. *Economics*: Weed.

Illustration: Clayton et al.: 848, fig. 200 (1982).
Voucher: *Parker 8-4-1959*.




## *Hainardia Greuter

Greuter: 178 (1967); Clayton & Renvoize: 111 (1986); Gibbs Russell et al.: 173, (1990); Watson & Dallwitz: 440 (1994); Sell & Murrell: 169 (1996); Smith 689 (2007).

[Formerly known as *Monerma*, a superfluous name for *Lepturus* R.Br.]

Tufted annual. **Leaf blade** expanded or rolled; *ligule* an unfringed membrane. **Inflorescence** a single cylindrical spike on a hard, articulated rachis; rachis fragile; *spikelets* edgeways on, alternating and sunk into rachis but longer than internodes, solitary at point of attachment to rachis. **Spikelet** dorsiventrally compressed, falling with the glumes; *lower glume* suppressed except on terminal spikelets, *upper glume* 5–8 mm long, as long as spikelet, abaxial, 3–7(–9)-nerved, glabrous, awnless. **Floret** 1, bisexual; *lemma* less firm than upper glume, membranous, glabrous, 3-nerved, laterals short, awnless; *palea* present. **Lodicules** 2, membranous, glabrous. **Stamens** 1–3.



Figure 249.—*Hainardia cylindrica*. Several spikelets (5–8 mm) on rachis. Photographer: M. Koekemoer.

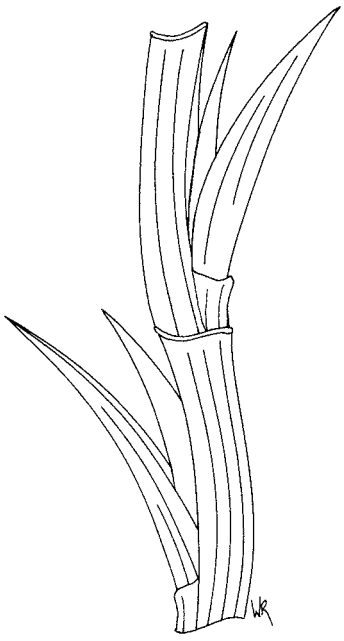
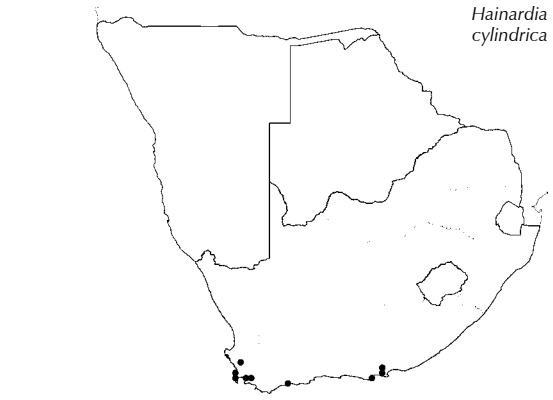


Figure 250.—*Hainardia cylindrica*. Portion of rachis with two spikelets (lateral view). Artist: W. Roux.



Figure 251.—*Hainardia cylindrica*. Artist: W. Roux.



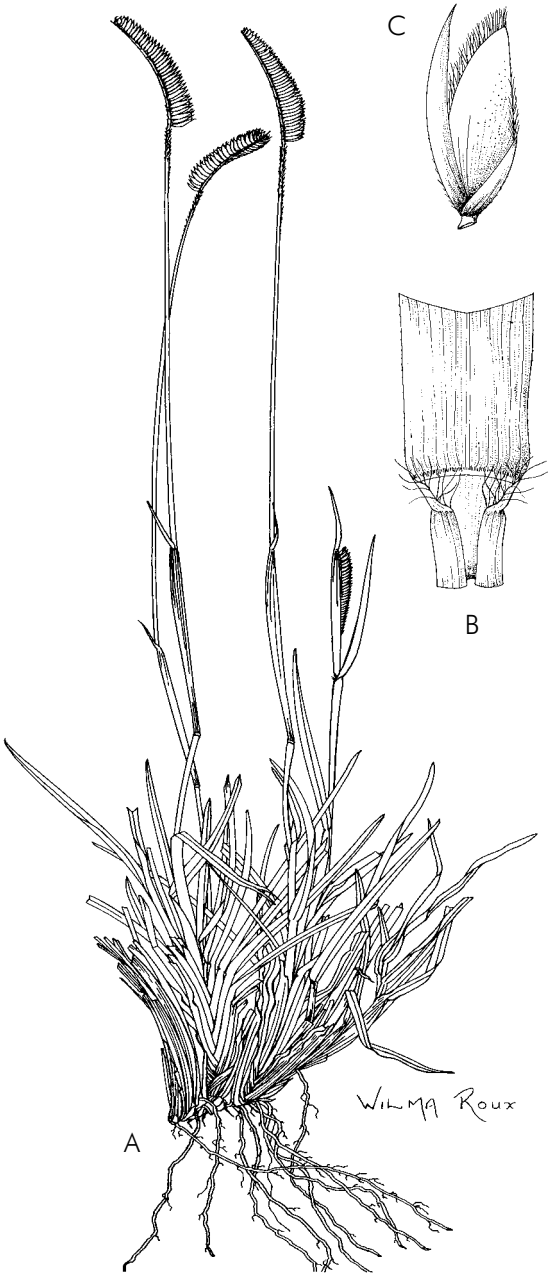




Figure 252.—*Harpochloa falx*. A, plant; B, ligule; C, spikelet. Artist: W. Roux.

**Ovary** glabrous. **Caryopsis** oblong, somewhat dorsally compressed with an appendage at apex; hilum short; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 13$ (polyploidy).

**Species** 1, Mediterranean region: **Hainardia cylindrica* (Willd.) Greuter, naturalised in coastal districts of the Western and Eastern Cape regions.

Species treatment by M.J. Moeaha.

**Quick guide to easily confused genera/taxa:**

1. Spikelet with one floret, rachilla sometimes present . . . . . 2
   Spikelet with two to many florets, upper florets may be sterile and reduced to lemmas or differing in size and shape . . . . . 3
2. Glume one, lower glume suppressed except in terminal spikelets . . . . . ***Hainardia**
   Glumes two, displaced side by side . . . . . ***Parapholis**
3(1). Spikelet laterally compressed, disarticulating above glumes; lemma 5–7-nerved; ligule an unfringed membrane . . . . . ***Lolium rigidium**
   Spikelet dorsiventrally compressed, falling with glumes; lemma 3-nerved; ligule a fringed membrane . . . . . **Lepturus repens**

***Hainardia cylindrica** (Willd.) Greuter, in *Boissiera* 13: 178 (1967). Type: Europe.

Erect annual 50–350 mm high. Leaf blade 7 × to 2.5 mm. Inflorescence a cylindrical, solitary spike; spikelets sunk in the rachis. Spikelet 5–8 mm long; glume 1, lower glume suppressed except in terminal spikelets, which has both glumes present; floret 1; anthers 1.0–1.5 mm long.

*Flowering*: November to December. *Ecology*: In moist places; salt tolerant. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from southern Europe and Mediterranean. WC, EC. *Economics*: Weed.

Illustration: Chippindall: 173 & 366, fig. 45 (1955); Smith: 690 (2007).
Anatomy vouchers: *Ellis 664* & *5140*.
Voucher: *Adamson 3309*.

## **Harpochloa** Kunth

Kunth: 92 (1829) as *Harpechloa*; Stapf: 639 (1900) as *Harpechloa*; Chippindall: 191 (1955) as *Harpechloa*; Pilger: 101 (1956); Clayton & Renvoize: 241 (1986); Gibbs Russell et al.: 174 (1990); Watson & Dallwitz: 444 (1994).

Perennial, densely tufted; rhizomatous. **Culms** flattened. **Leaf blade** stiff, linear, expanded, folded or rolled, strongly keeled; *ligule* a minute, fringed membrane. **Inflorescence** a solitary (rarely 2), 1-sided spike; rachis pubescent or woolly; *spikelets* solitary, sessile, arranged in 2 rows on abaxial side of rachis. **Spikelet** laterally compressed, darkly pigmented, disarticulating above glumes, not between florets; *glumes* unequal, dissimilar, membranous or subcoriaceous, awnless; lower glume less than half as long as upper glume, 1-keeled, 1-nerved; upper glume ± as long as spikelet, boat-shaped, somewhat falcate, 3-nerved, 2-keeled, scabrid on keels. **Florets** 2–4; *lowest floret* bisexual; *second* and *third* male, *fourth floret*, if present, sterile; lemmas dissimilar, decreasing in size upwards, 3-nerved,

awnless, *lowest lemma* sharply folded along keel, membranous, elliptic or elliptic-oblong, obtuse, long-hairy on nerves and margins, upper lemmas obovate or spathulate, rounded or almost truncate above, with 2 marginal nerves, glabrous; *palea* equalling or slightly longer than lemma, lanceolate or linear-lanceolate, hairy near apex. **Lodicules** cuneate, fleshy, narrowly 2-winged. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose. **Caryopsis** ellipsoid, trigonous, small (3 mm); hilum short; pericarp fused; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath extensions absent. PCR cell chloroplasts centripetal. **Cytology**: $x = 10$ (polyploidy).

**Species** ± 2, central and southern Africa; 1 in southern Africa: *Harpochloa falx* (L.f.) Kuntze, Swaziland, North West, Limpopo, Gauteng, Free State, KwaZulu-Natal, Western and Eastern Cape.

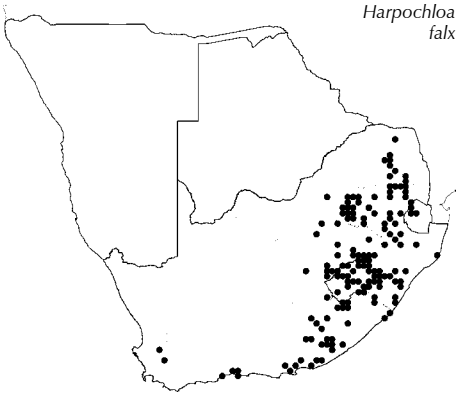
Species treatment by A.C. Mashau.



Figure 253.—*Harpochloa falx* spikelet (6–9 mm). Photographer: M. Koekemoer.

**Harpochloa falx** (L.f.) Kuntze, in *Revisio generum plantarum vascularium omnium*: 746. (1891). Type: South Africa, without precise locality, *Thunberg*.

Caterpillar grass, ruspergras, lefokolodi




Tufted perennial 400–900 mm high; distinctly rhizomatous. Leaf blade 100–250 × 2–4(–6) mm, often in-rolled. Inflorescence a solitary one-sided 'toothbrush' up to 80 × 10 mm, sickle-shaped at maturity; spikelets in two rows. Spikelet 6–9 mm long, 3 to 4-flowered, awnless; glumes unequal, dissimilar in appearance and texture; lower glume less than $^1/_2$ as long as upper glume; upper glume ± as long as spikelet; lemma 3-nerved; lowest lemma nerves hairy; anther 2.0–2.5 mm long.

*Flowering*: September to April. *Ecology*: Stony, well-drained to compacted soils; on moist slopes and usually in undisturbed mountain grassland. One of the first grasses to flower in spring and after a burn. *Frequency in southern Africa*: Locally common and often in large dense stands. *Distribution*: Endemic. S, L, LIM, NW, G, M, FS, KZN, WC, EC. *Economics*: Palatable especially early in the season; appears to be able to withstand heavy grazing and trampling.

Illustration: Chippindall: 190, fig. 166 (1955).
Anatomy vouchers: *Ellis 50, 1372, 1376, 1422 & 1484*.
Voucher: *Van Wyk & Theron 4706*.

## **Helictotrichon** Besser

Besser: 526 ['326'] (1827); Stapf: 472 (1899) under *Avenastrum* Jess.; Stent: 284 (1924) under *Avenastrum* Jess.; Schweickerdt: 185 (1937); Phillips: 118 (1951); Chippindall: 76 (1955); Clayton: 86 (1970); Sevenster & Veldkamp: 329 (1983); Clayton & Renvoize: 123 (1986); Gibbs Russell et al.: 175, Figure 4 (1990); Watson & Dallwitz: 446 (1994); Mashau et al.: 179, 184 (2010); Wölk & Röser: 57 (2013).

Perennial, tufted. **Leaf blade** linear, expanded or folded, sometimes setaceous, glabrous or hairy; *ligule* a hyaline or scarious, unfringed membrane. **Inflorescence** a panicle, open, contracted to spike-like, erect or nodding; *spikelets* solitary, pedicelled. **Spikelet** large, 7–30 mm long (excluding awns), laterally compressed, disarticulating above glumes and between florets; *glumes* ± equal or unequal, usually shorter than spikelet, hyaline or subhyaline, acute, acuminate or shortly awned, ±




Figure 254.—*Helictotrichon hirtulum*. A, plant; B, ligule. Artist: C. Bartman.



Figure 255.—*Helictotrichon hirtulum*. Spikelet (10–12 mm). Photographer: M. Koekemoer.

keeled; lower glume 1–3-nerved; upper glume 3(–7)-nerved. **Florets** 2–6, bisexual; *uppermost floret* male, sterile or reduced; rachilla internode up to 45 mm long, hairy, rarely glabrous, sometimes produced as a short bristle beyond uppermost floret; *lemma* firmer than glumes, firmly membranous to leathery with scarious or hyaline apices, surface glabrous, granular, smooth or papillae, scabrid, scaberulous or mixed with papillae, rounded on back, acute or acuminate, 5–11-nerved, 2-lobed (rarely 4-lobed), lobes awnless or awned; central *awn* from upper part of back between lobes, awn longer than body of lemma, geniculate and twisted, or only slightly so; *callus* hairy; *palea* shorter than lemma, 2-keeled, ciliate. **Lodicules** 2, large, hyaline. **Stamens** 3. **Ovary** hairy from above middle or at apex only; styles distinct, short, plumose. **Caryopsis** hilum long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (high polyploidy).

**Species** ± 70, mainly temperate Eurasia, but extending across the tropical mountains to temperate regions throughout the world; ± 14 in southern Africa, Swaziland, Lesotho, Limpopo, North West, Gauteng, Mpumalanga, Free State, KwaZulu-Natal, Northern Cape, Western Cape and Eastern Cape.

Species treatment by A.C. Mashau.

### Key to species:

*Do not mistake the hairs on the densely hairy callus for the rachilla hairs. The internode measurement is between the lowest floret and next one above.*

1. Rachilla internode glabrous . . . . . **H. leoninum**
   Rachilla internode sparsely or densely hairy . . . . . 2
2. Rachilla internode 2.5–4.5 mm long; spikelets usually loosely flowered (except closely flowered in *H. roggeveldense*) . . . . . 3
   Rachilla internode up to 2.3 mm long; spikelets usually closely flowered, if loosely flowered then leaves setaceous . . . . . 8
3. Spikelets closely flowered, rachilla usually not showing . . . . . **H. roggeveldense**
   Spikelets loosely flowered, rachilla usually exposed between florets . . . . . 4
4. Spikelets fewer than 20; leaves setaceous . . . . . **H. rogerellisii**
   Spikelets more than 20; leaves expanded or folded . . . . . 5
5. Lemma back scabrid or granular almost to the base, or at least for more than half the distance between the central awn insertion and lemma base; palea keels conspicuously hairy . . . . . 6
   Lemma smooth or minutely granular below central awn insertion, rarely slightly scabrid almost throughout; palea keels minutely and inconspicuously hairy . . . . . 7
6. Lemma nerves raised, scabrid below awn insertion and across in a band to margins, rest of body scaberulous; rachilla internode 3 mm long . . . . . **H. namaquense**
   Lemma nerves prominently raised, finely granular only between nerves; rachilla internode 3.5–4.5 mm long . . . **H. quinquesetum**
7(5). Rachilla internode bearded almost to the base with hairs up to 3 mm long; lemma minutely granular below central awn insertion . . . . . **H. longum**

Rachilla internode bearded on the upper two-thirds with hairs 5 to 6 mm long; lemma smooth below central awn insertion . . . . . **H. barbatum**

8(2). Lemma scabrid, scaberulous or mixed with papillae . . . . . 9
Lemma glabrous, granular, smooth or papillate . . . . . 11

9. Upper glume as long as spikelet, broadly lanceolate, almost enclosing the spikelet, usually scabrous especially on the nerves . . . . . **H. galpinii**
Upper glume $^2/_3$ as long as spikelet, narrowly lanceolate, glabrous . . . . . 10

10. Rachilla internode 1.5–2.0 mm long, hairs to 2 mm long; panicle contracted, almost spike-like . . . . . **H. hirtulum**
Rachilla internode 2 mm long, hairs 3 mm long; panicle open . . . . . **H. capense**

11(8). Lowest lemma shorter than 7 mm from the lemma base to the lobe base, nerves usually raised . . . . . **H. natalense**
Lowest lemma longer than 7 mm from the lemma base to the lobe base, nerves usually inconspicuous . . . . . 12

12. Spikelet 12–15 mm long (excluding awns); lemma lobe 6–8 mm long (including awns) above central awn insertion; panicle usually very dense and contracted; spikelet yellowish . . . . . **H. dodii**
Spikelet 8–12 mm long (excluding awns); lemma lobe 3–5 mm long (including awns) from above central awn insertion; panicle open or slightly contracted; spikelet green, often variegated with purple . . . . . 13

13. Leaf setaceous, 200–400 mm long; rachilla hair 3–4 mm long; spikelets loosely flowered, rachilla exposed between florets . . . . . **H. longifolium**
Leaf expanded, 60–150 mm long; rachilla hair 2 mm long; spikelets closely flowered, rachilla not showing . . . . . **H. turgidulum**

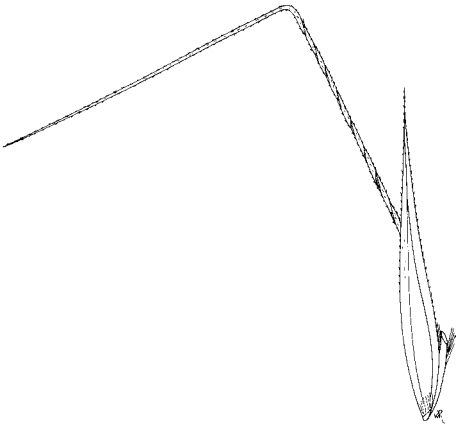


Figure 256.—*Helictotrichon hirtulum*. Lateral view of lemma with rachilla internode. Artist: W. Roux.

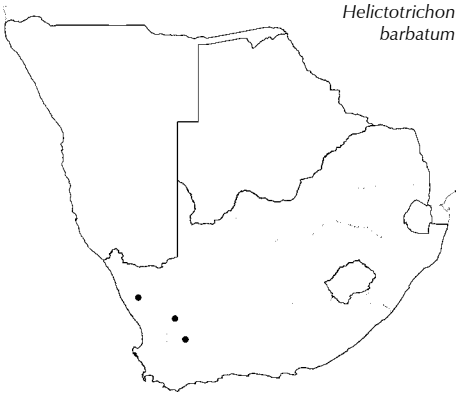
**Helictotrichon barbatum** (Nees) Schweick., in *Bothalia* 3: 190, f. 4 (1937). Type: South Africa, Northern Cape, Namaqualand, on the Kamiesbergen, Nov., *Drège 2572b* (in Herb-Nees. et in Herb. Mus. Austr.-Afric.).

Alternate name: *Trisetopsis barbata* (Nees) Röser & A.Wölk

Densely tufted perennial 600–800 mm high. Leaf blade 150–320 × 1.5–3.5 mm, narrowly linear, expanded. Inflorescence 80–100 mm long, oblong, open. Spikelet 14–17 mm long (excluding awns), usually loosely flowered; glumes unequal, lanceolate, acute to acuminate; lower glume acute, 1-nerved, glabrous but scaberulous along the nerve; upper glume longer than $^1/_2$ as long as spikelet, 3-nerved; rachilla internode 3.0–3.5 mm long, bearded with white hairs 5 to 6 mm long; lemma narrowly lanceolate, smooth or minutely granular below central awn insertion, minutely scabrid on the nerves upwards; palea keels minutely and inconspicuously hairy; anther 2.6–2.8 mm long.

*Flowering*: November. *Ecology*: Lower mountain slopes. *Frequency in southern Africa*: Very rare. *Distribution*: Endemic. NC.

Illustrations: Schweickerdt: 201, fig. IV (1937); Chippindall: 78, fig. 48(8) (1955).
Voucher: *Acocks 18632*.

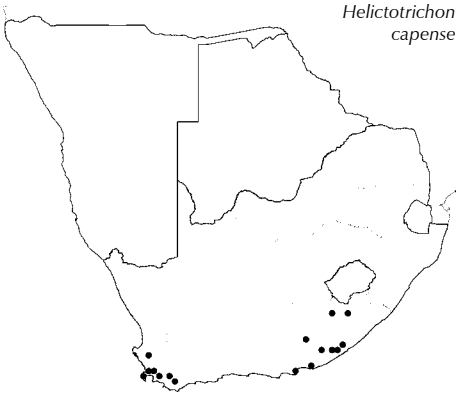


*Helictotrichon barbatum*

**Helictotrichon capense** Schweick., in *Bothalia* 3: 193, f. 7 (1937). Type: South Africa, Eastern Cape, Komgha district: near Komgha, *Flanagan 935*.

Alternate name: *Trisetopsis capensis* (Schweick.) Röser & A.Wölk

Tufted perennial to 1 000 mm high. Leaf blade to 250 × 1–2 mm, filiform, expanded. Panicle to 200 mm long, open. Spikelet 10–15 mm long (excluding awns), usually closely flowered; glumes unequal,



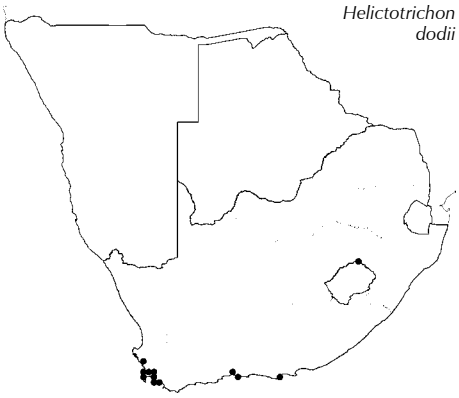
*Helictotrichon capense*

narrowly lanceolate, acuminate; lower glume 1-nerved, glabrous, scaberulous along the nerve; upper glume $^2/_3$ as long as spikelet, 3-nerved; rachilla internodes 2 mm long, with hairs 3 mm long; lemma linear-lanceolate, scabrous below central awn insertion; anther 2.5–3.0 mm long.

[A poorly defined species that is usually larger than *H. hirtulum* in all dimensions.]

*Flowering*: November, December and May. *Ecology*: Sandy soils; occasionally in disturbed places. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. WC, EC.

Illustration: Schweickerdt: 202, fig. VII (1937); Chippindall: 78, fig. 48(3) & 49 (1955).
Anatomy voucher: *Ellis 610*.
Voucher: *Sim 2803*.


*Helictotrichon dodii*

**Helictotrichon dodii** (Stapf) Schweick., in *Bothalia* 3: 197, f. 12 (1937). Type: South Africa, Western Cape, wet slopes near Oatlands Point, *Wolley-Dod 2775*.

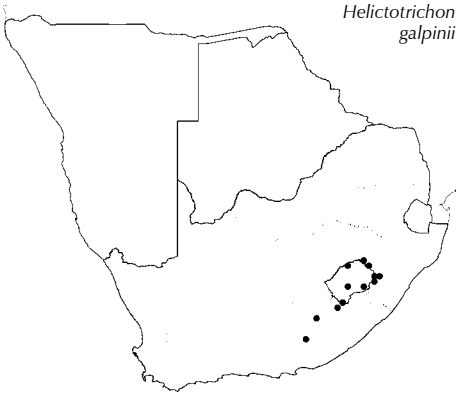
Alternate name: *Trisetopsis dodii* (Stapf) Röser & A.Wölk

Tufted perennial 500–1 000(–1 250) mm high. Leaf blade 300–500 × 3–5 mm, expanded. Inflorescence 120–300 mm long, narrow, contracted, usually dense. Spikelet 12–15 mm long (excluding awns), usually closely flowered; glumes subequal, lanceolate, acuminate; lower glume 1-nerved, glabrous, scaberulous along the nerve; upper glume $^2/_3$ as long as spikelet, 3-nerved; rachilla internode 2 mm long, with hairs 3.0–3.5 mm long; lemma lanceolate, glabrous, linear in outline, lobes 6–8 mm long, slender and delicate; lowest lemma longer than 7 mm from the base to where lobes start; anther 1.3–2.5 mm long.

[The very dense, contracted panicle and long lemma lobes make this a very well defined species. Similar to *H. turgidulum*, which has a shorter lemma lobe 3–5 mm long (including awn); *H. natalense*, which has a shorter spikelet (7–9 mm long); and *H. longifolium*, which has setaceous leaves.]

*Flowering*: Sporadic, but mainly October to December. *Ecology*: On coastal sand flats, disturbed places and vlei margins. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. FS, WC, EC.

Illustrations: Schweickerdt: 203, fig. XII (1937); Chippindall: 78, fig. 48(12) (1955).
Anatomy voucher: *Ellis 6005*.
Voucher: *Pole Evans 518*.


*Helictotrichon galpinii*

**Helictotrichon galpinii** Schweick., in *Bothalia* 3: 192, f. 6 (1937). Type: South Africa, Eastern Cape, Barkly East district, on Ben McDhui (Wittebergen), March, *Galpin 6902*, pro parte (PRE).

Alternate name: *Trisetopsis galpinii* (Schweick.) Röser & A.Wölk

Tufted perennial to 600 mm high. Leaf blade 120–160 × 2.5–3.0 mm, expanded, hairy. Inflorescence 100–160 mm long, contracted. Spikelet 8–10 mm long (excluding awns), usually closely flowered; glumes almost equal, broadly lanceolate, acuminate; lower glume 1-nerved, glabrous, minutely scaberulous along the nerve; upper glume as long as spikelet, 3-nerved; rachilla internode 1.25 mm long, with hairs 3 mm long; lemma lanceolate, scabrid and with papillae; anther 1.3–2.5 mm long.

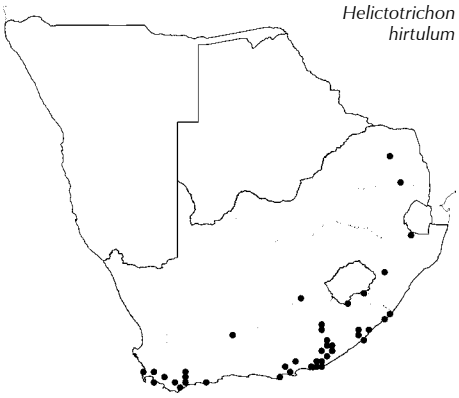
[Readily distinguished by glumes, which are broad, and as long as the spikelet and the scabrid lemma.]

*Flowering*: January to March. *Ecology*: On humic soils in wet places. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. L, KZN, EC.

Illustrations: Schweickerdt: 203, fig. IX (1937); Chippindall: 78, fig. 48(10) (1955).
Anatomy vouchers: *Ellis 1389, 1394* & *1401*.
Voucher: *Du Toit 2311*.

**Helictotrichon hirtulum** (Steud.) Schweick., in *Bothalia* 3: 193, f. 8 (1937). Type: South Africa, Eastern Cape, Olifantshoek ad flumen Boschesmanrivier (Uitenhage), *Ecklon s.n*.

Alternate name: *Trisetopsis hirtula* (Steud.) Röser & A.Wölk


*Helictotrichon hirtulum*

Loosely tufted, slender, weak perennial to 1 000 mm high. Leaf blade to 250 × to 2 mm, filiform. Inflorescence to 200 mm long, contracted, almost spike-like. Spikelet 8–11 mm long (excluding awns), usually closely flowered; glumes unequal, narrowly lanceolate, acute; lower glume 1-nerved, glabrous, minutely scaberulous along the nerve; upper glume to $^{2}/_{3}$ as long as spikelet, 3-nerved; rachilla internode 1.5–2.0 mm long, with hairs to 2 mm long; lemma lanceolate, scabrid below the central awn insertion; anther 0.6–1.6 mm long.

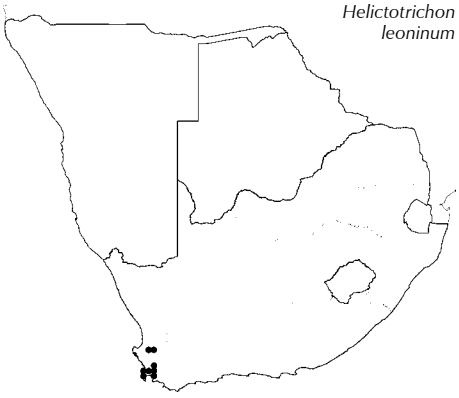
[Very similar to *H. capense*, which is normally a larger, more robust plant.]

*Flowering*: November to March. *Ecology*: On mountain slopes; often in shady, wet places and also in disturbed areas. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Endemic. L, LIM, M, FS, KZN, WC, EC.

Illustrations: Schweickerdt: 202, fig. VIII (1937); Chippindall: 78, fig. 48(2) (1955).
Anatomy vouchers: *Ellis 589, 2609, 5186* & *5678*.
Voucher: *Sim 2803*.

**Helictotrichon leoninum** (Steud.) Schweick., in *Bothalia* 3: 191, f. 5 (1937). Type: South Africa, Western Cape, Lion's Head Mountain, *Ecklon 928*.

Alternate name: *Trisetopsis leonine* (Steud.) Röser & A.Wölk

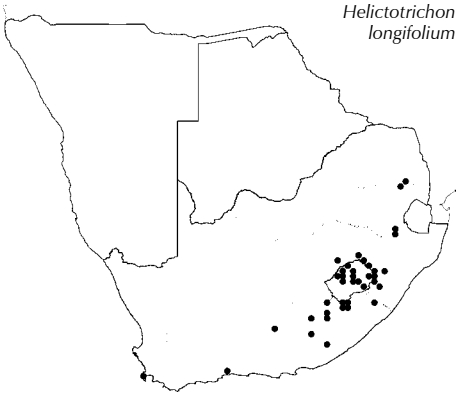

*Helictotrichon leoninum*

Loosely to fairly densely tufted perennial 150–450(–650) mm high. Leaf blade 40–100(–180) × to 4 mm, expanded, tapering to a thickened point. Inflorescence 60–100 mm long, linear, contracted. Spikelet 12–14 mm long (excluding awns), usually loosely flowered; glumes unequal, lanceolate, acuminate; lower glume 1-nerved, glabrous, minutely scaberulous along the nerve; upper glume about $^{1}/_{2}$ as long as spikelet, 3-nerved; rachilla internode 1.5–2.0 mm long, glabrous; lemma lanceolate, very densely papillose; anther 1.7–3.0 mm long.

[This is the only southern African *Helictotrichon* species with glabrous rachilla internodes.]

*Flowering*: August to November. *Ecology*: On mountain slopes, along mountain roads and in humic seepage areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. WC.

Illustrations: Schweickerdt: 202, fig. V (1937); Chippindall: 78, fig. 48(6) (1955).
Anatomy vouchers: *Ellis 2252, 2253* & *5124*.
Voucher: *Du Toit 1419*.


*Helictotrichon longifolium*

**Helictotrichon longifolium** (Nees) Schweick., in *Bothalia* 3: 195, f. 10 (1937). Type: South Africa, Eastern Cape, Aliwal North Distr.: Wittebergen, on rocks, 7,500 ft., *Drège 8134*, (Herb. Nees, lecto.).

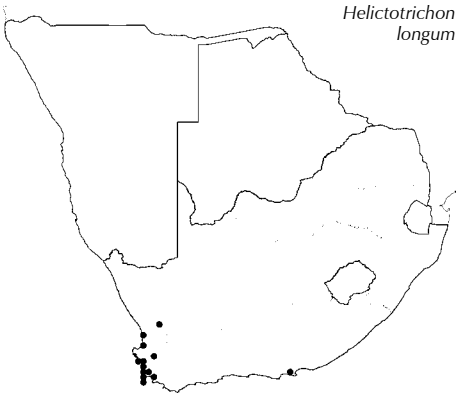
Alternate name: *Trisetopsis longifolia* (Nees) Röser & A.Wölk

Tufted perennial 300–900 mm high. Leaf blade 200–400 × to 1.5 mm, setaceous. Inflorescence to 200 mm long, usually open. Spikelet 8–10(–12) mm long (excluding awns), usually loosely flowered; glumes unequal, very narrowly lanceolate, acuminate; lower glume glabrous, scaberulous along the nerve, 1-nerved; upper glume about $^3/_4$ as long as spikelet, 3-nerved; rachilla internode about 2 mm long, with hairs 3–4 mm long; lemma linear-lanceolate, smooth or finely papillate, lobes shorter than 7 mm from above the central awn insertion; lowest lemma longer than 7 mm from the base to where lobes start; anther 0.6–3.3 mm long.

[Close to *H. dodii*, which has an expanded leaf blade and longer spikelet, 12–15 mm long; *H. turgidulum*, which has shorter rachilla hairs, to 2 mm long and an expanded leaf blade; and to *H. natalense*, which has a shorter spikelet, 7–9 mm long.]

*Flowering*: December to April. *Ecology*: On moist and rocky mountain slopes. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. L, M, FS, KZN, WC, EC.

Illustration: Schweickerdt: 203, fig. X (1937).
Anatomy vouchers: *Ellis 670, 671, 1419, 576 & 5677.*
Voucher: *Smook 1375*.


*Helictotrichon longum*

**Helictotrichon longum** (Stapf) Schweick., in *Bothalia* 3: 189, f. 2 (1937). Type: South Africa, Cape Colony, Cape Good of Hope, *R. Brown*; Western Cape, Cape flats, Doorn Hoogte, *Ecklon & Zeyher 1807, 1807B* in USN Herb. (syntypes).

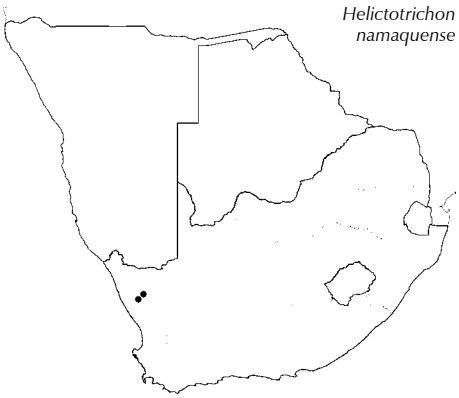
Alternate name: *Trisetopsis longa* (Stapf) Röser & A.Wölk

Tufted perennial 600–1 100(–1 600) mm high, long rhizomatous with new shoots spreading for a short distance underground before emergence. Leaf blade 150–300(–400) × 2.5–10.0 mm, expanded, tapering into a fine point. Inflorescence 150–300 mm long, linear, usually contracted. Spikelet 15–30 mm long (excluding awns), usually loosely flowered; glumes unequal, broadly lanceolate, acuminate; lower glume 1–3-nerved, glabrous, minutely scaberulous along the nerve(s); upper glume shorter than $^1/_2$ as long as spikelet, 3-nerved; rachilla internode 2.5–3.0 mm long, bearded, with hairs up to 3 mm long; lemma lanceolate, smooth or minutely granular below the central awn insertion; palea keels minutely and inconspicuously hairy; anther 3.6–5.1 mm long.

[A very distinct tall plant with expanded, wide leaf blades and both inflorescence and spikelets long.]

*Flowering*: September to November. *Ecology*: Sandy flats in coastal fynbos, occasionally in moist areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. NC, WC, EC.

Illustrations: Schweickerdt: 201, fig. II (1937); Chippindall: 78, fig. 48(5) (1955).
Anatomy vouchers: *Ellis 702, 5432 & 5441.*
Voucher: *Acocks 19730*.


*Helictotrichon namaquense*

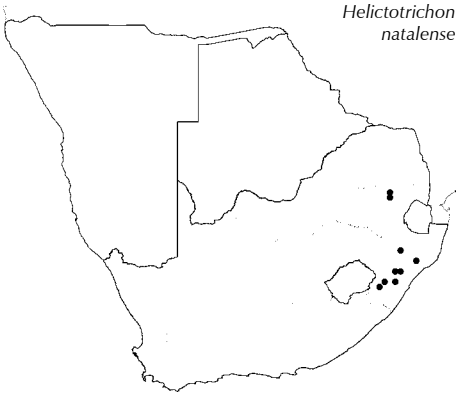
**Helictotrichon namaquense** Schweick., in *Bothalia* 3: 189, f. 9 (1937). Type: South Africa, Northern Cape, Namaqualand, Kamiesbergen steinige Berggegend bei Ezelsfontein, *Drège 2526*.

Alternate name: *Trisetopsis namaquensis* (Schweick.) Röser & A.Wölk

Densely tufted perennial up to 450 mm high, culm slender, glabrous, 2-noded. Leaves mainly basal; sheath margins membranous; leaf blade 30–100 × to 2 mm, expanded, narrowed towards apex, apex boat-shaped, strongly ribbed, both surfaces hairy; ligule an unfringed membrane, 1.5 mm long, laciniate or erose. Inflorescence open, with up to 10 spikelets, branches long and flexible, bare for most of their length; purple (usually) pulvinus present in axils; branches and pedicels scabrid; pedicels unequal. Spikelet 13–20 × to 4.5 mm (excluding awns), laterally compressed, loosely 3–4-flowered, pallid occasionally flushed purple; glumes unequal, narrowly lanceolate, acute to acuminate, hairy on upper margins; lower glume $^2/_3$ as long as upper glume, 1-nerved; upper glume slightly shorter to ± as long as spikelet, 3-nerved; rachilla internode 3 mm long, densely hairy on upper half; lemma scabrid below awn insertion and across in a band to margins, rest of body scaberulous, nerves raised, 7-nerved, 2-lobed; lobe 5 mm long (including awn) from above central awn insertion, awn 3.5–4.5 mm long; central awn 17–23 mm long, twisted below, geniculate, scabrid; callus 1 mm long, apex cuneate, hairy all over except on disarticulation scar; palea 2-toothed, 2-keeled, keels hairy; anther up to 4.5 mm long, yellow.

*Flowering*: October. *Ecology*: Mainly in granite and gneisses, which give rise to deep sandy loamy soils; sandy flats in Renosterveld. *Frequency in southern Africa*: Rare. Locally common. *Distribution*: Endemic. NC.

Illustrations: Schweickerdt: 201, fig. III (1937); Chippindall: 78, fig. 48(4) (1955).
Anatomy voucher: *Ellis 5997*.
Voucher: *Ellis 5997*.


*Helictotrichon natalense*

**Helictotrichon natalense** (Stapf) Schweick., in *Bothalia* 3: 194, f. 9 (1937). Type: South Africa, KwaZulu-Natal, Umvoti district: Rietvlei, *Buchanan 238*.

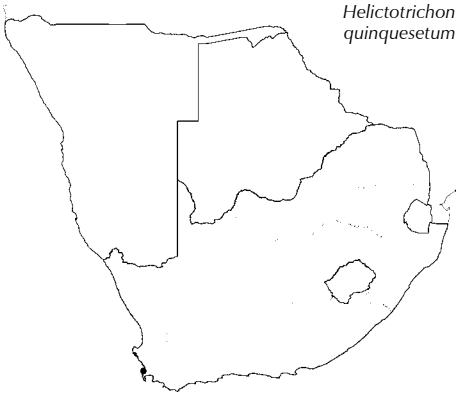
Alternate name: *Trisetopsis natalensis* (Stapf) Röser & A.Wölk

Tufted perennial, 400–800(–1 000) mm high. Leaf blade 100–250 × 3–5 mm, expanded. Inflorescence to 250 mm long, usually open, with branches spreading. Spikelet 7–9 mm long (excluding awns), usually closely flowered; glumes unequal, acuminate; lower glume linear-lanceolate, 1-nerved, glabrous, scaberulous along the nerve; upper glume $^2/_3$ as long as spikelet, 3-nerved; rachilla internode about 1.5 mm long, hairs 3 mm long; lemma lanceolate, glabrous, minutely granular, usually smooth, nerves usually raised, central awn column a loose spiral; lowest lemma shorter than 7 mm from the base to where lobes start; anther 1.6–2.4 mm long.

[Close to *H. longifolium*, which has setaceous leaves and longer spikelets 8–10(–12) mm long; and *H. turgidulum* and *H. dodii*, which have longer spikelets, 6–8 mm long.]

*Flowering*: November to January. *Ecology*: On rocky hillsides and in wet places such as streamsides. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Endemic. M, KZN.

Illustrations: Schweickerdt: 203, fig. IX (1937); Chippindall: 78, fig. 48(1) (1955).
Voucher: *De Wet 1722*.


*Helictotrichon quinquesetum*

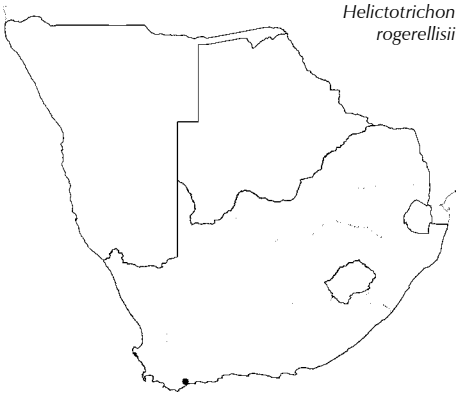
**Helictotrichon quinquesetum** (Steud.) Schweick., in *Bothalia* 3: 188, f. 1 (1937). Type: South Africa, Western Cape: Table Mountain, near Cape Town, *Ecklon 929*.

Alternate name: *Trisetopsis quinqueseta* (Steud.) Röser & A.Wölk

Tufted perennial 500–750 mm high. Leaf blade to 250 × to 4 mm, conduplicate or expanded. Inflorescence 120–180 mm long, contracted, almost spike-like. Spikelet 12–18 mm long (excluding awns), usually loosely flowered; glumes unequal, narrowly lanceolate, acuminate; lower glume 1-nerved, glabrous, scaberulous along the nerve; upper glume $^2/_3$ as long as spikelet, 3-nerved; rachilla internode 3.5–4.5 mm long, with hairs to 4 mm long; lemma linear-lanceolate, finely granular, nerves raised prominently; palea keels conspicuously hairy; anther 2.5 mm long.

*Ecology*: Slopes of Table Mountain. *Frequency in southern Africa*: Extremely rare. Represented in most herbaria only by duplicates of the type specimen, *Ecklon 929*. *Distribution*: Endemic. WC.

Illustration: Schweickerdt: 201, fig. I (1937); Chippindall: 78, fig. 48(9) (1955).
Voucher: *Ecklon 929*.


*Helictotrichon rogerellisii*

**Helictotrichon rogerellisii** Mashau, Fish & A.E.van Wyk, in *Bothalia* 40: 179 (2010). Type: South Africa, Western Cape, (Bredasdorp District): 2 km from De Hoop Nature Reserve entrance, on road to Wydgelegen, *R.P. Ellis 4663* (PRE, holo.).

Alternate name: *Trisetopsis rogerellisii* (Mashau, Fish & A.E.van Wyk) Röser & A.Wölk

Densely tufted perennial 300–600 mm high. Leaf blade 100–200 × to 1.5 mm, setaceous. Inflorescence open; branches spreading, bare for most of their length; spikelets fewer than 20. Spikelet 13–18 mm long (excluding awns), usually loosely flowered; glumes unequal, narrowly lanceolate, acute; lower glume 1-nerved, glabrous even along the nerve; upper glume about $^2/_3$ as long as spikelet, 3-nerved; rachilla internode 2.8–3.3 mm long, densely hairy; lemma glabrous, lobe 1.5–2.5 mm long from above the central awn insertion; anther 3.8 mm long.

[This species has setaceous leaves, an open, lax panicle with very few spikelets and long rachilla internodes. This combination of characters is not matched in any other southern African *Helictotrichon* species.]

*Flowering*: October. *Ecology*: In shallow humic soils between limestone outcrops. *Frequency in southern Africa*: Rare. *Distribution*: Collected by Ellis on two occasions at De Hoop. WC.

Anatomy voucher: *Ellis 4663*.
Voucher: *Ellis 4663*

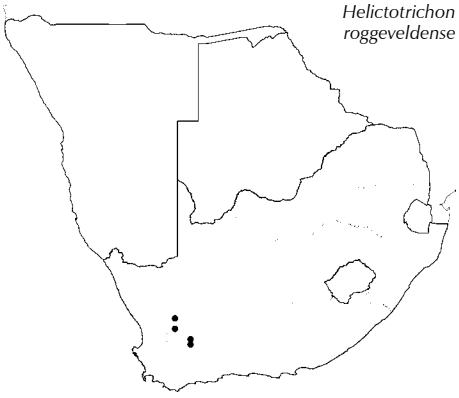
**Helictotrichon roggeveldense** Mashau, Fish & A.E.van Wyk, in *Bothalia* 40: 179 (2010). Type: South Africa, Northern Cape, (Sutherland): Geelhoek (Vyffontein), *J.P.H. Acocks 17178* (PRE, holo.).

Alternate name: *Trisetopsis roggeveldensis* (Mashau, Fish & A.E.van Wyk) Röser & A.Wölk

Densely tufted perennial 250–280 mm high; culms slender, 1- or 2-noded. Leaves mainly basal; sheath strongly ribbed, margins membranous; leaf blade 80–180 × 2–3 mm, expanded or convolute, nar-

rowed towards apex, apex boat-shaped, strongly ribbed, both surfaces hairy; ligule an unfringed membrane, 1.5–2.8 mm long, laciniate or erose. Inflorescence contracted; lower branches sometimes spreading; branches and pedicels scabrid; pulvini in axils absent; spikelets 15–18; pedicels unequal in length. Spikelet 10–17 × 2.5–3.0 mm (excluding awns), laterally compressed, closely 2- or 3-flowered, pallid (light green) occasionally flushed purple; rachilla internode 2.5–3.0 mm long, densely hairy on upper half, hairs 4.0–6.5 mm long; glumes unequal, lanceolate, acuminate, minutely ciliate on upper margins; lower glume $^1/_2$–$^2/_3$ as long as upper glume, 1-nerved; upper glume ± as long as spikelet (excluding awns), 3-nerved; lemma body densely scabrid, smooth at base, nerves conspicuous, apex 2-lobed; lobes 5–7 mm long (excluding awn) from insertion of central awn to apex, awn 3–5 mm long; central awn 12–25 mm long, twisted below, geniculate, scabrid; callus 1 mm long, apex cuneate, hairy all over except on disarticulation scar, hairs up to 6 mm long; palea emarginate, apex fimbriate, 2-keeled, keels hairy; anthers 1.7–2.6 mm long, yellow.

*Helictotrichon roggeveldense*



*Flowering*: September. *Ecology*: Mainly on sandy to clayey soils derived from shale; Renosterveld. *Frequency in southern Africa*: Rare. *Distribution*: NC.

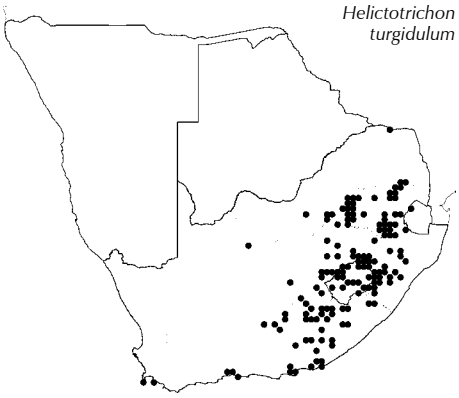
Illustration: Mashau et al.: 180, fig. 8 (2010).
Anatomy voucher: *Ellis 5117*.
Voucher: *Acocks 17178*.

**Helictotrichon turgidulum** (Stapf) Schweick., in *Bothalia* 3: 196, f. 11 (1937). Type: South Africa, Cape Colony: without locality, *Zeyher 463*.

Alternate name: *Trisetopsis turgidula* (Stapf) Röser & A.Wölk

Small oats grass

*Helictotrichon turgidulum*



Tufted perennial 300–1 000 mm high. Leaf blade 60–150(–250) × 1.5–6.0 mm, expanded. Inflorescence 70–300 mm long, open or contracted, often interrupted. Spikelet 10–12 mm long (excluding awns), usually closely flowered; glumes broadly lanceolate, acuminate; lower glume 1-nerved, glabrous, scaberulous along the nerve; upper glume $^2/_3$ as long as spikelet, 3-nerved; rachilla internode 2 mm long, with hairs to 2 mm long; lemma oblong-lanceolate, glabrous, smooth or papillate, very often variegated with purple, lobes 3–5 mm long (including awn) from above the central awn insertion; lowest lemma longer than 7 mm from the base to where lobes start; anther 0.5–2.7 mm long.

[Vegetatively a very variable species and by far the most widespread of all the South African *Helictotrichon* species. Close to *H. dodii*, which has longer lemma lobes 6–8 mm long; *H. longifolium*, which has setaceous leaves; and *H. natalense*, which has a smaller spikelet (7–9 mm long).]

*Flowering*: October to April. *Ecology*: Usually in wet places on mountain slopes and in vleis, occasionally at roadsides. *Frequency in southern Africa*: Common. *Distribution*: Endemic. S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: It is a relatively valuable grazing grass that remains green until late in winter.

Illustrations: Schweickerdt: 203, fig. XII (1937); Chippindall: 78, fig. 48(7) & 50 (1955).
Anatomy vouchers: *Ellis 71, 1370, 1427, 1832, 3453* & *3529*.
Voucher: *Smook 2560*.



Figure 257.—*Hemarthria altissima*. Artist: G.E. Lawrence.

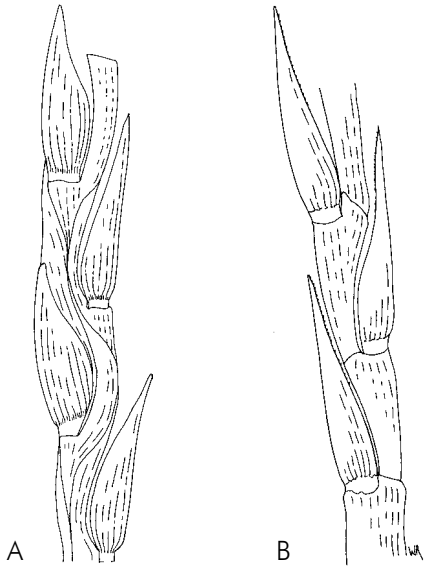



Figure 258.—*Hemarthria altissima*. A, portion of raceme showing sessile spikelets on clavate internodes; B, portion of raceme showing pedicelled spikelets on fused pedicels. Artist: W. Roux.

## **Hemarthria** R.Br.

Brown: 207 (1810); Stapf: 328 (1898) under *Rottboellia* L.f. subg. *Hemarthria* (R.Br.) Hack.; Chippindall: 519 (1955); Clayton & Renvoize: 851 (1982); Clayton & Renvoize: 363 (1986); Gibbs Russell et al.: 178 (1990); Watson & Dallwitz: 448 (1994); Cope: 164 (2002).



Figure 259.—*Hemarthria altissima*. Two spikelet pairs (5–7 mm). Photographer: M. Koekemoer.

Perennial, decumbent or rambling; rhizomatous, stoloniferous. **Leaf blade** linear-lanceolate to linear, usually flat; *ligule* a short, fringed membrane. **Inflorescence** of solitary spike-like racemes in a spatheate, leafy, false panicle, dorsiventrally compressed, tough, arising from subtending sheaths; internodes clavate, usually disarticulating obliquely; *spikelets* in pairs, secund, in long–short combinations: one sessile, the other pedicelled but appearing sessile owing to pedicel being fused with adjacent internode of rachis, sunk in concave hollow on inner surface of rachis, thus inflorescence appears culm-like. **Sessile spikelet** dorsiventrally compressed, lanceolate, glabrous, falling with glumes; *glumes* ± equal, dissimilar, awnless; lower glume obtuse to emarginate, 2-keeled, keels not winged, many-nerved; upper glume obtuse to long-acuminate, membranous. **Florets** 2; *lower floret* sterile, reduced to a hyaline lemma, awnless; *upper floret* bisexual; *lemma* lanceolate, less firm than glumes, hyaline, entire, glabrous, awnless; *callus* obtuse to cuneate, rarely truncate; *palea* similar to lemma. **Lodicules** 2, fleshy, cuneate, glabrous. **Stamens** 3. **Ovary** ellipsoid, glabrous; styles erect, plumose. **Caryopsis** narrowly obovoid, slightly dorsiventrally compressed. **Pedicelled spikelet** similar to sessile spikelet, bisexual; callus 0; pedicel flattened, broadly linear, fused to internode. **Photosynthetic pathway**: $C_4$; XyMS-. **Cytology**: $x = 9, 10$.

**Species** 12, tropical and subtropical regions of Old World, also in America; 1 in southern Africa: *Hemarthria altissima* (Poir.) Stapf & C.E.Hubb., widespread.

Species treatment by M.T. Nembudani.

**Hemarthria altissima** (Poir.) Stapf & C.E.Hubb., in *Kew Bulletin* 1934: 109 (1934). Type: Algeria, Bastion, *Poiret* (P, holo.).

*H. fasciculata* (Lam.) Kunth, in *Révision des graminées* 1: 153 (1829).

*Rottboellia compressa* L.f. var. *fasciculata* (Lam.) Hack., in DC., *Monographiae Phanerogamarum Prodromi nunc Continuatio, nunc Revisio* 6: 286 (1889).

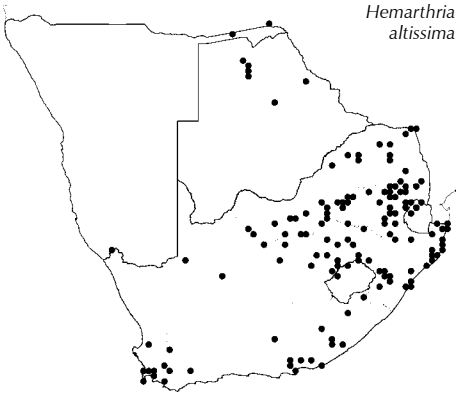
BATAVIAN QUICK GRASS, RED SWAMP GRASS, SWAMP COUCH, PERDEGRAS, ROOIKWEEK

A rust-red perennial, 300–1 500 mm high, mat forming; rhizomes and stolons present. Leaf blade 50–150 × 6 mm, flat, becoming twisted like a corkscrew when old. Inflorescence culm-like, raceme

very narrowly cylindrical, 3–6 mm long. Sessile spikelet 4–7 mm long; lower glume obtuse to emarginate; upper glume obtuse to acute; callus triangular; anther 2.4–3.0 mm long. Pedicelled spikelet without a callus.

*Flowering*: October to June. *Ecology*: Wet places, in vleis and river margins. *Frequency in southern Africa*: Sometimes locally dominant. *Distribution*: Southern tropical Africa and Madagascar, Mediterranean region, southeast Asia, introduced to America. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Good grazing grass; used as a cultivated pasture in some countries, for example, America where it is known as Limpo grass, an abbreviation for Limpopo; children in Lesotho are said to eat the raw rhizome; regarded as a ruderal weed in some places.

Voucher: *De Winter 4221*.




## **Heteropogon** Pers.

Persoon: 533 (1807); Stapf: 350 (1898) under *Andropogon* L.; Stent: 252 (1924); Chippindall: 492 (1955); Clayton & Renvoize: 825 (1982); Clayton & Renvoize: 359 (1986); Gibbs Russell et al.: 178 (1990); Watson & Dallwitz: 457 (1994); Cope: 145 (2002); Barkworth: 680 (2003).



Figure 260.—*Heteropogon contortus*. Spikelet pairs (5.5–7.0 mm). Photographer: M. Koekemoer.

Tufted perennial or annual; rhizomatous. **Leaf blade** narrowly linear, expanded; *ligule* an unfringed or a fringed membrane. **Inflorescence** a solitary, spike-like raceme, terminal, sometimes loosely aggregated into a false leafy panicle; racemes linear with spikelet pairs in lower $^1/_4$ or $^3/_4$ homogamous (alike in sex and shape), and spikelet pairs in upper part heterogamous (differing in sex and shape); internodes linear; *spikelets* paired, one sessile, the other pedicelled but pedicel reduced to a short stump, spikelets supported on a long *callus*. **Sessile spikelet** subterete to terete, coriaceous; *glumes* ± equal, dissimilar, awnless; lower glume linear, obtuse, flat or rounded on the back, hairy; upper glume linear, acute, prominently keeled. **Florets** 2, *lower floret* reduced to a lemma, hyaline, awnless; *upper floret* bisexual or female in heterogamous pair, or sterile in homogamous pair; *lemma* less firm than glumes, hyaline at base, entire, stipiform, awned; *central awn* stout, hairy, geniculate; *callus* long, pungent, hairy; *palea* 0. **Lodicules** large or somewhat reduced. **Stamens** 0–3. **Ovary** oblong, glabrous; styles plumose. **Caryopsis** lanceolate, channelled on one side; hilum short; embryo large. **Pedicelled spikelet** lanceolate, dorsally flattened, somewhat asymmetrical, larger than sessile spikelet; male or sterile; awnless; with long slender callus functioning as a pedicel, true pedicel reduced to a stump. **Photosynthetic pathway**: $C_4$; XyMS-. **Cytology**: $x = 10$ (11) (high polyploidy).




Figure 261.—*Heteropogon contortus*. A, plant; B, spikelet; C, mature matted awns; D, ligule. Artist: W. Roux.

**Species** ± 6, tropical and subtropical regions; 2 in southern Africa: *Heteropogon contortus* (L.) Roem. & Schult., widespread, and *Heteropogon melanocarpus* (Ell.) Benth., Namibia, Botswana and South Africa.

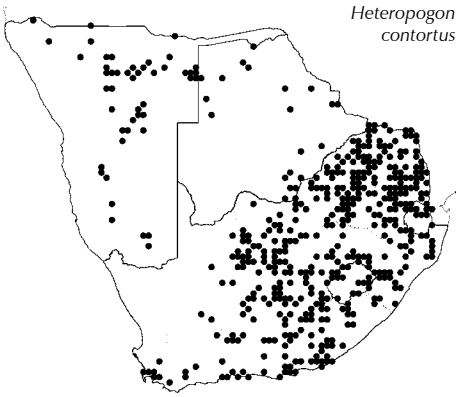
Species treatment by M.J. Moeaha.

### Quick guide to easily confused taxa:

1. Culm nodes with a ring of white adpressed hairs . . . . . **Trachypogon spicatus**
   Culm nodes without a ring of white hairs . . . . . 2
2. Inflorescence with scabrid awns throughout its length; pedicelled spikelet awned; ligule an unfringed membrane; tastes bitter . . . . . **Urelytrum agropyroides**
   Inflorescence with velvety hairy awns in upper half only; pedicelled spikelet awnless; ligule a fringed membrane; lacks bitter taste . . . . . **Heteropogon contortus**

### Key to species:

Perennial; ligule a fringed membrane; spathe and pedicelled spikelet lower glume without glands; pedicelled spikelet 8–13 mm long; leaf blade usually folded, 3–8 mm wide . . . . . **H. contortus**
Annual; ligule an unfringed membrane, usually lacerated; down middle of spathe back and pedicelled spikelet's lower glume with rows of depressed glands; pedicelled spikelet 16–20 mm long; leaf blade flat, to 12 mm wide . . . . . **H. melanocarpus**



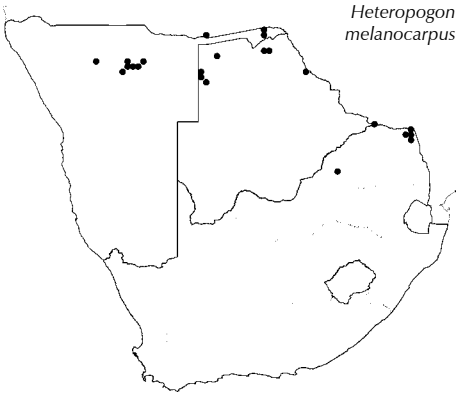
*Heteropogon contortus*

**Heteropogon contortus** (L.) Roem. & Schult., in *Systema Vegetabilium* 2: 836 (1817). Type: India.

TANGLEHEAD, SPEAR GRASS, PYLGRAS, ASSEGAAIGRAS

Perennial 200–1 000 mm high; rhizome present. Leaf blade 30–300 × 3–8 mm, usually folded, apex rounded and often hooded; ligule a fringed membrane. Inflorescence a single spike-like raceme with velvety awns in the upper half only; spathes without glands. Sessile spikelet 5.5–7.0 mm long. Pedicelled spikelet 8–13 mm long, glandless; anthers 3.0–3.5 mm long.

*Flowering*: October to June. *Ecology*: On well-drained soils; hillsides and rocky places. Hardy grass growing in poor soils; resistant to veld fires. *Frequency in southern Africa*: Common. *Distribution*: Tropical and warm temperate regions of the world. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: The awns penetrate the woolly coats of sheep decreasing the quality of wool, may even penetrate through the skin and into the body cavity causing severe irritation; introduced into many parts of the world as a forage grass.



*Heteropogon melanocarpus*

Illustration: Chippindall: 493, fig. 400 (1955); Cope: 147, tab. 47 (2002); Barkworth: 681 (2003).
Anatomy vouchers: *Ellis 6, 52, 88, 849* & *Van Heerden 33*.
Voucher: *Giess, Volk & Bleissner 6429*.

**Heteropogon melanocarpus** (Elliott) Benth., in *Journal of the Linnean Society, Botany* 19: 71 (1881). Type: USA.

SWEET TANGLE-HEAD, EENJARIGE-ASSEGAAIGRAS

Robust tufted annual 500–2 000 mm high; supported by stilt roots. Leaf blade up to 500 × to 12 mm, flat, gradually acuminate at apex; ligule an unfringed membrane, usually lacerated. Inflores-

cence with a row of depressed glands down the middle on the back of the spathes. Sessile spikelet 10–11 mm long. Pedicelled spikelet 16–20 mm long, lower glume with a row of depressed glands down the middle; anthers 3.0–3.5 mm long.

*Flowering*: January to May. *Ecology*: Often on turf soil; roadsides and rocky places. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical Africa, extending through Arabia to India; also in tropical America. N, B, LIM.

Illustrations: Hitchcock & Chase: 781, fig. 1183 (1950); Barkworth: 868 (2003).
Anatomy vouchers: *Ellis 1884, 1885* & *1886*.
Voucher: *De Winter & Marais 4601*.

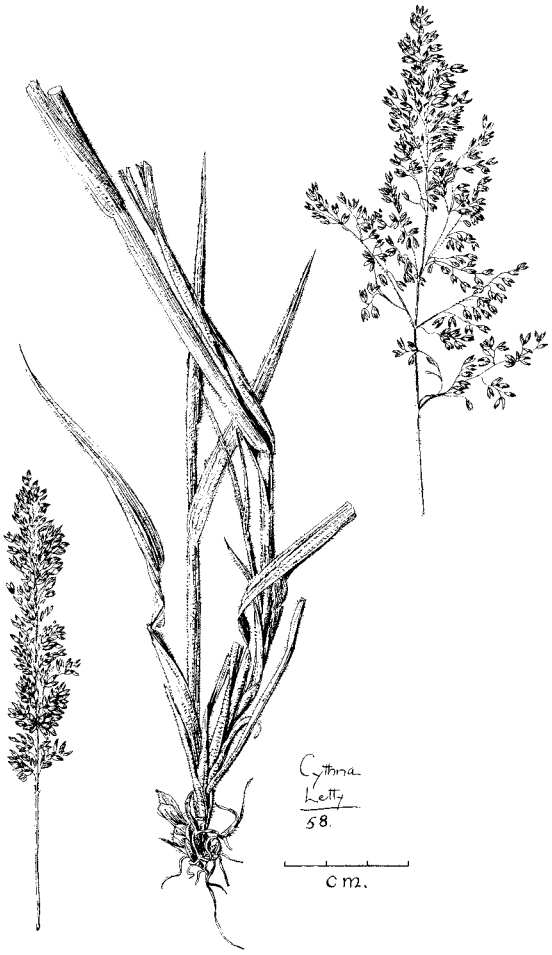



Figure 263.—*Holcus lanatus*. Artist: C. Letty.

## **Holcus** L.

Linnaeus: 1047 (1753) name conserved; Stapf: 464 (1899); Stent: 284 (1924); Adams & Salter: 66 (1950); Chippindall: 87 (1955); Tutin: 230 (1980); Hubbard: 260 (1984); Clayton & Renvoize: 130 (1986); Gibbs Russell et al.: 180 (1990); Watson & Dallwitz: 464 (1994); Sell & Murrell: 180 (1996).



Figure 262.—*Holcus lanatus* spikelet (3–4 mm). Photographer: M. Koekemoer.

Annual or perennial, tufted. **Leaf blade** linear, expanded, pubescent or pilose; *ligule* an unfringed or fringed membrane. **Inflorescence** a panicle, contracted, often dense, sometimes almost spike-like, oblong or interrupted; *spikelets* solitary, pedicelled; pedicel terete, pilose. **Spikelet** laterally compressed, falling with glumes; *glumes* ± equal, ± as long as to longer than spikelet, membranous, dissimilar, keeled; lower glume lanceolate, hairy on keels and margins, 1–3-nerved, awned, awn half as long as body of glume; upper glume larger, elliptic-lanceolate or ovate, 3-nerved, with 2 prominent lateral nerves, hairy on keel and margins, shortly mucronate or awned, awn shorter to longer than body of glume. **Florets** 2, a short rachilla extension often present; *lower floret* bisexual; *lemma* firmer in texture than glumes, shiny, ovate, rounded on back, obscurely 3–5-nerved, obtuse or acute, awnless; *upper floret* specialised in form, male or sterile, lemma shorter to ± as long as lower lemma, lanceolate, hyaline or membranous, glabrous, awned from back near apex; *awn* short, stout, hooked, usually geniculate, slightly twisted; *palea* smaller than lemma, narrow-lanceolate. **Lodicules** 2, delicate. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose above. **Caryopsis** narrowly ellipsoid; hilum short, or long-linear (rarely); embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 4, 7$ (polyploidy).

**Species** 6, Europe, North Africa and Middle East; ± 2 in southern Africa, 1 endemic: *Holcus setiger* Nees, 1 naturalised: **H. lanatus* L., Limpopo, Gauteng, Mpumalanga, KwaZulu-Natal, Western and Eastern Cape.

Species treatment by M.T. Nembudani.

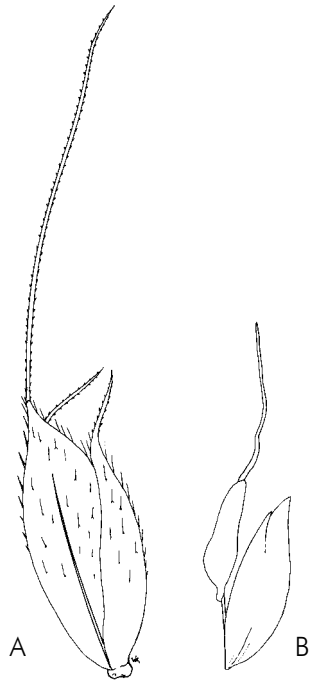
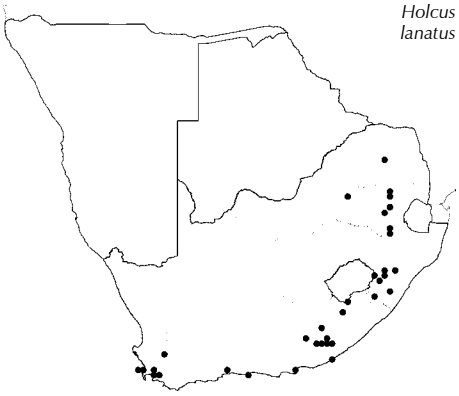



Figure 264.—*Holcus setiger*. A, spikelet (9.0 × 1.2 mm); B, florets (3.3 × 0.8 mm). Artist: W. Roux.

**Key to species:**

Perennial; upper glume awn to 1 mm long; anther 1.0–1.5 mm long; upper floret usually male; leaves woolly hairy . . . . . *__H. lanatus__
Annual; upper glume awn 2–6 mm long; anther 0.5–0.6 mm long; upper floret sterile; leaves puberulous . . . . . __H. setiger__

[In the past the name *H. mollis* L. was misapplied to some *Holcus* specimens found in southern Africa, but it is distinguished by a rhizome, bearded culm nodes and upper lemma awn not hooked and projecting beyond apices of glumes.]



*Holcus lanatus*

*__Holcus lanatus__ L., in *Species plantarum*: 1048 (1753). Type: Europe.

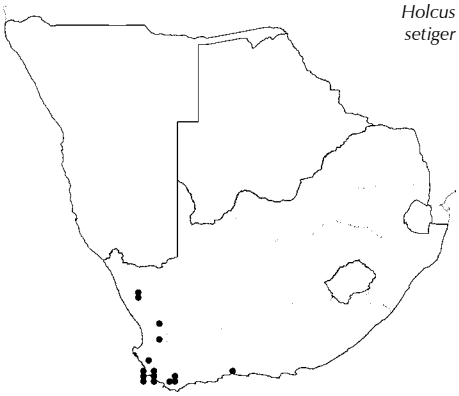
VELVET GRASS, YORKSHIRE FOG, SOFT GRASS

Loosely tufted perennial 300–1 000 mm high; culm nodes pubescent. Leaf blade 1.5–8.0 mm wide; conspicuously woolly hairy, greyish to blue-green. Inflorescence whitish, green pink or purple. Spikelet 3–4(6) mm long; lower glume awn to 0.5 mm long, rarely to 1 mm, 1-nerved; upper glume awn to 2 mm long; upper floret male; upper lemma awn hooked, barely projecting beyond apices of glumes; anther 1.0–1.5 mm long.

[Although variable in glume and lemma awn length, it is a distinct species that cannot easily be confused because of its relatively short-awned glumes.]

*Flowering*: November to January. *Ecology*: On sandy to nutrient-rich soils; vleis, damp, sheltered places. *Frequency in southern Africa*: Common in areas where it occurs. *Distribution*: Naturalised from Europe; also temperate India, introduced to the Americas. LIM, G, M, KZN, WC, EC. *Economics*: Occasionally as cultivated pastures; weed.

Illustration: Hubbard: 260 (1984).
Anatomy vouchers: *Ellis 229, 476, 1489* & *3368*.
Voucher: *Smook 4878, Dyer 6277.*



*Holcus setiger*

**Holcus setiger** Nees, in *Linnaea* 7: 278 (1832). Type: South Africa, Western Cape, Wiesenland beim Dorfe Sommerset in Hottentots-Holland, Octobri, *Ecklon s.n.*

Annual 150–300 mm high; culms solitary or loosely tufted, nodes pubescent. Leaf blade 5–140 × 1.0–4.5 mm, puberulous, pale to dark green. Inflorescence pale green, often only apex of spikelet purple, rarely purple throughout. Spikelet 3–4 mm long; lower glume awn to 1 mm long, 1-nerved; upper glume awn 2–6 mm long; upper floret sterile; upper lemma awn hooked, barely projecting beyond apices of glumes; anther 0.5–0.6 mm long.

[Chippindall (1955) comments that the forms from George and Namaqualand are exceptionally slender and weak (*Adamson 1476* and *Wilman PRE 34375*, all at PRE). This character is not useful to distinguish these forms, as it falls within the variability of the species.]

*Flowering*: November to January. *Ecology*: Sandy to sandy loam soils; damp and/or sheltered places. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. NC, WC.

Anatomy voucher: *Ellis 5515*.
Voucher: *Acocks 22966, Taylor 3489.*

## **Hordeum** L.

Linnaeus: 84 (1753); Stapf: 464 (1899); Chippindall: 71 (1955); Von Bothmer et al.: 539 (1980); Humphries: 204 (1980); Dewey: 209 (1984); Löve: 435 (1984); Clayton & Renvoize: 154 (1986); Baum & Bailey: 2433 (1990); Gibbs Russell et al.: 180 (1990); Baden & Von Bothmer: 117 (1994); Watson & Dallwitz: 471 (1994); Von Bothmer et al.: 1 (1995); Sell & Murrell: 216 (1996); Von Bothmer et al.: 241 (2007).

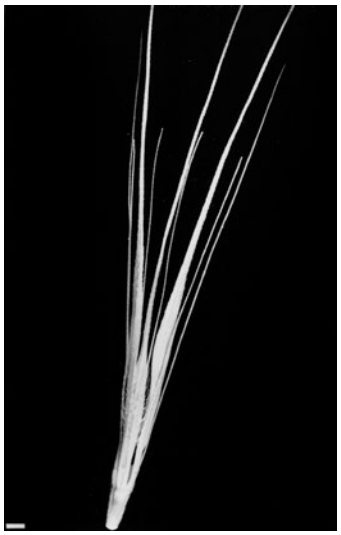


Figure 265.—*Hordeum murinum*. Awns and sterile spikelets (20–35 mm). Photographer: M. Koekemoer.

Annual or perennial, tufted or culm solitary, sometimes geniculate. **Leaf blade** linear, expanded; *ligule* an unfringed membrane. **Inflorescence** a dense, bristly, false spike; rachis usually fragile (tough in cultivated forms); *spikelets* in groups of 3, triads falling together as a unit, 2 laterals pedicelled, central one sessile or pedicelled, usually all awned, rarely one lateral spikelet absent or represented by 2 glumes only. **Central spikelet** laterally to dorsiventrally compressed; *glumes* side-by-side, linear-lanceolate, 1–3-nerved, awned and bristle-like. **Floret** 1, bisexual, rachilla extension present; *lemma* lanceolate, membranous, rounded on back, acuminate to awned, glabrous, usually obscurely 5-nerved, awned; *awn* scabrid; *palea* ± as long as lemma, lanceolate, acute or truncate, sometimes bidentate, membranous. **Lodicules** 2, lanceolate, ciliate or ciliolate, hyaline. **Stamens** 3. **Ovary** villous above; styles distinct, plumose. **Lateral spikelet** sterile or male; usually smaller than central spikelet, often reduced to awns; lemma, if present, awnless to awned, often with a rachilla extension; glumes bristle-like and long-awned, often ciliate. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (polyploidy).




Figure 266.—*Hordeum murinum*. Artist: C. Letty.

**Species** ± 40, temperate regions throughout the world; 5 naturalised and 1 indigenous in southern Africa, Lesotho, North West, Mpumalanga, Free State, KwaZulu-Natal, Northern, Western and Eastern Cape. 1 indigenous: *Hordeum capense* Thunb.

Species treatment by L. Fish and M.J. Moeaha.

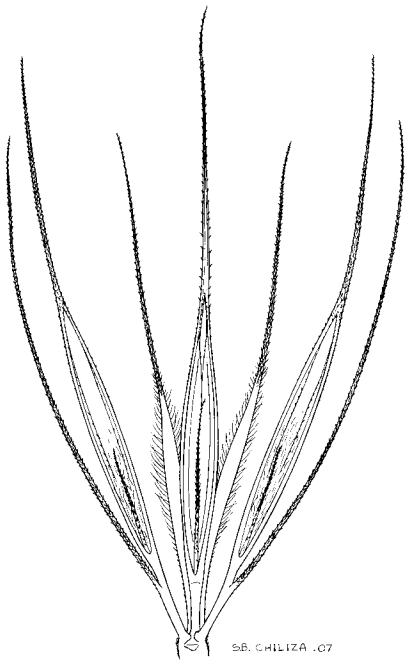
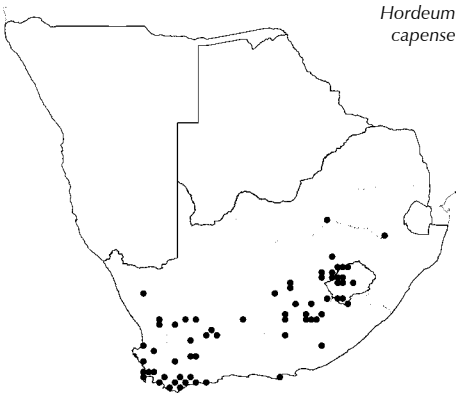



Figure 267.—*Hordeum murinum* spikelet triad. Artist: S.B. Chiliza.

### Key to species:

1. Inflorescence narrower than 6 mm (including awns); central spikelet lemma awn 2.5–8.0 mm long, lemma sparsely to densely pubescent ..... ***H. stenostachys***.
   Inflorescence wider than 6 mm (including awns); central spikelet lemma awn longer than 10 mm; lemma glabrous or shortly hairy, scabrid or smooth ..... 2
2. Leaf sheath auricles well developed, long (up to 8 mm long) and pointed; glume margins of central spikelet usually long hairy (often only at base) ..... 3
   Leaf sheath auricles small (to 0.3 mm long), round or absent; glume margins of central spikelet glabrous, smooth or scabrid ..... 5
3. Central spikelet of triad sessile to subsessile ..... ***H. murinum*** subsp**. murinum**

Central spikelet of triad pedicelled . . . . . 4
4. Central spikelet lemma shorter to slightly longer than lateral spikelet lemmas . . . . . *__H. murinum__ subsp__. glaucum__
Central spikelet lemma much longer than lateral spikelet lemmas . . . . . *__H. murinum__ subsp. __leporinum__
5(2). Central spikelet glumes 25–85 mm long, setaceous throughout; glumes bent and strongly divergent at maturity . . . *__H. jubatum__
Central spikelet glumes 14–23 mm long, wider at base; glumes straight, only slightly divergent at maturity . . . . . 6
6. Perennial; anthers 1.8–4.0 mm long . . . . . __H. capense__
Annual; anthers 0.6–1.3 mm long . . . . . 7
7. Lateral spikelet lower glumes winged on one side . . . *__H. marinum__
Lateral spikelet lower glumes not winged . . . . . *__H. geniculatum__

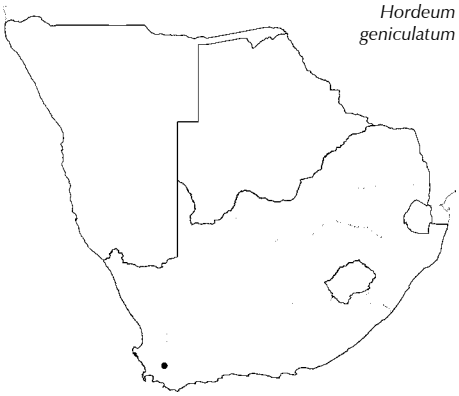

*Hordeum capense*

**Hordeum capense** Thunb., in *Podromus plantarum capensium* 23: 1974. Type: 'Promontorio Bonae Spei Africes', *Thunberg*.

Tufted perennial 200–600 mm high; basal sheaths fibrous with age. Leaf blade 60–170(–240) × 3–6 mm, rigid; sheath lacking auricles or with small rounded auricles. Inflorescence 8–17 mm wide (including awns), spike-like, rachis readily disarticulating at maturity. Central spikelet sessile to subsessile, pedicel shorter than 0.5 mm long; glumes 13–23 mm long, awn-like, scabrid, spreading at maturity; lemma glabrous, awn to 22 mm long; palea glabrous; anthers 1.8–4.0 mm long, yellow. Lateral spikelets well developed to reduced and awn-like; glumes 12–17 mm long.

*Flowering*: October to April. *Ecology*: Usually in moist areas such as streamsides, river banks and around dams, occasionally in disturbed areas. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Endemic. L, NW, M, FS, NC, WC, EC. *Economics*: Potential pasture.

Illustration: Von Bothmer et al.: 82 (1995).
Anatomy voucher: *Ellis 1273*.
Voucher: *Loxton 239*.


*Hordeum geniculatum*

*__Hordeum geniculatum__ All., in *Flora pedem Ontana, sive Enumeranto methodica Stirpium indigenarum Pedemontii* 2: 259 (1785). Type: Europe.

*H. marinum* Huds. subsp. *gussoneanum* (Parl.) Thell., in *Vierteljahrsschrift der Naturforshenden Gesellschaft in Zürich* 52: 441 (1908).

MEDITERRANEAN BARLEY

Loosely tufted annual 150–400 mm high; culms solitary or several, erect or geniculate, smooth. Leaf blade 20–80 × 2–4 mm, linear, flat, soft, margins scabrid; auricles absent or very small. Inflorescence 20–40 × 10–25 mm, dense, spike-like, fragile, disarticulating readily at maturity below each cluster of 3 spikelets. Central spikelet sessile; glumes setaceous, scabrid, awn up to 20 mm; lemma elliptical, glabrous, smooth or scabrid, awn 15–30 mm long; palea pilose on back; anthers 0.6–1.0 mm long. Lateral spikelets sterile, often reduced to a series of unequal, narrow awn-like scales, not winged; prolonged rachilla extension stout and yellowish-green.

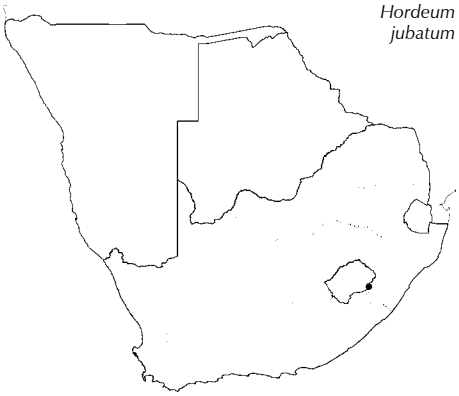
[Similar to *H. murinum* with all spikelets having glumes (at least the inner ones) long ciliate.]

*Flowering*: September to November. *Ecology*: Usually on roadsides or in moist waste and disturbed places. *Frequency in southern Africa*:

Locally common. *Distribution*: Naturalised from Europe and Mediterranean basin, introduced to many parts of the world. WC. *Economics*: Weed.

Illustration: Bothmer et al.: 249 (2007).
Voucher: *Van Breda 56*.

*Hordeum jubatum*



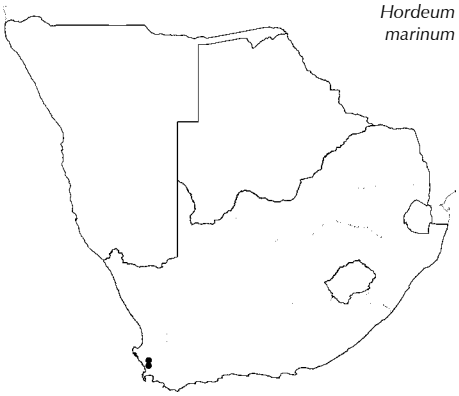
***Hordeum jubatum** L., in *Species Plantarum* 85 (1753). Type: Canada.

Densely tufted perennial or sometimes annual, 200–600 mm high; sheaths not fibrous with age; culms geniculate to erect, nodes glabrous. Leaf blade up to 150 × 2–5 mm, linear, often flat, scabrid, occasionally hairy, auricles absent. Inflorescence 30–150 mm long, spike-like, usually nodding, whitish to light purplish tinged. Central spikelet sessile, glumes 25–85 mm long, setaceous, awn-like; lemma 4.0–8.5 mm long, glabrous, awn 30–90 mm long; palea glabrous; anthers 1.0–1.5 mm long, yellow. Lateral spikelets much reduced; glumes more than 30 mm long, setaceous, awn-like; lemmas 4.0–6.5 mm long, awns 2–15 mm long.

*Flowering*: December to February. *Ecology*: Drier as well as moister habitats. *Frequency in southern Africa*: Uncommon. *Distribution*: Naturalised from Mexico, USA, Canada and Alaska and eastern Siberia; introduced to many parts of the world. L. *Economics*: Weed.

Illustrations: Bothmer et al.: 247 (2007).
Voucher: *Hoener 2140*.

*Hordeum marinum*



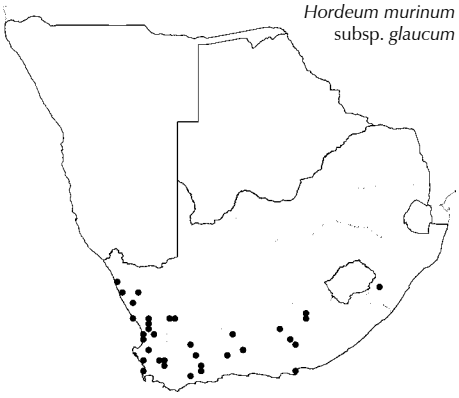
***Hordeum marinum** Huds., in *Flora anglica* (ed. 2) 1: 57 (1778). Type: Britain.

Annual; erect to geniculate. Leaf blade 15–80 × 1.0–3.5 mm; sheath auricles small, obscure or absent. Inflorescence 20–60 × 15–30 mm, oblong to ovate. Central spikelet sessile; glumes setaceous, 10–20 mm long (including awn); lemma 6–8 mm long, awn up to 24 mm long; palea as long as lemma; anthers 0.8–1.3 mm long. Lateral spikelets glumes dissimilar; lower awn-like, 8–26 mm long altogether; upper 4–6 mm long, broadly winged on one side; awn 3–5 mm long.

*Flowering*: November. *Ecology*: Disturbed areas, roadside; rocky soils. *Frequency in southern Africa*: Uncommon. *Distribution*: Naturalised from Eurasia. WC.

Illustrations: Von Bothmer et al.: 77 (1995); Bothmer et al.: 249 (2007).
Voucher: *Goldblatt 5107*.

*Hordeum murinum* subsp. *glaucum*



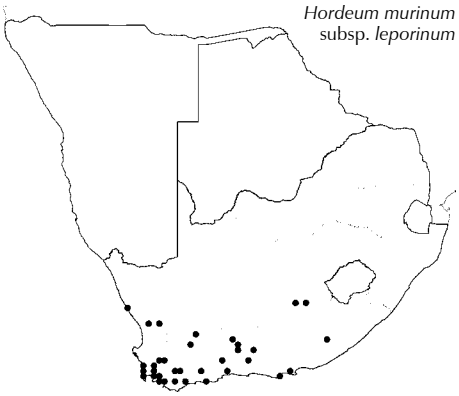
***Hordeum murinum** L. subsp. **glaucum** (Steud.) Tzvelev, in *Novosti Sistematiki vyssikh Rastenij* 8: 67 (1971). Type: Saudi Arabia.

Loosely tufted annual 150–400 mm; sheaths not fibrous with age; culms erect to prostate. Leaf blade 20–250 × 2–8 mm, soft, usually glaucous, sheath with long, well-developed, pointed auricles up to 8 mm long, often surrounding culm. Inflorescence glaucous to brownish at maturity. Central spikelet pedicel 0.6–1.5 mm long; glumes flattened, margins long hairy, awns up to 26 mm long; lemma awn 18–50 mm long; anthers 0.2–0.6 mm long, usually with purple spots. Lateral spikelets rachilla extension stout, orange-brown to yellow; glumes slightly unequal, setaceous, awn 16–30 mm long; upper

glume wider at base, long hairy on margins; lemma ± same size as central spikelet lemma, awn 10–50 mm long; palea densely hairy; anthers 1.2–1.8 mm long.

*Flowering*: August to October. *Ecology*: On sandy soils; usually in disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from Europe and the Mediterranean basin and introduced to other parts of the world. KZN, NC, WC, EC. *Economics*: Weed

Illustrations: Von Bothmer et al.: 38 (1995); Bothmer et al.: 251 (2007).
Anatomy vouchers: *Ellis 606, 640* & *665*.
Voucher: *Oliver 151*.

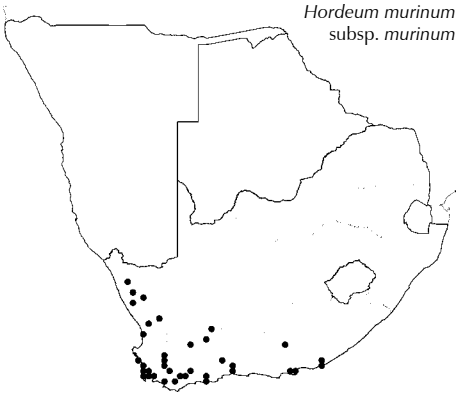

*Hordeum murinum* subsp. *leporinum*

***Hordeum murinum** L. subsp. **leporinum** (Link) Arcang., in *Compendio della Flora italiana, ossia Manuale per la Determinazione della Piante che trovansi selvatiche od inselvatichite nell'Italia e nelle Isole adiacenti* 805 (1882). Type: Greece.

Loosely tufted annual 300–1 100 mm high; sheaths not fibrous with age; culms erect to prostate. Leaf blade 20–250 × 2–8 mm, soft, usually green; sheath with long, well-developed, pointed auricles, up to 8 mm long, often surrounding culm. Inflorescence green, becoming purple at maturity. Central spikelet pedicel 0.7–1.8 mm long; glumes flattened, margins hairy, awns up to 26 mm long; lemma awn 18–50 mm long; anthers 0.9–3.0 mm long, yellow. Lateral spikelets longer than central spikelet, rachilla extension slender, green; glumes slightly unequal, setaceous, awn 16–30 mm long; upper glume wider at base and margins hairy; lemma awn 10–50 mm long; palea scabrid; anthers (0.9)1.2–3.2 mm long.

*Flowering*: September to November. *Ecology*: Disturbed areas. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Naturalised weed from Europe. NC, WC, EC.

Illustrations: Bothmer et al. 251 (2007).
Voucher: *Van Breda 2011*.


*Hordeum murinum* subsp. *murinum*

***Hordeum murinum** L. subsp. **murinum**, in *Species plantarum* 1: 85 (1753). Type: Europe.

*Critesion murinum* (L.) Löve, in *Taxon* 29: 350 (1980).

False barley, muiswildegars

Annual 50–600 mm high; basal sheaths not fibrous with age; culms solitary or loosely tufted. Leaf blade 20–150(–250) × 2–8 mm, soft; sheath with well-developed pointed auricles, up to 8 mm long, often surrounding culm. Inflorescence 15–25 mm wide, usually green; rachis disarticulating readily into a cluster of 3 at maturity. Central spikelet sessile or subsessile, pedicel shorter than 0.6 mm; glume margins distinctly hairy, basal parts widened; lemma ± smooth, awn to 30 mm long; palea almost glabrous; anthers 0.7–1.4 mm long. Lateral spikelets shorter than or as long as central spikelet; prolongation of rachilla slender, green; at least one glume basally widened, 0.3–0.7 mm wide, margins long hairy, especially the inner glume; palea almost glabrous; anthers 0.8–1.4 mm long.

*Flowering*: October to December. *Ecology*: On sandy soil; usually in disturbed areas. *Frequency in southern Africa*: Locally common.

*Distribution*: Naturalised from Europe. Introduced and naturalised in many countries. NC, WC, EC. *Economics*: Weed.

Illustration: Bothmer et al.: 251 (2007).
Anatomy voucher: *Ellis 640*.
Voucher: *Ellis 640*.

***Hordeum stenostachys** Godr., in *Mémoires de l'Académie des Sciences et Lettres de Montpellier, sect Sciences* 1: 455 (1853). Type: France.

Tufted perennial (280–)350–1 200(–1 500) mm high. Leaf blade 25–90(–102) × 1.5–5.0(–7.0) mm, flat; auricles absent. Inflorescence 3–5 mm wide (including awns), often partly enclosed in uppermost leaf sheath, green; rachis readily disarticulating into clusters of 3 at maturity. Central spikelet sessile, rachilla extension usually absent; glumes 4–11 × 0.3–0.5 mm , distinctly widened or flattened at base; lemma sparsely to densely hairy, awn 2.5–8.0 mm long; palea scabrid; anthers 2.2–4.4 mm long, yellow. Lateral spikelets rudimentary; upper glume setaceous or distinctly widened or flattened at base, 0.3–0.5 mm wide; rachilla extension stout and yellowish-green. Chromosome number: 2n = 14 (Von Bothmer 1980).

[Easily distinguished from the other *Hordeum* species in southern Africa by the narrow, slender inflorescence and short awns.]

*Flowering*: October to March. *Ecology*: In moist or seasonally moist areas, vleis and in disturbed places. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from tropical South America. FS, NC, EC.

Illustrations: Von Bothmer et al.: 54 (1995).
Voucher: *Comins 845*.

## **Hyparrhenia** E.Fourn.

Fournier: 51 (1886); Stapf: 336 (1898) under *Andropogon* L.; Chippindall: 509 (1955); Clayton: 1 (1969); Clayton & Renvoize: 788 (1982); Gibbs Russell: t. 1842 (1982); Clayton & Renvoize: 354 (1986); Gibbs Russell et al.: 182 (1990); Watson & Dallwitz: 483 (1994); Cope: 95 (2002).

Perennial, rarely annual, tufted and erect, forming tussocks, rarely trailing, rhizomatous, never aromatic. **Leaf blade** linear, usually flat, rarely folded; *ligule* a scarious unfringed membrane, truncate or rounded. **Inflorescence** of paired, short racemes enclosed by a spatheole; this crowded into a large, leafy, false panicle; racemes short, with 1 or 2 homogamous pairs of spikelets at base of lower raceme and 0–2 at base of upper raceme, these spikelets male or barren, awnless; raceme-bases flattened or terete, sometimes deflexed at maturity, pedicels and internodes linear; *spikelets* in pairs, in long–short combination: one sessile, the other pedicelled. **Sessile spikelet** narrowly lanceolate to lanceolate-oblong, dorsiventrally compressed or terete, hairy or glabrous; *glumes* ± equal, very dissimilar; lower glume as long as spikelet, lanceolate, truncate or acute, rarely produced into 2 short awns, broadly rounded or flattened on back; upper glume obtuse to acute or mucronate, awnless. **Florets** 2; *lower floret* sterile, reduced to a lemma, awnless; *upper floret* bisexual; *lemma* stipiform, less firm than glumes towards base, hyaline, 2-lobed, awned; *awn* stout, geniculate, column hairy, twisted; *callus*

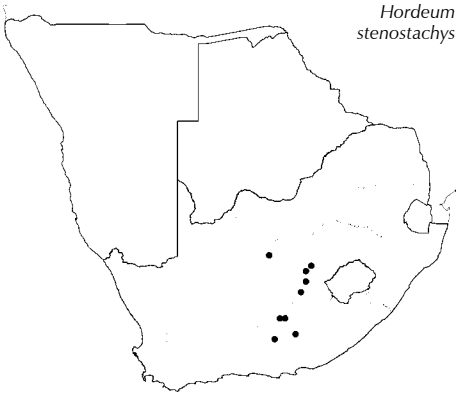






Figure 268.—*Hyparrhenia* raceme pair. A, *H. filipendula*, raceme bases unequal; B, *H. tamba*, raceme bases ± equal. Artist: S.B. Chiliza.




Figure 269.—*Hyparrhenia tamba*. A, plant with stilt root; B, ligule. Artist: C. Smith.

blunt to pungent, hairy, applied obliquely to apex of internode with its tip free; *palea* 0 or reduced. **Lodicules** 2, cuneate, truncate or emarginate. **Stamens** 3. **Ovary** glabrous. **Caryopsis** oblong, hilum short; embryo large. **Pedicelled spikelet** 3–8(–10) mm long, usually longer than sessile spikelet, narrowly lanceolate, acute, hairy or glabrous, male or sterile; callus 0; lower glume awnless or awned; upper glume awnless. **Photosynthetic pathway**: $C_4$; biochemical type NADP-ME (*H. hirta*); XyMS-. PCR cells with a suberised lamella. PCR cell chloroplasts with reduced grana; centrifugal/peripheral. **Cytology**: $x = 10$, 15 (polyploidy).

**Species** ± 55, mostly in Africa, few species in other tropical regions and the Mediterranean; 20 in southern Africa, widespread.

Species treatment by A.C. Mashau.

### Quick guide to easily confused genera:

Lemma awns glabrous; fresh plant aromatic . . . . . **Cymbopogon**
Lemma awns hairy; fresh plant not aromatic . . . . . **Hyparrhenia**

### Key to species:

1. Upper raceme base with a scarious appendage 3–4 mm long at apex, just below spikelets . . . . . 2
   Upper raceme base lacking an long appendage, but a scarious rim or short tooth to 0.5 mm long may be present . . . . . 3
2. Sessile spikelet lower glume glabrous or sparsely hairy at apex; awn hairs up to 2 mm long . . . . . **H. newtonii** var. **newtonii**
   Sessile spikelet lower glume with long hairs; awn hairs up to 0.5 mm long . . . . . **H. newtonii** var. **macra**
3(1). Raceme bases terete, markedly unequal, upper at least 3 times longer than the lower, usually not deflexed (if deflexed see *H. quarrei*) . . . . . 4
   Raceme bases flattened, subequal, often deflexed at maturity, usually less than 2 mm long . . . . . 14
4. Spikelet hairs reddish-brown or yellowish . . . . . 5
   Spikelet glabrous or hairs white . . . . . 8
5. Sessile spikelet 5–7 mm long, callus 0.8–2.0 mm long . . . . . 6
   Sessile spikelet 3–5 mm long, callus 0.2–0.8 mm long . . . . . 7
6. Basal leaf sheaths with spreading white hairs; upper raceme base 2–3 mm long . . . . . **H. nyassae**
   Basal leaf sheaths glabrous or rarely with a few hairs; upper raceme base 3.5–7.0 mm long . . . . . **H. poecilotricha**
7(5). Inflorescence lax or contracted; spatheoles linear, 40–50 mm long; awns 7–14 per raceme pair; spikelet hairs reddish-brown . . . . . **H. rufa** var. **rufa**
   Inflorescence copiously branched; spatheoles narrowly lanceolate, 20–40 mm long; awns 6–10 per raceme pair; spikelet hairs pale brown . . . . . **H. dichroa**
8(4). Upper raceme with 0 or 1 pair of homogamous spikelets at base . . . . . 9
   Upper raceme with 2 pairs of homogamous spikelets at base . . . 12
9. Spikelet glabrous or hispidulous; awns 2–6 per raceme pair . . . .10
   Spikelet pubescent to villous; awns 6–14 per raceme pair . . . 11
10. Culms slender; callus cuneate, 0.8–1.5 mm long; upper raceme base (2.0–)2.5–3.5 mm long; awns 4–5 per raceme pair . . . . . **H. gazensis**
    Culms robust; callus linear, slender, 1–2 mm long; upper raceme base 1.5–2.5 mm long; awns 2–6 per raceme pair . . . **H. finitima**
11(9). Racemes never deflexed; awns 8–14 per raceme pair . . . **H. hirta**
    Racemes, or some of them, deflexed; awns 6–10 per raceme pair . . . . . **H. quarrei**
12(8). Awns 4–7 per raceme pair, 25–40 mm long, with hairs 0.1–0.6 mm long; racemes 15–25 mm long; callus 1.0–1.8 mm long; pedicel-

late spikelets awnless or with an awn-point to 2 mm long . . . . . **H. anamesa**
Awns 2–4 per raceme pair, 30–55 mm long, with hairs 0.7–1.2 mm long; racemes 10–12 mm long; callus 1.8–3.0 mm long; pedicellate spikelets with an awn 1–5 mm long . . . . . 13
13. Spikelet glabrous; awns 2(–4) per raceme pair . . . . . **H. filipendula** var. **filipendula**
Spikelet white-villous; awns (2–)4 per raceme pair . . . . . **H. filipendula** var. **pilosa**
14(3). Awns 10–15 per raceme pair; awns short . . . . . **H. dregeana**
Awns fewer than 9 per raceme pair; awns short or long . . . . . 15
15. Pedicellate spikelet glabrous or shortly pilose between nerves and margins . . . . . 16
Pedicellate spikelet villous . . . . . 19
16. Awns 3–5 per raceme pair; peduncle 9 mm long or less . . . . 17
Awns (4–)6–8 per raceme pair; peduncle more than 9 mm long . . . . . 18
17. Awn to 16(–20) mm long; spatheole 8–18 mm long; callus square . . . . . **H. cymbaria**
Awn 18–30 mm long; spatheole 14–24 mm long; callus cuneate . . . . . **H. variabilis**
18(16). Awn 7–17 mm long; plant slender and rambling; callus oblong or square; pedicellate spikelet glabrous or shortly pilose between nerves and margins . . . . . **H. pilgeriana**
Awn 20–35 mm long; plant robust, erect; callus cuneate to acute; pedicellate spikelet glabrous or sparsely pilose . . . . **H. schimperi**
19(15). Basal sheaths hairy; plant densely tufted . . . . . **H. tamba**
Basal sheaths without hairs; plant more loosely tufted . . . . . 20
20. Awn 7–13 mm long; spatheole 12–23 mm long; peduncle 3–13 mm long; callus rounded; culms robust; stilt roots present . . . . . **H. umbrosa**
Awn more than 15 mm long; spatheole 20–40 mm long; peduncle 10–30 mm long; callus cuneate; culms robust or slender; stilt roots present or absent . . . . . 21
21. Awn 22–40 mm long; pedicellate spikelet usually with an awn 2–6 mm long; culms very robust, exposed at the base, lowest internodes narrower than those above; well-developed stilt roots present . . . . . **H. rudis**
Awn 15–25 mm long; pedicellate spikelet with an awn 1–3 mm long; culms robust or slender, clad in old leaf sheaths at base, lowest internode similar in width to upper ones; stilt roots usually absent . . . . . 22
22. Culms robust, sometimes with small stilt roots; plant 1 000–2 000(3 000) mm high . . . . . **H. tamba**
Culms slender, without stilt roots, arising in clumps from a short rhizomes; plant 300–1 300 mm high . . . . . **H. collina**



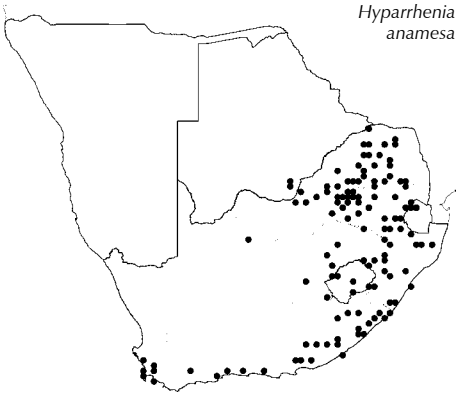
Figure 270.—*Hyparrhenia hirta* spikelet pair (4.0–6.5 mm). Photographer: M. Koekemoer.

**Hyparrhenia anamesa** Clayton, in *Kew Bulletin Additional Series* 2: 85 (1969). Type: Kenya, Masai District, Olodungoro, *Glover, Gwynne, Samuel and Tucker 2145* (K, holo.; EA, iso.).

Densely tufted perennial 600–1 200 mm high; rhizomatous. Leaf blade to 400 (but often shorter) × 4 mm. Raceme 15–25 mm long; raceme bases terete, unequal; with 2 homogamous pairs at base of upper raceme, raceme pairs with 4–7 awns. Sessile spikelet 5.0–6.5 mm long, white-villous; awn 25–40 mm long, hairs to 0.6 mm long; callus 1.0–1.8 mm long. Pedicellate spikelet 4–6 mm long, white-villous, awnless or awn up to 2 mm long; anther 1.3–2.0 mm long.

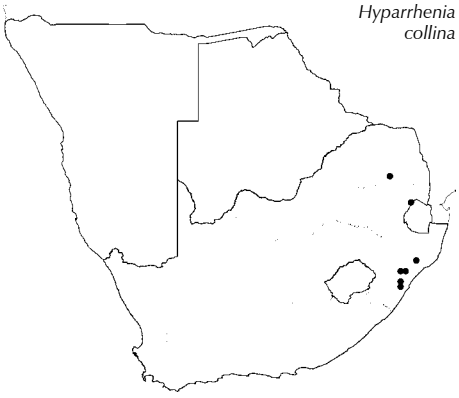
[This species is intermediate between *H. hirta*, which has longer racemes, more awns and 0 or 1 homogamous pair at the upper raceme base; and *H. filipendula*, which has shorter racemes with fewer awns.]

*Flowering*: October to May. *Ecology*: Dry soils, open places. *Frequency in southern Africa*: Common. *Distribution*: Northwards to



eastern Africa and Sudan. B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC.

Illustrations: Clayton: 86, fig. 21 (1969); Clayton et al.: 801, fig. 184 (1982).
Anatomy vouchers: *Ellis 66, 361, 373, 789* & *1355; Van Heerden 54*.
Voucher: *Rodin 3821*.


*Hyparrhenia collina*

**Hyparrhenia collina** (Pilg.) Stapf, in *Flora tropical Africa* 9: 337 (1919). Type: Rwanda, Bushara, *Exped. No. 375*; Tanzania, Kilimanjaro, *Volkens 352* (syntypes).

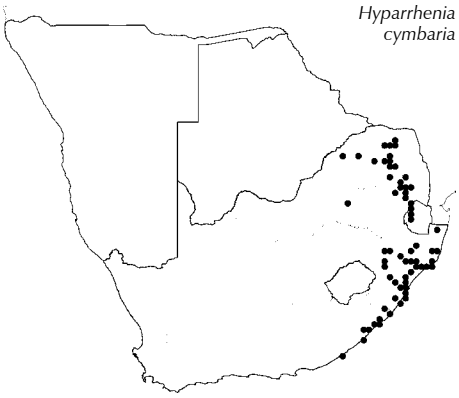
Elephant grass, olifantsgras

Loosely tufted, slender perennial 300–1 300 mm high; stilt roots absent; in clumps due to short rhizomes. Leaf blade to 300 × 2–5 mm. Spatheole 20–40 mm long; peduncle 10–25 mm long; raceme bases subequal, flattened; raceme pairs with 4–6 awns. Sessile spikelet 4.5–5.0 mm long, usually dark purple with white hairs; awn 15–25 mm long; callus cuneate. Pedicellate spikelet 4–7 mm long, villous, awn 1–3 mm long; anther 1.5 mm long.

[Imperfectly separated from the closely related *H. rudis*, *H. dregeana* and *H. tamba*, but it may be distinguished by its slender culms.]

*Flowering*: April to May. *Ecology*: Damp soils in dry savanna. *Frequency in southern Africa*: Infrequent. *Distribution*: Zambia, Zimbabwe and Malawi to eastern Africa and Sudan, then west to Cameroon. LIM, M, KZN.

Anatomy voucher: *Mogg PRE 11410*.
Voucher: *Du Toit 2412*.


*Hyparrhenia cymbaria*

**Hyparrhenia cymbaria** (L.) Stapf, in *Flora tropical Africa* 9: 332 (1919). Type: Said to be from India, but probably from Comoro Isands.

Boat thatching grass, bootjietamboekiegras

Coarsely tufted, robust perennial 2 000–4 000 mm high; stilt roots present; rhizomatous. Leaf blade to 450 × 6–20 mm. Spatheole 8–18 mm long, ovate, bright reddish-brown; peduncle 3–8 mm long; raceme bases subequal, flattened; raceme pairs with 3–5(–6) awns. Sessile spikelet 3.8–4.5 mm long, glabrescent to shortly pubescent, often purplish; awn to 16(–20) mm long; callus square, 0.2–0.3 mm long. Pedicellate spikelet 4–5 mm long, glabrous to puberulous, margins ciliate, acuminate or awn up to 1.5 mm long; anther 1.3–2.0 mm long.

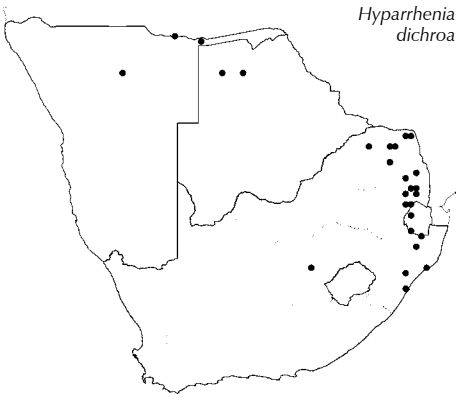
[Closely related to *H. umbrosa* and grades into *H. variabilis*, but distinguished by its small ovate spatheole and short square callus.]

*Flowering*: November to June. *Ecology*: Forest margins and open hillsides. *Frequency in southern Africa*: Common. *Distribution*: Northwards to eastern Africa, Eritrea and west in Cameroon and northern Angola; also Madagascar and Comoro Islands. S, LIM, G, M, KZN, EC.

Illustration: Chippindall: pl. 16, II (1955).
Anatomy vouchers: *Ellis 60, 1593, 2802, 3347, 3432* & *4437*.
Voucher: *Scheepers 190*.

**Hyparrhenia dichroa** (Steud.) Stapf, in *Flora tropical Africa* 9: 302 (1919). Type: South Africa, Eastern Cape, Mzimbubu [Omsamwubo] to Msikaba [Omsamcaba], *Drège*.

*H. fastigiata* Robyns, in *Flore agrostologique du Congo Belge* 1: 164 (1929). Type: DRC


*Hyparrhenia dichroa*

Tufted perennial to 3 000 mm high; rhizomatous; culms stout. Leaf blade to 600 × to 8 mm. Inflorescence copiously branched; spatheole narrowly lanceolate, 20–40 mm long; racemes often clasped at the base by spatheoles at maturity; raceme bases terete, unequal; raceme pairs with 6–10 awns. Sessile spikelet 4 to 5 mm long, hairs pale brownish, scanty; awn (10–)20–30 mm long; callus 0.4–0.8 mm long. Pedicellate spikelet 3–5 mm long, hairs pale brownish, acute or mucronate at apex; anther 2.2 mm long.

[Intergrades with *H. rufa*, which has exserted racemes and more awns, 7–14; and similar to *H. gazensis*, which has slender culms and fewer awns, 4–5 and *H. finitima*, which has a narrow pungent callus.]

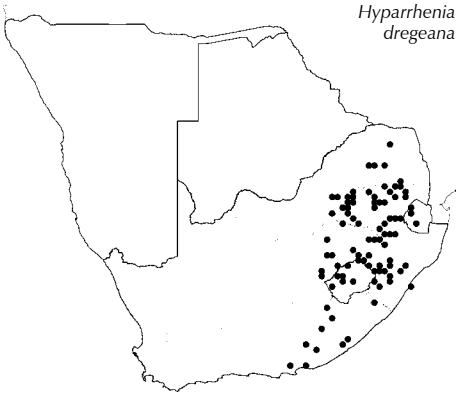
*Flowering*: March to June. *Ecology*: Moist areas; weedy places, roadsides. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to eastern tropical Africa. N, B, S, LIM, M, FS, KZN.

Anatomy voucher: *Ellis 1538*.
Voucher: *Strey & Schlieben 8597*.

**Hyparrhenia dregeana** (Nees) Stapf ex Stent, in *Bothalia* 1: 249 (1923). Type: South Africa, Eastern Cape, Kei [Key] R., *Drège*; Umgazana [Omgaziana] R., *Drège*; KwaZulu-Natal, Omsamculo to Omcomas, *Drège* (syntypes).

*H. aucta* (Stapf) Stapf ex Stent, in *Bothalia* 1: 249 (1923). Type: South Africa, KwaZulu-Natal, *Rehmann 7108*.

*H. pilosissima* (Hack.) J.G.Anderson, in *Bothalia* 9: 130 (1966). Type: South Africa, Free State, *Zeyher 1799*.


*Hyparrhenia dregeana*

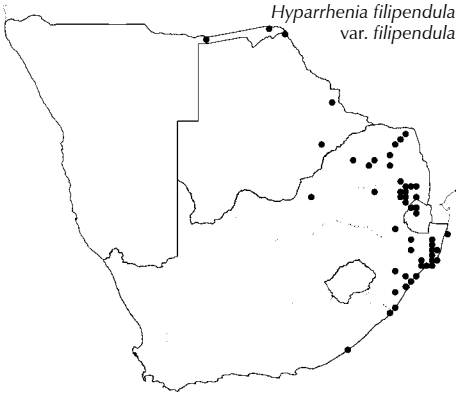
HAIRY BLUE THATCHING GRASS, HARIGE BLOUTAMBOEKIEGRAS

Densely tufted, robust perennial 1 500–2 000 mm high; rhizomatous; basal sheaths hairy; culm 4–9 mm wide. Leaf blade to 600 × 3–8 mm. Spatheole 20–25 mm long; peduncle 15–50 mm long; raceme bases subequal, flattened, short-appendaged; raceme pairs with 10–25 awns. Sessile spikelet 4–5 mm long, densely long-hairy to shortly hairy, rarely glabrous; awn 8–20 mm long; callus 1 mm long, cuneate. Pedicellate spikelet 5–6 mm long, villous to hispidulous, rarely glabrous, muticous or awn up to 1.5 mm long; anther 1.6–2.5 mm long.

[Related to *H. collina*, *H. tamba* and *H. rudis*, from which it may be distinguished by its densely tufted habit and very many short awns.]

*Flowering*: November to May. *Ecology*: Stony hillsides, streamsides, dry soils around vleis. *Frequency in southern Africa*: Common. *Distribution*: Zimbabwe, Malawi and along eastern side of Africa to Ethiopia. S, L, LIM, NW, G, M, FS, KZN, EC.

Anatomy vouchers: *Ellis 487, 1445, 1506 & 4433*; *Liengme 571*; *Loxton & Ellis 964*.
Voucher: *Liebenberg 6820*.




**Hyparrhenia filipendula** (Hochst.) Stapf var. **filipendula**, in *Flora tropical Africa* 9: 323 (1919). Type: South Africa, KwaZulu-Natal, *Krauss 28*.

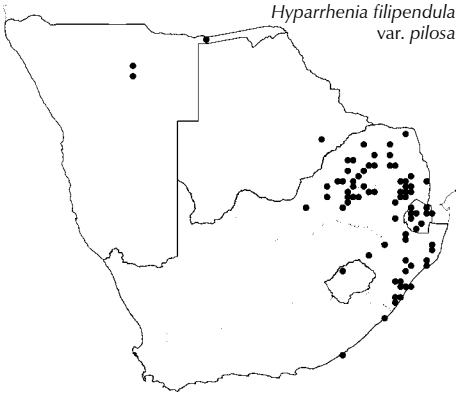
Fine thatching grass, fyntamboekiegras

Tufted delicate, graceful perennial 600–2 000 mm high; rhizomatous. Leaf blade to 300 × to 4 mm. Raceme 10–12 mm long; raceme bases terete, unequal, with 2 pairs of homogamous spikelets at base of upper raceme; raceme pairs with 2(–4) awns. Sessile spikelet 5.5–7.0 mm long, glabrous; awn 30–55 mm long, with hairs to 1.2 mm long; callus 1.8–3.0 mm long. Pedicellate spikelet 5–6 mm long, glabrous, awn 1–5 mm long; anther 1.5–1.8 mm long.

[Intergrades with var. *pilosa*, which in turn intergrades with *H. hirta* and *H. anamesa*, but recognised by its graceful appearance, many slender branches, drooping peduncles and small, few-awned racemes.]

*Flowering*: November to April. *Ecology*: High rainfall areas; woodlands, open veld. *Frequency in southern Africa*: Common. *Distribution*: Tropical Africa, Madagascar; and eastwards to Sri Lanka and Australia. N, B, S, LIM, NW, M, KZN, EC. *Economics*: Used for thatching.

Illustration: Chippindall: 511, fig. 408B (1955).
Anatomy vouchers: *Ellis 1548* & *6016*.
Voucher: *Codd 6880*.




**Hyparrhenia filipendula** (Hochst.) Stapf var. **pilosa** (Hochst.) Stapf, in *Flora tropical Africa* 9: 324 (1919). Type: South Africa, KwaZulu-Natal, *Krauss 164*.

Fine thatching grass, fyntamboekiegras

Tufted perennial 600–2 000 mm high; rhizomatous. Leaf blade to 300 × to 4 mm. Raceme 10–12 mm long; raceme bases terete, unequal, with 2 pairs of homogamous spikelets at base of upper raceme; raceme pairs with (2–)4 awns. Sessile spikelet 5.5–7.0 mm long; white-villous; awn 30–55 mm long, with hairs to 1.2 mm long; callus 1.8–3.0 mm long. Pedicellate spikelet 5–6 mm long, white-villous, awn 1–5 mm long; anther 1.5–1.7 mm long.

[Forms a bridge between var. *filipendula* and *H. hirta* and *H. anamesa*.]

*Flowering*: December to April. *Ecology*: In high rainfall areas; open veld and disturbed places. *Frequency in southern Africa*: Common. *Distribution*: Tropical Africa, southern Asia to Australia. N, B, S, L, LIM, NW, G, M, FS, KZN, EC. *Economics*: Used for thatching.

Anatomy vouchers: *Ellis 40, 120, 189, 630, 1917, 1920, 1921* & *3383*.
Voucher: *De Winter 2863*.

**Hyparrhenia finitima** (Hochst.) Andersson ex Stapf in *Flora tropical Africa* 9: 299 (1919). Type: Ethiopia, Djeladjeranne, *Schimper 1797* (K, iso.).

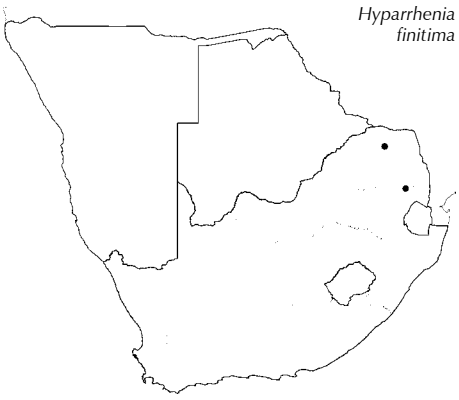
Robust perennial 1 000–2 000 mm high; rhizomatous; culms robust. Leaf blade to 600 × to 8 mm. Raceme bases terete, unequal, upper raceme base 1.5–2.5 mm long, homogamous spikelets 0–1 pair

at base of upper raceme; raceme pairs 2–6 awns. Sessile spikelet 5.5–6.0 mm long, yellowish, glabrous to shortly white hairy; awn 25–40 mm long; callus 1–2 mm long, linear, pungent. Pedicellate spikelet 5–6 mm long, glabrous or rarely hispidulous, awn 2–5 mm long; anther 2.0–2.5 mm long.

[Similar to *H. gazensis*, but distinguished by its robust culms and narrow callus.]

*Flowering*: December to March. *Ecology*: Rocky places, disturbed places. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to Ethiopia and west to Sierra Leone. LIM, M.

Anatomy voucher: *Kluge 2177*.
Voucher: *Van Vuuren 1685*.


*Hyparrhenia finitima*

**Hyparrhenia gazensis** (Rendle) Stapf, in *Flora tropical Africa* 9: 301 (1919). Type: Zimbabwe, Chirinda, *Swynnerton 1637* (BM, holo.).

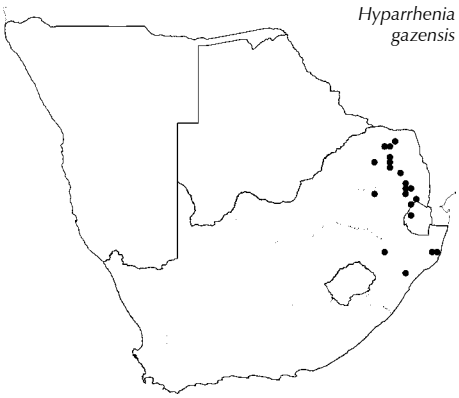
POLGRAS

Loosely tufted perennial 500–1 800 mm high; rhizomatous; culms slender. Leaf blade 80–200 × 2–5 mm. Raceme bases terete, unequal, upper raceme base (2.0–)2.5–3.5 mm long, homogamous spikelets 0–1 pair at base of upper raceme; raceme pairs with 4–5 awns. Sessile spikelet 4.0–5.5 mm long, white-hispidulous; awn 20–30 mm long; callus cuneate, 0.8–1.5 mm long. Pedicellate spikelet 5–6 mm long, glabrous, acute, muticous or with a short mucro 1–2 mm long; anther 1.7–2.3 mm long.

[Related to *H. finitima* and *H. dichroa*, but distinguished by its combination of slender culms, callus cuneate and few awns.]

*Flowering*: November to May. *Ecology*: Ruderal on poor soils, roadsides. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe, Zambia, to East Africa and DRC. S, LIM, M, KZN.

Anatomy voucher: *Ellis 3493*.
Voucher: *De Winter & Codd 145*.

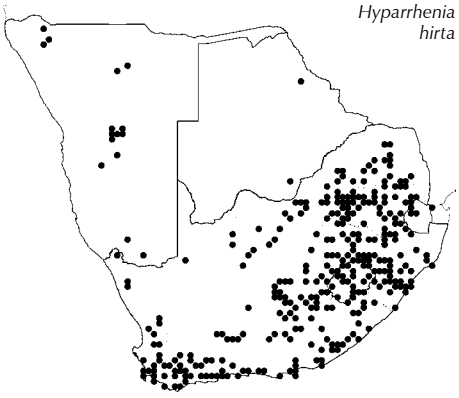

*Hyparrhenia gazensis*

**Hyparrhenia hirta** (L.) Stapf, in *Flora tropical Africa* 9: 315 (1919). Type: Italy.

COMMON THATCHING GRASS, DEKTAMBOEKIEGRAS

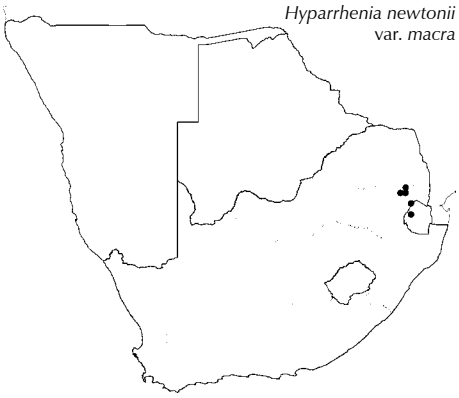
Wiry tufted perennial 300–800 mm high; rhizomatous; culms slender. Leaf blade 20–150 × 1–2(–4) mm. Inflorescence scanty, with 2–10 raceme pairs; raceme bases terete, unequal, with 0–1 homogamous pairs at base of upper raceme and 8–14 awns; racemes never deflexed, 20–40 mm long. Sessile spikelet 4.0–6.5 mm long, yellowish green to violet, white-villous; awn 10–35 mm long, hairs to 0.3 mm long; callus acute. Pedicellate spikelet 3–7 mm long, white-villous, acute, muticous; anther 1.5–2.5 mm long.

[The most widespread of all the hyparrhenias, *H. hirta* is linked through *H. quarrei* to H. *nyassae*, through *H. anamesa* to *H. filipendula* and also to *H. dregeana* and *H. finitima*. *Hyparrhenia hirta* may be recognised by its hard basal tussock, harsh narrow leaves and scanty inflorescence of white villous racemes that do not deflex.]


*Hyparrhenia hirta*

*Flowering*: September to June. *Ecology*: Stony soils. *Frequency in southern Africa*: Dominant. *Distribution*: Throughout Africa to the Mediterranean and Pakistan. N, B, L, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Used for thatching; indicator of climax vegetation.

Illustration: Chippindall: 511, fig. 408A (1955).
Anatomy vouchers: *Ellis 134, 158, 206, 356, 448, 1342, 1619, 1649, 2052, 4432, 4772 & 5399; Manders 1; Smook 3228 & 3900*.
Voucher: *De Winter 2579*.


*Hyparrhenia newtonii* var. *macra*

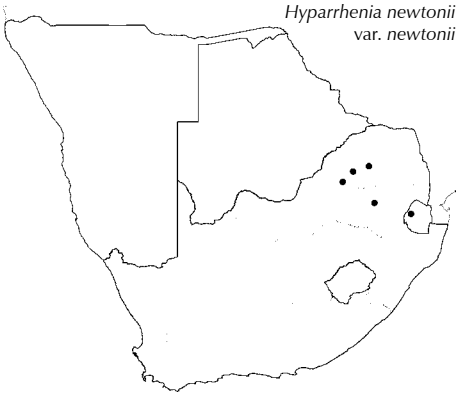
**Hyparrhenia newtonii** (Hack.) Stapf var. **macra** Stapf, in *Flora tropical Africa* 9: 364 (1919). Type: Zimbabwe, Harare, *Craster 59* (K, lecto.).

Densely tufted perennial 600–1 200 mm high; rhizomatous; basal sheaths tomentose or glabrous. Leaf blade to 300 × to 3 mm. Raceme bases covered with stiff hairs, upper raceme base with a linear scarious appendage 3 to 4 mm long; raceme pairs with 2–4 awns. Sessile spikelet 6–10 mm long; lower glume hairy; awn 25–55 mm long, hairs up to 0.5 mm long; callus acute to pungent, 1.5–2.0 mm long. Pedicellate spikelet 5–10 mm long, pubescent to villous, awn 1–5 mm long; anther 1.7–2.0 mm long.

[This variety is doubtfully distinct, distinguished from the typical var. *newtonii* only by the sessile spikelet lower glume hairy.]

*Flowering*: December to April. *Ecology*: Stony hillsides. *Frequency in southern Africa*: Infrequent. *Distribution*: Zimbabwe, Zambia, Malawi and Mozambique. S, M.

Voucher: *Louw 2720*.


*Hyparrhenia newtonii* var. *newtonii*

**Hyparrhenia newtonii** (Hack.) Stapf var. **newtonii**., in *Flora tropical Africa* 9: 363 (1919). Type: Angola, *Newton*.

Bearded thatching grass

Tufted perennial 300–1 000 mm high; rhizomatous; basal sheaths tomentose or glabrous. Leaf blade to 300 × to 3 mm. Raceme bases covered with stiff hairs, upper raceme base with a linear scarious appendage 3–4 mm long; raceme pairs with 2–4 awns. Sessile spikelet 6–10 mm long; lower glume glabrous or with a few hairs at apex; awn 25–55 mm long, hairs up to 2 mm long; callus acute to pungent, 1.5–2.0 mm long. Pedicellate spikelet, 5–10 mm long, glabrous, awn 1–5 mm long; anther 2.2 mm long.

*Flowering*: December to March. *Ecology*: Stony hillsides. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards into mainly western tropical Africa and Madagascar; and southeast Asia, Indonesia. S, LIM, M.

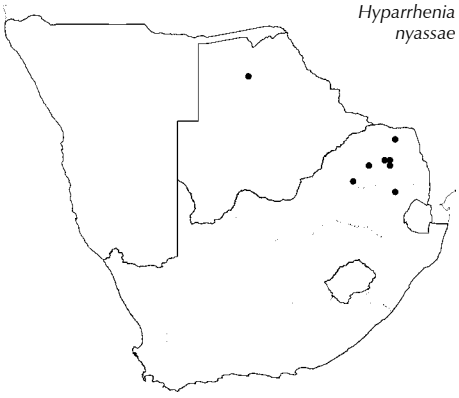
Illustration: Clayton et al. 815, fig. 186 (1982).
Voucher: *Story 1645*.

**Hyparrhenia nyassae** (Rendle) Stapf, in *Flora tropical Africa* 9: 313 (1919). Type: Malawi, *Buchanan 1423*.

Bronze-awned thatching grass, brons-aar tamboekiegras

Tufted perennial 600–1 300 mm high; rhizomatous; basal sheaths with dense spreading white hairs. Leaf blade to 450 × 2–5 mm. Raceme bases terete, unequal, upper raceme base 2–3 mm long;

raceme pairs with 6–14 awns. Sessile spikelet 5 to 6 mm long; yellowish-green to violet, with golden-yellow hairs; awns 20–40 mm long; callus linear or narrowly cuneate, 0.8–1.2 mm long. Pedicellate spikelet, 4.5–7.0 mm long, golden-yellow hairs, acute; anther 1.6–2.5 mm long.

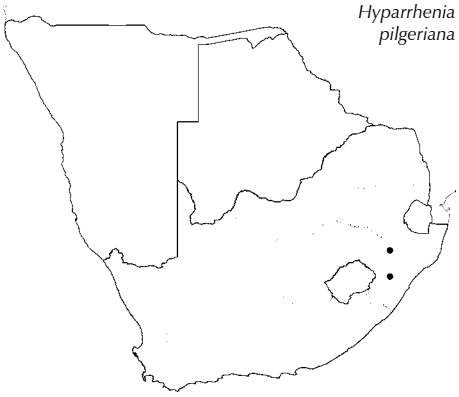

*Hyparrhenia nyassae*

[Related to *H. rufa*, which has no hairs on the basal sheaths, a shorter callus and racemes less hairy; *H. nyassae* also intergrades with *H. quarrei*, which has white raceme hairs.]

*Flowering*: November to March. *Ecology*: Moist places in open veld. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Ethiopia and west to Cameroon; also Thailand and Vietnam. B, LIM, M.

Voucher: *De Winter & Codd 432*.

**Hyparrhenia pilgeriana** C.E.Hubb., in *Kew Bulletin* 1928: 39 (1928), as *'pilgerana'*. Type: Tanzania, Rungwe District, Kyimbila, *Stolz 960*.


*Hyparrhenia pilgeriana*

Tufted slender perennial 300–600 mm high, lax and rambling; rhizomatous. Leaf blade 50–110 × 2–4 mm. Peduncle 9–30 mm long, raceme exserted from spatheole; raceme bases subequal or the upper somewhat longer (to 1.5 mm), flattened, shortly appendaged; raceme pairs with 6–7 awns. Sessile spikelet 4 mm long; glabrous or with very short white hairs; awn 7–17 mm long; callus oblong or square. Pedicellate spikelet 4.0–4.5 mm long, glabrous or shortly pilose between nerves and margins, awnless or awn up to 1.5 mm long; anther 1.6 mm long.

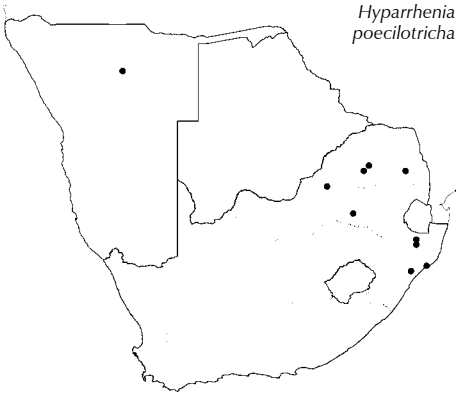
[Resembles *H. cymbaria*, which is a robust plant with racemes enveloped by short spatheoles; and *H. gazensis*, which has longer awns.]

*Flowering*: February to March. *Ecology*: Seasonal swamps, old fallow land. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to East Africa and Ethiopia. KZN.

Illustration: Clayton: 116, fig. 27 (1969).
Anatomy voucher: *Mogg 6941*.
Voucher: *McClean 101*.

**Hyparrhenia poecilotricha** (Hack.) Stapf, in *Flora tropical Africa* 9: 309 (1919). Type: Angola, Humpata, *Newton*.

*H. buchanani* (Stapf) Stapf ex Stent, in *Bothalia* 1: 249 (1923). Type: South Africa, KwaZulu-Natal, *Buchanan*. (K, holo.).

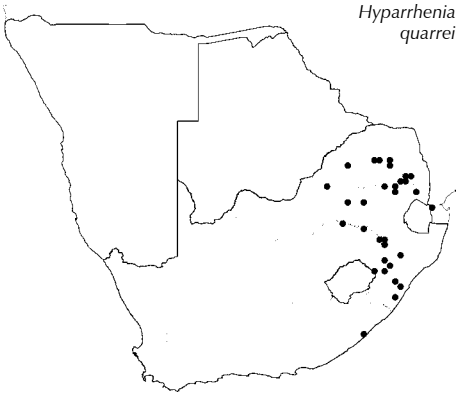

*Hyparrhenia poecilotricha*

Tufted perennial 600–1 300 mm high; rhizomatous; basal leaf sheaths glabrous or rarely with a few hairs. Leaf blade to 300 × to 3 mm. Raceme bases terete, unequal, upper raceme base 3.5–7.0 mm long, with 2 pairs of homogamous spikelets; raceme pairs with 4–7 awns. Sessile spikelet 5.5–7.0 mm long, hairs yellow or reddish-brown; awn 25–40 mm long; callus acute to pungent, 1–2 mm long. Pedicellate spikelet 4–7 mm long, yellow or reddish-brown hairs, awn up to 2 mm long; anther 1.4–2.0 mm long.

[It may be recognised by its tendency to a long upper raceme base. A variable species that connects *H. rufa*, *H. nyassae*, *H. filipendula* and the tropical species *H. familiaris* (Steud.) Stapf, probably through introgressive hybridisation.

*Flowering*: December to April. *Ecology*: Moist sandy soil; Bushveld. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards into eastern tropical Africa. N, LIM, NW, G, KZN.

Voucher: *Giess, Volk & Bleissner 6452*.


*Hyparrhenia quarrei*

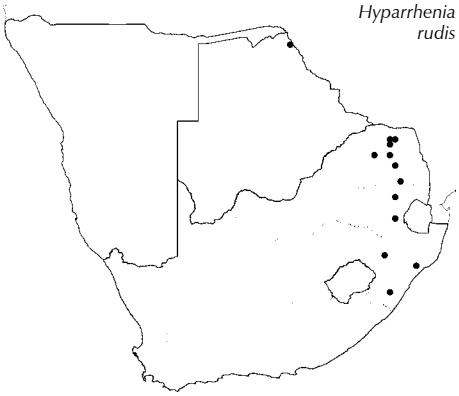
**Hyparrhenia quarrei** Robyns, in *Flore agrostologique du Congo Belge* 1: 171 (1929). Type: DRC, Kafubu, *Quarré 199* (BR, holo.).

Tufted perennial 1 000–2 000 mm high; shortly rhizomatous. Leaf blade to 400 × to 5 mm. Raceme bases unequal, terete, with 0 or 1 homogamous pairs at base of upper raceme; raceme deflexed at maturity; raceme pairs with 6–10 awns. Sessile spikelet 4.5–5.5 mm long, white pubescent to villous; awn 18–36 mm long; callus slender, 0.7–1.2 mm long. Pedicellate spikelet 5–7 mm long, pubescent to villous, acute; anther 1.7–2.3 mm long.

[This species links *H. hirta*, which does not have deflexed racemes and *H. nyassae*, which has yellow raceme hairs and it may be a product of introgression between these species.]

*Flowering*: January to June. *Ecology*: Forest margins. *Frequency in southern Africa*: Common. *Distribution*: Northwards and throughout tropical Africa. S, LIM, NW, G, M, FS, KZN, EC.

Anatomy vouchers: *Ellis 1604* & *4436*.
Voucher: *Pole Evans 3699*.


*Hyparrhenia rudis*

**Hyparrhenia rudis** Stapf, in *Flora tropical Africa* 9: 344 (1919). Type: Angola, Munongue, *Gossweiler 4151* (K, lecto.).

Coarsely tufted, robust perennial 2 000–3 000 mm high; stilt roots present; rhizomatous; culms to 8 mm thick, exposed at base. Leaf blade 300–600 × 3–18 mm. Spatheole 25–40 mm long; peduncle 10–20 mm long; raceme bases subequal, flattened, short-appendaged; raceme pairs with 4–7 awns. Sessile spikelet 5 to 6 mm long, pale or reddish brown; hairs silky white; awn 22–40 mm long; callus cuneate. Pedicellate spikelet 6–7 mm long, villous; awn 2–6 mm long; anther 2.2–3.5 mm long.

[Closely related to *H. dregeana*, *H. tamba* and *H. collina*, from which it is distinguished by its long awns and loosely tufted culms that increase in diameter above the lowest internodes; and to *H. schimperii*, which has the pedicellate spikelet glabrous or sparsely hairy.]

*Flowering*: February to May. *Ecology*: Moist soils. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Tanzania, Sudan, DRC and west to Nigeria; also Madagascar. B, LIM, M, KZN.

Anatomy vouchers: *Ellis 4481* & *4482*.
Voucher: *Scheepers 242*.

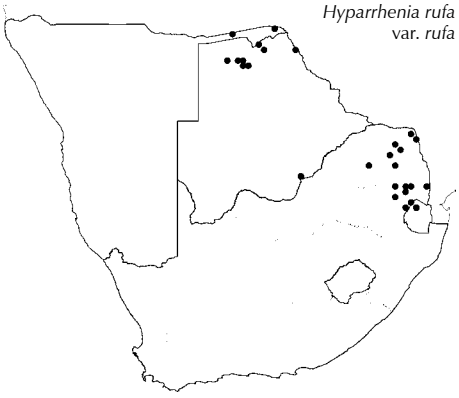
**Hyparrhenia rufa** (Nees) Stapf var. **rufa**, in *Flora tropical Africa* 9: 304 (1919). Type: Brazil.

*H. altissima* Stapf, in *Flora tropical Africa* 9: 307 (1919). Type: Ethiopia, plant cultivated at Karlsruhe from seeds collected by *Schimper*.

Giant thatching grass, geel-aar tamboekiegras

Perennial or sometimes annual 300–2 500 mm high; rhizomatous. Leaf blade 300–600 × 2–8 mm. Inflorescence lax or contracted;

spatheole linear, 40–50 mm long; raceme bases terete, unequal; raceme pairs with 7–14 awns. Sessile spikelet 3.5–4.5 mm long, yellowish to reddish-brown, often violet-tinged, usually glossy; glabrous or sparsely hairy, hairs reddish-brown; awn 20–30 mm long; callus rounded or wedge-shaped, 0.2–0.8 mm long. Pedicellate spikelet, 3–5 mm long, hairs reddish-brown, acute or rarely with a mucro up to 0.3 mm long; anther 1.3–2.2 mm long.

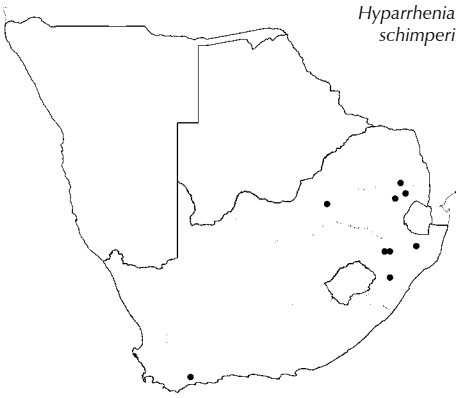

*Hyparrhenia rufa* var. *rufa*

[A widespread, common and very variable species, best recognised by the glossy lower glume. Close to *H. dichroa*, which has fewer awns, 6–10, and often has the spatheole clasping the raceme bases; and *H. poecilotricha*, which has a longer sessile spikelet, 5.5–7.0 mm long.]

*Flowering*: December to June. *Ecology*: Disturbed moist places and roadsides. *Frequency in southern Africa*: Common. *Distribution*: Tropical Africa, introduced in America and Australia. N, B, S, LIM, M. *Economics*: Used for thatching and pasture when young.

Illustration: Hitchcock & Chase: 772, fig. 1176 (1950).
Anatomy vouchers: *Ellis 3715, Smook 4974*.
Voucher: *Scheepers 215*.

**Hyparrhenia schimperi** (Hochst. ex A.Rich.) Andersson ex Stapf, in *Flora tropical Africa* 9: 341 (1919). Type: Ethiopia, Shire [Chiré], *Quartin Dillon* (P); Mt. Sholoda [Shelleuda], *Schimper 408* (syntypes).


*Hyparrhenia schimperi*

Coarsely tufted robust, erect perennial 2 000–4 000 mm high; with stilt roots; shortly rhizomatous; culms to 8 mm thick. Leaf blade to 600 × to 20 mm. Peduncle 10–15 mm long; raceme bases subequal, flattened and short-appendaged; raceme pairs with 6–8 awns. Sessile spikelet 4 to 5 mm long; sparsely hairy to nearly glabrous; awns 20–35 mm long; callus cuneate to acute. Pedicellate spikelet 5–7 mm long, glabrous to sparsely pilose, awnless or with awn up to 6 mm long; anther 1.3–3.5 mm long.

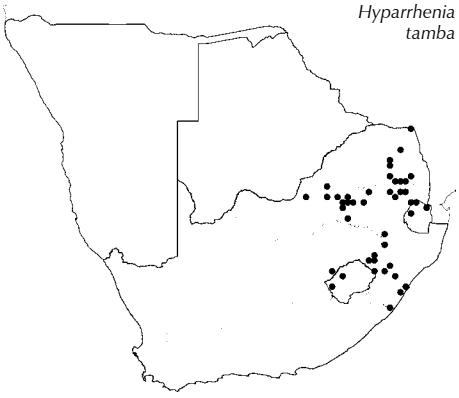
[Grades into *H. variabilis* which has fewer awns, awns 3–5 mm long; and closely related to *H. rudis*, which has long hairs on the pedicellate spikelet.]

*Flowering*: December to May. *Ecology*: Open moist places. *Frequency in southern Africa*: Locally common. *Distribution*: Eastern Africa and Madagascar. NW, M, KZN, WC.

Anatomy voucher: *Ellis 4480*.
Voucher: *Codd 208*.

**Hyparrhenia tamba** (Steud.) Stapf, in *Flora tropical Africa* 9: 336 (1919). Type: Ethiopia, Gennia, *Schimper 911* (PRE, fg.); Mt. Scholoda, *Schimper 937* (syntypes).

*H. glauca* Stent, in *Bothalia* 1: 251 (1923). Type: South Africa, Gauteng, Pretoria, *Stent H21425* (PRE, iso.; on this specimen Stent as collecter has been scratched out and replaced with Pole Evans – reason unknown).


*Hyparrhenia tamba*

Blue thatching grass, bloutamboekiegras

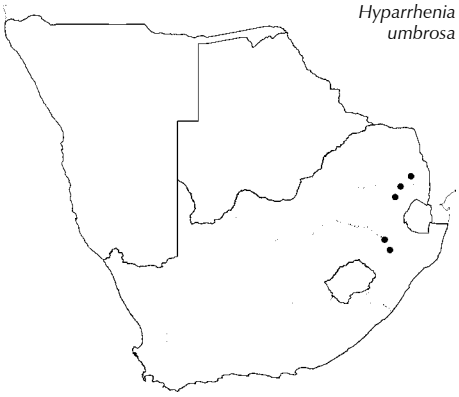
Densely tufted stout, robust perennial 1 000–3 000 mm high; sometimes with small stilt roots; rhizome dense; basal sheaths hairy; culms to 4 mm thick. Leaf blade to 800 × 3–7 mm. Spatheole 26–40 mm long; peduncle 20–30 mm long; raceme bases subequal, flattened, short-appendaged; raceme pairs with 5–8 awns. Sessile spikelet 5 mm

long; becoming dark purplish-grey; hairs long, white; awn 16–25 mm long; callus cuneate. Pedicellate spikelet 7–8 mm long, villous, awnless or with an awn up to 2 mm long; anther 1.5–2.0 mm long.

[Closely related to *H. collina* and *H. dregeana*, and possibly imperfectly separated from the latter, but distinguished by its combination of appendaged raceme base and few awns.]

*Flowering*: December to June. *Ecology*: Streamsides and roadsides. Common. *Distribution*: Zimbabwe, Kenya, Ethiopia to Sudan and DRC. S, L, LIM, NW, G, M, FS, KZN. *Economics*: Used for thatching.

Illustration: Flower. Pl. Afr.: 47 (1942); Chippindall: pl. 24 (1955).
Anatomy vouchers: *Ellis 552, 784; Van Heerden 41.*
Voucher: *Killick 2359.*


*Hyparrhenia umbrosa*

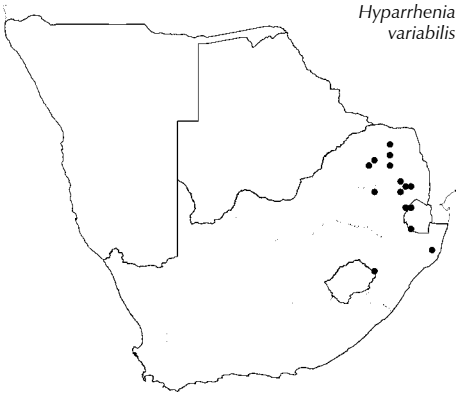
**Hyparrhenia umbrosa** (Hochst.) Andersson ex Clayton, in *Kew Bulletin, Additional Series* 2: 127 (1969). Type: Ethiopia, Mt. Scholoda, *Schimper 1116*.

Robust rambling perennial 1 300–2 000 mm high; with stilt roots; rhizomatous; culms slender below, increasing to 6 mm across above. Leaf blade to 600 × to 12 mm. Spatheole 12–23 mm long; peduncle 3–13 mm long; raceme bases flattened, subequal; raceme pairs with 4–6 awns. Sessile spikelet 4 mm long; hairs long, white; awn 7–13 mm long; callus 0.4 mm long, oblong with rounded apex. Pedicellate spikelet 5–6 mm long, villous, muticous or mucronate; anther 1.8 mm long.

[Closely related to *H. cymbaria* and *H. rudis*, and possibly not a distinct species, but distinguishable by the rambling culm bases and oblong callus.]

*Flowering*: May to June. *Ecology*: Roadsides, old lands. *Frequency in southern Africa*: Infrequent. *Distribution*: East Africa, Ethiopia to Sudan and DRC; then westwards to Cameroon and Nigeria. LIM, M, KZN.

Voucher: *Pole Evans 3775*.


*Hyparrhenia variabilis*

**Hyparrhenia variabilis** Stapf, in *Flora tropical Africa* 9: 334 (Jan. 1919). Type: Zambia, Mumbwa, *Macaulay 62* (K, lecto.).

Robust perennial 1 500–3 000 mm high; with stilt roots; rhizomatous; culm 3.0–5.5 mm across. Leaf blade to 450 × to 15 mm. Spatheole 14–24 mm long; peduncle 3–9 mm long; raceme bases subequal, flattened, short-appendaged; raceme pairs with 3–5 awns. Sessile spikelet 4–5 mm long, nearly glabrous to sparsely and shortly white-hairy; awn 18–30 mm long; callus cuneate, 0.5–1.0 mm long. Pedicellate spikelet 5–8 mm long, glabrous, except margins ciliate, awn 1–4 mm long; anther 1.4–3.0 mm long.

[Grades into *H. cymbaria*, which has short ovate spatheoles and a square callus; and *H. schimperi*, which has more awns, 6–8.]

*Flowering*: January to May. *Ecology*: Forest margins. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to eastern Africa; Madagascar, Comoro Islands and Java. S, LIM, M, KZN.

Illustration: Clayton et al.: 806, fig. 185 (1982).
Anatomy vouchers: *Deall 3, Ward 2102.*
Voucher: *Galpin 8887.*

## **Hyperthelia** Clayton

Clayton: 438 (1966c); Chippindall: 510 (1955) under *Hyparrhenia* Fourn.; Clayton & Renvoize: 786 (1982); Clayton & Renvoize: 356 (1986); Gibbs Russell et al.: 188 (1990); Watson & Dallwitz: 485 (1994); Cope: 136 (2002).



Figure 271.—*Hyperthelia dissoluta* spikelet pair (6.5–7.5 mm). Photographer: M. Koekemoer.

Tufted perennial. **Leaf blade** linear, expanded; *ligule* an unfringed to rarely a fringed membrane. **Inflorescence** of few to many spike-like, paired racemes embraced or subtended by linear to lanceolate spatheoles in a leafy spatheate false panicle; raceme-pairs with (1)2(–10) awned sessile spikelets per pair, 1 pair of homogamous spikelets at the base of lower raceme; raceme bases unequal, terete, sometimes deflexed, apex oblique, produced into a long scarious appendage; internodes and pedicels linear; *spikelets* paired, in long–short combination: one sessile, the other pedicelled, dissimilar. **Sessile spikelet** dorsiventrally compressed, narrow-oblong to narrow-lanceolate, falling with glumes; *glumes* ± equal, very dissimilar, coriaceous; lower glume shortly hairy, with a shallow median groove, otherwise rounded on the back and sides, apex 2-lobed; upper glume acute to apiculate, awned or awnless. **Florets** 2; *lower floret* reduced to a lemma, hyaline, awnless; *upper floret* bisexual; *lemma* less firm than glumes, hyaline, shortly 2-lobed, awned from between lobes; *awn* robust, geniculate, hairy; *callus* pungent, hairy; *palea* 0 or reduced. **Lodicules** 2, glabrous. **Stamens** 3. **Ovary** ovoid, glabrous; styles plumose. **Caryopsis** narrowly ellipsoid; hilum short; embryo large. **Pedicelled spikelet** ± as long as sessile spikelet; lower glume not grooved; male; awnless or aristulate; narrowed at base into an indistinct callus. **Photosynthetic pathway**: $C_4$; XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 10$.

**Species** 6, tropical and southern Africa, introduced to tropical America; 1 in southern Africa: *Hyperthelia dissoluta* (Nees ex Steud.) Clayton, northern Namibia, Botswana, Swaziland, Limpopo, North West, Gauteng, Mpumalanga and KwaZulu-Natal.

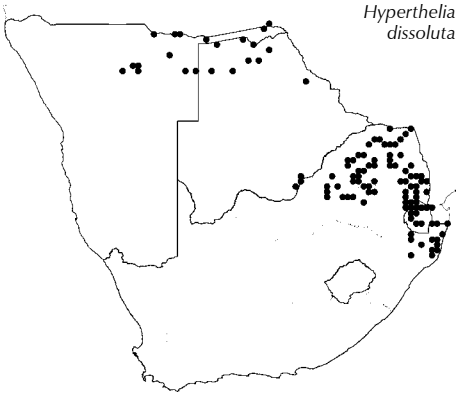
Species treatment by M.J. Moeaha.

### Quick guide to easily confused genera:

1. Sessile spikelet lower glume with a median longitudinal groove . . . . . **Hyperthelia**
   Sessile spikelet lower glume without a longitudinal groove . . . . 2
2. Sessile spikelet upper glume awned . . . . . **Elymandra**
   Sessile spikelet upper glume mucronate or awnless . . . **Hyparrhenia**



Figure 272.—*Hyperthelia dissoluta*. Artist: W. Roux.


*Hyperthelia dissoluta*

**Hyperthelia dissoluta** (Nees ex Steud.) Clayton, in *Kew Bulletin* 20: 441 (1966). Type: Tropical Africa (probably Ghana), in Herb. *Lindley* (CGE, holo.).

*Hyparrhenia dissoluta* (Nees) C.E.Hubb., in *Flora West tropical Africa* 2: 591 (1936). Type as above.

YELLOW THATCHING GRASS, GEELTAMBOEKIEGRAS

Tufted, robust perennial 1 000–3 000 mm high; culms yellow. Leaf blade 300 × 12 mm. Sessile spikelet 6.5–7.5 mm long, lower glume with a deep narrow, median longitudinal groove; lemma 2-lobed, awned; awn 50–100 mm long, hairy, yellowish, relatively thick; callus pungent. Pedicelled spikelet up to 14 mm long.

*Flowering*: July to June (mostly in autumn). *Ecology*: Common in sandy bushveld; along roadsides and disturbed places, often forming dense stands. *Frequency in southern Africa*: Relatively common. *Distribution*: Throughout tropical Africa, Madagascar; and introduced in tropical America. N, B, S, LIM, NW, G, M, KZN. *Economics*: Used mainly for thatching; can become a problem as it is difficult to eradicate.

Illustrations: Chippindall: 513, fig. 410 (1955); Cope: 137, tab. 43 (2002).
Anatomy vouchers: *Ellis 212, 551, 1537, 2056 & 4512*.
Voucher: *Compton 27058*.

## **Imperata** Cirillo

Cirillo: 26 (1792); Stapf: 320 (1898); Chippindall: 476 (1955); Launert: 121 (1970); Clayton & Renvoize: 700 (1982); Clayton & Renvoize: 333 (1986); Gibbs Russell et al.: 189 (1990); Watson & Dallwitz: 491 (1994); Clayton: 10 (2002).



Figure 273.—*Imperata cylindrica* spikelet pair (3–6 mm). Photographer: M. Koekemoer.

Perennial; strongly rhizomatous. **Leaf blade** narrow, leaves mainly basal; *ligule* a fringed membrane. **Inflorescence** a narrow, silky, white or silvery, often spiciform panicle; branches of many very short racemes, rachis tough; *spikelets* paired, similar, unequally pedicelled; pedicel slender. **Spikelet** lanceolate to oblong, ± terete, enveloped in long hairs from callus and glumes; *glumes* equal, similar, as long as spikelet, membranous, hairy towards base, hairs long, silky, awnless. **Florets** 2; *lower floret* sterile, rarely male, reduced to a hyaline lemma, shorter than spikelet, awnless; *upper floret* bisexual; *lemma* less firm than glumes, hyaline, lanceolate to oblong, shorter than spikelet, glabrous, awnless; *callus* short, truncate, hairy with long, white or silvery, silky hairs almost concealing spikelet; *palea* present or reduced. **Stamens** 1 or 2. **Ovary** glabrous. **Caryopsis** ellipsoid, small; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; XyMS-. PCR cell chloroplasts with reduced grana; centrifugal/peripheral. **Cytology**: $x = 5, 10$ (polyploidy).

**Species** 8, cosmopolitan in tropical and subtropical regions; 1 in southern Africa: *Imperata cylindrica* (L.) Raeusch., widespread.

Species treatment by A.C. Mashau.

**Imperata cylindrica** (L.) Raeusch., in *Nomenclator Botanicus*, ed. 3: 10 (1797). Type: Europe.

*I. cylindrica* (L.) Raeusch. var. *africana* (Andersson) C.E.Hubb., in *Joint publication of the Imperial Agricultural Bureaux and Aberystwyth* 7: 10 (1944). Type: From East Indies.

*I. cylindrica* (L.) Raeusch. var. *major* (Nees) C.E.Hubb., in *The grasses of Mauritius and Rodriguez*: 96 (1940). Type: South Africa, Eastern Cape, between Umgazana and Uzimkulu, *Drège*.

COTTONWOOL GRASS, SILVER-SPIKE, SYGRAS, DONSGRAS

Perennial 100–1 200 mm high; strongly rhizomatous. Leaf blade to 1 500 × 2–12 mm, broad in middle, narrowed at apex and base, reddish in winter. Inflorescence a dense cylindrical spike-like panicle, white to silvery due to long silky hairs from callus. Spikelet 3–6 mm long, awnless; glumes as long as spikelet; anther 3.0–3.5 mm long.

*Flowering*: August to June. *Ecology*: Forming dense stands in poorly drained soils; along riverbank sand in vleis and seasonally wet places.

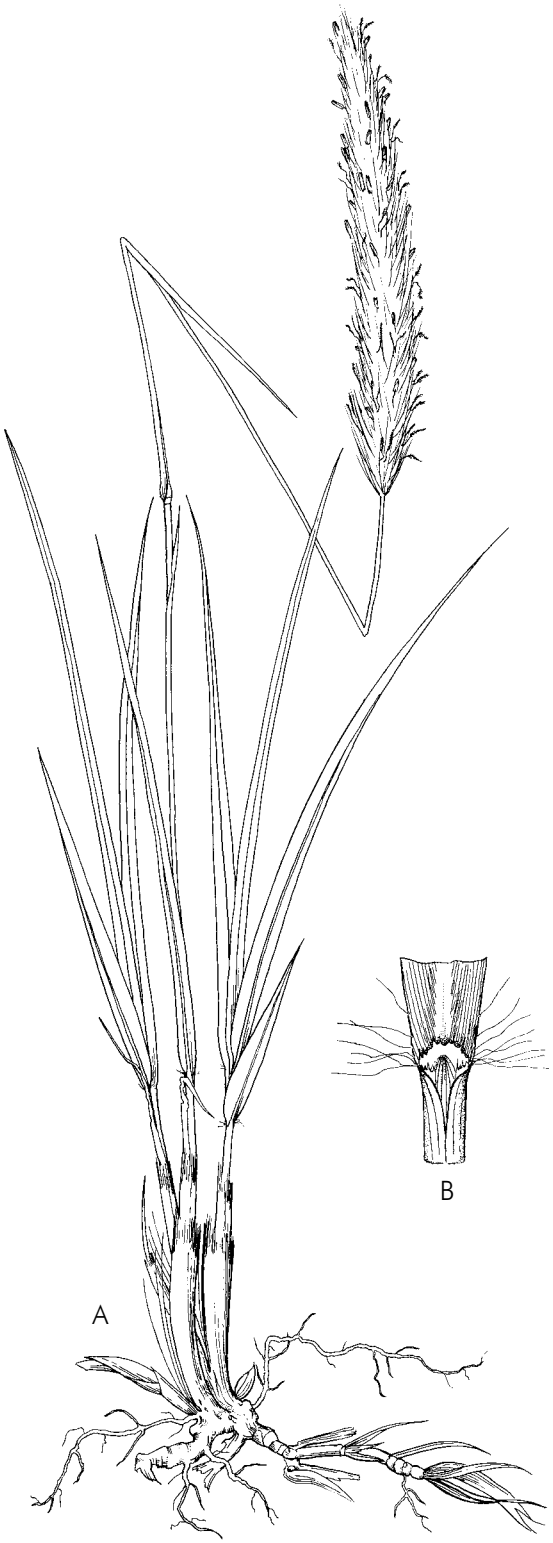



Figure 274.—*Imperata cylindrica*. A, plant; B, ligule. Artist: C. Smith.

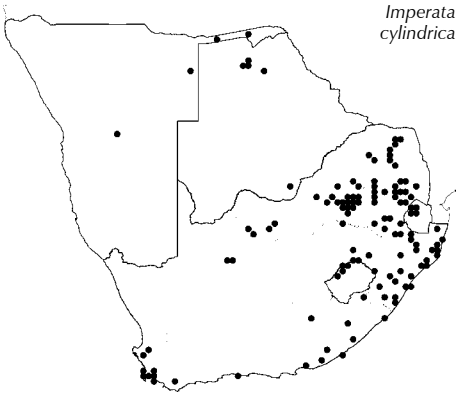






Figure 275.—*Ischaemum fasciculatum*. Artist: G.E. Lawrence.

*Frequency in southern Africa*: Common. *Distribution*: Old World tropics; also the Mediterranean and into Asia. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Not used for grazing, but is an important soil stabiliser. However, can become an aggressive weed as rhizomes make it difficult to eradicate. Used for thatching, paper, fuel and as ornamental in gardens.

Illustrations: Chippindall: 477, fig. 392 (1955); Clayton et al.: 701, fig. 159 (1982).
Anatomy vouchers: *Ellis 69, 720* & *1336*.
Voucher: *Gibbs Russell 2197*.

## **Ischaemum** L.

Linnaeus: 1049 (1753); Stapf: 326 (1898); Chippindall: 486 (1955); Clayton & Renvoize: 746 (1982); Clayton & Renvoize: 345 (1986); Gibbs Russell et al.: 190 (1990); Watson & Dallwitz: 498 (1994); Cope: 50 (2002).

Perennial, sometimes annual; rhizomatous. **Leaf blade** linear, expanded; *ligule* an unfringed membrane. **Inflorescence** of paired or digitate, spike-like racemes; internodes and pedicels often stout and clavate, usually exposed on back as U- or V-shaped segments; *spikelets* secund, paired, in long–short combinations: usually one sessile or subsessile, the other pedicelled, rarely both unequally pedicelled. **Sessile or subsessile spikelet** dorsiventrally compressed, falling with glumes; *glumes* ± equal, dissimilar; lower glume concave or somewhat convex on back, coriaceous to chartaceous, glabrous to hairy, markedly nerved upwards, usually 2-keeled, keels wingless to winged; upper glume boat-shaped, keeled at least above, often rather broad, awnless or awned. **Florets** 2; *lower floret* male or sterile, lemma membranous to hyaline, awnless; palea well developed; *upper floret* bisexual; *lemma* less firm than glumes, membranous to hyaline,

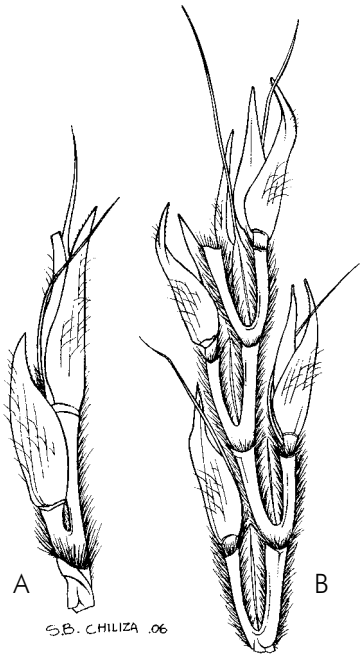



Figure 276.—*Ischaemum fasciculatum*. A, dorsal view of spikelet pair (10 × 2 mm); B, ventral view of raceme portion showing internodes and pedicels (23 × 4 mm). Artist: S.B. Chiliza.



Figure 277.—*Ischaemum afrum* spikelet pair (5–8 mm). Photographer: M. Koekemoer.

1–5-nerved, 2-lobed, awned from between lobes; *awn* geniculate, twisted, glabrous; *callus* inserted in concave top of internode; *palea* ± as long as lemma, hyaline. **Lodicules** 2, cuneate, fleshy, glabrous. **Stamens** 3. **Ovary** with stigmas linear-oblong, plumose. **Caryopsis** oblong to lanceolate, dorsiventrally compressed; hilum short; embryo large. **Pedicelled spikelet** similar to sessile spikelet or ± reduced; dorsiventrally or laterally compressed, often asymmetrical; awned or awnless. **Photosynthetic pathway**: $C_4$; XyMS-. PCR sheaths outlines even. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 10$ (high polyploidy).

**Species** ± 60, throughout the tropics, but mainly in Asia; 2 in southern Africa, northern Namibia, northern Botswana, Limpopo, North West, Gauteng, Mpumalanga, KwaZulu-Natal and Eastern Cape.

Species treatment by M.J. Moeaha.

**Quick guide to easily confused taxa:**

Sessile spikelet awn 5–10 mm long; occurs in wet places . . . . . **Ischaemum fasciculatum**
Sessile spikelet awn 15–20 mm long; occurs in dry places on hillsides . . . . . **Eulalia villosa**

**Key to species:**

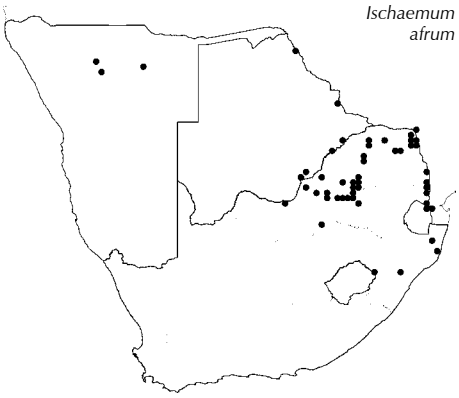
Sessile spikelet lower glume concave across the back, keels not winged; pedicelled spikelet awnless or rarely awned from upper lemma; leaves glaucous, tapering into a long filiform apex . . . . . **I. afrum**
Sessile spikelet lower glume convex or flat across the back, keels usually winged on upper half, rarely wingless; pedicelled spikelet upper lemma awned; leaves dark or bright green, turning reddish-brown at maturity, blades tapering abruptly into a fine apex . . . . . **I. fasciculatum**

**Ischaemum afrum** (J.F.Gmel.) Dandy in Andrews, in *The Flowering plants of the Anglo-Egyptian Sudan* 3: 476 (1956). Type: Ethiopia-Sudan border, figure in Bruce, Travels 5: 47 (1790).

*I. brachyatherum* (Hochst.) Fenzl ex Hack., in A. & C. De Candolle, *Monographiae Phanerogamarum Prodromi nunc Contiuato, nunc Revisio* 6: 239 (1889). Type: Sudan.

*I. glaucostachyum* Stapf, in *Flora capensis* 7: 328 (1898). Type: South Africa, Limpopo Province, Pienaars River (2528AB), *Nelson 17* (K, holo.; PRE, fg.).

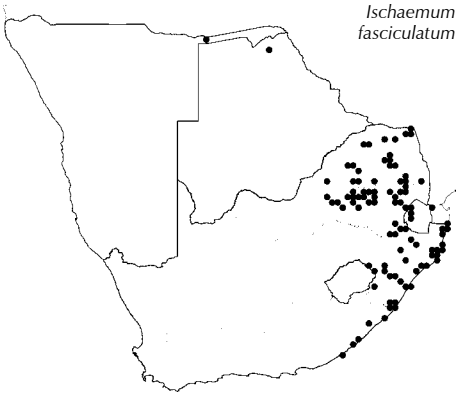
TURFGRAS, TWEEVINGERGRAS


*Ischaemum afrum*

Densely tufted perennial up to 1 200 mm high; rhizomes long, strong, creeping. Leaf blade 100–500 mm × 2–5(–11) mm, tapering into a long, fine apex, glaucous, often curling when dry. Sessile spikelet 5–8 mm long; lower glume concave, keels not winged; upper lemma awn 5–20 mm long. Pedicelled spikelet 1–6 mm long; awnless or rarely awned from upper lemma.

*Flowering*: October to April. *Ecology*: Black turf and clay soil; usually near water. *Distribution*: Northwards and throughout tropical Africa to Ethiopia across to Nigeria; also India. N, B, S, LIM, NW, G, M, KZN. *Economics*: Not utilised for grazing though said to be grazed by reedbuck; used for weaving hats; ruderal weed.

Anatomy vouchers: *Ellis 119, 351, 1613, 1881* & *5272*.
Voucher: *Giess, Volk & Bleissner 6436*.


*Ischaemum fasciculatum*

**Ischaemum fasciculatum** Brongn., in Duperrey, *Voyage autour du monde, exécute par orde du Roi, sur la corvette de Sa Majesté, La Coquille, pendant les années*: 73 (1831). Type: Mauritius, *d'Urville* (P, holo.).

*I. arcuatum* (Nees) Stapf, in *Flora tropical Africa* 9: 33 (1917). Type: South Africa, between Mtentu (Eastern Cape) and Mzimkulu (KwaZulu-Natal), *Drège*.

HIPPO GRASS, ROOIVLEIGRAS

Perennial 300–900 mm high; rhizomatous. Leaf blade 50–250 × (4–)5–16 mm, green, becoming reddish-brown, narrowing shortly to a sharp apex. Sessile spikelet 5–6 mm long, dorsally compressed; lower glume convex or flat, keels usually winged on upper half; awn 5–10 mm long. Pedicelled spikelet as long as sessile spikelet, laterally compressed; upper lemma awned; awn 5–15 mm long, geniculate; callus oblong, 1.0–1.5 mm long.

*Flowering*: October to May. *Ecology*: Wet places, vleis and river banks, growing in standing or flowing water where it forms dense stands. *Distribution*: Throughout tropical Africa to southeast Asia. N, B, S, LIM, NW, G, M, KZN, EC. *Economics*: Average grazing grass especially well grazed by hippo; a thatching grass in Mozambique; ruderal weed.

Illustration: Chippindall: 488, fig. 398 (1955).
Anatomy vouchers: *Ellis 1866, 4316, 4470, 4477, 4479, 6170* & *6173*.
Voucher: *De Winter & Wiss 4315*.

## *Jarava Ruiz & Pav.

Caro & Sanchez: 61 (1973); Jacobs & Everett: 301 (1997); Arriaga: 178 (2007).

Tufted perennial; knotted rhizomes present or absent; culms not branching at upper nodes; leaves mostly basal. **Leaf blade** usually convolute, stiff, apex narrowly pointed; leaf sheath open to base; *ligule* an unfringed membrane, truncate; auricles absent. **Inflorescence** a panicle, often partially included in upper leaf; branches straight; spikelets pedicellate. **Spikelet** terete; rachilla not extended, disarticulating above glumes; *glumes* ± equal to unequal, shorter to longer than spikelet, hyaline, 0–5-nerved. **Floret** 1; *lemma* terete, scabrid, shortly pubescent basally, apex glabrous or with hairs up to 1 mm or a pappus of ascending to divergent, 3–8 mm long hairs present or absent, margins not or slightly overlapping, crown absent, lobes 0.2 mm long; *awn* single, terminal, scabrid, geniculate, lemma-awn junction conspicuous; *callus* acute, hairy; *palea* shorter than lemma, 2-nerved (poorly developed), membranous to hyaline, glabrous or sparsely hairy, apex irregular. **Lodicules** 2–3, the third (if present) reduced, membranous, hyaline. **Stamens** 3. **Caryopsis** fusiform, not ribbed; embryo small; hilum linear; pericarp fused.

**Species** ± 53, South American, 1 naturalised in southern Africa. Western Cape.

Species treatment by L. Fish.



Figure 278.—*Jarava plumosa* specimen.

### Quick guide to easily confused genera/taxa:

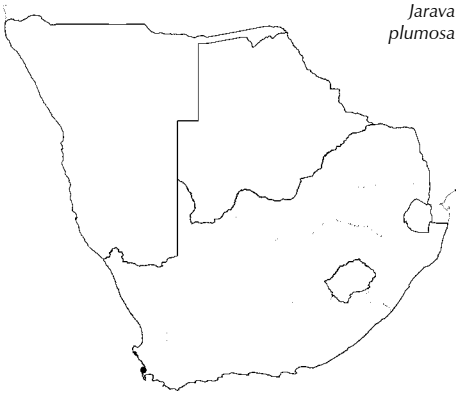
1. Lemma apex fused into a crown . . . . . ***Nassella**
   Lemma apex without a crown . . . . . 2
2. Apex of lemma and/or lower part of awn with a plume of long hairs, 4–8 mm long . . . . . 3
   Lemma apex and/or awn base glabrous or hairy, hairs less than 3.5 mm, not plume-like . . . . . 4
3. Apex of lemma and base of awn with a plume of long hairs; callus obtuse; perennial . . . . . ***Jarava plumosa**
   Only basal part of awn with a plume of long hairs above articulation; callus pungent; annual . . . . . **Stipagrostis anomala**

4(2). Awn longer than 30–100 mm long; callus pungent . . . . . 5
   Awn up to 25 mm long; callus blunt . . . . . 6

5. Plant perennial; awn lower part not obviously twisted . . . . . ***Austrostipa variabilis**
   Plant annual; awn lower part strongly and obviously twisted . . . . . **Stipa capensis**

6(4). Plant annual; callus hairs up to 2.5 mm long . . . **Aristida parvula**
   Plant perennial; callus hairs up to 1 mm long . . . . . 7

7. Leaves flat . . . . . **Stipa dregeana**
   Leaves convolute or rolled . . . . . ***Amelichloa clandestina**




***Jarava plumosa** (Spreng.) S.W.L.Jacobs & J.Everett, in *Telopea* 7: 301 (1997). Type: Uruguay.

*Stipa papposa* Nees, in C. Martius, *Flora brasiliensis seu enumeratio plantarum* 2: 377 (1829).

*Achnatherum papposum* (Nees) Barkworth, in *Phytologia* 74: 11 (1993).

Tufted perennial to 600 mm high; rhizome short; base knotted. Leaf blade 10–90(250) × 1–2 mm, rolled or flat; ligule a truncate, unfringed membrane. Inflorescence ovoid, lax, partially included in upper leaf; branches flexuous. Spikelet 5–10 mm long (excluding awn); glumes ± equal, equal to shorter than spikelet, acuminate,

membranous; lemma scabrid, except apex has a pappus or plume of shining white hairs 4–8 mm long and back hairy basally; margins not or slightly overlapping; awn 15–30 mm long, fine, bent, twisted, hairy at base; palea much shorter than lemma; callus 1.4–1.8 mm long, long slender, obtuse; anthers 0.7–3.5 mm long.

*Flowering*: December to January. *Ecology*: Sandy, clay loam soils; disturbed areas, occasionally roadsides. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from South America. Known only from a single population on the University of Cape Town campus, collected in 1963 and 1980. WC. *Economics*: Weed.

Illustration: Arriaga: 180 (2007).
Voucher: *Esterhuysen 30599a*.

## **Kaokochloa** De Winter

De Winter: 479 (1961); Launert: 123 (1970a); Clayton & Renvoize: 190 (1986); Gibbs Russell et al.: 191 (1990); Watson & Dallwitz: 509 (1994).

Annual, tufted. **Leaf blade** linear-lanceolate; *ligule* a fringe of long hairs. **Inflorescence** a panicle, rather dense and contracted, branches single; rachis and branches grooved, densely villous, with a mixture of long, villous hairs and shorter, gland-tipped hairs; *spikelets* shortly pedicelled or subsessile, clustered on somewhat short branches. **Spikelet** not noticeably compressed, subglobose, disarticulating between and above glumes; *glumes* ± equal, ± equalling spikelet, subacute, 9–11-nerved, hairy, with long thin hairs mixed with shorter club-shaped, glandular hairs, awnless. **Florets** 3–6, bisexual; *uppermost floret* reduced, sterile, usually awnless; *lower lemma* coriaceous, becoming indurated, densely hairy in lower half between nerves, 9-nerved, apex incurved and emarginate, each margin is lobed, sometimes with 1 or 2 shorter additional lobes, 2–5-awned, lobes usually black; marginal lobes with large, flat awns; median lobes with smaller awns; *awns* straight, hairy and scabrid; *palea* elliptic, thinly coriaceous, shallowly concave dorsally; keels somewhat thickened, densely fimbriate with short stiff bristles; margin membranous, inflexed, long villous at base. **Lodicules** 2, somewhat fleshy, wedge-shaped, with a somewhat truncate apex. **Stamens** 3. **Ovary** glabrous, obovate-cuneate; styles 2, plumose. **Caryopsis** obovoid; hilum short; pericarp fused; embryo large. **Photosynthetic pathway**. $C_4$; XyMS+. PCR sheath outlines uneven. PCR sheath extensions absent. PCR cell chloroplasts centrifugal/peripheral.

**Species** 1, southern Africa: *Kaokochloa nigrirostris* De Winter, northwestern Namibia.

Species treatment by M.T. Nembudani.



Figure 279.—*Kaokochloa nigrirostris* spikelet (to 7 mm). Photographer: M. Koekemoer.

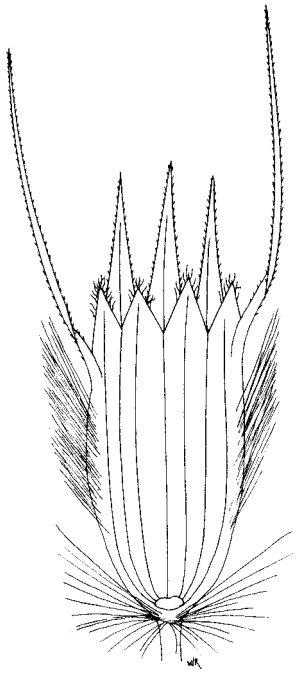
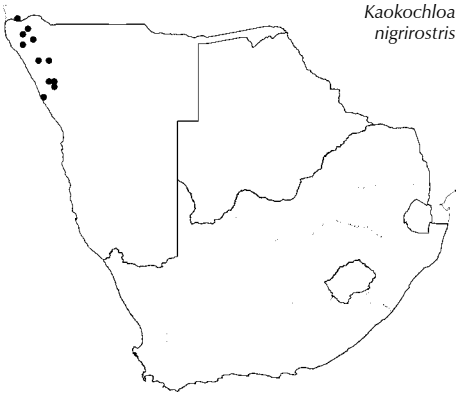


Figure 280.—*Kaokochloa nigrirostris* lemma (8.8 × 2.5 mm). Artist: W. Roux.



Figure 281.—*Kaokochloa nigrirostris*. Artist: W. Roux.




**Kaokochloa nigrirostris** De Winter, in *Bothalia* 7: 480 (1961). Type: Namibia, Kaokoveld, 18.5 miles west of Otju (Otjihu), mica schist hillocks and mountain slopes with coarse quartz and limestone gravel, *De Winter* & *Leistner 5679* (PRE, holo.).

Loosely tufted annual, 200–600 mm high, culm decumbent. Leaf blade 50–120 × 5–10 mm. Spikelet to 7 × 6 mm; lemma firmer than glumes, nerves form small awns except two lateral nerves extend into large awns; lemma curled inward at base of awns; awns finely, short hairy, scabrid, purple-tinged; anther 1.5–3.0 mm long.

*Flowering*: March to June. *Ecology*: In sandy or gravelly soil, coarse quartz and gravelly limestone; flats and hillsides. *Distribution*: Endemic (possibly in Angola). N.

Anatomy vouchers: *Ellis 4751 & 4752*.
Voucher: *De Winter & Leistner 5848*.

## **Koeleria** Pers.

Persoon: 97 (1805); Stapf: 468 (1899); Stent: 301 (1924); Adams & Salter: 84 (1950); Chippindall: 83 (1955); Clayton: 79 (1970); Launert: 69 (1971); Humphries: 218 (1980); Clayton & Renvoize: 127 (1986); Gibbs Russell et al.: 193 (1990); Watson & Dallwitz: 515 (1994).

Tufted perennial; basal sheaths sometimes swollen into bulbs. **Leaf blade** expanded or almost filiform; *ligule* an unfringed membrane. **Inflorescence** a panicle, contracted, spike-like, dense, cylindrical, often interrupted; *spikelets* solitary, pedicelled. **Spikelet** shining, laterally compressed, disarticulating above glumes; *glumes* ± equal to unequal, ± equal to longer than spikelet, lower sometimes shorter than spikelet, herbaceous, oblanceolate, linear or lanceolate-linear, acute, keeled, hairy or glabrous, with hyaline margins, sometimes mucronate; lower glume usually 1-nerved; upper glume 1–3-nerved.




Figure 282.—*Koeleria capensis*. Artist: C. Letty.

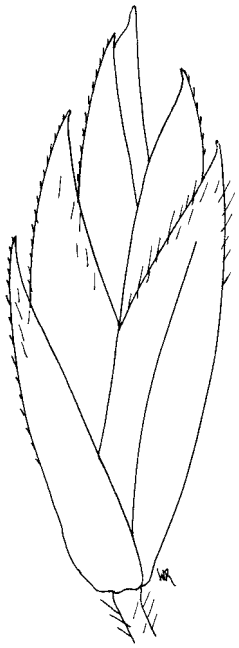


Figure 283.—*Koeleria capensis* spikelet (5.0 × 1.8 mm). Artist: W. Roux.



Figure 284.—*Koeleria capensis* spikelet (3.5–5.0 mm). Photographer: M. Koekemoer.

**Florets** 2–4, bisexual or *uppermost floret* reduced and sterile; *lemma* 3–5 mm long, similar in texture to glumes, 3-nerved, keeled, acute to acuminate, entire, sometimes with a mucro or awned (usually minute); *palea* projecting and conspicuous in mature spikelet, linear or narrowly lanceolate, subacute, 2-keeled, 2-toothed, thinner in texture than lemma, hyaline. **Lodicules** 2, hyaline, glabrous. **Stamen** 3. **Ovary** glabrous; styles distinct, plumose. **Caryopsis** small; hilum short, long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (aneuploids, high polyploidy).

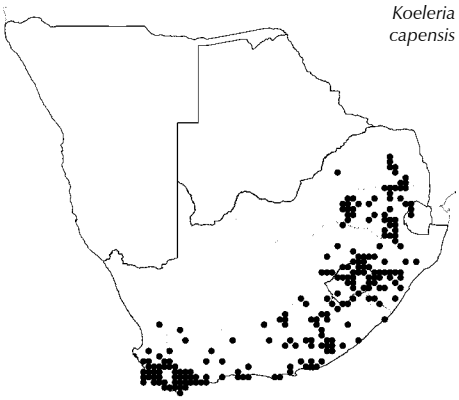
**Species** 35–60, temperate regions throughout the world; montane regions of tropical and subtropical Africa; 1 in southern Africa: *Koeleria capensis* (Steud.) Nees, mainly high eastern regions, not Namibia and Botswana.

Species treatment by M.J. Moeaha.

**Koeleria capensis** (Steud.) Nees, in *Linnaean* 7: 321 (1832). Type: South Africa, ?Cape, *Ecklon 945* (PRE, fg.).

*K. cristata* (L.) Pers. var. *brevifolia* (Nees) C.E.Hubb., in *Flora tropical Africa* 10: 96 (1937). Type: South Africa, Eastern Cape, Wittenbergen, *Drège*.

*K. cristata* (L.) Pers. var. *convoluta* (Steud.) C.E.Hubb., in *Kew Bulletin* 1936: 500 (1936). Type: Ethiopia, *Schimper 689*.


*Koeleria capensis*

Densely tufted perennial 150–800 mm high; culms terete, wiry. Leaf blade 40–200 × 1–4 mm. Inflorescence spike-like, sometimes interrupted. Spikelet 3.5–4.0(7.0) mm long, 2–4-flowered; glume margins hyaline; lemma apex acuminate; palea conspicuous in mature spikelet as projects out of florets; anthers 1.5–3.0 mm long.

[This is a very variable species.]

*Flowering*: October to January. *Ecology*: Common in montane areas; often among rocks and steep slopes, and dry to wet areas. *Frequency in southern Africa*: Locally common especially in high altitudes; sometimes locally dominant. *Distribution*: Throughout Africa. S, L, LIM, G, M, FS, KZN, NC, WC, EC.

Illustration: Chippindall: 83, fig. 54 (1955); Launert: 70, tab. 20 (1971).
Anatomy vouchers: *Ellis 621, 1387, 1392, 1412, 2534, 2537, 2588, 2589* & *2590*.
Voucher: *Behr 899, Codd 3155*.

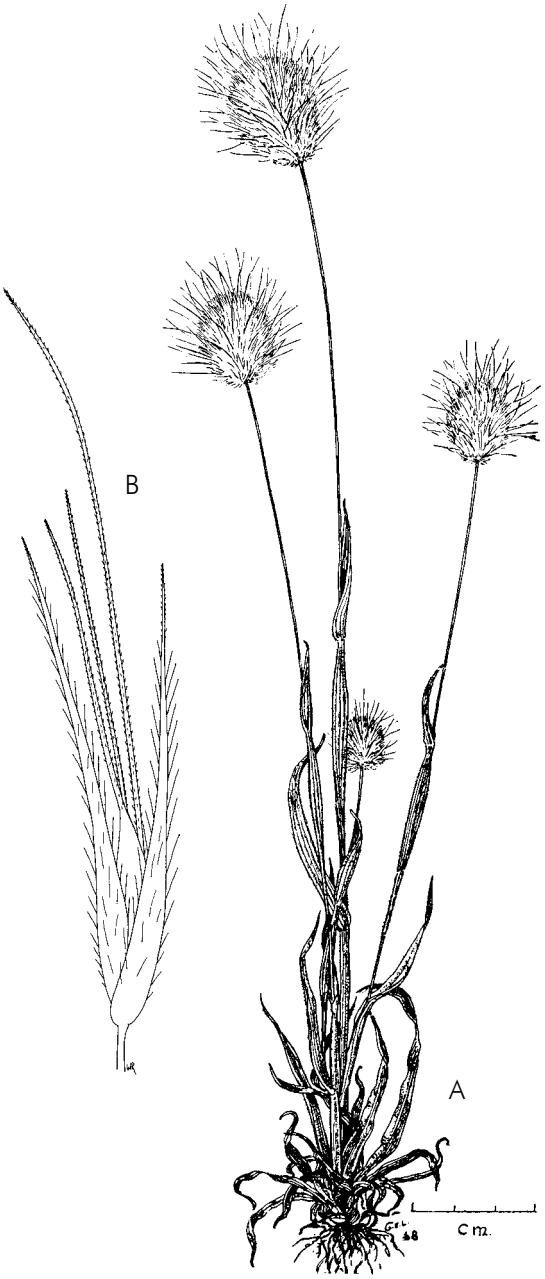
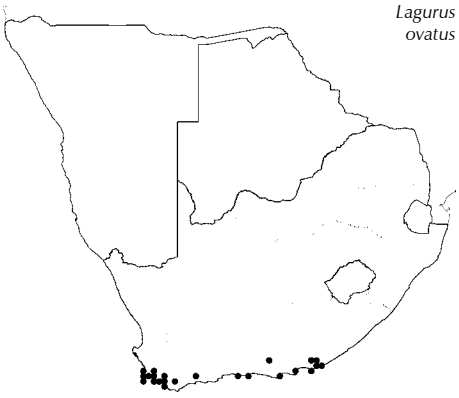



Figure 285.—*Lagurus ovatus*. A, plant; B, spikelet (19 × 1.5 mm). Artists: A, G.E. Lawrence; B, W. Roux.



*Lagurus ovatus*

## *Lagurus L.

Linnaeus: 81 (1753); Chippindall: 96 (1955); Clayton & Renvoize: 138 (1986); Gibbs Russell et al.: 194 (1990); Watson & Dallwitz: 516 (1994); Sell & Murrell: 195 (1996).



Figure 286—*Lagurus ovatus*, several spikelets (7–10 mm). Photographer: M. Koekemoer.

Annual, tufted, softly and densely hairy. **Leaf blade** expanded, linear to narrowly lanceolate, velvety; sheaths softly pilose; *ligule* an unfringed or rarely a fringed membrane. **Inflorescence** a solitary, dense, globose to ovoid or oblong-cylindrical, spike-like panicle, softly hairy and long bristly; *spikelets* subsessile or pedicelled. **Spikelet** laterally compressed, disarticulating above glumes, rachilla extension present; *glumes* ± equal, similar, thinly membranous, narrowly lanceolate, with long silky hairs, 1-nerved, long-acuminate, awned. **Floret** 1, bisexual; *lemma* membranous, shorter than glumes, lanceolate, rounded on back, hairy near base, 5-nerved, 2-lobed, 3-awned, each lobe awned with a fine straight awn; *central awn* longer than lemma, slightly geniculate, twisted; *palea* somewhat shorter than lemma, ovate, acuminate, 2-keeled. **Lodicules** 2, hyaline. **Stamens** 3. **Ovary** ellipsoid, glabrous; styles plumose. **Caryopsis** narrowly ellipsoid; hilum short; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$.

**Species** 1, Mediterranean region: **Lagurus ovatus* L., naturalised in southern Africa, mainly Western and Eastern Cape.

Species treatment by A.C. Mashau.

***Lagurus ovatus** L., in *Species plantarum* 1: 81 (1753). Type: Europe.

HARE'S-TAIL GRASS, HAASGRAS

Velvety annual 600 mm high. Leaf blade 100 × 10 mm; sheaths sparsely to densely hairy; ligule an unfringed membrane. Inflorescence a compact, oval panicle, soft as glumes have profusely spreading long silky hairs, and bristly from fine awns on glumes and lemmas. Spikelet 7–10 mm long (excluding awns), disarticulating above glumes; lemma rounded on back, 3-awned, central awn 10–12 mm long; palea acuminate; anther 1.5–2.0 mm long.

*Flowering*: October to November (rarely later). *Ecology*: Usually sandy soil; disturbed places,. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from the Mediterranean. Introduced into Americas and Australia. WC, EC. (Cultivated and collected in Gauteng.) *Economics*: Utilised by stock, but has low grazing value due to low leaf production; used in dried flower arrangements.

Anatomy vouchers: *Ellis 689 & 5479*.
Voucher: *Jacot Guillarmod 3951*.

## *Lamarckia Moench

Moench: 201 (1794); Stapf: 688 (1900); Hitchcock & Chase: 187 (1950); Chippindall: 61 (1955); Tutin: 172 (1980); Clayton & Renvoize: 99 (1986); Gibbs Russell et al.: 195 (1990); Watson & Dallwitz: 517 (1994); Sell & Murrell: 155 (1996).



Figure 287.—*Lamarckia aurea*. Spikelet cluster with awned and awnless fertile spikelets and sterile spikelets. Artist: S.B. Chiliza.



Figure 288.—*Lamarckia aurea* spikelet (6–9 mm). Photographer: M. Koekemoer.

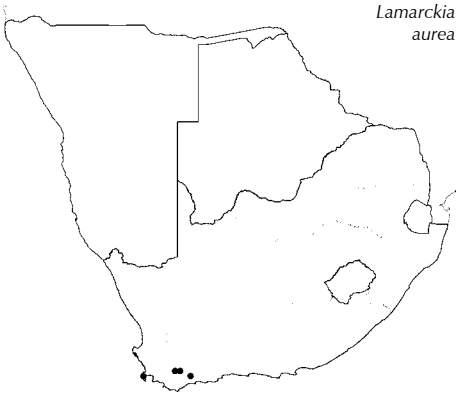


Figure 289.—*Lamarckia aurea* specimen.

Annual, tufted, sometimes geniculate. **Leaf blade** expanded; *ligule* a hyaline, unfringed membrane. **Inflorescence** usually a 1-sided panicle, contracted, spike-like, soft and silky; spikelets in clusters of 5, rarely 4; 2 awned, 3 awnless; one spikelet bisexual, others sterile, either male or empty lemmas; spikelets pedicelled; pedicels hairy, deciduous. **Bisexual spikelet** laterally compressed, cuneate; *glumes* ± equal, as long as to longer than spikelet, membranous, keeled, 1-nerved, acuminate or shortly awned. **Florets** 1 or 2; *lowest floret* bisexual; *upper floret* reduced; *lemma* lanceolate or ovate-oblong, membranous, 4–5-nerved, 2-lobed, awned from sinus; *awn* more than twice as long as lemma, straight; *palea* same texture as lemma, lanceolate, sub-acuminate, 2-lobed, 2-keeled. **Lodicules** 2, minute, glabrous. **Stamens** 3; styles distinct, barbellate. **Caryopsis** ellipsoid; hilum short, linear. **Sterile spikelet** awned spikelet similar but smaller than bisexual spikelet; awnless spikelet linear; florets up to 15, sterile; glumes lanceolate, acute; lemma obovate, membranous, keeled, obtuse. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$.

**Species** 1: Mediterranean to Pakistan; 1 naturalised in southern Africa, **Lamarckia aurea* (L.) Moench, Western Cape.

Species treatment by M.T. Nembudani.




***Lamarckia aurea** (L.) Moench, in *Methodus plantas horti botanici et agri marburgensis*: 201 (1794). Type: Europe.

*Cynosurus aureus* L., in *Species plantarum*: 73 (1753).

Loosely tufted annual 100–200(–300) mm high, culms geniculate or erect. Leaf blade 30–90 × 3–8 mm. Inflorescence 20–80

× 10–25 mm; soft, silky. Bisexual/fertile spikelet to 2 mm long, 1–2-flowered; pedicel 2–3 mm long, villous; lemma awned from below apex, awn up to 2× length of body; anther 0.5–0.6 mm long. Sterile spikelet 6–9 mm long, awnless, consisting of two glumes and numerous imbricate, obtuse, empty lemmas.

*Flowering*: August to October. *Ecology*: In stony gravel or loam; usually on road verges near tarmac. *Frequency in southern Africa*: Rare. Locally common. *Distribution*: Naturalised from the Mediterranean basin. Mediterranean and Middle East, cultivated in USA. WC. *Economics*: Ornamental. Insignificant weed.

Illustration: Hitchcock & Chase: fig. 369 (1950).
Voucher: *Crook 2195*.

## **Leersia** Sw.

Swartz: 21 (1788); Stapf: 659 (1900); Chippindall: 33 (1955); Launert: 137 (1965); Launert: 125 (1970a); Clayton: 24 (1970); Launert: 26 (1971); Clayton & Renvoize: 73 (1986); Gibbs Russell et al.: 196 (1990); Watson & Dallwitz: 526 (1994).

Perennial, rarely annual; tufted; often with creeping rhizomes or stoloniferous; culm slender, often geniculate and ascending. **Leaf blade** narrow, expanded, folded or rolled; *ligule* an unfringed membrane. **Inflorescence** a panicle, open or contracted; *spikelets* solitary, secund, shortly pedicelled. **Spikelet** unconventional and hard to interpret, strongly laterally compressed; *glumes* 0 or reduced to a very obscure rim at apex of pedicel. **Floret** 1; *lemma* coriaceous, not becoming indurated, boat-shaped, almost plano-convex in outline, keels with stiff hairs or scabrid, 3–5-nerved, shortly acuminate or awned; *palea* narrow, 3-nerved, subcartilaginous except on hyaline margins, grooved along outer nerves with keel rigidly ciliate, tightly clasped by inflexed margins of lemma. **Lodicules** 2, fleshy,




Figure 290.—*Leersia hexandra*. A, plant; B, ligule. Artist: C. Smith.

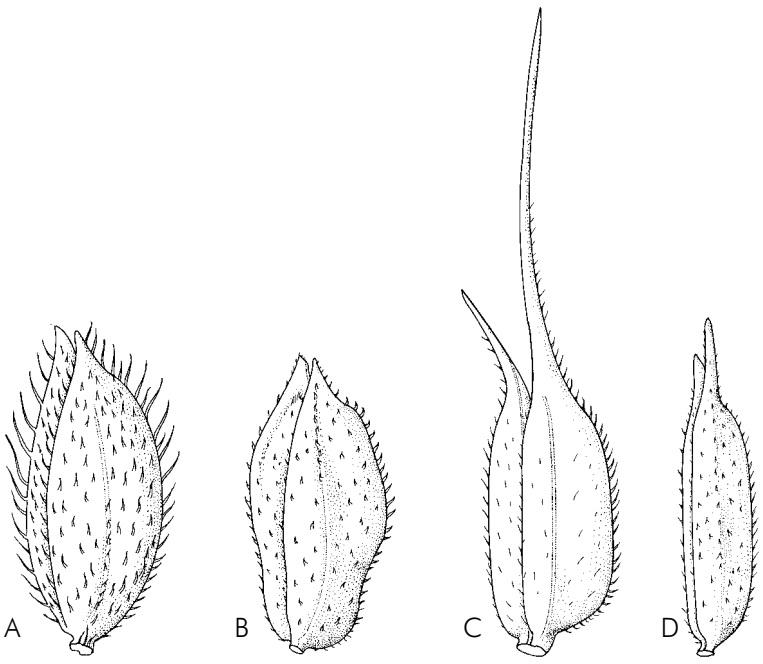



Figure 291.—*Leersia* spikelets. A, *L. hexandra* (4.4 × 1.6 mm); B, *L. denudata*; C, *L. tisserantii* (8.6 × 1.3 mm); D, *L. friesii* (4.7 × 1.0 mm). Artist: G. Condy.

finely nerved. **Stamens** (1–)6. **Ovary** ellipsoid, glabrous; styles distinct, plumose. **Caryopsis** hilum long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 12$ (polyploidy).

**Species** 18, throughout tropics and warm temperate regions; 3 in southern Africa, widespread in moist habitats.

Species treatment by A.C. Mashau.

### Quick guide to easily confused genera:

1. Glumes absent or reduced to a very obscure rim at apex of pedicel; spikelet 3–5 mm long . . . . . **Leersia**
   Glumes 2, reduced; spikelet 5–11 mm long . . . . . 2
2. Lemma awned (mucronate or awnless in cultivated forms), strongly keeled; spikelet strongly laterally compressed . . . . . **Oryza**
   Lemma awnless, scarcely keeled; spikelet slightly laterally compressed . . . . . **Prosphytochloa**

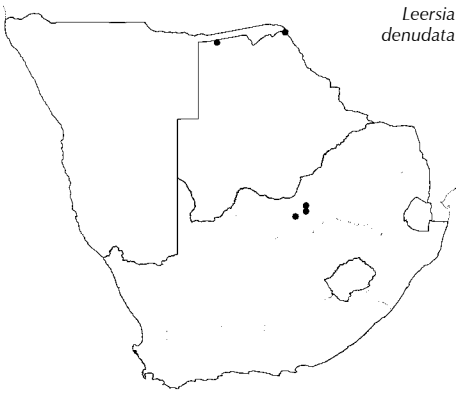


Figure 292.—*Leersia hexandra* spikelet (3.4–4.8 mm). Photographer: M. Koekemoer.

### Key to species:

1. Lemma cauda 0.8–7.5 mm long . . . . . **L. tisserantii**
   Lemma cauda less than 0.7 mm long . . . . . 2
2. Spikelet less than 1 mm wide; culm nodes glabrous; Okavango swamps . . . . . **L. friesii**
   Spikelet more than 1 mm wide; culm nodes hairy; widespread . .3
3. Keels of lemma and palea with stiff hair 0.2–0.6 mm long . . . . . **L. hexandra**
   Keels of lemma and palea with fine stiff hairs less than 0.2 mm long . . . . . **L. denudata**

**Leersia denudata** Launert, in *Senckenbergiana Biologica* 46: 144 (1965). Type: Tanzania, Dodoma District, *B.D. Burtt 3677* (K, holo.; PRE, iso.).



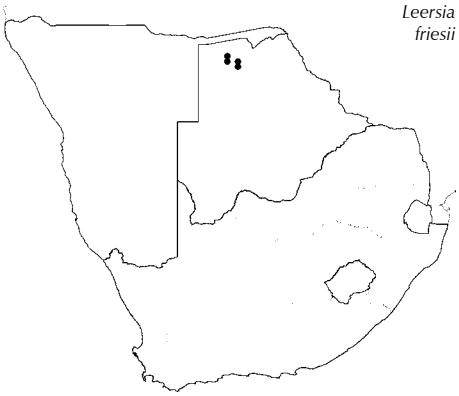
*Leersia denudata*

Slender tufted perennial to 700 mm high; hygrophyte; culm nodes velvety hairy. Leaf blade 30–140 × 1.5–6.0 mm, flat or rolled, nearly smooth. Inflorescence oblong to elliptic; branches obliquely ascending or sometimes spreading. Spikelet 3.5–4.5 × (0.8)1.3–1.6 mm, oblong; lemma apex usually with a short cauda, less than 0.7 mm long; lemma and palea keels with fine stiff hairs less than 0.2 mm long; anther 2.4–3.4 mm long.

[A few collections from Namibia and Botswana (*Smith 2668*, *Gibbs Russell 2840* and *Ellis 3736*) originally under *L. tisserantii* have been placed here, but may represent a new species.]

*Flowering*: January to April. *Ecology*: Swampy grassland, vleis, deep parts of temporary pans. *Frequency in southern Africa*: Rare. *Distribution*: North to tropical East Africa. N, B, NW.

Illustration: Launert: 138, fig. 23 (1965).
Voucher: *Kinges 1620*.



*Leersia friesii*

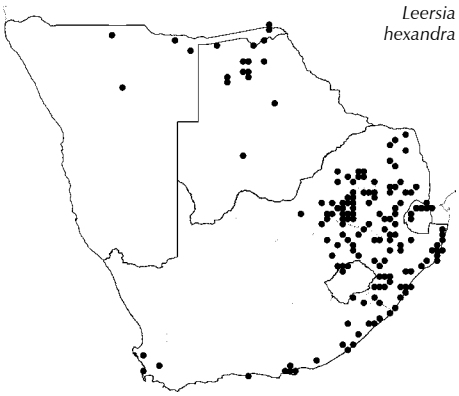
**Leersia friesii** Melderis in Svensk., in *Botaniska Tidskrift* 40: 225 (1946). Type: DRC, Katanga, *R.E. Fries 527* (UPS, holo.).

Robust perennial 600–700 mm high; hydrophyte; rhizome creeping; culm spongy, nodes glabrous. Leaf blade 80–200 × to 6 mm, flat, smooth. Inflorescence a narrow panicle, typically linear to linear-

oblong; branches adpressed to rachis. Spikelet 3.0–3.5 × 0.9–1.0 mm, oblong-elliptic to narrowly oblong; lemma sometimes with a minute cauda, keel scabrid; anther 2.5–3.0 mm long.

*Flowering*: November to May. *Ecology*: Swamps in shallow water. *Frequency in southern Africa*: Rare. *Distribution*: Central and eastern tropical Africa. B.

Illustration: Launert: 138, fig. 18 (1965).
Voucher: *P.A. Smith 1806*.


*Leersia hexandra*

**Leersia hexandra** Sw., in *Prodromus descriptionum Indiam occidentalem*: 21 (1788). Type: Jamaica.

Perennial 300–1 000 mm high; hygrophyte; rhizome creeping; culm nodes hairy. Leaf blade 100–200 × 4–8 mm, flat, strongly scabrous. Inflorescence narrowly elliptic to oblong, branches ascending. Spikelet 3.4–4.8 × 1.2–1.4 mm, oblong; lemma conspicuously pectinate-ciliate; lemma and palea keels with stiff hairs 0.2–0.6 mm long; anther 2.0–3.2 mm long.

[The leaves and culms make a characteristic rattling sound when shaken together.]

*Flowering*: July to June. *Ecology*: Floodplains and permanently wet places such as vleis, pans and ditches, often forming extensive colonies. *Frequency in southern Africa*: Locally common. *Distribution*: Throughout tropics. N, B, S, L, LIM, NW, G, M, FS, KZN, WC, EC. *Economics*: The extended rhizome system plays an important role in protecting wet places against flooding.

Illustration: Chippindall: pl. 2 (1955); Launert: 138, fig. 19–20 (1965).
Anatomy vouchers: *Ellis 1471, 3364, 3402, 4505* & *5195*.
Voucher: *Van der Schijff 2115*.

**Leersia tisserantii** (A.Chev.) Launert, in *Senckenbergiana Biologica* 46: 137 (1965). Type: Chad, SE. of Bambari, *Tisserant 2582* (P, holo.).

Delicate, loosely-densely tufted perennial or annual 150–600 mm high; culm nodes usually hairy. Inflorescence narrowly ovate. Spikelet 4–5 × 0.8–1.0(–1.1) mm (excluding cauda), oblong to narrowly elliptic; lemma with a flat cauda 0.8–7.5 mm long, keel spinulose-hairy; palea similar to lemma, cauda 1.5–2.5 mm long.

*Distribution*: Central and eastern tropical Africa.

[The only three specimens at PRE, previously identified as *L. tisserantii*, have a cauda of only up to 0.6 mm, and spikelet length of 3.5 mm. Although spikelet width is less than usual for *L. denudata*, other characters indicate a better placement in *L. denudata* until more research has been done.]

## **Leptocarydion** Stapf

Stapf: 316 (1898); Chippindall: 127 (1955); Phillips: 294 (1974); Chippindall & Crook: 177 (1976); Clayton & Renvoize: 213 (1986); Gibbs Russell et al.: 197 (1990); Watson & Dallwitz: 530 (1994); Cope: 41 (1999).



Figure 293.—*Leptocarydion vulpiastrum* spikelet (5–11 mm). Photographer: M. Koekemoer.

Tufted annual. **Leaf blade** lanceolate to ovate, broad, expanded or rolled; rounded or abruptly constricted at base; *ligule* a fringed membrane. **Inflorescence** ± oblong, dense silky panicle, spike-like, composed of many, crowded, slender, 1-sided racemes adpressed to axis; *spikelets* solitary, sessile or subsessile. **Spikelet** laterally compressed, disarticulating above glumes and between florets; *glumes* very unequal, shorter than spikelet, linear, keeled, 1-nerved, acuminate to acute, sometimes mucronate. **Florets** 5–14; *lower florets* bisexual; *upper floret* reduced and sterile; *lemmas* similar, elliptic-lanceolate, keeled, 3-nerved, nerves conspicuously hairy, truncate or minutely 2–4-lobed; *central awn* long, slender, straight, scabrid; *callus* hairy; *palea* linear-lanceolate, shorter than lemma, 2-keeled, hyaline. **Lodicules** 2, cuneate, glabrous. **Stamens** 3; anthers minute. **Ovary** glabrous; styles distinct, slender, plumose. **Caryopsis** up to 1 mm, linear; pericarp fused; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines even. PCR sheaths extensions absent. PCR cell chloroplasts centripetal.

**Species** 1, eastern and southern Africa: *Leptocarydion vulpiastrum* (De Not.) Stapf, northern Namibia and Botswana, Limpopo, Mpumalanga and KwaZulu-Natal.

Species treatment by M.J. Moeaha.

**Leptocarydion vulpiastrum** (De Not.) Stapf, in *Flora capensis* 7: 648 (1900). Type: Sudan, *Figari*.

SPADE GRASS

Loosely or compactly tufted annual 400–1 070 mm high. Leaf blade 20–120 × 6–20 mm, papery, broad lanceolate-oblong, rounded at base. Inflorescence a dense, compacted narrow silky plume, 50–150 mm long, pale green or tinged purplish. Spikelet 5–11 mm long; glumes turn reddish-brown with age; anther 0.5–1.5 mm long.

*Flowering*: February to June. *Ecology*: Usually on sandy soil; in mopane veld, riverine woodland or rocky hillsides, often in the shade. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Angola, northwards to East Africa, Ethiopia and Sudan; also Madagascar. N, B, LIM, M, KZN. *Economics*: Ornamental in gardens. Easily controlled weed.

Illustration: Cope: 42, tab. 19.
Anatomy vouchers: *Ellis 1583, 2076, 2077, 3238* & *3686*.
Voucher: *De Winter 2905*.




Figure 294.—*Leptocarydion vulpiastrum*. A, plant; B, lemma (lateral view) (6.2 × 0.4 mm). Artist: W. Roux.

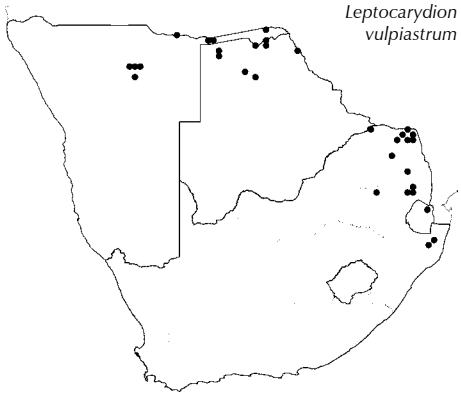





Figure 295.—*Leptochloa fusca*. A, plant; B, spikelet (9 × 2 mm). Artists: A, G.E. Lawrence; B, W. Roux.

## **Leptochloa** P.Beauv.

Palisot de Beauvois: 71 (1812); Stapf: 590 (1900); Stent: 296 (1924); Chippindall: 121 (1955); Pilger: 41 (1956); Launert: 67 (1970a); Phillips: 276, 281 (1974); Phillips: 142 (1982); Clayton & Renvoize: 209 (1986); Gibbs Russell et al.: 198 (1990); Watson & Dallwitz: 338, 531 (1994); Snow: 77 (1998); Snow & Davidse: 157 (1998); Cope: 23 (1999).

*Diplachne* P.Beauv.: 80 (1812); Stapf: 590 (1900); Chippindall: 118, fig. 91 (1955); Launert: 67 (1970a); Phillips: 281 (1974); Phillips: 142 (1982); Gibbs Russell et al.: 116 (1990); Snow & Peterson: 25 (2012); Peterson et al.: 1317 (2012).

Tufted annual or perennial; stoloniferous, rhizomatous, often geniculate. **Leaf blade** lanceolate to linear, expanded or rolled; *ligule* an unfringed or fringed membrane, rarely a fringe of hairs. **Inflorescence** a contracted or open panicle of several, slender, 1-sided, occasionally biseriate racemes scattered along a central axis; *spikelets* solitary, subsessile or shortly pedicelled. **Spikelet** laterally or dorsiventrally to not noticeably compressed, disarticulating above glumes and between florets, sometimes persistent; *glumes* unequal to ± equal, shorter to rarely longer than spikelet, similar, membranous, lanceolate to ovate, sometimes sub-acuminate or notched, 1-nerved, keeled to rounded on back, mucronate to awnless. **Florets** 1–20, bisexual; *uppermost floret* sterile or reduced, often decreasing in size upwards; *lemma* lanceolate or oblong-elliptic to elliptic, keeled to rounded or flattened on back, less firm to similar in texture as glumes, 3-nerved, glabrous or minutely hairy along nerves and/or back or margins, keel present or back rounded, obtuse or acute to ± truncate or 2-lobed, awnless, mucronate or awned between lobes; *awn* shorter than body of lemma to minute, sometimes lateral nerves excurrent into short mucros; *callus* short, blunt; *palea* almost as long as lemma, sometimes 2-lobed, 2-keeled, flat dorsally or concave between keels, glabrous to minutely or distinctly hairy, sub-hyaline. **Lodicules** 2, cuneate, fleshy, glabrous. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose. **Caryopsis** ellipsoid to ellipsoid-oblong, laterally to dorsally compressed; hilum short; pericarp free, or loosely adherent, or fused; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines even; with or without extensions, maximum number of extensions

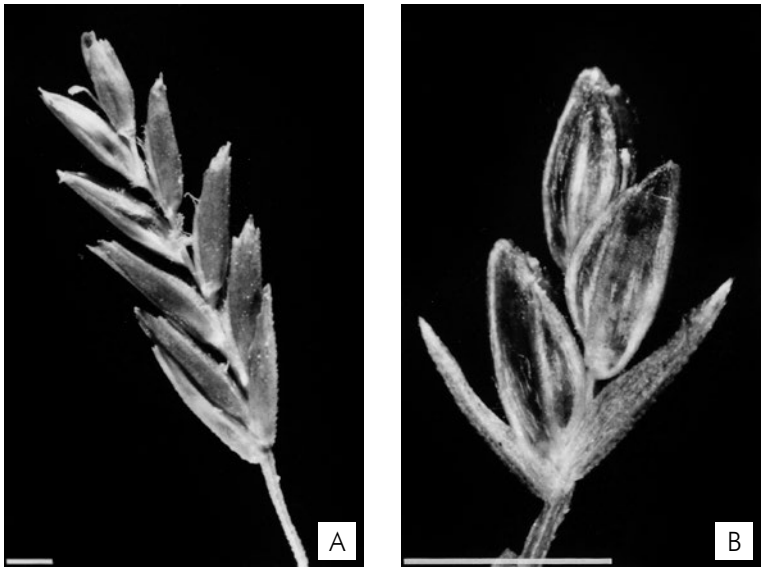



Figure 296.—Spikelets. A, *Leptochloa fusca* (6–14 mm); B, *L. panicea* (1.9–2.5 mm). Photographer: M. Koekemoer.

when present one; cell chloroplasts ovoid, or elongate with well-developed grana, centrifugal/peripheral, or centripetal. PCK (*L. ciliolata*), or NAD-ME (*L. digitata*). **Cytology**: $x = 10$ (polyploidy).

**Species** ± 30, tropical and subtropical regions; 7 in southern Africa, widespread.

Species treatment by M.J. Moeaha and L. Fish.

### Quick guide to easily confused genera:

**A**

1. Leaves hard, needle-like; plants prickly . . . . . **Odyssea**
   Leaves not needle-like; plants not prickly . . . . . 2
2. Lemma glabrous (if reed-like see *Leptochloa gigantea*) . . . . **Eragrostis**
   Lemma hairy (at least somewhere) . . . . . 3
3. Lemma awned from below apex; awn 1–8 mm long . . . **Bewsia**
   Lemma mucronate, awnless or awned from apex; awn 0.3–0.8 mm long . . . . . **Leptochloa**

**B**

Lemma oblong-elliptic to elliptic, keeled, nerves minutely hairy near base, hairs acute; callus short, blunt; palea 2-keeled . . . . . **Leptochloa eleusine**
Lemma ovate, rounded on back in lower half, hairy near base between nerves, hairs club-shaped; callus absent; palea not keeled . . . . . **Coelachyrum yemenicum**

### Key to species:

1. Spikelet 1-flowered; leaf blade lanceolate-oblong . . . **L. uniflora**
   Spikelet 2–15-flowered; leaf blade linear . . . . . 2
2. Spikelet 4–14 mm long; lemma dorsally compressed; anthers 0.8–2.5 mm long . . . . . 3
   Spikelet 1.5–3.5 mm long; lemma laterally compressed; anthers 0.3–0.6 mm long . . . . . 5
3. Ligule a fringed or fimbriate membrane; lemma awnless . . . . . **L. eleusine**
   Ligule an unfringed membrane; lemma awned or mucronate . . .4
4. Reed-like; lemma glabrous to obscurely pubescent, apex entire . . . . . **L. gigantea**
   Not reed-like; lemma densely hairy along nerves towards the base, apex toothed . . . . . **L. fusca**

5(2). Annual; upper glume mucronate or minutely awned; lemma hairs on nerves and scattered or in vertical rows on back . . **L. panicea**
   Perennial; upper glume without mucro or awn; lemma adpressed hairy only along nerves . . . . . **L. chinensis**

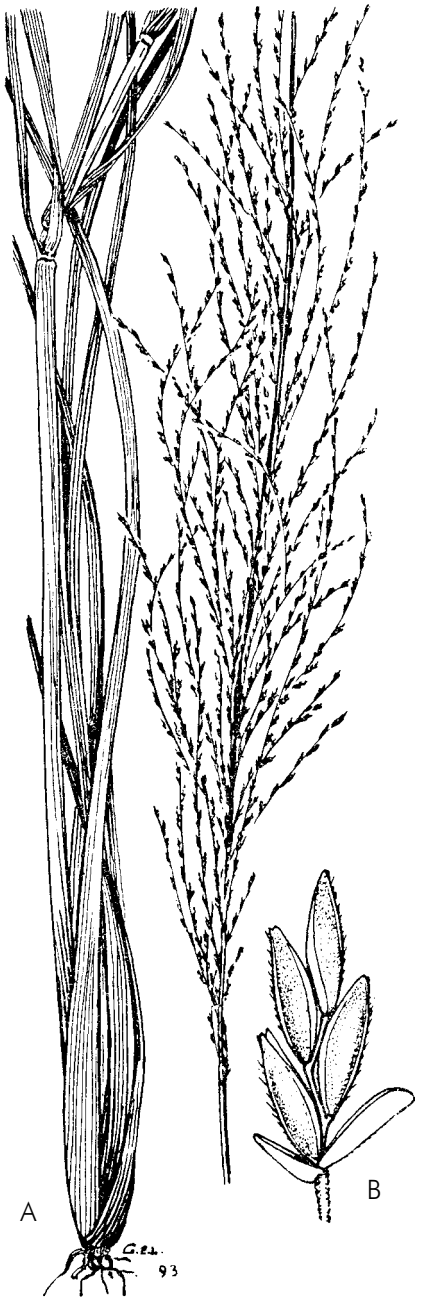
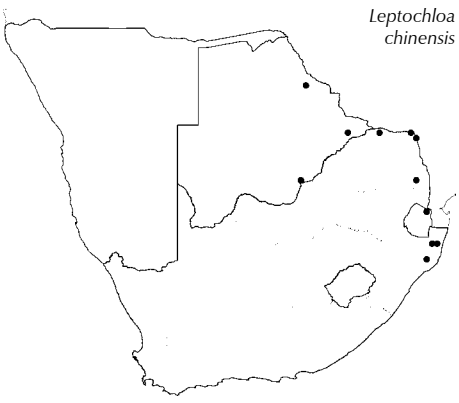



Figure 297.—*Leptochloa panicea*. A, plant; B, spikelet. Artist: G.E. Lawrence.

**Leptochloa chinensis** (L.) Nees, in *Sylloge Plantarum novarum itemque minus cognitarum a praetantissimis Botanicis adhuc viventibus collecta et a Societate regia botanic ratisbonensi edita* 1: 4 (1824). Type: India.

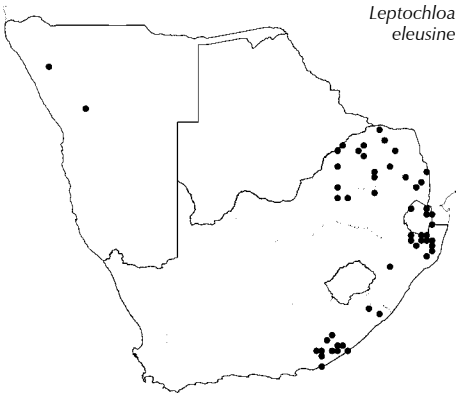
Alternate name: *Dinebra chinensis* (L.) P.M.Peterson & N.Snow

Hygrophytic, tufted perennial 440–820 mm tall; stoloniferous; sheaths papery; leaves cauline. Leaf blade 200–500 × 3.0–7.5 mm, linear, glabrous; ligule a fringed membrane, 1.8–5.4 mm long. Inflorescence 200–600 mm long. Spikelet 2.1–3.5 mm long, 2–6-flowered; glumes unequal, shorter than spikelet, often tinged purplish; upper glume obtuse to rounded, without mucro or awn; lemma laterally compressed, keeled, entire or bifid, hairy along nerves; anthers 0.3–0.6 mm long, dark maroon; caryopsis 0.6–0.9 mm long, elliptic-oblong.



*Flowering*: December to April. *Ecology*: Usually clay soils; in or by water. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Southern tropical Africa to Tanzania and Kenya; through India to China, Japan and Indonesia. B, S, LIM, KZN. *Economics*: Weed.

Anatomy vouchers: *Ellis 556, 1899, 3632 & 4543*.
Voucher: *De Winter & Codd 315*.


*Leptochloa eleusine*

**Leptochloa eleusine** (Nees) Cope & N.Snow, in *Novon* 8: 78 (1998). Type: South Africa, Eastern Cape, Katrivierspoort, *Drége 3906* (PRE, fg.) (syntype).

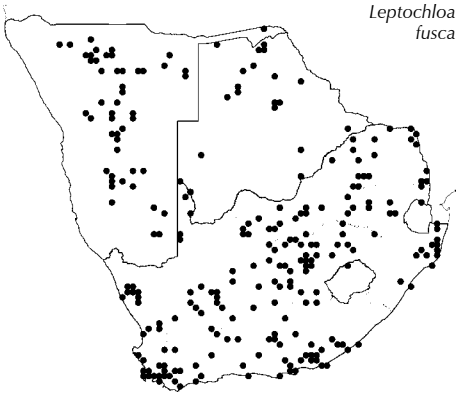
*Diplachne eleusine* Nees, in *Florae Africanae australioris*: 255 (1841).

Alternate name: *Disakisperma eleusine* (Nees) P.M.Peterson & N.Snow

Tufted perennial 520–1 270 mm high; rhizomatous, culms geniculately ascending. Leaf blade 120–270 × 2–4 mm, ligule a fringed membrane 1.5 mm long. Inflorescence spike-like, 150–300 mm long; spikelets overlapping. Spikelet 4–8(11) mm long, 5–10-flowered; glumes ± equal, acute to acuminate; lemma rounded on back; hairy on nerves at base, entire or shallowly 2-lobed; anthers 0.8–1.0 mm long; caryopsis 1.7–2.0 mm long, elliptic or obovate.

*Flowering*: November to April. *Ecology*: Sandy soils, occasionally on turf soils; rocky slopes or in the shade of trees. *Frequency in southern Africa*: Common. *Distribution*: Mozambique. N, B, S, LIM, NW, G, M, KZN, EC.

Illustration: Chippindall: 120, fig. 91 (1955).
Anatomy vouchers: *Ellis 2057, 2058, 2059, 2105, 3352, 3546 & 3868*.
Voucher: *Smook 4249*.


*Leptochloa fusca*

**Leptochloa fusca** (L.) Kunth, in *Novon* 8: 78 (1998). Type: 'Palestine'.

*Diplachne fusca* (L.) P.Beauv. ex Roem. & Schult., in *Systema vegetabilium*, ed. 15,2: 615 (1817).

*Diplachne cuspidata* Launert, in Merxmüller, Gramineae, *Podromus einer Flora von Südwesafrika* 160: 221 (1970a). Type: Namibia, Etoschapfanne, Okaukuejo, *Giess, Volk & Bleissner 6015*.

SWAMP GRASS, KUILGRAS

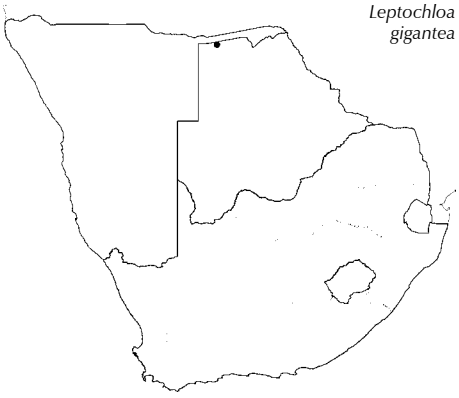
Highly variable, tufted, erect or geniculate perennial 220–1 550 mm high; hydro- to hygrophyte; rhizomatous; culms branching and rooting from lower nodes. Leaf blade 20–550 × 2–5 mm, linear, tapering to a fine point, often glaucous, ligule a conspicuous unfringed membrane to 5 mm long. Inflorescence with numerous racemes, open or contracted; spikelets not overlapping. Spikelet 6–15 mm long, 5–12-flowered; glumes unequal, 2.0–7.5 mm long, acute, keeled, upper glume acute or obtuse, minute mucro or awn present or absent; lemma 3.0–6.0 mm long, rounded on back, minutely hairy on nerves below, apex acute, toothed, mucronate or awned; anthers 0.8–1.5 mm long; caryopsis 1.6–1.8 mm long.

*Flowering*: October to May. *Ecology*: Sandy or clayey soils; almost always near or in fresh or brackish water up to 500 mm deep. *Frequency in southern Africa*: Common. *Distribution*: Old world tropics and subtropics; and Australia. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Pasture in vleis and on brackish soil.

Anatomy vouchers: *Gibbs Russell & Smook 5248, 5332*; *Smook 5111A & 5132*; *Ellis 532, 558, 1715, 1908, 2915, 3410, 4718, 4779, 5268 & 5811*.
Voucher: *Scheepers 1495, Goldblatt 2820, Smook 5111*.

**Leptochloa gigantea** (Launert) Cope & N.Snow, in *Novon* 8: 78 (1998). Type: Zambia, Mbala (Abercorn), *Vesey-Fitzgerald 1551* (K, holo.).

*Diplachne gigantea* Launert, in *Boletim da Sociedade Broteriana* ser. 2a, 47: 349 (1974).


*Leptochloa gigantea*

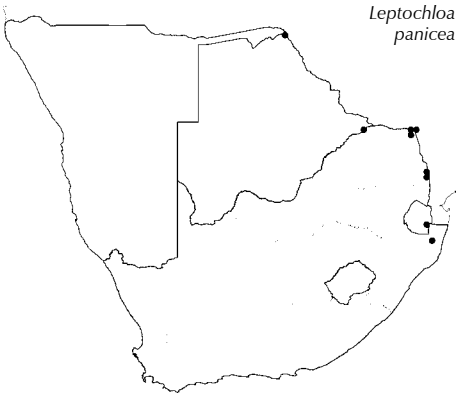
Hydro-hygrophytic, robust, reed-like perennial 1 500–2 700 mm high; rhizomes long, creeping. Leaf blade 300–650 × 4–5 mm, tapering to a filiform point; ligule an unfringed membrane 4–6 mm long, acute, entire or lacerated. Inflorescence 330–800 mm long; with many racemes. Spikelet 10–14 mm long; glumes unequal, keeled; upper glume with a mucro or awn present; lemma acuminate, entire, rounded at back, with a mucro or awn 0.25–0.50 mm long, obscurely hairy at base near margins or glabrous; anthers 1.9–2.5 mm long, purple or yellow; caryopsis 1.5–2.0 mm long, elliptic-oblong.

*Flowering*: February to May. *Ecology*: Amongst reeds and water-lilies, on sandbanks and along rivers; often in deep water. *Frequency in southern Africa*: Rare. *Distribution*: Tropical Africa. B.

Illustration: Cope: 27, tab. 12 (1999).
Voucher: *Smith 1387*.

**Leptochloa panicea** (Retz.) Ohwi, in *The Botanical Magazine* (Tokyo) 55: 311 (1941). Type: China.

Alternate name*: Dinebra panicea* (Retz) P.M.Peterson & N.Snow

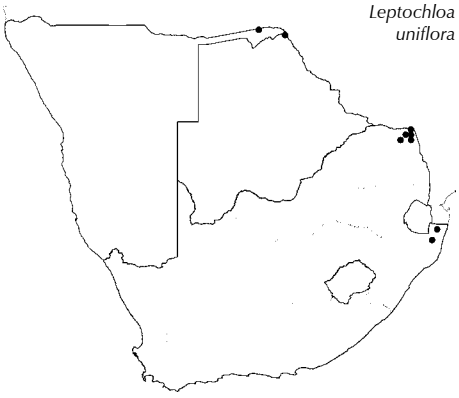

*Leptochloa panicea*

Tufted annual 320–1 200 mm high; erect to geniculate; leaves cauline. Leaf blade to 250 × about 7 mm, linear; sheaths and blades with bulbous based hairs; ligule an unfringed membrane, 0.5–3.2 mm long. Inflorescence 200–300 mm long. Spikelet 1.9–2.5 mm long, (2–)3(–5)-flowered; glumes unequal; upper glume mucronate or minutely awned; lemma laterally compressed, keeled, minutely hairy on back, hairs scattered or in vertical rows, apex bifid; anthers 0.2–0.3 mm long, yellow; caryopsis 0.4–0.6 mm long, broadly elliptic.

*Flowering*: January to May. *Ecology*: Clayey loam; in or near water, disturbed places. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to Sudan and West Africa; also tropical Asia. N, B, S, LIM, M, KZN.

Anatomy vouchers: *Ellis 519* & *565*.
Voucher: *Acocks 16789*.

**Leptochloa uniflora** Hochst. ex A.Rich., in *Tentamen Florae Abyssinicae* 2: 409 (1851). Type: Ethiopia, Tacazzé valley, *Schimper 1707* (P, holo.).


*Leptochloa uniflora*

*Craspedorhachis uniflora* (Hochst. ex A.Rich.) Chippind., in Meredith, *Grasses & Pastures of South Africa*: 205 (155).

Alternate name: *Trigonochloa uniflora* (Hochst. ex A.Rich.) P.M.Peterson & N.Snow

Slender, tufted annual or perennial 300–750 mm high; erect to geniculate. Leaf blade 40–120 × 6–18 mm, lanceolate-oblong to oblong, acute; ligule unfringed membrane, 6–8 mm long. Inflorescence




Figure 298.—*Lepturus repens*. Artist: S.B. Chiliza.

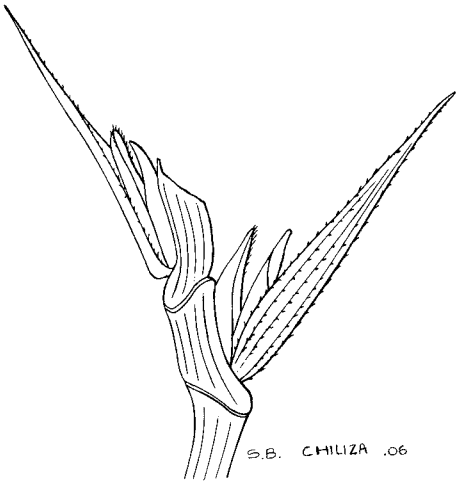



Figure 299.—*Lepturus repens*. Portion of inflorescence showing articulation joints and lateral view of spikelets (10.1 × 0.5 mm). Artist: S.B. Chiliza.

150–450 mm long. Spikelet 1.9–2.8 mm long, laterally compressed; 1-flowered; glumes ± equal, as long as spikelet, acuminate; upper glume without mucro or awn; lemma keeled, entire, acute, minutely hairy on nerves; anthers 0.2–0.4 mm long, dark purple to pale olive green; caryopsis 1.0–1.2 mm long, narrowly elliptic.

*Flowering*: January to May. *Ecology*: In bushveld under trees; in damp shade. *Frequency in southern Africa*: Rare. Locally common. *Distribution*: Tropical Africa; Arabia, India and Sri Lanka. N, ?B, LIM, KZN.

Anatomy vouchers: *Ellis 3226* & 3635.
Voucher: *Killick & Leistner 3347*.

## **Lepturus** R.Br.

Brown: 207 (1810); Stapf: 740 (1900); Pilger: 73 (1956); Hubbard: 388 (1974); Clayton & Renvoize: 229 (1986); Gibbs Russell et al.: 199 (1990); Watson & Dallwitz: 542 (1994); Cope: 202 (1999).

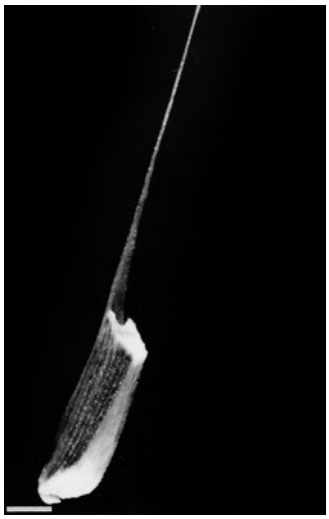


Figure 300.—*Lepturus repens* spikelet (10–14 mm, including awn). Photographer: M. Koekemoer.

Perennial, tufted, stoloniferous. **Leaf blade** expanded or rolled, linear; leaves usually mainly cauline; *ligule* a fringed membrane. **Inflorescence** a single cylindrical spike with spikelets sunken and closely adpressed in depressions on alternate sides of main axis, axis disarticulating at joints; *spikelets* solitary, sessile. **Spikelet** dorsiventrally compressed, falling with glumes; *glumes* very dissimilar, unequal; lower glume minute or 0; upper glume coriaceous, longer than spikelet and covering lemma, facing outwards, lanceolate, 5–12-nerved, awned; both glumes of terminal spikelet well developed, equal, similar. **Floret** 1, rarely 2, bisexual; *upper floret* reduced and sterile occasionally fertile; *lemma* less firm than glumes, membranous, lanceolate, obtuse to acute, rounded on back, 3-nerved, awnless; *palea* as long as lemma, lanceolate, 2-nerved, hyaline. **Lodicules** 2, obovate to elliptic. **Stamens** 3. **Ovary** truncate, glabrous; styles distinct, plumose. **Caryopsis** ellipsoid; hilum short; pericarp free; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines uneven, or even. PCR sheath extension absent. **Cytology**: $x = 7$ (9, 13) (polyploidy).

**Species** ± 15, East Africa, Sri Lanka, Polynesia to Australia; 1 in southern Africa: *Lepturus repens* (G.Forst.) R.Br., KwaZulu-Natal (Ingwavuma District).

Species treatment by A.C. Mashau.

### Quick guide to easily confused taxa:

1. Annual; ligule an unfringed membrane . . . ***Hainardia cylindrica**
   Perennial; ligule a fringed membrane . . . . . 2
2. Upper glume lanceolate, awned; spikelets solitary, sessile; lower glume absent (maybe present in terminal spikelets) . . . . . .**Lepturus repens**

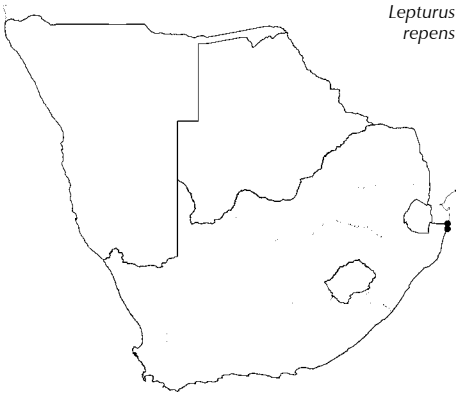
Upper glume obtuse to long-acuminate; spikelets are in sessile-pedicelled pairs; lower glume 4–6 mm long. . . . . .**Hemarthria altissima**

**Lepturus repens** (G.Forst.) R.Br., in *Prodromus florae Novae Hollandiae et Insulae Van-Diemen*: 207 (1810). Type: Tahiti.

Perennial 100–600 mm high; stoloniferous. Leaf blade to 150 × 2–10 mm. Inflorescence a fragile spike, spikelets sunk on opposite sides of the corky axis. Spikelet (8)10–14(22) mm long, dorsiventrally compressed; lower glume absent; upper glume longer than spikelet, awned; florets 1 to 2; lemma 4.0–5.5 mm long, obtuse; anther 1.3–1.5 mm long.

*Flowering*: September to October. *Ecology*: Sand dunes, in salt spray zone. *Frequency in southern Africa*: Infrequent. *Distribution*: Shores of the Indian Ocean east to Polynesia and northern Australia. KZN. *Economics*: As a sand binder for erosion control.

Illustration: Hubbard: 390, fig. 104 (1974).
Anatomy vouchers: *Ellis 4062, 4063* & *4065*.
Voucher: *Venter 6274*.




## **Leucophrys** Rendle

Rendle: 193 (1899); Pilger: 254 (1954); Chippindall: 379 (1955); Launert: 126 (1970a); Clayton & Renvoize: 283 (1986) under *Brachiaria* Griseb.; Gibbs Russell et al.: 200 (1990); Watson & Dallwitz: 544 (1994).

Perennial; culms woody, stiffly geniculate, branched profusely from swollen nodes. **Leaf blade** linear, expanded or rolled, often spiny, hard and brittle; sheath broad and papery; *ligule* a fringe of hairs. **Inflorescence** a contracted but loose panicle, branches slender, each with 2–6 spikelets; *spikelets* solitary or paired, pedicels unequal, hairy, contracted at base into a short stalk which fits into the cup-like apex of the pedicel. **Spikelet** dorsiventrally compressed, falling with glumes;

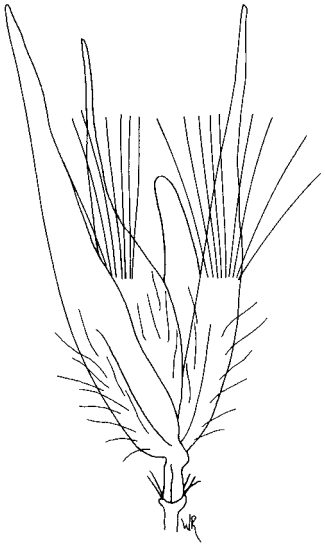


Figure 301.—*Leucophrys mesocoma* spikelet (8 × 3 mm). Artist: W. Roux.



Figure 302.—*Leucophrys mesocoma* spikelet (to 7 mm). Photographer: M. Koekemoer.

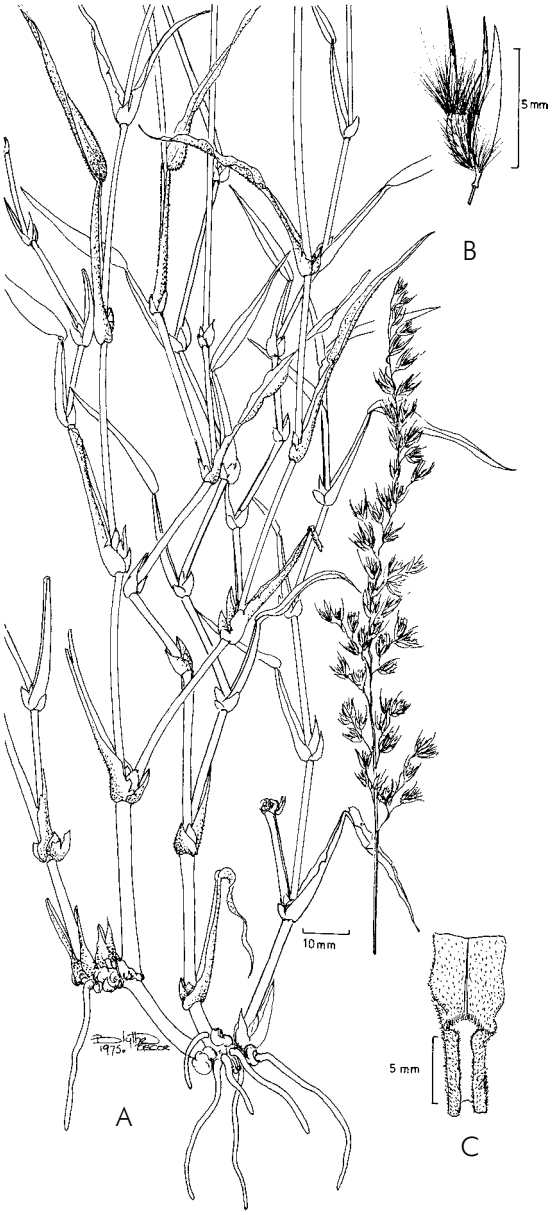
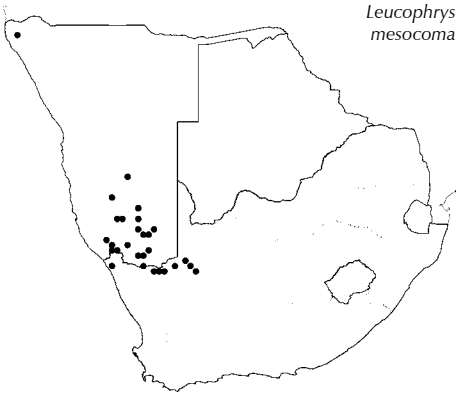



Figure 303.—*Leucophrys mesocoma*. A, plant; B, spikelet; C, ligule. Artist: B. Pascoe.

*glumes* ± equal to unequal, ± equal to longer than spikelet, dissimilar; lower glume membranous, lanceolate, obtuse or apex notched, base hairy, 3-nerved; upper glume ovate-lanceolate, tapering into a long awn-like apex, 5–7-nerved, long-hairy dorsally, with a transverse fringe or tufts of hairs on either side just above middle, or a continuous fringe. **Florets** 2; *lower floret* male; lemma equalling upper glume, channelled dorsally, hairy, hairs always in 2 fringes; palea well developed; *upper floret* bisexual; *lemma* ± half as long as lower lemma, elliptic, obtuse, indurated, smooth, glossy, glabrous, faintly 5-nerved, awnless; *palea* relatively long. **Lodicules** 2, cuneate, fleshy. **Stamens** 3. **Ovary** ellipsoid; styles free, plumose. **Photosynthetic pathway**: $C_4$; XyMS+. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 9$ (1 report).

**Species** 1, Angola and southern Africa; *Leucophrys mesocoma* (Nees) Rendle; southern Namibia to Northern Cape.

Species treatment by L. Fish.


*Leucophrys mesocoma*

**Leucophrys mesocoma** (Nees) Rendle, in *Catalogue of the African plants collected by Dr F. Welwitsch* 2: 194 (1899). Type: South Africa, Northern Cape, Little Namaqualand, by the Orange River, near Verlaptpraam, *Drège*.

*Panicum mesocomum* Nees, in *Florae africae australioris illustraiones monographicae*: 34 (1841).

Alternate name: *Bracharia mesocoma* (Nees) A.Camus

Zig-zag grass, withaargras

Tufted perennial to 1 000 mm high; culms much branched, geniculate, blue-green, woody, brittle; nodes swollen. Leaf blade 30–120 × 3–8 mm. Inflorescence 130 × 30 mm. Spikelet 6–8 × 2–3 mm; upper glume and lemma of lower floret with dense hairs 3–5 mm long, hairs in two tufts or a continuous fringe halfway up; upper lemma smooth; anther of male floret 2–4 mm long, brown.

*Flowering*: February to May. *Ecology*: Sandy river beds. *Frequency in southern Africa*: Infrequent. *Distribution*: Angola. N, NC. *Economics*: Palatable when young.

Anatomy vouchers: *Ellis 4338, 4339* & *Smook 5261A*.
Voucher: *Smook 5261*.

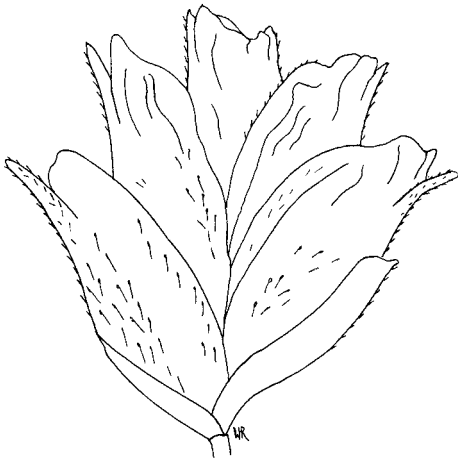


Figure 304.—*Lintonia nutans* spikelet (6.2 × 6.5 mm). Artist: W. Roux.

## **Lintonia** Stapf

Stapf: t. 2949 (1911); Chippindall: 117 (1955); Phillips: 302 (1974); Ellis: 162 (1983); Clayton & Renvoize: 235 (1986); Gibbs Russell et al.: 201 (1990); Watson & Dallwitz: 553 (1994); Cope: 205 (1999).

Perennial, tufted; stoloniferous. **Leaf blade** narrow-linear, expanded, tapering to a fine acuminate apex; *ligule* an unfringed membrane, truncate. **Inflorescence** of 1–5 spike-like racemes, digitate or subdigitate; *spikelets* solitary, shortly pedicelled. **Spikelet** plump, wedge-shaped, laterally compressed, disarticulating above glumes but not between florets; *glumes* unequal, shorter than spikelet, membranous, 1-nerved, weakly keeled, awnless, dissimilar; lower glume shorter than upper glume, lanceolate, obtuse; upper glume oblong, notched at apex. **Florets** 4–10, lower 2–4 bisexual, *upper* or *uppermost floret* reduced and sterile; *lemma* firmer than glumes, similar, broad, obovate, rounded on back, hairy; hairs short, stiff, sharp-pointed to obtuse or club-shaped, in rows on lower half or towards base of

lobes, 5–9-nerved, nerves slightly shorter than lemma, shortly 2-lobed; shortly awned from between lobes or from back near apex; *central awn* straight to curved, not geniculate; *callus* hairy; *palea* elliptic-lanceolate, shortly 2-lobed, flat dorsally, 2-keeled, ciliate on keels. **Lodicules** 2, oblong. **Stamens** 3. **Ovary** shortly stalked, oblong; styles fused at base, plumose. **Caryopsis** 1.3–2.2 mm, ellipsoid, dorsiventrally flattened, enclosed within a free hyaline pericarp; hilum short, elliptical; embryo large, about half the length of caryopsis. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines uneven, without extensions. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 15$ (1 report).



Figure 305.—*Lintonia nutans* spikelet (6–11 mm). Photographer: M. Koekemoer.

**Species** 2, Africa; 1 in southern Africa: *Lintonia nutans* Stapf, Botswana, Swaziland, Limpopo, Mpumalanga, northern KwaZulu-Natal.

Species treatment by M.J. Moeaha.

**Quick guide to easily confused taxa:**

| | | |
|---|---|---|
| 1. | Lemma back rounded or flat | **Lintonia** |
| | Lemma keeled | 2 |
| 2. | Glumes ± equal (excluding awn) | **Tetrapogon** |
| | Glumes unequal in size (excluding awn) | 3 |
| 3. | Upper glume awned, awn up to half as long as body of glume | **Eustachys** |
| | Upper glume awnless or with a very small awn | **Chloris mossambicensis** |

**Lintonia nutans** Stapf, in *Hooker's Icones Plantarum* 30, t. 2949. Type: Kenya, Nairobi, *Linton 193* (K, holo.).

Tufted perennial 400–900 mm high, stolons short; basal sheaths compressed, keeled. Leaf blade 30–150 × 3–5 mm, usually glabrous. Inflorescence of 2–4 digitate or subdigitate racemes. Spikelet 5–10 × 4–8 mm, wedge-shaped, usually tinged purple, 4–10-flowered; lemma 4–7 mm long (excluding awns), back rounded, shortly bilobed, awned from between the lobes; awn 1–11 mm long, straight, outwardly curved or flexuous; anther up to 1 mm long.

[Anatomical evidence indicates that *L. nutans* is closely allied with some species of *Chloris* as there are no significant anatomical differences observed between *C. gayana*, *C. virgata*, *C. mossambicensis* and *L. nutans*. Furthermore, *Lintonia* appears to be congeneric with all *Chloris* species showing the PCK-type of anatomy, particularly *C. mossambicensis* K.Schum., which shows close anatomical, ecological and morphological similarities with *L. nutans* (Ellis 1983).]

*Flowering*: December to March. *Ecology*: On black clayey soil; in vleis or along pan edges. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to East Africa, Somalia, Ethiopia and Sudan. B, S, LIM, M, KZN.

Illustration: Cope: 206, tab. 59 (1999).
Anatomy vouchers: *Ellis 3544, 3545, 3547* & *Bond 3* (Ellis 1983).
Voucher: *Du Toit 169*.




Figure 306.—*Lintonia nutans*. Artist: G.E. Lawrence.

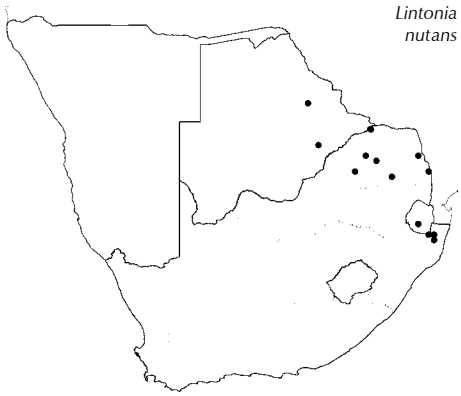





Figure 307.—*Lolium temulentum*. Artist: C. Letty.

## *Lolium L.

Linnaeus: 83 (1753); Stapf: 738 (1900); Stent: 303 (1924); Hitchcock & Chase: 274 (1950); Chippindall: 58 (1955); Launert: 42 (1971); Hubbard: 41 (1970); Humphries: 153 (1980); Clayton & Renvoize: 95 (1986); Gibbs Russell et al.: 201 (1990); Darbyshire: 239 (1993); Loos: 87 (1993); Watson & Dallwitz: 558 (1994); Sell & Murrell: 150 (1996); Terrell: 454 (2007).



Figure 308.—*Lolium multiflorum* spikelet (8–20 mm). Photographer: M. Koekemoer.

Annual or perennial (usually short-lived), tufted or culms solitary; sometimes rooting at nodes. **Leaf blade** linear, expanded, rolled or folded; *ligule* an unfringed membrane. **Inflorescence** a bilateral spike with spikelets sunk and lying edgeways in partial cavities on alternate sides of the central axis; *spikelets* solitary, sessile. **Spikelet** laterally compressed, disarticulating above glumes; *glumes* unequal; lower glume absent except in terminal spikelets, when present then much reduced; upper glume facing outwards, membranous, shorter than to as long as spikelet, lanceolate or linear-lanceolate, sometimes turgid in fruit, obtuse or subacute, 3–7-nerved, glabrous. **Florets** 2–22, bisexual or *uppermost floret* reduced and sterile; *lemma* less firm to firmer in texture to glumes, coriaceous, lanceolate or elliptic, rounded dorsally, 5–7-nerved, glabrous, acute to obtuse or awned; *awn* straight; *palea* equalling or sub-equalling body of lemma, somewhat thinner in texture, lanceolate, lanceolate-elliptic or lanceolate-oblong, 2-keeled. **Lodicules** 2, lanceolate with a lateral tooth. **Stamens** 3. **Ovary** truncate, glabrous; styles distinct, plumose. **Caryopsis** hilum long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. PBS cells without a suberised lamella. **Cytology**: $x = 7$ (polyploidy).

**Species** 8, temperate regions of Eurasia, introduced elsewhere; ± 4 naturalised in southern Africa, widespread.

Species treatment by A.C. Mashau.

### Quick guide to easily confused taxa:

1. Spikelet with one floret . . . . . *__Hainardia cylindrica__
   Spikelet with two to many florets . . . . . 2
2. Glume 1, shorter than to as long as spikelet, obtuse to acute, awnless; lower glume usually absent, when present much reduced . . . . . *__Lolium rigidum__
   Glumes 2, slightly shorter than spikelet, ovate, oblong to lanceolate, awned; lower glume present . . . . . *__Elytrigia repens__

### Key to species:

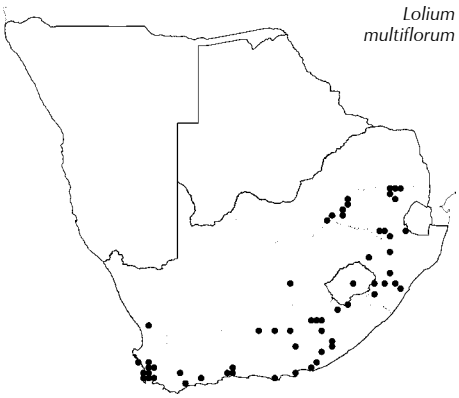
1. Upper glume adpressed to rachis, ± concealing spikelet in rachis cavity, slightly gaping at maturity; spikelet 1–3 mm wide . . . . . *__L. rigidum__
   Upper glume ascending or spreading, not concealing spikelet; spikelet 3–11 mm wide . . . . . .2

2. Upper glume as long as to longer than spikelet; lemma elliptical to ovate, less than 3 × as long as wide, very turgid at maturity especially towards base; mature caryopses up to 3 times as long as wide . . . . . *__L. temulentum__
Upper glume shorter than spikelet; lemma oblong to oblong-lanceolate, more than 3 × as long as wide, not turgid at maturity; mature caryopses more than 3 times as long as wide . . . . . 3
3. Perennial, lemma awnless; leaf flat, folded along midrib when young . . . . . *__L. perenne__
Annual or short-lived perennial, lemma awn up to 15 mm long; leaf rolled along midrib when young . . . . . *__L. multiflorum__
A combination of characteristics of *L. perenne* and *L. multiflorum* . . . . . *__L. multiflorum × L. perenne__

[*L. multiflorum* has been regarded as a variety of *L. perenne* as the two species interbreed freely, often making their separation into distinct species doubtful. In Europe, *L. multiflorum* and *L. perenne* are two quite distinct species, but a complete range of intermediates are found in southern Africa and the hybrid *L. multiflorum* × *L. perenne* is subjectively separated from *L. multiflorum* and *L. perenne* by numerous overlapping characters.]

***Lolium multiflorum** Lam., in *Flore française* 3: 621 (1779). Type: France.

ITALIAN RYE GRASS

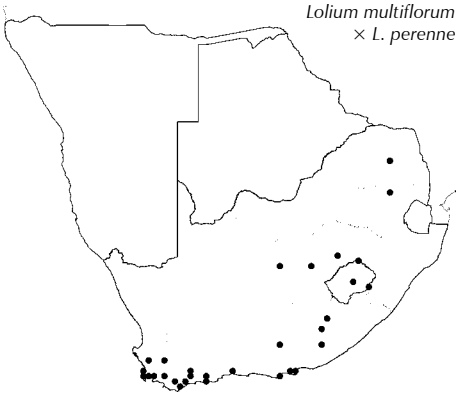

*Lolium multiflorum*

Loosely tufted, short-lived perennial or annual, 200–800(–1 300) mm high. Leaf blade 110–220 × 3–8 mm, rolled up along the midrib when young. Spikelet 10–15 × 2–10 mm, 8–20-flowered; lower glume present only in the terminal spikelets, similar to upper glume; upper glume ascending or spreading, $^1/_4$–$^1/_2$(–$^3/_4$) as long as spikelet, not concealing the spikelet, persistent; lemma acute, more than 3 × as long as wide, not turgid at maturity, awn to 15 mm long; palea as long as lemma, with 2 minutely rough keels; anther 2.3–4.5 mm long; mature caryopsis more than three times as long as wide.

[Subjectively separated from *L. multiflorum* × *L. perenne* by numerous overlapping characters.]

*Flowering*: October to April. *Ecology*: On roadsides and other disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Naturalised from Europe and the Mediterranean; introduced worldwide. L, NW, G, M, FS, KZN, WC, EC. *Economics*: Irrigated annual winter pasture but poisonous when infected by fungi; weed as an escape from cultivation.

Illustration: Hitchcock & Chase: 276, fig. 370 (1950); Terrell: 457 (2007).
Anatomy voucher: *Ellis 474*.
Voucher: *Smook 1705*.


*Lolium multiflorum × L. perenne*

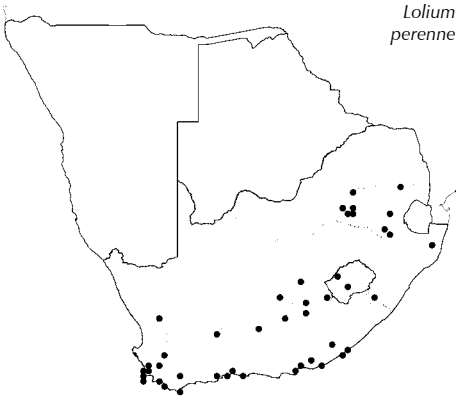
***Lolium multiflorum × L. perenne**

Loosely tufted biennial, or annual 150–1 000 mm high. Leaf blade to 300 × 10 mm, flat, folded, rolled when young. Spikelet 6–25 × 3–10 mm; upper glume ascending or spreading, $^1/_4$ to as long as the spikelet, not concealing the spikelet; lemma ± acute, more than 3 × as long as wide, not turgid at maturity, awn absent or up to 10 mm long; palea as long as lemma, 2 keeled, minutely rough; anther 2.1–3.6 mm long; mature caryopsis more than three times as long as wide.

[Subjectively separated from *L. multiflorum* and *L. perenne* by numerous overlapping characters.]

*Flowering*: October to December. *Ecology*: In cultivated or fallow lands, on roadsides and in moist disturbed places. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from Europe. L, LIM, M, FS, WC, EC.

Voucher: *Theron 927*.



*Lolium perenne*

***Lolium perenne** L., in *Species plantarum*: 83 (1753). Type: Europe.

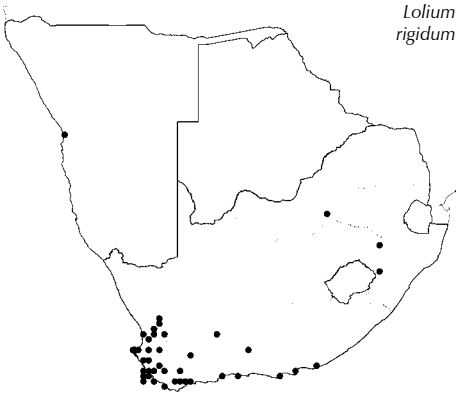
PERENNIAL RYE GRASS

Tufted perennial 250–500(–900) mm high; culms numerous. Leaf blade 50–140(–300) × 2–4 mm, flat, folded along midrib when young. Spikelet 10–15 × 3–10 mm, usually 6–10-flowered; lower glume present only in a terminal spikelet, similar to upper glume; upper glume ascending or spreading, $^1/_2$–$^3/_4$ as long as spikelet, not concealing the spikelet, persistent; lemma acute, more than 3 × as long as wide, not turgid at maturity, awnless; palea as long as lemma, with 2 minutely rough keels; anther 2.9–4.0 mm long; mature caryopsis more than three times as long as wide.

[Hybridises freely with other *Lolium* species, as well as with species of *Festuca*.]

*Flowering*: March, April, November and December. *Ecology*: On roadsides, in moist disturbed areas and cultivated and fallow lands. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from Europe. Introduced worldwide. L, G, M, FS, KZN, NC, WC, EC. *Economics*: Irrigated perennial winter pasture but poisonous when infected by fungi; weed as an escape from cultivation.

Illustration: Terrell: 457 (2007).
Anatomy vouchers: *Ellis 631* & *1266*.
Voucher: *Burrows 2216*.



*Lolium rigidum*

***Lolium rigidum** Gaudin, in *Agrostologia helvetica* 1: 334 (1811). Type: Switzerland.

*L. loliaceum* (Bory & Chaub.) Hand.-Mazz., in *Annalen des k.k. naturhistorischen Hofmuseums, Wien*. 28: 32 (1914).

Tufted annual 100–300(–500) mm high; solitary or numerous flowering culms, culms in young plants branching near the base and sometimes rooting from the lower nodes. Leaf blade 100–170 × 5–8 mm. Spikelet 7–20 × 1–3 mm; 2-flowered; upper glume adpressed to the rachis, slightly gaping at maturity, $^3/_4$ to slightly longer than spikelet, concealing or partly concealing the spikelet in a concavity of the rachis; lemma obtuse to acute, not turgid at maturity, awn absent or to 10 mm long; palea as long as lemma, keels 2, rough; anther 1.4–1.7 mm long; mature caryopsis more than three times as long as wide.

*Flowering*: September to January. *Ecology*: On sandy to clayey soils; preferably where it is moist, occasionally in water and on stream edges; in disturbed and weedy places. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from the Mediterranean. Introduced worldwide in temperate regions. N, NW, KZN, NC, WC, EC. *Economics*: Weed.

Illustration: Terrell: 457 (2007).
Anatomy vouchers: *Ellis 1182, 5141* & *5142*.
Voucher: *Smook 3649*.

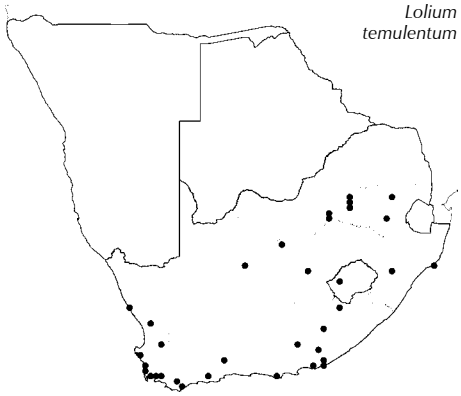
***Lolium temulentum** L., in *Species plantarum*: 83 (1753). Type: Europe.

DRABOK, DARNEL

Robust annual 400–900 mm high; culms solitary or tufted. Leaf blade 150–300 × 3–7 mm. Spikelet 8–28 × 3–8 mm, 5–9-flowered; lower glume usually suppressed, except in terminal spikelets; upper glume ascending or spreading, $^{3}/_{4}$ to $1^{1}/_{2}$ × spikelet length, not concealing the spikelet; lemma elliptical to ovate, less than 3 × as long as wide, very turgid at maturity, awn absent or to 20 mm long; palea as long as lemma, 2-keeled; anther 2.1–3.2 mm long; mature caryopsis 2–3 times as long as wide.

*Flowering*: September to February. *Ecology*: Usually in cultivated or fallow lands, gardens or other disturbed areas, often associated with wheat. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from the Mediterranean. Introduced and naturalised in most warm temperate countries. L, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: The fungus associated with this grass contains an alkaloid poisonous to livestock; weed.

Illustration: Hitchcock & Chase: 277, fig. 371 (1950).
Voucher: *Lategan s.n.*




## **Lophacme** Stapf

Stapf: 316 (1898); Stapf: 647 (1900); Stent: 292 (1924); Chippindall: 127 (1955); Pilger: 32 (1956); Clayton & Renvoize: 213 (1986); Gibbs Russell et al.: 203 (1990); Watson & Dallwitz: 560 (1994); Cope: 39 (1999).

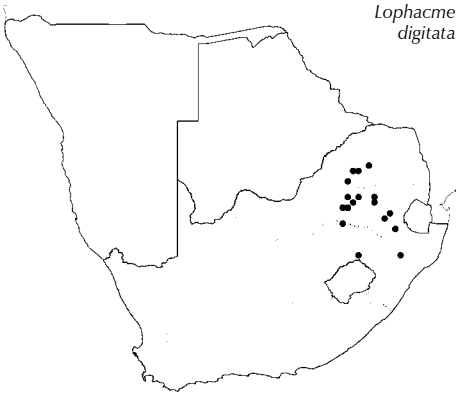


Figure 309.—*Lophacme digitata* spikelet (5–6 mm). Photographer: M. Koekemoer.

Perennial, tufted; rhizomatous; basal sheaths fibrous. **Leaf blade** expanded or rolled, almost setaceous; *ligule* a fringed membrane. **Inflorescence** 2–8 slender, spike-like racemes, digitate or subdigitate; *spikelets* solitary, subsessile or shortly pedicelled, somewhat distant on rachis. **Spikelet** laterally compressed, disarticulating above glumes and between florets; *glumes* ± equal or unequal, shorter to as long as spikelet, linear, similar, membranous, glabrous, 1-nerved, keeled, awnless. **Florets** 2–many, dissimilar; *lower florets* 1–3, bisexual or *second floret* sometimes male only; *upper florets* 1–5, sterile, reduced to awns, forming a tuft that remains attached to upper fertile floret; bisexual *lemma* linear, less firm than glumes, thinly membranous, finely hairy, 3-nerved, dorsally keeled, shortly 2-lobed, central awn from between lobes; *awn* slender, straight, longer than body of lemma; *callus* short, pointed, minutely hairy; *palea* slightly shorter than lemma, linear, acute, deeply concave on back, 2-keeled, subhyaline. **Lodicules** 2, minute, hyaline, glabrous. **Stamens** 3. **Ovary** glabrous; styles distinct, short, loosely plumose above. **Caryopsis**




Figure 310.—*Lophacme digitata*. A, plant; B, spikelet. Artists: A, G.E. Lawrence; B, W. Roux.




fusiform; hilum short; pericarp loosely adherent (easily removable after soaking); embryo large (a little more than $^1/_3$ length of caryopsis). **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines even. PCR sheath extensions absent. PCR cell chloroplasts centripetal.

**Species** 2, south tropical and southern Africa; 1 in southern Africa: *Lophacme digitata* Stapf, Limpopo, Mpumalanga, Gauteng, Free State to KwaZulu-Natal.

Species treatment by A.C. Mashau.

**Lophacme digitata** Stapf, in *Hooker's Icones Plantarum* 27: t. 2611 (1899). Type: South Africa, Limpopo Province, near Rhenosterpoort, *Nelson 32* (PRE, fg.).

Slender tufted perennial 170–570 mm high; rhizomes long, slender; basal sheaths fibrous. Leaf blade 30–45 × 1.0–2.5 mm. Inflorescence of 2–8 racemes, up to 80 mm long, not obviously secund. Spikelet 5–6 mm long; lower glume 3.4–5.1 mm long; upper glume ± as long as spikelet; lemma pilose on back, hairs not clavate, central nerve extending to an awn longer than the lemma; awn slender, straight; anther 1.8–2.0 mm long; upper sterile florets modified to form a tuft of awns.

*Flowering*: February to April. *Ecology*: Open highveld sourveld. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Northwards to Zambia and Zimbabwe. LIM, G, M, FS, KZN.

Illustrations: Hooker's Icones: plate 2611 (1899); Cope: 40, tab. 18 (1999).
Anatomy vouchers: *Ellis 4264* & *4265*.
Voucher: *Codd 974*.




Figure 311.—*Lophochloa pumila*. A, plant; B, spikelet (6 × 3 mm). Artist: W. Roux.

## *Lophochloa Rchb.

Reichenbach: 42 (1830); Stapf: 470 (1899) under *Koeleria*; Adamson & Salter: 84 (1950); Chippindall: 84 (1955) under *Trisetaria* Forssk.; Jonsell: 220 (1980); Clayton & Renvoize: 128 (1986) included under *Rostraria* Trin.; Gibbs Russell et al.: 204 (1990); Watson & Dallwitz: 515 (1994) under *Koeleria* Pers.; Standley: 756 (2007) under *Rostraria* Trin.

Annual, tufted. **Leaf blade** linear, expanded; *ligule* an unfringed membrane. **Inflorescence** a spike-like panicle. **Spikelet** 2.5–5.0 mm long, laterally compressed, variously disarticulating; *glumes* unequal or ± equal, shorter to ± equal to longer than spikelet, similar, glabrous or hairy, keeled, sometimes hairy on keel, awnless; lower glume 1-nerved; upper glume 3-nerved. **Floret** 2–6, all bisexual or uppermost reduced; *lemma* 3–7-nerved, 2-lobed, keeled, usually conspicuously 1–3-awned; *awn* short, straight; *palea* 2-lobed, 2-keeled. **Lodicules** 2, membranous. **Stamens** 3. **Ovary** usually glabrous.



Figure 312.—*Lophochloa pumila* spikelet (2.5–4.0 mm). Photographer: M. Koekemoer.

Hilum short; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 6, 7, 13$.

**Species** ± 85, temperate regions of the world; 2 naturalised in southern Africa, western regions of Northern Cape, Western and Eastern Cape.

Species treatment by M.T. Nembudani.

**Key to species:**

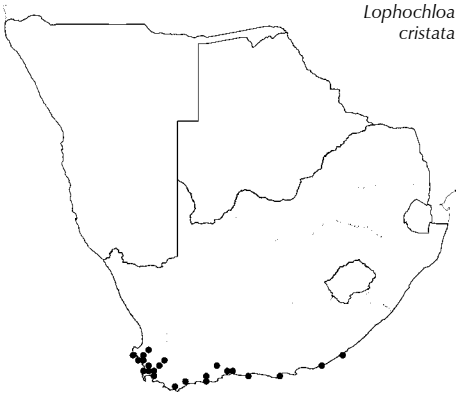
Lower glume distinctly narrower and less than $^1/_2$ as wide as upper glume; rachilla hairs not more than 0.5 mm long or absent . . . . . * **L. cristata**

Lower glume as wide or more than $^1/_2$ as wide as upper glume; rachilla hairs ± 1 mm long . . . . . * **L. pumila**

***Lophochloa cristata** (L.) Hyl., in *Botaniska Notiser* 1953: 355 (1953). Type: France.

*Koeleria phleoides* (Vill.) Pers., in *Synopsis Plantarum* 1: 97 (1805). Type: South Africa, Western Cape, *Wolley-Dod* 3576 (syntype).

Alternate name: *Rostraria cristata* (L.) Tzvelev


*Lophochloa cristata*

Loosely tufted annual 50–400 mm high. Leaf blade 40–120 × 2.5 mm. Inflorescence spike-like, green. Spikelet 3–5(7) mm long, 3–6-flowered; glumes glabrous to slightly pubescent, or lower glume pubescent and upper glume glabrous; lower glume about $^3/_4$ as long and less than $^1/_2$ as wide as upper glume, much narrower than upper glume and lemma; rachilla hairs not more than 0.5 mm long or absent; lemma awn 1–3 mm long; anther 0.2–0.6 mm long.

*Flowering*: October to December. *Ecology*: Dry exposed areas or sometimes also in moist or rocky areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from Europe, the Mediterranean and North Africa; and to India. WC, EC. *Economics*: Weed.

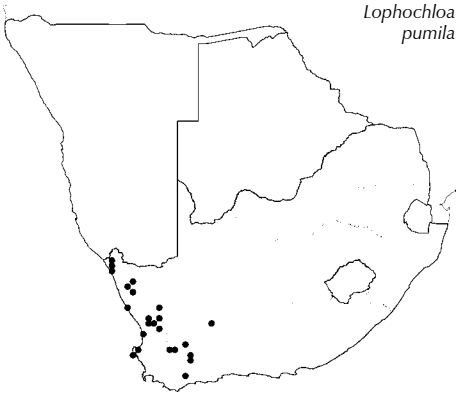
Anatomy vouchers: *Ellis 701, 1187 & 2243*.
Voucher: *Cleghorn 3144*.

***Lophochloa pumila** (Desf.) Bor, in *The Grasses of Burma, Ceylon, India and Pakistan*: 455 (1960). Type: ? (not found).

*Trisetaria pumila* (Desf.) Maire, in *Flora de l'Afrique du Nord* 2: 261 (1953).

*Trisetum pumilum* (Desf.) Kunth, in *Révision des graminées* 1: 102 (1829).

Alternate name: *Rostraria pumila* (Desf.) Tzvelev


*Lophochloa pumila*

Tufted annual 45–400 mm high. Leaf blade 35–65 × 2 mm. Inflorescence spike-like, purple tinged. Spikelet 2.5–4.0 mm long, 2–4-flowered; lower glume densely pubescent, as wide or more than $^1/_2$ as wide as upper glume; upper glume glabrous to puberulous, ciliate on the keel; rachilla hairs about 1 mm long; lemma awn 1.5–4.0 mm long; anther 0.3–0.4 mm long.

*Flowering*: September to January. *Ecology*: Dry and/or rocky areas, sometimes beneath bushes. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from Spain; NC, WC. *Economics*: Weed.

Illustration: Chippindall: 84, fig. 55 (1955); Standley: 756 (2007).
Anatomy vouchers: *Ellis 1688, 1714 & 5095*.
Voucher: *Acocks 15020, Smook 3652*.

## **Loudetia** Hochst. ex Steud.

Steudel: 238 (1854); Stapf: 452 (1899); Stent: 287 (1924); Chippindall: 279 (1955); Conert: 247 (1957); Phipps: 87 (1964); Clayton: 122 (1967b); Launert: 126 (1970a); Clayton: 415 (1974); Chippindall & Crook: 93 (1976); Clayton & Renvoize: 319 (1986); Clayton: 216 (1989); Gibbs Russell et al.: 205 (1990); Watson & Dallwitz: 567 (1994).




Figure 313.—*Loudetia flavida*. A, plant; B, ligule. Artist: C. Smith.



Figure 314.—*Loudetia simplex* spikelet (7–13 mm). Photographer: M. Koekemoer.

Perennial, tufted. **Leaf blade** narrowly linear to linear, expanded or rolled; *ligule* a fringe of hairs. **Inflorescence** an open or contracted, rarely spike-like panicle; *spikelets* solitary or in pairs, rarely in threes, pedicelled; pedicels free, stout, often of unequal lengths, usually longest pedicel ± twice as long as shortest pedicel. **Spikelet** usually brown, laterally to not noticeably compressed, disarticulating above glumes; *glumes* very unequal, chartaceous to coriaceous, 3-nerved, glabrous or coarsely hairy, hairs with black or brown tubercles, awnless or shortly awned; lower glume usually ovate or ovate-elliptic, acuminate, acute, obtuse or truncate, rarely setaceously acuminate, up to half as long as upper glume; upper glume linear-lanceolate or lanceolate, obtuse or truncate, rarely acute or setaceously acuminate, as long as or nearly as long as spikelet. **Florets** 2, *lower floret* male or rarely sterile; lemma 3–5-nerved; *upper floret* bisexual; *lemma* similar to firmer in texture than glumes, thinly coriaceous, linear to linear-lanceolate, rounded on the back, 5–9-nerved, glabrous to hairy, hairs not in tufts, shortly or deeply 2-lobed, lobes obtuse or acute, awned from between 2 lobes or from apex; *awn* geniculate, strongly twisted below, up to 4 times as long as spikelet; *callus* short to long, oblong to linear, truncate, 2-toothed or obliquely pungent, hairy; *palea* linear to linear-lanceolate, shorter or up to as long as lemma, 2-keeled, keels with thickened nerves, wingless, membranous. **Lodicules** 2, linear or narrowly cuneate. **Stamens** 2 or 3. **Ovary** glabrous; styles free, plumose. **Caryopsis** narrowly ovoid; hilum long-linear; embryo large. **Photosynthetic pathway**: $C_4$. Organisation of PCR tissue when unconventional arundinella-type. XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 6$, 12 (polyploidy).

**Species** ± 26, mostly tropical Africa, also Madagascar and South America; 6 in southern Africa, Northern Namibia, Botswana, Swaziland, Limpopo, North West, Gauteng, Mpumalanga, Free State, KwaZulu-Natal and Eastern Cape.

Species treatment by A.C. Mashau.

### Quick guide to easily confused taxa:

1. Upper lemma lobes awned; lower glume ovate . . . . . **Loudetia pedicellata**
   Upper lemma lobes awnless, lower glume ovate-elliptic or acute to acuminate . . . . . 2
2. Spikelets not in dense triads; lower glume acute to acuminate; glumes twice as long as spikelet . . . . . **Loudetia glabrata** **(West Africa)

Spikelets in triads, pedicels unequal; lower glume ovate-elliptic; glumes $^1/_3$–$^2/_3$ as long as spikelet . . . . . 3

3. Lemma central awn 15–35 mm long; culm base partly swollen; spikelet 10–20 mm long (excluding awn) . . **Tristachya lualabaensis**
Lemma central awn 40–120 mm long; culm base markedly bulbous; spikelet 25–35 mm long (excluding awn) . . . . . **Tristachya superba**

[**The following specimens: Namibia, Katima Mulilo (1724AD), *Ellis 344*; Kabe floodplains (1724DA), *Brown s.n.* were wrongly identified as *Loudetiopsis glabrata* (K.Schum.) Conert (now *Loudetia glabrata* (K.Schum) Conert) a species from West Africa. These specimens have been re-identified as *Tristachya lualabaensis*.]

## Key to species:

1. Spikelet 20–30 mm long, in triads . . . . . **L. pedicellata**
Spikelet less than 15 mm long, in pairs or solitary . . . . . 2
2. Inflorescence dense, spike-like . . . . . **L. densispica**
Inflorescence an open or contracted panicle, but not spike-like . . . 3
3. Lower glume obtuse to subacute or truncate . . . . . .4
Lower glume acute, acuminate or minutely awned . . . . . 5
4. Basal leaf sheaths densely hairy, but not woolly hairy, sometime silky pubescent to glabrescent; callus of upper floret narrowly oblong, 2-toothed in mature specimens; leaves may be loosely hairy . . . . . **L. simplex**
Basal leaf sheaths woolly hairy; callus of upper floret obliquely pungent; leaves densely covered with velvety white hairs . . . . . **L. lanata**

5(3). Leaves mainly cauline; culm branched after first node; spikelet 6–8 mm long . . . . . **L. filifolia**
Leaves mainly basal; culm unbranched after first node; spikelet 8–12 mm long . . . . . **L. flavida**

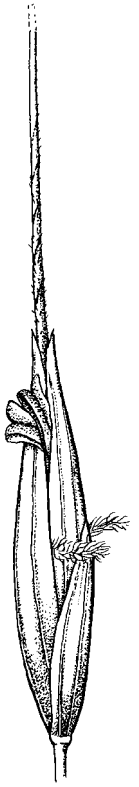


Figure 315.—*Loudetia flavida* spikelet. Artist: C. Smith.

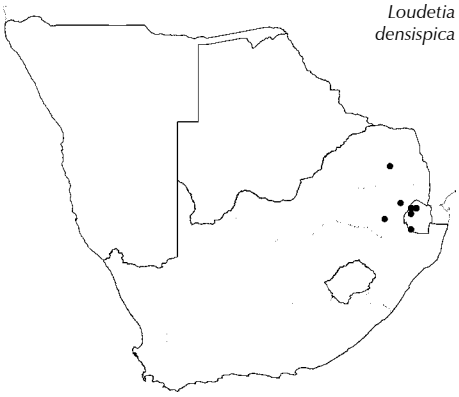
**Loudetia densispica** (Rendle) C.E.Hubb., in *Kew Bulletin* 1934: 428 (1934). Type: Angola, Lopollo District, Huilla, *Welwitsch 7500*.

Tufted perennial to 900 mm high; basal leaf sheaths glabrous, sometimes splitting into fibres; culm unbranched after first node. Leaf blade 100–200 × to 3 mm, expanded; ligule an inconspicuous fringe of hairs. Inflorescence 40–80 mm long, dense, spike-like. Spikelet 10–15 mm long; lower glume $^1/_2$ as long as upper glume, obtuse, with 2 rows of tubercle-based hairs; upper glume ± as long as spikelet; lower lemma similar to the upper glume; upper lemma minutely 2-lobed, central awn 25–40 mm long; callus of upper floret pungent or obliquely 2-toothed; stamens 2; anther 2.0–3.3 mm long.

*Flowering*: January. *Ecology*: Open grassland. *Frequency in southern Africa*: Locally common. *Distribution*: Angola, Zambia and DRC. S, LIM, M.

Illustration: Chippindall: 283, fig. 254 (1955).
Voucher: *Acocks 13308*.

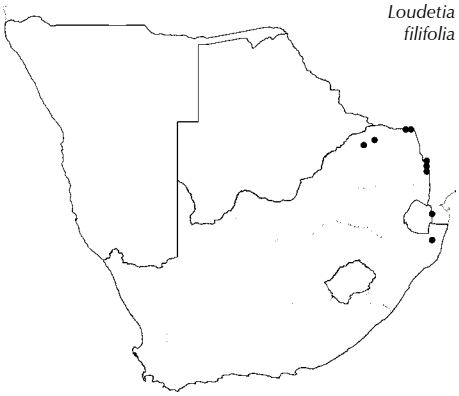
*Loudetia densispica*



**Loudetia filifolia** Schweick., in *Kew Bulletin of Miscellaneous Information* 1935: 207 (1935). Type: South Africa, Limpopo, Soutpansberg District, Soutpan, *Schweickerdt & Verdoorn 523*.

Tufted, slender, wiry perennial to 600 mm high; basal leaf sheaths shortly and loosely hairy; leaves mainly cauline, often without leaf blades near the base; culm narrow, branched after first node. Leaf blade to 100 × to 2 mm, filiform; ligule an inconspicuous fringe of hairs. Inflorescence usually open, more rarely somewhat contracted; branches and pedicels pubescent or scabrid. Spikelet 6–8 mm long;

*Loudetia filifolia*

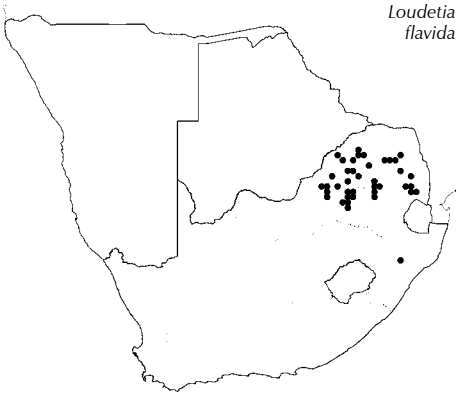


glumes without tubercle-based hairs; lower glume $^1/_2$ as long as upper glume, acute to acuminate or shortly awned; upper glume shorter than lower lemma, acuminate; lower lemma similar to upper glume; upper lemma minutely 2-lobed, central awn up to 20 mm long; callus of upper floret oblong, truncate or rounded; stamens 3; anther 2.8–3.3 mm long.

[Distinguished from *L. flavida*, which has a larger spikelet (8–12 mm long) and wider leaf blade (2–4 mm).]

*Flowering*: November to June. *Ecology*: Rock crevices on cliffs and mountain slopes. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. S, LIM, M, KZN.

Voucher: *Van Rooyen 3333*.


*Loudetia flavida*

**Loudetia flavida** (Stapf) C.E.Hubb., in *Kew Bulletin* 1934: 429 (1934). Type: South Africa, Gauteng, Pretoria, *Rehmann 4730*; Derdepoort, *Nelson* 75 (syntypes).

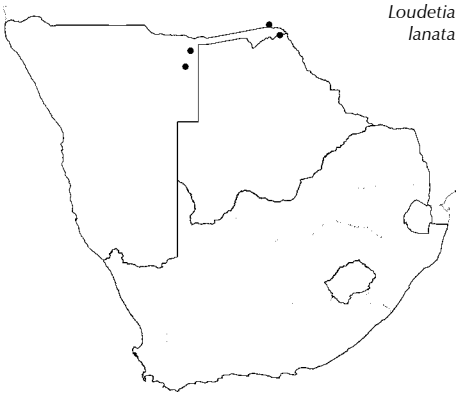
POINTED RUSSET GRASS

Tufted perennial 800–1 500 mm high; basal leaf sheaths pubescent to woolly tomentose; leaves mainly basal, tend to be widely spreading; culm unbranched after first node. Leaf blade 150–400 × 2–4 mm, usually narrow, unevenly filiform; ligule a conspicuous fringe of hairs. Inflorescence linear to narrowly ovate, open or dense; branches and pedicels glabrous to pubescent, rarely villous. Spikelet 8–12 mm long; glumes usually glabrous and rarely with tubercle-based hairs; lower glume $^1/_2$–$^2/_3$ as long as upper glume, acute to acuminate; upper glume ± as long as spikelet, acuminate; lower lemma acute, similar to upper glume; upper lemma lobe 1–2 mm long, acute; central awn 30–40 mm long; callus of upper floret linear, pungent or narrowly truncate; stamens 3; anther 2.5–4.0 mm long.

[Distinguished from *L. simplex*, which has truncate or obtuse lower glumes; and *L. filifolia* which has a shorter spikelet (6–8 mm long) and wider leaf blade (up to 2 mm).]

*Flowering*: November to March. *Ecology*: Shallow rocky soils, also vlei margins. *Frequency in southern Africa*: Common. *Distribution*: Northwards into tropical Africa. LIM, NW, G, M, KZN.

Illustration: Chippindall: 282, fig. 253 (1955).
Anatomy vouchers: *Ellis 1334, 1346, 1786* & *2838*.
Voucher: *Smook 912*.


*Loudetia lanata*

**Loudetia lanata** (Stent & J.M.Rattray) C.E.Hubb., in *Kew Bulletin* 1934: 429 (1934). Type: Zimbabwe, Harare, *Eyles 2955* (SRGH, holo.).

WOOLLY RUSSET GRASS

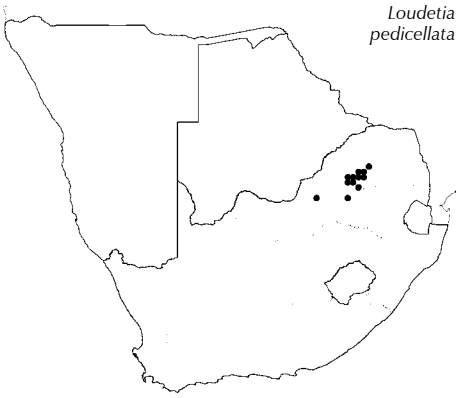
Tufted perennial 500–900 mm high; basal leaf sheaths woolly hairy, usually becoming fibrous; culm unbranched after first node. Leaf blade 200 × 4 mm, tapering into a fine point, thickly white velvety hairy; ligule a conspicuous fringe of hairs. Inflorescence broadly elliptic or ovate in outline, open to somewhat contracted, branches and pedicels pubescent. Spikelet 8–12 mm long; glumes with tubercle-based hairs present, rarely glabrous; lower glume $^1/_2$ as long as upper

glume, obtuse to subacute; upper glume as long as spikelet, obtuse to acute; lower lemma similar to upper glume; upper lemma bidentate, lobe 0.5–1.0 mm long, central awn 40–70 mm long and purple; callus of upper floret obliquely pungent or 2-toothed; stamens 2; anther 2.9–3.1 mm long.

*Flowering*: January to April. *Ecology*: In sandveld areas; edge of vleis. *Frequency in southern Africa*: Common. *Distribution*: Angola, Zambia, Zimbabwe. N.

Voucher: *De Winter & Marais 4649*.

**Loudetia pedicellata** (Stent) Chippind., in D. Meredith, *Grasses and Pastures of South Africa*: 280, f. 251 (1955). Type: South Africa, Limpopo, Waterberg, Warmbaths, *Burtt-Davy 1144*; Naboomspruit, *Galpin 428* (syntypes).

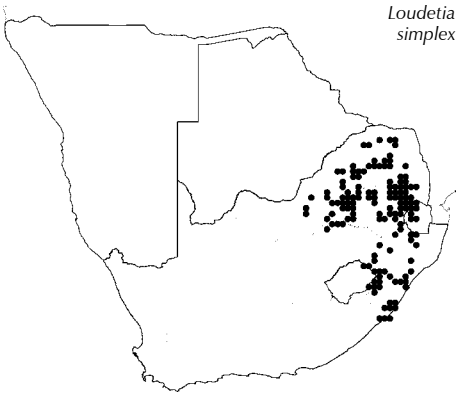

*Loudetia pedicellata*

Tufted perennial to 1 600 mm high; basal leaf sheaths shortly and densely hairy; culm unbranched after first node. Leaf blade to 150 × 4–6 mm, expanded; ligule a conspicuous fringe of hairs. Inflorescence narrow, contracted but not spike-like, branches and pedicles glabrous, scabrid; spikelets in groups of 3 or rarely paired; pedicels free, unequal, 2 mm and 4 mm long respectively. Spikelet 20–28 mm long; glumes ovate, glabrous, smooth, tubercle-based hairs absent; lower glume ½ as long as upper glume; upper glume as long as spikelet; lower lemma similar to upper glume; upper lemma lobes awned, awn 4–5 mm long; central awn 50–70 mm long; callus of upper floret pungent, bearded with brown and white hairs; stamens 3; anther 6.0–8.7 mm long.

*Flowering*: December to April. *Ecology*: *Burkea-Terminalia* veld. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. LIM, NW, G. *Economics*: Thatching or coarse hay pasture.

Illustration: Chippindall: 280, fig. 251 (1955).
Anatomy vouchers: *Ellis 830, 2006 & 2008*.
Voucher: *De Winter 722*.

**Loudetia simplex** (Nees) C.E.Hubb., in *Kew Bulletin* 1934: 431 (1934). Type: South Africa, KwaZulu-Natal, Umzimkulu [Omsamculo] River, *Drège*.


*Loudetia simplex*

Common russet grass, stingelgras, besemgras

Tufted perennial 400–1 500 mm high; basal leaf sheaths densely hairy, not woolly hairy, sometime silky pubescent to glabrescent, splitting into fibres; culm unbranched after first node. Leaf blade 100–300 × 5 mm, flat or convolute, rarely filiform; ligule a conspicuous fringe of hairs. Inflorescence linear to narrowly ovate, contracted or loose; branches and pedicels glabrous, scabrid or sometimes hairy. Spikelet 7–13 mm long; glumes glabrous or with few to many white hairs from rows of dark brown or black tubercles; lower glume usually ⅓–½ as long as upper glume, obtuse to truncate; upper glume as long as spikelet; lower lemma similar to upper lemma; upper lemma lobe 1 mm long, acute; central awn 25–50 mm long; callus of upper floret narrowly oblong, 2-toothed in mature specimens; stamens 2; anther 2.6–4.2 mm long.

[This species is exceedingly variable, especially in panicle shape, hairiness of vegetative parts and presence or absence of tubercle

based hairs on the glumes and lower lemma. Distinguished from *L. flavida*, which has acute, acuminate or shortly awned lower glumes.]

*Flowering*: July to June. *Ecology*: Poor coarse, sandy soils; in open grassland or hillsides. *Frequency in southern Africa*: Common, widespread. *Distribution*: Northwards into tropical Africa and Madagascar. S, LIM, NW, G, M, FS, KZN, EC. *Economics*: Poor grazing grass as too hard; probably an indicator of poor soil and/or overgrazing; used for thatching, hand brooms; being an attractive grass it could possibly be used in gardening and the inflorescences in flower arrangements.

Illustration: Chippindall: pl. 8 (1955).
Anatomy vouchers: (spikelet without tubercles) *Ellis 427, 458* & *756;* (spikelet with tubercles): *Ellis 438, 1452, 1564, 3376* & *Smook 4823*.
Voucher: *Du Toit 2355*.

## **Megaloprotachne** C.E.Hubb.

Hubbard: 319 (1929); Chippindall: 422 (1955); Roivainen: 38 (1974); Clayton & Renvoize: 298 (1986); Clayton: 130 (1989); Gibbs Russell et al.: 207 (1990); Watson & Dallwitz: 583 (1994).

Annual; tufted or decumbent; sometimes rooting at lower nodes. **Leaf blade** linear, expanded or folded; *ligule* a fringed membrane. **Inflorescence** of 3–9 spike-like, one-sided racemes, solitary or paired on a central axis shorter than racemes; digitate to subdigitate; *spikelets* similar, unequally pedicelled, pedicel linear, saucer-shaped at apex. **Spikelet** dorsiventrally compressed; *glumes* usually unequal, sometimes ± equal, dissimilar, awnless; lower glume as long as to slightly longer than spikelet, lanceolate, somewhat convex dorsally, obtuse, margins in-turned, 5–7-nerved, glabrous; upper glume lanceolate, 3-nerved, densely hairy with four rows of long, green or purple hairs between nerves near margins. **Florets** 2; *lower floret* male; lemma elliptic, 3–5-nerved, pilose on margins, a few hairs on glandular patches; palea fully developed, elliptic to elliptic-lanceolate, flat dorsally, 2-keeled, margins inturned; *upper floret* bisexual, *lemma* much firmer than glumes, hard and glossy except for thin translucent margins, glabrous, ovate-elliptic, shortly sub-acuminate, convex dorsally, margins flat covering most of palea (digitaria-type), awnless; *palea* same as lower floret. **Lodicules** 2, cuneate, fleshy to hyaline. **Stamens** 3. **Ovary** ellipsoid; styles free, plumose. **Caryopsis** 2 mm long; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; XyMS-. PCR cell chloroplasts centrifugal/peripheral.

**Species** 1, southern Africa: *Megaloprotachne albescens* C.E.Hubb., Namibia, Botswana and Northern Cape.

Species treatment by M.T. Nembudani.

**Quick guide to easily confused genera:**

1. Upper lemma awned . . . . . **Alloteropsis**
   Upper lemma awnless . . . . . 2
2. Lower glume as long as spikelet . . . . . **Megaloprotachne**
   Lower glume never longer than ¼ spikelet length, often absent . . . . . **Digitaria**

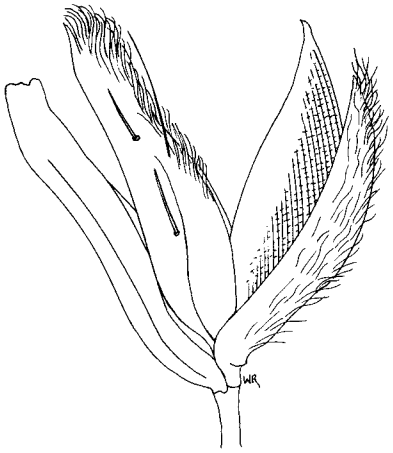


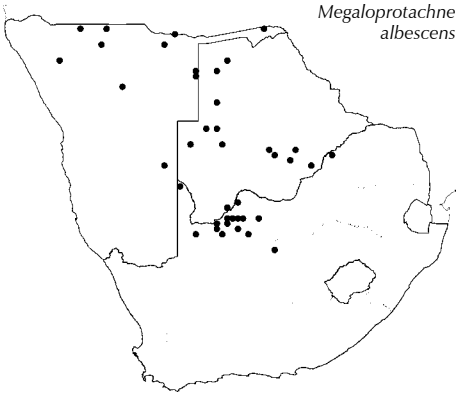
Figure 316.—*Megaloprotachne albescens* spikelet (3.7 × 3.3 mm). Artist: W. Roux.



Figure 317.—*Megaloprotachne albescens*. Two spikelets (4.0–4.5 mm). Photographer: M. Koekemoer.



Figure 318.—*Megaloprotachne albescens*. Artist: W. Roux.




**Megaloprotachne albescens** C.E.Hubb., in *Kew Bulletin* 1929: 321 (1929). Type: South Africa, Northern Cape, Kuruman, Vaal Kameel, *Pole Evans 2075* (PRE, iso.) [in the orginal description the type is given as *Pole Evans 207*, but this is incorrect. From his original register 2075 is the correct number].

*M. glabrescens* Roiv., in *Annales Botanici Fennici* 11: 40 (1974). Type: Namibia, about 100 km south of Runtu, *Soini 213* (H, holo.).

Erect or decumbent annual to 800 mm high. Leaf blade 60–150 × 3–4 mm; long woolly hairs on leaf sheath or only present on lower parts of sheath or on basal node only. Spikelet 3.5–4.5 mm long; lower glume as long as spikelet; lower lemma with glandular patches on margins; upper lemma margins cover most of the palea (digitaria-type); anther 2.8–3.0 mm long.

*Flowering*: January to May. *Ecology*: Sandveld. *Frequency in southern Africa*: Infrequent. *Distribution*: Zambia and Zimbabwe. N, B, LIM, NW, NC.

Illustration: Chippindall: 422, fig. 351 (1955); Clayton: 132, tab. 37 (1989).
Anatomy vouchers: *Ellis 3597* & *Smook 4314*.
Voucher: *Van Vuuren & Giess 1086*




Figure 319.—*Megastachya mucronata*. A, plant; B, spikelet (8.0 × 2.5 mm). Artist: W. Roux.

## **Megastachya** P.Beauv.

Palisot de Beauvois: 74 (1812); Phillips: 139 (1951); Chippindall: 45 (1955); Clayton: 161 (1970); Launert: 139 (1971); Clayton & Renvoize: 160 (1986); Gibbs Russell et al.: 208 (1990); Watson & Dallwitz: 585 (1994).



Figure 320.—*Megastachya mucronata* spikelet (7–15 mm). Photographer: M. Koekemoer.

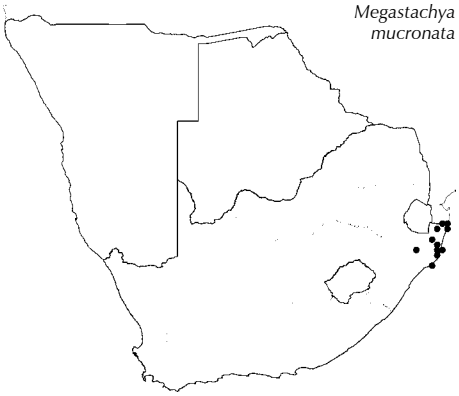
Tufted annual or short-lived perennial. **Leaf blade** expanded, broadly lanceolate; amplexicaul at base; cross-veins present (more visible on lower surface); *ligule* an unfringed membrane. **Inflorescence** an open panicle; *spikelets* solitary, pedicels long, slender. **Spikelet** laterally compressed, disarticulating above glumes and between florets; *glumes* unequal, similar, shorter than spikelet, keeled, obtuse to broadly ovate, 3- or 4-nerved, central nerve excurrent into a short awn or mucro. **Florets** many, all bisexual though smaller at apex; *lemma* similar in texture to glumes, chartaceous, glabrous, obscurely 5–7-nerved, apex shortly 2-lobed or emarginate, central nerve usually running out into a short mucro between lobes; *palea* almost equalling lemma, 2-keeled, ciliolate on keels, membranous, inflexed margins very narrow. **Stamens** 2 or 3. **Ovary** glabrous; styles distinct, plumose. **Caryopsis** up to 1 mm long, subglobose; hilum short; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 12$ (polyploidy).

**Species** 1, tropical and southern Africa: *Megastachya mucronata* (Poir.) P.Beauv., Northern KwaZulu-Natal.

Species treatment by M.J. Moeaha.

**Megastachya mucronata** (Poir.) P.Beauv., in *Essai d'une nouvelle agrostographie*: 74, 167 (1812). Type: ? Africa, specimen in *Herb. Jussieu* (P, holo.).

*Centotheca mucronata* Hack., in *Journal of the Linnean Society*, Botany 29: 66 (1891).




Tufted annual or weak perennial up to 900 mm high; sometimes stoloniferous; culms decumbent, rooting at the lower nodes. Leaf blade 60–120 × 10–25 mm, broadly lanceolate, apex acuminate, base cordate; margins scaberulous; cross-veins conspicuous. Inflorescence 100–350 mm long, open; pedicel up to 25(35) mm long. Spikelet 7–15 mm long; anther up to 1.5 mm long.

*Flowering*: July to June (most frequently in spring). *Ecology*: Often on sandy soil; in forests. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical Africa and Madagascar. KZN.

Illustration: Chippindall: 46, fig. 15 (1955); Launert: 142, tab. 37 (1971).
Anatomy voucher: *Ellis 4501*.
Voucher: *Ward 8621*.

## **Melica** L.

Linnaeus: 66 (1753); Stapf: 684 (1900); Chippindall: 73 (1955); Gibbs Russell & Ellis: 37 (1982); Clayton & Renvoize: 113 (1986); Gibbs Russell et al.: 209 (1990); Watson & Dallwitz: 587 (1994).

Perennial, tufted. **Leaf blade** expanded or rolled; frequently slightly auricled; *ligule* a delicate, hyaline, unfringed membrane. **Inflorescence** an erect terminal raceme or a narrow panicle, often secund; *spikelets* solitary, on short pedicels with thickened apices; pedicels

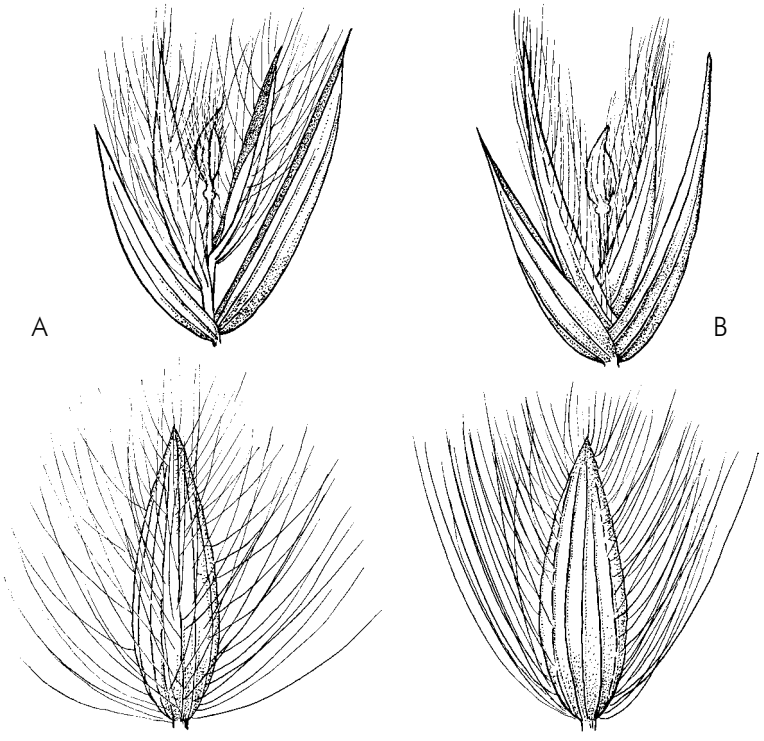



Figure 321.—*Melica* species. A, *M. decumbens* spikelet and lower lemma; B, *M. racemosa* spikelet and lower lemma. Artist: C. Smith.




Figure 322.—*Melica decumbens*. Artist: C. Letty.




Figure 323.—*Melica racemosa*. A, plant; B, ligule. Artist: C. Smith.

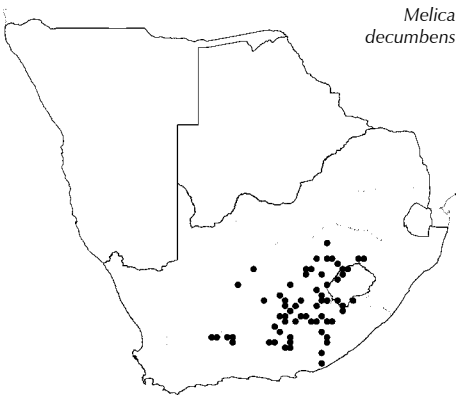





Figure 324.—*Melica racemosa* spikelet (5–9 mm). Photographer: M. Koekemoer.

usually capillary and often nodding. **Spikelet** weakly laterally compressed, variously disarticulating; *glumes* ± equal or unequal, ± equal to spikelet, papery, similar, lanceolate or ovate-lanceolate, sub-acuminate, acute or subacute; upper glume 3–7-nerved. **Florets** 3–6; *lower* 2 *florets*, rarely 1 or 3, bisexual; *upper* 2 or 3 *florets* sterile, reduced to lemmas compacted to form a club-shaped body on the prolonged rachis, glabrous or hairy; *bisexual floret lemma* lanceolate, membranous, 7–9-nerved, rounded on back, hairy with long, silky, silvery hairs on back or only near margins, awnless; *callus* short, glabrous; *palea* shorter than lemma, lanceolate or oblanceolate, acute, 2-keeled, ciliate on keels. **Lodicules** 2, short, thick, rounded, glabrous. **Stamens** 3. **Ovary** glabrous; styles distinct, short, finely plumose. Hilum long-linear; embryo small. **Photosynthetic pathway**: $C_3$. XyMS+. **Cytology**: $x = 9$ (7) (polyploidy).

**Species** ± 80, temperate regions throughout the world except Australia; 2 in southern Africa, widespread, not recorded from Namibia and Botswana.

Species treatment by M.T. Nembudani.

**Quick guide to easily confused taxa:**

Lower 2 florets fertile, uppermost reduced; leaf blade strongly scabrid, plant to 500 mm high . . . . . **Melica racemosa**
Lower 2 florets sterile, uppermost fertile; leaf blade glabrous, plant to 1 500 mm high . . . . . **Ehrharta villosa**

**Key to species:**

Lemma hairy on margins only, glabrous or slightly scabrous on back; spikelet 5–9(–11) mm long; sterile cluster of florets glabrous or with a few hairs . . . . . **M. racemosa**
Lemma hairy on back and margins; spikelet 10–15 mm long; sterile cluster of florets hairy . . . . . **M. decumbens**

**Melica decumbens** Thunb., in *Prodromus Plantarum capensium* 1: 21 (1794). Type: South Africa, 'Cape', *Thunberg s.n.*, Herb. No. 2166 (UPS, holo.).

*M. neesii* Stapf, in *Flora capensis* 7: 687 (1900). Type: South Africa, Western Cape, Prince Albert, Weltevrede, *Drège 752* (K, holo.; PRE, fg., photo.).

DRONKGRAS

Tufted perennial 300–500 mm high. Leaf blade 20–200 × 1.5–3.5 mm, erect, usually rolled, strongly scabrous. Inflorescence a secund raceme up to 120 mm long; pedicel hairy. Spikelet 10–15 mm long; lemma of fertile floret hairy on back and margins; lemma of sterile floret usually hairy; anther 1.0–1.5 mm long.

*Flowering*: October to April. *Ecology*: Hill and mountain sides; among rocks or in shade of trees, occasionally on road sides. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. L, FS, NC, WC, EC. *Economics*: Poisonous to horses, cattle and donkeys.

Anatomy vouchers: *Ellis 1245, 1814, 2095* & *Smook 3190*.
Voucher: *Smith 4477*.

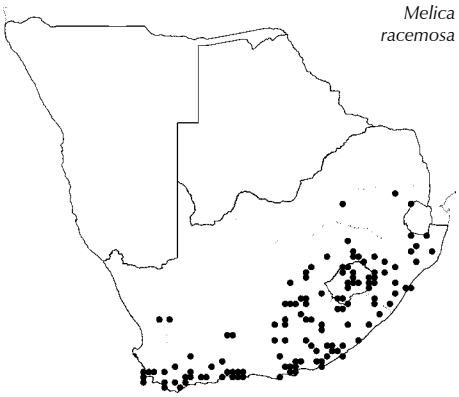
**Melica racemosa** Thunb., in *Prodromus Plantarum capensium* 1: 21 (1794). Type: South Africa, 'Cape', *Thunberg s.n., Herb. No. 2173* (UPS, holo.; microfiche in PRE).

*M. bolusii* Stapf, in *Flora capensis* 7: 686 (1900). Type: South Africa, Eastern Cape, Graaff Reinet, Compasberg, *Bolus 1985* (K, holo.).

*M. brevifolia* Stapf, in *Kew Bulletin* 1910: 131 (1910). Type: South Africa, Eastern Cape, Groot Winterberg, *Galpin 5614*.

*M. ovalis* Nees, in *Florae Africanae australioris*: 417 (1841). Type: South Africa, Eastern Cape, Queenstown, Stormberg range, *Drège* (K, holo.).

*M. pumila* Stapf, in *Flora capensis* 7: 686 (1900). Type: South Africa, Western Cape, Prince Albert, Weltevrede, *Drège* (K, holo.).




Tufted perennial 300–500 mm high. Leaf blade 40–300 × 1.5–5.0 mm, erect, flat or rolled, often scabrous. Inflorescence a narrow panicle or raceme 50–200 mm long; pedicel hairy. Spikelet 5–9 (–11) mm long; lemma of fertile floret hairy only on margins; lemma of sterile floret glabrous or with only a few hairs; anther 1.2–1.7 mm long.

[KwaZulu-Natal plants tend to have larger spikelets.]

*Flowering*: September to April. *Ecology*: On steep hills and mountain slopes among rocks and also in lightly shaded places at edges of bush clumps and dune forest. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. L, G, M, FS, KZN, NC, WC, EC.

Illustration: Chippindall: 74, fig. 46 (1955).
Anatomy vouchers: *Ellis 593, 605, 1204, 1246* & *1815*.
Voucher: *Edwards 4179*.

## **Melinis** P.Beauv.

Palisot de Beauvois: 54 (1812); Stapf: 447 (1899); Stent: 257 (1924); Chippindall: 426 (1955); Clayton: 21 (1978); Clayton & Renvoize: 505 (1982); Clayton & Renvoize: 295 (1986); Zizka: 50 (1988); Zizka: 115 (1989); Gibbs Russell et al.: 210 (1990); Watson & Dallwitz: 589 (1994).

*Rhynchelytrum* Nees: 446 (1936); Chippindall: 428 (1955); Clayton & Renvoize: 295 (1986); Watson & Dallwitz: 822 (1994).

Tufted annual or perennial. **Leaf blade** expanded, rarely rolled, usually linear-lanceolate, blades and sheaths pilose with bulbous-based hairs or glabrous; *ligule* a fringed membrane or a fringe of hairs. **Inflorescence** a panicle, contracted and narrow or open and spreading; *spikelets* pedicelled, pedicels capillary. **Spikelet** symmetrical or asymmetrical in profile; laterally or dorsiventrally compressed or not noticeably compressed, glabrous to densely hairy; *glumes* unequal, dissimilar, awnless or awned; lower glume reduced to a minute scale or rim or absent, sometimes distant from upper glume, nerve-




Figure 325.—*Melinis macrochaeta*. Artist: C. Letty.

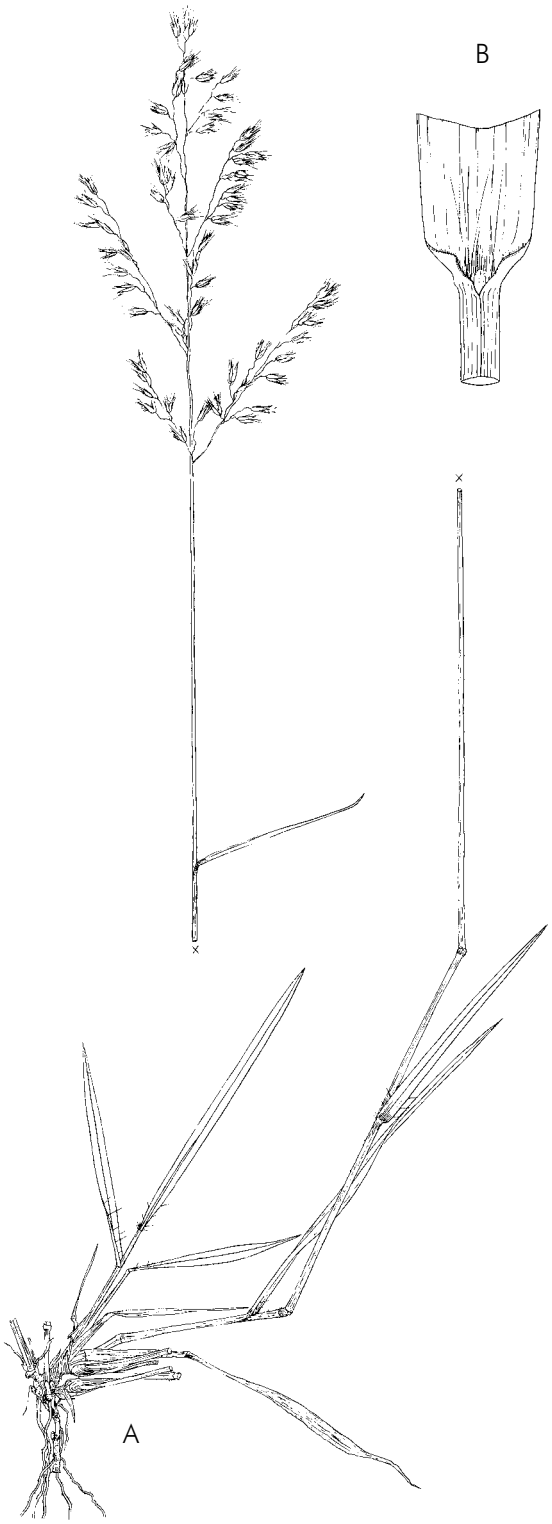



Figure 326.—*Melinis repens* subsp. *repens*. A, plant; B, ligule. Artist: C.D. Bartman.




Figure 327.—A, B: *Melinis repens* subsp. *grandiflora*. A, spikelet (9.2 × 2.7 mm); B, upper floret (2.3 × 0.9 mm); C, *M. macrochaeta* spikelet (13.5 × 0.9 mm). Artist: S.B. Chiliza.

less to 1-nerved; upper glume as long as spikelet, sometimes gibbous, emarginated to 2-lobed at apex, often awned from between lobes, sometimes tapering to a beak above, finely or prominently 5–9-nerved. **Florets** 2; *lower floret* male or sterile; lemma resembling upper glume but narrower, often hairy, 3–7-nerved, awnless or usually awned; palea present or 0, when present scaberulous or ciliate on margins; *upper floret* bisexual; *lemma* less firm to similar in texture as glumes, smaller than lower lemma, often deciduous before rest of spikelet, smooth, glabrous, margins flat and ± covering palea; *palea* similar to upper lemma. **Lodicules** 3, very delicate. **Stamens** 3. **Ovary** ellipsoid, glabrous; style free, plumose. **Caryopsis** oblong to oblong-ellipsoid; hilum short; embryo large. **Cytology**: *x* = 9 (polyploidy). **Photosynthetic pathway**: $C_4$ anatomical organisation conventional; biochemical type PCK (*M. repens*, *M. minutiflora*); XyMS+. PCR cell chloroplasts centrifugal/peripheral.

**Species** 20, mainly Africa, also on other continents but possibly introduced there; 10 in southern Africa, widespread.

Species treatment by L. Fish and M.J. Moeaha.

**Key to species:**

[Note: *M. subglabra*, see under description].

1. Lower palea absent; spikelet 1.0–2.2 mm long (if up to 2.4 mm and plant viscid see *M. minutiflora*) . . . . . 2
   Lower palea usually present, rarely reduced or absent; spikelet (2.0–)2.3–5.0(–12.0) mm long . . . . . 5

2. Pedicel smooth, long white hairs near apex; upper glume 5-nerved; spikelet 1.0–1.5(1.6) mm long . . . . . **M. tenuissima**
Pedicel scaberulous; upper glume 7-nerved; spikelet 1.5–3.4 mm long . . . . . 3
3. Spikelet (2.0)2.4–3.4 mm long (excluding awns); lower glume 0.4–1.0 mm long . . . . . **M. ambigua** subsp. **ambigua**
Spikelet 1.5–2.0 mm long (excluding awns); lower glume up to 0.4 mm long . . . . . 4
4. Upper glume and lower lemma deeply grooved between prominent nerves; plant viscid and strongly aromatic; perennial . . . . . **M. minutiflora**
Upper glume and lower lemma not deeply grooved, finely nerved; plant not viscid and aromatic; annual to short-lived perennial . . . . . **M. macrochaeta**
5(1). Lower palea keels scaberulous or smooth and glabrous, sometimes palea reduced or absent (may be mixed on same inflorescence) 6
Lower palea keels hairy . . . . . 9
6. Upper glume 7-nerved (nerves more visible on inner surface) . . . . . **M. ambigua** subsp. **ambigua**
Upper glume 5-nerved (3 nerves often the most obvious), rarely 7-nerved . . . . . 7
7. Upper glume awnless or awn up to 0.3 mm long . . . . **M. scabrida**
Upper glume awn 1–10 mm long . . . . . 8
8. Upper glume awn 5–10 mm long; lower lemma awn 8–20 mm long; leaf linear; spikelet (3.5)4.0–8.5 mm long . . . . . **M. longiseta** subsp. **bellespicata**
Upper glume awn 1–6 mm long; lower lemma awn 4.0–8.5 mm long; leaf narrowly lanceolate; spikelet 2.3–3.8(4.2) mm long . . . . . **M. longiseta** subsp. **longiseta**
9(5). Pedicel laterally attached to spikelet . . . . . **M. kallimorpha**
Pedicel centrally attached to spikelet . . . . . 10
10. Upper glume and lower lemma similar in shape; inflorescence branches, branchlets and pedicels usually densely hairy, prickles, when present large, usually very dense; pedicels usually stout, straight or slightly wavy, often purple . . . . . **M. nerviglumis**
Upper glume distinctly more gibbous on back and broader than lower lemma; inflorescence branches, branchlets and pedicels usually glabrous except at apex of pedicel, prickles absent or minute; pedicels usually fine, very wavy, often twisted round . . . 11
11. Spikelet (4)5–12 mm long; conspicuously laterally compressed, glabrous to hairy; internode between glumes (0.5)0.7–1.7(–2.0) mm long . . . . . .**M. repens** subsp. **grandiflora**
Spikelet 2.2–4.0(–5.0) mm long, slightly laterally compressed, usually densely hairy; internode between glumes 0.1–0.5(–0.6) mm long . . . . . **M. repens** subsp. **repens**



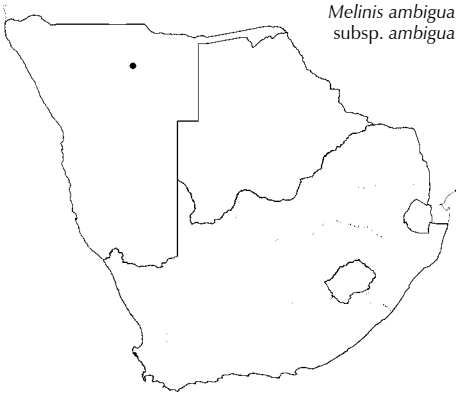
Figure 328.—*Melinis minutiflora*. Several spikelets (1.5–2.0 mm). Photographer: M. Koekemoer.



Figure 329.—*Melinis repens* subsp. *repens* spikelet (2.2–4.0 mm). Photographer: M. Koekemoer.

**Melinis ambigua** Hack. subsp. **ambigua**, in *Bibliotheca Botanica* 138: 90 (1988). Type: Ethiopia. Amba Harres Mt, *Schimper 800* (PRE, iso.).

*M. hirsuta* Mez, in *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 57: 201 (1921). Type: Namibia, Otavi Mts., Gaub, *Dinter 2394* (B, holo.; PRE, iso.).

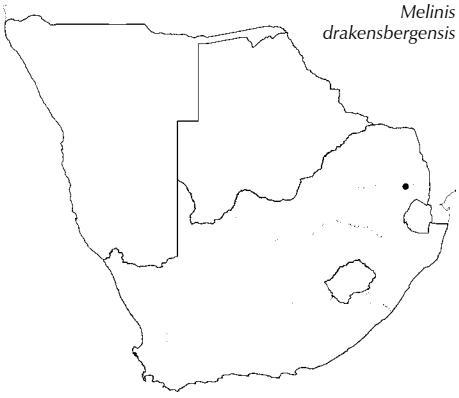



Tufted perennial. Leaf blade (35)50–200(230) × 3–8(11) mm, usually flat, glabrous to softly pilose. Inflorescence narrowly ovate; pedicels scaberulous, with or without few long hairs at apex. Spikelet (2.0)2.4–3.0(3.4) mm long, narrowly ovate; lower glume 0.4–1.0 mm long, internode between glumes short; upper glume 7-nerved, usually hairy, awn (0.1)0.8–4.5 mm long; lower lemma 5-nerved, awn (0.3)2.0–12.0 mm long; palea absent or present but reduced, keels scaberulous; anthers 1.2–1.5 mm long.

*Flowering time*: Unknown. *Ecology*: Sandy or stony soils; often at anthropogenic sites and streamsides. *Distribution*: Northwards to Angola, central Africa, Tanzania and Ethiopia. ?N.

[*M. hirsuta* Mez has been placed into synonymy under *M. ambigua* subsp. *ambigua*, although the type, *Dinter 2394* from Gaub, Otavi Mts is badly infected with fungus].

Illustration: Zizka: 122, tab. 32 (1989).
Voucher: *Dinter 2394*.


*Melinis drakensbergensis*

**Melinis drakensbergensis** (C.E.Hubb. & Schweick.) Clayton, in *Kew Bulletin* 33: 22 (1978). Type: South Africa, Mpumalanga, cultivated at Rietondale Pasture Experiment Station, originally from Sabie Camp on mountains, April 1935, *Pole Evans & Van Rensburg* in *Nat. Herb. Pretoria 19797*.

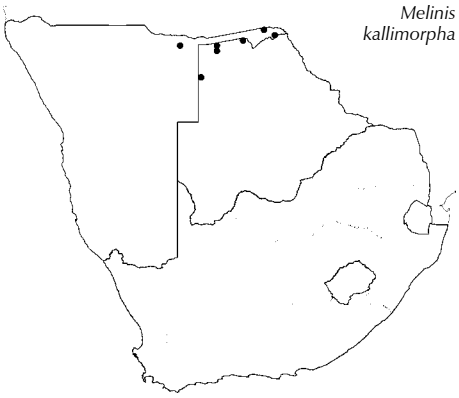
*Rhynchelytrum drakensbergense* C.E.Hubb. & Schweick., in *Bulletin of Miscellaneous Information, Kew* 1936: 323 (1936).

Perennial up to 550 mm long, culm geniculate. Leaf blade 50–120 × 2.0–4.5 mm; hairy. Inflorescence contracted, hairy; pedicels pubescent. Spikelet 2.3–2.6 mm long, densely hairy; lower glume a tiny scale 0.3–0.4 mm long; upper glume awn 0.7 mm long; lower lemma awn ± 2.2 mm long, lower palea keels ciliate; upper lemma distinctly longer than palea.

[The only known material is the type specimen (PRE); Zizka: 106–108 (1988) records this as a possible hybrid.]

*Flowering*: April. *Ecology*: Unknown. *Distribution*: M.

Voucher: *Pole Evans & Van Rensburg* in *Nat. Herb. Pretoria 19797*.


*Melinis kallimorpha*

**Melinis kallimorpha** (Clayton) Zizka, in *Bibliotheca Botanica* 138: 84 (1988). Type: Zambia, Mbala [Abercorn], *McCallum Webster A289* (K, holo.).

*Rhynchelytrum kallimorphon* Clayton, in *Kew Bulletin* 33: 22 (1978). Type: as above

Tufted annual to short-lived perennial 400–1 000 mm high; geniculate. Leaf blade 40–160 × 2–4 mm, flat. Inflorescence linear; pedicels glabrous, scaberulous; attached laterally to spikelet. Spikelet 3.5–5.0 × 1.5–2.0 mm, ovate, glabrous or with hairs 0.5 mm long; lower glume 0.7–1.5(–1.7) mm long; upper glume 5-nerved, awn 3–10 mm long; internode between glumes 0.4–0.7(–0.9) mm long; upper glume gibbous but not tapering into an elongated beak, nerves slightly raised; lower lemma not as gibbous, 5-nerved; lower palea keels ciliate; anthers 1.4–1.8 mm long.

*Flowering*: January to May. *Ecology*: Sandy areas; prefers shade. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to East Africa, and Angola. N, B.

Illustration: Zizka: 66, fig. 22 (1988).
Anatomy voucher: *Ellis 3733*.
Voucher: *Smith 4031*.

**Melinis longiseta** (A.Rich.) Zizka subsp. **bellespicata** (Rendle) Zizka, in *Bibliotheca Botanica* 138: 78 (1988). Type: Angola, Pungo Adonga, *Welwitsch 7425* (lectotype).

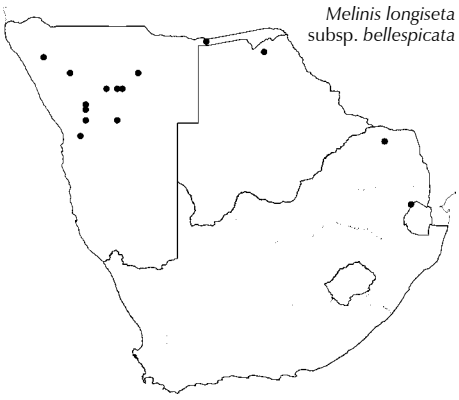
*Rhynchelytrum bellespicatum* (Rendle) Stapf & C.E.Hubb., in *Flora tropical Africa* 9: 900 (1930). Type: as above.

Tufted perennial 200–800 mm high; geniculate to erect. Leaf blade (30–)60–200 × 1.5–5.0(–6.0) mm, linear, flexuous, hairy or gla-

brous. Inflorescence narrow oblong to linear; pedicels sparsely long hairy. Spikelet 3.5–5.0(–8.5) × 2 mm, oblong to linear; lower glume 0.9–1.4 mm long; upper glume 5-nerved, awn 5–10 mm long, keel densely hairy, sides glabrous; internode between glumes 0.3–0.5 mm long; lower lemma 5-nerved, sides densely hairy, keels glabrous, awn 8–20 mm long; lower palea keels scaberulous; anthers 1.6–1.8 mm long.

*Flowering*: February to June. *Ecology*: Crevices in rocks, often sunny places. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Zambia, Zimbabwe, Malawi, Mozambique, Angola, Cameroon, Nigeria. N, B, LIM, M.

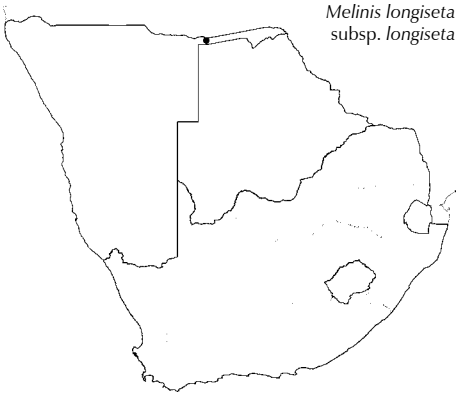
Illustrations: Chippindall: 432, fig. 358 (1955); Zizka: 79, fig. 31 (1988).
Anatomy voucher: *Smook 5205A*.
Voucher: *Smook 5205*.


*Melinis longiseta* subsp. *bellespicata*

**Melinis longiseta** (A.Rich.) Zizka subsp. **longiseta**, in *Bibliotheca Botanica* 138: 73 (1988). Type: Ethiopia, Chiré, *Quartin Dillon*; and *Schimper 1803* (syntypes).

*Rhynchelytrum longisetum* (A.Rich.) Stapf & C.E.Hubb., in *Flora tropical Africa* 9: 902 (1930). Type: as above.

*Rhynchelytrum minutiflorum* (Rendle) Stapf & C.E.Hubb. var. *melinoides* (Stent) C.E.Hubb., in *Flora tropical Africa* 9: 904 (1930). Type: Zimbabwe, Harare, *Eyles 2191* (K, holo.).

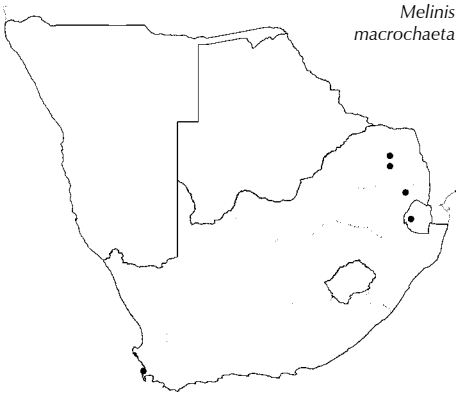

*Melinis longiseta* subsp. *longiseta*

Tufted perennial 450–1 000 mm high. Leaf blade 40–120 × 4–9 mm, narrowly lanceolate, hairy, rarely glabrous. Inflorescence narrow oblong to linear; pedicels sparsely long hairy. Spikelet 2.3–3.8(–4.2) × 1.5–2.0 mm; lower glume 0.6–1.0 mm long; upper glume 5-nerved, awn 1–6 mm long, keels densely hairy, sides glabrous; internode between glumes rarely up to 0.3 mm long; lower lemma 5-nerved, keels glabrous, sides hairy, awn 4.0–8.5 mm long; lower palea keels scaberulous; anthers 1.6–1.8 mm long.

*Flowering*: March to July. *Ecology*: Sandy areas; open woodland. *Frequency in southern Africa*: Infrequent. *Distribution*: Angola and northwards to Tanzania; also Sudan. N.

Voucher: *Volk 2159*.

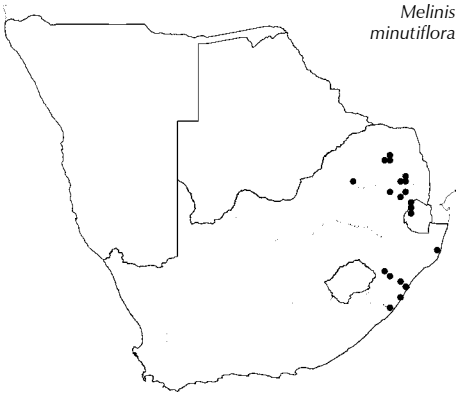
**Melinis macrochaeta** Stapf & C.E.Hubb., in *Kew Bulletin* 1926: 443 (1926). Type: Nigeria, *Lely 785* (K, holo.).


*Melinis macrochaeta*

A tufted annual, sometimes a short-lived perennial, 500–1 000 mm high; culm with less than 10 nodes, often rooting at lower nodes. Leaf blade 50–150 × 5–10 mm. Inflorescence narrowly ovate; pedicel glabrous, occasionally sparsely hairy, scaberulous. Spikelet 1.5–2.0 × 0.5 mm, narrowly oblong, glabrous or pubescent; lower glume reduced to a scale up to 0.1 mm long; upper glume with dentate lobes, 7-nerved, awnless or mucronate; internode absent; upper glume and lower lemma finely nerved, not grooved; lower lemma lobed, 3–5 nerved, awn (5–)8–20 mm long; lower palea absent; anthers 0.8–1.2 mm long.

*Flowering*: April to June. *Ecology*: Sand or loam; mainly in grassland; often disturbed areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to tropical Africa. S, LIM, M, WC.

Illustration: Zizka: 125, tab. 33 (1989).
Voucher: *Compton 27774*.


*Melinis minutiflora*

**Melinis minutiflora** P.Beauv., in *Essai d'une novelle Agrostographie*: 54, pl. 11, fig. 4 (1812). Type: Brazil.

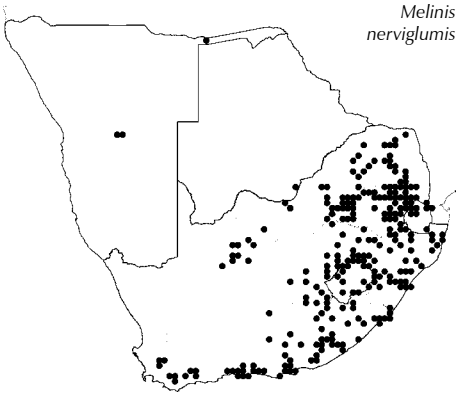
*M. tenuinervis* (Stapf) Stapf, in *Kew Bulletin* 1922: 310 (1922), based on *M. minutiflora* var. *pilosa* Stapf. *Melinis minutiflora* P.Beauv. var. *pilosa* Stapf, in *Flora capensis* 7: 447 (1899). Type: South Africa, KwaZulu-Natal, Umpumulo, *Buchanan 299* (K, holo.).

MOLASSES GRASS

Tufted perennial 800–1 500 mm; densely hairy, strongly aromatic and sticky as hairs finely tubercled, exuding drops of viscid oil. Leaf blade 40–200 × 5–11 mm. Inflorescence narrowly ovate; pedicels glabrous, scabrous occasionally with 1–3 long hairs at apex. Spikelet 1.5–2.2(2.4) × 0.5 mm, narrowly ovate to narrowly oblong, glabrous, sometimes shortly hairy; lower glume 0.1–0.4 mm long; upper glume 7-nerved, obtusely bilobed, mucronate or awnless rarely with awn 0.5–9 mm long, usually glabrous; internode absent; upper glume and lower lemma deeply grooved between prominent veins; lower lemma 5-nerved, acutely bilobed, awnless or awn 5–14 mm long; lower palea absent; anthers 1.0–1.2 mm long.

*Flowering*: April to June. *Ecology*: Sand or near rocks; moist and shady areas, open hillsides; grassland or savanna. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards throughout Africa and Madagascar; throughout tropics, probably introduced to America, southeast Asia and Australia. S, LIM, M, KZN. *Economics*: Cultivated for pasture throughout tropics; serious weed in many places.

Illustration: Clayton et al.: 507, fig. 124 (1982).
Anatomy vouchers: *Ellis 1877, 1878, 3459 & 3798*.
Voucher: *Killick 1715*.


*Melinis nerviglumis*

**Melinis nerviglumis** (Franch.) Zizka, in *Bibliotheca Botanica* 138: 111 (1988). Type: The Congo, Brazzaville, *Brazza & Thollon 380;* and Alima River, *Thollon 897* (syntypes).

*Rhynchelytrum nerviglume* (Franch.) Chiov., in *Nuovo Giornale botanico italiano, s.n.*, 26: 78 (1919). Type: as above.

*Rhynchelytrum nyassanum* (Mez) Stapf & C.E.Hubb., in *Flora tropical Africa* 9: 896 (1930). Type: Tanzania, Kyimbila, *Stolz 1095*.

*Rhynchelytrum ramosum* Stapf & C.E.Hubb., in *Flora tropical Africa* 9: 895 (1930). Type: Angola, Sumba Plateau, *Gossweiler 8603* (B, holo.).

*Rhynchelytrum rhodesianum* (Rendle) Stapf & C.E.Hubb., in *Flora tropical Africa* 9: 895 (1930). Type: Zimbabwe, Gazaland, near Chirinda Forest, *Swynnerton 1632*; Nyahodi River, *Swynnerton 1663*.

*Rhynchelytrum setifolium* (Stapf) Chiov., in *Annuario del reale Istituto Botanico di Roma* 8: 310 (1907). Type: South Africa, Eastern Cape, *Bachmann 191* (B, holo.; PRE, fg.).

BRISTLE-LEAVED RED TOP

Tufted perennial (250–)400–1 200(–1 500) mm high, without knotty rootstock; basal leaf sheaths strongly overlapping. Leaf blade (30–)100–300(–440) × (1.3–)2.0–3.5(–4.5) mm, filiform, rolled. Inflorescence branches, branchlets and pedicels usually hairy and densely covered in long prickles, mostly stout, fairly rigid, only slightly wavy, often purple (in herbarium specimens mostly erect and closely adpressed to central axis). Spikelet (3.2–)3.6–5.0(–5.7) × 2 mm, narrowly ovate or narrowly oblong, densely villous with silky white, pink or purplish hairs extending up to 4 mm beyond apex, rarely glabrous or sparsely hairy; internode between glumes short 0.3(–0.6) mm

long; lower glume (0.3)0.5–1.0(–1.9) mm long; upper glume back straight to slightly gibbous, 5(–7)-nerved, mucronate or awn 1–2(–3) mm long; lower lemma 5-nerved, palea keels ciliate; anthers 1.4–2.2 mm long.

[Easily confused with *M. repens*.]

*Flowering*: November to September. *Ecology*: Open grassland, stony hillsides. *Frequency in southern Africa*: Locally dominant. *Distribution*: Northwards to East Africa and westwards as far as Gabon, Madagascar and probably introduced to southeast Asia (Thailand and Vietnam). N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Average grazing grass; has garden ornamental potential (Van Oudtshoorn 1995).

Illustration: Chippindall: 433, fig. 359 (1955).
Anatomy vouchers: *Ellis 142, 122, 386, 387, 723, 1216, 1561, 1565, 2393, 2823, 2831 & 4462*
Voucher: *Smook 5268*.

**Melinis repens** (Willd.) Zizka subsp. **grandiflora** (Hochst.) Zizka, in *Bibliotheca Botanica* 138: 60 (1988). Type: Sudan Republic, *Kotschy 370* (lecto.).

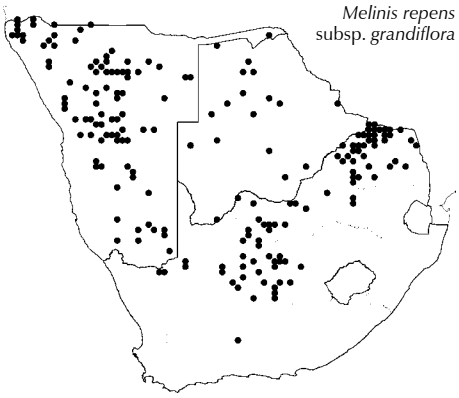
*Rhynchelytrum brevipilum* (Hack.) Chiov., in *Annuario del reale Istituto Botanico di Roma* 8: 310 (1907). Type: Namibia, Great Namaqualand, *Schinz 631*.

*Rhynchelytrum costatum* Stapf & C.E.Hubb., in *Flora tropical Africa* 9: 874 (1930) nom. superfluous, based on *Melinis ejubata*. Type: Namibia, Gaub, *Dinter 2435* (lecto.).

*Rhynchelytrum grandiflorum* Hochst., in *Flora* 27: 249 (1844). Type: as above.

*Rhynchelytrum villosum* (Parl.) Chiov., in *Annuario del reale Istituto Botanico di Roma* 8: 310 (1907). Type: Cape Verde Is.

RED TOP, EENJARIGE-FLUWEELGRAS

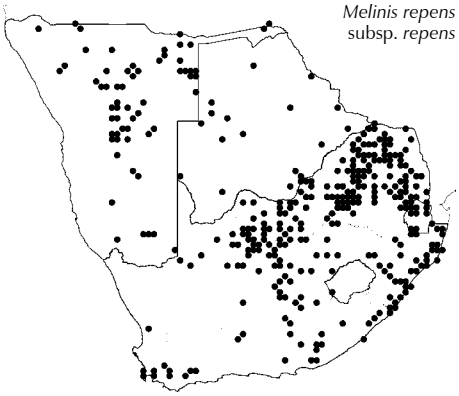

*Melinis repens* subsp. *grandiflora*

Tufted annual or short-lived perennial 250–900 mm high. Leaf blade 40–150(–180) × 2.0–6.5(–8.0) mm. Inflorescence branches, branchlets and pedicels usually glabrous except at apex of pedicels and nodes, usually long, fine and very wavy, often twisted around. Spikelet (4–)5–12 × 2–3 mm, conspicuously laterally compressed, glabrous to hairy, hairs exceeding spikelet; internode between glumes (0.5–)0.7–1.7(–2.0) mm long; lower glume (0.6–)1.5–3.0(–4.3) mm long; upper glume and lower lemma gibbous, tapering into an elongated narrow, glabrous beak; upper glume 5-nerved, mucronate or awn (2–)12–22 mm long; lower palea keels ciliate; anthers 1.5–2.2 mm long.

[Although typical specimens are easy to identify, frequent intergradation with subsp. *repens* does occur, making identification difficult sometimes.]

*Flowering*: January to July. *Ecology*: More often in sunny arid areas; rarely in disturbed areas. *Frequency in southern Africa*: Locally dominant. *Distribution*: Northwards to tropical Africa, through Arabia to as far as India. N, B, LIM, NW, G, FS, NC, WC.

Illustration: Chippindall: 431, fig. 357 (1955).
Anatomy vouchers: *Ellis 1940*; *Gibbs Russell & Smook 5125, 5225*; *Smook 5078, 5212, 5235, 5236, 5237 & 5237A*.
Voucher: *Giess & Van der Walt 12666*.


*Melinis repens* subsp. *repens*

**Melinis repens** (Willd.) Zizka subsp. **repens**, in *Bibliotheca Botanica* 138: 55 (1988).

*Rhynchelytrum repens* (Willd.) C.E.Hubb., in *Kew Bulletin*. 1934: 110 (1934). Type: Ghana, [Guinea], *Isert s.n.* (B, holo.).

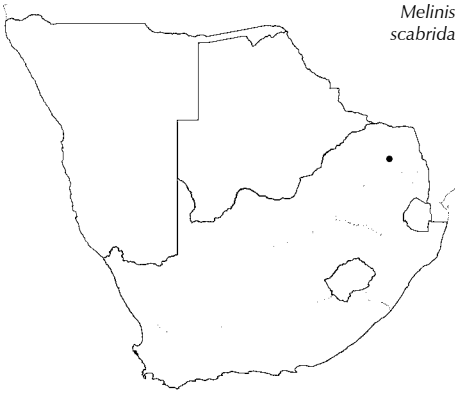
NATAL RED TOP

Tufted, mainly annual, rarely perennial, 250–1 200(–1 500) mm high. Leaf blade 40–200(–270) × 2–11(–13) mm. Inflorescence branches, branchlets and pedicels usually glabrous except at apex of pedicels and at nodes, usually long, fine and very wavy, often twisted around. Spikelet 2.2–4.0(–5.0) × 2–3 mm, slightly laterally compressed, usually densely hairy; internode between glumes 0.1–0.5(–0.6) mm long; lower glume (0.3–)0.6–1.3(–1.5) mm long; upper glume and lower lemma gibbous, rarely tapering into an elongated beak; upper glume 5-nerved; lower palea keels ciliate.

[Intergradation between the infraspecific groups can make identification difficult.]

*Flowering*: September to May. *Ecology*: Mainly a ruderal, common on disturbed ground. *Frequency in southern Africa*: Common to locally dominant. *Distribution*: Northwards and widely spread in tropical Africa and western Asia, introduced elsewhere, common throughout the tropics and subtropics. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Erosion control as a good pioneer grass often found in disturbed sites, for example along roadsides; garden ornamental; a poor grazing grass due to low leaf production; and a common innocuous weed.

Illustration: Chippindall: pl. 12 (1955).
Anatomy vouchers: *Ellis 746, 926* & *Smook 5238*.
Voucher: *Smook 4767*.


*Melinis scabrida*

**Melinis scabrida** (K.Schum.) Hack., in *Öesterreichische Botanische Zeitschrift* 51: 464 (1901). Type: Tanzania, Moshi District, Mwika [Muika], *Volkens 1814* (B, lecto.).

*Rhynchelytrum scabridum* (K.Schum.) Chiov., in *Annuario del reale Istituto Botanico di Roma* 8: 310 (1908). Type: as above.

Loosely tufted perennial 400–1 000 mm high; culms geniculate. Leaf blade 20–140 × 2.8–6.5 mm. Inflorescence 70–200 × 20–40 mm. Spikelet 2.4–2.8(–3.2) mm long, hairs extending to 1.5 mm beyond the apex; internode between glumes very short; lower glume 0.2–0.8 mm long; upper glume 5- rarely 7-nerved, awnless or awn up to 0.3 mm long; lower lemma 5-nerved, awn 1.0–2.4 mm long; lower palea present, sometimes reduced or absent on same inflorescence, keels scaberulous or sometimes minutely ciliate.

[Recorded as of possible hybrid origin by Clayton & Renvoize (1982), *Melinis ambigua* × *Melinis longiseta*.]

*Ecology*: Open hillsides. *Frequency in southern Africa*: Infrequent. *Distribution*: East Africa, one record said to be from South Africa. LIM?, specimen not seen.

Illustration: Zizka: 83, fig. 33 (1988).
Vouchers: No specimens seen.

**Melinis subglabra** Mez, in *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 57: 197 (1921). Type: Tanzania, Rungwe District, Bundali Mts., *Stolz 1298*.

*Rhynchelytrum subglabrum* (Mez) Stapf & C.E.Hubb., in *Flora tropical Africa* 9: 886 (1930). Type: as above.

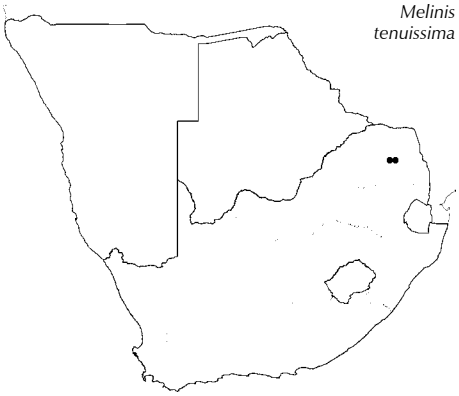
Tufted perennial 400–1 300 mm high; rhizome short, thick and knotty. Leaf blade 30–170 × (2.3–)3.0–8.0(–10.0) mm. Inflorescence broadly ovate; pedicels glabrous or with long hairs at apex. Spikelet 3.2–5.0 × 1.5 mm, ovate, glabrous rarely densely hairy; internode between glumes short, 0.1–0.6 mm long; upper glume and lower lemma usually mucronate, rarely with awn up to 3 mm long; upper glume gibbous, 5-nerved, usually glabrous or with a tuft of hairs from the middle of the back; lower palea keels ciliate; anthers 1.2–1.8 mm long.

[Zizka (1988) doubts that the specimen from Namibia is *M. subglabra*, and at PRE, the specimen, *De Winter 2786*, is identified as *M. repens* subsp. *repens*, which has specimens across its range with knotty bases. The Mpumalanga specimen, *Codd 1588*, from close to the Barberton area is a very poor specimen with only a remnant of a spikelet, but this matches *Stalmans 2887* and *Balkwill 9172* from Songimvelo, which is possibly a new *Tricholaena* sp. close to *T. monachne*.]

*Flowering*: February to June. *Ecology*: Prefers shady areas near water. *Distribution*: Angola and northwards to East Africa. ?N.

Illustration: Zizka: 70, fig. 25 (1988) (anatomy).
Voucher: see above.

**Melinis tenuissima** Stapf, in *Hooker's Icones Plantarum* 27: t. 2660 (1900). Type: Malawi, Namasi, *Cameron 33* (K, holo.).


*Melinis tenuissima*

Straggling perennial 500–1 100 mm high. Leaf blade 20–80 × 3–6 mm, occasionally hairy. Inflorescence branches delicate; pedicels smooth, apex with few long hairs of 2–4 mm. Spikelet 1.1–1.5(–1.6) × 0.5 mm, narrowly ovate to oblong, glabrous or pubescent; internode between glumes very short; lower glume reduced to a scale, 0.1 mm long; upper glume 5-nerved, not grooved as nerves not prominent, dentate, awnless, glabrous to sparsely hairy; lower lemma 3–5-nerved, lobed or dentate, awn white, (1.5–)4.0–10.0 mm long; lower palea absent; anthers 1.2–1.5 mm long.

*Flowering*: April to June. *Ecology*: Grassland and bush; often near cultivation and water. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to tropical Africa. LIM.

Illustration: Chippindall: 428, fig. 355 (1955); Hooker's Icones: pl. 2660.
Voucher: *Scheepers 1153*.

## **Merxmuellera** Conert

Stapf: 516 (1899) under *Danthonia* DC.; Schweickerdt: 88 (1938) under *Danthonia*; Chippindall: 241 (1955) under *Danthonia* DC.; Conert: 129 (1970); Ellis: 487 (1981a); Ellis: 493 (1981b); Clayton & Renvoize: 175 (1986) under *Rytidosperma* Steud.; Gibbs Russell et al.: 213 (1990); Watson & Dallwitz: 593 (1994); Benesch: 11 (1995); Cope: 7 (1999) as *Rytidosperma*; Barker: 135 (2007); Linder et al.: 322 (2010).

*Danthonia* DC., in part, Stapf: 516 (1899).

Perennial, tufted; basal sheaths persistent. **Leaf blade** linear, setaceous or expanded, glabrous, sometimes hairy just above ligule;




Figure 330.—*Merxmuellera drakenbergensis*. Artist: R. Holcroft.

usually disarticulating above the ligule, leaving a short piece that is entire or split, straight or recurved; *ligule* a short fringe of hairs. **Inflorescence** a panicle, open or rarely contracted; *spikelets* pedicelled. **Spikelet** laterally compressed; disarticulating above glumes and between florets; *glumes* similar, ± equal, shorter to longer than spikelet, 1-keeled, 1–3-nerved, awnless. **Florets** 3–10; bisexual; *lemma* rounded on back, similar in texture to glumes, 7–9-nerved, hairy, hairs usually arranged in 3 tufts between midrib and margin, these tufts often poorly defined or missing, marginal tufts sometimes well developed; 2-lobed, lobes free, rarely completely adnate to central awn, finely awned or awnless; central awn from sinus; *awn* usually geniculate, column twisted, rarely straight; *callus* rounded to truncate, hairy; *palea* bidentate, awnless, almost equal to lemma, 2-keeled, lanceolate, similar in texture to lemma, hyaline, glabrous on the flaps. **Lodicules** 2, long, membranous, ciliate. **Stamens** 3. **Ovary** ovoid, glabrous; styles 2, long and plumose. **Caryopsis** pericarp fused. **Photosynthetic pathway**: $C_3$; XyMS+.

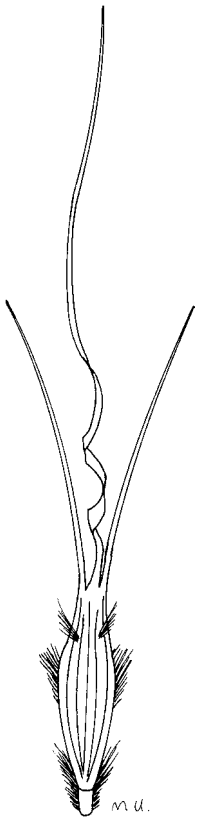



Figure 331.—*Merxmuellera stereophylla* lemma (23 × 1 mm). Artist: M. Ueckermann.

**Species** ± 7, 4 in southern Africa, in mountainous areas of Lesotho, Mpumalanga, Free State, KwaZulu-Natal, Eastern Cape.

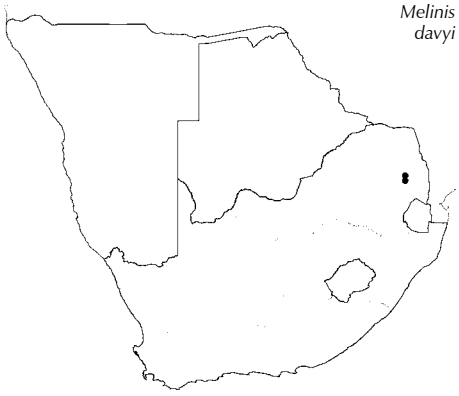
Species treatment by A.C. Mashau & L. Fish.

**Key to species:**

1. Lemma margins fringed, hairs short at base becoming longer towards apex; leaf blades do not break off and split . . . . . **M. stereophylla**
   Lemma back with 2 to 3 distinct tufts of long, white hairs on each side of the central nerve towards the margins, tufts or fringes of hairs on margins near the base; leaves break off ± 10–20 mm above ligule, the remains either splits, the two halves curving away from each other and/or curls into a spiral or stays entire . . . . . 2
2. Lemma lobes completely adnate to central awn, lateral awns absent; central lemma awn seldom geniculate . . . . . **M. macowanii**
   Lemma lobes wholly or partly free from the central awn, each lobe usually terminating in an awn; central awn usually geniculate . . .3
3. Glumes 11–13 mm long, 1-nerved; remains of the dead leaves curl into a spiral at base of plant; lemma back with 2 to 3 tufts of hairs on each side of the central nerve near margins, a single marginal tuft basally . . . . . **M. davyi**
   Glumes 13–17 mm long, 1–3-nerved; leaf blade splits, two halves curling away from each other; lemma with 2 to 3 tufts of hairs either side on central nerve towards margins, margins with a fringe of hairs towards base . . . . . **M. drakensbergensis**

**Merxmuellera davyi** (C.E.Hubb.) Conert, in *Senckenbergiana Biologica* 51: 132 (1970). Type: Malawi, Mt. Mulanje (Mlanje), Lichenya Gorge, 1 950 m, 23 ix 1929, *Burtt Davy 2068/29* (K, holo.).

*Danthonia davyi* C.E.Hubb., in *Bulletin of Miscellaneous Information, Kew* 1936: 501 (1936).


*Melinis davyi*

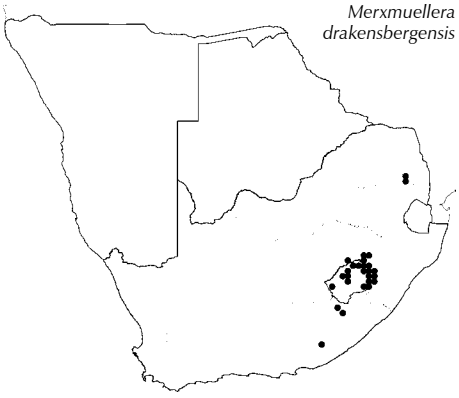
Tufted perennial to 1 000 mm high; base of plant glabrous; dead leaf blade breaks off above sheath mouth, the remains then curl into a tight spiral. Leaf blade to 600 × to 1.5 mm, convolute. Inflorescence dense, 150–250 mm long. Spikelet 15–17 (including awns) × 6–8 mm, 2–4-flowered; glumes 11–13 mm long, 1-nerved (short lateral nerves near base); lemma 7.5–9.0 mm long, with 3 unequally spaced tufts of white hairs on either side of the central nerve, and two tufts of hair on either side of central nerve near the margins, the most basal tufts are on the margins; lobes adnate to the central awn for $^1/_4$–$^3/_4$ of their length, ending in a short fine awn; central awn 12 mm long; anther 1.7–2.6 mm long.

*Flowering*: September. *Ecology*: Xeric, rocky, mountainous areas. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to central Africa. M.

Illustration: Cope: 8, tab. 4. A (1999).
Anatomy vouchers: *Werdemann & Oberdieck 1908* & *Davidson & Mogg 33315*. This species is anatomically very similar to *M. macowanii* (Ellis 1981b).
Voucher*: Davidson & Mogg 33315*.

**Merxmuellera drakensbergensis** (Schweick.) Conert, in *Senckenbergiana Biologica* 51: 132. Type: South Africa, Eastern Cape, Barkly East District, Summit of Doodman's Krans Mountain (Drakensberg), *Galpin 6903* (K, ?; PRE, iso.).

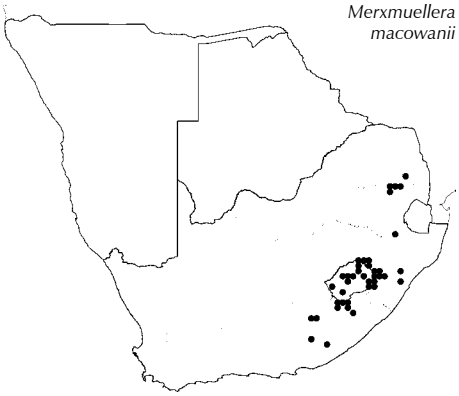
*Danthonia drakensbergensis* Schweick., in *Feddes Repertorium* 43: 88 (1938).


*Merxmuellera drakensbergensis*

Tufted perennial to 1 000 mm high; old leaves break off close to the sheath mouth, and the remaining pieces split along the midrib, the two halves curling away from each other. Leaf blade to 300 × to 1.3 mm. Inflorescence 80–180 mm long, loosely contracted and interrupted. Spikelet 12–17 (including awns) × 8–13 mm, (5–)6–8-flowered; glumes 13–17 mm long, 1–3-nerved; lemma 6.5–9.0 mm long, back with 2 to 3 tufts of white hairs on either side of central nerve near margins, margins with a fringe of hairs basally; lobes 3.5–5.0 mm long, adnate to the central awn for approximately half their length; central awn 9–12 mm long, geniculate at point where lemma lobes detached from awn; anther 2.5–3.3 mm long.

*Flowering*: October to March. *Ecology*: Mesic sites in stream banks, seeps, mud patch communities and rocky outcrops of the alpine belt, in areas where the soil is deeper than in the surrounding areas. *Frequency in southern Africa*: Common along stream banks and in seeps. *Distribution*: Endemic. L, M, FS, KZN, EC. *Economics*: Used to make rope.

Illustration: Chippindall: 247, fig. 219 (1955).
Anatomy vouchers: *Werdermann & Oberdieck 1139*; *Staple 242*; *Du Toit 669 & 2313*; *Ellis 1398, 3138, 3154, 3155, 3156, 3189, 3190, 3191, 4310* & *4311*. This species is anatomically very similar to *M. stereophylla* (Ellis 1981a).
Voucher: *Hilliard & Burtt 13710*.


*Merxmuellera macowanii*

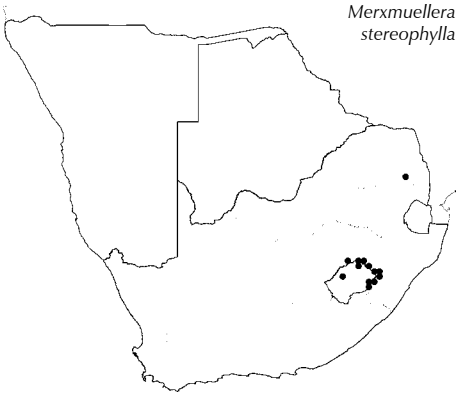
**Merxmuellera macowanii** (Stapf) Conert, in *Senckenbergiana Biologica* 51: 132. Type: South Africa, Eastern Cape, Somerset East, *Macowan 1986* (PRE, fg.).

*Danthonia macowanii* Stapf, in *Flora capensis* 7: 527 (1899).

Tufted perennial 700–1 300 mm high; old leaves break off above sheath mouth, the remaining pieces usually split along midrib and the two halves curl away from each other. Leaf blade to 650 × to 1.3 mm. Inflorescence 170–270 mm long, loosely contracted, interrupted and shortly branched. Spikelet to 13 (including awns) × to 6 mm, (2–)3–4-flowered; glumes 9–14 mm long, 1–3-nerved; lemma 10 mm long, back with 3 tufts of white hairs on either side of central nerve near margins, tufts on the margins are mostly basal; lobes usually fully adnate to central awn, awns absent; central awn 5–8 mm long, seldom geniculate; anther 1.5–3.8 mm long.

*Flowering*: July to January. *Ecology*: In montane and subalpine regions at altitudes between 1 500 and 3 000 m in the Drakensberg. *Frequency in southern Africa*: Locally dominant on stream banks and marshy areas of montane areas. *Distribution*: Endemic. L, M, FS, KZN, EC. *Economics*: Used especially for food and grain baskets and brooms.

Anatomy vouchers: *Devenish 1152*; *De Winter & Codd 183*; *Codd & De Winter 3229*; *Acocks 10659*; *Story 476*; *Stretton 182*; *Ellis 1455, 2394, 3282* & *3372*.
Voucher: *Burrows, J.E., Burrows, S.M. & Parker, E.*


*Merxmuellera stereophylla*

**Merxmuellera stereophylla** (J.G.Anderson) Conert, in *Senckenbergiana Biologica* 51: 133. Type: South Africa, KwaZulu-Natal, Bergville, *Killick 1184* (PRE, iso.).

*Danthonia stereophylla* J.G.Anderson, in *Bothalia* 7: 419 (1960).

Tufted perennial 800 mm high. Leaf blade to 360 × to 1.5 mm, rigid, erect; old leaves not breaking off above the sheath mouth and splitting or curling. Inflorescence contracted, shortly branched, to 180 mm long. Spikelet up to 20 mm long (including awns); glumes 11–18 mm long, 1-nerved; (3–)4–5-flowered; lemma 10–16 mm long, back glabrous, margins fringed, hairs short at the base becoming longer and ending in tufts of long hairs at the apex; lobes 5–7 mm long, free from central awn, awned; central awn 13–18 mm long, geniculate close to the base, twisted basally, the apical portion much longer than base and protruding from spikelet for some length; anther 2.5–3.6 mm long.

*Flowering*: December to April. *Ecology*: Xeric alpine grasslands and crevices in basaltic cliffs of the Drakensberg above 2000 m. *Frequency in southern Africa*: Common in alpine grassland. *Distribution*: Endemic. L, M, FS, KZN. Economic: Used for baskets, brooms hats and rope.

Anatomy vouchers: *Roberts 3152*; *Schelpe 1390*; *Killick 1317*; *Killick & Marais 2183*; *Jacot-Guillarmond 3733*; *Ellis 1397, 1408, 2208, 3137, 3139, 3186* & *3307*. Anatomically and morphologically very similar to *M. drakensbergensis* (Ellis 1981a).
Voucher: *Killick 2349*.

## **Microchloa** R.Br.

Brown: 208 (1810); Stapf: 635 (1900); Stent: 287 (1924); Hitchcock & Chase: 636 (1950); Chippindall: 203 (1955); Launert: 129 (1970a); Renvoize: 313 (1974); Clayton & Renvoize: 242 (1986); Gibbs Russell et al.: 218 (1990); Watson & Dallwitz: 601 (1994); Cope: 229 (1999).

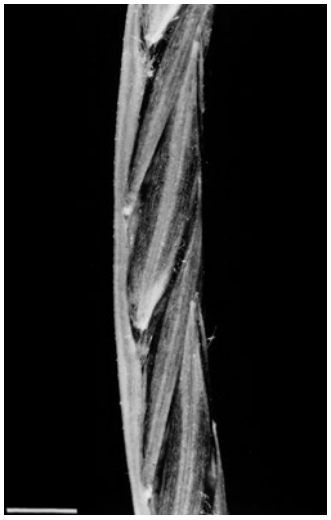


Figure 332.—*Microchloa caffra*. Several spikelets (3.0–5.5 mm). Photographer: M. Koekemoer.

Perennial, rarely annual, tufted or mat-forming. **Leaf blade** longitudinally folded and setaceous, rarely expanded; *ligule* a narrow fringed membrane or a fringe of hairs. **Inflorescence** a solitary, terminal, slender, curved, 1-sided raceme; rachis semi-crescent in section, hairy; *spikelets* solitary. **Spikelet** dark, dorsiventrally to not noticeably compressed, disarticulating above glumes; *glumes* ± equal, ± as long as spikelet or lower glume little shorter than spikelet, dissimilar, membranous, 1-nerved, awnless; lower glume lanceolate or linear-oblong, acute or obtuse, keeled, somewhat gibbous at base; upper glume lanceolate, acute, rounded on the back. **Floret** 1, bisexual; *lemma* lanceolate or ovate, membranous to hyaline, 2-nerved, densely hairy on margins and midrib, awnless or mucronate; *palea* almost equalling or slightly shorter than lemma, hyaline, pilose. **Lodicules** 2, cuneate, glabrous, thin, faintly nerved. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose. **Caryopsis** ellipsoid; hilum short; pericarp fused; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines uneven, or even. PCR sheath extensions absent. PCR cell chloroplasts centrifugal/peripheral (usually), or centripetal (in some individuals of *M. caffra*?). **Cytology**: $x = 10$ (polyploidy).

**Species** ± 4, throughout tropics; 3 in southern Africa, widespread, not recorded in Western Cape.

Species treatment by A.C. Mashau.

### Quick guide to easily confused taxa:

1. Spikelet 4.0–5.5 mm long; florets two . . . . . **Rendlia altera**
   Spikelet 2.3–4.5 mm long; floret one . . . . . 2
2. Glumes strongly keeled . . . . . **Microchloa caffra**
   Glumes not strongly keeled . . . . . **Brachyachne patentiflora**

### Key to species:

1. Annual, loosely tufted; leaves usually cauline; old leaf sheaths not breaking into fibres; anther 0.3–0.7 mm long . . . . . **M. indica**
   Perennial, densely tufted; leaves usually basal; old leaf sheaths splitting into dense fibres; anther 0.4–1.6 mm long . . . . . .2
2. Anther 0.4–0.9(1.0) mm long; spikelet 2.0–3.2 mm long; raceme rarely more than 1 mm wide; leaf blade tapering to a fine point . . . . . **M. kunthii**
   Anther 1.0–1.6 mm long; spikelet 3.4–4.5 mm long; raceme 1–2 mm wide; leaf blade tapering to an obtuse or acute point . . . . . **M. caffra**

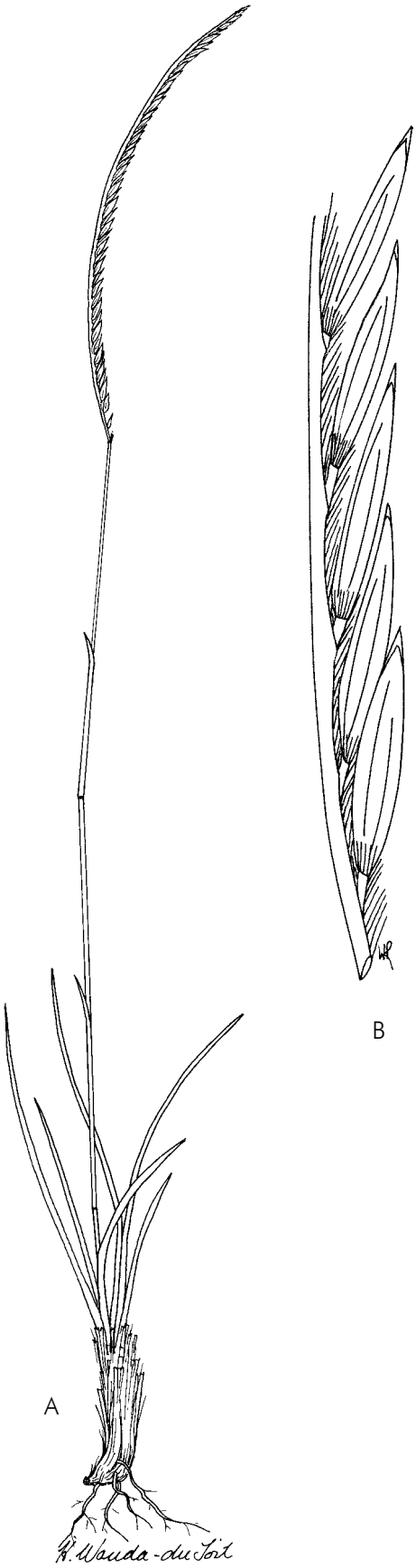
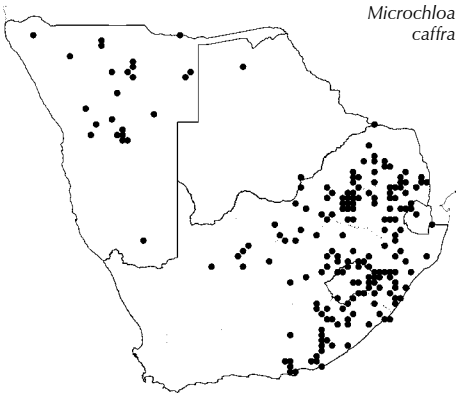



Figure 333.—*Microchloa caffra*. A, plant; B, portion of raceme with spikelets (10.0 × 1.4 mm). Artists: A, H.W. du Toit; B, W. Roux.

[Although the species can usually be distinguished by the characters as given in the key above, *M. caffra* does intergrade with *M. kunthii* and there are specimens that are difficult to place. Careful collecting and observations are needed as some specimens were found with what appeared to be mixed collections either with some specimens that did not quite fit in either *M. caffra* or *M. kunthii* or which appeared to have both species on the same sheet. There is a possibility that the two species grow in the same area, but in different microhabitats, and this has not been picked up during collecting in the past.]


*Microchloa caffra*

**Microchloa caffra** Nees, in *Florae africanae australioris*: 246 (1841). Type: South Africa, Eastern Cape, Zwartkopsrivier, *Zeyher 946* (PRE, isosyn.); Katberg, *Drège*; ?Eastern Cape, Blesbok flats, *Drège*; Uitenhage, Swartkops river, *Zeyher 4518* (PRE, isosyn.); ?Western Cape, Katrivierberg, *Ecklon* (PRE, fg.) (syntypes).

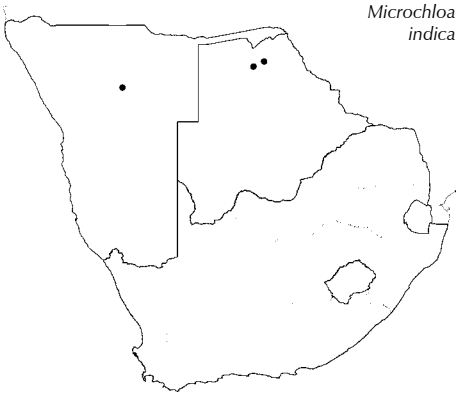
PINCUSHION GRASS, ELSGRAS

Densely tufted perennial 100–500 mm high; old leaf sheaths splitting into fibres; leaves mostly crowded at the base; culm 2–3-noded. Leaf blade 20–100 mm long, tapering to an obtuse or acute point; ligule a fringed membrane to a fringe of hairs. Inflorescence a single raceme 40–150 × 1–2 mm. Spikelet 3.4–4.5 mm long, usually purple or purple-brown, awnless; glumes ± equal; lemma 2.0–2.6 mm long, 2-nerved; anther 1.0–1.6 mm long; caryopsis terete, over 1 mm long.

[The circumscription of this species is not clear cut and intergrades with *M. kunthii*, which generally has a shorter spikelet and anthers.]

*Flowering*: October to April. *Ecology*: Shallow soils on rocky outcrops; often in veld that is overgrazed. *Frequency in southern Africa*: Common. *Distribution*: Northwards to East Africa, Ethiopia and DRC. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, EC. *Economics*: Possibly slightly palatable, but with a low leaf yield not an important grazing grass; plays an important role in stabilising disturbed shallow soil.]

Illustration: Chippindall: 203, fig. 179 (1955).
Anatomy vouchers: *Ellis 95, 1938, 2835* & *3276*.
Voucher: *Smook 4450*.


*Microchloa indica*

**Microchloa indica** (L.f.) P.Beauv., in *Essai d'une nouvelle agrostographie*, Expl. Pl.: 13, t. 20/8 (1812). Type: India.

*M. setacea* (Roxb.) R.Br., in *Prodromus florae Novae Hollandiae et Insulae Van-Diemen*: 208 (1810), nom. illegit.

Loosely tufted annual 90–200 mm high; old leaf sheaths not splitting into fibres; leaves usually cauline. Leaf blade 10–80 × 0.3–1.8 mm, tapering to an abrupt point; ligule a fringed membrane. Inflorescence raceme very slender, straight or curved, glabrous at base. Spikelet 1.7–2.9 mm long; anther 0.3–0.7 mm long; caryopsis dorsally compressed, 1 mm long.

[Very similar to *M. kunthii* in all characters except its annual habit.]

*Flowering*: January to May. *Ecology*: In semi-shade on bare hard ground. *Frequency in southern Africa*: Rare. *Distribution*: Africa, south of the Sahara and Mexico. N, B.

Voucher: *Volk 1013*.

**Microchloa kunthii** Desv., in *Opuscules sur les sciences physiques et naturelles*: 75 (1831). Type: Tropical America.

PINCUSHION GRASS, ELSGRAS

Densely tufted perennial 100–430 mm high, growing in compact mats; basal leaf sheaths splitting into fibres; leaves mostly crowded at the base; culm 1–4-noded. Leaf blade 10–80 mm long, tapering to a fine point; ligule a fringe of hairs to a fringed membrane. Inflorescence raceme 20–150(–250) × 1 mm (rarely more). Spikelet 2.0–3.2 mm long, awnless; lemma 1.9–2.8 mm long; anther 0.4–0.9(1.0) mm long; caryopsis 1.5 mm long.

[Intergrades with *M. caffra*, which generally has a longer spikelet and anthers.]

*Flowering*: November to April. *Ecology*: Shallow soil on rocky outcrops, open sandy patches or sometimes even on waterlogged, clayey soils. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to tropical Africa; also Arabia, India, China and South America. N, B, S, LIM, NW, G, M, FS, KZN, NC, EC.

Illustration: Clayton et al.: 78, fig. 88 (1974).
Anatomy voucher: *Ellis 1558*.
Voucher: *De Winter & Codd 557*.

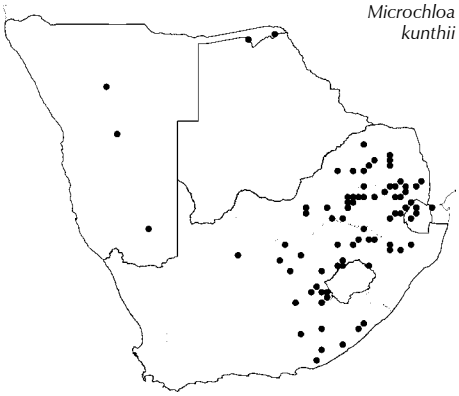





Figure 335.—*Microlaena stipoides* specimen.

## *Microlaena R.Br.

Brown: 210 (1810); Willemse: 181 (1982); Clayton & Renvoize: 76 (1986) included in *Ehrharta* Thunb.; Gibbs Russell et al.: 219 (1990); Chapman: 1998 (1991); Watson & Dallwitz: 603 (1994).

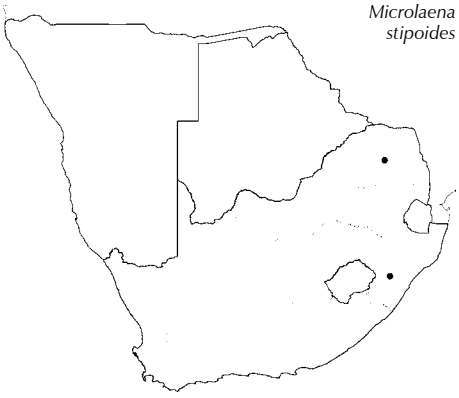


Figure 334.—*Microlaena stipoides* spikelet. Artist: W. Roux.

Perennial, weakly tufted; sometimes rhizomatous. **Leaf blade** linear to lanceolate, usually flat; *ligule* a fringed to unfringed membrane. **Inflorescence** a single raceme or open panicle; *spikelets* pedicelled. **Spikelet** laterally compressed, disarticulating above glumes; *glumes* unequal, similar, reduced to minute lips, membranous, awnless, separated from florets by a stipe. **Florets** 3, *lower* 2 *florets* sterile, reduced to lemmas; lemma long-acuminate, tapering into a long slender awn, keeled, 5–7-nerved; palea 0; *upper floret* bisexual, *lemma* firmer in texture than glumes, 5–7-nerved, mucronate, awned or awnless; *awn* straight, shorter than body of lemma; *callus* hairy; *palea* usually present, membranous. **Lodicules** 2, membranous, glabrous. **Stamens** 2–6. **Ovary** glabrous. **Caryopsis** ellipsoid, oblong-linear; hilum long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 10$.



Figure 336.—*Microlaena stipoides* spikelet (9–11 mm, excluding awns). Photographer: M. Koekemoer.




**Species** ± 10, Philippines, Java to Australia; 1 naturalised in southern Africa: **Microlaena stipoides* (Labill.) R.Br., Limpopo, KwaZulu-Natal.

Species treatment by A.C. Mashau.

[Willemse (1982) united *Microlaena* with *Ehrharta*, maintaining that characters within the four genera in Ehrharteae are too variable to be useful for generic differences. *Microlaena* is here still accepted as a separate genus following G.A. Verboom (2007 *pers. comm.*) who suggests that a broader phylogenetic analysis of the entire Ehrhartoideae is needed before a final decision can be made.]

***Microlaena stipoides** (Labill.) R.Br., in *Prodromus florae Novae Hollandiae et Insulae Van-Diemen*: 210 (1810). Type: Australia.

*Ehrharta stipoides* Labill., in *Novae Hollandiae plantarum* 1: 91, pl. 118 (1804).

Weakly tufted, slender perennial 300–500 mm high. Leaf blade 40–150 × 1.5–3.0 mm. Spikelet 20–30 mm long (including stipe and awn); glumes minute, much shorter than the spikelet, slightly keeled, 1-nerved; lower 2 florets sterile; sterile lemma subtended by a long stipe with a fine tuft of hairs at the base, apex drawn out into a long scabrous awn; fertile lemma apex cuspidate to shortly awned; anthers usually 4, 0.3 mm long.

*Flowering*: April. *Ecology*: Semi-shade in forests, woodlands, plantations such as pine, also in open pastures; disturbed areas. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from Australasia. Malaysia, New Zealand and Australia. LIM, KZN.

Voucher: *Gordon-Gray s.n.*




Figure 337.—*Microstegium nudum*. A, plant; B, sessile and pedicelled spikelet pair (17.0 × 1.2 mm). Artists: A, artist not known; B, W. Roux.

## ?*Microstegium Nees

Nees: 447 (1836); Stapf: 326 (1898) under *Pollinia* Trin.; Chippindall: 484 (1955); Clayton & Renvoize: 715 (1982); Clayton & Renvoize: 335 (1986); Gibbs Russell et al.: 220 (1990); Watson & Dallwitz: 605 (1994); Clayton: 17 (2002); Chen et al.: 175 (2009).

Annual, sometimes perennial, delicate; mostly rambling or creeping; rooting at lower nodes. **Leaf blade** linear to lanceolate, narrowed at base, often with a false petiole, expanded; *ligule* an unfringed membrane. **Inflorescence** terminal, open; racemes slender, spike-like, digitate to subdigitate; spikelets loosely spaced; internodes and pedicels linear, rarely inflated; *spikelets* usually similar, in pairs: one sessile, the other pedicelled; pedicels free. **Sessile spikelet** dorsiventrally compressed, falling with glumes, linear-lanceolate, bearded at base with a ring of white hairs; *glumes* ± equal, dissimilar; lower glume narrow, acute or notched at apex, shallowly concave on back to

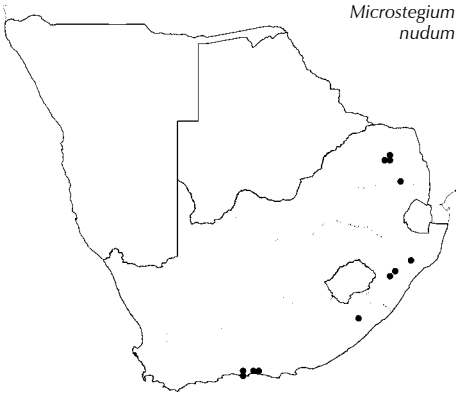


Figure 338.—*Microstegium nudum*. Terminal spikelets (3.5–4.5 mm). Photographer: M. Koekemoer.

medianly grooved, margins sharply inflexed; upper glume weakly keeled or rounded on back, acute. **Florets** 2; *lower floret* male or sterile, reduced to a linear-lanceolate, hyaline, nerveless scale or suppressed (often mixed on same inflorescence), awnless; *upper floret* bisexual; *lemma* less firm than glumes, hyaline, linear to cordate, often minute, narrow, 1-nerved, minutely 2-lobed, awned from between lobes; *awn* hair-like, flexuous, glabrous; *callus* obtuse, hairy; *palea* much reduced or 0. **Lodicules** 2, cuneate. **Stamens** 2 or 3. **Ovary** oblong-elliptic, glabrous. **Caryopsis** ellipsoid to lanceolate, dorsally flattened; hilum short; embryo large. **Pedicelled spikelet** similar to sessile spikelet. **Photosynthetic pathway**: $C_4$; biochemical type NADP-ME (1 species); XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 10$ (polyploidy).

**Species** ± 15, tropical Asia; also Africa but possibly introduced there; 1 in southern Africa: *Microstegium nudum* (Trin.) A.Camus, Limpopo, Mpumalanga, KwaZulu-Natal, Eastern and Western Cape.

Species treatment by A.C. Mashau.




**?*Microstegium nudum** (Trin.) A.Camus, in *Annales de la Société linnéene de Lyon, n.s.* 68: 201 (1921). Type: Nepal.

*M. capense* (Hochst.) A.Camus, in *Annales de la Société linnéene de Lyon, n.s.* 68: 201 (1921).

Alternate name: *Leptatherum nudum* (Trin.) C.Hui Chen, Kuoh, Veldkamp

Annual, trailing, forming a tangled mat, 600 mm high. Leaf blade 80 × 2–7 mm. Inflorescence of 3–4 slender racemes, solitary or paired on the central axis; internodes filiform. Sessile spikelet 3.5–4.5 mm long; lower glume concave on the back, upper lemma with a capillary, glabrous awn; anther 0.8–1.0 mm long. Pedicelled spikelet similar to sessile spikelet.

*Flowering*: January to May. *Ecology*: Moist shady places in forests. *Frequency in southern Africa*: Infrequent. *Distribution*: Possibly naturalised from Asia. Northwards to tropical Africa; and east to Japan and Australia. LIM, M, KZN, EC, WC.

Illustration: Clayton: 18, tab. 7 (2002).
Anatomy vouchers: *Ellis 3367, 4456* & *Smook 5685*.
Voucher: *Fisher 131*.

## **Miscanthus** Andersson

Andersson: 165 (1856); Clayton & Renvoize: 702 (1982); Mabberly: 442 (1984); Clayton & Renvoize: 332 (1986); Gibbs Russell et al.: 221 (1990); Hodkinson et al.: 189 (1997); Clayton: 8 (2002).

*Miscanthidium* Stapf: 89 (1917); Chippindall: 477 (1955); Watson & Dallwitz: 609 (1994); Yasushi Ibaragi: 175 (2004).

Perennial, tufted, often robust, sometimes rhizomatous. **Leaf blade** linear, expanded or whole blade terete; *ligule* an unfringed to a fringed membrane. **Inflorescence** a panicle, open or contracted, often large and plumose; rachis tough, internodes and pedicels slender and free; *spikelets* paired, unequally pedicelled, similar in form and function. **Spikelet** dorsiventrally compressed, falling with glumes, narrowly oblong to lanceolate, surrounded by an involucre of spreading hairs from callus; *glumes* ± equal in size, as long



Figure 339.—*Miscanthus ecklonii*. Portion of inflorescence branch with several spikelets. Artist: W. Roux.




Figure 340.—*Miscanthus ecklonii*. Artist: C. Letty.

as spikelet, very dissimilar, awnless; lower glume ± flattened on back, 2-keeled with inflexed margins, nerves present between keels; upper glume 1-keeled. **Florets** 2, *lower floret* sterile, reduced to a hyaline lemma, awnless or sometimes mucronate; *upper floret* bisexual; *lemma* less firm than glumes, hyaline, entire or finely bidentate, awned or awnless; *awn* straight or geniculate, as long as to longer than body of lemma; *callus* very short, truncate, hairy with long, spreading hairs; *palea* minute. **Lodicules** 2, fleshy. **Stamens** 2 or 3. **Caryopsis** oblong to lanceolate; hilum short; embryo large.



Figure 341.—*Miscanthus ecklonii* spikelet (4–6 mm). Photographer: M. Koekemoer.

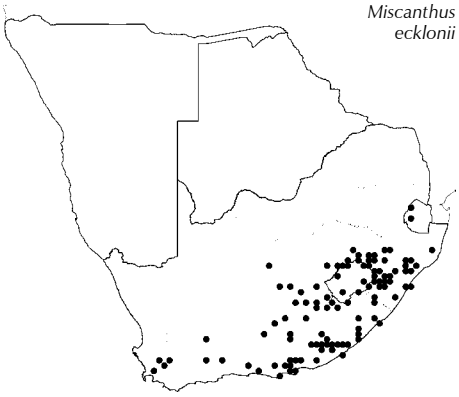
**Species** ± 20, mostly in Southeast Asia and a few in Africa; 2 in southern Africa.

[There is no census as to whether the species below belong to *Miscanthidium* or *Miscanthus*.]

Species treatment by L. Fish.

**Key to species:**

Leaf blades terete, reduced to a midrib . . . . . **M. junceus**
Leaf blades expanded, sometimes folded, may be narrowed to the midrib near base only . . . . . **M. ecklonii**



*Miscanthus ecklonii*

**Miscanthus ecklonii** (Nees) Mabb., in *Taxon* 33: 442 (1984). Type: South Africa, Eastern Cape, ?, *Ecklon*.

*Miscanthus capensis* (Nees) Andersson, in *Öfversigt Svensk Vetenskaps-Akademies Förhandlingar* 12: 165 (1855). Type: South Africa, Eastern Cape, Uitenhage, Zwartkops River, *Ecklon*; banks of Kei River, *Drège* (syntypes).

*Miscanthidium capensis* (Nees) Stapf var. *capensis*, in *Flora tropical Africa* 9: 91 (1917).

*Miscanthidium capensis* (Nees) Stapf var. *villosa* Stapf, in *Introduction to South African grasses*: 89, 218 (1931). Type: South Africa, KwaZulu-Natal, Durban, *Buchanan 45* (many more syntypes).

*Miscanthidium erectum* Stent ex C.E.Hubb., in *Bulletin of Miscellaneous Information, Kew* 1928: 36 (1928). Type: South Africa, KwaZulu-Natal, Eshowe, *Kotze 246*.

*Miscanthidium sorghum* (Nees) Stapf, in *Flora tropical Africa* 9: 91 (1917). Type: South Africa, Western Cape and Eastern Cape (many syntypes).

DABA GRASS, RUIGTEGRAS

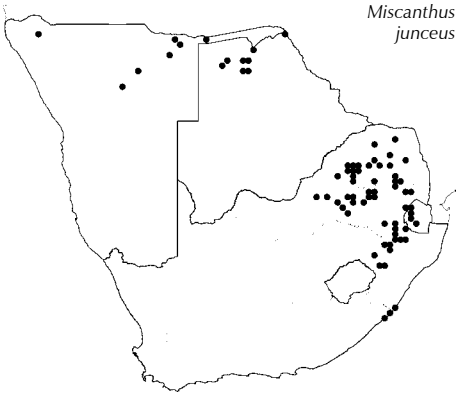
Tufted often robust perennial to 2 400 mm high; rhizomatous. Leaf blades to 90 × to 16 mm, expanded, folded or narrowed to the midrib only near the base. Inflorescence 200–450 mm long. Spikelet 3–6 mm long; callus hairs $^1/_4$–$^1/_3$ of length of spikelet; upper lemma awnless or awn up to 7 mm long.

[All three broad-leaved species formerly recognised in *Miscanthidium* or *Miscanthus* (*M. sorghum*, *M. erectum* and *M. capense*) are combined here because of great variability in the characters on

which the separation has been attempted; including leaf blade reduction, leaf blade and sheath hairiness, ligule length, and spikelet length and hairiness.]

*Flowering*: November to April. *Ecology*: River banks, forest margins and wet places. *Frequency in southern Africa*: Infrequent. *Distribution*: Southern Africa. S, L, FS, KZN, NC, WC, EC. *Economics*: Not grazed; used medicinally and for thatching; Basotho children chew the rhizome; possible garden ornamental.

Anatomy vouchers: *Ellis 1100* & *3365*.
Voucher: *Moll 1667*.




**Miscanthus junceus** (Stapf) Pilg., in Engler & Prantl., *Natürlichen Planzenfamilien* ed 2, 14e: 113 (1940). Type: Lesotho, Leribe, *Buchanan 228*; South Africa?, *Nelson 73* & *77* (syntypes).

*Miscanthidium junceum* (Stapf) Stapf, in *Hooker's Icones* Pl. 31: t. 3084 (1922).

*Miscanthidium teretifolium* (Stapf) Stapf, in *Flora tropical Africa* 9: 89 (1917). Type: Zimbabwe, Victoria Falls, *Gibbs 141* (K, holo.).

Broom grass, besemgras, ruigtegras

Tufted perennial 1 000–1 800 mm high; rhizomatous. Leaf blade 500–1 000 × to 3 mm, terete, reduced to a yellow midrib. Inflorescence 200–550 mm long. Spikelet 3–5 mm long; lower glume hairy; upper lemma awned; awn 2–10 mm long.

*Flowering*: November to June. *Ecology*: River banks and vleis. *Frequency in southern Africa*: Infrequent. *Distribution*: Zimbabwe, Zambia, Angola and DRC. N, B, S, LIM, NW, G, M, KZN, EC. *Economics*: Not grazed; plays a role in water purification and river bank stabilisation; possible garden plant.

Anatomy vouchers: *Ellis 317, 188* & *1770*.
Voucher: *Edwards 2053*.

## **Monelytrum** Hack. ex Schinz

Schinz: 140 (1888); Schweickerdt: 71 (1946); Chippindall: 110 (1955); Launert: 131 (1970a); Clayton & Renvoize: 253 (1986); Gibbs Russell et al.: 222 (1990); Watson & Dallwitz: 618 (1994).

Perennial or annual, tufted; stoloniferous; leaves mostly basal, cauline leaves few. **Leaf blade** expanded, linear, margins rigidly ciliate with tubercle-based hairs; *ligule* a fringed membrane. **Inflorescence** a false bristly spike with clusters of spikelets on a reduced axis, clusters are of 2–4 bisexual spikelets, 1–3 sterile and reduced spikelets, these often reduced to bristles; *spikelets* shortly pedicelled, pedicels conspicuously hairy. **Spikelet** 3–4 mm long, dor-



Figure 342.—*Monelytrum luederitzianum*. Spikelet cluster (3–4 mm). Photographer: M. Koekemoer.

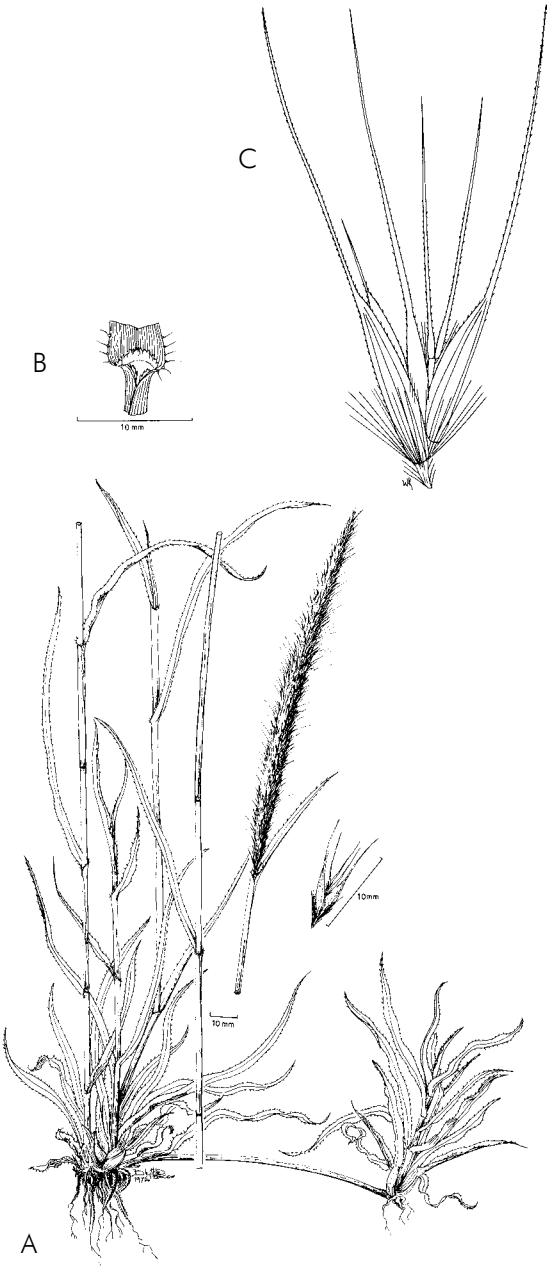



Figure 343.—*Monelytrum luederitzianum*. A, plant; B, ligule; C, spikelet. Artists: A and B, B. Pascoe; C, W. Roux.

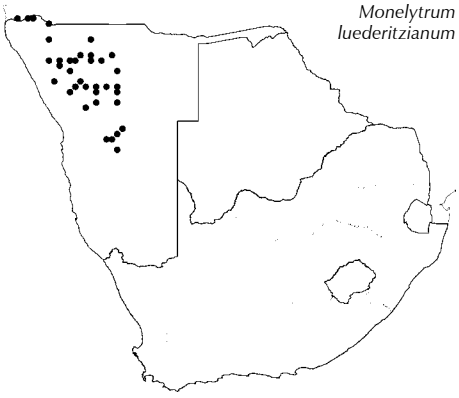






Figure 344.—*Monocymbium ceresiiforme*. Artist: S.B. Chiliza.

siventrally compressed, falling with glumes; *glumes* unequal; lower glume reduced to a small membranous, nerveless scale; upper glume elliptic-lanceolate, 5–7-nerved, herbaceous, scabrid and hairy, awned; awn longer than glume, scabrid. **Floret** 1, bisexual; *lemma* less firm than glumes, herbaceous, elliptic-lanceolate, hairy, 3-nerved, shortly awned; *awn* straight; *callus* present at base of clusters, hairy; *palea* broadly lanceolate, slightly thinner in texture than lemma. **Lodicules** 2, cuneate, glabrous. **Stamens** 3. **Ovary** ellipsoid; stigmas plumose. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines even. PCR sheath extensions absent. PCR cell chloroplasts centripetal.

**Species** 1, Africa; *Monelytrum luederitzianum* Hack., Namibia to southern Angola.

Species treatment by M.T. Nembudani.

**Monelytrum luederitzianum** Hack., in *Verhandlungen des botanischen Vereins der Provinz Brandenburg* 30: 140 (1888). Type: Namibia, Kaoko, nördlich von Omuramba u Omaruru, *Lüderitz 40* (B, holo.; PRE, fragment).

*M. annuum* Gooss., in *Kew Bulletin* 1934: 197 (1934). Type: Namibia, *Drinkuth 11* (PRE, iso.).

Tufted perennial or annual, to 800 mm high; stoloniferous. Leaf blade to 500 × 8 mm. Spikelet 3–4 mm long, pedicel and spikelet base woolly hairy; upper glume awn 3.3–5.0(7.0) mm long; lemma awn 0.3–0.5(1.2) mm long; anther 1.5–2.0 mm long.

*Flowering*: December to June. *Ecology*: On sandy or calcareous soils; rocky hill slopes, and often by ephemeral water. *Frequency in southern Africa*: Infrequent. *Distribution*: Into southern Angola. N.

Illustration: Chippindall: 109, fig. 83 (1955).
Anatomy vouchers: *Gibbs Russell & Smook 5228*; *Ellis 928, 4358, 4359 & 4747*.
Voucher: *De Winter 2558*.

## **Monocymbium** Stapf

Stapf: 337 (1898) under *Andropogon* L.; Stapf: 386 (1919); Stent: 252 (1924); Chippindall: 515 (1955); Clayton & Renvoize: 823 (1982); Clayton & Renvoize: 358 (1986); Gibbs Russell et al.: 222 (1990); Watson & Dallwitz: 622 (1994); Cope: 143 (2002).

Tufted perennial; sometimes shortly rhizomatous. **Leaf blade** linear, tapering to a sharp apex, expanded; *ligule* an unfringed membrane. **Inflorescence** of short, solitary spike-like racemes partly enclosed by a spathe and spatheole, these loosely gathered into an open false panicle; spatheoles on slender, filiform branches that are mostly in pairs or groups of three from upper nodes of culm; spatheole narrowly boat-shaped, reddish brown, acuminate, longer than enclosed raceme; *spikelets* paired, in long–short combination: one sessile, the other pedicelled. **Sessile spikelet** dorsiventrally compressed, falling with glumes; *glumes* ± equal, dissimilar; lower glume lanceolate, flat with rounded sides, hairy, not grooved or 2-keeled, usually winged on upper portion; upper glume thinner in texture, boat-shaped, sometimes winged on upper portion of keel, awned from entire or minutely 2-lobed apex; awn fine, straight. **Florets** 2; *lower floret* sterile, reduced to a lemma, hyaline, hairy, awnless; *upper floret* bisexual;



Figure 345.—*Monocymbium ceresiiforme* spikelet pair (3.5–4.0 mm). Photographer: M. Koekemoer.

*lemma* less firm than glumes, cartilaginous with a hyaline base and margins, glabrous, deeply 2-lobed, awned from between lobes; *awn* delicate, much longer than body of lemma, geniculate, twisted, column glabrous; *callus* short, obtuse, applied obliquely to apex of internode; *palea* 0. **Lodicules** 2, cuneiform, glabrous. **Stamens** 3. **Ovary** ellipsoid, glabrous; stigmas plumose. **Caryopsis** oblong, slightly dorsiventrally compressed; hilum short; embryo large. **Pedicelled spikelet** broadly lanceolate, resembling sessile spikelet but slightly longer and wider, male, awnless; callus linear. **Cytology**: $x = 5$, 10 (polyploidy). **Photosynthetic pathway**: $C_4$; XyMS-. PCR cell chloroplasts centrifugal/peripheral.

**Species** ± 4, tropical and southern Africa; 1 in southern Africa: *Monocymbium ceresiiforme* (Nees) Stapf, northern Namibia, Lesotho, Limpopo, Gauteng, North West, Mpumalanga, Free State, KwaZulu-Natal, northern Eastern Cape.

Species treatment by M.J Moeaha.




Figure 346.—*Monocymbium ceresiiforme*. Sessile and pedicelled spikelet pair (16.0 × 1.9 mm). Artist: S.B. Chiliza.

### Quick guide to easily confused genera:

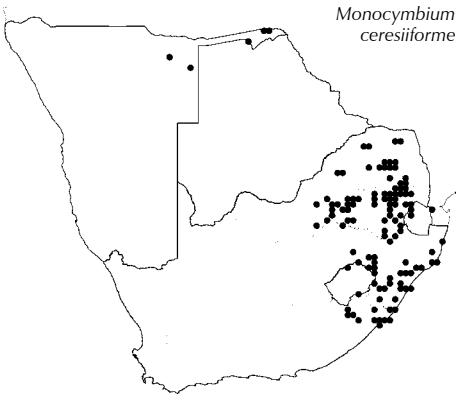
1. Raceme solitary in spatheoles . . . . . 2
   Racemes two or more in spatheoles, rarely solitary . . . . . 3
2. Ligule an unfringed membrane . . . . . **Monocymbium**
   Ligule a fringed membrane . . . . . **Schizachyrium**
3(1). Sessile spikelet lower glume deeply and narrowly grooved on the back; inflorescence without conspicuous spathes and spatheoles subtending spikelet-bearing axis . . . . . **Andropogon**
   Sessile spikelet lower glume flattened to rounded on the back; inflorescence with conspicuous spathes and spatheoles subtending spikelet-bearing axis . . . . . **Hyparrhenia**

**Monocymbium ceresiiforme** (Nees) Stapf, *Flora tropical Africa* 9: 387 (1919). Type: South Africa, KwaZulu-Natal, Mzimvubu (Omsamwubo), *Drège*.

WILD OATGRASS, BOATGRASS, WILDEHAWERGRAS

Loosely or densely tufted, graceful perennial 300–1 000 mm high; sometimes shortly rhizomatous; plant turns reddish or purple-tinged when flowering. Leaf blade 50–180 × 2–6 mm, dried leaves curled like a cork-screw. Inflorescence of solitary racemes partly enclosed in reddish-brown, boat-shaped spatheoles; spatheoles 16–40 mm long. Sessile spikelet 3–4 mm long; upper glume awn 3–6 mm long; upper lemma awn 6–15 mm long; anthers 1.5–2.0 mm long. Pedicelled spikelet 4–5 mm long, anthers 1.5–2.5 mm long.

*Flowering*: January to June. *Ecology*: Indicator of acid soils; open grassland and hillsides, often in wet places. *Frequency in southern*



*Africa*: Common. *Distribution*: Northwards throughout tropical Africa. N, B, S, L, LIM, NW, G, M, FS, KZN, EC.

Illustration: Chippindall: 515, fig. 411 (1955); Cope: 144, tab. 46 (2002).
Anatomy vouchers: *Ellis 203, 450, 459, 1514, 1518, 1528 & 6165*.
Voucher: *Ward 6477*.

## **Mosdenia** Stent

Stent: 170 (1922); Stent: 256 (1924); Chippindall: 108 (1955); Clayton: 250 (1971); Clayton & Renvoize: 255 (1986); Gibbs Russell et al.: 223 (1990); Watson & Dallwitz: 625 (1994).



Figure 348.—*Mosdenia leptostachys* spikelet (2.5–3.7 mm). Photographer: M. Koekemoer.

Perennial, rhizomatous. **Leaf blade** expanded, linear-lanceolate to linear; *ligule* an unfringed membrane. **Inflorescence** a narrow, solitary, dense spike-like raceme; *spikelets* solitary, subsessile, in irregular whorls or spirals. **Spikelet** subfalcate, falling with glumes; *glumes* ± equal, ± as long as spikelet, rigidly membranous, very dissimilar, 1-nerved, glabrous, awnless; lower glume sub-acuminate, scabrid on nerve, slightly longer and broader than upper glume, boat-shaped; upper glume subfalcate, flat on back, slightly gibbous at base. **Floret** 1, bisexual; *lemma* less firm than glumes, delicately hyaline, lanceolate-ovate, 1–3-nerved, glabrous, acuminate, acute, awnless; *palea* ± as long as lemma, minutely bilobed, faintly 2-nerved. **Lodicules** 2, truncate. **Stamens** 3. **Ovary** ovoid, glabrous; style short, distinct, plumose. **Caryopsis** ± 1.5 mm long, ellipsoid; hilum short; pericarp fused; embryo large, about $^1/_3$ as long as caryopsis. **Photosynthetic pathway**: $C_4$; XyMS+. PCR cell chloroplasts centripetal. **Cytology**: $x = 10$ (polyploidy).




Figure 347.—*Mosdenia leptostachys*. A, plant; B, ligule. Artist: C. Smith.

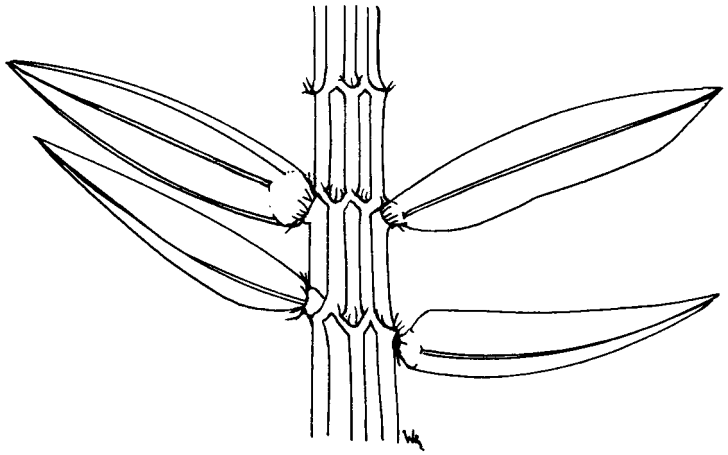


Figure 349.—*Mosdenia leptostachys*. Portion of inflorescence branch with several spikelets. Artist: W. Roux.

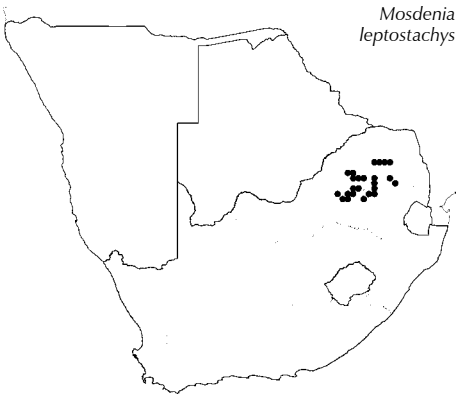
**Species** 1, southern Africa: *Mosdenia leptostachys* (Ficalho & Hiern) Clayton, North West, Limpopo, Mpumalanga, Gauteng.

Species treatment by A.C. Mashau.

**Mosdenia leptostachys** (Ficalho & Hiern) Clayton, in *Kew Bulletin* 25: 250 (1971). Type: Angola, upper reaches of River Ninda, *Serpa Pinto 58* (LISU, holo.).

*M. waterbergensis* Stent, in *Bothalia* 1: 170 (1922). Type: South Africa, Limpopo, Naboomspruit, Mosdene, *E.E. Galpin 447* (PRE, holo.).

*M. phleoides* (Hack.) Stent, in *Bothalia* 2: 288 (1927). Type: South Africa, Gauteng, *Schlecter 4200*.


*Mosdenia leptostachys*

[There is obviously a mistake with the locality of the type. Although Ficalho & Hiern described *Sporobolus leptostachys,* which is conspecific with *Mosdenia leptostachys*, from specimens which were said to have been collected at a single locality in southeast Angola during the Major Serpa Pinto's journey across Africa, this species has hitherto only been found in South Africa. It seems likely that the specimen was collected during the Major's passage through the old Transvaal, South Africa, towards the end of his journey.]

Perennial 900 mm high; rhizomatous. Leaf blade 20–80 × 2–3 mm; margins scaberulous. Inflorescence a narrow, spike-like raceme; spikelets subsessile, not clustered. Spikelet 2.5–3.8 mm long, falling with glumes, awnless, often flushed with purple and glume midrib dark green; glumes glabrous, very dissimilar in shape and/or texture; lower glume nerve scabrid; upper glume as long as spikelet, flat-backed; lemma 1–3-nerved; palea present; anther 0.6–1.0 mm long.

*Flowering*: January to April. *Ecology*: Usually on sandy soil; bushveld. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic (see note above). LIM, NW, G, M.

Illustration: Chippindall: 108, fig. 81 (1955).
Anatomy vouchers: *Ellis 1601, 2071, 2072* & *Smook 1967.*
Voucher: *Codd 825*.




Figure 350.—*Nassella trichotoma*. A, plant; B, glumes (6.5 × 1.2 mm); C, awned lemma (26.0 × 0.8 mm). Artist: W. Roux.

## *Nassella (Trin.) E.Desv.

Desvaux: 263 (1854); Chippindall: 287 (1955) under *Stipa* L.; Caro: 79 (1966); Vickery & Jacobs: 17 (1980); Clayton & Renvoize: 84 (1986); Moraldo: 203 (1986); Barkworth: 597 (1990); Gibbs Russell et al.: 224 (1990); Barkworth: 1 (1993); Watson & Dallwitz: 635 (1994); Jacobs et al.: 33 (1995); Jacobs & Everett: 593 (1996); Barkworth et al.: 439 (2001); Henderson: 13 (2001); Barkworth: 170 (2007).



Figure 351.—*Nassella trichotoma* spikelet (6.0–8.5 mm). Photographer: M. Koekemoer.

Tufted perennial rarely annual; occasionally rhizomatous; leaves mainly basal. **Leaf blade** expanded to tightly rolled; sheaths open; auricles absent; *ligule* a fringed or unfringed membrane. **Inflorescence** an open or contracted panicle; spikelets all alike, pedicelled. **Spikelet** terete, sometimes laterally compressed, plump, gibbous, disarticulating above glumes; *glumes* ± equal, acuminate, longer than spikelet, similar, rounded on back, (1)3–5-nerved, awned or awnless. **Floret** 1; *lemma* strongly convolute, firmer than glumes, becoming indurated, coriaceous, thick and stiff, usually tuberculate to papillose, hairy basally or glabrous, apex not lobed but fused into crown; crown mostly glabrous except for a few bulbous-based hairs on the rim; *awn* centric to off-centre, deciduous or persistent, geniculate, robust, column weakly to strongly twisted; *callus* obtuse or pungent, glabrous or hairy; *palea* up to ½ as long as lemma, glabrous, hyaline, nerveless. **Lodicules** 2 or 3. **Stamens** 1 or 3, when 3 often of two different lengths even within same floret, the longer often ciliate. **Ovary** glabrous. Caryopsis glabrous, not ribbed. **Photosynthetic pathway**: $C_3$; XyMS+.

**Species** ± 116, mainly South America; 3 naturalised in southern Africa, Western and Eastern Cape.

Species treatment by L. Fish.

### Quick guide to easily confused genera/taxa:

| | | |
|---|---|---|
| 1. | Lemma apex fused into a crown | ***Nassella*** |
| | Lemma apex without crown | 2 |
| 2. | Apex of lemma and/or lower part of awn with a plume of long hairs, 4–8 mm long | 3 |
| | Lemma apex and/or awn base glabrous or hairy, hairs less than 3.5 mm, not plume-like | 4 |
| 3. | Apex of lemma and base of awn with a plume of long hairs; callus obtuse; perennial | ***Jarava plumosa*** |
| | Only basal part of awn with a plume of long hairs above articulation; callus pungent; annual | **Stipagrostis anomala** |
| 4(2). | Awn longer than 30–100 mm long; callus pungent | 5 |
| | Awn up to 25 mm long; callus blunt | 6 |
| 5. | Plant perennial; awn lower part not obviously twisted | ***Austrostipa variabilis*** |
| | Plant annual; awn lower part strongly and obviously twisted | **Stipa capensis** |

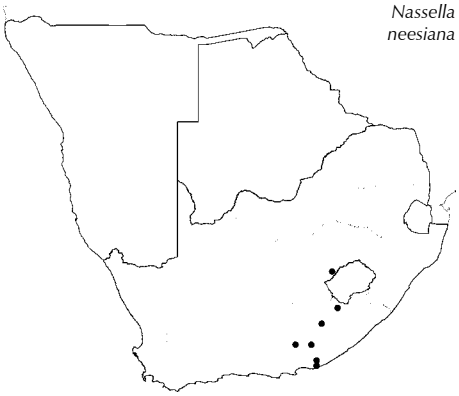
6(4). Plant annual; callus hairs up to 2.5 mm long . . . . **Aristida parvula**
Plant perennial; callus hairs up to 1 mm long . . . . . 7
7. Leaves flat . . . . . **Stipa dregeana**
Leaves convolute or rolled . . . . . ***Amelichloa clandestina**

**Key to species:**

1. Spikelet 15–17 mm long (excluding awn); callus long, pungent . . . . . ***N. neesiana**
Spikelet 4.0–8.5 mm long (excluding awn); callus short, obtuse or acute . . . . . 2
2. Lemma elliptic, lemma awn centrally placed, crown obvious. . . . . ***N. tenuissima**
Lemma obovate; lemma awn lateral, crown not obvious . . . . . ***N. trichotoma**

***Nassella neesiana** (Trin. & Rupr.) Barkworth, in *Taxon* 39: 611 (1990).

*Stipa neesiana* Trin. & Rupr., in *Memoires del' Académie impériale des Sciences de St. Pétersbourg Ser 6, Sci. Nat*. 5: 27 (1842). Type: Uruguay.


*Nassella neesiana*

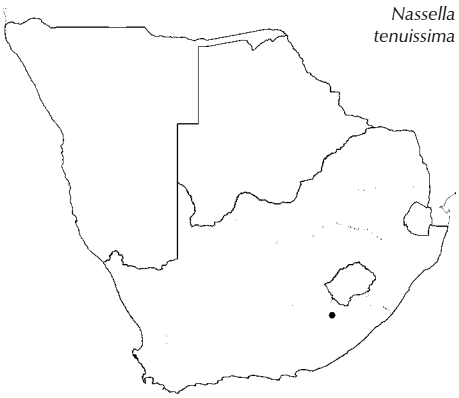
Loosely to densely tufted, erect perennial 300–1 000 mm high. Leaf blade to 300 × 2–8 mm; ligule truncate. Inflorescence base usually enclosed in uppermost leaf. Spikelet 15–17 mm long (excluding awn); glumes ± equal, long acuminate, longer than lemma, hyaline, flushed purple, 3–5-nerved, nerves distinct; lemma terete, widest just below crown, strongly overlapping, finely tuberculate, hairy basally; crown usually wider than long, rim with hairs 0.5 mm long; awn 50–120 mm long, usually long hairy basally, scabrid above, geniculate; callus 2.0–4.5 mm long, pungent; anthers 3.0–3.5 mm long.

*Flowering*: November to December. *Ecology*: Disturbed places and cultivated lands. *Frequency in southern Africa*: Infrequent or locally common. *Distribution*: Naturalised from South America. Introduced to France, Australia and New Zealand. FS, EC. *Economics*: Weed; regarded as a noxious weed in Australia.

Illustrations: Barkworth: 173 (2007).
Voucher: *Jacot Guillarmod 10061.*

***Nassella tenuissima** (Trin.) Barkworth, in *Taxon* 39: 612 (1990). Type: Argentina.

*Stipa tenuissima* Trin., in *Bulletin Scientifique publié par Académie impériale des Sciences de St. Pétersbourg* 1: 67 (1836).


*Nassella tenuissima*

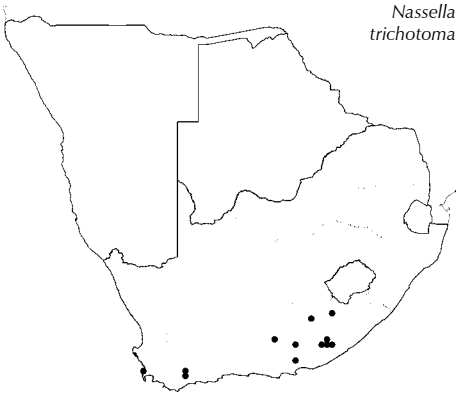
WHITE TUSSOCK, WITPOLGRAS

Very densely tufted perennial 250–1 000 mm. Leaf blade to 700 × 0.5 mm, tightly rolled, setaceous, scaberulous; ligule acute. Inflorescence contracted, usually not extending above leaves. Spikelet 4.0–5.0(–5.5) mm long (excluding awn); glumes ± equal, very long acuminate, membranous, hyaline, flushed purple; lemma ± laterally compressed, widest at middle, elliptic, symmetrical, strongly overlapping, rounded to crown; crown straight-sided, rim hairs less than 0.5 mm, finely tuberculate, hairy basally; awn ± centrally placed, up to 80 mm long, fine, inconspicuously geniculate, twisted, scabrid; callus short, obtuse, long hairy; anthers 1.2–1.5 mm long.

*Flowering*: January. *Ecology*: Open mountain grassland. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from southwestern

USA and Mexico. Also introduced to Australia and New Zealand. EC. *Economics*: Declared weed as serious invader; used as an ornamental in gardens in some parts of the world but readily escapes from cultivation; awns can act as a skin irritant.

Illustrations: Henderson: 13 (2001); Barkworth: 175 (2007).
Voucher: *Van Graan 411*.



*Nassella trichotoma*

***Nassella trichotoma** (Nees) Hack. ex Arechav., in *Les Gramineas Uruguayas*: 276 (1894). Type: Uruguay.

*Stipa trichotoma* Nees, in *Agrostologia brasiliensis*: 375 (1829).

NASSELLA TUSSOCK, SERRATED TUSSOCK, NASSELLA-POLGRAS

Very densely tufted perennial 250–650 mm high; mature plant droops. Leaf blade 150–450 × 0.25–0.50 mm, setaceous: ligule obtuse. Inflorescence open, sparsely branched. Spikelet 6.0–8.5 mm long (excluding awns); glumes ± equal, long finely acuminate, purple; lemma obovate, asymmetrical, widest near apex, strongly overlapping, narrowing abruptly to crown; crown not obvious, straight-sided; rim not obvious, either lacerate or entire, glabrous, coarsely tuberculate, hairy basally; awn 15–35 mm long, off centre, straight or geniculate, lower part scabrid or very short hairy, rest scabrid; callus acute, long hairy; anthers 1.0–1.5 mm long.

*Flowering*: August to January. *Ecology*: Mountain grasslands, old degraded lands and disturbed places. *Frequency in southern Africa*: Locally dominant. *Distribution*: Naturalised from South America (Argentina and Uruguay). Also introduced to France, Italy, Australia, New Zealand and USA. WC, EC. *Economics*: Declared weed as very serious invader; and in USA regarded as one of the 10 worst weeds in the country; awns can act as a skin irritant.

Illustrations: Henderson & Anderson: 41 (1966); Henderson: 14 (2001).
Voucher: *Theron 1856*.

## **Odontelytrum** Hack.

Hackel: 86 (1898); Stapf: t. 3074 (1922); Stapf & Hubbard: 1086 (1934); Du Toit: 258 (1977); Clayton & Renvoize: 668 (1982); Clayton & Renvoize: 305 (1986); Gibbs Russell et al.: 225 (1990); Watson & Dallwitz: 652 (1994); Phillips: 279 (1995); Chemisquy et al.: 107 (2010).

Alternate genus: *Cenchrus* L.



Figure 352.—*Odontelytrum abyssinicum* spikelet (to 12 mm). Photographer: M. Koekemoer.

Perennial; long-stoloniferous; culms many-noded, branched, floating, smooth, spongy. **Leaf blade** linear, expanded; *ligule* an unfringed membrane. **Inflorescence** spike-like, a coarse cylindrical raceme enveloped below by uppermost leaf sheath of which the blade is as long as the inflorescence; spikelet subtended by a solitary 4–6-lobed herbaceous scale or cupule, one lobe almost free, scabrid and awn-like, very long, the whole forming a purplish involucre-plus-bristle; *spikelets* solitary, supported on a blunt stipe, falling entire with involucre and peduncle. **Spikelet** lanceolate, dorsiventrally compressed; *glumes* unequal, awnless; lower glume hyaline, nerveless, sometimes absent; upper glume shorter than spikelet, membranous, 1–3-nerved. **Florets** 2, *lower floret* male; lemma convex on back, acute, 9-nerved, awnless; palea well developed; *upper floret* bisexual; *lemma* firmer than glumes, as long as spikelet, cartilaginous below, entire, 7-nerved, margins flat and exposed on palea, apex caudate, awnless; *palea* as long as lemma, scaberulous on keels. **Lodicules** 0. **Stamens** 3. **Ovary** ellipsoid or obovoid; style long, stigma 1, shortly plumose, exserted from apex. **Caryopsis** oblong, dorsiventrally compressed; embryo large, about $^1/_3$ the length of the fruit. **Photosynthetic pathway**. $C_4$; XyMS+. PCR cell chloroplasts centrifugal/peripheral.

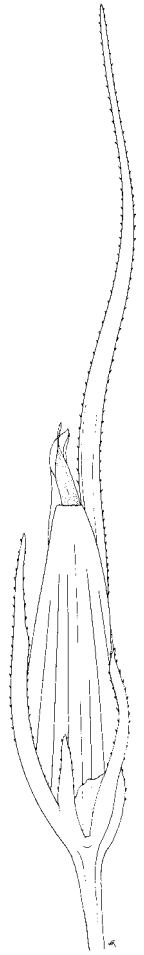


Figure 353.—*Odontelytrum abyssinicum*. Spikelet subtended by lobed scale or cupule. Artist: W. Roux.

**Species** 1, Tropical East Africa, from Ethiopia to southern Africa; *Odontelytrum abyssinicum* Hack., Mpumalanga, Free State.

Species treatment by M.T. Nembudani.

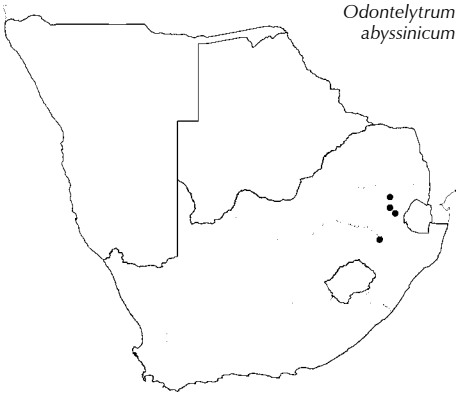
**Odontelytrum abyssinicum** Hack., in *Österreichische Botanische Zeitschrift* 48: 86 (1898). Type: Ethiopia, Gaffat to Debra Tabor, *Schimper 1121*.

Alternate name: *Cenchrus abyssinicus* (Hack.) Morrone

Perennial hydrophyte 600–1 000 mm high, often mat-forming; culms soft, spongy. Leaf blade 100–200 × 7 mm. Inflorescence spike-like; longest lobe of subtending cupule 12–35 mm long. Spikelet 10–12(14) × 3 mm; anther 4.0–5.3 mm long; style distinctly greyish black.



Figure 354.—*Odontelytrum abyssinicum* specimen




*Flowering*: December to February. *Ecology*: In stagnant and running water. *Frequency in southern Africa*: Infrequent. *Distribution*: Ethiopia, Tanzania and Yemen. M, FS.

Illustration: Clayton et al.: 669, fig. 154 (1982).
Anatomy vouchers: *Ellis 4101, 4102, 4711 & 4712*.
Voucher: *Du Toit 1083*.

## **Odyssea** Stapf

Stapf: 539 (1900) under *Diplachne* P.Beauv.; Stapf: t. 3100 (1922); Chippindall: 118 (1955); Launert: 132 (1970a); Phillips: 286 (1974); Clayton & Renvoize: 212 (1986); Gibbs Russell et al.: 225 (1990); Watson & Dallwitz: 654 (1994); Cope: 34 (1999); Müller: 230 (2007).

Perennial; prickly, rigid, glaucous; mat-forming; rhizomatous. **Leaf blade** linear or linear-lanceolate, rigid, thick, needle-like, pungent, flat or rolled; *ligule* a fringe of hairs. **Inflorescence** a dense and spike-like panicle with short, crowded sub-secund branches; *spikelets* 2-ranked, solitary, shortly pedicelled. **Spikelet** ± laterally compressed, disarticulating above glumes and between florets; *glumes* very unequal, similar, shorter than spikelet, scarious to membranous, narrowly ovate, rounded or weakly keeled, 1-nerved, subacute, awnless or minutely mucronate. **Florets** 4–9, bisexual, with *upper floret* reduced and sterile; *lemma* broadly elliptic, similar to firmer in texture to glumes, membranous, 3-nerved, lateral nerves long hairy all over, central nerve hairy towards base with short hairs, incised, shortly 2-lobed, mucronate or awned on back just below apex; *awn* short, stout; *callus* short, hairy; *palea* ± as long as lemma, lanceolate, truncate, 2-keeled, concave between keels, scabrid on keels, sparsely pilose. **Lodicules** 2, broadly cuneate, glabrous. **Stamens** 3. **Ovary** obovoid; styles free, plumose. **Caryopsis** an achene, 1.1–1.5 mm, ellipsoid, with free pericarp; hilum short; embryo large about ⅓ grain length. **Photosynthetic pathway**: $C_4$; XyMS+. PCR cell chloroplasts centripetal.



Figure 355.—*Odyssea paucinervis*. Artist: C.D. Bartman.

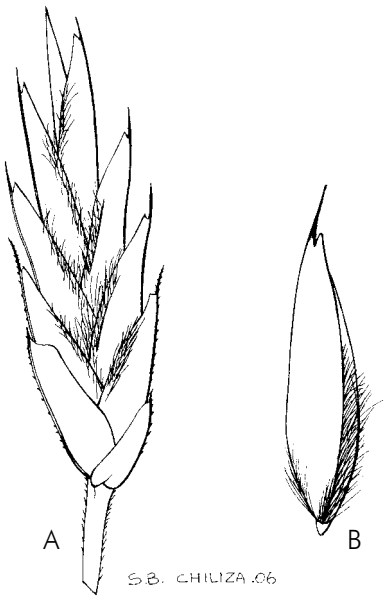



Figure 356.—*Odyssea paucinervis*. A, spikelet (7.5 × 2.0 mm); B, lemma (3.5 × 0.6 mm). Artist: S.B. Chiliza.



Figure 357.—*Odyssea paucinervis* spikelet (5–9 mm). Photographer: M. Koekemoer.

**Species** 2, Coastal Red Sea, tropical and southern Africa; 1 in southern Africa: *Odyssea paucinervis* (Nees) Stapf, Namibia, Botswana, Limpopo, North West and northwest Western Cape.

Species treatment by M.J. Moeaha.

### Quick guide to easily confused taxa:

1. Leaves hard, needle-like; plants prickly; ligule a fringe of hairs; lemma shortly awned . . . . . **Odyssea**
   Leaves not needle-like; plants not prickly; ligule unfringed to a fringed membrane; lemma awnless . . . . . 2
2. Lemma oblong-elliptic to elliptic, distinctly keeled, nerves minutely hairy below; hairs acute; callus short, blunt; palea 2-keeled . . . . . **Leptochloa eleusine**
   Lemma ovate, rounded on back in lower half, hairy near the base; hairs club-shaped; lateral nerves glabrous; callus absent; palea not keeled . . . . . **Coelachyrum yemenicum**

**Odyssea paucinervis** (Nees) Stapf, in *Hooker's Icones Plantarum* 31, t. 3100 (1922). Type: South Africa, Northern Cape, mouth of the Olifants River, *Drège*.

*Dactylis paucinervis* Nees, in *Florae Africae australioris*: 429 (1841). Type: South Africa, *Drége 2538*.

*Diplachne cinerea* Hack., in *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 11: 403 (1889). Type: Namibia, Klein Barmen spring, *Marloth 1365* (Z, holo.).

*Diplachne pungens* Hack., in *Bulletin de l'Herbier Boisser* 4: 25 (1896). Type: Namibia, Horebis (2215DA), *Fleck 717*.

PRICKLY BRACK GRASS, STEEKRIET, BRAKKWEEK

Densely tufted, spiny, mat-forming perennial 100–750 mm high; rhizomes very long, well developed, deeply buried underground; culms bearing dense tufts of spiny glaucous shoots at nodes. Tufts tend to grow in rows, due to the long rhizomes. Leaf blade 10–60 × 1–5 mm, rigid, pungent; sheaths striate, finely bearded at mouth. Inflorescence 15–70 mm long, light green; spikelets fewer than 15. Spikelet 5–9 mm long; 4–9-flowered; glumes unequal; lower glume acute; upper glume obtuse; lemma narrowly ovate; anthers 1–2 mm long.

*Flowering*: October to May. *Ecology*: Brackish or saline soil; in or near pans or rivers. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to the Congo River, Tanzania and Somalia. N, B, LIM, NW, NC, WC. *Economics*: Favoured by stock because of salty deposits on leaves.

Illustration: Chippindall: 119, fig. 89 (1955); Cope: 35, tab. 15 (1999); Müller: 231 (2007).
Anatomy vouchers: *Ellis 930, 1166, 1689, 2897, 4349, 4758 & 4782*.
Voucher: *Acocks 15602*.

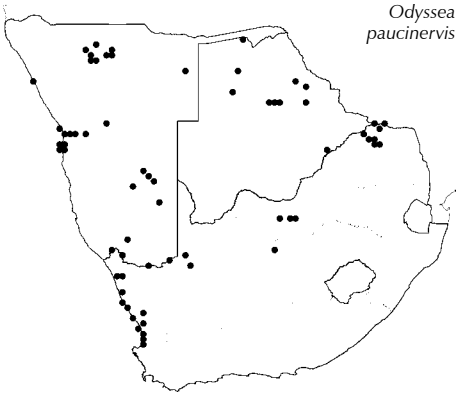






Figure 358.—*Olyra latifolia*. A, plant; B, pseudo-petiolate leaf base. Artist: C. Smith.

## *?**Olyra** L.

Linnaeus: 1261 (1759); Stapf: 746 (1900); Chippindall: 453 (1955); Clayton: 17 (1970); Launert: 23 (1971); Clayton & Renvoize: 62 (1986); Gibbs Russell et al.: 226 (1990); Watson & Dallwitz: 656 (1994).

Perennial, erect or straggling. **Leaf blade** expanded, ovate or ovate-lanceolate, long-acuminate, acute, with cross-veins, contracted at base into a short pseudo-petiole, disarticulating from

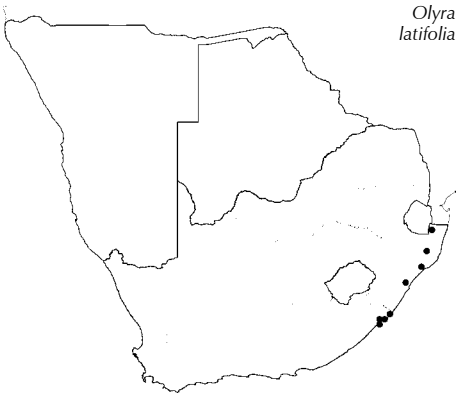


Figure 359—*Olyra latifolia* spikelet (7–10 mm). Photographer: M. Koekemoer.

sheaths; *ligule* an unfringed or a fringed membrane. **Inflorescence** a panicle, open or contracted, either solitary or two from upper leaf sheath; *spikelets* solitary, pedicelled, unisexual; male spikelets usually just below female spikelets on lower part of inflorescence. **Male spikelet** on filiform pedicels, narrow and smaller than female, readily deciduous; *glumes* 0 or represented by an obscure rim. **Floret** 1; *lemma* lanceolate, membranous, prominently keeled, 3-nerved, shortly awned; *palea* equalling or shorter than lemma, 2-nerved, membranous. **Lodicules** 3, rarely 2, small, cuneate. **Stamens** 3; anthers linear. **Female spikelet** on clavate pedicels, dorsiventrally compressed; *glumes* unequal or ± equal, equal to longer than spikelet, ovate to lanceolate, herbaceous, 5–9-nerved, cross-veined, acuminate, awned; awn up to 20 mm long, flexuous, longer than glume. **Floret** 1; *lemma* becoming indurated, crustaceous, white, shining, ovate, elliptic or lanceolate, convex, dorsally obtuse, entire, awnless; *callus* 0; *palea* similar to lemma. **Lodicules** 3, truncate, cuneate. **Stamens** 0. **Ovary** ± ellipsoid, acuminate, glabrous; styles connate at base or beyond middle; stigmas plumose. **Caryopsis** fusiform or ellipsoid; hilum long-linear, as long as caryopsis; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x$ = 7, 10, 11 (polyploidy).

**Species** 23, mainly tropical and subtropical America and Africa; 1 in southern Africa: *Olyra latifolia* L., KwaZulu-Natal into Eastern Cape.

Species treatment by A.C. Mashau.



*Olyra latifolia*

*?**Olyra latifolia** L., in *Systema naturae*, ed. 10,2: 1261 (1759). Type: Jamaica.

Bamboo-like scrambling perennial, 900–3 000 mm high. Leaf blade 170 × 25–70 mm, flat, broadly lanceolate, pseudopetiolate, cross-veins visible. Inflorescence a scanty whitish panicle, with male spikelets below and female spikelets above. Male spikelet smaller than female spikelet; glumes 0; lemma awned; anther 3.0–3.5 mm long. Female spikelet 7–10 mm long (excluding awns); lower glume drawn out into an awn up to 20 mm long; floret 1.

*Flowering*: December to May. *Ecology*: Wet forests; climbs over shrubs. *Frequency in southern Africa*: Rare but can be locally common. *Distribution*: Possibly naturalised from tropical America. Tropical America, Africa and Madagascar. KZN, EC.

Illustration: Chippindall: 452, fig. 376 (1955); Clayton et al.: 18, fig. 6 (1970).
Anatomy vouchers: *Ellis 3387* & *3388*.
Voucher: *Smook 5527*.

## **Oplismenus** P.Beauv.

Palisot de Beauvois: 14 (1810); Stapf: 415 (1899); Stent: 271 (1924); Chippindall: 362 (1955); Launert: 132 (1970a); Davey & Clayton: 151 (1978); Clayton & Renvoize: 541 (1982); Clayton & Renvoize: 271 (1986); Clayton: 6 (1989); Gibbs Russell et al.: 227 (1990); Watson & Dallwitz: 663 (1994).

Annual or perennial; trailing or scrambling, prostrate; shade-loving; culms slender and weak, often with aerial roots from nodes. **Leaf**

**blade** broadly linear to ovate, expanded, often minutely cross-veined; *ligule* a short, fringed membrane. **Inflorescence** of several 1-sided, spike-like racemes usually scattered and distant on a slender central axis, racemes sometimes reduced to fascicles, rachis narrow; *spikelets* abaxial, solitary, paired, subsessile or shortly pedicelled. **Spikelet** lanceolate to oblong, weakly laterally compressed to not noticeably or dorsiventrally compressed, falling with glumes; *glumes* ± equal, similar, shorter than spikelet, membranous, elliptic, 3–5-nerved, sometimes hairy, lower or both glumes long-awned from apex; awn of lower glume always longer. **Florets** 2; *lower floret* sterile or rarely male; lemma acute or very shortly awned; palea usually 0; *upper floret* bisexual; *lemma* dorsally compressed, similar in texture to glumes, coriaceous, lanceolate to elliptic, entire, shortly apiculate or obtuse, glabrous, smooth, shining, margins inrolled and clasping palea (paspalum-type), awnless; *callus* hairy; *palea* acute, relatively long, hyaline, 2-nerved. **Lodicules** 2, broadly cuneate, often very delicate. **Stamens** 3. **Ovary** ellipsoid, glabrous; styles distinct, plumose. **Caryopsis** oblong to ellipsoid. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 9, 10, 11$ (high polyploidy).

**Species** 5, tropics and subtropics; 3 in southern Africa, Caprivi in Namibia, northern Botswana, Swaziland, North West, Limpopo, Mpumalanga, Gauteng, KwaZulu-Natal and Eastern Cape.

Species treatment by M.J. Moeaha.

**Key to species:**

1. Glume awn minutely scabrid; annual . . . . . **O. burmannii**
   Glume awn smooth, sticky; perennial . . . . . 2
2. Spikelets 6–20 per inflorescence, arranged on an elongated raceme, if in fascicles then longest awn less than 7 mm long; longest awn of glumes 3–14 mm long . . . . . **O. hirtellus**
   Spikelets 2–6 per inflorescence, arranged in fascicles on a reduced raceme, longest awn of glumes 7–14 mm long. . . . . **O. undulatifolius**




Figure 360.—*Oplismenus hirtellus* spikelet. Artist: S.B. Chiliza.



Figure 361.—*Oplismenus hirtellus* spikelet (2–4 mm). Photographer: M. Koekemoer.

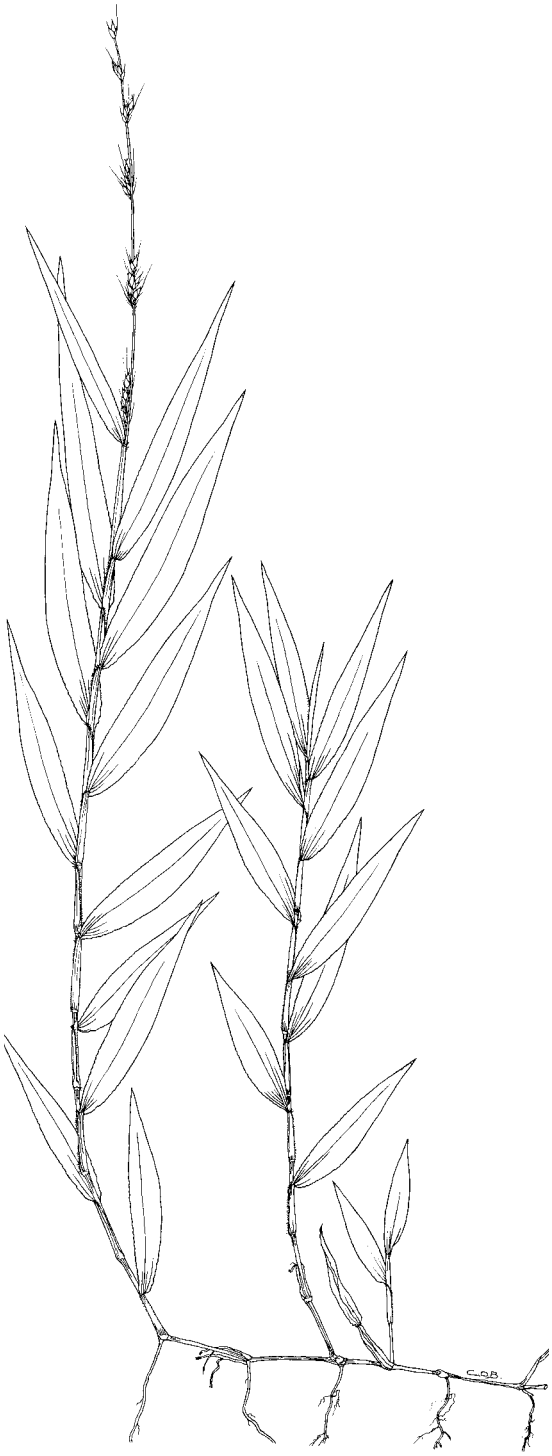
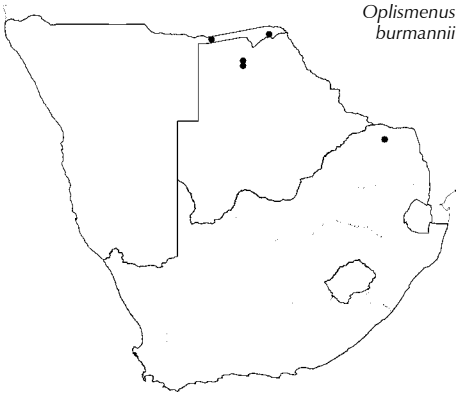



Figure 362.—*Oplismenus hirtellus*. Artist: C.D. Bartman.

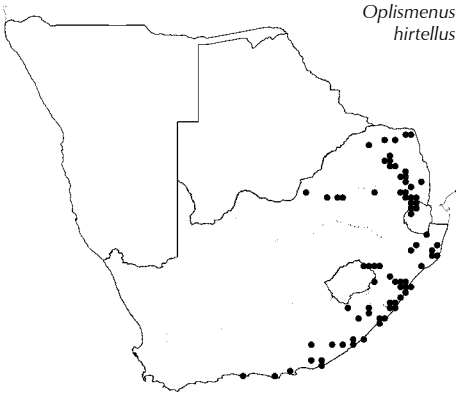

*Oplismenus burmannii*

**Oplismenus burmannii** (Retz.) P.Beauv., in *Essai d'une nouvelle agrostographie*: 54, 169 (1812). Type: India.

Prostrate or trailing annual; culm 100–250 mm long. Leaf blade 10–60 × 5–20 mm. Inflorescence 40–100 mm long; racemes elongated, up to 250 mm long; rachis with long bulbous-based hairs up to 3.5 mm long. Spikelet 2.5–3.5 mm long, hairy; glumes with minutely scabrid awns; lower glume awn 3–20 mm long.

*Flowering*: February to April. *Ecology*: In shade of forest or bushland trees. *Frequency in southern Africa*: Rare. *Distribution*: Northwards throughout tropical Africa, Asia and America. N, B, LIM.

Voucher: *P.A. Smith 583*.


*Oplismenus hirtellus*

**Oplismenus hirtellus** (L.) P.Beauv., in *Essai d'une nouvelle agrostographie*: 54, 170 (1812). Type: Jamaica.

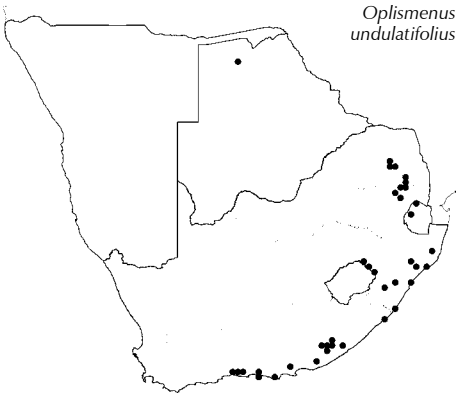
Basket grass

Prostrate perennial, sometimes climbing in undergrowth; culm 150–800 mm long. Leaf blade to 130 × 4–20 mm. Inflorescence 60–180 mm long; racemes elongated, up 300 mm long; 6–20 spikelets. Spikelet 2–4 mm long; glumes with smooth sticky awns, longest awn 3–14 mm long; lower lemma awn 0.5–1.2 mm long; anther 1.4–2.5 mm long.

[Very variable in leaf and inflorescence. *O. hirtellus* integrates with *O. undulatifolius*, which has clumped spikelets. Specimens with underdeveloped inflorescences or spikelets may be difficult to place or separate as there are intermediary populations that fall within the morphological range of *O. hirtellus* (Davey & Clayton 1978).]

*Flowering*: January to June (rarely at other times). *Ecology*: In forest shade. *Frequency in southern Africa*: Locally common. *Distribution*: Throughout tropics except southeast Asia. S, L, LIM, NW, G, M, KZN, WC, EC.

Anatomy vouchers: *Ellis 310, 377, 391, 1544, 1579, 1868* & *3361*.
Voucher: *Liebenberg 8035*.


*Oplismenus undulatifolius*

**Oplismenus undulatifolius** (Ard.) Roem. & Schult., in *Systema Vegetabilium* ed. 15,2: 482 (1817), non P.Beauv. (1812), nom. nud. Type: Italy.

Trailing perennial; culm 150–500 mm long. Leaf blade 10–70 × 4–15 mm. Inflorescence 100–125 mm long; with 2–6 spikelets fascicled into wedge-shaped clumps; rachis glabrous or with stiff hairs up to 2.8 mm long. Spikelet 2.5–4.0 mm long; glumes with smooth, sticky awns, longest awn 7–14 mm long; lower lemma awn 0.3–1.8 mm long; anther 1.7–2.4 mm long.

[Intergrades with *O. hirtellus*, which has spikelets in elongated racemes.]

*Flowering*: January to July. *Ecology*: In forest shade. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards into upland areas in Africa; temperate areas in the northern hemisphere. B, S, LIM, M, KZN, WC, EC.

Voucher: *Davidse 5827*.

## **Oropetium** Trin.

Trinius: 98 (1820); Stapf: 741 (1900); Stent: 303 (1924); Phillips: 146 (1951); Chippindall: 204 (1955); Renvoize: 306 (1974); Phillips: 467 (1975); Clayton & Renvoize: 211 (1986); Gibbs Russell et al.: 228 (1990); Watson & Dallwitz: 668 (1994); Cope: 32 (1999).



Figure 363.—*Oropetium capense* rachis and several spikelets (2.5–4.0 mm). Photographer: M. Koekemoer.

Perennial, small, densely tufted, cushion-forming; leaves mainly basal. **Leaf blade** rolled, folded or flat; *ligule* a short, fringed, hyaline membrane. **Inflorescence** a solitary, slender, straight or gradually curved terminal spike-like raceme; *spikelets* subsessile, solitary, closely or loosely 2-ranked on opposite or subopposite sides of rachis, ± embedded in rachis; rachis tough or fracturing tardily in segments of 1–4(–8) spikelets. **Spikelet** laterally compressed; *glumes* of terminal spikelet equal and similar; glumes of lateral spikelets unequal, dissimilar, awnless; lower glume suppressed or reduced; upper glume narrowly lanceolate to lanceolate, rigid except at hyaline margins, subacute to acuminate, (1–)3-nerved. **Floret** 1, rarely 2, bisexual; *lemma* oblong or lanceolate, membranous, obscurely or distinctly keeled, at least in upper part, finely 1–3-nerved, hairy along nerves, truncate or minutely 3-lobed, mucronate; *palea* equalling lemma, faintly 2-nerved. **Lodicules** 2, minute, cuneate. **Stamens** 3; anthers minute. **Ovary** glabrous; styles slender, distinct, plumose. **Caryopsis** small, about 1.5 mm long, ellipsoid-oblong; hilum short; pericarp loosely adherent (removable when soaked); embryo small, about $^1/_4$ the length of the fruit. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines even. PCR sheath extensions absent. PCR cell chloroplasts centripetal. **Cytology**: $x = 10$ (polyploidy).

**Species** 3–6, dry areas of India and Africa; 1 in southern Africa: *Oropetium capense* Stapf, widespread.

Species treatment by M.T. Nembudani.

**Oropetium capense** Stapf, in *Flora capensis* 7: 742 (1900). Type: South Africa, Northern Cape, Asbestos Mts., *Burchell 2057* & *2091*; Eastern Cape, near Somerset East, *Macowan* (syntypes).

DWARF GRASS, HAASGRAS

Densely tufted, dwarf perennial 25–100 mm high (rarely to 170 mm). Leaf blade 10–40 × 1.2 mm. Inflorescence a solitary raceme, straight or curved; spikelets sunk into rachis. Spikelet 2.5–4.0 mm long; upper glume of lateral spikelet 2–3 mm long; anther 0.5 mm long.



Figure 364.—*Oropetium capense*. Portion of rachis with several spikelets (10.0 × 1.3 mm). Artist: W. Roux.

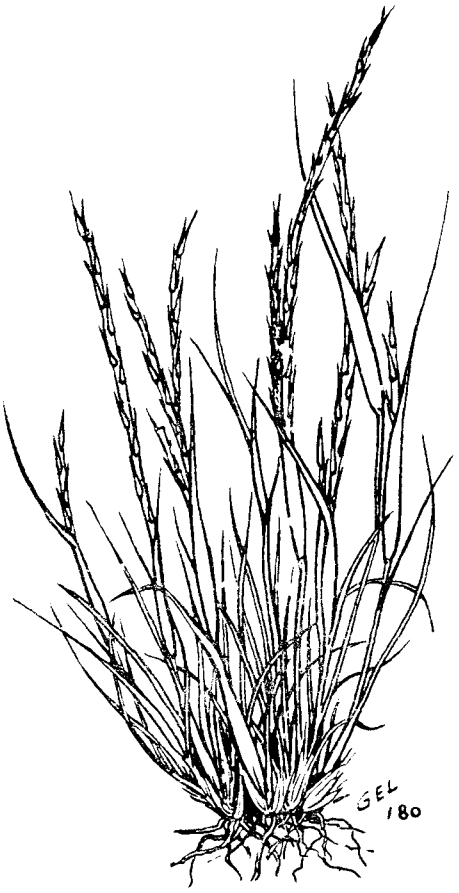
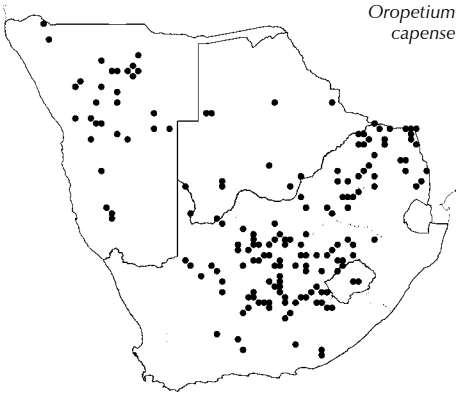



Figure 365.—*Oropetium capense*. Artist: G.E. Lawrence.




*Flowering*: December to May. *Ecology*: In shallow soil; in open places or rocky outcrops or in crevices and hollows on exposed rocks, often in badly grazed or disturbed veld. *Frequency in southern Africa*: Locally common. *Distribution*: Mozambique, Zimbabwe, Kenya, Tanzania to Chad and Somalia; and tropical Arabia. N, B, L, LIM, NW, G, M, FS, NC, WC, EC.

Illustration: Cope: 33, tab 14 (1999).
Anatomy vouchers: *Ellis 543, 1231, 1934 & 2037.*
Voucher: *Van Rooyen 3130*.

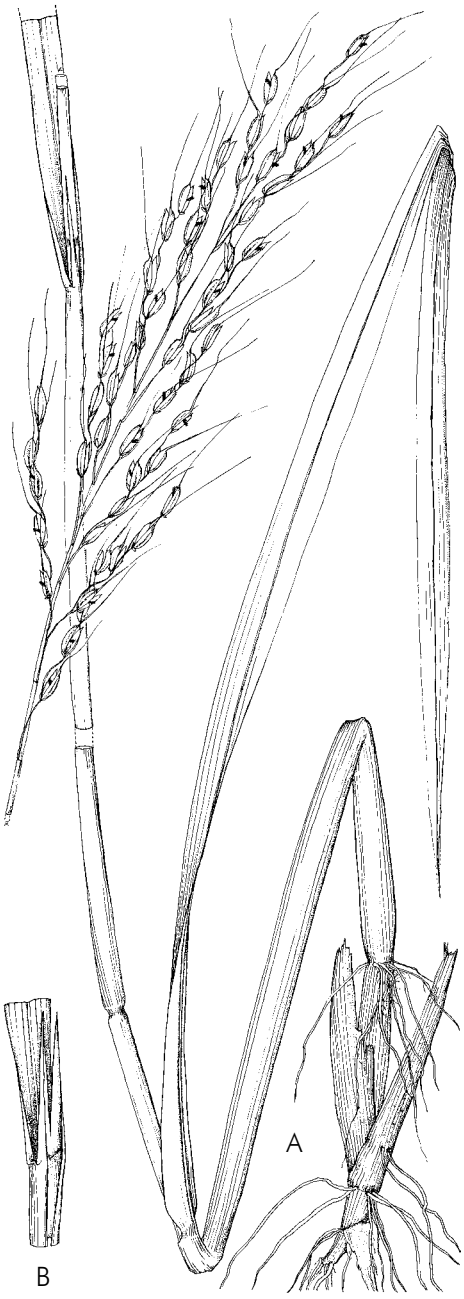



Figure 366.—*Oryza longistaminata*. A, plant; B, ligule. Artist: C.D. Bartman.

## **Oryza** L.

Linnaeus: 333 (1753); Stent: 274 (1924); Chippindall: 32 (1955); Launert: 134 (1970a); Clayton: 28 (1970); Launert: 31 (1971); Clayton & Renvoize: 71 (1986); Gibbs Russell et al.: 229 (1990); Watson & Dallwitz: 672 (1994); Phillips: 10 (1995).

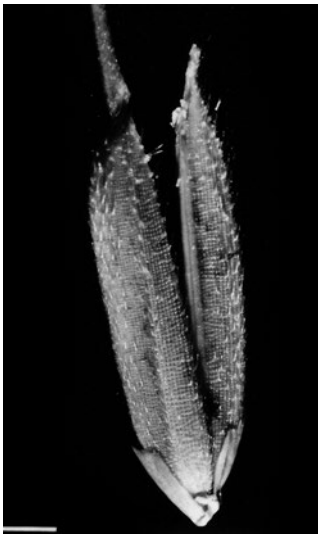


Figure 367.—*Oryza longistaminata* spikelet (7–9 mm). Photographer: M. Koekemoer.

Annual or perennial, tufted, sometimes decumbent; long rhizomatous; rooting at nodes. **Leaf blade** expanded, long-linear; usually auriculate; *ligule* a long, firm, unfringed membrane. **Inflorescence** an open or contracted panicle; *spikelets* solitary, shortly pedicelled, obliquely or transversely attached to pedicel; pedicels linear, somewhat cup-shaped at apex. **Spikelet** unconventional, strongly laterally compressed, scabrid to hispid; *glumes* 0 and represented by a small, 2-lobed cupule, or present and then ± equal, reduced and small, suborbicular, thinly membranous, nerveless, acuminate, awnless. **Florets** 3, *lower* 2 *florets*, sterile, reduced to narrow or bristle-like lemmas, much shorter than spikelet; *upper floret* bisexual; *lemma* coriaceous, oblong to elliptic, strongly keeled, rigidly ciliate, scabrid, rugose, strongly 3–9-nerved, apex obtuse or acute, mucronate or awnless (mostly in cultivated forms) or awned; *awn* 10–160 mm long, straight, sometimes flexuous, much longer than body of lemma, scabrid; *palea* as long as lemma and similar in texture, 3-nerved. **Lodicules** elliptic-lanceolate to obovate, 2-lobed, rarely entire. **Stamens** 6; anthers linear. **Ovary** glabrous; styles short, free; stigmas plumose. **Caryopsis** not grooved; hilum long-linear; embryo small. **Cytology**: $x = 12$ (polyploidy). **Photosynthetic pathway**: $C_3$; XyMS+.

[The spikelet is unconventional and there is dissent as to whether the cupule and the lower two structures are glumes or sterile lemmas (see Terrell et al. 2001). In this work the lower 2 structures are referred to as glumes.]

**Species** ± 25, throughout tropics and subtropics; 3 in southern Africa, northern regions of Namibia and Botswana, Swaziland, Limpopo and KwaZulu-Natal.

Species treatment by M.T. Nembudani.

**Quick guide to easily confused genera:**

1. Spikelet without glumes or these reduced to a very obscure rim at apex of pedicel . . . . . **Leersia**
   Spikelet with 2 reduced glumes . . . . . 2
2. Lemma awned (mucronate or awnless in cultivated forms), strongly keeled; spikelet strongly laterally compressed . . . . . **Oryza**
   Lemma awnless, scarcely keeled; spikelet slightly laterally compressed . . . . . **Prosphytochloa**

**Key to species:**

1. Spikelet 5–6 mm long (excluding awns), transversely attached to pedicel . . . . . **O. punctata**
   Spikelet more than 7 mm long (excluding awns), obliquely attached to pedicel . . . . . 2
2. Ligule of lower leaves 2–6 mm long; glumes ± ½ the spikelet length . . . . . **O. barthii**
   Ligule of lower leaves 15–45 mm long; glumes ¼ the spikelet length . . . . . 3
3. Perennial, rhizome extensive; spikelet deciduous, awned; awn 20–80 mm long; anther 5.5–6.5 mm long . . . **O. longistaminata**
   Annual or short-lived perennial; rhizome not well developed; spikelet persistent, usually awnless; awn up to 42 mm long; anther 1.0–2.5 mm long . . . . . *__O. sativa__

   [*_O. sativa_ L., the cultivated rice, is an annual or short-lived perennial with a long ligule and spikelets that are usually awnless. Although grown in southern Africa, escapes from cultivation have not yet been reported.]

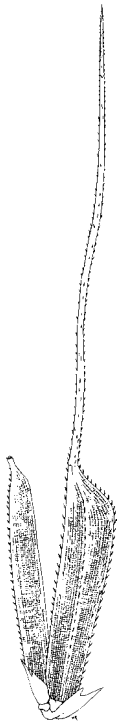
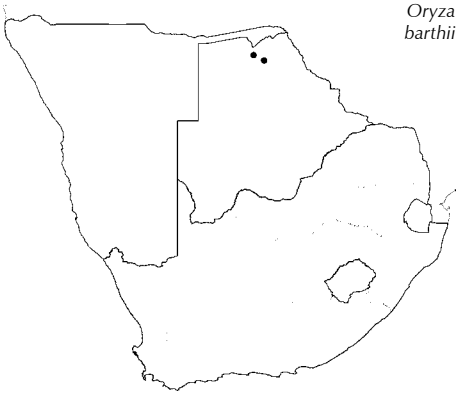


Figure 368.—*Oryza longistaminata* spikelet (35.0 × 3.2 mm). Artist: W. Roux.

**Oryza barthii** A.Chev., in *Bulletin du Museum d'histoire naturelle, Paris* 16: 405 (1911). Type: Chad, Baguirmi region, *Chevalier 9615* (P, holo.).



*Oryza barthii*

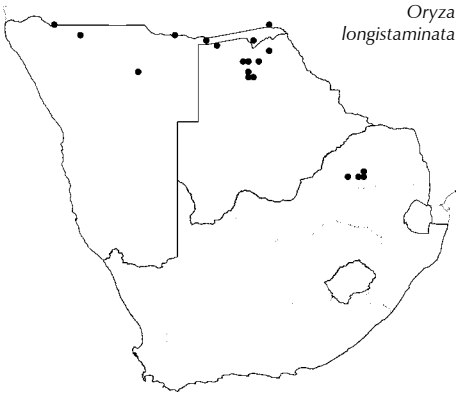
Robust, annual hydrophyte to 1 500 mm high. Leaf blade to 450 × 15 mm, shortly auricled; ligule 2–6 mm long, truncate. Spikelet 7–11 mm long, obliquely attached to pedicel; glumes ± ½ the spikelet length; lemma and palea apex usually purple; lemma awn 40–160 mm long, scabrid; anther 1.7–2.0 mm long.

[Usually does not produce mature grains.]

*Flowering*: February to March. *Ecology*: Floodplain pans in shallow water and marshy ground around pans. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to tropical Africa. B.

Anatomy voucher: *Ellis 2909*.
Voucher: *P.A. Smith 1937*.

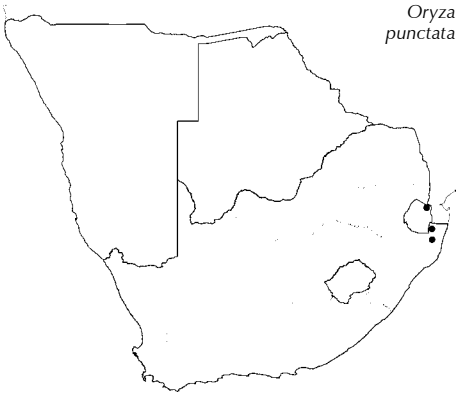
**Oryza longistaminata** A.Chev. & Roehr., in *Compte rendu Académie des Sciences* 159: 561 (1914). Type: Chad, Fort Lamy, *Chevalier 10306* (P, lecto.).



*Oryza longistaminata*

WILD RICE

Perennial hydrophyte to 1 200 m high; rhizome extensive, branched; culms spongy. Leaf blade to 450 × 15 mm, long auricled; ligule 15–45 mm long, acute, often split along middle. Spikelet 7–9 mm long, obliquely attached to pedicel; glumes ¼ the spikelet length; lemma awn 20–80 mm long, scabrid; anther 5.5–6.5 mm long; stigma long.



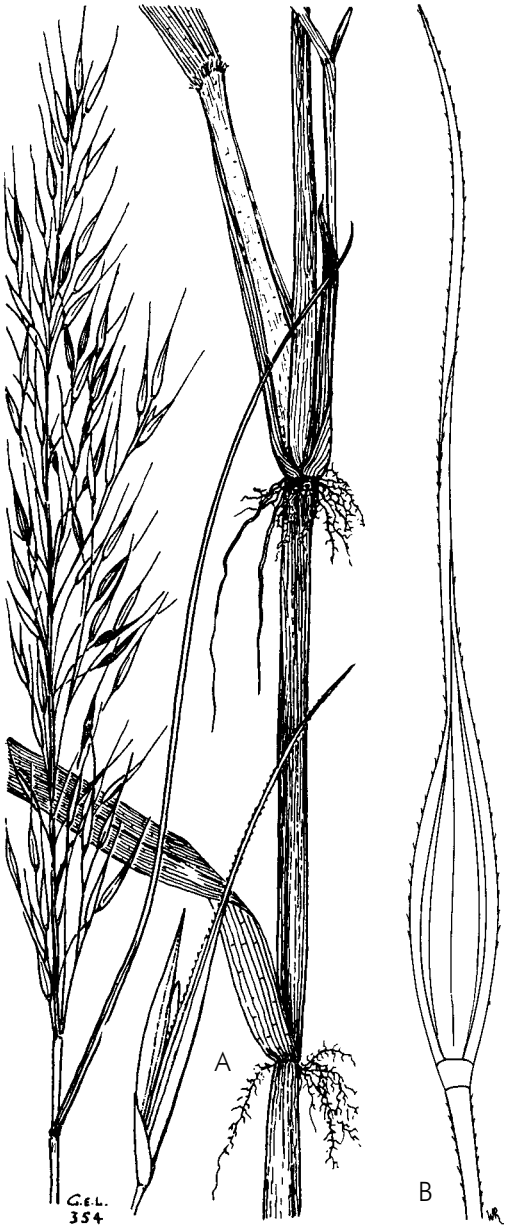




Figure 369.—*Oryzidium barnardii*. A, plant; B, spikelet with reduced lower glume, lower lemma and long awned upper glume (dorsal view) (18.0 × 1.6 mm). Artists: A, G.E. Lawrence; B, W. Roux.

[The plants growing at Nylsvlei, Limpopo are said to be a single clone and therefore the whole population could disappear if there is any serious environmental change.]

*Flowering*: October to May. *Ecology*: Swamps and floodplains, often in deep water. *Frequency in southern Africa*: Locally common. *Distribution*: Throughout tropical Africa and Madagascar. N, B, LIM.

Illustration: Clayton: 29, fig. 10 (1970).
Anatomy vouchers: *Smook & Gibbs Russell 1942, 1947*; *Ellis 1124, 1609*, *2012* & *2013*.
Voucher: *Killick & Leistner 3029*.

**Oryza punctata** Kotschy ex Steud., in *Synopsis plantarum glumacearum* 1: 3 (1854). Type: Sudan Republic, Blue Nile Province, Jebel Arashkol, *Kotschy 136*.

Annual hydrophyte 600–1 200 mm high; culms spongy. Leaf blade to 300 × 10 mm, auricles short; ligule 3–10 mm long, truncate, splits when dry. Spikelet 5–6 mm long, transversely attached to pedicel; lemma awn 10–70 mm long, scabrid; anther 1.3–1.5 mm long; stigma black.

*Flowering*: November to April. *Ecology*: Swampy soils around floodplain pans and along streams. *Frequency in southern Africa*: Rare. *Distribution*: Tropical Africa and Madagascar; also Thailand. S, KZN. *Economics*: Weed in rice paddies.

Illustration: Clayton: 29, fig. 10 (1970).
Anatomy vouchers: *Ellis 3630* & *3631*.
Voucher: *Ward 2054*.

## **Oryzidium** C.E.Hubb. & Schweick.

Hubbard & Schweickerdt: 326 (1936); Chippindall: 425 (1955); Launert: 134 (1970a); Clayton & Renvoize: 58 (1986); Clayton: 58 (1989); Gibbs Russell et al.: 230 (1990); Watson & Dallwitz: 674 (1994).

Perennial, stoloniferous, rooting from lower nodes; floating; culms soft, spongy and compressible. **Leaf blade** expanded, linear, leaf sheaths broad, papery; *ligule* a very short fringe of hairs. **Inflorescence** a panicle, somewhat contracted; *spikelets* solitary, pedicelled; pedicels coarsely scabrid. **Spikelet** lanceolate, dorsiventrally compressed, falling with glumes and pedicels; *glumes* very unequal in size, dissimilar in appearance, 3–7-nerved; lower glume usually reduced to an ovate, membranous scale; upper glume lanceolate, as long as spikelet, stiffly membranous, scabrid on nerves, produced at apex into an stiff awn; awn 3 or 4 × as long as body of glume, scabrid. **Florets** 2; *lower floret* male, separated from upper floret by a long rachilla internode; lemma lanceolate, membranous, 5-nerved,

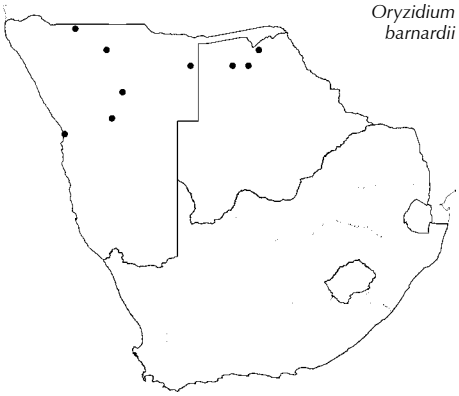


Figure 370.—*Oryzidium barnardii* spikelet (8–10 mm). Photographer: M. Koekemoer.

awned; palea shorter than lemma, subhyaline; *upper floret* bisexual; *lemma* similar to, to firmer in texture than glumes, acute, entire, glabrous, 7-nerved, mucronate, margins flat and exposed on palea (digitaria-type), *palea* similar to lemma. **Lodicules** 2, cuneate. **Stamens** 3. **Ovary** ellipsoid, glabrous; style distinct, plumose. **Caryopsis** 3.0–3.5 mm, ellipsoid; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR cell chloroplasts seemingly centripetal.

**Species** 1, southern tropical Africa: *Oryzidium barnardii* C.E.Hubb. & Schweick., Namibia and northern Botswana.

Species treatment by M.J. Moeaha.




**Oryzidium barnardii** C.E.Hubb. & Schweick., in *Kew Bulletin* 1936: 326 (1936). Type: Namibia, Ovamboland, Tamansu in vleis, March–April 1923, *Barnard*.

Hydrophytic perennial; floating culms to 1 200 mm long, rooting and branching at lower nodes. Leaf blade 150–200 × 6–8 mm, sheath broad, papery and straw coloured. Spikelet 8–10 × 1.5 mm; lower glume an ovate white scale, 1–2 mm long; upper glume 8–10 mm long, awn scabrid, 10–18 mm long; upper floret separated from lower by a rachilla internode 1 mm long; anthers 2.5–3.0 mm long.

*Flowering*: October to May. *Ecology*: Pans and dams. *Frequency in southern Africa*: Infrequent. *Distribution*: Zambia and Zimbabwe. N, B.

Illustration: Clayton: 59, tab. 14 (1989).
Anatomy vouchers: *Ellis 2917*.
Voucher: *Smith 1944*.




Figure 372.—*Oxyrhachis gracillima*. A, plant; B, portion of rachis showing sessile spikelets, and fused pedicels and internodes (10.1 × 1.7 mm). Artist: W. Roux.

## **Oxyrhachis** Pilg.

Pilger: 655 (1932); Clayton & Renvoize: 855 (1982); Clayton & Renvoize: 368 (1986); Gibbs Russell et al.: 231 (1990); Watson & Dallwitz: 681 (1994); Cope: 180 (2002).



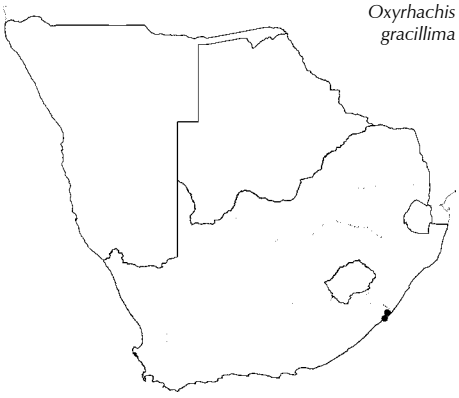
Figure 371.—*Oxyrhachis gracillima* spikelet pair (3–6 mm). Photographer: M. Koekemoer.

Perennial, tufted. **Leaf blade** linear, folded or rolled; *ligule* a fringed membrane or a fringe of hairs. **Inflorescence** terminal, with a single cylindrical raceme; spikelets apparently borne singly since pedicels fused to rachis and indistinguishable from internode; internodes semi-cylindrical and strongly oblique top and bottom; *spikelets* sunken, in pairs: one sessile, the other pedicelled (but suppressed). **Sessile spikelet** dorsiventrally compressed, falling with glumes and adjacent joint; *glumes* ± equal, rounded on back, awnless, dissimilar; lower glume lanceolate, obtuse, smooth, rounded on flanks, wingless; upper glume apically notched or entire. **Florets** 2, *lower floret* sterile, reduced to a hyaline lemma, awnless, palea 0; *upper floret* bisex-

ual, *lemma* less firm in texture than glumes, 2-nerved, entire, awnless; *callus* obtuse; *palea* small or suppressed. **Lodicules** 2, fleshy, glabrous. **Stamens** 3. **Ovary** glabrous. **Caryopsis** oblong-ellipsoid, dorsiventrally compressed; hilum short; embryo large. **Pedicelled spikelet** and pedicel suppressed or fused and indistinguishable from internode. **Photosynthetic pathway**: $C_4$; XyMS-. PCR sheath outlines even. PCR sheath extensions absent.

**Species** 1, Africa and Madagascar: *Oxyrhachis gracillima* (Baker) C.E.Hubb., southern KwaZulu-Natal and Eastern Cape.

Species treatment by A.C. Mashau.



*Oxyrhachis gracillima*

**Oxyrhachis gracillima** (Baker) C.E.Hubb., in *Hooker's Icones Plantarum*: 35, t. 3454 (1947). Type: Madagascar, *Baron 4457* (K, holo.).

Densely tufted perennial 200–600 mm high. Leaf blade 50–300 mm long, filiform; ligule a fringed membrane. Inflorescence 50–120 mm long, very slender, often flushed purple; spikelets sunken in rachis. Sessile spikelet 3–6 mm long; lower glume smooth; upper lemma less firm in texture than glumes, awnless; anther 2.0–2.5 mm long. Pedicel of suppressed pedicelled spikelet probably present but fused and indistinguishable from the internode.

*Flowering*: June. *Ecology*: Wet places. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to tropical Africa and Madagascar. EC, KZN.

Illustration: Clayton et al.: 856, fig. 204 (1982).
Voucher: *Huntley 791*.

## **Oxytenanthera** Munro

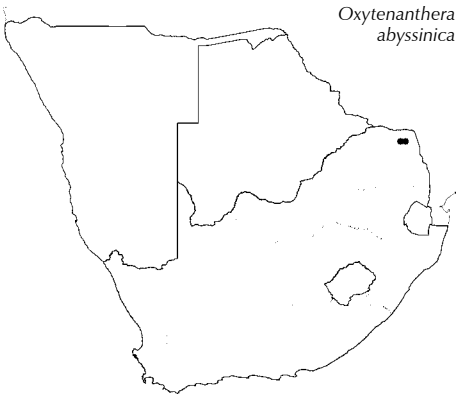
Munro: 126 (1868); Henkel: 244 (1927); Clayton: 11 (1970); Clayton & Renvoize: 56 (1986); Gibbs Russell et al.: 232 (1990); Watson & Dallwitz: 683 (1994); Phillips: 6 (1995).

Perennial; woody; tufted; culm sheath blades narrow. **Leaf blade** linear-lanceolate to lanceolate, pseudopetiolated, expanded, deciduous from sheath. **Inflorescence** a dense, spiny, globose cluster of spikelets at tips of leafy branchlets, each spikelet cluster subtended by a short-bladed papery sheath. **Spikelet** subtended by several short papery bracts, falling entire at maturity; *glumes* unequal, 17–30-nerved with cross-nerves connecting them. **Florets** 1–4; *lower florets* male or sterile; *upper florets* bisexual; *lemma* 11–23-nerved with cross-nerves, apically awned; *palea* 16–19-nerved. **Lodicules** usually 0. **Stamens** 6; filaments united. **Ovary** glabrous; apical appendage long, stiff and tapering. **Hilum** long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 12$ (polyploidy).

**Species** 1, Africa: *Oxytenanthera abyssinica* (A.Rich.) Munro, specimens from Limpopo Province resemble this species vegetatively but until flowering material is obtained the identification remains tentative.

Species treatment by M.T. Nembudani.

**Oxytenanthera abyssinica** (A.Rich.) Munro, in *Transactions of the Linnean Society of London* 26: 127 (1868). Type: Ethiopia, Tigre, Tacazze valley, *Quartin Dillon & Petit*; Aderbati, *Quartin Dillon & Petit* near Djeladjeranne, *Schimper 501* (syntypes).


*Oxytenanthera abyssinica*

Clump-forming, woody bamboo to 10 m high; rhizomatous; culms 50–100 mm in diameter, drooping; culm sheath with dense brown hairs on inner surface, auricles absent; branches clustered at nodes. Leaf blade 50–250 × 10–30 mm. Inflorescence globose, spiky. Spikelet 15–45 mm long, pungent; glumes and sterile lemmas shorter than spikelet; bisexual lemma ± as long as spikelet.

[There is some doubt as to the identification of this plant in South Africa and so far no flowers have been collected for a positive identification.]

*Flowering*: unknown in southern Africa. *Ecology*: In shade of larger trees. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to East Africa, Ethiopia and west to Senegal. Maintained in semi-cultivation in the Limpopo Province, near Sibasa. LIM. *Economics*: The Venda people use it for making flutes and it was regarded as sacred.

Illustration: Phillips: 5 (1995).
Voucher: *Smook & Soderstrom 1983*.




Figure 373.—*Panicum ecklonii*. A, plant; B, pectinate glume and lower lemma. Artist: F. Lauth.

## **Panicum** L.

Linnaeus: 55 (1753); Stapf: 382 (1898); Stent: 263 (1924); Chippindall: 321 (1955); Launert: 135 (1970a); Clayton & Renvoize: 461 (1982); Clayton & Renvoize: 272 (1986); Webster: 118 (1987); Botha et al.: 89 (1988); Renvoize: 9 (1989); Gibbs Russell et al.: 233 (1990); Smook & Ellis: 59 (1993); Watson & Dallwitz: 684 (1994); Phillips: 202 (1995); Lebrun & Stork: 265 (1995); Simon: 571 (2003); Fish: 238 (2009).

*Psilochloa* Launert: 156 (1970b).

Annual or perennial, of various habits. **Leaf blade** linear-lanceolate or long-linear, expanded or rolled; *ligule* an unfringed or a fringed membrane or a fringe of hairs. **Inflorescence** a panicle, open or rarely contracted; *spikelets* pedicelled. **Spikelet** lanceolate, oblong, elliptic or almost spherical, usually dorsiventrally compressed, mostly falling with glumes; *glumes* unequal, rarely equal, membranous to hyaline, dissimilar or similar, usually awnless; lower glume usually shorter than spikelet, 0–7-nerved, awnless or minutely awned; upper glume as long as spikelet, 3–14-nerved. **Florets** 2; *lower floret* male or sterile; lemma very similar to upper glume, with or without a palea; *upper floret* bisexual, *lemma* similar to firmer in texture than glumes, usually becoming indurated, elliptic, ovate-elliptic or rarely oblong, obtuse or subacute, smooth or transversely rugose, glabrous, margins inrolled and clasping edges of palea, awnless; *palea* similar to and sub-equalling lemma, often with marginal flaps at base. **Lodicules** 2, broadly cuneate. **Stamens** 3. **Ovary** ellipsoid, glabrous; styles distinct, plumose above. **Caryopsis** ± ellipsoid, dorsiventrally compressed. **Photosynthetic pathway**: $C_4$ or $C_3$.

**Species** ± 470, tropical, subtropical and warm temperate; 44 indigenous and naturalised in southern Africa, widespread.

Species treatment by L. Fish.

### Key to species:

1. Glumes and lower lemma apices pectinate . . . . . **P. ecklonii**
   Glumes and lower lemma entire . . . . . 2
2. Upper lemma conspicuously transversely rugose . . . . . 3
   Upper lemma smooth, scaberulous or if sculptured not conspicuously rugose . . . . . 4
3. Spikelet 2.5–3.0(–4.0) mm long, cartilaginous; lower lemma back rounded, all nerves clearly visible on the closed spikelet; inflorescence much branched, secondary branches usually flexible; lowest branches arranged in whorls; spikelet glabrous or hairy . . . . . **P. maximum**
   Spikelet 3.2–3.5 mm long, somewhat leathery; lower lemma usually with midnerve, the only nerve clearly visible on the closed spikelet, sunk in a groove; inflorescence sparsely branched, secondary branches usually absent, lowest branches not whorled, either one or paired; spikelet scabrid or scaberulous . . . **P. infestum**

4(2). Spikelet 4.5–5.5 mm long . . . . . 5
   Spikelet up to 4.3 mm long . . . . . 9
5. Lower glume separated from upper glume by a distinct internode . . . . . 6
   Lower glume not separated from upper glume . . . . . 7
6. Perennial; upper glume 7-nerved; inflorescence branches usually with clavate hairs . . . . . **P. deustum**
   Annual; upper glume 11–15-nerved; inflorescence branches never with clavate hairs . . . . . ***P. miliaceum**

7(5). Perennial . . . . . **P. kalaharense**
   Annual . . . . . 8

8. Lower glume 1/6–1/5 the spikelet length, obtuse; inflorescence with branchlets adpressed along secondary branches, spikelets usually along entire length of the branches, lowest branches not whorled . . . . . **P. pilgerianum**
Lower glume nearly as long as spikelet, long acuminate; inflorescence branches spreading, spikelets at the ends, lowest branches whorled . . . . . **P. volutans**
9(4). Glumes as long as spikelet . . . . . 10
Glumes shorter or only upper glume as long as spikelet . . . . . 13
10. Inflorescence branches with flat glandular patches . . . . . 11
Inflorescence branches eglandular, or if glandular, patches not flat . . . . . 12
11. Leaves thin, cross-veins conspicuous; plant usually erect; upper lemma densely verruculose/warty; lower glume not separated from upper glume; spikelet up to 1.5 mm long; lower floret sterile . . . . . **P. heterostachyum**
Leaves thick and slightly leathery, cross-veins not conspicuous; plant usually trailing; upper lemma smooth and shiny, sometimes with scattered papillae at base and apex; lower glume separated from upper glume by short internode; spikelets (1.5)2.0–2.5 (3.0) mm long; lower floret male . . . . . **P. glandulopaniculatum**
12(10). Spikelet 2.5–4.0 mm long; lower glume 5–7-nerved . . . . . **P. aequinerve**
Spikelet 1.8–2.4 mm long; lower glume 3-nerved . . . **P. silvestre**
13(9). Lower glume separated from upper glume by internode . . . . 14
Lower glume not separated by internode . . . . . 16
14. Spikelet 1.5–2.5 mm long; upper glume 5-nerved . . . **P. laticomum**
Spikelet 3.5–6.0 mm long; upper glume 7–15-nerved . . . . . 15
15. Perennial; lower palea well developed; upper glume 7-nerved; inflorescence usually with clavate hairs . . . . . **P. deustum**
Annual; lower palea reduced; upper glume 11–15-nerved; inflorescence never with clavate hairs . . . . . ***P. miliaceum**
16(13). Spikelet rounded to nearly globose; upper lemma verrulose (look carefully) . . . . . **P. natalense**
Spikelet oblong, ovate to elliptic; upper lemma smooth, granulose or papillose . . . . . 17
17. Lower glume not clasping or cuff-like . . . . . 18
Lower glume clasping right round or cuff-like . . . . . 23
18. Lower glume 0–1-nerved . . . . . 19
Lower glume 3–5-nerved (at least at base), rarely 1-nerved . . . .20
19. Upper glume 7–9-nerved; spikelet apex obtuse; inflorescence branches with clavate hairs usually present. . . . **P. hymeniochilum**
Upper glume 5-nerved; spikelet apex acute to acuminate; inflorescence branches always without clavate hairs . . . . . **P. monticola**
20(18). Upper glume 5-nerved . . . . . **P. parvifolium**
Upper glume 7–9-nerved . . . . . 21
21. Lower glume nearly as long to longer than spikelet . . . **P. silvestre**
Lower glume up to 1/2 as long as spikelet . . . . . 22
22. Leaf blade 150–350 mm long; upper lemma densely long hairy above . . . . . **P. funaense**
Leaf blade 30–60 mm long; upper lemma apex glabrous or few hairs right at tip . . . . . **P. sancta-luciense**
23(17). Annual . . . . . 24
Perennial to sub-perennial . . . . . 34
24. Upper glume 3-nerved; upper lemma with a green spot at apex . . . . . **P. comorense**
Upper glume 5–11-nerved; upper lemma lacking green spot . . .25
25. Lower glume 0–1-nerved . . . . . 26
Lower glume 3–7-nerved . . . . . 31
26. Inflorescence enclosed in two uppermost leaves and not extending beyond the leaf apex . . . . . **P. gilvum**
Inflorescence well exserted from the uppermost leaf, or associated with only a single leaf . . . . . 27
27. Culm nodes hairy . . . . . **P. simulans**
Culm nodes glabrous . . . . . 28
28. Spikelet obtuse or bluntly acute . . . . . 29
Spikelet acuminate . . . . . 30
29. Spikelet elliptic-oblong; leaf blade linear . . . . . **P. schinzii**
Spikelet oblong; leaf blade linear-lanceolate . . . . **P. madipirense**




Figure 374.—*Panicum maximum*. A, plant; B, ligule; C, spikelet. Artists: A and B, C. Smith; C, H.W. du Toit.

30(28). Upper leaf surface densely covered with large prickles which are usually white (always visible on upper leaves) and minute papillae . . . . . **P. subalbidum**
Upper leaf surface without prickles, densely covered with papillae . . . . . **P. impeditum**
31(25). Inflorescence branches with spikelets adpressed and appearing close together . . . . . **P. subalbidum**
Inflorescence branches with spikelets spreading, and usually distant from each other . . . . . 32
32. Inflorescence branches modestly covered with prickles less than 0.05 mm long just below the spikelets; mature inflorescence well exserted from uppermost leaf; spikelet 1.8–2.2 mm long, often entirely tinged purple when mature . . . . . **P. atrosanguineum**
Inflorescence branches densely scabrid with prickles 0.10–0.15 mm long just below the spikelets; base of inflorescence usually enclosed in the uppermost leaf; spikelet 2–3 mm long, tinged purple only at apex of glumes and lower lemma . . . . . 33
33. Inflorescence broadly ovate, branches long and flexuous . . . . . **P. novemnerve**
Inflorescence obovate, branches usually short and rigid . . . . . **P. arcurameum**
34(23). Spikelet 1.3–1.7 mm long; upper glume 5-nerved; leaves mainly cauline . . . . . 35
Characters not in above combination . . . . . 36
35. Leaf blade 30–70 mm long; lower glume $^1/_3$ spikelet length . . . . . **P. subflabellatum**
Leaf blade 15–30 mm long; lower glume $^1/_2$–$^2/_3$ spikelet length . . . . . **P. parvifolium**
36(34). Basal sheaths densely covered with matted woolly hairs . . . . 37
Basal sheaths glabrous to densely hairy but then hairs not matted and woolly . . . . . 38
37. Spikelet 2.0–2.5(3.0) mm long . . . . . **P. lanipes**
Spikelet 3.0–3.5 mm long . . . . . **P. pearsonii**
38(36). Lower lemma 5-nerved . . . . . 39
Lower lemma 7–11-nerved . . . . . 43
39. Lower palea reduced . . . . . **P. dewinteri**
Lower palea well developed . . . . . 40
40. Apices of glumes not recurved . . . . . **P. bechuanense**
Apices of glumes recurved . . . . . 41
41. Basal sheaths silky pubescent . . . . . **P. dregeanum**
Basal sheaths glabrous or sparsely hispid, not silky pubescent. . .42
42. Culms usually stout, (2.0–)3.5–7.0 mm wide at base. . . .**P. fluviicola**




Figure 375.—*Panicum natalense*. Artist: C.D. Bartman.



Figure 376.—*Panicum maximum* spikelet (2.5–3.0 mm). Photographer: M. Koekemoer.



Figure 377.—*Panicum natalense*. Several spikelets (1.7–2.2 mm). Photographer: M. Koekemoer.

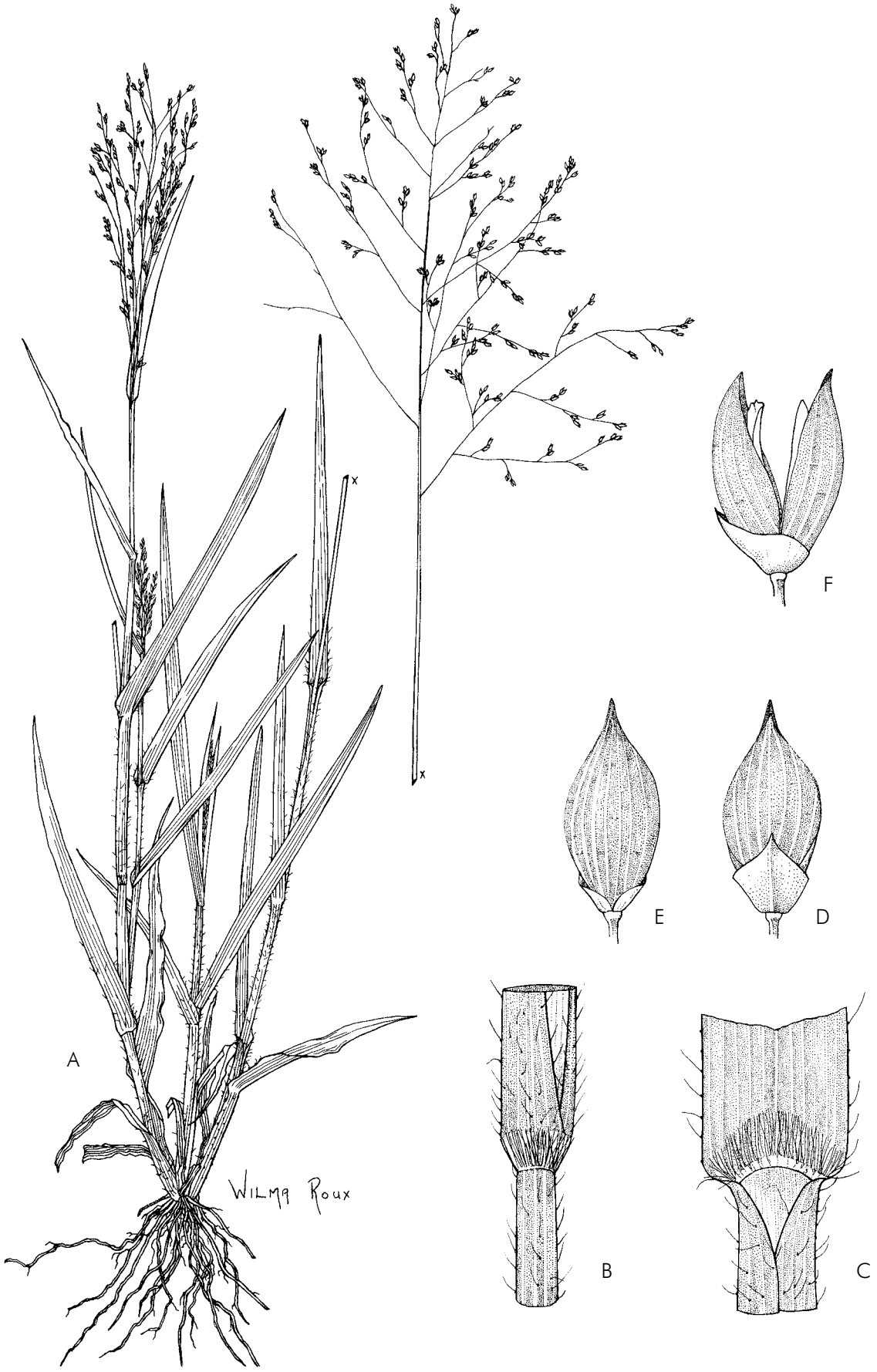
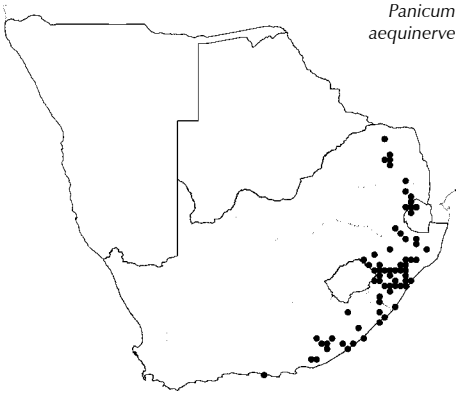



Figure 378.—*Panicum simulans*. A, plant; B, hairy node; C, ligule; D, E, F, spikelet. Artist: W. Roux.

Culms usually slender, 1–3 mm wide at base . . . . **P. graniflorum**
43(38). Lower lemma with interspaces between nerves broadest adjacent to central nerve . . . . . 44
Lower lemma with the broadest interspaces between nerves not confined to those adjacent to the central nerve . . . . . 45
44. Culm robust; inflorescence 200–500 mm long; leaf blade 150–300 mm long; spikelet 3.0–3.5 mm long . . . . . **P. porphyrrhizos**
Culm slender; inflorescence 60–140 mm long; leaf blade 50–120 mm long; spikelet 2.0–3.5 mm long . . . . . **P. hygrocharis**
45(43). Culms much branched; plants shrub-like . . . . . 46
Culm not branched; plants not shrub-like . . . . . 47
46. Lower palea reduced to small scale; spikelet 3.5–4.0 mm long; lower glume $^2/_3$ the spikelet length . . . . . **P. dewinteri**
Lower palea well developed; spikelet 2.5–3.0 mm long; lower glume up to $^1/_2$ the spikelet length . . . . . **P. arbusculum**
47(45). Rhizomes stout, long and creeping; leaves cauline, often obviously distichous, usually pungent . . . . . **P. repens**
Rhizomes absent, or if present, short and compact; leaves cauline or basal, usually not pungent . . . . . 48
48. Plant hispid; base knotty, hairy . . . . . **P. bechuanense**
Plant glabrous or hairy, if hispid, base not knotty . . . . . 49
49. Spikelet 3.4–4.5 mm long; abaxial surface at sheath mouth densely covered with long woolly hairs . . . . . **P. kalaharense**
Spikelet up to 3.2 mm long; abaxial surface of the sheath mouth glabrous or hairs shorter, long and straight, or bristles present . . . . 50
50. Plant robust, 1 000–2 000 mm high . . . . . **P. merkeri**
Plant slender, 350–1 000 mm high . . . . . 51
51. Culm nodes densely and completely covered with adpressed hairs . . . . . **P. trichonode**
Culm nodes glabrous or sparsely hairy in furrows and not on the ridges, nodes remain obvious . . . . . 52
52. Leaves mainly basal . . . . . **P. stapfianum**
Leaves mainly cauline . . . . . **P. coloratum**


*Panicum aequinerve*

**Panicum aequinerve** Nees, *Florae Africanae australioris*: 40 (1841). Type: South Africa, Cape, *Drège*.

BOSBUFFELSGRAS

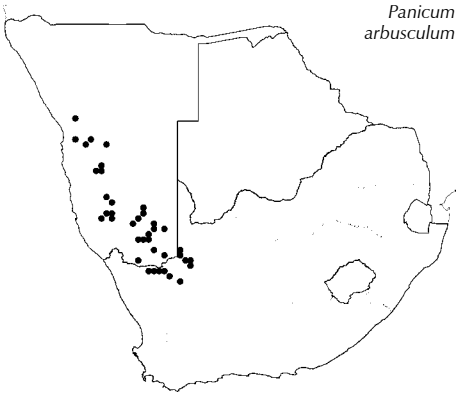
Annual or short-lived perennial; scrambling, trailing, decumbent, rooting at nodes; rhizome present or absent; culm to 1 000 mm long. Leaf blade 30–110 × 3–10(–12) mm; ligule a fringed membrane. Inflorescence sparsely branched, usually spreading at maturity, sometimes contracted, branches naked for a long distance, with 2–5 spikelets crowded at the apex; exserted from uppermost leaf. Spikelet 2.5–3.5(–4.0) mm long, acuminate, glabrous or pubescent; lower glume as long as spikelet, 3–5-nerved; upper glume 7-nerved; lower floret sterile, lemma 5-nerved, palea reduced; upper lemma pale, shiny; anthers 1.2–1.5 mm long.

[Shows much variation in inflorescence shape and spikelet size. Spikelets are often infected with fungi. Similar to *P. inaequilatum* Stapf & C.E.Hubb. from Zimbabwe, Malawi and Mozambique, which has a spikelet 2–3 mm long.]

*Flowering*: September and January to June. *Ecology*: Clay or sand on shallow soils; forest margins or open grasslands, mainly in damp places and around boulders. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Malawi and northwards to Uganda, Ethiopia; also Madagascar. S, LIM, M, KZN, EC.

Illustration: Chippindall: 324, fig. 281 (1955).
Anatomy vouchers: *Ellis 283, 2103, 3342, 3366, 3370, 4419* & *4466*.
Voucher: *Smook 5486, 5634*.

**Panicum arbusculum** Mez, in *Botanischer Jahrbücher* 57: 187 (1921). Type: Namibia (without collector or locality).


*Panicum arbusculum*

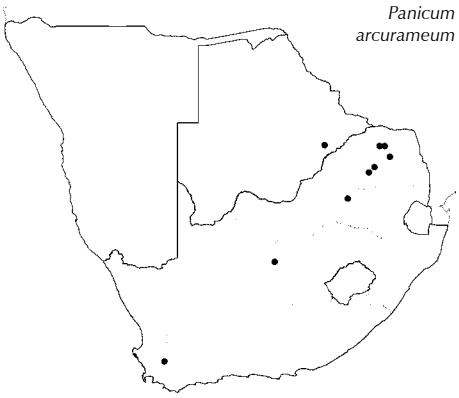
SHRUBBY PANICUM, STRUIK PANICUM

Erect, tufted shrub-like perennial to 800 mm high, glaucous; rhizomes short, strong; culm hard, brittle, much branched, nodes thickened and swollen, often bulbous. Leaf blade to 100 × to 6 mm. Inflorescence open, sparsely branched, primary branches with long naked bases bearing spikelets crowded towards the apex. Spikelet 2.5–3.0 mm long, often flushed purple; lower glume broadly ovate, up to $^1/_2$ the length of spikelet; upper glume 7–9-nerved; lower floret male or sterile; lemma 9-nerved, palea well developed; upper lemma pale-yellow to brown, shiny.

*Flowering*: October to May. *Ecology*: Stony places; in mountainous areas. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Endemic. N, NC. *Economics*: Good grazing; erosion control as effective in blocking water runoff.

Illustration: Chippindall: 338, fig. 295 (1955); Müller: 233 (2007).
Anatomy vouchers: *Ellis 898, 4727*; *Botha & Panagos 29* & *34*.
Voucher: *Giess 10356*.

**Panicum arcurameum** Stapf, in *Flora tropical Africa* 9: 704 (1920). Type: South Africa, Limpopo, Mara, *Schlechter 4614* (PRE, ?holo.).

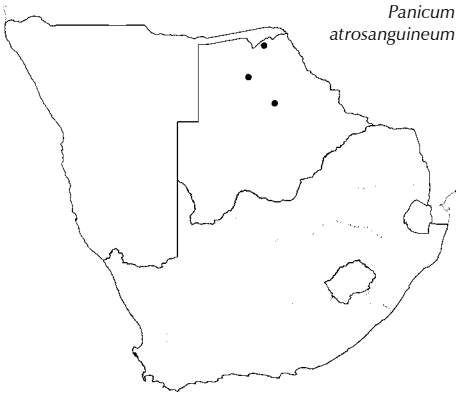

*Panicum arcurameum*

Tufted, hispid annual to 600 mm high, erect or geniculate. Leaf blade to 100 × to 7 mm. Inflorescence obovate, base usually enclosed by uppermost leaf, branches usually short, rigid, ascending; densely scabrid just below point of attachment of spikelets, prickles 0.10–0.15 mm long; spikelets spreading and distant from one another. Spikelet 2.0–2.5 mm long; lower glume and lower lemma apex often tinged purple; lower glume $^1/_2$–$^2/_3$ length of spikelet, 5–7-nerved; upper glume (7–)9-nerved; lower floret sterile, lemma (7–)9-nerved, palea reduced, much shorter than lower lemma; upper lemma pale to dark, shiny.

[Barely distinguishable from *P. novemnerve* and a detailed study is needed in this group. Similar to *P. atrosanguineum*, which has inflorescence branches moderately scabrid with prickles less than 0.05 mm long just below the spikelets.]

*Flowering*: January. *Ecology*: Sandy soils, black turf; in disturbed areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Zimbabwe. N (locality uncertain), B, LIM, G, NC, WC.

Anatomy vouchers: *Ellis 3881, 3883* & *3904*.
Voucher: *Smook 4404*.


*Panicum atrosanguineum*

**Panicum atrosanguineum** Hochst. ex A.Rich., in *Tentamen florae Abyssinicae* 2: 375 (1851). Type: Ethiopia, Djeladjeranne, *Schimper 1709*.

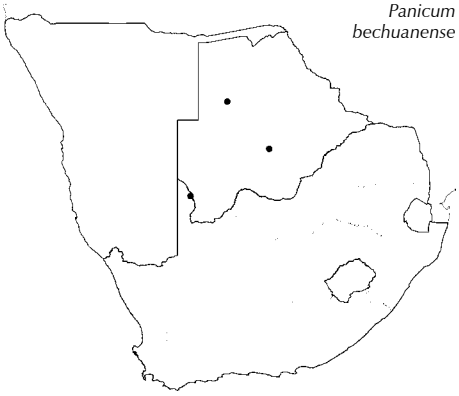
Tufted annual 100–400 mm high. Leaf blade to 60 × to 5 mm, broadly linear. Inflorescence open, when mature well exserted from uppermost leaf; branches moderately scabrid just below the point of attachment of spikelets, prickles less than 0.05 mm long; spikelets distant from one another. Spikelet 1.8–2.2 mm long, elliptic-

ovate, acute, usually strongly flushed with purple; lower glume $^{2}/_{3}$–$^{3}/_{4}$ the spikelet length, broadly ovate, 3–5-nerved; upper glume 5–7-nerved; lower floret sterile, lemma 5–7-nerved, palea reduced, much shorter than lower lemma; upper lemma usually dark at maturity, shiny.

[Similar to *P. novemnerve* and *P. arcurameum*, which have inflorescence branches densely covered with prickles 0.10–0.15 mm long just below the spikelet attachment.]

*Flowering*: February to May. *Ecology*: Old farmlands, roadsides and other disturbed places. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards through Zimbabwe, Zambia, DRC to Ethiopia, Somalia; also northwest India. B.

Voucher: *Smith 2366*.



*Panicum bechuanense*

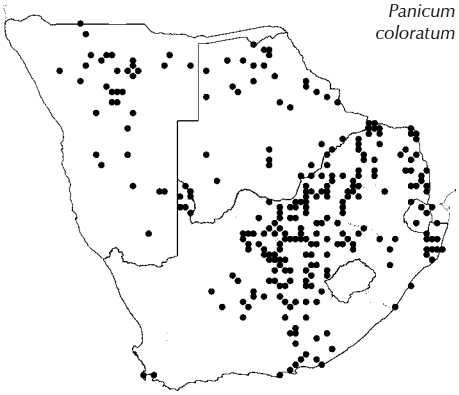
**Panicum bechuanense** Bremek. & Oberm., in *Annals of the Transvaal Museum* 16: 403 (1935). Type: Botswana, Kuke Pan, *Van Son* TM 28611 (PRE, ?holo.).

Tufted perennial to 600 mm high, erect to geniculate. Leaf blade to 100 × 3–5 mm, upper leaf surface densely papillate; leaves and sheaths with bulbous-based hairs. Spikelet 2.4–3.5 mm long; glumes not recurved; lower glume ovate, $^{1}/_{3}$ the spikelet length; upper glume 9-nerved; lower floret male, lemma 5–9-nerved, palea well developed; upper lemma pale to dark brown, shiny.

[This species belongs to the *P. coloratum–P. stapfianum* complex, which is in need of detailed studies.]

*Flowering*: March. *Ecology*: Seepage areas, in river beds and pans, also in disturbed areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. B, NC.

Anatomy voucher: *Ellis 4366* [this is anatomically different from *P. coloratum*].
Voucher: *Coleman 79*.



*Panicum coloratum*

**Panicum coloratum** L., in *Mantissa Plantarum* 1: 30 (1767). Type: Egypt, Cairo, *Forsskål* (LINN, holo.).

*P. coloratum* L. var. *makarikariense* Goossens, in *Kew Bulletin* 1934: 195 (1934). Type: Botswana, Makarikari Pan, *Pentz Nat. Herb. PRE 8416; Phillips & Goossens Nat. Herb. PRE 8787* (syntypes).

SMALL BUFFALO GRASS, WHITE BUFFALO GRASS, WITBUFFELSGRAS

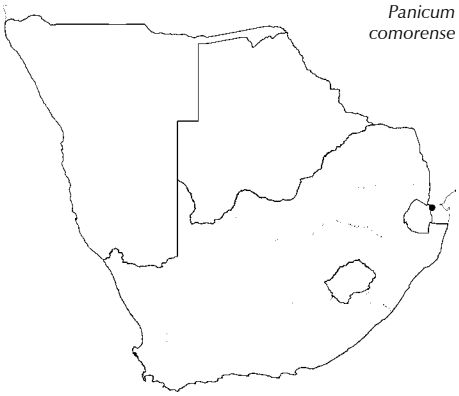
Tufted perennial 500–1 000 mm high, erect, geniculate or occasionally decumbent; lower leaf sheaths glabrous to densely adpressed-hairy, bulbous-based hairs present or absent; leaves mainly cauline; culm nodes glabrous or if hairy, hairs only in the furrows not ridges, node obvious. Leaf blade to 300 × 5–10 mm, expanded, rounded or almost cordate at base, green or glaucous, glabrous or loosely to fairly densely hairy with tubercle-based hairs. Inflorescence branches spreading; spikelets distant. Spikelet 2.5–3.0 mm long; lower glume ovate, $^{1}/_{4}$–$^{1}/_{3}$ spikelet length; upper glume 7(–9)-nerved; lower floret male, lemma 7(–9)-nerved, palea well developed; upper lemma pale to dark, shiny.

[A highly variable polymorphic species belonging to the *P. stapfianum–P. coloratum* complex for which detailed studies are needed.]

*Flowering*: October to May. *Ecology*: Sandy or clay soils; in river beds, drainage courses, around pans or in depressions. *Frequency in southern Africa*: Common. *Distribution*: Tropical and subtropical Africa, introduced and naturalised elsewhere. N, B, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Palatable and good grazing grass, drought resistant. There are many distinct ecotypes, a number of which have been selected for pastures such as var. *makarikariense*, a tall, robust, glaucous plant. Various cultivars, e.g. Bambatsi, have also been selected as pastures.

Illustration: Chippindall: 335, fig. 291, 292 (1955), Müller: 235 (2007).
Anatomy vouchers: *Botha & Panagos 3*; *Ellis 3323, 3332, 3584, 3625, 3924, 4522, 4542 & Smook 3807*.
Voucher: *Merxmueller & Giess 30162, Theron 2091*.

**Panicum comorense** Mez, in Engler, *Botanischer Jahrbücher* 57: 185 (1921). Type: Tanzania, Usambara Mts., *Holst 549*; Comoros Islands, *Boivin* (syntypes).


*Panicum comorense*

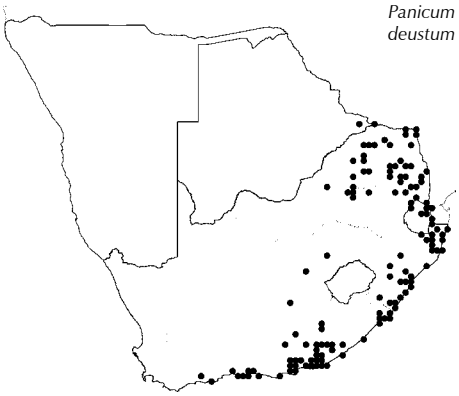
Annual, tufted, decumbent or erect or trailing, rooting at nodes; culms to 1 000 mm long, sometimes longer. Leaf blade 60–150 × 10–15 mm, leaf apex abruptly acuminate. Inflorescence sparsely branched, secondary branches adpressed. Spikelet 1.8–2.2 mm long, oblong, blunt; lower glume $^1/_4$–$^1/_3$ as long as spikelet; 1-nerved; upper glume 3-nerved; lower floret sterile, lemma 5-nerved, palea absent; upper lemma pale, shiny, minutely scaberulous, a tiny green spot at apex.

[Resembles *P. monticola*, which has upper glume 5-nerved and lacks green spot on upper lemma apex.]

*Flowering*: March. *Ecology*: Forest shade. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to Zambia, Zimbabwe and throughout tropical Africa; also Comoro Islands and Madagascar. S.

Voucher: *Culverwell 757*.

**Panicum deustum** Thunb., in *Podromus Plantarum Capensium*: 19 (1794). Type: South Africa, *Thunberg* (UPS, holo.).

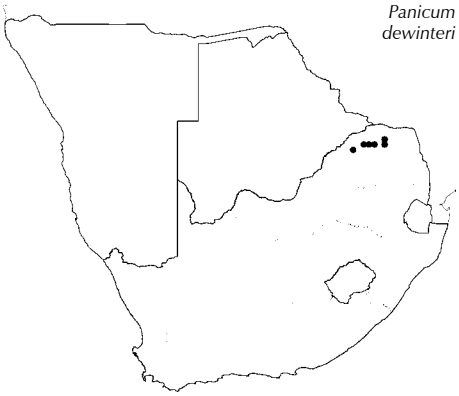

*Panicum deustum*

Reed panicum, broad-leaved panicum

Tufted perennial to 2 000–2 400 mm high; rhizome short, sometimes rooting at lower nodes; leaves mainly cauline; culm slender or robust, branched or unbranched. Leaf blade 150–480 × 5–35(–45) mm, cordate or straight at base. Inflorescence branches usually with clavate hairs. Spikelet 3.5–5.0(–5.5) mm long; lower glume $^1/_2$–$^2/_3$ the spikelet length, separated by a short internode from rest of spikelet; upper glume 7-nerved; lower floret male, lemma 5-nerved, palea well developed; upper lemma pale, dull or shiny. Variable in size, hairiness and habitat.

*Flowering*: September to April. *Ecology*: On clay, loam or sandy soils; often in moist soils, shady places or rocky hillsides. *Frequency in southern Africa*: Common but scattered. *Distribution*: Northwards to Ethiopia and Sudan. B, S, LIM, NW, G, M, FS, KZN, WC, EC. *Economics*: Palatable and nutritious, staying green well into dry periods, sometimes planted as pasture; domestic use such as grass mats.

Illustration: Chippindall: 328, fig. 287 (1955).
Anatomy vouchers: *Ellis 1547, 1590, 3385, 3480 & 4061*.
Voucher: *Compton 26639; Godfrey & Acocks SH 1652*.

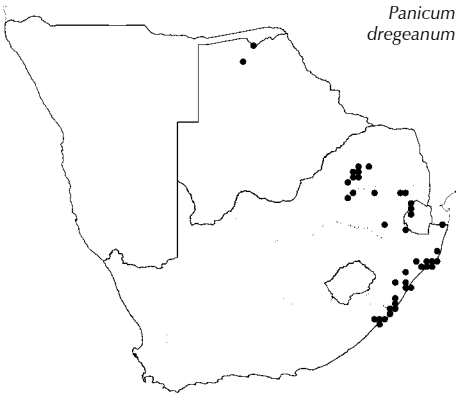

*Panicum dewinteri*

**Panicum dewinteri** J.G.Anderson, in *Bothalia* 9: 341 (1966). Type: South Africa, Soutpansberg dist., Lejuma, *De Winter 6006* (PRE, holo.).

Erect, tufted perennial to 1 000 mm high, shrub-like; sometimes rooting at lower nodes; culm hard and wiry, much branched, particularly in upper portion. Leaf blade of young leaves 200–500 × 1–6 mm, leaf blades of older portion of culms falling off early. Inflorescence sparsely branched, secondary branches adpressed. Spikelet 3.5–4.0 mm long; lower glume narrowly ovate, 3-nerved, $^{2}/_{3}$ the spikelet length; upper glume 5–7-nerved; lower floret sterile, lemma 5–7-nerved, palea reduced to a small scale; upper lemma pale to light brown, shiny.

*Flowering*: January to May. *Ecology*: Rocky outcrops, in crevices; along forest margins and wooded rocky slopes. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. LIM (Soutpansberg and Blouberg ranges).

Anatomy voucher: *Smook 7500*.
Voucher: *Smook 7500A, Raal 377, 143*.


*Panicum dregeanum*

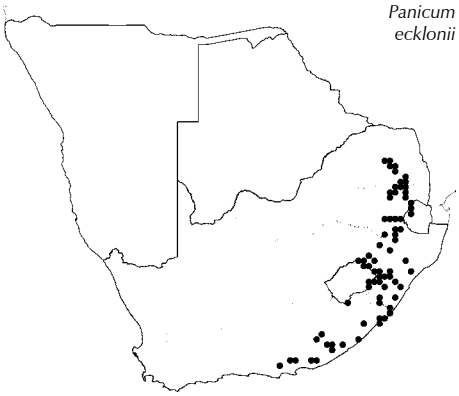
**Panicum dregeanum** Nees, in *Florae Africanae australioris*: 42 (1841). Type: South Africa, KwaZulu-Natal, Durban (Port Natal), *Drège s.n.*

Densely tufted perennial to 1 100 mm high; basal sheaths silky pubescent; leaves mostly basal. Leaf blade 140–350(–500) × 1.5–3.0 mm. Inflorescence 80–150 mm long, ovate to elliptic; much branched. Spikelet 2.0–2.5(–3.0) mm long, ovate, usually strongly flushed with purple; glume apex shortly mucronate and recurved; lower glume $^{1}/_{2}$–$^{3}/_{4}$ the spikelet length, 5-nerved; upper glume 5–7-nerved; lower floret male, lemma 5-nerved, palea well developed; upper lemma pale, smooth, shiny.

[Resembles *P. graniflorum* and *P. fluviicola*, which have glabrous or sparsely hispid basal sheaths.]

*Flowering*: November to April. *Ecology*: Usually in wet places, frequently in vleis, sometimes on hillsides. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Northwards to Zambia, Zimbabwe, Mozambique and throughout tropical Africa. B, S, LIM, G, M, KZN, EC. *Economics*: Grazed by cattle.

Anatomy vouchers: *Ellis 3389, 3390, 3502, 3799, 4079 & 4421*.
Voucher: *Smook 1891*.


*Panicum ecklonii*

**Panicum ecklonii** Nees, in *Florae Africanae australioris*: 43 (1841). Type: South Africa, Eastern Cape, Fort Beaufort, Katberg, *Drège*.

Densely tufted perennial to 800 mm high, shortly rhizomatous; leaves mainly basal; culms erect, slender, nodes densely hairy. Leaf blade 60–200(–260) × 3–8 mm, flat, bright green; usually loosely to densely hairy with long tubercle-based hairs; some clavate hairs present at the apex; ligule a fringe of hairs. Inflorescence 50–200 mm long, loose, open or somewhat contracted, some axes sometimes with few to many clavate hairs. Spikelet 2.5–3.5 mm long, obtuse, glabrous, light yellow-green usually tinged with purple; glumes and lower lemma pectinate at the apex; lower glume up to $^{1}/_{2}$ as long as spikelet, 3-nerved; upper glume 5-nerved; lower floret sterile,

lemma 7-nerved, palea absent or reduced; upper lemma dull, often flushed purple, shortly hairy towards apex; palea as long as spikelet, shortly hairy towards apex; anthers 1.7–2.2 mm long.

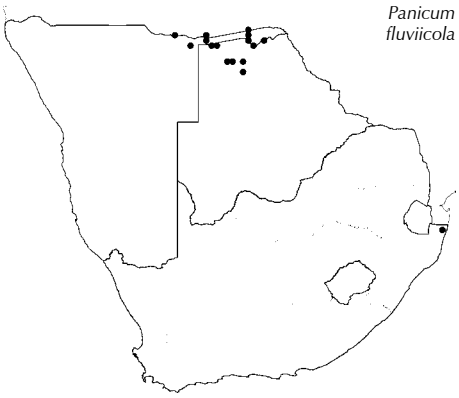
[Botha et al. (1988) reported that *P. ecklonii* has both $C_3$ and $C_4$ forms.]

*Flowering*: September to April. *Ecology*: Sandy soils; often in moist areas in mountainous regions that are subject to burning. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Zambia, Zimbabwe, Malawi, Mozambique, DRC, Tanzania and West Africa. S, L, LIM, M, FS, KZN, EC.

Illustration: Chippindall: 331, fig. 289 (1955).
Anatomy vouchers: *Ellis 1449, 2815, 2816, 2827, 4313, 4319, 5614* & 5835.
Voucher: *Kluge 1968, Hoener 1903*.

**Panicum fluviicola** Steud., in *Synopsis plantarum glumacearum* 1: 89 (1854). Type: Gabon, Gabon River, *Jardin* (P, holo.).

*P. aphanoneurum* Stapf, in *Flora tropical Africa* 9: 687 (1920). Type: Nigeria, Nupe, *Barker 728* (syntype).


*Panicum fluviicola*

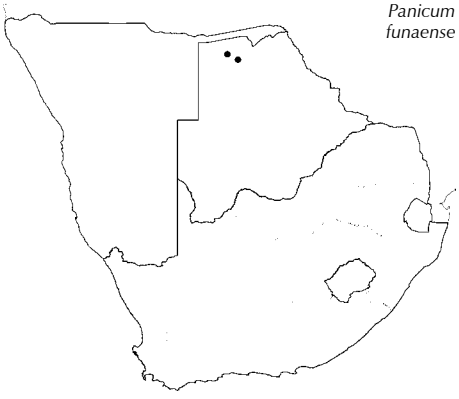
Tufted perennial (300–)600–2 300 mm high, erect to geniculate, often flushed purple; basal sheaths glabrous, sometimes sparsely hispid; culm usually stout, base (2.0–)3.5–7.0 mm wide. Leaf blade 130–500 × 3–12 mm. Inflorescence 80–150 mm long. Spikelet 2.0–2.5 mm long; glumes and lower lemma apices green with purple; glumes acuminate to mucronate, recurved; lower glume up to $^2/_3$ the spikelet length; upper glume 5–7-nerved; lower floret male, lemma 5-nerved, palea well developed; upper lemma pale, smooth and shiny.

[Barely distinct from *P. graniflorum*, which has spikelets congested on short branches, culms slender and 1–2 mm wide at the base; *P. genuflexum*, which has sparsely branched inflorescences with long flexuous branches; and *P. dregeanum*, which has basal sheaths silky pubescent.]

*Flowering*: December to May. *Ecology*: Sandy loam, sand or heavy clays; in seasonally wet open areas. *Frequency in southern Africa*: Locally common where occurring. *Distribution*: Scattered throughout tropical Africa. N, B, KZN.

Anatomy vouchers: *Ellis 312, 3694, 3729* & *4058*.
Voucher: *De Winter 4264*.

**Panicum funaense** Vanderyst, in *Bulletin Agricole du Congo Belge* 10: 248 (1919). Type: Democratic Republic of the Congo.


*Panicum funaense*

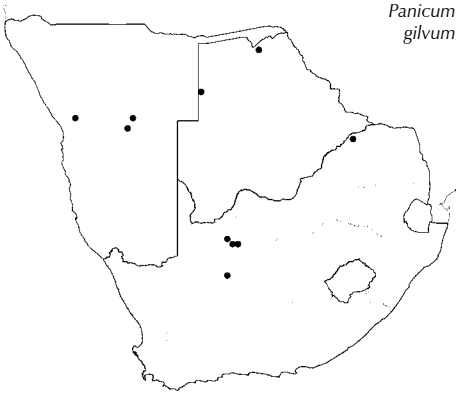
Perennial 400–2 000 mm; culm soft, spongy. Leaf blade 150–350 mm long. Inflorescence 150–250 mm long, narrowly oblong, secondary branches short. Spikelet 2.5–3.0 mm long; lower glume $^1/_4$–$^1/_3$ the spikelet length, not clasping, 3-nerved; upper glume 9-nerved; lower floret male, lemma 9-nerved, palea well developed; upper lemma smooth, shiny, apex long hairy.

*Flowering*: February and March. *Ecology*: Marshy and aquatic areas. *Distribution*: Zambia and DRC. B.

Illustration: Renvoize: 18, tab. 4 (1989).
Voucher: *Smith 4120*.

*Panicum genuflexum* Stapf

[In the past this name was wrongly applied to specimens of *P. graniflorum* from KwaZulu-Natal.]


*Panicum gilvum*

**Panicum gilvum** Launert, in *Mitteilungen der Botanischen Staatssammlung München* 8: 153 (1970). Type: Namibia, pad [road] Okahandja–Otjisazu, *Dinter 2544*.

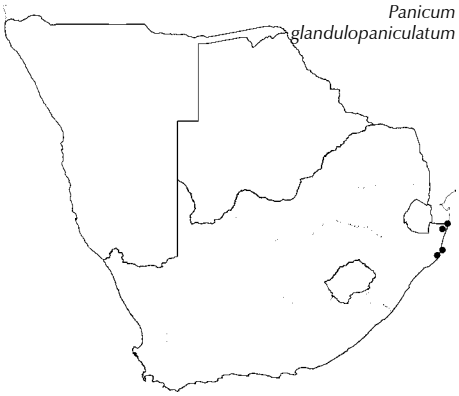
*P. laevifolium* Hack. var. *contractum* Pilg., in *Notizblatt des botanischen Gartens und Museums zu Berlin-Dahlem* 15: 448 (1940).

Hygrophytic, tufted annual to 650 mm tall, geniculate, rarely erect; culm nodes glabrous. Leaf blade 30–150 × 3–8 mm, glabrous or sparsely hairy, hairs not clavate. Inflorescence 25–100 mm long; not exserted beyond uppermost leaf, which is usually about 8 mm wide, often there are two leaves closely associated with the inflorescence; secondary branches usually absent; spikelets adpressed to branches. Spikelet 2.8–3.4(4.0) mm long, acute, glabrous; lower glume up to $^1/_3$ the spikelet length, 0–1-nerved; upper glume (10–)11–14-nerved; lower floret sterile, lemma (9–)10–11-nerved, palea absent or reduced, if reduced then conspicuously shorter than lower lemma; upper lemma pale to yellow, often flushed dark, smooth, shiny; anthers 0.8–1.0 mm long.

[Resembles a number of other taxa associated with moist habitats: *P. impeditum* and *P. subalbidum*, which have upper glumes 3–9-nerved, lower lemma 5–9-nerved.]

*Flowering*: January to April. *Ecology*: Sandy soils; margin of vleis, dams and waterholes, in ephemeral water, and in disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, B, LIM, NC.

Anatomy vouchers: *Botha & Panagos 50, Gibbs Russell & Smook 5354, Smook 5355, Ellis 2916 & 4742.*
Voucher: *De Winter & Giess 6911, Smith 3300.*


*Panicum glandulopaniculatum*

**Panicum glandulopaniculatum** Renvoize, in *Kew Bulletin* 44: 544 (1989). Type: Malawi, Nkhata Bay, Bandawe, *Jackson 910* (K, holo.).

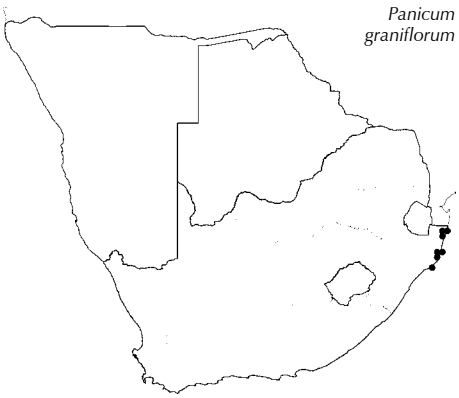
Trailing or rambling annual to 1 000 mm high, often rooting at nodes. Leaf blade to 100 × 10–25 mm, thick, slightly leathery, flat with cordate bases, cross-venation not conspicuous; ligule a fimbriate membrane. Inflorescence branches with flat glandular patches. Spikelet (1.5)2.0–2.5(–3.0) mm long, asymmetrical, ovate, some spikelets with long woolly hairs, others shortly hairy; glumes as long as spikelet, hairy; lower glume separated from upper glume by short internode; lower glume 3-nerved; upper glume 5-nerved; lower floret male, lemma 5-nerved, palea well developed; upper lemma shiny, smooth except for scattered papillae occurring sometimes at base and/or apex; palea scaberulous; anthers 0.7–0.9 mm long.

[Resembles *P. heterostachyum*, which has thinner leaves and a densely verruculose upper lemma, and *P. brevifolium* (from Zambia, Zimbabwe, Malawi and Mozambique), which has eglandular inflorescence branches.]

*Flowering*: sporadically November to June. *Ecology*: In sand; forest shade. *Frequency in southern Africa*: Locally common. *Distribution*: Zambia, Zimbabwe, Malawi and Mozambique. KZN.

Anatomy voucher: *Ellis 4076*.
Voucher: *Strey 8222*.

**Panicum graniflorum** Stapf, in *Flora tropical Africa* 9: 681 (1920). Type: Mozambique, Kongone, *Kirk* (K, holo.).

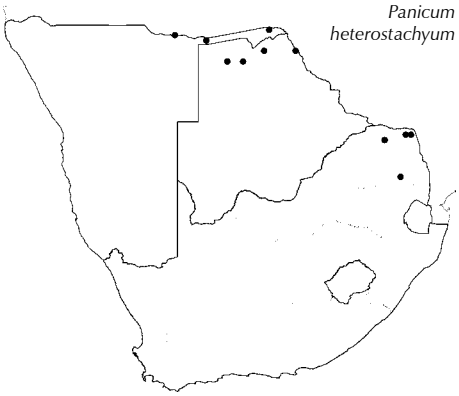

*Panicum graniflorum*

Tufted perennial 300–1 500 mm; sometimes shortly rhizomatous; culm slender, base 1–3 mm wide. Leaf blade 100–250 × 2–5 mm, usually glaucous. Inflorescence 70–350 mm long, oblong, moderately branched, branches short; spikelets clustered. Spikelet 2.0–2.5 mm long, ovate; glume apices recurved; lower glume $^1/_2$–$^2/_3$ the spikelet length, 1–3-nerved, acuminate; upper glume 5-nerved; lower floret male, lemma 5-nerved, palea well developed; upper lemma pale, shiny.

*Flowering*: April. *Ecology*: Sandy soils; damp grassland. *Distribution*: Zambia, Zimbabwe, Malawi and Mozambique. B (specimen at KEW, locality uncertain), KZN.

Anatomy voucher: *Ellis 3413, 4496* & *4498*.
Voucher: *Smook 1931*.

**Panicum heterostachyum** Hack., in *Österreichische Botanische Zeitschrift* 51: 430 (1901). Type: Eritrea, Keren, *Steudner 1009* (W, holo.).

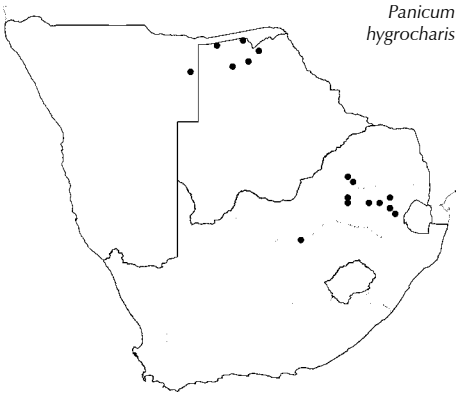

*Panicum heterostachyum*

Slender, loosely tufted annual 200–800 mm high, erect or sometimes decumbent. Leaf blade 80–120 × 10–25 mm, thin, amplexicaul, cross-venation conspicuous. Inflorescence 40–150 mm long, moderately branched, branches stiff, flat glandular patches present. Spikelet to 1.5 mm long, asymmetric, ovate; glumes as long as spikelet, sparsely to densely hairy, separated by short internode; lower glume 3-nerved; upper glume 5-nerved; lower floret male, lemma 5-nerved, palea well developed; upper lemma pale, minutely verruculose.

[Resembles *P. glandulopaniculatum*, which has thick, leathery leaves, a smooth upper lemma occasionally with scattered papillae at base or apex; and *P. brevifolium* (from Zambia, Zimbabwe, Malawi and Mozambique), which has no flat glandular patches on inflorescence branches.]

*Flowering*: January to May (and August). *Ecology*: Poor sandy soils; in wooded grassland, seasonally flooded pans, rocky hills and in disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards and throughout tropical Africa, also Sudan and Niger. N, B, LIM, M.

Illustration: Chippindall: 327, fig. 285 (1955).
Anatomy vouchers: *Ellis 1923, 3724* & *3625*.
Voucher: *Merxmueller & Giess 1963*.


*Panicum hygrocharis*

**Panicum hygrocharis** Steud., in *Synopsis plantarum glumacearum* 1: 72 (1854). Type: Ethiopia, Ferras-Mai, *Schimper 1786* (syntype).

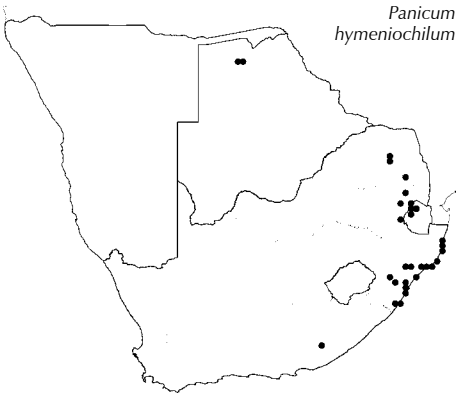
*Panicum repentellum* Napper, in *Kirkia* 3: 127 (1963). Type: Tanzania, Mbulu District, Karatu Swamp, *Greenway 7780*.

Perennial or sub-perennial to 600 mm high, erect or decumbent; hydrophyte or hygrophyte; rhizomatous, stoloniferous; leaves mainly cauline; culms usually soft. Leaf blade 50–120 × 3–5 mm, flat, slen-

der, sometimes slightly pungent. Inflorescence 60–140 mm long, ovate to narrowly oblong; narrow, sparsely branched, branches ascending or adpressed; closely associated with uppermost leaf. Spikelet 2.0–3.5 mm long, ovate, acuminate; lower glume broadly ovate, $^1/_4$ as long as spikelet, 0–3-nerved, clasping; upper glume 7-nerved, acuminate; lower floret usually male, lemma 7-nerved; broadest interspaces of nerves adjacent to central nerve, palea well developed; upper lemma pale, shiny.

*Flowering*: January to May. *Ecology*: Black or grey soils; around vleis and lakes or in water. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to Zambia, Zimbabwe, Malawi to East Africa and Ethiopia; also Sudan. N, B, LIM, G, M, FS.

Anatomy vouchers: *Ellis 2918, 3915, 3917 & 4438*.
Voucher: *Chippindall 346, Smith 3812*.



*Panicum hymeniochilum*

**Panicum hymeniochilum** Nees, in *Florae Africanae australioris*: 46 (1841). Type: South Africa, KwaZulu-Natal, *Drège*.

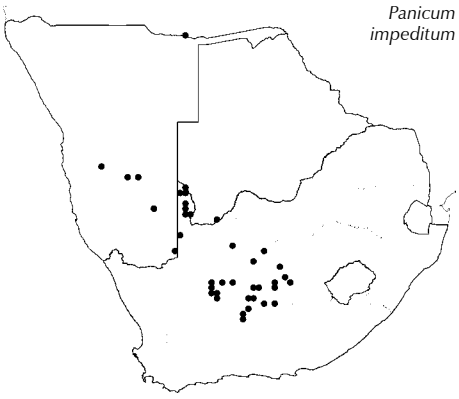
*P. filiculme* Schinz, in *Bulletin de l'Herbier Boissier* 3: 377 (1895). Type: South Africa, KwaZulu-Natal, *Rehmann 8049* (Z, holo.).

*P. hymeniochilum* Nees var. *glandulosum* Nees, in *Florae Africanae australioris*: 47 (1841). Type: South Africa, KwaZulu-Natal, *Drège*.

Semi-hydrophytic annual or short lived perennial 140–2 000 mm, scrambler, often rooting at lower nodes. Leaf blade 12–70 × 1.2–5.0(–10.0) mm. Inflorescence 20–90 mm long, oblong to pyramidal, branches sparsely branched; clavate hairs usually present, rarely absent; pedicels 0.2–2.7(9.0) mm long. Spikelet 2.0–2.5(–3.0) mm long, narrowly elliptic-oblong, obtuse, often tinged purple; lower glume narrowly ovate, $^1/_2$–$^2/_3$ the spikelet length, 0–1-nerved, not clasping; upper glume 7–9-nerved; lower floret male or sterile, lemma 7–9-nerved, palea developed or reduced, usually slightly narrower and shorter than lower lemma; upper lemma sometimes minutely granulose, especially towards apex, usually shiny.

*Flowering*: December to May. *Ecology*: Moist, organically rich soils; river margins and perennial swamps, in or near water. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to East Africa, Ethiopia and Guinea; also in Madagascar. B, S, LIM, M, KZN, EC.

Anatomy vouchers: *Ellis 465, 1523, 1560, 3373, 3571 & 3778*.
Voucher: *Ward 5518*.



*Panicum impeditum*

**Panicum impeditum** Launert, in *Mitteilungen der Botanischen Staatssammlung München* 8: 150 (1970). Type: Namibia, Mariental, *De Winter 3483*.

Tufted annual to 500 mm high, geniculate, erect to prostrate, hygrophyte. Leaf blade 20–80 × 3–6 mm, upper leaf surface densely covered with papillae. Inflorescence base enclosed by uppermost leaf but the inflorescence extends beyond leaf apex; spikelets crowded; adpressed to branches. Spikelet 2.7–3.3 mm long; lower glume up to $^1/_4$–$^1/_3(^3/_4)$ the spikelet length, 1-nerved; upper glume 7–9-nerved; lower floret sterile, lemma 7–9-nerved, palea well developed or reduced, long and narrow; upper lemma pale, smooth and shiny.

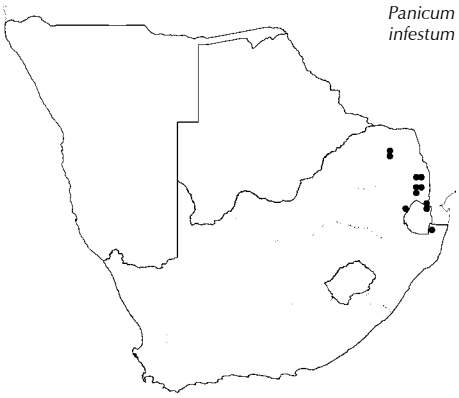
[Resembles *P. gilvum*, which has upper glume (10–)11–14-nerved, lower lemma (9–)10–11-nerved; and *P. subalbidum*, which has the upper leaf surface covered with prickles.]

*Flowering*: November and January to May. *Ecology*: Moist sandy or clay soils; around water holes, vleis and pans. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. ?B, N, FS, NC.

Anatomy voucher: *Gibbs Russell & Smook 5108*.
Voucher: *Leistner 2229 & 3152*.

**Panicum infestum** Peters, in *Naturwissen schaftliche Reise nach Mossambique* 2: 546 (1865). Type: Mozambique, Querimba, *Peters*.

Alternate name: *Megathyrsus infestus* (Peters) B.K.Simon & S.W.L.Jacobs


*Panicum infestum*

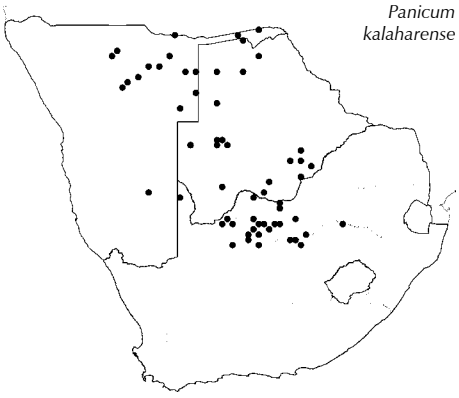
Densely tufted perennial to 2 000 mm high, erect; shortly rhizomatous; usually hairy with tubercle-based hairs, rarely glabrous. Leaf blade 150–500 × 2–10 mm. Inflorescence 100–280 mm long, sparsely branched; primary branches ascending, secondary branches usually short or absent. Spikelet 3.5(–4.0) mm long, acute or apiculate, somewhat leathery, back often grooved, closed spikelet with only the central nerve on lower lemma visible, glabrous or densely scabrid; lower glume 1–3-nerved; upper glume 5-nerved; lower floret male, lemma 5-nerved, palea well developed, slightly longer than upper floret; upper lemma and palea conspicuously transversely rugose; anthers 1.4–1.6 mm long.

[Similar to *P. maximum*, which has a much more branched inflorescence, spikelets cartilaginous, and the closed spikelets with many nerves clearly visible on the lower lemma.]

*Flowering*: November, January, February and May. *Ecology*: Clay or sandy soils; in seasonally damp places, rocky hillsides and disturbed areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to DRC, East Africa, Ethiopia and Somalia. S, LIM, M, KZN.

Anatomy voucher: *Ellis 5246*.
Voucher: *Acocks 16687*.

**Panicum kalaharense** Mez, in *Botanischer Jahrbücher* 57: 187 (1921). Type: Namibia, *Schultze 318*, *342p*, *356c* (many syntypes).


*Panicum kalaharense*

Kalahari buffalo grass, sandveld panicum

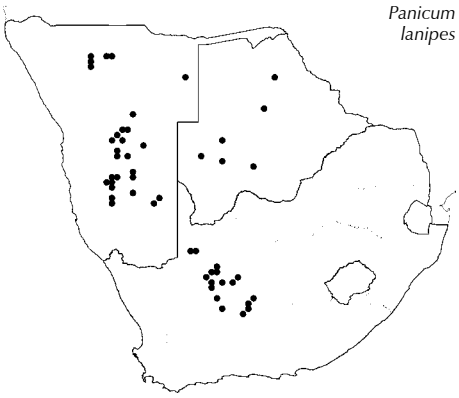
Robust, hard, densely tufted perennial to 2 500 mm high; rhizome short; basal sheaths densely hairy; leaves mainly basal. Leaf blade to 200–350 × 2–8 mm, flat or rolled; upper leaf surface densely covered with short hairs; sheath mouth with dense, long woolly hairs on abaxial side. Spikelet 3.2–4.5 mm long; lower glume broadly ovate, up to $^{2}/_{5}$–$^{3}/_{4}$ the spikelet length, 3–5-nerved; upper glume 7–9-nerved; lower floret male, lemma 7–9-nerved, palea well developed; upper lemma pale and dull.

[Plants from Namibia that were previously referred to as *P. phragmitoides* Stapf are a more broad-leaved form of *P. kalaharense* found in the northern part of its distribution range.]

*Flowering*: December to April. *Ecology*: Kalahari sands; disturbed places such as roadsides. *Frequency in southern Africa*: Infrequent

or locally common, especially in dune streets. *Distribution*: Zimbabwe and Mozambique. N, B, NW, FS, NC. *Economics*: Reasonably palatable when young, drought resistant; sometimes seeds eaten as porridge in northern Namibia; used in making of arrows in Namibia.

Illustration: Renvoize: 32, tab. 6 (1989).
Anatomy vouchers: *Ellis 3590* & *Botha & Panagos 43*.
Voucher: *Ellis 2677, Acocks 12488, Story 6373*.


*Panicum lanipes*

**Panicum lanipes** Mez, in *Botanischer Jahrbücher* 57: 187 (1921). Type: South Africa, Northern Cape, Calvinia Div., Hantam's Berg, *Meyer*.

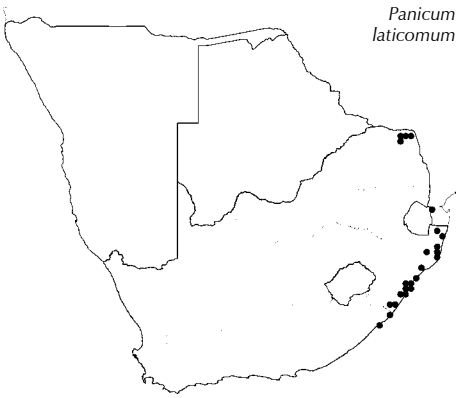
WOLVOET PANICUM

Densely tufted perennial to 800 mm high, erect to geniculate; basal sheaths densely covered with matted woolly hairs. Leaf blade to 300 × to 6 mm, usually glaucous, glabrous or hairy. Inflorescence 70–200 mm long, ovate. Spikelet 2.0–2.5(3.0) mm long, ovate, light green, sometimes tinged with purple; lower glume $^1/_3$–$^2/_3$ the spikelet length, 0–3-nerved; upper glume 7–9-nerved; lower floret male, lemma 7–9-nerved, palea well developed; upper lemma pale yellow to brown, shiny.

[Similar to *P. pearsonii* F.Bolus, which has a woolly base but longer spikelet, 3.0–3.5 mm long. As far as known, *P. pearsonii* has never been recollected since the type specimen. It also resembles *P. coloratum* and *P. stapfianum*, which have bases glabrous or, if hairy, then the hairs not woolly and matted.]

*Flowering*: September to May. *Ecology*: Stony, sandy or calcrete soils; in vleis, on mountain slopes or in dry river beds. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, B, NC. *Economics*: Palatable and valuable fodder.

Illustration: Chippindall: 337, fig. 294 (1955); Müller: 239 (2007).
Anatomy vouchers: *Botha & Panagos* 15, 41; *Ellis 4340, 4341* & *4775*.
Voucher: *Müller 1389; Giess, Volk & Bleisner 6104*.


*Panicum laticomum*

**Panicum laticomum** Nees, in *Florae Africanae australioris*: 43 (1841). Type: South Africa, KwaZulu-Natal, Durban [Port Natal], *Drège*.

Scrambling annual to 2 000 mm; decumbent to semi-erect; rooting at nodes. Leaf blade to 100 × (5–)8–28 mm, abruptly or asymmetrically narrowed at base. Inflorescence open, 100–250 mm long, extending beyond uppermost leaf; finely and usually profusely branched. Spikelet 1.5–2.5 mm long, asymmetrical, glabrous or hairy; lower glume $^1/_2$ the spikelet length, separated from rest of spikelet by a short internode, 3-nerved; upper glume 5-nerved; lower floret sterile, lemma 5–7-nerved, palea reduced or poorly developed; upper lemma pale, granulose.

*Flowering*: January to April, (June and July). *Ecology*: Sandy soils; in dense shade and wet areas in forests. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Kenya. S, LIM, KZN, EC.

Anatomy vouchers: *Ellis 3231* & *3643*.
Voucher: *Culverwell 736, Galpin 2896*.

**Panicum madipirense** Mez, in *Botanischer Jahrbücher* 57: 189 (1921). Type: Tanzania, Mbeya Dist., *Zimmerman* in *Herb. Amani 2528, 2583* (syntypes).

Erect annual 250–1 200 mm. Leaf blade 80–240 × 6–25 mm, cordate. Inflorescence 100–300 mm long, oblong, finely branched. Spikelet 2.5–3.7 mm long, oblong, glabrous; lower glume 1/4 the spikelet length, cuff-like, 1–(sub-7)-nerved; upper glume 9-nerved; lower floret male, lemma 9-nerved, palea well developed; upper lemma smooth or scaberulous near apex.

[There is some doubt of its occurrence in Botswana, as it apparently had been collected only once, in 1883.]

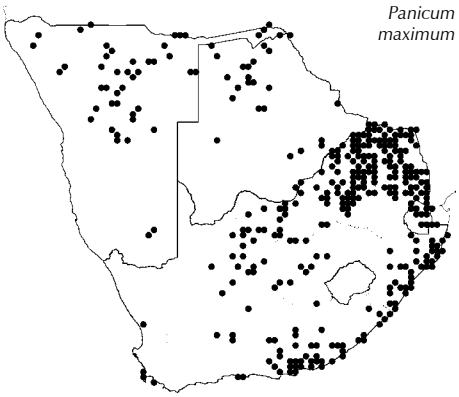
*Flowering*: May. *Ecology*: Swamps and damp areas. *Frequency in southern Africa*: unknown. *Distribution*: northwards to East Africa. B.

Voucher: *Holub* [K, no specimen at PRE].

**Panicum maximum** Jacq., in *Icones plantarum Rariorum* 1: 2, t. 13 (1781). Type: Middle America, Lesser Antilles, Guadeloupe, *Jacquin*.

Alternate name: *Megathyrsus maximus* (Jacq.) B.K.Simon & S.W.L.Jacobs

GUINEA GRASS, BLOUSAAD-SOETGRAS


*Panicum maximum*

Loosely to densely tufted, usually perennial, occasionally annual, to 2 000 mm high, erect or geniculate, rooting at nodes; usually glabrous, sometimes hispid to pilose. Leaf blade 60–400(–1 000) × 4–12(–35) mm. Inflorescence 120–450(–650) mm long, glabrous or pilose below, usually much branched, secondary branches well developed and flexuous, glabrous; lowest branches usually whorled. Spikelet 2.5–3.0(–4.0) mm long, mostly blunt or acute, back rounded; closed spikelet with many nerves clearly visible on lower lemma, cartilaginous, glabrous or hairy; lower glume 1/3–1/2 the spikelet length, 3-nerved; upper glume 5-nerved; lower floret usually male, lemma back rounded, palea well developed, slightly longer than upper floret; upper lemma and palea pale, conspicuously transversely rugose; anthers 1.5–2.0 mm long.

[There is considerable variation in size and indumentum of culms, leaves, inflorescences and spikelets across its distribution range. Resembles *P. infestum*, which has inflorescence sparsely branched, secondary branches usually absent, spikelet leathery and the closed spikelet with only the central nerve visible on the lower lemma.]

*Flowering*: November to July. *Ecology*: In shady places, especially under canopy of trees or open places, in cultivated areas and along river banks, but well adapted to a variety of conditions. *Frequency in southern Africa*: Widely common. *Distribution*: Northwards to tropical Africa; and Madagascar. Widely introduced throughout tropics. N, B, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Valuable grazing grass; extensively planted for hay and pasture; often grown in the form of selected agricultural strains in the tropics; seeds popular with wild birds. A weed in crops and difficult to eradicate.

Illustration: Müller: 241 (2007).
Anatomy vouchers: *Ellis 3477, 3850, 3858, 3920, 5254*.
Voucher: *De Winter 9167, Godfrey SH 1709*.

**Panicum merkerii** Mez, in Engler, *Botanischer Jahrbücher* 34: 144 (1904). Type: Tanzania, Kilimanjaro, *Merker*; Malawi, *Whyte* (syntypes).

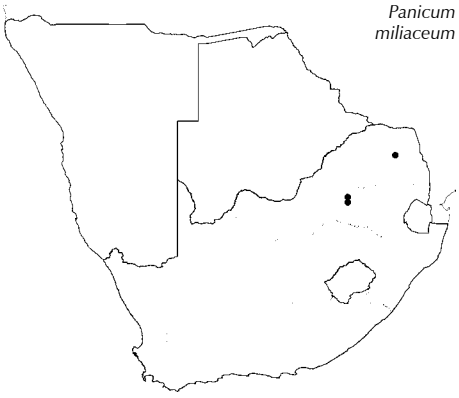
*P. radula* Mez, in Engler, *Botanischer Jahrbücher* 57: 189 (1921). Type: Namibia, *Morgenstein* (B, holo.).

Robust, tufted, usually hispid perennial 1 000–1 600 mm high, erect; rhizome short. Leaf blade to 350 × 7–15 mm. Inflorescence 200–350 mm long, elliptic-oblong; moderately to much branched. Spikelet 2.0–2.5(3.0) mm long, acute; lower glume $^1/_4$–$^1/_3$ the spikelet length, 1–3-nerved; upper glume 9(–11)-nerved; lower floret male, lemma 9(–11)-nerved, palea well developed; upper floret pale, shiny.

[Integrates with *P. coloratum*, but is more robust and larger all round. No specimen definitely referred to this species has been seen, but it belongs to the *P. coloratum*–*P. stapfianum* complex and more detailed studies are needed for this group.]

*Flowering*: April. *Ecology*: In heavy clay soils; swamps and seasonally damp places. *Frequency in southern Africa*: Infrequent. *Distribution*: Angola and northwards to East Africa. N.

Voucher: photo of type of *P. radula*, *Morgenstein*.



*Panicum miliaceum*

***Panicum miliaceum** L., in *Species plantarum* 1: 58 (1753). Type: India.

Broomcorn millet, proso millet

Loosely tufted annual 300–1 200 mm tall. Leaf blade to 15–40 × 7–25 mm, expanded, loosely hairy or glabrous. Inflorescence 100–350 mm long, dense, often drooping; included or exserted from uppermost leaf; spikelets clustered in upper parts of branches. Spikelet 4–6 mm long, ovate to ovate-oblong, glabrous; glumes separated by internode; lower glume $^1/_2$–$^3/_4$ as long as spikelet, 5–7-nerved, nerves prominent; upper glume 11–15-nerved; lower floret sterile, lemma 9–13-nerved, palea reduced; upper floret smooth or striate, glossy, white, yellow, red, brown or black when mature, persistent or deciduous.

[*P. miliaceum* is a cultivated species occasionally found as an escape.]

*Flowering*: December to April. *Ecology*: Occurs as a weed of cultivation. *Distribution*: Asia. LIM, G. *Economics*: Cultivated for grain as bird seed or as a fodder plant.

Illustration: Freckmann & Lelong: 458 (2003).
Anatomy voucher: *Ellis 3575* (cultivated).
Voucher: *Ellis 4088* (cultivated).

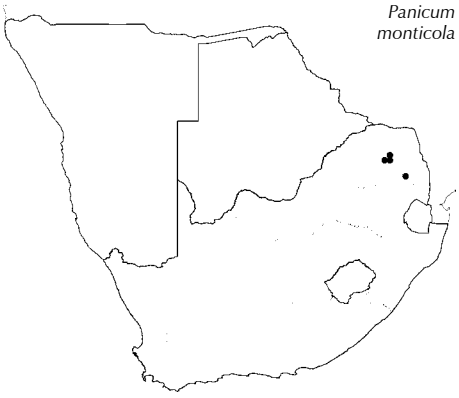
**Panicum monticola** Hook.f., in *The Journal of the Proceedings of the Linnean Society. Botany* 7: 226 (1864). Type: Cameroon, Cameroon Mt., *Mann 1353*.

Trailing, decumbent perennial; culms 300–1 000 mm long; stolon present; rooting at nodes. Leaf blade to 150 × (5)10–25 mm, lanceolate to narrowly ovate, cross-veins present, base rounded, apex acuminate. Inflorescence 100–250 mm long; sparsely and irregularly branched, ascending to spreading, scabrid; exserted from uppermost

leaf; spikelets adpressed to branches. Spikelet 2.2–3.5(–4.0) mm long, glabrous, acuminate to apiculate; lower glume broadly ovate, rounded, $^1/_4$–$^1/_2$($^2/_3$) the spikelet length, 0–1-nerved, not clasping; upper glume 5-nerved; lower floret sterile, lemma 5-nerved, palea variable but mainly absent or rudimentary; upper lemma pale or light brown, smooth, shiny.

*Flowering*: January, April and June. *Ecology*: Forest shade. *Frequency in southern Africa*: Infrequent. *Distribution*: Zimbabwe, Malawi and throughout tropical Africa. LIM (in forests around Magoebaskloof and Duiwelskloof).

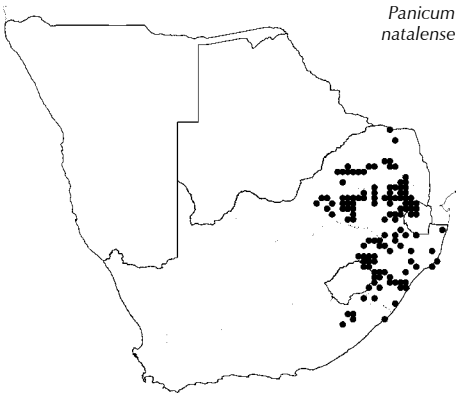
Anatomy vouchers: *Ellis 1867, 1869, 3418, 4426* & *4499*.
Voucher: *Scheepers 399*.


*Panicum monticola*

**Panicum natalense** Hochst., in *Flora* 29: 113 (1846). Type: South Africa, KwaZulu-Natal, Umlazi River, *Krauss 188*.

Natal buffalo grass, Natal buffelsgras

Densely tufted, wiry perennial to 500(–800) mm high; rhizomatous; base knotty; leaves usually basal, rarely cauline. Leaf blade to 500 × to 3.5 mm, usually tightly folded, rarely expanded. Inflorescence 70–150 mm long, ovate to oblong. Spikelet 1.7–2.2 mm long, nearly rounded to almost globose, obtuse or subacute, glabrous, light green or brownish green, rarely slightly tinged purplish; lower glume $^1/_2$–$^3/_4$ the spikelet length, distinctly 3-nerved; upper glume 5-nerved; lower floret male or sterile, lemma 5-nerved, palea membranous, well developed or reduced in width only, not longer than lemma; upper lemma pale, sparsely to densely verrulose.

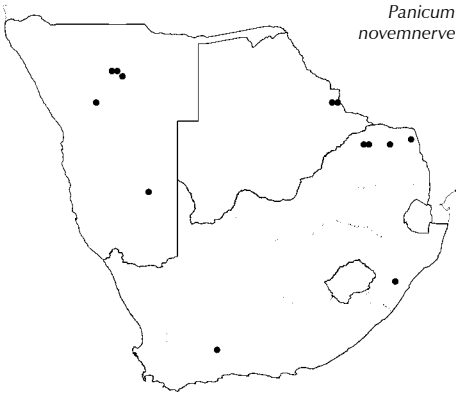

*Panicum natalense*

*Flowering*: October to April. *Ecology*: Sandy loam or sandy soils; in well drained or shallow soils in rocky areas, often in burnt veld. *Frequency in southern Africa*: Infrequent to common. *Distribution*: Angola and northwards to DRC. S, LIM, NW, G, M, FS, KZN, EC. *Economics*: Unpalatable and normally only grazed in spring after burning; possibly a natural soil stabiliser.

Anatomy vouchers: *Ellis 140, 417, 223, 1442, 5701* & *Smook 4828*.
Voucher: *Smook 1154* & *5005*.

**Panicum novemnerve** Stapf, in *Flora tropical Africa* 9: 702 (1920). Type: Zimbabwe, Harare, *Craster 27* (and other syntypes).

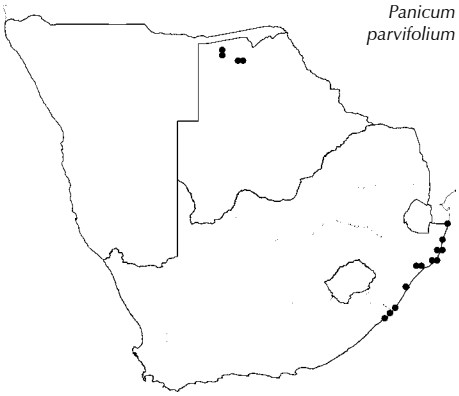
Loosely tufted annual to 600 mm high; geniculate; hispid due to bulbous-based hairs at least on leaf sheaths; culm nodes adpressed hairy. Leaf blade to 200 × to 15 mm. Inflorescence 100–200 mm long; extends beyond apex of uppermost leaf, but base is enclosed in uppermost leaf; broadly ovate, branches long, flexuous, spreading; densely scabrid below spikelets, prickles 0.10–0.15 mm long. Spikelet 2.0–2.5 mm long, narrowly ovate; lower glume $^1/_2$–$^2/_3$ the spikelet length, 5-nerved; upper glume (7–)9-nerved; lower floret sterile, lemma (7–)9-nerved, palea conspicuously reduced, much shorter than lower lemma; upper floret pale to dark, smooth, shiny.


*Panicum novemnerve*

[Barely distinguishable from *P. arcurameum* and a detailed study is needed in this group. Resembles *P. atrosanguineum*, which has inflorescence branches only moderately scabrid with prickles.]

*Flowering*: December to April. *Ecology*: Moist clayey loams, brackish soils; along drainage lines and in depressions where water collects; disturbed areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Zambia, Zimbabwe and Malawi. N, B, LIM, KZN, WC.

Anatomy vouchers: *Gibbs Russell & Smook 5235* & *Smook 7475*.
Voucher: *Freyer 36*.


*Panicum parvifolium*

**Panicum parvifolium** Lam., in *Tableau encyclopédique et mèthodique des trois Règnes de la Nature. Botanique* 1: 173 (1791). Type: South America, *Richard* (P, holo.).

Wiry perennial, culms 80–500 mm long; scrambler; rooting at lower nodes; hygro- and hydrophyte. Leaf blade (13–)15–30 × 2–7 mm, lanceolate to narrowly ovate, acute, base cordate, cross-veins present, often reflexed at maturity. Inflorescence small, open, 10–50 mm long, ovate; branches spreading to reflexed; often barely exserted from uppermost leaf sheath. Spikelet 1–2 mm long; glume apices not recurved; lower glume $^1/_2$–$^2/_3$ the spikelet length, 3–5-nerved, acuminate, clasping or non-clasping; upper glume 5-nerved; lower floret usually male or sterile, lemma 5-nerved, palea well developed, absent or reduced in width; upper lemma pale, smooth, shiny.

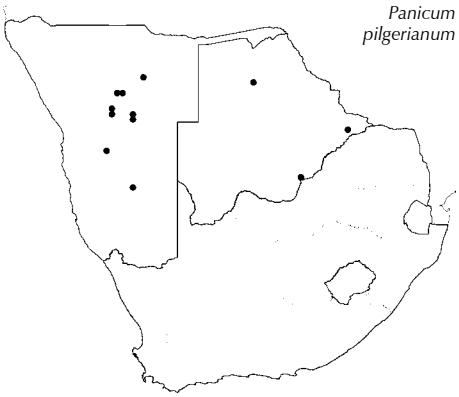
[Resembles *P. subflabellatum*, which has longer leaves (30–70 mm long) and a shorter lower glume ($^1/_3$ the spikelet length).]

*Flowering*: December to June. *Ecology*: Organically rich sandy soils; in water or along streams or in swamps. *Frequency in southern Africa*: Infrequent. *Distribution*: Throughout tropical Africa and Madagascar; also tropical America. B, KZN, EC.

Anatomy vouchers: *Ellis 1816, 3394* & *3570*.
Voucher: *Acocks 13340*.

**Panicum pearsonii** F.Bolus, in *Annuals of the Bolus Herbarium* 1: 107 (1915). Type: Namibia, Central Karasberge, Lone Hill, *Pearson 8518*.

[As far as known, *P. pearsonii* has never been recollected since the type specimen. It has a woolly base and spikelet 3.0–3.5 mm long. Resembles *P. lanipes*, which has a spikelet 2.0–2.5(3.0) mm long.]


*Panicum pilgerianum*

**Panicum pilgerianum** (Schweick.) Clayton, in *Kew Bulletin* 42: 402 (1987). Type: Namibia, Damaraland, Ovikokorero, *Dinter 3395*.

*Psilochloa pilgeriana* (Schweick.) Launert, in *Mitteilungen der Botanischen Staatssammlung München* 8: 156 (1970). Type as above.

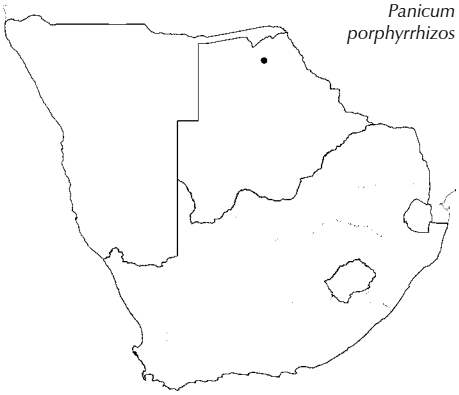
Tufted annual to 2 000 mm high; hygrophyte to semi-aquatic. Leaf blade to 320 × 5–12 mm. Inflorescence 60–360 mm long, narrowly oblong to linear; branches ascending, sometimes spreading, not whorled at base; spikelets densely adpressed along most of the length of the branches. Spikelet 4.5–6.0 mm long, lanceolate, acuminate; lower glume $^1/_6$–$^1/_5$ the spikelet length, broadly ovate, obtuse, 0–3-nerved, clasping; upper glume 7–9-nerved; lower floret sterile or male, or both on same inflorescence, lemma 5–7-nerved, broadest interspaces between nerves adjacent to central nerve; palea well

developed or slightly shorter and narrower than lower lemma; upper lemma pale, dull, rough.

*Flowering*: February to June. *Ecology*: In clay soils; in water of dams and pans, vleis and seasonally flooded areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, B.

Anatomy vouchers: *Ellis 2901* & *5331*.
Voucher: *Smith 1899*.

**Panicum porphyrrhizos** Steud., in *Synopsis plantarum glumacearum* 1: 72 (1854). Type: Ethiopia, Gaft, *Schimper 1230*.


*Panicum porphyrrhizos*

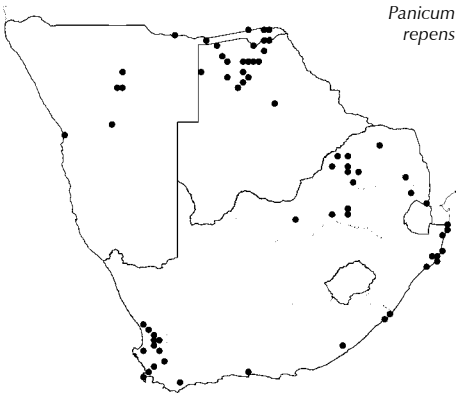
Tough, robust perennial 500–2 000 mm; sometimes hygrophytic; shortly rhizomatous. Leaf blade 150–300 × 5–10 mm, flat, acuminate. Inflorescence 200–500 mm long, ovate to oblong; some branches adpressed. Spikelet 3.0–3.5 mm long, narrowly ovate; lower glume $^1/_4$–$^1/_3$ the spikelet length, 1–3-nerved; upper glume 7–9-nerved; lower floret sterile sometimes male, lemma 7–9-nerved, palea reduced, smaller than lemma; upper lemma pale to light brown, smooth, shiny.

[Close to the *P. coloratum* complex and *P. subalbidum*; further studies are needed in this group.]

*Flowering*: June. *Ecology*: Damp ground around seasonally wet swamps and rivers. *Distribution*: Northwards to Zambia, Zimbabwe, Malawi, Mozambique; and Ethiopia, Sudan and West Africa. B.

Voucher: *Smith 2455*.

**Panicum repens** L., in *Species plantarum* ed. 2: 87 (1762). Type: Spain.

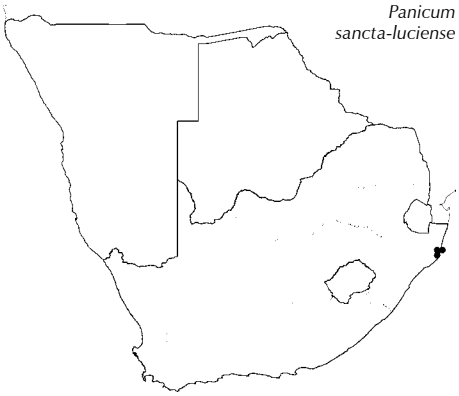

*Panicum repens*

COUCH PANICUM, KRUIPGRAS

Tufted perennial to 1 000 mm high; hygrophyte to occasional hydrophyte, erect to decumbent, sometimes floating; rhizome long; base sometimes knotty; leaves mainly cauline. Leaf blade 70–250 × 2–8 mm, obviously distichous, ascending, usually pungent. Inflorescence 50–200 mm long, narrowly oblong; sparsely to moderately branched, usually ascending. Spikelet 2–3 mm long, ovate-elliptic to ovate; lower glume broadly ovate, $^1/_3$–$^1/_2$ the spikelet length, 0–3-nerved; upper glume 7–9-nerved; lower floret usually male, lemma 7–9-nerved, broadest interspaces between nerves, not confined to only those adjacent to the central nerve, palea well developed; upper lemma pale to yellowish, shiny.

*Flowering*: October to June. *Ecology*: Wet sandy soils, sometimes in either fresh or brackish water. *Frequency in southern Africa*: Locally common. *Distribution*: Throughout tropics and subtropics, introduced to Australia and possibly America. N, B, ?S, LIM, NW, G, M, KZN, WC, EC. *Economics*: Good grazing grass for both game and livestock; cultivated as pasture in many countries; used for erosion control e.g. planted around dams in Zimbabwe. Regarded as a serious weed in Australia.

Illustration: Clayton et al.: 483, fig. 121 (1982).
Anatomy vouchers: *Ellis 3379, 3401, 3503, 3504, 3696, 3711, 3919* & *Smook 4211*.
Voucher: *Smook 4211*.

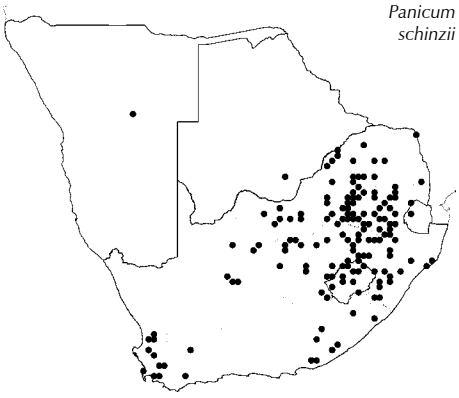

*Panicum sancta-luciense*

**Panicum sancta-luciense** Fish, in *Bothalia* 39,2: 238 (2009). Type: South Africa, KwaZulu-Natal, 2832BA (Mtubatuba): St Lucia Game Park [iSimangaliso], *Smook 1908* (PRE, holo.).

Trailing perennial; rooting at nodes; sheaths densely hairy with bulbous-based hairs; leaves cauline. Leaf blade lanceolate, 30–60 × 5–12 mm, apex acute, base cordate, amplexicaul, glabrous or hairy; margins thickened, often crinkled, usually scaberulous, bulbous-based hairs present at base. Inflorescence 30–110 mm long, open, obovate, sparsely branching; primary branches solitary or in clusters of 2 or 3 on same side of central axis. Spikelet 1.8–2.5 mm long, glumes and lemma apices usually purple; lower glume ovate, up to $^1/_2$ as long as spikelet, 3-nerved (at least near base) rarely 1-nerved (on same inflorescence), not clasping all round; upper glume slightly shorter than lower lemma and as long as upper lemma, 9-nerved; lower floret male, lemma 9–11-nerved, at least at base; palea well developed; upper lemma crustaceous, pallid to straw-coloured, shiny apex with scattered stiff hairs; anthers 1.3 mm long, dark yellow, flushed purple.

*Flowering*: January to April. *Ecology*: Hygrophilous grass growing between other grasses and sedges in sandy soils in moist areas and swamps, also in water deeper than 1.5 m with culms and leaves forming floating mats. *Distribution*: So far only recorded for the Greater St Lucia (iSimangaliso) area. KZN.

Anatomy vouchers: *Ellis 3403* & *4492*.
Voucher: *De Wet 1085, Du Toit 2719*.


*Panicum schinzii*

**Panicum schinzii** Hack., in *Verhandlungen des Botanischen Vereins der Provinz Brandenburg* 30: 142 (1888). Type: Namibia, Olukonda, *Schinz 641*.

*P. laevifolium* Hack. var. *laevifolium*, in *Bulletin de l'Herbier Boissier* 3: 378 (1895). Type: Namibia, Zwischen Ondonga und Uukuanyama, *Rautanen 593*.

LAND GRASS, SWEET GRASS, BLOUSAADGRAS

Tufted annual to 900 mm high, erect to sprawling; occasionally rooting at nodes; lower sheaths glabrous or sparsely hairy at extreme base; culm nodes glabrous. Leaf blade to 300 × to 20 mm, expanded or folded, glabrous, dark green. Inflorescence 100–350 mm long, oblanceolate to narrowly obovate, open; moderately branched; well exserted from uppermost leaf; spikelets many. Spikelet 2.0–2.5 (–3.5) mm long, obtuse, glabrous, light green often tinged with purple, rarely entirely purple; glumes apices not recurved; lower glume $^1/_4$ as long as spikelet, broadly ovate, cuff-like, 1-nerved; upper glume (7)9–11-nerved; lower floret male, or both male and sterile occurring in same inflorescence, lower lemma (7)9–11-nerved, palea well developed; upper lemma pale to yellow to light brown, shiny.

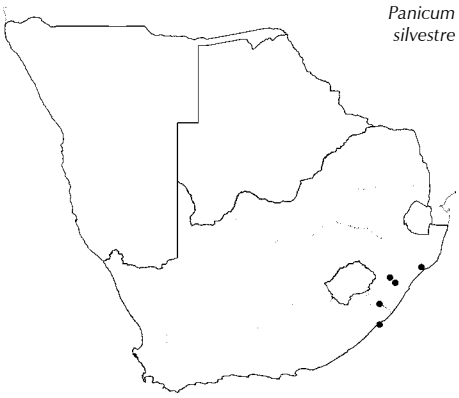
[Resembles *P. simulans*, which is yellowish green, inflorescence obovate to broadly obovate, spikelet acute and occurs in northern Namibia; and *P. subalbidum*, which has spikelets adpressed to inflorescence branches and lower palea conspicuously reduced in length.]

*Flowering*: November to May. *Ecology*: Moisture loving, in sandy and clay soils; seepage areas, depressions where water collects and in cultivated lands. *Frequency in southern Africa*: Common. *Distribution*: Zimbabwe. Introduced into other countries such as Australia and India. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Eco-*

*nomics*: Palatable sweet grass; makes good hay and silage; bad weed in cultivated lands.

Anatomy vouchers: *Botha & Panagos 48*; *Ellis & Loxton 940*; *Ellis 1842, 3912, 3856, 3857, 3900, 3918 & Smook 4271.*
Voucher: *Smook 3163, Galpin 401.*

**Panicum silvestre** Fish, in *Bothalia* 39,2: 239 (2009). Type: South Africa, KwaZulu-Natal, *Acocks 13315* (PRE, holo.).


*Panicum silvestre*

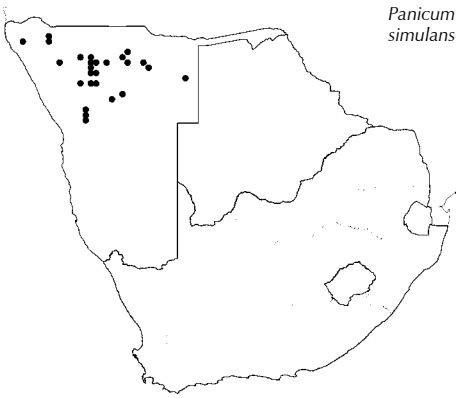
?Perennial, scrambling; leaves cauline; culms up to 400 mm long, branched, rooting at the nodes; nodes yellow, glabrous. Leaf blades flat, lanceolate, 20–85 × 4–9 mm, acuminate, base cordate, then narrowing at junction with sheath; cross-venation present (obvious on abaxial surface); long, rigid hairs present or absent; margins pale, densely scaberulous, often crinkled, usually with dense long hairs at base; sheaths convolute, outer margins densely hairy. Inflorescence 35–145 × 20–180 mm, delicate, open, sparsely branched, closely associated with flag leaf or well exserted; branches long, fine; spikelets solitary, pedicels (4)6–15 mm long, slightly thickened at apex. Spikelet 1.8–2.4 mm long, acute to acuminate; lower glume nearly as to longer than spikelet, 3-nerved, long-acuminate, not clasping; upper glume longer than spikelet, 7-nerved, hardly separated from lower glume; lower floret sterile, lemma 5–7-nerved; palea absent or reduced to a small scale; upper lemma shorter than lower lemma, pallid to light brown, shiny.

[Similar to *P. laticomum*, which has leaves glabrous or hairy with short rigid hairs and an asymmetrical base; glumes distinctly separated, lower glume $^1/_2$ as long as spikelet, and an inflorescence with many more spikelets.]

*Flowering*: December to July. *Ecology*: On forest floor between other herbs, along streams and roads in forests. *Frequency in southern Africa*: locally common. *Distribution*: KZN, EC.

Anatomy voucher: *Ellis 4415*.
Voucher: *Moll 2872, Smook 1759*.

**Panicum simulans** Smook**,** in *Bothalia* 23: 59 (1993). Type: Namibia, Otjihorongo, 25 km north of Outjo on road to Okaukuejo, *Smook 5108* (PRE, holo.).


*Panicum simulans*

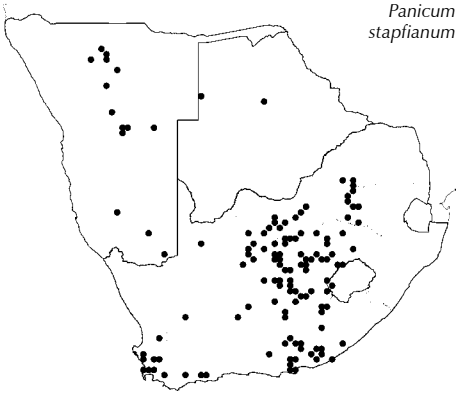
Annual 600(–1 200) mm tall, erect to geniculate; culm nodes with adpressed silvery white hairs pointing upwards; sometimes rooting at nodes. Leaf blade 5–200(–250) × 2–15 mm, linear, straight or cordate at base, flat; apex acute to acuminate; margins white, smooth to scaberulous to densely scabrid; bulbous-based hairs present or absent, densely papillate on lower surface; sheath glabrous or with bulbous-based hairs. Inflorescence (80–)160–250(–400) mm long, narrowly obovate to obovate, occasionally oblanceolate. Spikelet (2.2–)2.4–2.6(–3.0) mm long, narrowly obovate to obovate-elliptic, acute or acuminate, often tinged purple; lower glume $^1/_3$–$^1/_2$ as long as spikelet, acute to acuminate, membranous, central nerve distinct, scaberulous to scabrid; lateral nerves obscure, or only visible at base; apex minutely mucronate or with a brush of prickles, clasping; upper glume membranous, 7–9(–11)-nerved, acute to acuminate, scabrid, mucro present, erect or slightly recurved; often tinged purple mainly at apex; lower floret male or sterile, both conditions occurring in same inflorescence; lower lemma (7–)9-nerved, cross-venation often

visible; palea well developed; upper lemma white to straw-coloured, occasionally dark with distinctly yellow nerves, both colour forms sometimes present in same inflorescence, smooth and shiny.

[*Panicum simulans* is similar to *P. schinzii* Hack. and *P. novemnerve* Stapf, but characters such as culm nodes, lower glume venation, apex of upper glume and lower lemma, lower floret, lower palea and Kranz chloroplast in combination are used to separate these three species clearly and to justify the recognition of *P. simulans* as a new species.]

*Flowering*: November to May. *Ecology*: Occurs in areas with seasonally high moisture as found in vleis and around fountains or in more ephemerally moist situations such as in natural hollows in granite outcrops or saturated soil pockets overlaying calcrete; also in disturbed areas in depressions along roadsides and in irrigated lands. *Distribution*: ?Endemic. N (Northern Namibia but may also occur in southern Angola).

Illustrations: Smook & Ellis: 60, fig. 1 (1993).
Anatomy vouchers: *Smook 5109, 5110, 5120, 5153*; *Ellis 5271* & *5273*.
Voucher: *Giess 8605* & *10799*.


*Panicum stapfianum*

**Panicum stapfianum** Fourc., in *Transactions of the Royal Society of South Africa* 21: 76 (1932). Type: South Africa, Eastern Cape, Uitenhage div., *Ecklon & Zeyher 478*; Free State, Caledon River, *Burke 424*; Northern Cape, Little Namaqualand, *Drège* (many other syntypes).

STAPF'S BUFFALO GRASS

Erect, tufted perennial to 900 mm high; bulbous-based hairs present or absent; leaves mainly basal. Leaf blade to 400 (but usually shorter) × to 5 mm; upper leaf surface usually densely papillate. Spikelet to 3 mm long; lower glume $^1/_3$–$^2/_5$ the spikelet length; upper glume 7–9-nerved; lower floret male, lemma 7–9-nerved, palea well developed; upper lemma pale yellow to flushed greyish, smooth.

[Belongs to the *P. coloratum, P. bechuanense* and *P. merkeri* complex for which detailed studies are needed.]

*Flowering*: November to May. *Ecology*: On heavy sandy soils or calcrete; in damp areas and occasionally rocky dry areas, as well as disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, B, L, LIM, NW, G, FS, NC, WC, EC. *Economics*: Highly palatable grazing grass.

Illustration: Chippindall: 336, fig. 293 (1955), Müller: 247 (2007).
Anatomy vouchers: *Ellis 3609* & *5137*.
Voucher: *Smook 2357*.

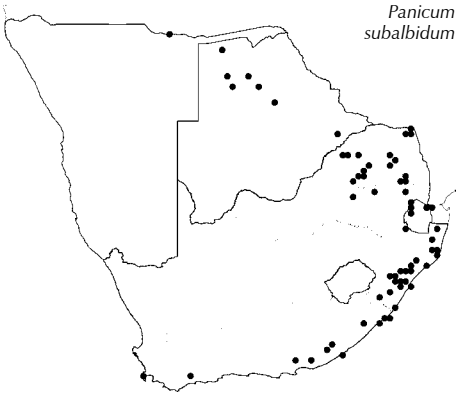
**Panicum subalbidum** Kunth, in *Rèvision des Graminèes* 2: 397 (1831). Type: Senegal, Walo, *Leprieur* (P, holo.).

*P. glabrescens* Steud., in *Synopsis plantarum glumacearum* 1: 72 (1854). Type: Senegal, *Leprieur*.

ELBOW BUFFALO GRASS

Tufted slender to robust, erect to decumbent, short-lived perennial or annual to 2 000 mm high; hygro- and occasionally hydrophyte;

sometimes rooting at lower nodes; culm 3–10 mm wide at base, soft, often spongy, nodes usually dark brown or black. Leaf blade 200–500 × 6–18 mm, expanded, glabrous; upper surface with large, usually white, prickles (always visible on upper leaves); papillae sometimes present. Inflorescence 130–500 mm long, sparsely to moderately branched, spikelets adpressed to branches. Spikelet 2.5–3.5 mm long, narrowly ovate, acute to acuminate, glabrous, light green, sometimes tinged with purple; lower glume broadly ovate, $^1/_3$ the spikelet length, 1–3-nerved; upper glume 7–9-nerved; lower floret sterile, lemma 7–9-nerved, palea absent or poorly developed, then narrower and shorter than lower lemma; upper lemma smooth, pale to yellowish, shiny.

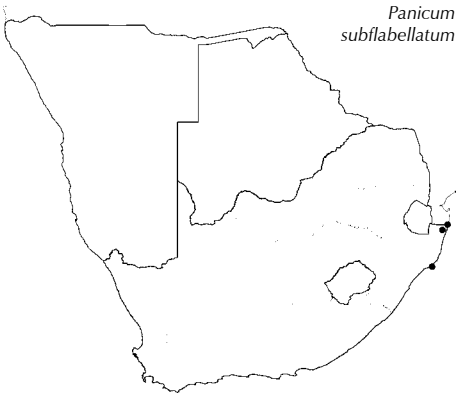

*Panicum subalbidum*

[Very variable in size. Resembles *P. impeditum*, which has only papillae and no prickles on leaf upper surface.]

*Flowering*: October to April. *Ecology*: Usually on clay soils; in disturbed areas, in or near water, along rivers and swamps. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to Zambia, Zimbabwe, Malawi and Mozambique and throughout tropical Africa. N, B, S, LIM, G, M, KZN, WC, EC.

Anatomy vouchers: *Ellis 563, 1925, 1467, 3870, 3893, 4209 & 4506*.
Voucher: *Smith 1438, Theron 1978*.

**Panicum subflabellatum** Stapf, in *Flora tropical Africa* 9: 711 (1920). Type: Mozambique, W Luabo, *Kirk* (K, holo.).

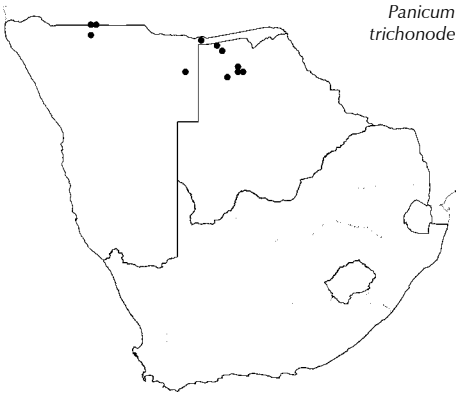

*Panicum subflabellatum*

Tufted perennial to 500 mm high; erect or decumbent; often wiry; sometimes shortly rhizomatous; stoloniferous; basal leaf sheaths glabrous. Leaf blade 30–70 × 2–3 mm, linear-lanceolate, tapering to a long acuminate tip, base straight, not reflexed. Inflorescence 10–60 mm long; moderately branched; branches short, ascending to adpressed. Spikelet 1.3–1.7 mm long, broadly ovate, strongly flushed with purple; glume apex not recurved; lower glume $^1/_3$ the spikelet length, broadly ovate, 3–5-nerved; upper glume 5-nerved; lower floret usually male, lemma 5–7-nerved, palea well developed; upper lemma pale, shiny or dull.

[Resembles *P. parvifolium*, which has shorter leaves (15–30 mm long) and a longer lower glume ($^1/_2$–$^2/_3$ the spikelet length).]

*Flowering*: December and March. *Ecology*: Sand dunes and swampy areas along coast. *Frequency in southern Africa*: Locally common. *Distribution*: Mozambique and Tanzania. KZN.

Voucher: *Ward 8822*.


*Panicum trichonode*

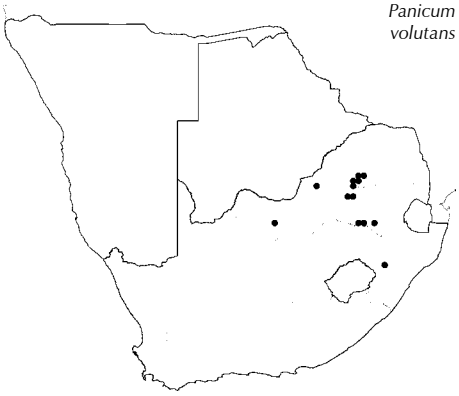
**Panicum trichonode** Launert & Renvoize, in *Podromus einer Flora von Südwestafrika* 160: 226 (1970). Type: Zambia, *Robinson 6124* (K, holo.).

Densely tufted perennial 350–1 200 mm high; erect or occasionally geniculate; shortly rhizomatous; basal sheaths hairy, usually strongly flushed with purple; appears sparsely leafy, leaves mainly cauline; culm nodes completely and densely covered with short adpressed hairs. Leaf blade 100–300 × 2–6 mm; upper leaf surface densely papillate. Inflorescence 100–200 mm long, elliptic to oblong; moderately branched, ascending; lower part of branches naked for a distance below spikelets. Spikelet (2.0–)2.5–3.0 mm long; lower glume

broadly ovate, up to 1/4 the spikelet length, 0–1-nerved; upper glume (7)9–11-nerved; lower floret male, lemma (7)9–11-nerved, palea well developed; upper lemma pale to yellow, shiny.

*Flowering*: January to May. *Ecology*: Black clays or sand; in seasonally flooded areas, vleis and pan edges. *Frequency in southern Africa*: Infrequent. *Distribution*: Zambia and Zimbabwe. N, B. *Economics*: Used for thatching.

Voucher: *Rodin 9098*.



*Panicum volutans*

**Panicum volutans** J.G.Anderson, in *Bothalia* 7: 420 (1960). Type: South Africa, North West, Leeufontein, Ventersdorp, *Louw 1713* (PRE, holo.).

ROLLING GRASS, TUMBLE WEED

Loosely tufted annual to 750 mm high; erect to decumbent; culm nodes hairy; rooting at nodes. Leaf blade 230 × 0.5–10.0 mm, expanded, hispid with bulbous-based hairs. Inflorescence large 400 × 250 mm, open; spreading, rigidly branched; branches naked for long distance before the 1–3 spikelets at apex; extends beyond tip of uppermost leaf, but base is often enclosed in uppermost leaf; lowest primary branches whorled. Spikelet (5.5–)6.0–6.5(–7.0) mm long, long-acuminate, glabrous; lower glume usually more than half as to nearly as long as spikelet, distinctly 3-nerved; upper glume as long as to longer than spikelet, 7–9-nerved; lower floret sterile, lemma 7-nerved, palea reduced, conspicuously shorter than lemma; upper lemma yellowish grey, nerves very conspicuous, smooth, shiny; anthers 1.5 mm long.

[This is the only *Panicum* species in the FSA area in which the inflorescence breaks off as a unit at maturity and is rolled about by the wind.]

*Flowering*: January to March. *Ecology*: Mainly in black turf and areas of high moisture; in cultivated and disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. LIM, NW, G, M, KZN.

Anatomy vouchers: *Ellis 2002, 3430* & *3882*,
Voucher: *Scheepers 1478*.




Figure 379.—*Parapholis incurva*. Artist: S.B. Chiliza

## *__Parapholis__ C.E.Hubb.

Hubbard: 14 (1946); Chase & Niles: 7 (1962); Chippindall: 73 (1955); Tutin: 243 (1980); Clayton & Renvoize: 111 (1986); Gibbs Russell et al.: 243 (1990); Watson & Dallwitz: 692 (1994); Sell & Murrell: 168 (1996).

Annual; tufted, erect to prostrate. **Leaf blade** linear, expanded or rolled, apex acute; *ligule* an unfringed membrane. **Inflorescence** a single, slender, ± curved, rigid, cylindrical spike; spikelets sunk in and closely pressed to rachis, alternating on opposite sides of rachis; *spikelets* solitary, sessile. **Spikelet** ± laterally compressed, falling with glumes and internodes of rachis at maturity; *glumes* ± equal, displaced side-by-side, similar, as long as spikelet, narrow, acute,

glabrous, 3–5-nerved, thick and rigid, awnless. **Floret** 1, bisexual; *lemma* almost as long as glumes, less firm in texture than glumes, thinly membranous, lanceolate to narrowly ovate, 3-nerved, lateral nerves short, awnless; *palea* almost as long as lemma, 2-nerved, keels wingless. **Lodicules** 2. **Stamens** 3. **Ovary** glabrous, truncate; styles obsolete, plumose. **Caryopsis** narrowly ellipsoid; hilum short; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: *x* = 7, 9, 19 (polyploidy).

**Species** 6, Europe and Asia; 1 naturalised in southern Africa: **Parapholis incurva* (L.) C.E.Hubb., western Northern Cape and Western Cape.

Species treatment by M.J. Moeaha.



Figure 380.—*Parapholis incurva*. Several spikelets (4.5–5.5 mm). Photographer: M. Koekemoer.

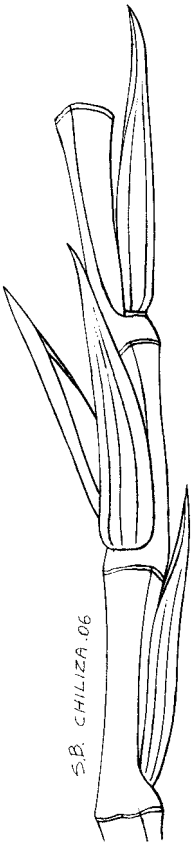



Figure 381.—*Parapholis incurva*. Several spikelets (15.0 × 1.6 mm). Artist: S.B. Chiliza

**Quick guide to easily confused taxa:**

| | | |
|---|---|---|
| 1. | Spikelet with one floret | 2 |
| | Spikelet with two to many florets | 3 |
| 2. | Glumes two, lying side-by-side | **Parapholis* |
| | Glume one, lower glume suppressed except in terminal spikelets | **Hainardia* |
| 3(1). | Glume 1, shorter than to as long as spikelet, obtuse to acute, awnless; lower glume usually absent, when present then much reduced | **Lolium rigidum* |
| | Glumes 2, slightly shorter than spikelet, ovate, oblong to lanceolate, awned; lower glume present | **Elytrigia repens* |

***Parapholis incurva** (L.) C.E.Hubb., in *Blumea* Supplement 3 (Henrard Jubilee Vol.): 14 (1946). Type: Europe.

Annual 60–300 mm high; culms erect or decumbent. Leaf blade up to 30 × 1.5–2.0 mm. Inflorescence 20–60(85) mm long, a solitary cylindrical spike, usually curved. Spikelet 4.5–5.5 mm long; glumes two, lying side-by-side, keel not winged; anther 1–2 mm long.

*Flowering*: August to October. *Ecology*: Roadsides and in moist places. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised weed from Europe; widely introduced in temperate areas. NC, WC, EC. *Economics*: Weed.

Illustration: Hubbard: 340 (1984).
Anatomy vouchers: *Ellis 638, 1270, 1710* & *5419*.
Voucher: *Acocks 17786*.

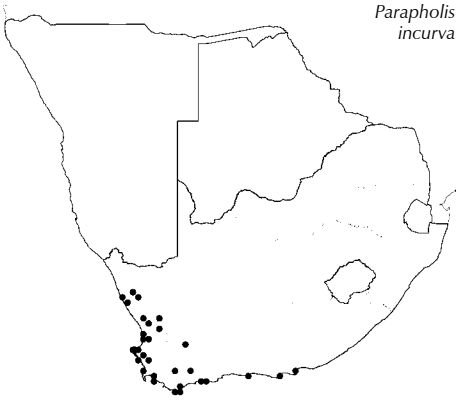




Figure 382.—*Paratheria prostrata*. Spikelet with awn bristle and pungent callus. Artist: W. Roux.



Figure 383.—*Paratheria prostrata* specimen.

## **Paratheria** Griseb.

Grisebach: 236 (1866); Stapf & Hubbard: 1084 (1934); Launert: 143 (1970a); Clayton: 457 (1972); Clayton & Renvoize: 305 (1986); Clayton: 188 (1989); Gibbs Russell et al.: 243 (1990); Watson & Dallwitz: 693 (1994).



Figure 384.—*Paratheria prostrata* spikelet (to 9 mm). Photographer: M. Koekemoer.

Perennial, tufted, often rooting at nodes. Culms slender, ascending, geniculate, branched. **Leaf blade** linear, expanded; *ligule* a fringed membrane or a fringe of hairs. **Inflorescence** a solitary, terminal, contracted panicle, branches adpressed to central axis, each branch disarticulating with a spikelet; *spikelets* solitary, surrounded by a ring of short hairs at the base, subtended by a long, robust, awn-like bristle, supported on a long, pungent callus beneath spikelet; callus constituting a stipe; *cleistogamous spikelets* occurring at base of inflorescence and hidden in uppermost leaf sheaths resemble normal spikelets except for the absence of a bristle. **Spikelet** dorsiventrally compressed; *glumes* ± equal, minute, rarely 0, similar, glabrous, awnless. **Florets** 2, lower sterile, reduced to a lemma, dorsally flattened, 7–11-nerved, awnless; palea 0; *upper floret* bisexual; *lemma* firmer than glumes, similar to lower floret but convex dorsally, 7-nerved, glabrous, margins flat and exposed on palea, (digitaria-type) acuminate, awnless; *palea* ± as long as lemma. **Lodicules** 2. **Stamens** 3. **Ovary** glabrous. **Caryopsis** hilum short; embryo large. **Photosynthetic pathway**: $C_4$; XyMS-. **Cytology**: $x = 9$.

**Species** 2, Zambia to tropical West Africa, Madagascar, Cuba and Brazil; 1 in southern Africa: *Paratheria prostrata* Griseb., Namibia, in Okavango River.

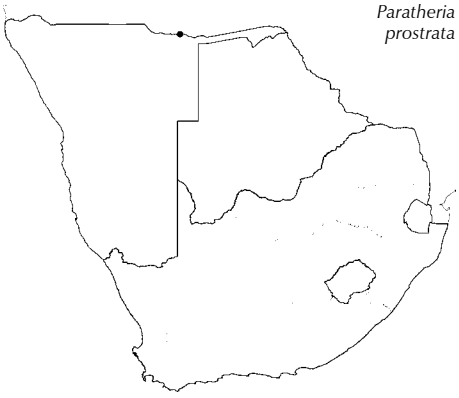
Species treatment by A.C. Mashau.

**Paratheria prostrata** Griseb., in *Catalogus plantarum cubensium*: 236 (1866). Type: Cuba.

Tufted perennial, 150–450 mm high; culm nodes bearded. Leaf blade 20–60 × 2–4 mm; ligule a fringe of hairs. Inflorescence contracted; spikelet on a pungent stipe and with a solitary bristle 20 mm long; bristle and spikelet disarticulate together. Spikelet ± 9 × 1 mm, lanceolate, awnless; glumes similar, tiny; lower lemma as long as spikelet; upper lemma margins flat and exposed on palea (digitaria-type); anthers 2–3 mm long.

*Flowering*: December to January. *Ecology*: Growing in and near water. *Frequency in southern Africa*: Infrequent. *Distribution*: Zambia, tropical West Africa; and Cuba, Brazil and Madagascar. N.

Illustration: Clayton: 189, tab. 49 (1989).
Voucher: *De Winter 4049*.




## **Paspalidium** Stapf

Stapf: 582 (1920); Chippindall: 365 (1955); Launert: 144 (1970a); Clayton & Renvoize: 551 (1982); Clayton & Renvoize: 291 (1986); Clayton: 109 (1989); Gibbs Russell et al.: 244 (1990); Veldkamp: 374 (1994) as *Setaria*; Watson & Dallwitz: 699 (1994); Webster: 439 (1995) as *Setaria*.

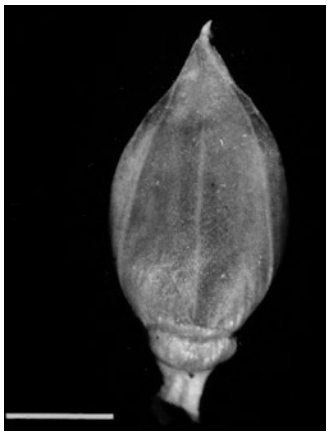


Figure 385.—*Paspalidium obtusifolium* spikelet (3.0–3.5 mm). Photographer: M. Koekemoer.

Annual or perennial; rhizomatous or stoloniferous; rooting from lower nodes; sometimes floating. **Leaf blade** expanded or rolled, linear; *ligule* a fringed membrane to a fringe of hairs. **Inflorescence** an elongated, secund, false spike consisting of several sessile, spike-like, 1-sided racemes scattered singly on alternate sides and ± adpressed to the long central axis; rachis triquetrous or winged, usually ending in an inconspicuous point; *spikelets* solitary or paired, often in 2 rows, sessile or very shortly pedicelled; upper glume abaxial (turned away from rachis). **Spikelet** ovate, dorsiventrally compressed, falling with glumes; *glumes* unequal, awnless; lower glume a small membranous scale, 1–5-nerved; upper glume to $^2/_3$ as long as spikelet, 3–11-nerved, membranous. **Florets** 2; *lower floret* male or sterile; lemma membranous, ± oblong-elliptic, rounded dorsally, subacute, 5–7-nerved, awnless; palea thinly membranous, equalling lemma; *upper floret* bisexual; *lemma* firmer than glumes, broadly elliptic, rounded dorsally, almost as long as spikelet, glabrous, rugose, entire, margins inrolled and clasping edges of palea (paspalum-type), awnless; *palea* elliptic-lanceolate, acute, tip often briefly reflexed, flat and 2-keeled with margins involute, indurated. **Lodicules** 2, broadly cuneate, fleshy. **Stamens** 3. **Ovary** glabrous; styles connate at base, plumose. **Caryopsis** ellipsoid to subglobose, dorsiventrally compressed; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 9$ (polyploidy).

**Species** ± 40, warmer regions of both hemispheres; 2 in southern Africa, northern Namibia and Botswana, Limpopo and KwaZulu-Natal.

Species treatment by A.C. Mashau.

**Key to species:**

Spikelet 1.6–2.6 mm long, ovate; inflorescence central axis 0.5–1.5 mm wide, narrowly winged; upper glume $^2/_3$–$^4/_5$ as long as spikelet . . . . . **P. geminatum**
Spikelet 3.0–3.5 mm long, narrowly ovate; inflorescence central axis 3–5 mm wide, ribbon-like and broadly winged; upper glume $^1/_3$–$^1/_2$ as long as spikelet . . . . . ?***P. obtusifolium**

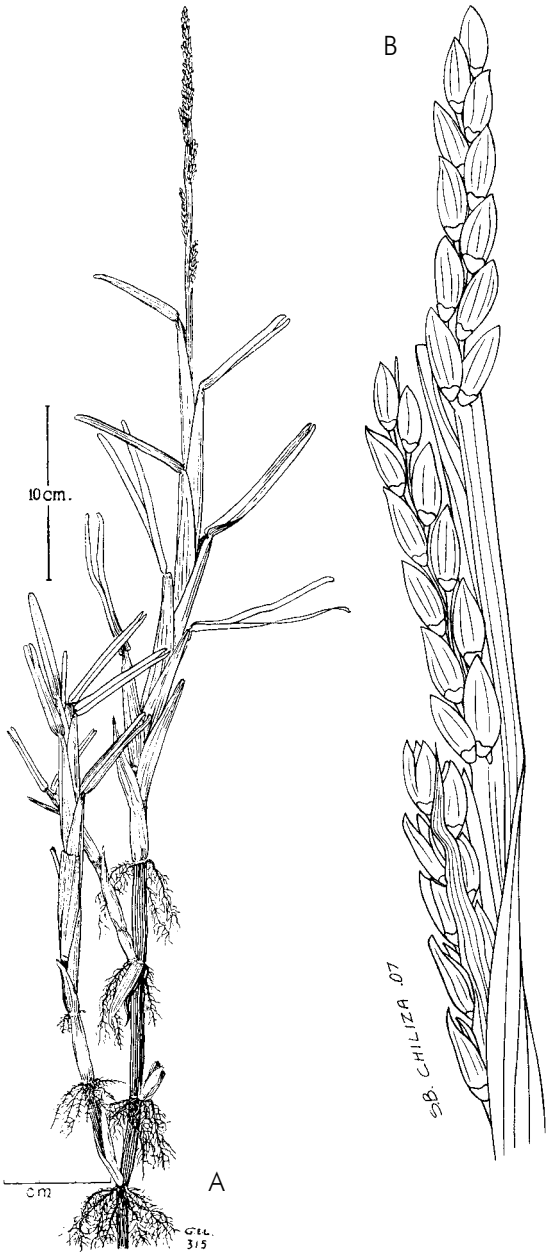
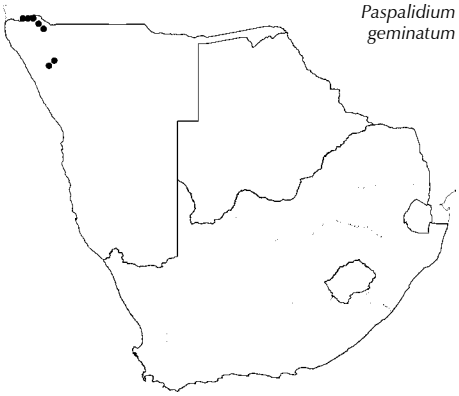



Figure 386.—*Paspalidium obtusifolium*. A, plant; B, portion of inflorescence showing racemes with spikelets (50 × 5 mm). Artists: A, G.E. Lawrence; B, S.B. Chiliza.

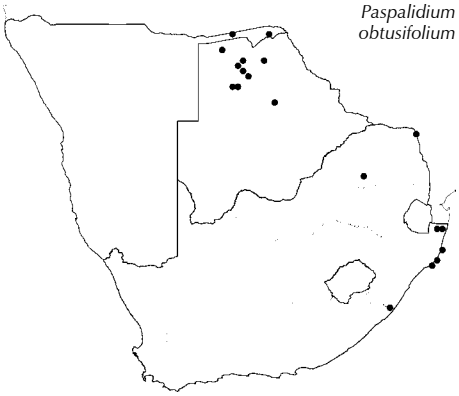

*Paspalidium geminatum*

**Paspalidium geminatum** (Forssk.) Stapf, in *Flora tropical Africa* 9: 583 (1920). Type: Egypt, Rosetta, *Forsskål* (C, holo.).

Perennial 100–600 mm high, often hydrophytic; rhizomatous or stoloniferous; culms floating and spongy, or prostrate and rooting at nodes. Leaf blade 50–350 × 2–13 mm, acuminate; ligule a fringe of hairs. Inflorescence central axis 0.5–1.0 mm wide, narrowly winged. Spikelet 1.6–2.6 mm long, ovate; lower glume $^1/_4$–$^1/_3$ as long as spikelet, truncate; upper glume $^2/_3$–$^4/_5$ as long as spikelet; lower lemma as long as spikelet; upper lemma almost as long as spikelet, granulose; anther 1.0–1.6 mm long.

*Flowering*: March to June. *Ecology*: In water up to 2 m deep but also extending to wet marshy soils on the edges of rivers, pans or vleis. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Northwards to tropical Africa; Old World tropics. N.

Illustration: Clayton et al.: 553, fig. 133 (1982).
Voucher: *Leistner, Oliver, Steenkamp & Vorster 253; Giess 3132*.


*Paspalidium obtusifolium*

**?*Paspalidium obtusifolium** (Delile) N.D.Simpson, *Ministry of Agriculture, Egypt*. *Bulletin* 93: 10 (1930). Type: Egypt, *Delile* (MPU, holo.).

*P. platyrrhachis* C.E.Hubb., in *Kew Bulletin* 1934: 262 (1934). Type: Zambia, Mazabuka, *Trapnell 1086* (K, holo.).

Perennial 300–600 mm high, often hydrophyte; rhizomatous or stoloniferous; culms floating and spongy, or prostrate and rooting at nodes. Leaf blade 30–200 × 4–12 mm, bluntly acute to broadly obtuse, often notched at rounded apex and splitting along midrib; ligule a fringed membrane to a fringe of hairs. Inflorescence central axis 3–5 mm wide, ribbon-like, broadly winged. Spikelet 3.0–3.5 mm long, acute, narrowly ovate; lower glume $^1/_8$–$^1/_4$ as long as spikelet, truncate; upper glume $^1/_3$–$^1/_2$ as long as spikelet; lower lemma as long as spikelet; upper lemma almost as long as spikelet, granulose; anther 1.2–2.2 mm long.

*Flowering*: September to May. *Ecology*: On marshy soils or shallow water in pans, often with culms floating. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Although regarded as indigenous it may be alien, possibly brought from Egypt by water birds. Northwards to Algeria and Egypt. N, B, LIM, KZN.

Anatomy vouchers: *Ellis 555, 1900, 1901, 3709 & 3710*.
Voucher: *Davidse 5868*.

## **Paspalum** L.

Linnaeus: 855 (1759); Stapf: 369 (1898); Stapf: 570 (1919); Stent: 258 (1924); Hitchcock & Chase: 599 (1950); Chippindall: 386 (1955); De Winter & Vorster: 295 (1974); Chippindall & Crook: 12 (1976); Renvoize & Clayton: 339 (1980); Clayton & Renvoize: 607 (1982); Brummitt: 281 (1983); Clayton & Renvoize: 287 (1986); Webster: 172 (1987); Clayton: 88 (1989); Gibbs Russell et al.: 245 (1990); Watson & Dallwitz: 701 (1994); Allen & Hall: 566 (2003).

Perennial; of varying habit. **Leaf blade** long-linear, expanded, rarely folded or with inrolled margins; *ligule* an unfringed membrane. **Inflorescence** of spike-like, 1-sided (secund) racemes; digitate to subdigitate

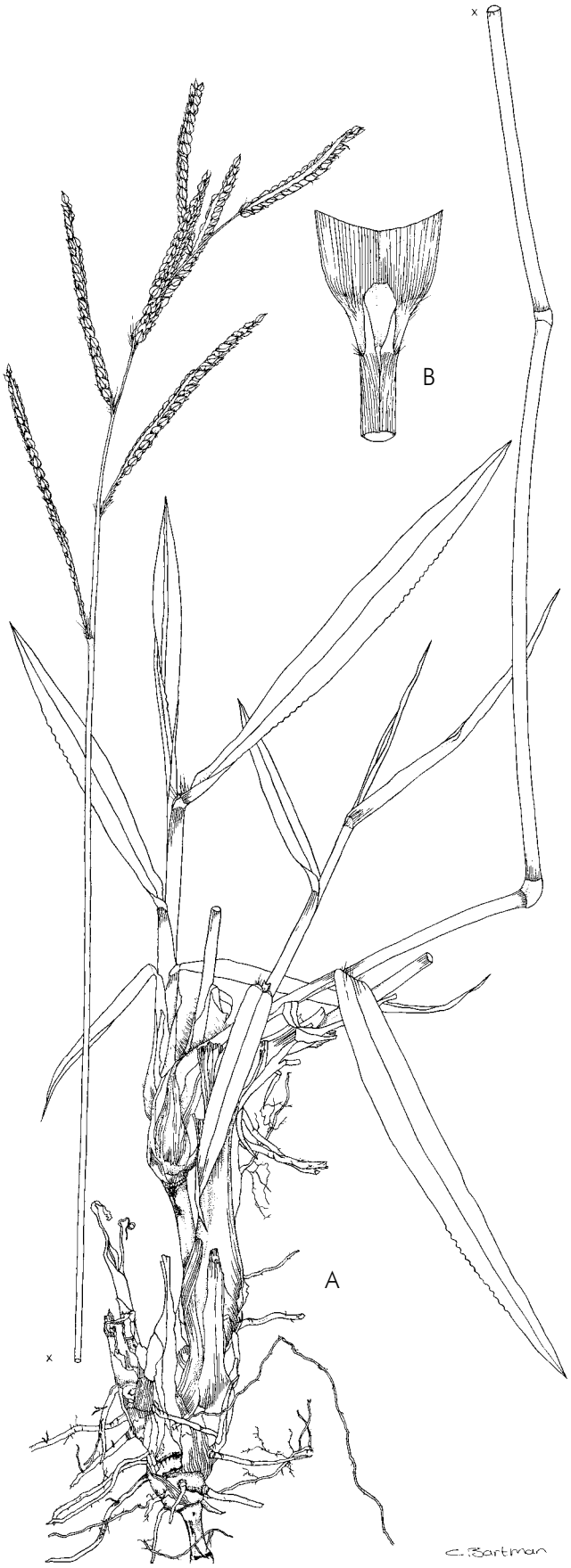



Figure 387.—*Paspalum dilatatum*. A, plant; B, ligule. Artist: C.D. Bartman.

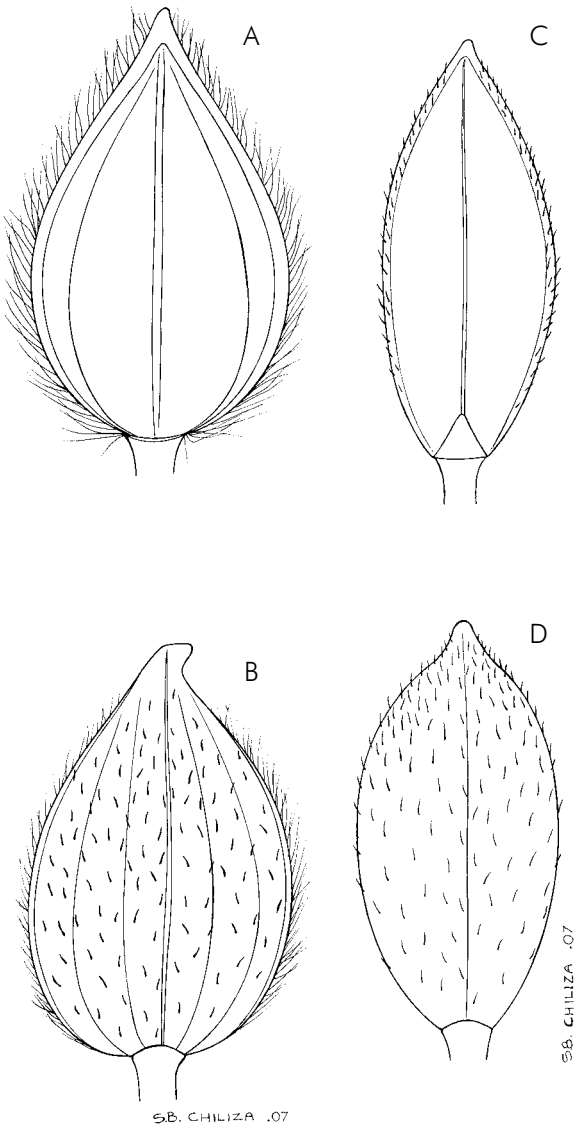



Figure 388.—*Paspalum* spikelets. A, B, *P. dilatatum*; C, D, *P. distichum*. A, C, dorsal view; B, D; ventral view. Artist: S.B. Chiliza.

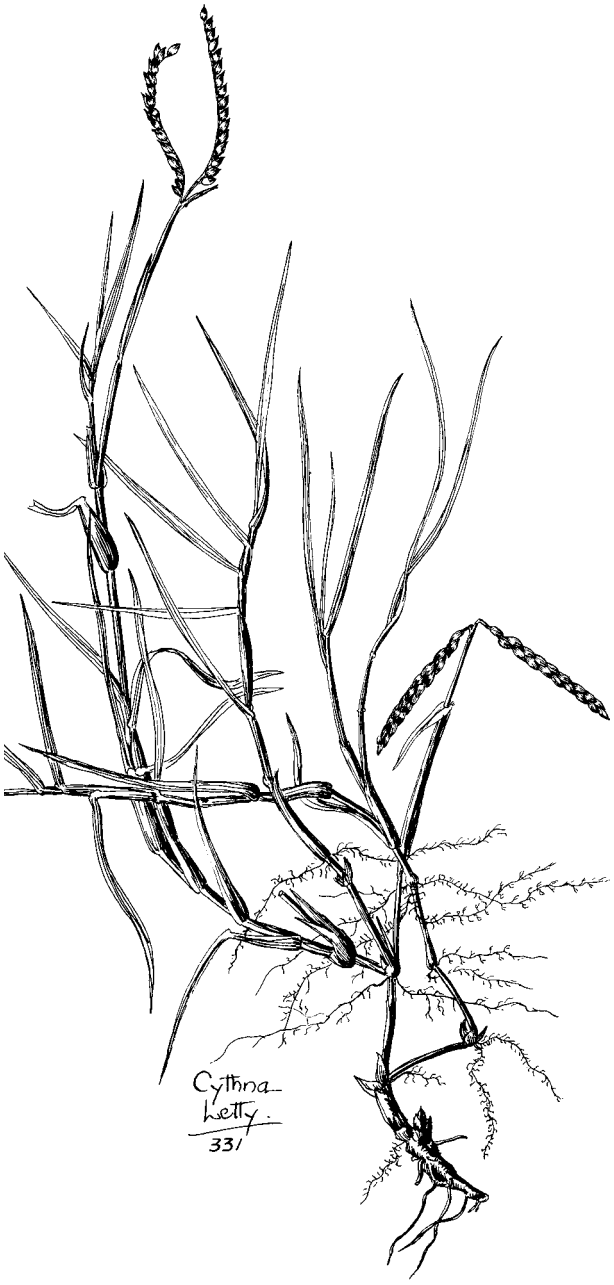



Figure 389.—*Paspalum distichum*. Artist: C. Letty.




Figure 390.—*Paspalum scrobiculatum*. Artist: C. Letty.

or scattered up central axis, rarely solitary; rachis flat dorsally, with a raised midrib in front, bearing spikelets alternately on either side of midrib in 2 or 4 rows; *spikelets* solitary or paired, subsessile or unequally pedicelled; lower lemma abaxial and upper lemma facing rachis. **Spikelet** strongly plano-convex, orbicular to oblong to lanceolate, dorsiventrally compressed, disarticulating with glumes; *glumes* unequal, dissimilar, awnless; lower glume 0 or scale-like, rarely up to $^{2}/_{3}$ as long as spikelet; upper glume as long as spikelet, convex dorsally, membranous, 3–5-nerved, nerves curved. **Florets** 2; *lower floret* sterile, reduced to a lemma; lemma equal and similar to upper glume but back flat, awnless; *upper floret* bisexual; *lemma* similar in texture, to firmer than glumes, chartaceous to crustaceous, smooth to rugose, obtuse, entire, faintly nerved, glabrous, sometimes minutely punctiform, margins narrow and inrolled, clasping only edges of palea (paspalum-type), awnless; *palea* subequal to and similar in

texture to lemma, obtuse or acute. **Lodicules** 2, broadly cuneate. **Stamen**s 3. **Ovary** glabrous; styles distinct or united at base, plumose. **Caryopsis** plano-convex; hilum short; embryo large, or rarely small. **Photosynthetic pathway**: $C_4$; NADP-ME (*P. notatum*, *P. dilatatum*); XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x$ = 10, 12 (high polyploidy).

**Species** ± 330, tropics, predominately New World; 7 (indigenous and naturalised) in southern Africa, widespread.

Species treatment by A.C. Mashau.



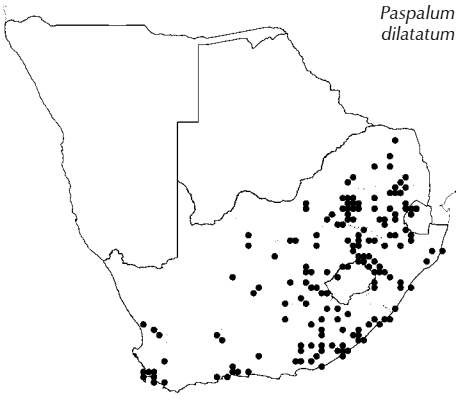
Figure 391.—*Paspalum dilatatum* spikelet (3–4 mm). Photographer: M. Koekemoer.

**Key to species:**

1. Spikelet with upper glume margins fringed with long hairs, rest of surface pubescent or glabrous, matt . . . . . 2
   Spikelet with upper glume margins not fringed, surface glabrous or minutely hairy, usually glossy . . . . . 3
2. Spikelet 3–4 mm long; racemes (3)4–9, scattered on the central axis; basal sheaths glabrous or sparsely hairy . . . . . ***P. dilatatum***
   Spikelet 1.6–2.8 mm long; racemes 10–30; closely spaced on the central axis; basal sheaths densely hairy . . . . . ***P. urvillei***
3(2). Spikelets arranged in four rows; racemes 15–44; spikelet yellowish-brown to straw-coloured, often purple-tinged . . . . . ***P. quadrifarium***
   Spikelets arranged in two rows; racemes 1–5; spikelet green or pale brownish-green sometimes becoming brown . . . . . 4
4. Spikelet apex rounded; spikelet ovate to elliptic, 1.0–1.5 × as long as wide . . . . . 5
   Spikelet apex acute; spikelet nearly lanceolate to narrowly obovate, more than 2 × longer than wide . . . . . 6
5. Spikelet 2.8–3.7 mm long; rachis often zig-zag; rhizome very well developed, horizontally creeping . . . . . ***P. notatum***
   Spikelet 2.0–2.5 mm long; rachis flat, linear, almost leaf-like; rhizome short, not horizontally creeping . . . . . **P. scrobiculatum**
6(4). Upper glume minutely hairy (look carefully); spikelet narrowly obovate, 2.5–3.5 mm long; lower glume a small triangular scale up to $^2/_3$ as long as spikelet to absent (all 3 states can occur on the same inflorescence); leaves more than 3 mm wide . . . . . **P. distichum**
   Upper glume glabrous; spikelet almost lanceolate, 3.0–4.5 mm long; lower glume absent or reduced to a rim; leaves less than 3 mm wide . . . . . **P. vaginatum**

***Paspalum dilatatum** Poir., in *Encyclopédie méthodique Botanique* 5: 35 (1804). Type: Argentina.

Dallis grass, gewone paspalum, watergras



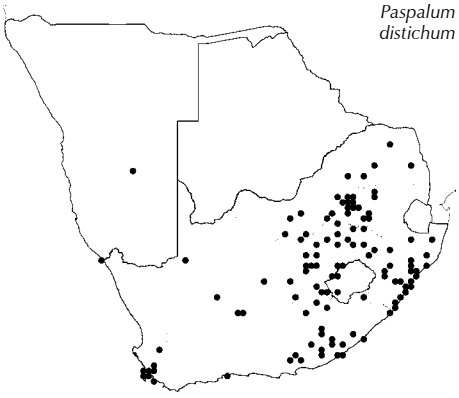

Tufted perennial 300–1 800 mm high; rhizome short, creeping; basal sheaths glabrous or sometimes sparsely hairy; culm nodes glabrous. Leaf blade 90–350(–450) × 6–14 mm; ligule 2–8 mm long, conspicuous. Inflorescence central axis 30–200 mm long; racemes (3)4–9, scattered on the axis; spikelets arranged in four rows on one side of the rachis (secund). Spikelet 3–4 × 2.0–2.5 mm, yellowish-green to purplish, matt; lower glume absent; upper glume fringed with long white hairs along margins, 5-nerved; upper lemma papillose-striate, pallid at maturity; anther 1.2–1.5 mm long.

[Resembles *P. urvillei*, which has more racemes and smaller spikelets.]

*Flowering*: October to May. *Ecology*: Usually in damp places, most often in disturbed areas such as roadsides, gardens, plantations and cultivated lands. *Frequency in southern Africa*: Common. *Distri-*

*bution*: Naturalised from South America. Occurring in the tropics worldwide. S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: A palatable grazing grass with a high leaf production that can endure heavy grazing and trampling to a reasonable extent; widely used as fodder and leys; erosion control such as stabilisation of mine dumps; can become a troublesome weed and is a common invader worldwide where introduced.

Illustrations: Chippindall: pl. 13 (II) (1955); Hitchcock & Chase: 616, fig. 893 (1950); Allen & Hall: 580 (2003).
Anatomy vouchers: *Ellis 272* & *1835*.
Voucher: *Smook 4134*.


*Paspalum distichum*

**Paspalum distichum** L., in *Systema naturae*, ed. 10,2: 855 (1759). Type: Jamaica.

*P. paspalodes* (Michx.) Scribn., in *Memoirs of the Torrey Botanical Club* 5: 29 (1894).

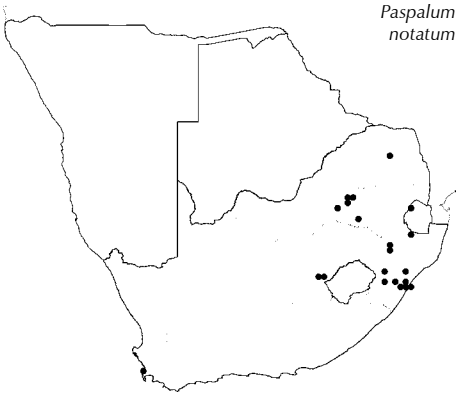
Couch paspalum, bankrotkweek

Perennial 100–300 mm high, hydrophyte; mat-forming as rhizomatous or stoloniferous and rooting at nodes; culm nodes pubescent. Leaf blade 20–220 × 3–8 mm; ligule 1.5–3.5 mm long, conspicuous. Inflorescence usually of two racemes; spikelets arranged in two rows, secund. Spikelet 2.5–3.5 × 1.3–1.5 mm, lanceolate, green, apex acute; lower glume usually a small triangular scale up to $^{2}/_{3}$ as long as spikelet to absent (all 3 states can occur on the same inflorescence); upper glume 3-nerved, minutely hairy especially towards apex; lower lemma with a prominent midrib; upper lemma smooth, pallid at maturity; anther 1.0–1.6 mm long.

[Very similar to *P. vaginatum*, which has the lower glume absent or reduced to a rim, upper glume glabrous and leaves less than 3 mm wide. Conflicting opinions exist about the nomenclature and status of these two species, but leaf anatomical differences were found by Ellis (1974).]

*Flowering*: November to May. *Ecology*: Sand or black turf and in muddy soil; always in or near salt or fresh water on river banks, in vleis and along pan edges. *Frequency in southern Africa*: Locally common. *Distribution*: Tropics worldwide and into warm temperate regions. N, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: A palatable grass that can endure heavy grazing; a weed that can be a pest, especially in cultivated lands as it is difficult to eradicate.

Illustration: Allen & Hall: 576 (2003).
Anatomy vouchers: *Ellis 146, 432, 767, 1106* & *1323*. Ellis: 235 (1974).
Vouchers: *Jacobsz 4003, Smook & Gibbs Russell 2242*.


*Paspalum notatum*

***Paspalum notatum** Flüggé, in *Gramininum monographiae Pars I. Paspalum*: 106 (1810). Type: West Indies.

Bahia grass, Bahia paspalum

Tufted perennial 100–600 mm high, often decumbent; long stout rhizomes are well developed and horizontally creeping, almost woody, clad in overlapping leaf sheaths; culm nodes glabrous. Leaf blade 60–240 × 4–10 mm; ligule 2–6 mm long, conspicuous. Inflorescence of 2 occasionally 3 racemes, 25–130 mm long; rachis often zig-zag; spikelets arranged in two rows, secund. Spikelet 2.8–3.7 × 2.0–2.8 mm, more than 1.5 × longer than wide, green, glabrous, glossy, apex rounded; lower glume absent; upper glume and lower

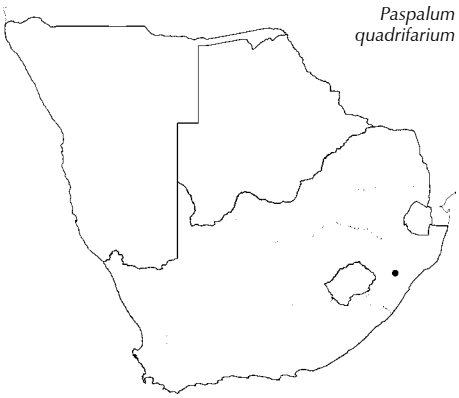
lemma as long as spikelet; upper lemma finely striate, pallid at maturity, 5-nerved; anther 1.6–1.8 mm long.

[Similar to *P. scrobiculatum*, which has a smaller spikelet, 2.0–2.5 mm long, a flat, almost leaf-like rachis and no horizontally creeping rhizome.]

*Flowering*: November to April. *Ecology*: In high rainfall areas on sandy or clayey soil; often in disturbed places and cultivation. *Frequency in southern Africa*: Infrequent. *Distribution*: Tropical Africa and America. Naturalised from South America. S, LIM, G, M, FS, KZN, WC. *Economics*: Pasture, though not extensively cultivated as it is less productive and palatable than most other cultivated pastures, improved strains are used as fodder for sheep. As erosion control such as binding soil on terraces; a weed that is a tough and aggressive invader of cultivated and disturbed areas.

Illustration: Hitchcock & Chase: 605, fig. 870 (1950); Allen & Hall: 578 (2003).
Anatomy vouchers: *Ellis 1753* & *4423*.
Voucher: *Mogg 35370*.

*__Paspalum quadrifarium__ Lam., in *Tableau encyclopédique et methodique des trois Régnes de la Nature. Botanique* 1: 176 (1791). Type: Argentina.

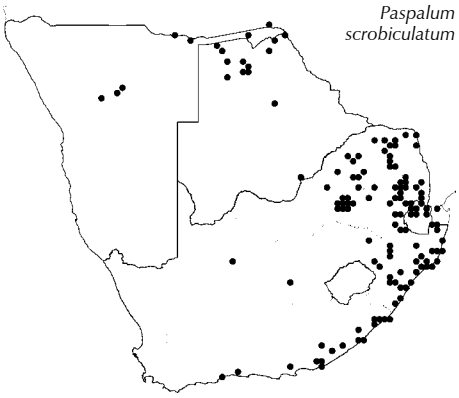

*Paspalum quadrifarium*

Tufted perennial about 1 700 mm high; basal sheaths pubescent; culm erect, nodes pubescent. Leaf blade 15–62 × 4.9–6.1 mm, involute to flat, glabrous; ligule 2–8 mm long, conspicuous. Inflorescence terminal, with 15–44 racemes, scattered up central axis; spikelets divergent, arranged in four rows, secund. Spikelet 2.0–2.5(3.0) × 0.9–1.3 mm, elliptic, yellowish-brown to straw-coloured often purple-tinged; lower glume triangular but usually absent; upper glume shortly pubescent, 3-nerved, occasionally minutely reddish-purple spotted; lower lemma glabrous or pubescent, 3-nerved; upper lemma rugose; anther about 1.9 mm long.

*Flowering*: October and November. *Ecology*: Black soils in wet places; in areas where fire is excluded. *Distribution*: Naturalised from South America. KZN. *Economics*: Very attractive and is grown as an ornamental in some countries; can become an invasive weed; introduced into USA where it has become established in disturbed habitat; also a noxious weed in New South Wales, Australia. First reported in South Africa around 2003/2004, forming dense stands of a few hectares where fire had been excluded.

Illustration: Allen & Hall: 589 (2003).
Voucher: *De Wet 888*.

**Paspalum scrobiculatum** L., in *Mantissa Plantatum* 1: 29 (1767). Type: India.


*Paspalum scrobiculatum*

*P. auriculatum* J.Presl & C.Presl., in *Reliquiae Haenkeanae* 1: 217 (1830).

*P. commersonii* Lam., in *Tableau encyclopédique et methodique des trois Régnes de la Nature. Botanique* 1: 175 (1791). Type: Mauritius.

*P. orbiculare* G.Forst., in *Florulae Insularis Australium Prodromus*: 7 (1786). Type: Society Islands.

*P. polystachyum* R.Br., in *Prodromus florae Novae Hollandiae et Insulae Van-Diemen*: 188 (1810). Type: Australia.

CREEPING PASPALUM, DRONKGRAS

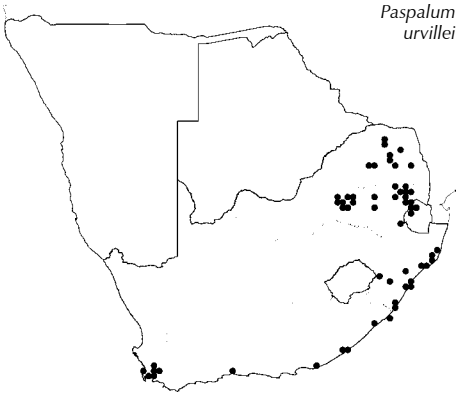
Loosely tufted, erect or decumbent perennial 100–700 mm high, occasionally a hydrophyte; rhizome short, sometimes stoloniferous;

culm nodes glabrous. Leaf blade 150–200(–380) × 6–8(–10) mm, ligule 2–8 mm long, conspicuous. Inflorescence of 1–5 racemes, 30–80(–150) mm long; rachis flat and linear, almost leaf-like; spikelets arranged in two rows, secund. Spikelet 2.0–2.5 × 1.8–2.4 mm, ovate, green becoming brown, glabrous; lower glume absent; upper glume 3-nerved, papery; upper lemma finely striate, brown at maturity; anther 0.5–0.8 mm long.

[Similar to *P. notatum*, which has larger spikelet 2.8–3.7 mm long, a narrower rachis and a very well-developed horizontal rhizome.]

*Flowering*: September to May. *Ecology*: Moist, semi-swampy areas or on fertile well-drained soils, often in disturbed places and abandoned lands. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical Africa. Old World tropics and subtropics. N, B, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Apparently very palatable and highly digestible and cultivars are planted as pasture for fodder but seed heads can be poisonous as they are subject to ergot; used as cereal or alcoholic drink in India; ruderal weed in damp areas.

Illustrations: Chipindall: 388, fig. 330 (1955); Clayton et al.: 611, fig. 142 (1980); Allen & Hall: 573 (2003).
Anatomy vouchers: *Ellis 318, 327, 433, 1339, 1364, 1823 & 4485*.
Voucher: *Smook 1006*.



*Paspalum urvillei*

***Paspalum urvillei** Steud., in *Synopsis plantarum glumacearum* 1: 24 (1854). Type: Brazil.

Vasey grass, langbeen paspalum

Coarsely tufted, erect perennial 100–2 500 mm high; rhizomatous; basal sheaths densely hairy; culm nodes pubescent. Leaf blade 250–600 × 4–15 mm; ligule 2–9 mm long, conspicuous. Inflorescence central axis 120–300 mm long; racemes 10–30, closely spaced on axis; spikelets arranged in four rows, secund. Spikelet 1.6–2.8 × 1.2–1.4 mm, ovate, yellowish-green; upper glume 3-nerved; upper glume and lower lemma fringed on margins with silky hairs giving a woolly appearance; upper lemma uniformly to irregularly striate; anther 1.0–1.2 mm long.

[Resembles *P. dilatatum*, which has a larger spikelet, 3–4 mm long and fewer racemes.]

*Flowering*: October to April. *Ecology*: Near water or in moist places, along water furrows, roadsides and stream banks on sandy loam, disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Naturalised from South America. Found in tropics worldwide. S, LIM, G, M, KZN, WC, EC. *Economics*: Young growth palatable and nutritious, but its palatability quickly diminishes as the plant matures, becoming stalky when old; cultivated as pasture for hay as it is frost resistant and only occasionally susceptible to ergot; old inflorescences were used as whisk brooms for brushing lint; a weed that is difficult to control when the plant reaches maturity.

Illustrations: Chippindall: pl. 13 (I) (1955); Hitchcock & Chase: 617, fig. 894 (1950); Allen & Hall: 580 (2003).
Anatomy vouchers: *Ellis 68, 152, 730 & 770*.
Voucher: *Liebenberg 8769*.

**Paspalum vaginatum** Sw., in *Prodromus descriptionum Indiam occidentalem* 21 (1788). Type: Jamaica.

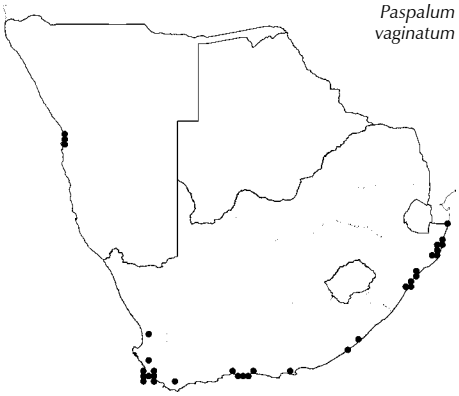
SEASHORE PASPALUM, BRAK PASPALUM

Perennial 300–400(–600) mm high; mat-forming, hydrophyte; shortly rhizomatous or stoloniferous or rooting at the nodes below water level and branching above; internodes short, branching at most nodes; culm nodes glabrous. Leaf blade 40–90 × 2–3(–4) mm; ligule 2–5 mm long, conspicuous. Inflorescence usually of two racemes (rarely more); spikelets arranged in two rows, secund. Spikelet 3.0–4.5 × 0.9–1.5 mm, lanceolate with apex acute, usually pale brownish-green, glabrous; lower glume absent or reduced to a rim; upper glume 5-nerved; upper lemma smooth, pallid at maturity; anther 1.6–2.0 mm long.

[Similar to *P. distichum*, which has upper glume minutely hairy. Conflicting opinions exist about the nomenclature and status of these two species, however leaf anatomical differences were found by Ellis (1974).]

*Flowering*: December to April. *Ecology*: Near coasts, in or near estuaries or rivers, also inland at water edges on sandy soils, but most often in saline water. *Frequency in southern Africa*: Locally common. *Distribution*: Worldwide in tropics and subtropics. N, KZN, WC, EC. *Economics*: Potential pasture on some brack and structureless soils; for erosion control as sand binder at coasts. Potential problematic weed and known weed in irrigation furrows and rice lands.

Illustration: Hitchcock & Chase: 603, fig. 865 (1950); Allen & Hall: 576 (2003).
Anatomy vouchers: *Ellis 276, 1114, 1235, 1299, 1622* & *3560;* Ellis: *235* (1974).
Voucher: *Michelmore 162*.




## **Pennisetum** Rich.

Richard: 72 (1805); Stapf: 430 (1899); Stent: 273 (1924); Chippindall: 439 (1955); Launert: 146 (1970a); Burken: 161 (1977); Clayton & Renvoize: 672 (1982); Clayton & Renvoize: 303 (1986); Clayton: 178 (1989); Gibbs Russell et al.: 247 (1990); Watson & Dallwitz: 703 (1994); Henderson: 15 (2001); Wipff: 515 (2003); Scholz: 512 (2006).

*Beckeropsis* Fig. & De Not.: 49 (1853).

*Cenchrus* Chemisquy et al.: 107 (2010).

Annual or perennial, tufted, stoloniferous, rhizomatous. **Leaf blade** narrow-linear, expanded, folded or rolled; *ligule* a fringed membrane or a fringe of hairs. **Inflorescence** a solitary, terminal, cylindrical to subglobose spike-like panicle, branches short or reduced to stumps, rarely axillary, then gathered into a leafy false panicle, or 2–4 spikelets enclosed in uppermost sheath (*P. clandestinum*); spikelets subtended by an involucre of filiform or slender, glabrous, scabrid or plumose, rarely solitary bristles, free to base, falling with spikelets at maturity (except in cultivated forms); *spikelets* solitary or in clusters of 2–5, outer often reduced, sessile or shortly pedicelled. **Spikelet** narrowly lanceolate to oblong, dorsiventrally compressed to subterete; *glumes* unequal, awnless; lower glume up to half as long as spikelet, sometimes suppressed, thinly membranous, nerveless or 1–5-nerved; upper glume very small to as long as spikelet, 1–11-nerved. **Florets** 2; *lower floret* male or sterile; lemma lanceolate or ovate-lanceolate, membranous, of variable length, acuminate or acute, 1–15-nerved, awnless or awned; palea well developed or reduced or 0; *upper floret* bisexual; *lemma* as long as or little shorter

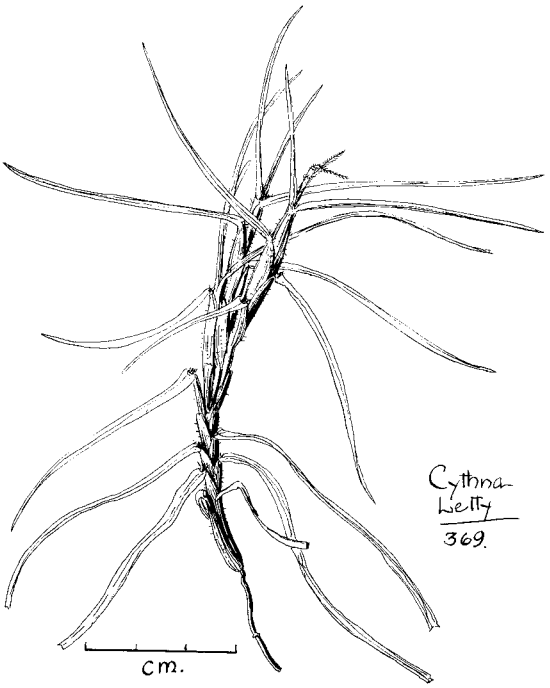



Figure 392.—*Pennisetum clandestinum*. Artist: C. Letty.

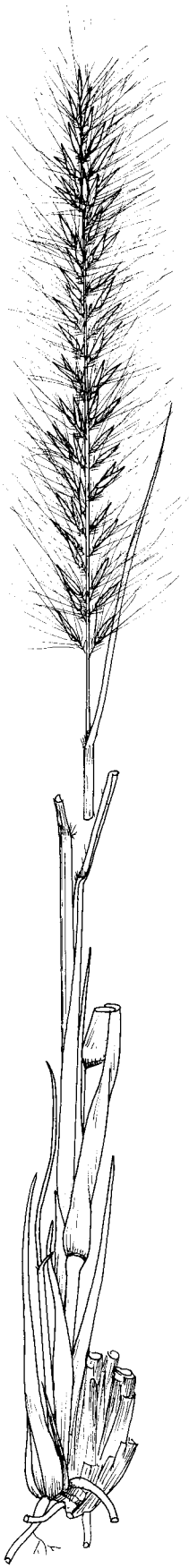


Figure 393.—*Pennisetum setaceum*. Artist: H.W. du Toit.




Figure 394.—*Pennisetum thunbergii*. A, spikelet with bristles (11.0 × 1.5 mm); B, anther with tufts of hair at apex (2.3 × 0.4 mm); C, plant. Artist: S.B. Chiliza.

## PENNISETUM

than spikelet, similar to firmer than glumes, membranous to thinly coriaceous, entire, 5–7-nerved, flat, thin margins covering ± half of palea, mucronate to awned; *palea* subequal and similar in texture to lemma, 2-nerved. **Lodicules** small, 2 or 0. **Stamens** 3; tips of anthers glabrous or minutely penicillate. **Ovary** ellipsoid; style distinct or connate below. **Caryopsis** oblong and dorsiventrally compressed to subglobose. **Photosynthetic pathway**: $C_4$; biochemical type NADP-ME (2 species); XyMS-. **Cytology**: $x = 9$ (aneuploids, polyploidy).

**Species** ± 80, cosmopolitan in tropical and warm regions; 13 in southern Africa, naturalised and indigenous; widespread.

Species treatment by L. Fish and M.J. Moeaha.

### Quick guide to easily confused genera/ species:

1. Bristles from spikelet base absent . . . . . 2
   Bristles from spikelet base present . . . . . 3
2. Lemma 9-lobed, lobes awned . . . . . **Enneapogon cenchroides**
   Lemma not 9-lobed . . . . . **Fingerhuthia sesleriiformis**
3(1). Bristles persistent on inflorescence . . . . . **Setaria**
   Bristles and/or spines fall with the spikelet . . . . . 4
4. Bristles and/or spines free throughout, always ± filiform . . . . . **Pennisetum**
   Bristles and/or spines connate to a greater or lesser degree to form a disc (may be minute) . . . . . **Cenchrus ciliaris**

### Key to species:

1. Inflorescence of 2–4 subsessile spikelets hidden in uppermost leaf sheath; filaments and stigmas long protruding . . . . . *__P. clandestinum__
   Inflorescence conspicuous . . . . . 2
2. Bristle solitary below each spikelet or spikelet cluster; inflorescence a compound leafy false panicle . . . . . **P. unisetum**
   Bristles many below each spikelet or spikelet cluster; inflorescence a raceme or a spike-like panicle . . . . . 3
3. Bristles, at least one or more inner ones, plumose (hairs may be obscure) . . . . . 4
   Bristles glabrous, usually scabrid, rarely smooth . . . . . 9
4. Inflorescence loose, spikelets usually well separated, central axis clearly visible . . . . . **P. foermerianum**
   Inflorescence spike-like, spikelets dense, central axis not clearly visible . . . . . .5
5. Annual; upper lemma margins usually hairy; spikelet clusters/involucre borne on a stipe 1–25 mm long; cultivated . . . . . *__P. glaucum__
   Perennial; upper lemma margins glabrous or scaberulous, sometimes hairy; spikelet cluster/involucre with or without short stipe (1–3 mm long) . . . . . 6
6. Spikelet 9–14 mm long; rhizomatous, mat-forming . . . *__P. villosum__
   Spikelet 2.0–7.5 mm long; densely tufted . . . . . 7
7. Upper lemma varying in texture, smooth, hard, shiny below; plants 1 800 mm or more tall; leaves 10–50 mm wide. . . . *__P. purpureum__
   Upper lemma similar in texture throughout; plant rarely more than 1 000 mm tall; leaves 1–5 mm wide . . . . . 8
8. Longest bristle 4–12 mm long; rachis ribs rounded; involucre with solitary/single spikelet, stipe absent . . . . . **P. sphacelatum**
   Longest bristle 17–40 mm long; rachis ribs angular; involucre with 2–4 spikelets, stipe present . . . . . *__P. setaceum__
9(3). Annual; upper lemma margins usually hairy; spikelet clusters/involucre borne on a stipe 1–25 mm long; cultivated. . . . *__P. glaucum__
   Perennial; upper lemma margins glabrous or scaberulous, sometimes hairy; spikelet cluster/involucre with or without short stipe . . . . . 10
10. Upper lemma ± hard and shining in lower half; rachis hairy, involucre with 1–5 spikelets . . . . . *__P. purpureum__

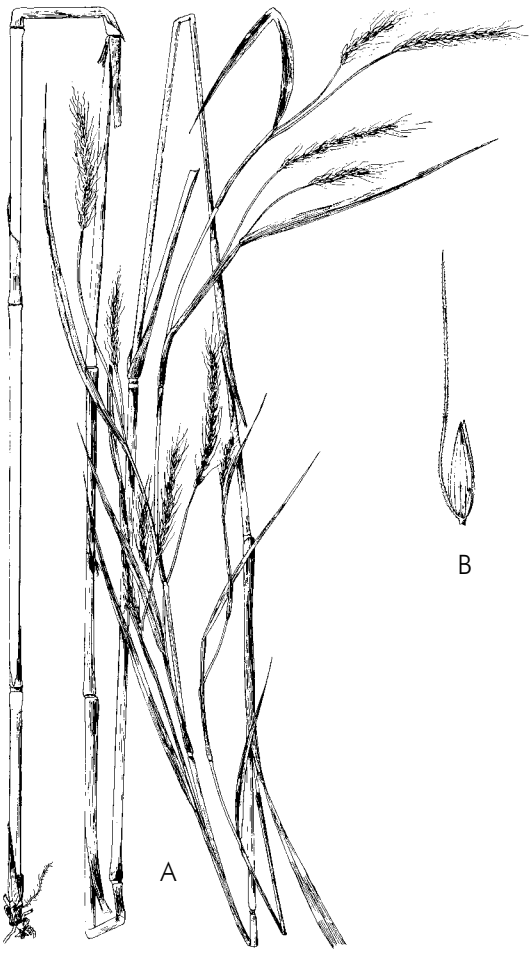
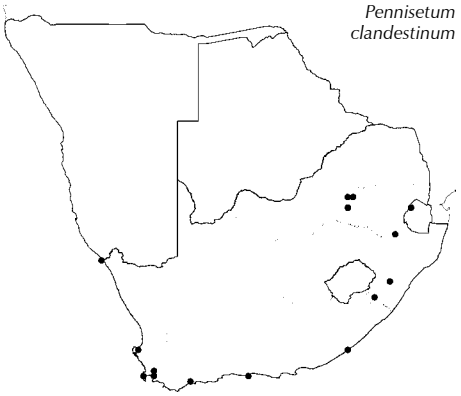



Figure 395.—*Pennisetum unisetum*. A, plant; B, spikelet with single bristle. Artist: F. Lauth.



Figure 396.—*Pennisetum setaceum* spikelet cluster (4.0–6.5 mm). Photographer: M. Koekemoer.

Upper lemma same texture throughout; rachis scaberulous, if hairy then involucre with one spikelet only . . . . . 11
11. Culms much branched, especially at upper nodes; plant woody . . . . . **P. mezianum**
Culms not much branched; plant woody or herbaceous . . . . . 12
12. Lowest leaf sheath with numerous short transverse nerves (best seen on inner surface); plants 1 000–3 000 mm high . . . . . **P. glaucocladum**
Lowest leaf sheath rarely with transverse nerves; plants 200–2 000 mm high . . . . . 13
13. Lower lemma tip abruptly cuspidate; usually up to $^3/_4$ length of spikelet (excluding awn); bristles purple; inflorescence 30–50 mm long . . . . . **P. thunbergii**
Lower lemma gradually tapering; usually nearly as long as spikelet; bristle usually white, yellow or straw-coloured, rarely purple; inflorescence 50–300 mm long . . . . . 14
14. Plant tufted; culm below inflorescence usually long hairy; leaves convolute . . . . . **P. sphacelatum**
Plant reed-like, robust; culm below inflorescence usually scabrid, rarely long hairy; leaves flat, rarely convolute . . . . . 15
15. Spikelet 2.5–3.5 mm long; most bristles shorter to only slightly longer than spikelet . . . . . **P. natalense**
Spikelet 4–6 mm long; most bristles much longer than spikelet . . . . . **P. macrourum**


*Pennisetum clandestinum*

***Pennisetum clandestinum** Hochst. ex Chiov., in *Annuario Reale del Istituto Botanico di Roma* 8: 41, fig. 5/2 (1903). Type: Ethiopia, *Schimper 2084*.

Alternate names: *Kikuyuochloa clandestina* (Hochst. ex Chiov.) H.Scholz

*Cenchrus clandestinus* (Hochst. ex Chiov.) Morrone

KIKUYU GRASS

Perennial 30–1 200 mm high; creeps vigorously by rhizomes and stolons; culms closely sheathed; leaves bright green and abundant. Leaf blade 10–300 × 1–7 mm; flat, spreading; ligule a fringe of hairs. Inflorescence of (1)2–4(–6) hidden spikelets enclosed in uppermost leaf sheath; filamentous stigmas and stamens with long filaments clearly visible at flowering time; spikelet clusters subsessile; bristles delicate, scaberulous to hairy. Spikelet 10–20 mm long; lower glume absent, upper glume 1–3 mm long, sometimes suppressed, glabrous; lower lemma as long as spikelet, tapering; palea absent; anthers 5.5–6.0 mm long, silvery, apical tufts of hairs absent.

*Flowering*: August to April. *Ecology*: Requires high rainfall and sunlight. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from east African highlands and introduced worldwide. S, G, KZN, NC, WC, EC. *Economics*: Cultivated pasture, lawns and sports turf; weed, invader in some countries.

Illustration: Wipff: 519 (2003).
Anatomy vouchers: *Ellis 583* & *1113*.
Voucher: *Smook 1165*.

**Pennisetum foermerianum** Leeke, in *Zeitschrift für Naturwissenschaften Berlin* 79: 26 (1907). Type: Namibia, Windhoek, ?*Foermer 46*.

Alternate name: *Cenchrus foermeranus* (Leeke) Morrone

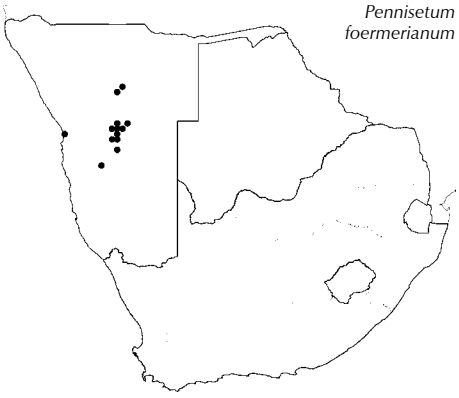
Tufted perennial 200–600 mm high; rhizome stout, creeping; culms woody, profusely branched, usually a few nodes up from base. Leaf

blade 80–150 × 2 mm, filiform; ligule a fringe of hairs. Inflorescence interrupted, loose, central axis clearly visible, spikelet clusters usually well separated; involucral bristles ± 5 mm long, longest 7–20 mm long, plumose; basal stipe present. Spikelet 4.5–6.0 × 1–2 mm; lower glume obtuse; upper glume acuminate; lemma membranous; anthers 1.4–1.6 mm long, without a tuft of hairs at apex.

[May be confused with *Cenchrus ciliaris*, which has bristles connate at the base forming a disc.]

*Flowering*: December to April. *Ecology*: Sandy soil; mountainous areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N.

Illustrations: Chippindall: 371, 447 (1955); Müller: 137 (2007).
Anatomy vouchers: *Smook 5182* & *5231*.
Voucher: *Smook 5128*.


*Pennisetum foermerianum*

**Pennisetum glaucocladum** Stapf & C.E.Hubb., *Kew Bulletin* 1933: 276 (1933). Type: Zimbabwe, Hunyani River, *Eyles 4903* (K, holo.).

Alternate name; *Cenchrus glaucocladus* (Stapf & C.E.Hubb.) Morrone

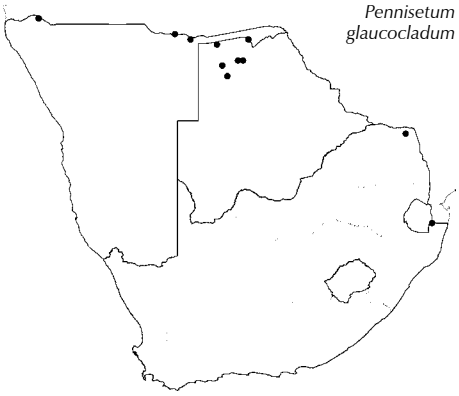
Riverbank pennisetum

Tufted perennial 1 000–3 000 mm high; rhizomatous; leaves widely spaced and often held at right angles to culm; lower leaf sheaths with numerous transverse veins (inner surface best to see this). Leaf blade 300–650 × 5–13 mm; ligule a fringe of hairs. Inflorescence 200–300 mm long; culm scaberulous below inflorescence; involucral bristles up to 30, mostly longer than spikelet, one thicker and longer than rest, glabrous, scabrid. Spikelet 3–6 × 1 mm; glumes unequal; lower glume minute; upper glume $^1/_4$–$^1/_3$ as long as spikelet; lower lemma 3–5-nerved, shortly awned; upper lemma 5-nerved, anthers 1.0–2.3 mm long.

[This species grows much larger than *P. macrourum* and occurs more commonly along river banks (sometimes sunk under *P. macrourum*).]

*Flowering*: January to May. *Ecology*: River banks and other wet areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Tropical Africa. N, B, LIM, KZN. *Economics*: Used for thatching.

Illustration: Chippindall & Crook 184 (1976).
Anatomy vouchers: *Ellis 2922* & *3701*.
Voucher: *Tinley 437*.


*Pennisetum glaucocladum*

*__Pennisetum glaucum__ (L.) R.Br., in *Podromus florae Novae Hollandiae et Insulae Van-Diemen* 1: 195 (1810). Type: Sri Lanka.

*P. americanum* (L.) Leeke subsp. *americanum*, in *Species plantarum*: 56 (1753). Type: Spain.

*P. albicauda* Stapf & C.E.Hubb., in *Kew Bulletin* 1933: 294 (1933).

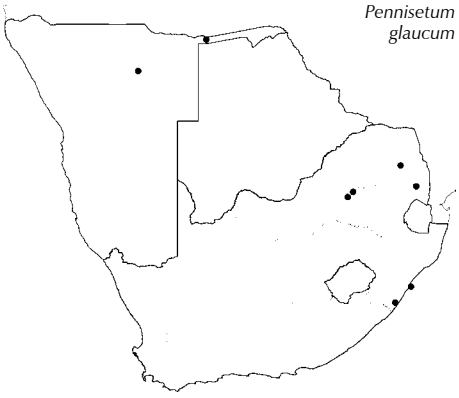
*P. echinurus* (K.Schum.) Stapf & C.E.Hubb., in *Kew Bulletin* 1933: 270 (1933).

*P. nigritarum* (Schlecht.) T.Durand & Schinz, in *Conspectus Florae Africae* 5: 781 (1894).

*P. typhoides* (Burm.f.) Stapf & C.E.Hubb., in *Kew Bulletin* 1933: 271 (1933). Type: India.

*Setaria lutescens* (Wiegel) F.T.Hubb., in *Rhodora* 18: 232 (1916). Type: Sri Lanka.

Alternate name: *Cenchrus americanus* (L.) Morrone


*Pennisetum glaucum*

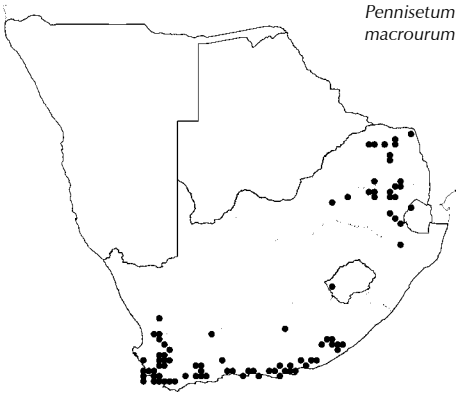
[For typification information see Clayton, *Flora zambesiaca*: 180 (1989); Terrell, *Taxon* 25: 297 (1976); Kerguelen, *Bulletin de la Socíeté Botanique de France* 124: 341 (1977). Information on the cultivars that are part of a complex which hybridise freely see: Bono, *Agronomía tropical* 28: 229 (1973); Burken, *Economic Botany* 31: 163 (1977), *American Journal of Botany* 64: 161 (1977).]

PEARL MILLET

Tufted annual 2 000–3 000 mm high. Leaf blade 300–1 000 × 20–70 mm, flat; ligule a fringe of hairs. Inflorescence a false spike 200–500 × 30 mm, subglobose to linear; rachis cylindrical, hairy; involucre encloses a spikelet cluster of 1–9 spikelets on a hairy basal stipe 1–25 mm long; involucral bristles many, shorter to as long as spikelets, inner bristles plumose or glabrous. Spikelet 3–7 × 5 mm; glumes 2.5–3.2 mm long, similar, membranous, pubescent at apex; lower floret male or sterile, lemma margins usually hairy, lower palea present, pilose between keels; upper lemma dissimilar to lower, smooth, hard and shiny, usually densely pubescent on margins; anthers 2.2–2.5 mm long, apex with a tuft of hairs.

*Flowering*: January to April. *Ecology*: Widely cultivated in semi-arid tropics as drought resistant cereal growing with as little as 250 mm rainfall per annum. *Distribution*: Africa and India; introduced worldwide. N, LIM, G, M, KZN. *Economics*: Cultivated cereal crop, pasture and birdseed.

Illustrations: Chippindall: 448, fig. 372 (1955); Wipff: 522 (2003).
Anatomy vouchers: *Ellis 428*.
Voucher: *Hardy, Retief & Herman 5315*.



*Pennisetum macrourum*

**Pennisetum macrourum** Trin., in *De Graminibus paniceis*: 64 (1826). Type: South Africa, Western Cape, Cape of Good Hope, *Swartz*, *Link*.

Alternate name: *Cenchrus macrourus* (Trin.) Morrone

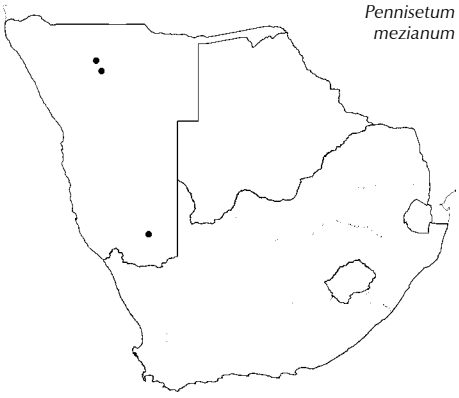
BEDDINGGRAS

Tufted, reed-like perennial 800–2 500 mm high; rhizome creeping, often branched. Leaf blade 250–600 × 4–11 mm, hard, flat or sometimes rolled, glabrous or variably pilose; ligule a fringe of hairs. Inflorescence 120–250 mm long, light green or straw-coloured, often tinged purple; rachis cylindrical, ribs rounded, involucral stumps present or absent, scaberulous to rarely hairy; involucre sessile, of up to 20 bristles, bristles unequal, mostly longer than spikelet, one thicker and longer, glabrous, scabrid; spikelet solitary, sessile; culm scabrid, rarely long hairy below inflorescence. Spikelet 4–6 × 1 mm; lower glume minute, up to 1 mm long, or absent; upper glume $^1/_4$–$^1/_3$ the spikelet length, acute or acuminate; lower lemma $^3/_4$ to as long as spikelet, acute; lower palea absent; upper lemma thinly coriaceous, similar to lower lemma; anthers 1.6–1.8 mm long; without a tuft of hairs at apex.

[Clayton (1982) regards *P. macrourum* as a polymorphic species that includes *P. natalense*, *P. glaucocladum* and other tropical species, but pending further studies on FSA species these are kept separate for now.]

*Flowering*: November to May. *Ecology*: Near streams or damp places. *Frequency in southern Africa*: Common. *Distribution*: Tropical Africa to Yemen. ?L, S, LIM, NW, G, M, KZN, NC, WC, EC.

Anatomy vouchers: *Ellis 299, 661, 1482, 1522 & 1161*.
Voucher: *Smook 3167*.


*Pennisetum mezianum*

**Pennisetum mezianum** Leeke, in *Zeitschrift für Naturwissenschaften Berlin* 79: 39 (1907). Type: Tanzania, Arusha-Moshi, *Uhlig 1076*.

*P. stapfianum* F.Bolus, in *Annals of the Bolus Herbarium of the South African College*: 108 (1915). Type: Namibia, Central Karasberg, Scharfenstein, *Pearson 8556*.

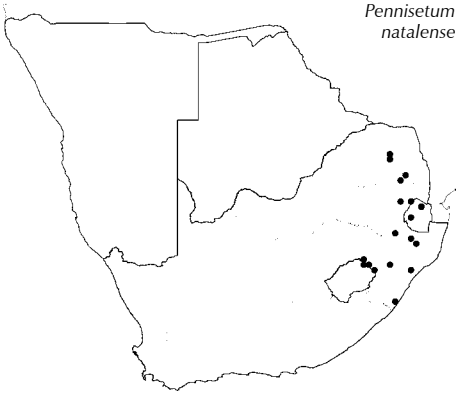
Alternate name: *Cenchrus mezianus* (Leeke) Morrone

Tufted perennial to 600 mm tall; rhizome short, woody; culms woody, wiry, profusely branched at nodes forming dense clusters of leafy shoots. Leaf blade to 10 × 3–4 mm, flat or folded or rolled, glabrous; ligule a fringed membrane. Inflorescence dense, oblong, 10–30 mm long; rachis ribs angular, scars closely spaced; involucral bristles scabrid, usually in 2 whorls, enclosing 1 sessile spikelet; basal stipe 0.2 mm long; culm smooth below inflorescence. Spikelet 3–4 × 1 mm; lower glume minute, up to 2 mm long, $^1/_2$ the spikelet length, 1-nerved, acute; upper glume $^2/_3$ to as long as spikelet, acuminate; lower floret male or sterile, lemma nearly as long as spikelet, palea well developed; anthers 1.4–1.6 mm long, without a tuft of hairs at apex.

[*P. stapfianum* is here considered to belong to this species, as the specimens available in PRE show no morphological differences. Doubtfully separate from *P. massaicum* from Kenya, Tanzania, Somalia and Zimbabwe. The two species are separated mainly by whether the culms are smooth or scabrid below the inflorescence and although the species may integrate and some material at PRE is very slightly scaberulous, the species are kept separate till further studies have been done.]

*Flowering*: March to April. *Ecology*: Prefers plains with impeded drainage. *Frequency in southern Africa*: Infrequent. *Distribution*: East Africa, Ethiopia and Sudan. N, (possibly occurring in northeastern regions of South Africa).

Anatomy vouchers: *Smook 5117*.
Voucher: *Smook 5117*.


*Pennisetum natalense*

**Pennisetum natalense** Stapf, in *Flora capensis* 7: 435 (1899). Type: South Africa, KwaZulu-Natal, Umpumulo, *Buchanan 172* (K, holo.).

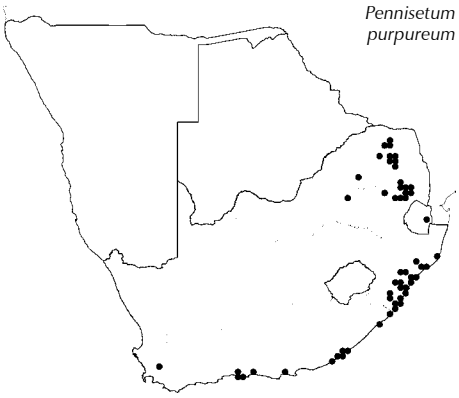
Suurbuffelsgras

Tufted perennial 500–2 000 mm high. Leaf blade 100–400 × 3–8 mm; ligule a fringe of hairs. Inflorescence 70–220 mm long, straw-coloured to purple; involucral bristles scabrid, unequal, mostly longer than spikelet, one distinctly thicker and longer; culm scabrid below inflorescence. Spikelet 2.5–3.5 × 1 mm; lower glume minute, obtuse; upper glume $^2/_3$ to as long as spikelet; lower floret male, lemma acuminate or shortly awned, palea well developed, almost as long as lemma or absent; upper lemma similar to lower, membranous; anthers 1.2–1.4 mm long, without tufts of hairs at the apex.

[Although *P. macrourum* is similar to this species it is a much larger plant and does not have a lower palea. Clayton (1982) regards *P. macrourum* as a polymorphic species including *P. natalense*, *P. glaucocladum* and a number of other tropical species, but until further studies have been done, the FSA species will be kept separate.]

*Flowering*: February to June. *Ecology*: Forms large tufts in water on river banks and vleis. *Frequency in southern Africa*: Common. *Distribution*: S, LIM, M, KZN.

Anatomy vouchers: *Ellis 1441, 2117* & *3357*.
Voucher: *Strey 10968*.


*Pennisetum purpureum*

*__Pennisetum purpureum__ Schumach., in *Beskrivelse af Guineeiseke planter*: 44 (1827). Type: Ghana, *Thonning* (C, holo.).

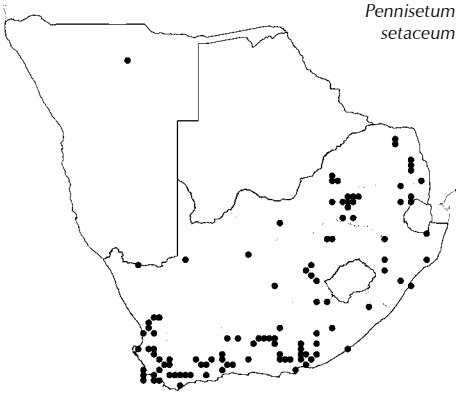
Alternate name: *Cenchrus purpureus* (Schumach.) Morrone

NAPIER FODDER, ELEPHANT GRASS, MFUFU

Tufted, robust perennial 1.8 to 7.5 m high, often forms tall bamboo-like clumps; culms branched. Leaf blade 300–1 200 × 10–40 mm, flat; ligule a fringe of hairs. Inflorescence 70–300 mm long, linear, robust; rachis cylindrical, short involucral stumps present or absent, hairy; involucre of up to 40 bristles, outer glabrous, scabrid, inner loosely plumose towards base; bristles unequal, one inner bristle longer than rest; involucre encloses 1–5 spikelets, one sessile and bisexual, the rest pedicelled and male. Spikelet 4.5–7.0 × 1 mm; lower glume absent; upper glume $^1/_4$–$^1/_2$ the spikelet length, rarely absent; lemmas glabrous or scaberulous; lower floret usually male sometimes sterile, lemma $^2/_3$ to as long as spikelet, 3-nerved; upper lemma shining basally; anther tips bearing a tiny tuft of hairs, rarely glabrous.

*Flowering*: January to June. *Ecology*: With a preference for rich soils; riverine sites, valley floors, forest margins. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from tropical Africa and introduced to many tropical countries. S, LIM, G, M, KZN, ?WC, EC. *Economics*: Used as cultivated pasture with many cultivars and hybrids occurring such as 'bana grass', a cross with *P. glaucum*; also used for fencing and as an ornamental. Invades forest margins and valley floors.

Illustrations: Chippindall: 444, fig. 368 (1955); Wipff: 520 (2003).
Anatomy voucher: *Ellis 741*.
Voucher: *Smook 1794*.


*Pennisetum setaceum*

*__Pennisetum setaceum__ (Forssk.) Chiov., in *Bullettino della Società botanica italiana* 1923: 113 (1923). Type: Egypt, Cairo, *Forsskål*.

Alternate name: *Cenchrus setaceus* (Forssk.) Morrone

FOUNTAIN GRASS, PRONKGRAS

Tufted perennial 600–1 000 mm high. Leaf blade 20–40 × 1–2 mm, often rolled, rigid, rough, midrib conspicuously thickened on upper surface; glaucous; ligule a fringe of hairs. Inflorescence 100–250 mm long, spike-like, often purple; rachis cylindrical with shallow angular ribs below stumpless scars, glabrous to hairy; involucre enclosing 1–3 spikelets, one sessile, rest pedicelled, borne on a basal stipe 1–3 mm long, hairy; bristles mostly ± 4–5 × as long as spikelet, longest 16–40 mm long, usually purple, at least inner ones plumose. Spikelet 4.0–6.5 × 3 mm; occasionally rachilla prolonged beyond upper lemma as a tiny bristle; lower glume short, subrotund to ovate, up to $^1/_3$ the spikelet length or suppressed; upper glume $^1/_4$–$^2/_3$ the spikelet length, acute to acuminate; lemmas similar; lower floret male or

sterile, lemma as long as spikelet; anthers 1.8–2.0 mm long, without a tuft of hairs at apex.

*Flowering*: November to July. *Ecology*: A ruderal on stony slopes and dry open places. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from Kenya, Tanzania, Somalia and Sudan, also found in North Africa and southwest Asia; introduced into many warm countries. N, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Garden ornamental but also a widespread, invasive and declared weed of disturbed sites in many countries, southern Africa included. The purple fountain grass *P. setaceum* 'rubrum', which has also been named *P. advena* Wipff & Veldkamp (Wipff 2003) is said to be non-invasive.

Illustration: Chippindall & Crook: 183 (1976).
Anatomy vouchers: *Ellis 366* & *Van Heerden 77*.
Voucher: *Retief & Reid 503*.

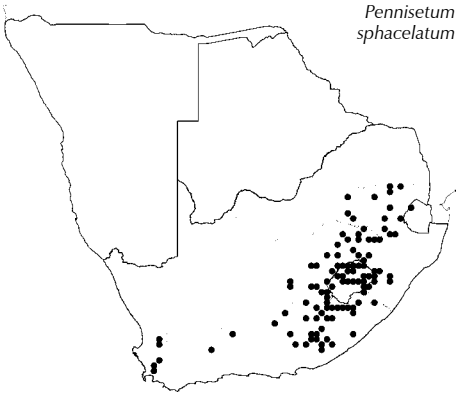
**Pennisetum sphacelatum** (Nees) T.Durand & Schinz, in *Conspectus Florae Africae* 5: 784 (1894). Type: South Africa, ?Stormberg, *Drège*; Gekau to Mbashe [Basche], *Drège;* and Gekau, *Drège* (syntypes).

*P. tenuifolium* Hack., in *Bulletin de l'Herbier Boissier* 3: 380 (1895). Type: South Africa, Gauteng, *Rehmann 4490*.

*P. sphacelatum* (Nees) T.Durand & Schinz var. *tenuifolium* (Hack.) Stapf, in *Flora capensis* 7: 436 (1899).

Alternate name: *Cenchrus sphacelatus* (Nees) Morrone

Bull grass, bulgras


*Pennisetum sphacelatum*

Densely tufted perennial 400–900 mm high. Leaf blade 100–400 × 2–4 mm, convolute, often filiform, hard, prominently nerved; ligule a fringe of hairs. Inflorescence 50–150 mm long, linear, straw-coloured; rachis cylindrical, scaberulous to minutely hairy, ribs rounded, involucral stumps very short; involucre bristles enclosing 1 spikelet; most involucral bristles equal to twice as long as spikelet, glabrous sometimes slightly plumose otherwise scabrid; culm scabrid and/or long hairy for some distance below inflorescence, rarely smooth and hairless. Spikelet 2.5–4.5 × 1 mm; lower glume minute; lower floret sterile, lemma $^2/_3$ to as long as spikelet, gradually tapering to an acute or acuminate apex, palea well developed or absent; upper lemma firmly membranous, similar to lower lemma; anthers 2.2–2.4 mm long, without tuft of hairs at apex.

*Flowering*: November to April. *Ecology*: Moist or clay soil; wet areas, vleis; usually hillsides. *Frequency in southern Africa*: Common. *Distribution*: Malawi to East Africa and Ethiopia. S, L, G, M, FS, KZN, NC, WC, EC. *Economics*: Not palatable; especially as the growing season advances and leaves become hard.

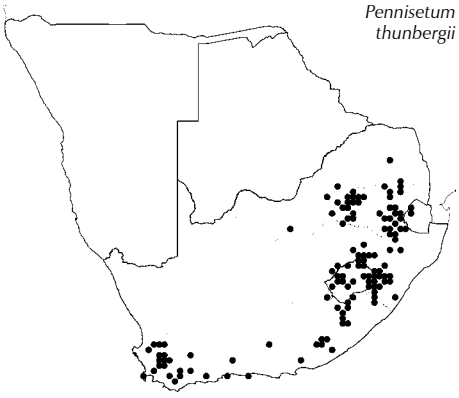
Illustration: Chippindall: 442, fig. 366 (1955).
Voucher: *Smook 4692*.

**Pennisetum thunbergii** Kunth, in *Rèvision des graminées* 1: 50 (1829). Type: South Africa, Kapland, *Thunberg* (UPS, holo.).

Alternate name: *Cenchrus thunbergii* (Kunth) Morrone

Thunberg's pennisetum

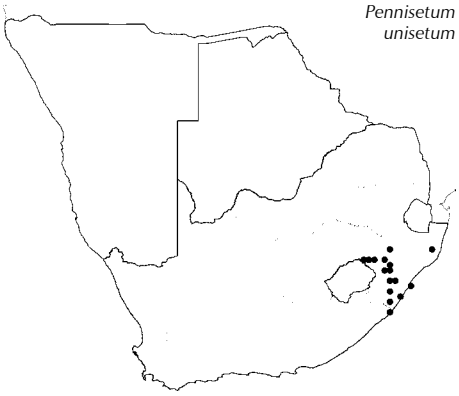
Loosely tufted perennial 200–800 mm tall, erect or geniculate; rhizome robust, extensively creeping. Leaf blade 100–400 × 4–7 mm,


*Pennisetum thunbergii*

flat or folded, tip filiform, usually sparsely to densely pilose; ligule a fringe of hairs. Inflorescence 30–50 mm long, linear, purple; rachis cylindrical, ribs rounded, involucre stumps distinct, scaberulous; involucre enclosing 1 spikelet; bristles fine, one thicker and longer, glabrous, scaberulous; culm scabrid (prickles large) below inflorescence. Spikelet 2.5–5.0 × 1 mm; lower glume absent or up to 1 mm long; upper glume $^1/_4$–$^1/_5$ as long as spikelet; lower lemma usually up to $^3/_4$ the spikelet length, abruptly cuspidate, awned, awn to 0.5–1.5 mm long, lower palea absent; upper lemma acuminate or with awn up to 1 mm long; anther 1.4–1.6 mm long, with a few hairs or a minute tuft at apex.

*Flowering*: October to June. *Ecology*: Grows in wet places, river banks, vleis; mainly upland grasslands. *Frequency in southern Africa*: Common. *Distribution*: Northwards to central and East Africa and Ethiopia; also Yemen and Sri Lanka. S, L, LIM, NW, G, M, FS, KZN, WC, EC.

Illustrations: Chippindall: 443, fig. 367 (1955); Chippindall & Crook 184 (1976); Clayton: 184, tab. 47 (1989).
Anatomy vouchers: *Ellis 227, 348, 480, 659, 1219, 1252, 1852* & *3158*.
Voucher: *Smook 2575*.


*Pennisetum unisetum*

**Pennisetum unisetum** (Nees) Benth., in *The Journal of the Linnean Society, Botany* 19: 47, 49 (1881). Type: South Africa, KwaZulu-Natal, Durban [Port Natal], *Drège*.

*Beckeropsis uniseta* (Nees) K.Schum., in *Pflanzenwelt Ost Afrikas und der nachbargebiete B*: 52 (1895).

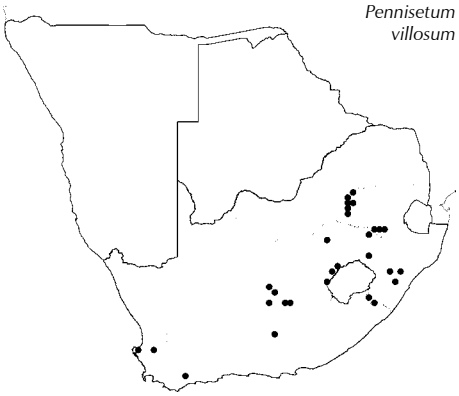
Alternate name: *Cenchrus unisetus* (Nees) Morrone

Natal grass, silky grass

Tufted robust perennial 900–2 400 mm high. Leaf blade 200–450 × 5–10 mm, broadly linear to linear lanceolate; ligule a fringe of hairs. Inflorescence an axillary, compound, leafy, false panicle; branches filiform, usually in groups of 2–5; rachis ribs rounded, involucral stumps distinct, minutely hairy; involucre reduced to a single bristle 3–4 × as long as spikelet, glabrous, scabrid. Spikelet 2.5–3.5 × 1 mm; glumes 0.2–0.5(–0.8) mm long, obtuse to emarginate rarely subacute; lemmas as long as spikelet, membranous, scaberulous to minutely hairy; anthers 1.2–1.5 mm long, without tuft of hairs at apex.

[Sometimes placed in a separate genus, *Beckeropsis*, because of the single involucral bristle, reduction of inflorescence into a single raceme and apparent lack of the germination flap characteristic of *Pennisetum*.]

*Flowering*: March to June. *Ecology*: Near water and in shady places. *Frequency in southern Africa*: Common. *Distribution*: Northwards to tropical Africa; also Yemen. KZN. *Economics*: Cultivated pasture.


*Pennisetum villosum*

Anatomy vouchers: *Ellis 4975* & *4976*.
Voucher: *Nicholson 1750*.

***Pennisetum villosum** R.Br. ex Fresen., in *Annuario del Regio Istituto botanico di Roma* 8: 41, fig. 5/2 (1903). Type: Ethiopia, Semien, *Rüppell s.n.*

Feathertop

Tufted, mat-forming perennial 200–900 mm high; rhizomatous; culms geniculate. Leaf blade 8–15 × 3 mm, narrowly to broadly

lanceolate; ligule a fringe of hairs. Inflorescence 40–100 mm long, ovoid to sub-spherical, usually white; involucre enclosing 1 to 2 spikelets; involucral bristles unequal, some 4–5 × as long as spikelet, most of them about 30 mm long, plumose in lower part, occasionally outer sparely plumose to glabrous, white, often turning yellowish at maturity; stipe basal, 0.5–1.0 mm long, hairy. Spikelet 9–14 × 4 mm; lower glume 0.8–1.0 mm long, obtuse; upper glume triangular, 3–4 mm long, $^1/_4$–$^2/_3$ the spikelet length, acute; lower floret male or sterile, lemma acuminate, scabrid on nerves, 6–13-nerved, palea reduced; upper lemma membranous, acute, 5-nerved, nerves scabrous; anthers 3.2–3.5 mm long, without tuft of hairs at apex.

*Flowering*: January to May. *Ecology*: Roadsides and disturbed areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from Ethiopia, also Somalia and Arabia; cultivated as an ornamental in North America. G, M, FS, KZN, NC, WC, EC. *Economics*: Cultivated ornamental, pasture, also invader in disturbed sites of wet cold areas. Declared invader in South Africa; also parts of Tasmania and Australia.

Anatomy vouchers: *Ellis 468*.
Voucher: *Smook 2127*.

## **Pentameris** P.Beauv.

Palisot de Beauvois: 92 (1812); Stapf: 512 (1899); Schweickerdt: 43 (1938); Chippindall: 251 (1955); Clayton & Renvoize: 174 (1986); Gibbs Russell et al.: 251 (1990); Barker: 25 (1993); Watson & Dallwitz: 705 (1994); Linder: 191 (2010); Linder et al.: 327 (2010).

> *Pentaschistis* (Nees) Spach: 164 (1846); Stapf: 480 (1899); Chippindall: 254 (1955); Clayton & Renvoize: 174 (1986); Gibbs Russell et al.: 253 (1990); Linder & Ellis: 1 (1990); Linder: tt. 2038, 2039 (1991); Watson & Dallwitz: 709 (1994); Galley & Linder: 157 (2006).
>
> *Achneria* Benth. & Hook.f.: 1158 (1883) not of P.Beauv. (1812); Stapf: 456 (1899).
>
> *Poagrostis* Stapf: 760 (1900); Chippindall: 272 (1955).
>
> *Prionanthium* Desv.: 64 (1831); Stapf: 455 (1899); Chippindall: 270 (1955); Clayton & Renvoize: 170 (1986); Davidse: 149 (1988); Gibbs Russell et al.: 276 (1990); Watson & Dallwitz: 773 (1994).

Perennial, biennial or annual, tufted, decumbent, occasionally cushion-forming, sometimes geophytic or woody; rhizomes or stolons present or absent; culms sometimes branched. **Leaf blade** variable, flat or setaceous, linear, tubercular, stalked or saucer-shaped glands present or absent; *ligule* a fringed membrane to a fringe of hairs. **Inflorescence** an open or contracted panicle, sometimes spike-like; *spikelets* solitary or paired, sometimes mixed on same inflorescence, sessile or subsessile or pedicelled, sometimes pairs unequally pedicelled. **Spikelet** laterally compressed, disarticulating above glumes and between florets; *glumes* ± equal, as long as to longer than spikelet (excluding awns), similar, lanceolate to ± boat-shaped, rounded at apex, slightly asymmetrical, 1–7-nerved, keeled, keel often glandular, glabrous to hairy, rarely with tufts of long hairs, usually awnless. **Florets** 2, rarely 1 (occasionally with rudiments of a third), all bisexual; *lemma* similar in texture to glumes to less firm, back rounded, hairy or glabrous, 3–9-nerved, entire to 2-lobed, lobes awnless or awned, awn straight, shortly or partly fused to inner margin of lobe, often long and exserted from glumes; *central awn* from between lobes, rarely only upper lemma awned or awnless to mucronate; awn varying greatly in length, usually flat and twisted

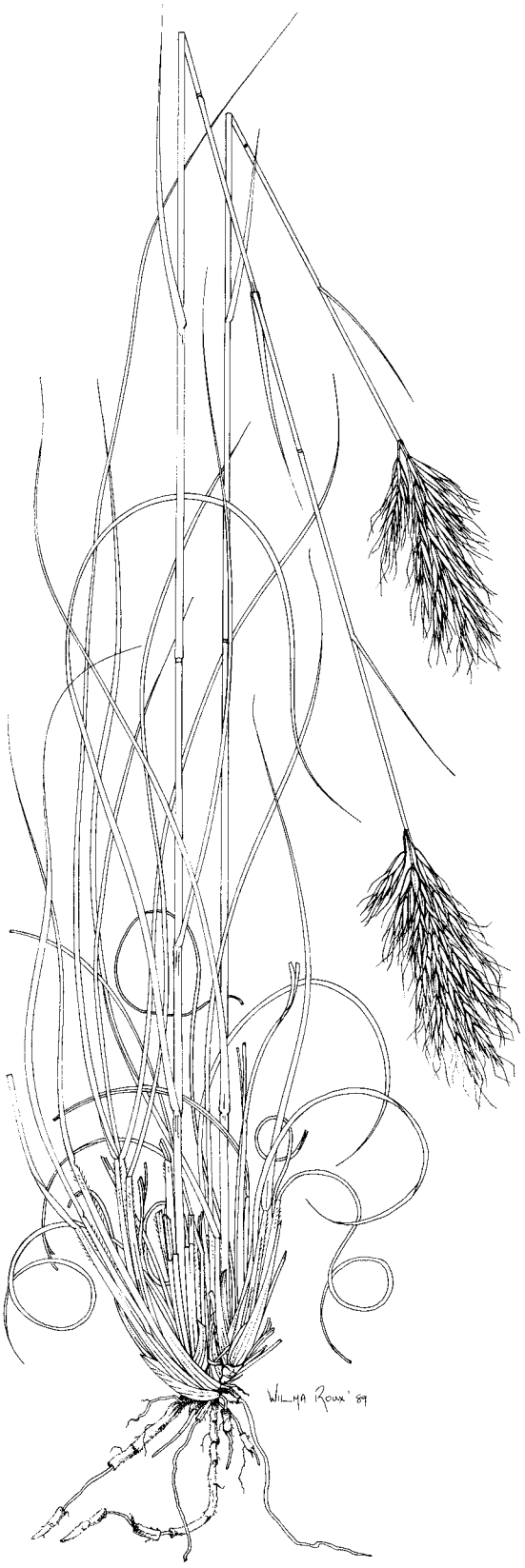



Figure 397.—*Pentameris curvifolia*. Artist: W. Roux.

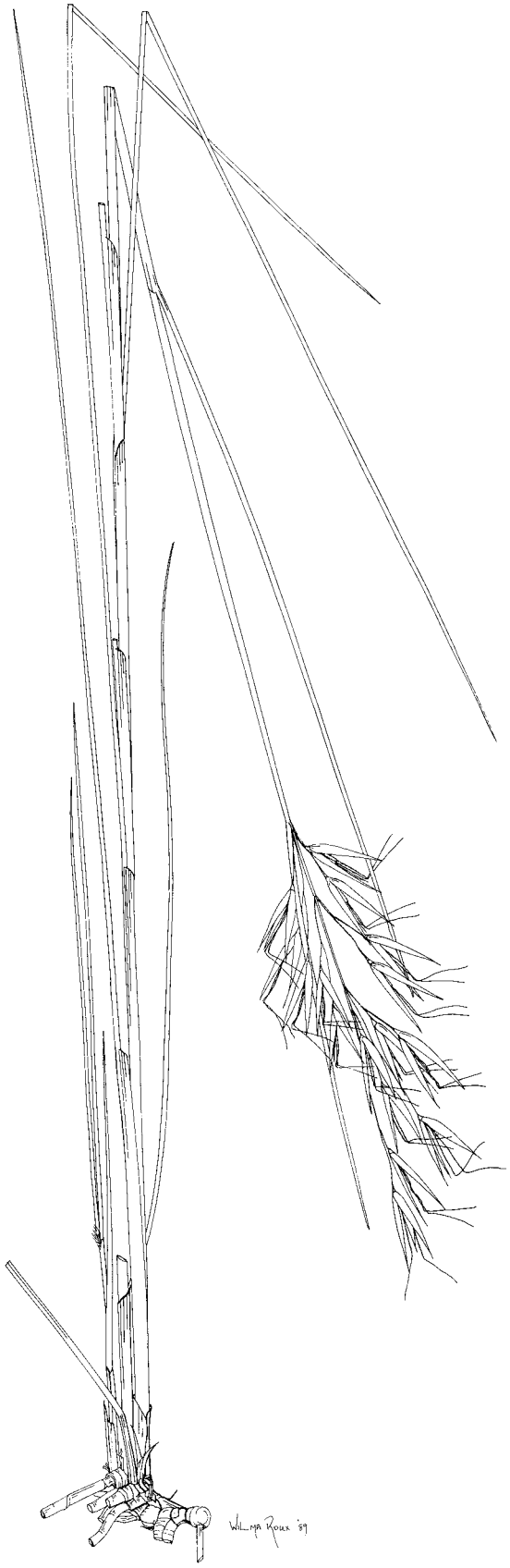


Figure 398.—*Pentameris macrocalcina*. Artist: W. Roux.

in lower part, geniculate, often longer than body of lemma; *callus* short, blunt, hairy; *palea* 2-keeled, bidentate apically, slightly shorter to ± as long as lemma, membranous. **Lodicules** 2, cuneate, small. **Stamens** 3. **Ovary** oblong, glabrous or hairy at apex; styles distinct, slender, plumose. **Seed** a caryopsis or an achene with a free pericarp. **Photosynthetic pathway**: $C_3$; XyMS+. **Anatomical properties** see Ellis & Linder, Atlas of the leaf anatomy in *Pentaschistis*. *Memoirs of the Botanical Society* 60 (1992).

**Species** ± 83, mainly Africa, also in Madagascar with several species introduced into Australia; ± 74 in southern Africa, mainly in mountainous areas, Namibia, Lesotho, Swaziland, Limpopo, Gauteng, Mpumalanga, Free State, KwaZulu-Natal, Northern Cape, Western Cape, Eastern Cape .

Species treatment by L. Fish, M.T. Nembudani & M.J. Moeaha.

**Key to species:**

1. Spikelet 1-flowered . . . . . 2
   Spikelet 2-flowered, rarely with a third rudimentary floret . . . . 5
2. Lemma awned . . . . . 3
   Lemma awnless . . . . . 4
3. Spikelet 4.5–5.5 mm long; lemma central awn 18–24 mm long . . . . . **P. trifida**
   Spikelet 11–12 mm long; lemma central awn 10.5–11.0 mm long . . . . . **P. uniflora**
4(2). Lemma hairs clavate . . . . . **P. clavata**
   Lemma hairs not clavate . . . . . **P. pusilla**
5(1). Lemmas awnless, or central awn minute (0.5 mm or less long) or mucronate . . . . . 6
   Lemmas awned, central awn longer than 0.5 mm (at least one lemma well awned) . . . . . 23
6. Inflorescence spike-like . . . . . 7
   Inflorescence open, if contracted not spike-like . . . . . 12
7. Annual . . . . . 8
   Perennial . . . . . 10
8. Lemma hairy . . . . . **P. dentata**
   Lemma glabrous . . . . . 9
9. Spikelets solitary; rachis triquetrous; glume keel glands sessile or slightly stalked, rarely absent . . . . . **P. pholiuroides**
   Spikelets paired (may be solitary near base and apex of inflorescence); rachis cylindrical; glume keel glands conspicuously stalked . . . . . **P. ecklonii**
10(7). Plant without glands . . . . . **P. malouinensis**
   Glands present on pedicels . . . . . 11
11. Leaves cauline; inflorescence with ± 100 spikelets; spikelet 3 to 4 mm long . . . . . **P. bachmannii**
   Leaves basal; inflorescence with ± 70 spikelet; spikelet 4–6 mm long . . . . . **P. galpinii**
12(6). Annual . . . . . **P. capillaris**
   Perennial . . . . . 13
13. Inflorescence with reflexed spikelets; lemma hairs clavate . . . . . **P. reflexa**
   Inflorescence with spikelets not reflexed; lemma glabrous or hairy, hairs rarely clavate . . . . . 14
14. Stalked crateriform glands present . . . . . 15
   Glands absent or linear glands or sunken glandular dots present (may be inconspicuous and difficult to see) . . . . . 17
15. Inflorescence branches with axils glabrous, ± 50 spikelets; spikelet 3.0–3.5 mm long; rhizome present . . . . . **P. microphylla**
   Inflorescence branches with axils hairy, ± 70–100 spikelets; spikelet 3.5–6.0 mm long; rhizome absent . . . . . 16
16. Glumes with stalked glands on leaf blades and pedicels, apex obtuse; inflorescence with ± 100 spikelets . . . . . **P. setifolia**

Glumes without glands on leaf margins and pedicels, apex acute; inflorescence ± 70 spikelets . . . . . **P. galpinii**
17(14). Inflorescence branches with axils sparsely to densely hairy (sometimes hairy only in lower axils) . . . . . 18
Inflorescence branches with axils glabrous . . . . . 20
18. Inflorescence with ± 100 spikelets . . . . . **P. setifolia**
Inflorescence with 2–20 spikelets . . . . . 19
19. Glumes acute to acuminate . . . . . **P. alticola**
Glumes rounded at apex . . . . . **P. malouinensis**
20(17). Inflorescence with ± 10 spikelets; spikelet 2.5–3.0 mm long . . . . . **P. pusilla**
Inflorescence with 50–150 spikelets; spikelet 3–7 mm long. . . .21
21. Spikelet 6–7 mm long . . . . . **P. aurea** subsp. **pilosogluma**
Spikelet 3.3–5.0 mm long . . . . . 22
22. Plant with a flat, woody base, culms distinctly separate at base . . . . . **P. ampla**
Plant with a soft, compact base, culms dense and close together at base . . . . . **P. aurea** subsp. **aurea**
23(5). Plant with stalked crateriform glands on either leaves, sheaths, pedicles or on all, but may be very sparse . . . . . 24
Plant with glands absent or glands linear or sunken dots, these often obscure . . . . . 52
24. Annual to biennial . . . . . 25
Perennial . . . . . 27
25. Anthers 1.5–2.5 mm long . . . . . **P. patula**
Anthers 0.3–1.0 mm long . . . . . 26
26. Annual . . . . . **P. airoides** subsp. **airoides**
Biennial . . . . . P. **airoides** subsp. **jugorum**
27(24). Leaves cauline . . . . . 28
Leaves basal . . . . . 34
28. Spikelet 3.5–4.5 mm long . . . . . 29
Spikelet 5–10 mm long . . . . . 30
29. Lemma with 3 minute awns; lemma hairs clavate; spikelets often reflexed; glands on pedicels and glumes . . . . . **P. reflexa**
Lemma central awn 3–6 mm long; lemma hairs not clavate; spikelets not reflexed; glands on leaves and pedicels . . . **P. densifolia**
30(28). Spikelet 8–10 mm long . . . . . **P. barbata** subsp. **orientalis**
Spikelet 5–7 mm long . . . . . 31
31. Lemma lateral awn 4–7 mm long . . . . . **P. scabra**
Lemma lateral awn 2–3 mm long . . . . . 32
32. Leaves rolled; glands on pedicel and glumes, leaves eglandular . . . . . **P. ellisii**
Leaves expanded; glands on pedicels, glumes and leaves . . . . 33
33. Anthers 1.8–2.5 mm long; leaves usually straight; plant loosely tufted . . . . . **P. barbata** subsp. **barbata**
Anthers 2.5–2.8 mm long; leaves usually curved to curling; plant cushion-forming . . . . . **P. aspera**
34(27). Lemma 2.0–2.9 mm long . . . . . 35
Lemma 3–5 mm long . . . . . 44
35. All pedicels shorter than the spikelets . . . . . 36
Pedicels of variable length on inflorescence, but at least some as long as to longer than a spikelet . . . . . 41
36. Lemma central awn 3–5 mm long, lateral awns 1.0–1.5 mm long, much shorter than glumes . . . . . 37
Lemma central awn 6–11 mm long, lateral awns 2 to 3 mm long, as long as or longer than glumes . . . . . 38
37. Inflorescence branches with axils glabrous; lemma 2.0–2.5 mm long, lateral awns 1.0–1.5 mm long; found in Northern Cape and Western Cape . . . . . **P. tomentella**
Inflorescence branches with axils hairy; lemma 3 mm long, lateral awns 0.5 mm long; found in Lesotho, Free State, KwaZulu-Natal and Eastern Cape . . . . . **P. galpinii**
38(36). Leaves more than 4 mm wide . . . . . 39
Leaves less than 3.5 mm wide . . . . . 40
39. Widespread, from Betty's Bay to Elands Bay . . . . . **P. barbata** subsp. **barbata**
Restricted distribution, only the Goukamma dunes near Knysna . . . . . **P. barbata** subsp. **orientalis**




Figure 399.—*Pentameris oreophila*. A, plant; B, lemma; C, ovary with tuft of hairs at apex. Artist: W. Roux.

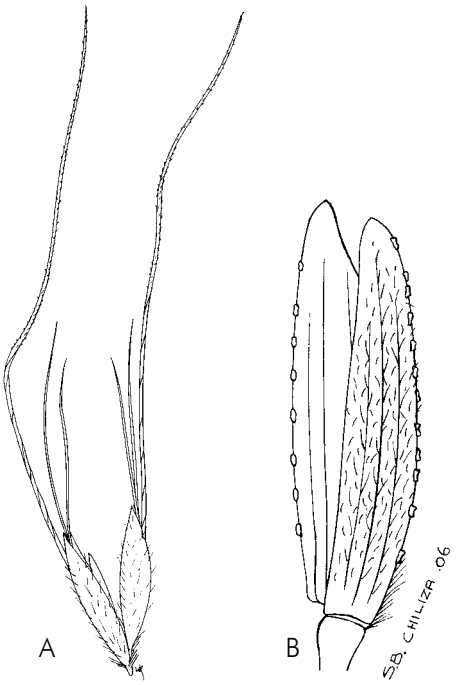



Figure 400.—*Pentameris* spikelets. A, *P. curvifolia*; B, *P. pholiuroides*. Artists: A, W. Roux; B, S.B. Chiliza.




Figure 401.—*Pentameris pholiuroides*. Artist: S.B. Chiliza.

40(38). Leaves with scattered sunken glands . . . . . **P. glandulosa**
Leaves with stalked or crateriform glands . . . . . **P. pallida**
41(35). Minute glands only on lemma keels; found in Swaziland, Limpopo, Mpumalanga and KwaZulu-Natal . . . . . **P. natalensis**
Gland present on leaves, pedicels and/or glumes; found in southern Eastern Cape, Western Cape and Northern Cape . . . . . 42
42. Lemma central awn 8–10 mm long; spikelet 5.0–6.5 mm long; lemma hairy all over . . . . . **P. veneta**
Lemma central awn 6–7 mm long; spikelet 3–5 mm long; lemma hairy basally and along keel and margins . . . . . 43
43. Inflorescence 20–80 × 10–70 mm . . . . . **P. pallida**
Inflorescence 130 × 50 mm . . . . . **P. longipes**
44(34). Some spikelets in same inflorescence with one awn, others awnless . . . . . **P. setifolia**
All spikelets in the same inflorescence with both lemmas in a spikelet with central awns . . . . . 45
45. Leaves with scattered sunken glands . . . . . **P. glandulosa**
Leaves with stalked crateriform glands or glands absent . . . . . 46
46. Glumes acuminate; found in Western Cape and western Northern Cape . . . . . 47
Glumes acute; widespread but not in Western Cape and Northern Cape . . . . . 50
47. Leaves setaceous or if expanded up to 3 mm wide . . . . . 48
Leaves 3.5–6.0 mm wide (may be rolled) . . . . . 49
48. Lemma lateral awns much shorter than glumes, central awn 6 mm long . . . . . **P. lima**
Lemma lateral awns as long as to longer than glumes, central awn 7–20 mm long . . . . . **P. cirrhulosa**
49(47). Spikelet 5.0–6.5 mm long; leaf sheaths usually with coarse bulbous-based hairs . . . . . **P. veneta**
Spikelet 7–8 mm long; leaf sheaths glabrous or if hairy, hairs fine, not bulbous-based . . . . . **P. rupestris**
50(46). Lemma lateral awns 0.5 mm long, central awn 4 mm long; lateral awns shorter than glumes . . . . . **P. galpinii**
Lemma lateral awns 1–7 mm long, central awn 6–13 mm long; lateral awns as long as to longer than glumes . . . . . 51
51. Glands only on glumes (these minute) . . . . . **P. natalensis**
Gland present on glumes, pedicels and leaves . . . . . **P. oreodoxa**
52(23). Spikelet up to 13.5 mm long (includes awns on glumes) . . . . . 53
Spikelet 14–30 mm long (includes awns on glumes) . . . . . 108
53. Spikelet 2.0–6.5 mm long . . . . . 54
Spikelet 7.0–13.5 mm long . . . . . 68
54. Annual; leaf blade with long aristae; anthers 0.6 mm long . . . . . **P. aristifolia**
Perennial; leaf blade without aristae; anthers 1.0–2.4 mm long . . . . . 55
55. Lemma lateral awns 1–3 mm long . . . . . 56
Lemma lateral awns 3.5–10.0 mm long . . . . . 64
56. Only one lemma awned . . . . . **P. setifolia**
Both lemmas awned . . . . . 57
57. Lemma only hairy on nerves . . . . . **P. oreodoxa**
Lemma hairy all over and/or basally and/or along keels and margins . . . . . 58
58. Glumes acute; in high ground sour grasslands of Limpopo, Mpumalanga, Free State, KwaZulu-Natal and Eastern Cape . . . . . 59
Glumes acuminate; in Fynbos and Succulent Karoo of Eastern Cape, Western Cape and Northern Cape . . . . . 60
59. Lemma 2.5–3.0 mm long; anther 3 mm long; leaves soft, often curly . . . . . **P. chippindalliae**
Lemma 3.5 mm long; anther 3.2–4.0 mm long; leaves rigid, straight . . . . . **P. tysonii**
60(58). Inflorescence with 2–20 spikelets; lemma hairy basally or on margins only . . . . . **P. alticola**
Inflorescence with 30–100 spikelets; lemma hairy all over or only on keel and margins . . . . . 61
61. Lemma lateral awns 0.1–1.5 mm long or absent . . . . . 62
Lemma lateral awns 2–5 mm long . . . . . 63

62. Spikelet 6–7 mm long; lemma lateral awns 0.1–0.9 mm long or absent, central awn 3–4 mm long; anthers 3.0–3.5 mm long . . . . . **P. holciformis**
Spikelet 4.5–5.0 mm long; lemma lateral awns 1.0–1.5 mm long, central awn 5–6 mm long; anthers 1.8 mm long . . . . .**P. montana**
63(61). Spikelet 3–5 mm long . . . . . **P. pallida**
Spikelet 6–8 mm long . . . . . **P. rigidissima**
64(55). Leaves cauline; lemma usually 4–9-awned; inflorescence with ± 100 spikelets . . . . . **P. heptameris**
Leaves basal; lemma 3-awned; inflorescence with (5)15–60 spikelets . . . . . 65
65. Lemma central awn 15–23 mm long, lateral awns 6–10 mm long; leaf blade usually expanded up to 4 mm wide . . . . . **P. capensis**
Lemma central awn 8–12 mm long, lateral awns 4 to 5 mm long; leaf blade 0.3–0.5 mm wide . . . . . 66
66. Inflorescence branches with axils hairy; lemma hairy all over . . . . . **P. rigidissima**
Inflorescence branches with axils glabrous; lemma hairy only on nerves . . . . . 67
67. Leaves glabrous . . . . . **P. calcicola** var. **calcicola**
Leaves hairy . . . . . **P. calcicola** var. **hirsuta**
68(53). Leaves mainly cauline . . . . . 69
Leaves mainly basal . . . . . 76
69. Ovary with a tuft of white hairs at the apex; fruit with a brittle pericarp . . . . . 70
Ovary with a tuft of white hairs at the apex; fruit without a brittle pericarp . . . . . 72
70. Lemma lateral awns 5–10 mm long; leaf sheath hairy . . . . . **P. distichophylla**
Lemma lateral awns 2.2–4.5 mm long; leaf sheath glabrous or only margins hairy . . . . . 71
71. Inflorescence with 6–15 spikelets; leaves up to 100 mm long . . . . . **P. glacialis**
Inflorescence with 25 or more spikelets; leaves 200 mm long or longer . . . . . **P. swartbergensis**
72(69). Inflorescence axils glabrous; rhizome present; from coastal sands . . . . . **P. scandens**
Inflorescence axils hairy; rhizomes absent; from mountains … 73
73. Lemma glabrous, central awn 16–19 mm long . . . . **P. caulescens**
Lemma hairy, central awn 6–15 mm long . . . . . 74
74. Lemma 4.0–4.5 mm long, hairy on nerves . . . . . **P. acinosa**
Lemma 2.3–3.5 mm long, hairy all over (hairs may be scattered) . . . . . 75
75. Leaves rolled, hard and rigid; lemma central awn 8 mm long . . . . . **P. horrida**
Leaves expanded, soft; lemma central awn 10–15 mm long . . . . . **P. rosea** subsp. **purpurascens**
76(68). Lemma 2.0–3.0 mm long . . . . . 77
Lemma 3.5–7.0 mm long . . . . . 85
77. Inflorescence densely contracted, spike-like, pedicels obscure . . . . . **P. curvifolia**
Inflorescence open or contracted, not spike-like, pedicels usually visible . . . . . 78
78. Plant base densely woolly hairy . . . . . **P. velutina**
Plant base glabrous or hairy but not woolly hairy . . . . . 79
79. Inflorescence with 2–25 spikelets . . . . . 80
Inflorescence with 30–70 spikelets . . . . . 81
80. Leaves expanded; lemma apex hairy, rest glabrous, central awn 15 mm long . . . . . **P. elegans**
Leaves rolled; lemma hairy all over, central awn 8–12 mm long . . . . . **P. rigidissima**
81(79). Found in Limpopo, Mpumalanga, KwaZulu-Natal and Swaziland . . . . . 82
Found in the Western Cape . . . . . 83
82. Glume keel with minute glands; lemma lateral awns 3.5–7.0 mm long; anthers 2.5 mm long . . . . . **P. natalensis**
Glume without glands; lemma lateral awns 2–3 mm long; anthers 3 mm long . . . . . **P. chippindalliae**

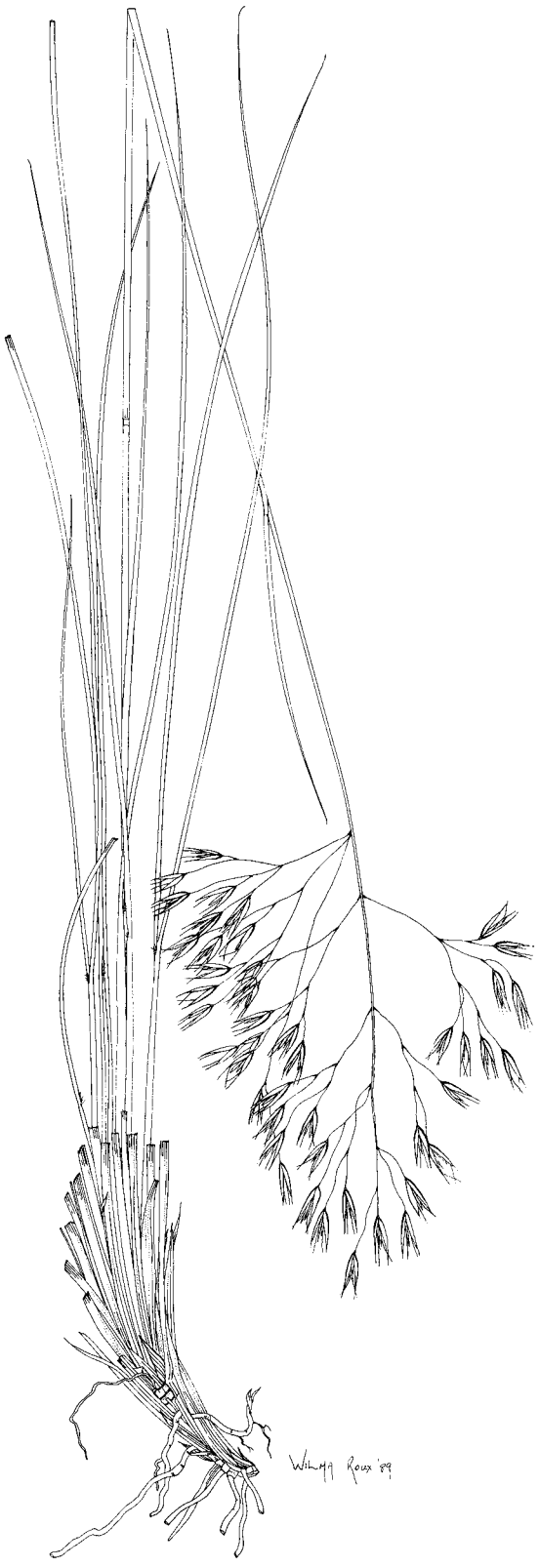


Figure 402.—*Pentameris tysoniii*. Artist: W. Roux.



Figure 403.—*Pentameris curvifolia* spikelet (11–14 mm). Photographer: M. Koekemoer.



Figure 404.—*Pentameris galpinii* spikelet (4–6 mm). Photographer: M. Koekemoer.



Figure 405.—*Pentameris pholiuroides* spikelet (3–7 mm). Photographer: M. Koekemoer.

83(81). Inflorescence axils glabrous; glumes glabrous; anthers 1.7 mm long; lemma central awn not twisted . . . . . **P. capensis**
Inflorescence axils hairy; glumes hairy; anthers 2.5–4.0 mm long; lemma central awn twisted below . . . . . 84
84. Leaves 20–100 mm long, rolled or margin incurved . . . . . **P. rosea** subsp. **rosea**
Leaves to 300 mm long, expanded . . . . . **P. pseudopallescens**
85(76). Lemma lateral awns 0.1–0.9 mm long or absent, central awn 3–4 mm long . . . . . **P. holciformis**
Characters not in above combination . . . . . 86
86. Inflorescence spike-like, pedicels hidden by spikelets . . . . . 87
Inflorescence open, if contracted and dense usually not spike-like and pedicels visible . . . . . 88
87. Lemma hairs 0.2–0.7 mm long; lemma 3 to 4 mm long; leaf expanded (rolled and curly when old); anthers 2.0–2.3 mm long . . . . . **P. curvifolia**
Lemma hairs 1.5–2.5 mm long; lemma 4.5–6.0 mm long; leaf rolled, straight; anthers 3.5–4.0 mm long . . . . . **P. pyrophila**
88(86). Lemma central awn not twisted a number of times to form a column, curved . . . . . **P. capensis**
Lemma central awn twisted a number of times to form a column, straight or geniculate . . . . . 89
89. Upper part of leaf sheath and sheath mouth densely woolly hairy . . . . . **P. eriostoma**
Upper part of leaf sheath glabrous, if hairy not woolly hairy . . . .90
90. Plant base densely hairy . . . . . 91
Plant base glabrous . . . . . 96
91. Plant base woolly hairy (sometimes lower part only, straight above) . . . . . 92
Plant base hairs straight, adpressed to sheath . . . . . 94
92. Lemma hairs 1.5–2.5 mm long; plant base woolly hairy on lower part becoming straight adpressed hairy above . . . . . **P. pyrophila**
Lemma glabrous or with hairs 0.4–0.8 mm long; whole base woolly hairy . . . . . 93
93. Glumes silvery to pallid, flushed purple, hyaline; lemma glabrous or sparsely hairy; callus 0.4–0.5 mm long . . . . . **P. viscidula**
Glumes brown flushed purple, not hyaline; lemma densely hairy along nerves; callus 1.0–1.2 mm long . . . . . **P. velutina**
94(91). Glumes pallid to silvery, flushed purple . . . . . **P. argentea**
Glumes yellowish-brown to brown, flushed purple . . . . . 95
95. Old leaves expanded, curling; lemma untidily hairy up to lobe awns, hairs up to 2.5 mm long, longest at apex often hiding lobes; leaves up to 120 mm long . . . . . **P. pungens**
Old leaves rolled; lemma tidily hairy to upper $^1/_4$ hairs up to 0.8 mm long, lobes not hidden by hairs; leaves up to 300 mm long . . . . . **P. aristidoides**
96(90). At least some leaves expanded . . . . . 97
All leaves setaceous . . . . . 100
97. Lemma lateral awns 3 mm long . . . . . **P. pallescens**
Lemma lateral awns 4–9 mm long . . . . . 98
98. Inflorescence branches with axils glabrous . . . . . **P. tortuosa**
Inflorescence branches with axils hairy . . . . . 99
99. Old leaves expanded; glumes glabrous; lemma central awn 17–20 mm long; anthers 3.3–4.0 mm long . . . . . **P. pungens**
Old leaves rolled; glumes hairy; lemma central awn 12–17 mm long; anthers 2.7–3.0 mm long . . . . . **P. pseudopallescens**
100(96). Found in Lesotho and surrounding high mountain areas and eastern Eastern Cape . . . . . 101
Found in Western Cape and southwestern Eastern Cape mainly in Fynbos . . . . . 104
101. Leaves densely woolly hairy on the inside along the whole length . . . . . **P. basutorum**
Leaves glabrous or if hairy along whole length, hairs not woolly nor densely hairy . . . . . 102
102. Lateral awns exserted from the glumes . . . . . **P. exserta**
Lateral awns included in the glumes . . . . . 103
103. Lemma 3 mm long; anthers 3.2–4.0 mm long . . . . . **P. tysonii**
Lemma 4.5–6.0 mm long; anthers 2–3 mm long . . . . **P. praecox**

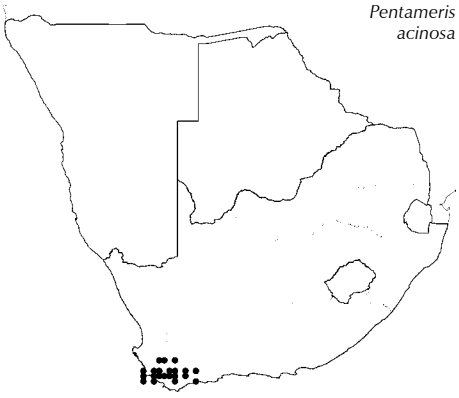
104(100). Lemma 2.5–3.5 mm long; linear glands on leaf blade margins and pedicels . . . . . **P. rosea** subsp. **rosea**
Lemma 3.5–6.0 mm long; glands absent from plant . . . . . 105
105. Inflorescence usually hemispherical and open . . . . . **P. colorata**
Inflorescence linear or densely contracted . . . . . 106
106. Inflorescence with 20–50(80) spikelets; plant 200–600 mm high; leaves 60–200 mm long . . . . . **P. pyrophila**
Inflorescence with ± 100–200 spikelets; plant 600–1 200 mm high; leaves to 500 mm long . . . . . 107
107. Lemma lateral awns 4–5 mm long; lemma hairs mostly short . . . . . **P. tortuosa**
Lemma lateral awns 5.5–6.0 mm long; lemma hairs mostly long . . . . . **P. junciformis**
108(52). Annual; lemma lateral awns 12–17 mm long, central awn 25–35 mm long; inflorescence with 5–15 spikelets . . . . . **P. triseta**
Perennial; lemma lateral awns 4–11 mm long, central awn 10–25 mm long; inflorescence with 20–100 spikelets . . . . . 109
109. Fruit without a brittle pericarp; ovary or fruit without a tuft of white hairs at the apex . . . . . 110
Fruit with a brittle pericarp; ovary or fruit with a tuft of white hairs at the apex . . . . . 113
110. Inflorescence dense, spike-like, pedicels hidden . . . . **P. curvifolia**
Inflorescence open, if contracted, not spike-like, pedicels obvious . . . . . 111
111. Plant base densely woolly hairy; lemma 3–4 mm long . . . . . **P. velutina**
Plant base glabrous to hairy, hairs straight and adpressed; lemma 4.5–7.0 mm long . . . . . 112
112. Rhizome present; old leaves rolled and shrivelled; inflorescence open. . . . . **P. aristidoides**
Rhizome absent; old leaves expanded and recurved; inflorescence contracted . . . . . **P. pungens**
113(109). Leaf sheath auricles conspicuous, usually purple, dark brown to black (often pale with age); lemma lobes truncate . . . . **P. thuarii**
Leaf sheath auricles not conspicuous or absent; lemma lobes acute to acuminate . . . . . 114
114. Inflorescence 150–300 mm long . . . . . 115
Inflorescence up to 150 mm long . . . . . 116
115. Basal leaf sheaths straw-coloured; leaf sheaths densely pubescent; inflorescence up to 170 mm long; lemma lobe up to 3 mm long; central awn 9–13 mm long; known only from Table Mountain, Cape Town . . . . . **P. longiglumis** subsp. **longiglumis**
Basal leaf sheaths brown; leaf sheaths glabrous; inflorescence up to 300 mm long; lemma lobe 3 mm and longer; central awn 21–27 mm long; known only from Kogelberg . . . . . **P. longiglumis** subsp. **gymnocolea**
116(114). Leaf venation obscure for most of the blade length . . . . . 117
Leaf venation visible for most of the blade length . . . . . 118
117. Leaves straight to curling, occasionally pungent; lower leaf sheath glabrous, brown, closely adpressed to culm, sheath mouth may be bearded . . . . . **P. macrocalycina**
Leaves curved and usually falcate, strongly pungent; leaf sheath pubescent, at least along at margins, straw-coloured, not adpressed to culm . . . . . **P. oreophila**
118(116). Glumes hairy (may be very sparsely so) or only one glume hairy . . . . . 119
Glumes both glabrous . . . . . 120
119. Leaves permanently rolled; lemma lobes acute . . . **P. hirtiglumis**
Leaves not permanently rolled, folded or expanded; lemma lobes acuminate . . . . . **P. distichophylla**
120(118). Spikelet 18–25 mm long; lemma 4.5–6.0 mm long, central awn 19–24 mm long . . . . . **P. obtusifolia**
Spikelet 12–15 mm long; lemma 2.3–4.0 mm long, central awn 10–16 mm long . . . . . 121
121. Plant slender, culms up to 1.5 mm wide; leaves usually straight . . . . . **P. glacialis**
Plant robust, culms up to 4.5 mm wide; leaves usually strongly curved . . . . . **P. distichophylla**



Figure 406.—*Pentameris pusilla* spikelet (2–4 mm). Photographer: M. Koekemoer.



Figure 407.—*Pentameris thuarii* spikelet (16–22 mm). Photographer: M. Koekemoer.


*Pentameris acinosa*

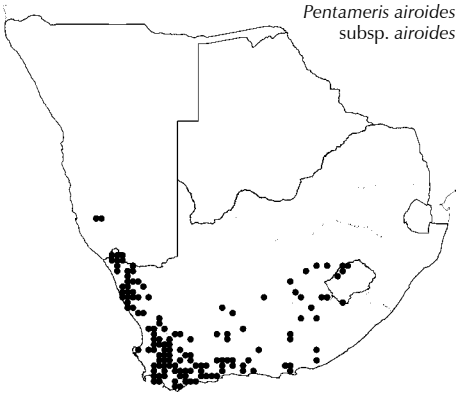
**Pentameris acinosa** (Stapf) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Appelskraal, *Zeyher 4539* (K, lecto; PRE, isolec.).

*Pentaschistis acinosa* Stapf, in *Flora capensis* 7: 495 (1899).

Loosely tufted or cushion-forming perennial 150–300 mm high; base glabrous, old leaf sheath absent; leaves cauline; glands absent. Leaf blade to 40 × to 4 mm, expanded, rigid, spreading, glabrous; margins smooth; sheath mouth with a ring of bristles. Inflorescence open, 20–40 × 10–30 mm, with 5–15 spikelets; axils hairy; pedicels mostly erect, not hidden by spikelets, glabrous. Spikelet 9–10 mm long; glumes acuminate, yellow, glabrous; lemma 4.0–4.5 mm long, nerves hairy, lobed; lateral awns 3–7 mm long, extending to glume apices; central awn 10–15 mm long; palea hairy; anthers 4 mm long.

*Flowering*: October to January. *Ecology*: Restricted to sandstone rock ledges. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC.

Illustration: Chippindall: 262, fig. 230 (1955).
Anatomy vouchers: *Ellis 2267, 2278, 2340, 4678* & *5550*.
Vouchers: *Esterhuysen 35125, 28158*.


*Pentameris airoides* subsp. *airoides*

**Pentameris airoides** Nees subsp. **airoides**, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Tulbagh Waterfall, *Ecklon*; between Cogmanskloof and Gouritz River, *Ecklon* (?); along Rivier Zonder Einde, *Ecklon* (?); without precise locality data, *Mundt* (?) (syntypes).

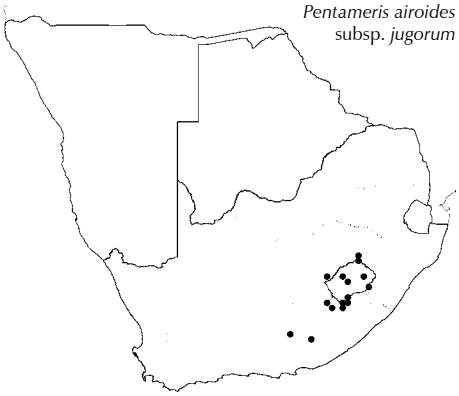
*Pentaschistis airoides* (Nees) Stapf subsp. *airoides*, in *Flora capensis* 7: 511 (1899).

*Pentaschistis patula* (Nees) Stapf var. *glabrata* Stapf, in *Flora capensis* 7: 510 (1899).

Annual 60–350 mm high; leaves basal; stalked crateriform glands present on leaves, pedicels and glumes. Leaf blade to 30–60 × to 2 mm, expanded, glabrous or hairy with bulbous-based hairs; margins smooth; sheath mouth hairy or with a ring of bristles. Inflorescence open, 20–60 × 20–50 mm, 30–100 spikelets; axils glabrous or hairy; pedicels not hidden by spikelets, glabrous or rarely hairy. Spikelet 2.5–3.5 mm long; glumes yellowish-green to purplish, glabrous, keels scaberulous; lemma 1.5–2.5 mm long, glabrous or hairy all over or only basally; lateral awn 2–3 mm long, extending up to and beyond glumes apices; central awn 5–8 mm long; anthers 0.3–1.0 mm long.

*Flowering*: August to December. *Ecology*: On 'richer' soils; absent from sandstone derived soils. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, L, FS, NC, WC, EC. *Economics*: Prevents soil erosion.

Illustration: Chippindall: 270, fig. 242 (1955).
Anatomy vouchers: *Ellis 5120, 5121* & *5126*.
Voucher: *Smook 3645*.


*Pentameris airoides* subsp. *jugorum*

**Pentameris airoides** Nees subsp. **jugorum** (Stapf) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Eastern Cape, Witteberge near Aliwal North, *Drège* (K, holo.).

*Pentaschistis airoides* (Nees) Stapf subsp. *jugorum* (Stapf) H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 48 (1990).

*Pentaschistis jugorum* Stapf, in *Flora capensis* 7: 504 (1899). Type as above.

Tufted or nearly cushion-forming annual or weakly perennial 60–350 mm high; stalked crateriform glands present on leaves, pedicels

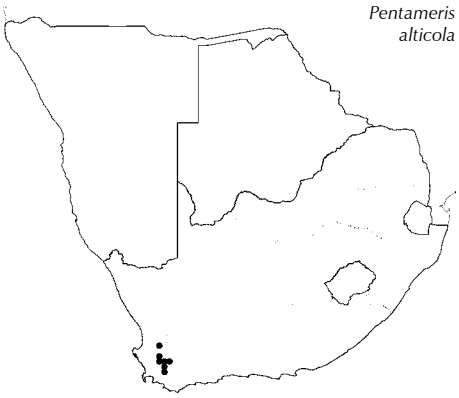
and glumes. Leaf blade 40–60 × 1–3 mm, expanded; sheath mouth hairy or with bristles. Inflorescence open, 30–100 spikelets, axils glabrous or hairy. Spikelet 3.5–5.0 mm long; glumes acute; lemma glabrous to hairy all over or only basally; lateral awn 2–3 mm long; central awn 5–8 mm long; anthers 0.5–1.0 mm long.

*Flowering*: December to February. *Ecology*: On shallow soils; in alpine and high montane areas, also disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Endemic. L, FS, EC.

Anatomy vouchers: *Ellis 5680, 5695 & 5814*.
Voucher: *Linder 4839, Acocks 20163*.

**Pentameris alticola** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Ceres, Milner Vlakte in the Hex River Mountains, 3319AD, *Linder 4486* (BOL, holo.; PRE, iso.).

*Pentaschistis alticola* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 79 (1990).


*Pentameris alticola*

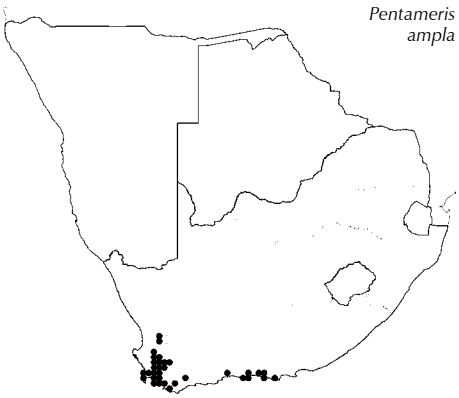
Cushion-forming biennial or weakly perennial 100–300 mm high; basal sheaths brown and soon rotting away; leaves basal; culms weakly geniculate; glands absent. Leaf blade 30–80 × 0.2–0.5 mm, rolled, curly, glabrous or hairy; margins smooth; sheath mouth with a ring of bristles. Inflorescence open, 15–30 × 10–20 mm, with 2–20 spikelets; pedicels glabrous or scaberulous; axils hairy. Spikelet 4–6 mm long; glumes acute to acuminate, purplish-brown, glabrous; lemma 2.5–3.0 mm long, hairy basally or along margins; lateral awns 1.5–3.0 mm long; central awn 7–10 mm long; palea glabrous; anthers 2 mm long.

*Flowering*: November to January. *Ecology*: Sandstone mountains; on rocky upper slopes, but not summits; flowering in first years after fires. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC.

Illustration: Linder & Ellis: 80, fig. 10 (1990).
Anatomy voucher: *Ellis 5528*.
Voucher: *Esterhuysen 28359*

**Pentameris ampla** (Nees) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, between Paarlberg and Du Toits Kloof, *Drège 1674*; on Simonsberg, *Drège s.n.* (syntypes; see note in Linder & Ellis: 59 (1990)).

*Pentaschistis ampla* (Nees) McClean, in *South African Journal of Science* 23: 282 (1926).

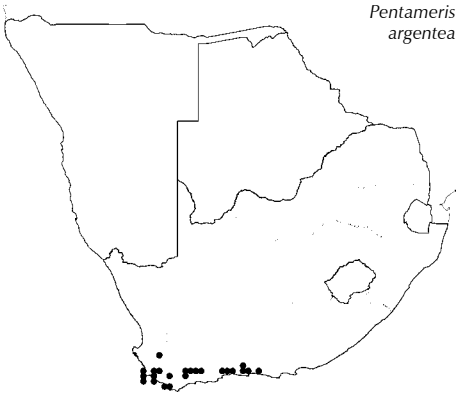

*Pentameris ampla*

Weakly tufted perennial 400–700 mm high; base woody; basal sheaths white, shiny and persistent; leaves basal; obscure linear or sunken glands present on leaves or pedicels or absent. Leaf blade to 300 × 1–6 mm, expanded, glabrous or hairy; margins smooth; sheath mouth glabrous or with a ring of bristles. Inflorescence open, 70–170 × 60–170 mm, ± 100 spikelets; pedicels mostly erect, glabrous or rarely scaberulous; axils glabrous, rarely hairy. Spikelet 3.3–4.6 mm long, awnless; glumes acute, green or straw-coloured, base purple; lemma 2–3 mm long, acute or lobed, glabrous or hairy along keel and margins, hairs sometimes clavate; palea scaberulous near apex or often villous between keels; anthers 1.5–2.2 mm long.

[Similar to and easily confused with *P. aurea*, which has a different base.]

*Flowering*: December to March. *Ecology*: On sandstone derived soils; at low to mid altitudes; often found on rock ledges. *Frequency in southern Africa*: Occasional. *Distribution*: Endemic. EC, WC.

Illustrations: Chippindall: fig. 236 (1955), Linder & Ellis: 8, fig. 2 (1990).
Anatomy vouchers: *Esterhuysen 28112, Taylor 4575* & *Ellis 5591*.
Voucher: *Esterhuysen 22769*.


*Pentameris argentea*

**Pentameris argentea** (Stapf) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Cape Peninsula, *MacGillivray 406*; Table Mt., *Spielhaus 1878*; Orange Kloof, *Wolley-Dod 3342*; Simons Bay, *Milne 247* (syntypes).

*Pentaschistis argentea* Stapf, in *Flora capensis* 7: 487 (1899).

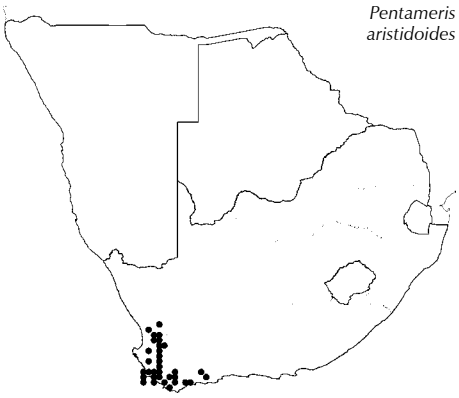
*Pentaschistis involuta* sensu Adamson; and Chippindall non Steud. (see Linder & Ellis: 68 (1990)).

Tufted perennial 300–800 mm high, geophytic with a swollen hairy underground base; stolons horizontal; basal sheaths forming a sheath of burnt-off leaf bases, base densely hairy with long straight adpressed hairs; leaves basal; linear glands present on pedicels. Leaf blade to 250 × 1.0–2.5 mm, expanded, rigid; margins scabrid. Inflorescence open, 50–120 × 20–80 mm, with up to ± 200 spikelets; pedicels not hidden by spikelets, glabrous; axils glabrous or hairy. Spikelet 9–12 mm long; glumes straw-coloured or silvery, glabrous or scaberulous along keels; lemma 4–5 mm long, glabrous, rarely hairy all over, hairs up to 0.1 mm long; lobes small; lateral awn 8–10 mm long, exserted from glumes; central awn 15–20 mm long; palea hairy all over; anthers 2.7–3.0 mm long.

[Similar to *P. viscidula*, a more western species with a different base.]

*Flowering*: October and November. *Ecology*: In sandstone derived soils; dry mountain slopes and foothills. Flowering after fire or bush-cutting. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC, EC.

Anatomy vouchers: *Ellis 658, 2284, 2285, 2290, 5154, 5493, 5541, 5552* & *5561*.
Voucher: *Esterhuysen 27316*.


*Pentameris aristidoides*

**Pentameris aristidoides** (Thunb.) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Cape, Thunberg in herb. *Thunberg 2577*; *Thunberg 2578*.

*Pentaschistis aristidoides* (Thunb.) Stapf, in *Flora capensis* 7: 485 (1899).

Perennial 500–1 000 mm high; rhizomes stout, usually present but may decay quickly; base swollen, basal sheaths brown and soon rotting away, hairy with straight adpressed hairs; leaves basal; linear glands present on pedicels. Leaf blade to 300 × 5–10 mm, expanded, acute, glabrous to hairy; margins smooth; sheath mouth hairy. Inflorescence open, 100–200 × 120–150 mm, with ± 35–100 spikelets; pedicels not hidden by spikelets, glabrous; axils glabrous. Spikelet 12–20 mm long; glumes acuminate apically, creamy to yellowish-brown, base and keel purple-brown, hairy; lemma 5.5–7.0 mm long, densely and tidily hairy along nerves up to upper $^1/_4$, hairs up to 0.8 mm long, upper part glabrous or very short hairy;

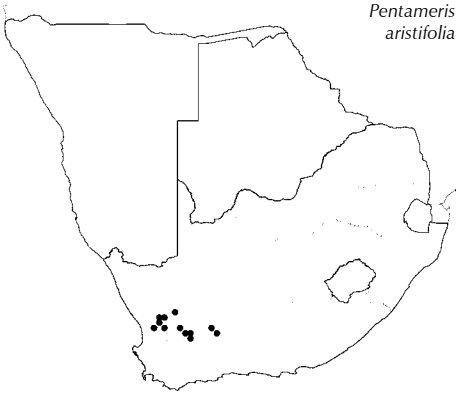
lobes acute, not hidden by hairs; lateral awn 7–11 mm long; exserted from glumes; central awn 20–25 mm long; palea hairy in upper half; anthers 4.5 mm long.

*Flowering*: September to November. *Ecology*: On Table Mountain Sandstone; rocky mountain slopes, occasionally on sandy flats. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC, NC.

Illustration: Chippindall: 258, fig. 225.6 (1955).
Anatomy vouchers: *Ellis 676, 2487, 2857, 5428, 5440, 5778, 5785 & 5787.*
Voucher: *Esterhuysen 32766*.

**Pentameris aristifolia** (Schweick.) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Northern Cape, 40 miles southeast of Williston, *Hutchinson 981* (K, holo.).

*Pentaschistis aristifolia* Schweick., in *Feddes Repertorium* 43: 89 (1938).


*Pentameris aristifolia*

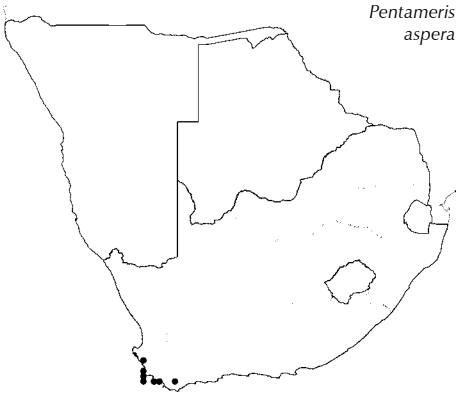
Annual about 250 mm high; glands absent. Leaf blade to 60 × to 4 mm, expanded, hairy; apex usually with a long slender aristae; margins scabrid; sheath mouth with a ring of bristles. Inflorescence open, 60–100 × 60–80 mm, with ± 200 spikelets; pedicels not hidden by spikelets, glabrous; axils glabrous. Spikelet 2.5–3.0 mm long; glumes acute, base green, upper $^2/_3$ purple, glabrous; lemma hairy all over; lateral awns 1.2–2.0 mm long, exserted from glumes; central awn 5–7 mm long (lower lemma may be awnless); palea glabrous; anthers 0.6 mm long.

*Flowering*: September and October. *Ecology*: On heavier soils associated with the Karoo sediments. *Frequency in southern Africa*: Common. *Distribution*: Endemic. NC, WC.

Anatomy vouchers: *Ellis 1722, 2463 & 5414*.
Voucher: *Acocks 16900*.

**Pentameris aspera** (Thunb.) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, 'crescit in summis lateribus montium urbis', Thunberg in herb. *Thunb. 23841* (UPS, holo., microfiche).

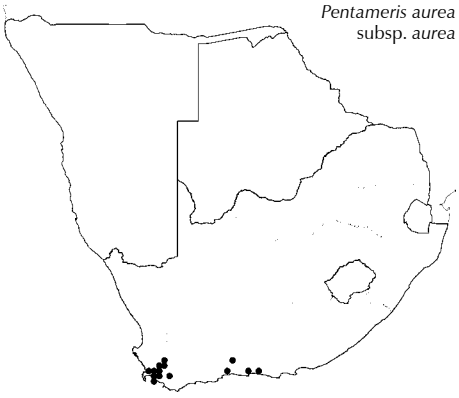
*Pentaschistis aspera* (Thunb.) Stapf in *Flora capensis* 7: 500 (1899).


*Pentameris aspera*

Cushion-forming perennial 300–600 mm high, sticky; base glabrous; basal sheaths soon rotting away; leaves cauline; culms branched; stalked glands on leaves, pedicels and glumes. Leaf blade 40–100 × 3–6 mm, expanded, glabrous or hairy; sheath mouth with a ring of bristles. Inflorescence open, 30–90 × 15–60 mm, with ± 100 spikelets; pedicels not hidden by spikelets, scaberulous; axils glabrous or hairy (often on same inflorescence). Spikelet 5–7 mm long; glumes acute, yellowish-green with purple awns, glabrous or scaberulous; lemma 2.5–3.5 mm long, hairy all over; lateral awns 3 mm long, extending to glume apices; central awn 8–10 mm long; palea hairy in upper half; anthers 2.5–2.8 mm long.

*Flowering*: September to December. *Ecology*: On stony slopes, on both granitic and quartzitic soils; in light disturbances. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC.

Illustration: Chippindall: 263, fig. 231 (1955).
Anatomy vouchers: *Ellis 679, 2328, 2337, 5437, 5540 & 5575*.
Voucher: *Cleghorn 3126*.


*Pentameris aurea* subsp. *aurea*

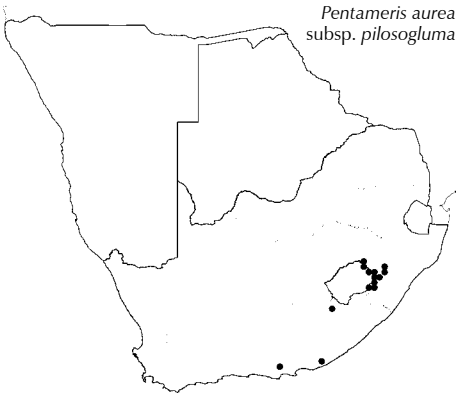
**Pentameris aurea** (Steud.) Galley & H.P.Linder subsp. **aurea**, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Table Mountain, *Ecklon 915* (P, holo.).

*Pentaschistis aurea* (Steud.) McClean subsp. *aurea***,** in *South African Journal of Science* 23: 282 (1926).

Tufted perennial 300–450 mm high, base compact, glabrous; basal sheaths white, shiny, persistent; leaves basal; linear glands usually on pedicels. Leaf blade to 300 × 1–5 mm, expanded, glabrous or hairy; margins smooth; sheath mouth hairy. Inflorescence open, 60–140 × 50–120 mm, with ± 100–150 spikelets; pedicels and axils glabrous. Spikelet 3.5–5.0 mm long, awnless; glumes acute, yellow to green, scaberulous or hairy apically; lemma 3.0–3.5 mm long, glabrous to hairy all over; palea glabrous or villous; anthers 2–3 mm long.

*Flowering*: January to March. *Ecology*: On sandstone derived soil; in marshy areas; usually at lower altitudes. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC, EC.

Illustration: Chippindall: 267, fig. 238 (1955).
Anatomy vouchers: *Ellis 5539, 5570* & *5822*.
Voucher: *Esterhuysen 24111*.


*Pentameris aurea* subsp. *pilosogluma*

**Pentameris aurea** (Steud.) Galley & H.P.Linder subsp. **pilosogluma** (McClean) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Eastern Cape, Witteberge, *Drège 8116* (B, holo.).

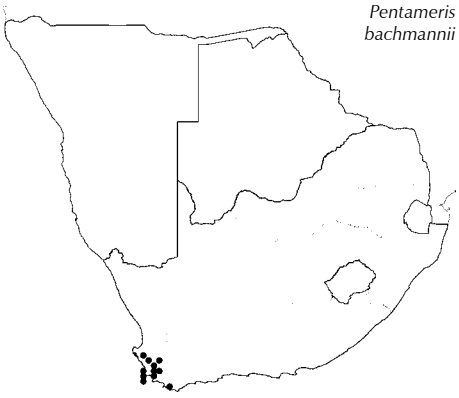
*Pentaschistis aurea* (Steud.) McClean subsp. *pilosogluma* (McClean) H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 76 (1990).

*Pentaschistis pilosogluma* McClean; in *South African Journal of Science* 23: 282 (1926). Type as above.

Tufted perennial 600–700 mm high, forming large floppy tussocks; obscure linear glands on pedicels present or absent. Leaf blade to 350 × to 5 mm setaceous, expanded or rolled; margins smooth. Inflorescence open; with 100–150 spikelets; axils glabrous. Spikelet 6–7 mm long, awnless; lemma 4–5 mm long, glabrous or hairy all over; palea glabrous or hairy; anthers 2–3 mm long.

*Flowering*: December to February. *Ecology*: On cave sandstone and basaltic soils; along streams and seepages. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. L, FS, KZN, EC.

Illustration: Chippindall: 266, fig. 235 (1955).
Anatomy vouchers: *Ellis 3162, 5616, 5617, 5699, 5716* & *5730*.
Voucher: *Liebenberg 5445*.


*Pentameris bachmannii*

**Pentameris bachmannii** (McClean) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, near Hopefield, *F.E. Bachmann 1017*.

*Pentaschistis bachmannii* McClean, in *South African Journal of Science* 23: 282 (1926).

*Pentaschistis ecklonii* (Nees) McClean, in *South African Journal of Science* 23: 282 (1926). Type: South Africa, Western Cape, Klein Drakenstein at the Berg River, *Drège 1660*; Tulbagh Waterfall, *Ecklon* (?).

Tufted perennial 200–300 mm high; basal sheaths brown, soon rotting away; leaves cauline; stalked, crateriform glands on pedicels.

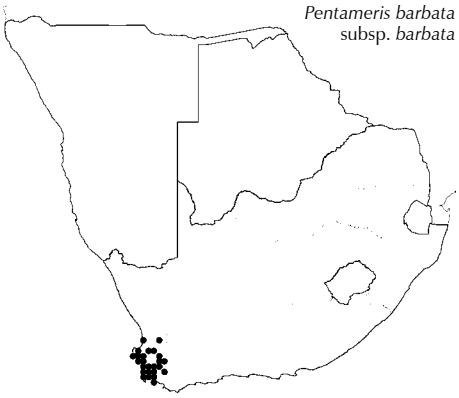
Leaf blade to 60 × to 2 mm, rolled, rigid, glabrous; margins smooth; sheath mouth glabrous. Inflorescence spikelike, 20–60 × 5–7 mm, with ± 100 spikelets; pedicels hidden by spikelets, scaberulous; axils hairy. Spikelet 3–4 mm long, awnless; glumes acute, yellow, scaberulous apically; lemma 1.8–2.5 mm long, hairy along keel and margins; palea glabrous; anthers 1.5–2.0 mm long.

*Flowering*: January to March. *Ecology*: On richer soils derived from shales or sand; in lowlands. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. WC.

Illustration: Chippindall: 268, fig. 239 (1955).
Anatomy vouchers: *Ellis 5984* & *5985*.
Voucher: *Esterhuysen 24035*.

**Pentameris barbata** (Nees) Steud. subsp. **barbata**, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Olifants River, *Ecklon* (?); Tulbagh (Tulbagh Waterfall, Winterhoek and Tulbaghskloof), *Ecklon* (B, lecto.).

*Pentaschistis barbata* (Nees) H.P.Linder subsp. *barbata***,** in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 30 (1990).


*Pentameris barbata* subsp. *barbata*

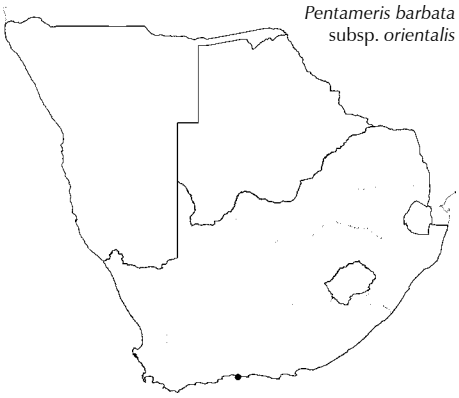
Weakly tufted perennial 300–600 mm high, nearly forming cushions; base glabrous; basal sheaths brown, soon rotting away; leaves basal or cauline; stalked glands common to rare on leaves, pedicels and glumes. Leaf blade to 200 × to 12 mm, expanded, glabrous or more commonly hairy; margins scabrid; sheaths mouth with a ring of bristles. Inflorescence open, 110 × 70 mm, with ± 200 spikelets; pedicels not hidden by spikelets, shorter than spikelets; axils hairy. Spikelet 5–6 mm long; glumes acute, green, glabrous or hairy all over; lemma 2.0–2.5 mm long, hairy all over, lobes truncate-lacerate; lateral awns 3 mm long, excerted from glumes; central awn 8–11 mm long; palea hairy in upper half; anthers 1.8–2.0 mm long.

*Flowering*: September to November. *Ecology*: Coastal sands (West Coast Sand Flats); in slightly disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC.

Anatomy vouchers: *Ellis 1684, 2219, 2234, 2305, 2359, 5802, 5134, 5135, 5803* & *5804*.
Voucher: *Davidse 34138*.

**Pentameris barbata** (Nees) Steud. subsp. **orientalis (**H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Goukamma Nature Reserve (3423AA), at beacon, *Van der Merwe 1765* (STE, holo.; PRE, iso.).

*Pentaschistis barbata* (Nees) H.P.Linder subsp. *orientalis* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 31 (1990).

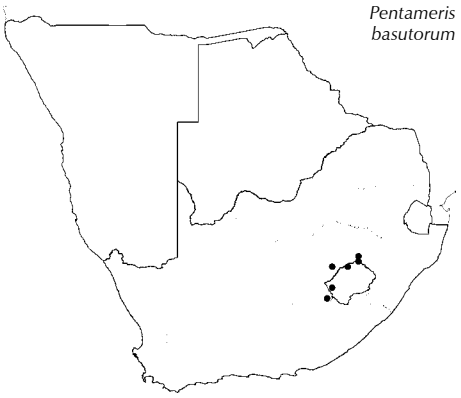

*Pentameris barbata* subsp. *orientalis*

Tufted perennial 300–600 mm high, almost forming cushions; base glabrous; basal sheaths brown, soon rotting away; leaves cauline; stalked glands common to rare on leaves, pedicels and glumes. Leaf blade to 300 × to 9 mm, expanded, glabrous or more commonly hairy; margins scabrid; sheaths mouth with a ring of bristles. Inflorescence open, 110 × 70 mm, with ± 200 spikelets; pedicels not hidden by spikelets; axils hairy. Spikelet 8–10 mm long; glumes acute, green, glabrous or hairy all over; lemma 2.5 mm long, hairy; lobes truncate-lacerate; lateral awns 3 mm long, exserted from glumes;

central awn 8–11 mm long; palea hairy in upper half; anthers 1.8–2.0 mm long.

*Flowering*: February. *Ecology*: On coastal dunes. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. WC.

Anatomy voucher: *Ellis 6002*.
Voucher: *Van der Merwe 1634*.


*Pentameris basutorum*

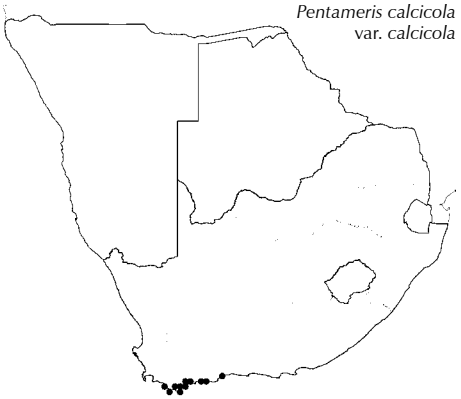
**Pentameris basutorum** (Stapf) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: Lesotho, Leribe, *Dieterlen 222* (K, holo.; PRE, SAM, STE, all iso.).

*Pentaschistis basutorum* Stapf, in *Kew Bulletin* 1914: 20 (1914).

Tufted perennial 500–700 mm high; base glabrous; basal sheaths either burnt off or white, shiny and persistent; leaves basal; glands absent. Leaf blade to 600 × to 0.5 mm, rolled, rigid, glabrous outside, densely woolly hairy inside along entire length; margins smooth; sheath mouth hairy. Inflorescence contracted, 120 × 30 mm, almost cylindrical with a tangled appearance, ± 100 spikelets; pedicels not hidden by spikelets, glabrous; axils hairy. Spikelet 7–10 mm long; glumes acute to acuminate, straw-coloured, glabrous; lemma 4–5 mm long, hairy all over; lateral awns 5–6 mm long, exserted from glumes; central awn 10–20 mm long; palea glabrous or with a few long hairs; anthers 2 mm long.

*Flowering*: November and December. *Ecology*: On shallow soil over sandstone platforms; on the western slopes of the Drakensberg. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. L, FS.

Anatomy vouchers: *Liebenberg 7454*; *Ellis 2367, 2368, 2369, 3270* & *2373*.
Voucher: *Dieterlen 1162*.


*Pentameris calcicola* var. *calcicola*

**Pentameris calcicola** (H.P.Linder) Galley & H.P.Linder var. **calcicola**, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Bredasdorp, farm 'Wydgelee', *Linder 4365* (BOL, holo.; PRE, iso.).

*Pentaschistis calcicola* H.P.Linder var. *calcicola*, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 81 (1990).

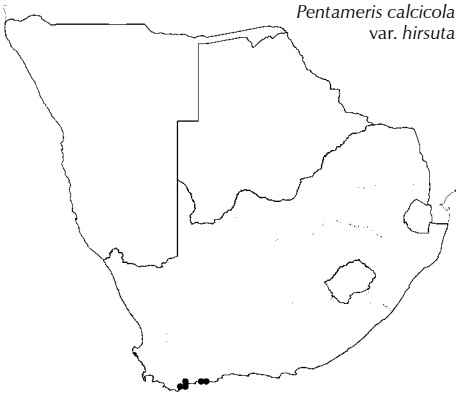
Very neat tufted perennial 200–300 mm high; basal sheaths brown, soon rotting away; leaves in a tight basal tussock; glands absent. Leaf blade 30–100 × 0.3–0.5 mm, rolled, rigid, glabrous; sheath mouth hairy. Inflorescence open or contracted, 15–60 × 5–40 mm, with (5)15–50 spikelets; pedicels not hidden by spikelets, glabrous or hairy; axils glabrous. Spikelet 5–6 mm long; glumes acuminate, brownish, glabrous or scaberulous along keels; lemma 2–3 mm long, hairy along nerves; lateral awns 4–5 mm long; central awn 10–12 mm long; palea glabrous; anthers 2 mm long.

*Flowering*: October. *Ecology*: Restricted to limestone pavements; only known from the Bredasdorp flats to Gansbaai. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. WC.

Illustration: Linder & Ellis: 84, fig. 12 (1990).
Anatomy vouchers: *Ellis 1282, 1666, 1667, 2511, 5148, 5447* & *5449*.
Voucher: *Bohnen 424/1*.

**Pentameris calcicola** (H.P.Linder) Galley & H.P.Linder var. **hirsuta** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Bredasdorp, farm 'Wydgelee', 3420AD, *Linder 4366*, (BOL, holo.).

*Pentaschistis calcicola* H.P.Linder var. *hirsuta* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 83 (1990).


*Pentameris calcicola* var. *hirsuta*

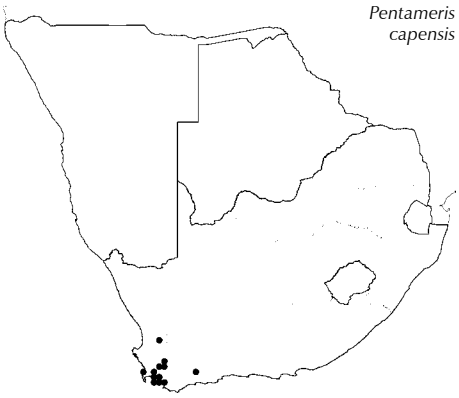
Tufted perennial 200–300 mm high; basal sheaths brown, soon rotting away; leaves in a tight basal tussock; glands absent. Leaf blade to 30 × to 0.5 mm, rolled, rigid, hairy. Inflorescence 15–60 × 5–40 mm, open at anthesis, with 30–50 spikelets; pedicels not hidden by spikelets, glabrous or hairy; axils glabrous. Spikelet 6–7 mm long, silvery; lemma hairy along nerves; lateral awns 4–5 mm long; central awn 10–12 mm long; palea glabrous; anthers 2 mm long.

*Flowering*: September. *Ecology*: On limestone pavements; restricted to the Bredasdorp flats. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

Anatomy vouchers: *Ellis 2530, 5149, 5150* & *5451.*
Voucher: *Spies 3461.*

**Pentameris capensis** (Nees) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Du Toits Kloof, *Drège s.n.* (B, holo.; SAM, iso.).

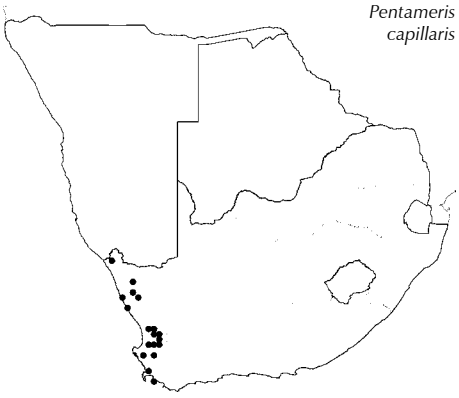
*Pentaschistis capensis* (Nees) Stapf, in *Flora capensis* 7: 494 (1899).


*Pentameris capensis*

Tangled perennial 200–350 mm high; hydrophyte; stolons horizontal; basal sheaths white, shiny, persistent; leaves basal; glands absent. Leaf blade to 120 × to 4 mm, expanded or occasionally rolled (possibly as a result of drying out before being pressed), glabrous; margins smooth; upper surface with papillae; sheath mouth glabrous. Inflorescence open, 50–120 × 30–50 mm, with ± 60 spikelets; pedicels and axils glabrous. Spikelet 6–9 mm long; glumes acuminate, green, glabrous; lemma 3–5 mm long, hairy all over or only in the middle; lobes acute to acuminate; lateral awns 6–10 mm long, exserted from glumes; central awn 15–23 mm long, curved, not geniculate, column not twisted; palea hairy along keels; anthers 1.7 mm long.

*Flowering*: December and January. *Ecology*: Restricted to rocky, running streams where it grows in water, often over waterfalls. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC.

Illustration: Chippindall: 258, fig. 225.7 (1955).
Anatomy vouchers: *Ellis 5571, 5574* & *Esterhuysen 22571.*
Voucher: *Esterhuysen 9554* .


*Pentameris capillaris*

**Pentameris capillaris** (Thunb.) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Thunberg in herb. *Thunb. 23845* (UPS, holo., microfiche).

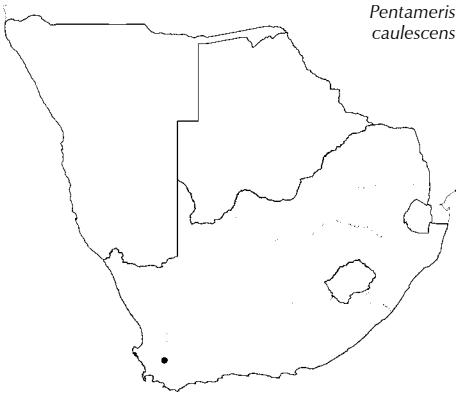
*Pentaschistis capillaris* (Thunb.) McClean, in *South African Journal of Science* 23: 281 (1926).

Robust annual 80–400 mm high; stalked, crateriform glands on leaves and pedicels. Leaf blade to 50 × to 5 mm, expanded, hairy; margins scabrid; sheath mouth hairy. Inflorescence open, 40–100 × 30–80 mm, with 100–300 spikelets; pedicel glabrous; axils hairy. Spikelet 3 mm long, awnless; glumes obtuse, green, scaberulous all

over; lemmas 1.5–2.0 mm long, truncate, glabrous; palea glabrous; anthers 1.5–2.0 mm long.

*Flowering*: September and October. *Ecology*: In coastal sands. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. WC, NC.

Illustration: Chippindall: 269, fig. 241 (1955).
Anatomy vouchers: *Ellis 5410, 5411, 5782, 5994* & *Acocks 24150*.
Voucher: *Reid 1302*.


*Pentameris caulescens*

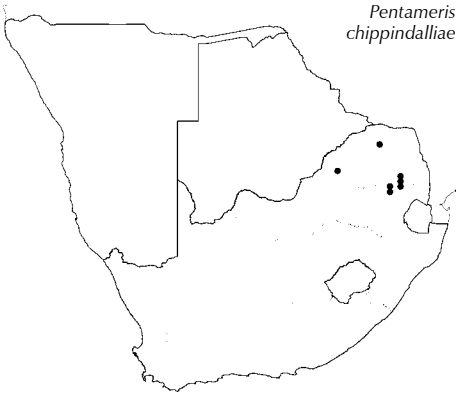
**Pentameris caulescens** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Ceres, Buffelshoek Peak in the Hex River Mountains, *Esterhuysen 26349* (BOL, holo.; PRE, iso.).

*Pentaschistis caulescens* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 99 (1990).

Tangled perennial 150–300 mm high; basal sheaths not persistent; leaves mainly cauline; glands absent. Leaf blade 30–40 × 1–2 mm, rigid, spreading from aerial stems, glabrous; margins incurved, smooth; sheath mouth glabrous. Inflorescence open, 30–50 × 20–40 mm, with 5–10 spikelets; pedicels and axils hairy. Spikelet 8–12 mm long; glumes acuminate, hyaline above, base purple, glabrous; lemma 3 mm long, glabrous; lateral awns 6–8 mm long, exserted from glumes, central awn 16–19 mm long, geniculate; palea hairy along keels; anthers 1.2 mm long.

*Flowering*: September to October. *Ecology*: On shale bands; on dry stony mountain slopes. *Frequency in southern Africa*: Abundance not known. *Distribution*: Endemic. WC.

Illustration: Linder & Ellis: 100, fig. 17 (1990).
Anatomy voucher: *Ellis 2482*.
Voucher: *Esterhuysen 26349* (BOL).


*Pentameris chippindalliae*

**Pentameris chippindalliae** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Mpumalanga, Dullstroom, *Linder 4711* (BOL, holo.; NBG, PRE, iso.).

*Pentaschistis chippindalliae* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 92 (1990).

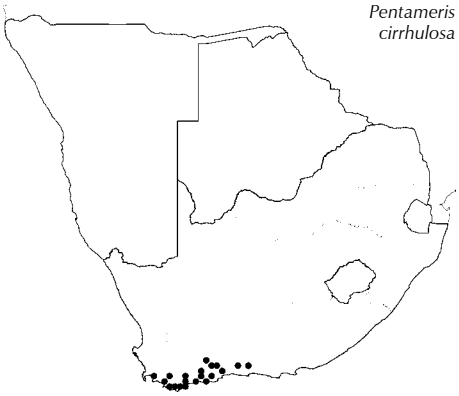
Tufted perennial 300–500 mm high; basal sheaths either burnt-off leaf bases, or persistent, white, shiny, glabrous; leaves basal; glands absent. Leaf blade to 200 × to 0.5 mm, rolled, soft, often curly; sheath mouth hairy. Inflorescence open, 70–90 × 50–80 mm, with ± 50 spikelets; pedicels not hidden by spikelets, glabrous; axils hairy. Spikelet 4.5–7.5 mm long; glumes finely acute, yellow, glabrous or scaberulous along keels; lemma 2.5–3.0 mm long, acute, hairy all over; lateral awns 2–3 mm long, reaching up to glume apices; central awn 7–10 mm long, geniculate; palea glabrous; anthers 3 mm long.

*Flowering*: February to March. *Ecology*: Restricted to sour grassland and probably quartzites; in high lying ground. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. LIM, M.

Illustration: Linder & Ellis: 93, fig. 15 (1990).
Anatomy vouchers: *Ellis 3447, 3451, 4451, 4452* & *5734*.
Voucher: *Krynauw 477*.

**Pentameris cirrhulosa** (Nees) Steud., in *Nomenclator Botanicus* (Steudel), ed. 2,2: 229 (1841). Type: South Africa, Western Cape, Puspasvallei near Swellendam, *Ecklon* (B, holo.).

*Pentaschistis cirrhulosa* (Nees) H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 42 (1990).


*Pentameris cirrhulosa*

Tufted perennial 150–300 mm high; base glabrous; leaves basal; stalked, crateriform glands present on sheaths, pedicels and glumes. Leaf blade 30–70 × 0.5–3.0 mm, expanded or rolled, purplish; sheath mouth hairy. Inflorescence open, 30–60 × 15–50 mm, with ± 50 spikelets; pedicels not hidden by spikelets; axils hairy. Spikelet 5–9 mm long; glumes acuminate, silvery to straw or purple-coloured; lemma 3 mm long, hairy all over or only basally; lobes truncate-lacerate, hairy; lateral awns 1–7 mm long, extending to glume apices; central awn 7–20 mm long, geniculate; palea glabrous; anthers 2.0–2.5 mm long.

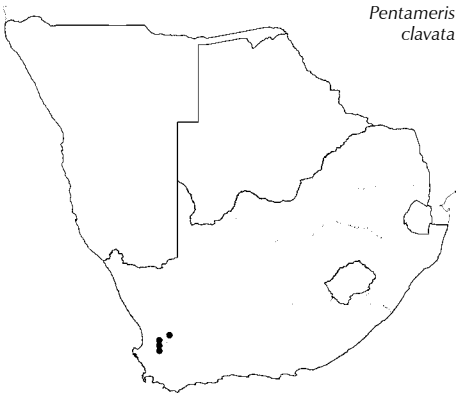
[Similar to *P. pallida*, but differing in spikelet size, growth form and colour of spikelet.]

*Flowering*: October. *Ecology*: On sandstone gravels, often associated with conglomerates; at low altitudes. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC.

Anatomy vouchers: *Ellis 2524, 2531 & 4664*.
Voucher: *Esterhuysen 17189*.

**Pentameris clavata** (Galley) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: Western Cape, Koue Bokkeveld Mountains south of Hexberg, on the Farm De Boom, 1 212 m, *C.A. Galley 567* (ZH, holo.; NBG, PRE, iso.).

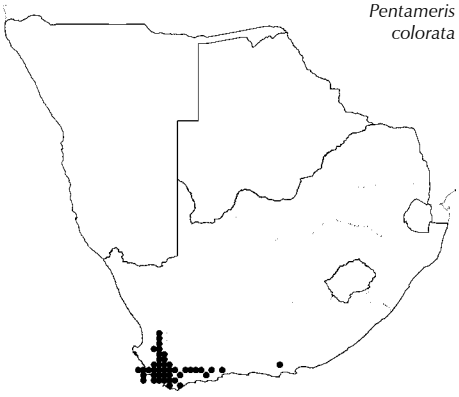
*Pentaschistis clavata* Galley, in *Bothalia* 36: 159 (2006).


*Pentameris clavata*

Neat round, cushion-forming perennial 80–200 mm high; sheath bases, shiny white, persistant; leaves cauline; glands absent. Leaf blade 40–50 × 1 mm, expanded at base; margins smooth; sparsely, scattered tubercle-based hairs present on blade and sheath or sheaths glabrous; sheath mouth with a ring of stiff hairs. Inflorescence widely open, 20–35 × 15–35 mm, with 10–20 spikelets; axils with long erect hairs. Spikelet 2.5 mm long, 1-flowered, awnless; glumes acute, straw-coloured, base purplish; lemma 2.2–2.5 mm long, clavate hairs scattered between nerves; palea glabrous or with few clavate hairs between keels; anthers 1.6–1.9 mm long.

*Flowering*: November and December. *Ecology*: On damp sand derived from Table Mountain Sandstone; stream banks in wet moss. *Frequency in southern Africa*: Locally common. *Distribution*: NC, WC.

Illustrations: Galley & Linder: fig. 1 (2006).
Voucher: *Taylor 12095*.


*Pentameris colorata*

**Pentameris colorata** (Steud.) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Cape Town, Table Mt., *Ecklon 931* (P, holo.).

*Pentaschistis colorata* (Steud.) Stapf, in *Flora capensis* 7: 491 (1899).

*Pentaschistis colorata* (Steud.) Stapf var. *polytricha* Stapf, in *Flora capensis* 7: 491 (1899). Type: South Africa, Western Cape, Cape Peninsula, Paulsberg, *Wolley-Dod 2962* (K, holo.).

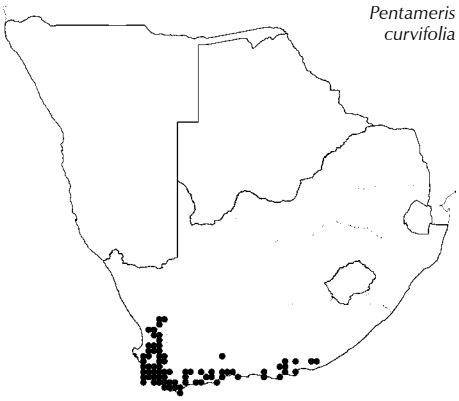
Tufted perennial 300–600 mm high; cushion-forming or tangled; basal sheaths white, shiny, persistent; leaves basal; glands absent.

Leaf blade 150–300 × 0.3–1.0 mm, rolled, usually curly, glabrous; margins scabrid; sheath mouth glabrous, occasionally with few bristles. Inflorescence open, 50–120 × 20–60 mm, with 4–25 spikelets; pedicels not hidden by spikelets, glabrous or scaberulous; axils glabrous. Spikelet 8–13 mm long; glumes acuminate, pale yellow, base purplish, glabrous; lemma 4–5 mm long, hairy along nerves; lateral awns 5–9 mm long, extending to glume apices; central awn 13–21 mm long; palea glabrous or hairy in upper third; anthers 2.5–4.0 mm long.

[A highly variable species.]

*Flowering*: August to December. *Ecology*: Has a wide ecological range but usually on stony mountain slopes in sandstone derived soils. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC, EC.

Anatomy vouchers: *Ellis 649, 1200, 1682, 2217, 2230, 2232, 2259, 2264, 2270, 2281, 2296, 2485, 2539, 2541, 2585, 5438, 5445, 5536, 5546, 5551 & 5563*.
Vouchers: *Taylor 6571, Van Zyl 3100*.



*Pentameris curvifolia*

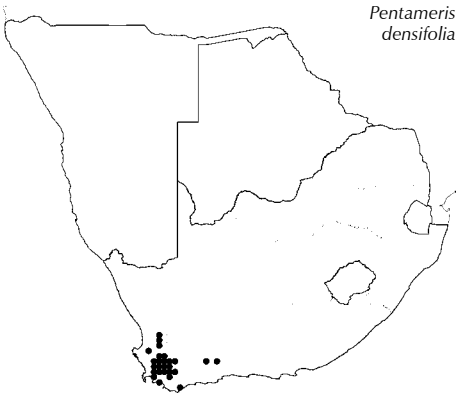
**Pentameris curvifolia** (Schrad.) Nees, in *Linnaea* 7: 313 (1832). Type: South Africa, Cape, *Hesse* (?).

*Pentaschistis curvifolia* (Schrad.) Stapf, in *Flora capensis* 7: 491 (1899).

Tufted perennial 400–500 mm high; stolons present or absent; basal sheaths white, shiny, persistent; leaves basal; glands absent. Leaf blade to 300 × to 4 mm, expanded, rigid, glabrous; margins thickened; sheath mouth glabrous or woolly (only hairy when sheaths hairy). Inflorescence contracted, 40–90 × 20–50 mm, with ± 100 spikelets; pedicels hidden by spikelets, scaberulous; axils glabrous. Spikelet 8–15 mm long (includes glume awn), ivory-coloured; glumes acuminate to awned, scaberulous all over or only along keel; lemma 3–4 mm long, hairy along nerves, hairs 0.3–0.7 mm long; lateral awns 4–7 mm long, not reaching to reaching glume apices; central awn 10–17 mm long; palea hairy; anthers 2.0–2.3 mm long.

*Flowering*: October and November. *Ecology*: On sandstone derived soils; widespread over wide altitude range and usually in Fynbos. *Frequency in southern Africa*: Common. *Distribution*: Endemic. NC, WC, EC.

Illustration: Chippindall: 259, fig. 226 (1955).
Anatomy vouchers: *Ellis 625, 646, 2224, 2225, 2216, 2231, 2233, 2301, 2322, 2325, 2351, 2353, 2354, 2492, 2513, 2518, 5485, 5610 & 5837*.
Voucher: *Hugo 2139*.



*Pentameris densifolia*

**Pentameris densifolia** (Nees) Steud., in *Nomenclator Botanicus* (Steudel), ed. 2,2: 298 (1841). Type: South Africa, Western Cape, Tulbagh waterfall, *Ecklon* (B, holo.).

*Pentaschistis densifolia* (Nees) Stapf var. *densifolia*, in *Flora capensis* 7: 506 (1899).

*Pentaschistis densifolia* (Nees) Stapf var. *intricata* Stapf, in *Flora capensis* 7: 507 (1899). Type: South Africa, Cape Province, mountains above Worcester, *Rehmann 2586* (K, lecto.); Simonsberg, *Drège*; Worcester, Constable, 3000', *Drège* (syntypes).

Softly herbaceous perennial 90–250 mm high, cushion-forming; stolons present; basal sheaths brown, soon rotting away; leaves cauline; stalked, crateriform glands on leaves and pedicels. Leaf blade to 40 × to 1.5 mm, expanded, rigid, old blades drying pink; sheaths mouth

with a ring of bristles. Inflorescence open, 10–50 × 5–35 mm, with 1–50 spikelets; pedicels glabrous or scaberulous; axils hairy. Spikelet 3.5–4.5 mm long; glumes acute to acuminate, yellow or green, scaberulous along keels; lemma 2.00–2.25 mm long, hairy along keel and margins; lateral awn 1–2 mm long, extending up to glume apices; central awn 3–6 mm long; palea hairy in upper half; anthers 1.5–1.8 mm long.

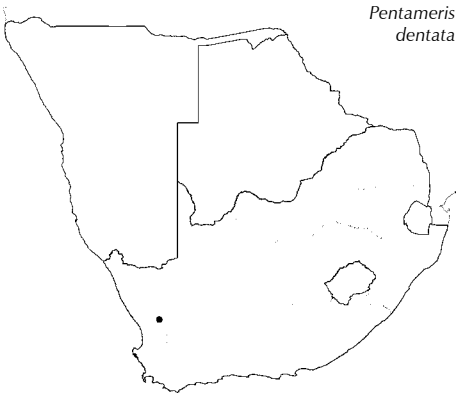
*Flowering*: December to January. *Ecology*: At mid-altitudes on mountains; on ledges and in crevices, often growing in moss-beds on rocky ledges. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC.

Anatomy vouchers*: Ellis 2493, 5519, 5527, 5559, 5584, 5621 & 5977.*
Voucher: *Esterhuysen 22595*.

**Pentameris dentata** (L.f.) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Bockland, 1773, *Thunberg s.n.* (UPS, holo.).

*Prionanthium dentatum* (L.f.) Henrard, in *Blumea* 4: 530 (1941).

*Prionanthium rigidum* Desv., in *Opuscules sur les sciences physiques et Naturelles*: 65 (1831). Type: 'Crescit in India Oriental'.


*Pentameris dentata*

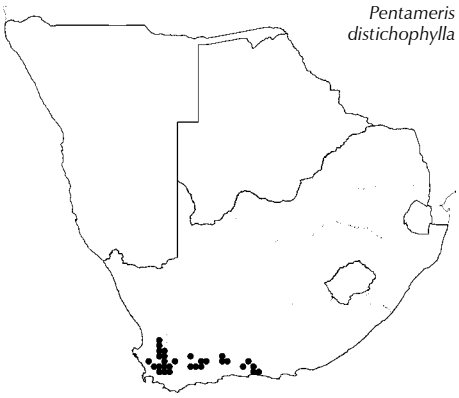
Tufted annual 30–430 mm high; stalked glands on glume keel. Leaf blade 15–105 × 0.5–3.0 mm. Inflorescence spike-like, 5–75 mm long; rachis cylindrical; spikelets densely aggregated, laterally arranged, not obviously paired. Spikelet 3.2–5.2 × to 1.2 mm; glumes shortly awned, awn 0.4 mm long; lemma awn up to 0.3 mm long, hairy all over; palea hairy between keels; anthers 1.8–2.5 mm long.

*Flowering*: September. *Ecology*: At low elevations of ± 700 m. *Frequency in southern Africa*. Rare. *Distribution*: Endemic. Nieuwoudtville area in Western Mountain Karoo. Re-collected in 1975, over 200 years after it was last collected by Thunberg, who first described the taxon. NC.

Illustration: Davidse: 145, fig. 2c (1988).
Anatomy vouchers: *Ellis 2452, 5417 & 5773*.
Voucher: *Davidse 33396*.

**Pentameris distichophylla** (Lehm.) Nees, in *Linnaea* 7: 314 (1832). Type: South Africa, Habitat in *Promontorio Bonae Spei*, collector unknown (S, lecto.).

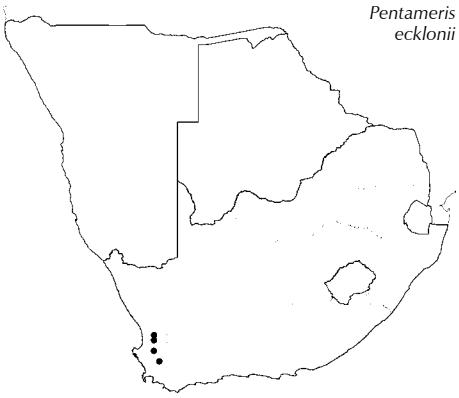
*Pentameris dregeana* Stapf, in *Flora capensis* 7: 515 (1897). Type: South Africa, Western Cape, Paarl Mountains, *Drége*.


*Pentameris distichophylla*

Robust, tufted to decumbent perennial, 300–1 200 mm high, eventually forming cushions, culm up to 4.5 mm wide, branched basally. Leaf blade 80–190(–300) × 1.5 mm, folded or rolled, flexible, usually strongly curved, densely hairy, especially near the base, rarely glabrous; leaf sheath often woolly hairy, auricles absent, sheath mouth densely bearded. Inflorescence loosely contracted, 50–110 mm long, lanceolate; with 6–30(50) spikelets. Spikelet 12–15 × 3.5–10.0 mm; glumes 12–15 mm long, glabrous or hairy; lemma 2.3–4.0 mm long; lobes acuminate, 1–3 mm long; lateral awn 4.0–10.5 mm long; central awn 13.0–15.5 mm long; palea 4–7 mm long; lodicules glabrous or ciliate, sometimes with one or two arm-like extensions; anther 3.0–4.5 mm long; caryopsis 2.0 × 0.9 mm, rugosely sculptured, pericarp brittle, apex with tuft of white hairs.

*Flowering*: September to December. *Ecology*: Coarse sandy soil; in rock crevices of the Cape Fold mountains, especially on northern aspects. Reacts well to fire. *Frequency in southern Africa*: Infrequent to common, especially after fire. *Distribution*: Endemic, a widespread Fynbos species. WC, EC. *Economics*: Domestic use such as bedding in mountain huts and caves.

Illustration: Chippindall: 253, fig. 224 (1955).
Anatomy vouchers: *Ellis 2347, 2477, 2480, 2484, 2494, 2495, 2509, 2556, 2580*; *Esterhuysen 27321, 26313*; *Boucher 2388* & *Acocks 19925*.
Voucher: *Compton 13952*.


*Pentameris ecklonii*

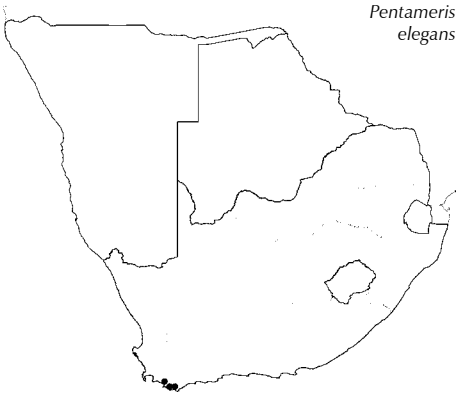
**Pentameris ecklonii** (Nees) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Olifantsrivier fluviam at I, Clanwilliam, *Ecklon s.n.* (BM, lectotype).

*Prionanthium ecklonii* (Nees) Stapf, in *Flora capensis* 7: 456 (1899).

Tufted annual 190–370 mm high; stalked glands on glume keel. Leaf blade 40–160 × 0.5–1.5 mm. Inflorescence spike-like, inconspicuously secund, 15–95 mm long; rachis cylindrical; spikelets arranged alternately in pairs, but usually solitary near base and apex. Spikelet 4.4–6.1 × to 1.5 mm, awnless; lemma and palea glabrous; anthers 2.7–4.0 mm long.

*Flowering*: September to October. *Ecology*: At low altitudes in Coastal Renosterveld. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

Illustration: Davidse: 145, figs 2A–D (1988).
Anatomy voucher: *Ellis 5784*.
Voucher: *Ecklon & Zeyher s.n.*


*Pentameris elegans*

**Pentameris elegans** (Nees) Steud., in *Nomenclator Botanicus* (Steudel), ed. 2,2: 298 (1841). Type: South Africa, Western Cape, Kleinriviersberge, *Ecklon* (B, holo.).

*Pentaschistis elegans* (Nees) Stapf, in *Flora capensis* 7: 496 (1899).

Tufted perennial 200–300 mm high; stolons present; basal sheaths brown, soon rotting away; leaves basal; glands absent. Leaf blade 20–30 × to 1 mm, expanded, flaccid; margins smooth; sheath mouth with a ring of bristles. Inflorescence open, 40–50 × 15–25 mm, with 2–10 spikelets; pedicels scaberulous; axils glabrous or hairy. Spikelet 7–9 mm long; glumes acuminate, yellow to greenish, scaberulous along keels; lemma 3 mm long, apex sparsely hairy; lateral awns 2 mm long, not reaching glume apices; central awn 15 mm long; palea as long as lemma; anthers golden brown.

*Flowering*: September. *Ecology*: In sand on coastal flats. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

Voucher: *Henderson 1820* (BOL).

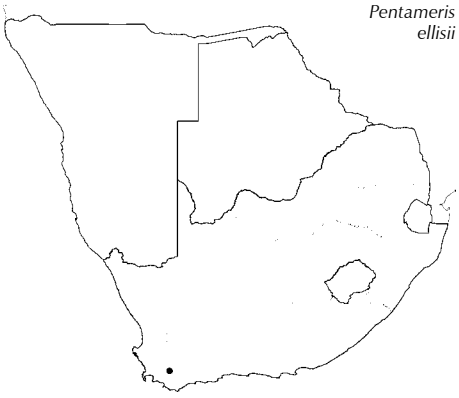
**Pentameris ellisii** H.P.Linder, in *Bothalia* 40: 191 (2010). Type: South Africa, Western Cape, Jonaskop, *Linder 7898* (Z, holo.).

Tufted perennial; basal sheaths glabrous, not swollen; leaves cauline; glands on pedicels and glumes. Leaf blade 50–150 × 0.5–0.7 mm, rolled, sparsely long hairy; sheath mouth hairy. Inflorescence open,

50–100 × 40–60 mm, with 50–100 spikelets; axils hairy; pedicels densely glandular. Spikelet 5.5–6.0 mm long; glumes acute to acuminate, dark purple with yellow, upper margins densely glandular; lemma 2.5–2.8 mm long, sparsely hairy between keel and first nerves; lobes acute, lateral awns 2.0–2.5 mm long, exserted from glumes; central awn 7–8 mm long, tightly twisted basally, column and bristle of equal length; palea apex hairy, rest glabrous; anthers 3 mm long.

*Flowering*: January. *Ecology*: Shallow soils over sandstone; on northern mountain slopes. *Frequency in southern Africa*: only known from one collection, but locally common. *Distribution*: Endemic. WC.

Illustration: Linder: 192, fig. 18 (2010).
Voucher: *Linder 7898* (type).


*Pentameris ellisii*

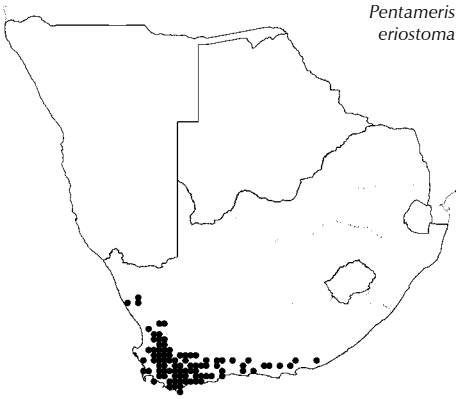
**Pentameris eriostoma** (Nees) Steud., in *Nomenclator Botanicus* (Steudel), ed. 2,2: 298 (1841). Types: South Africa, Western Cape, Cannaland between Cogmanskloof and Gouritz, *Ecklon*; Eastern Cape, Albany, Bothasberg, *Ecklon*.

*Pentaschistis eriostoma* (Nees) Stapf, in *Flora capensis* 7: 489 (1899).

Tufted perennial 300–900 mm high; basal leaf sheaths densely woolly hairy; leaves basal; glands absent. Leaf blade to 400 × to 2.5 mm, rolled, rarely expanded, rigid, glabrous; margins smooth; sheath upper part and mouth woolly hairy. Inflorescence contracted, 50–150 × 20–35 mm, with ± 100 spikelets; pedicels glabrous, hairy or scaberulous; axils hairy. Spikelet 8–12 mm long; glumes acuminate, glabrous; lemma 3.5–4.5 mm long, hairy all over; lateral awns 4–6 mm long, extending up to glume apices; central awn 10–17 mm; palea hairy between keels; anthers 2.7–3.5 mm long.

*Flowering*: September to November. *Ecology*: Shales and sandstones. *Frequency in southern Africa*: Common. *Distribution*: Endemic. NC, WC, EC.

Illustration: Chippindall: 259, fig. 227 (1955).
Anatomy vouchers: *Ellis 696, 1251, 1672, 2486, 2473, 2490, 2502, 2581, 2584, 5513, 5627.*
Voucher: *Esterhuysen 27416*.

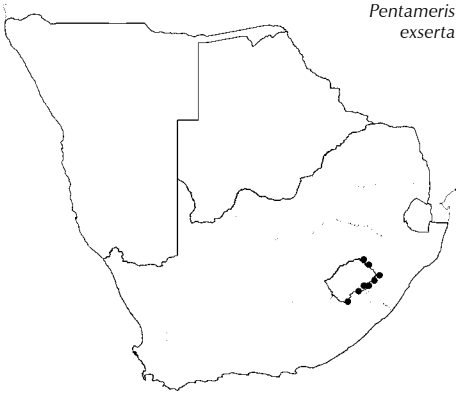

*Pentameris eriostoma*

**Pentameris exserta** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, KwaZulu-Natal, Cathedral Peak Forest Reserve, Organ Pipes Pass, *Linder 4685* (BOL, holo.).

*Pentaschistis exserta* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 92 (1990).

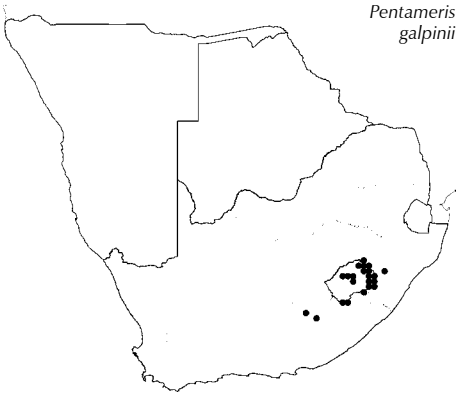
Tufted perennial about 600 mm high; stolons horizontal; basal sheaths white, shiny, persistent; leaves basal; glands absent. Leaf blade to 300 × to 1.5 mm, rolled, rigid, glabrous; margins scabrid; sheath mouth with a ring of bristles. Inflorescence open, 60–110 × 50–80 mm, with ± 45–100 spikelets; pedicels glabrous; axils usually hairy. Spikelet 7.5–8.5 mm long; glumes acuminate, green, glabrous; lemma 3.5–5.0 mm long, sparsely hairy all over except apex usually glabrous; lateral awns 3–4 mm long, exserted from glumes; central awn 7–12 mm long, geniculate; palea hairy in upper third; anthers 2–3 mm long.

[Similar to *P. tysonii*, which has the lateral awns not reaching glume apices.]


*Pentameris exserta*

*Flowering*: January. *Ecology*: In seeps and along streams at high altitudes. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. L, FS, KZN, EC.

Anatomy vouchers: *Ellis 3168, 3300, 5696, 5687, 5688, 5700, 5713, 5714, 5723, 5724; Du Toit 646 & 2301.*
Voucher: *Braun 1018*.



*Pentameris galpinii*

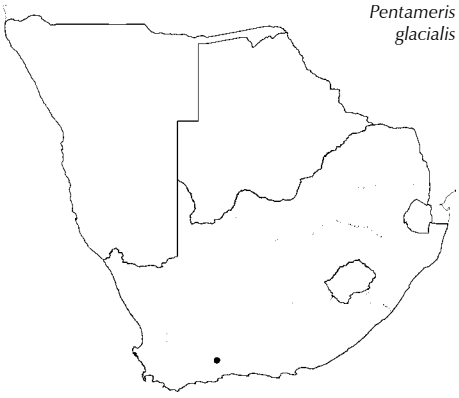
**Pentameris galpinii** (Stapf) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Eastern Cape, Barkly East, Ben Macdhui, *Galpin 6915* (K, holo.; BOl, GRA, PRE, SAM, iso.).

*Pentaschistis galpinii* (Stapf) McClean, in *South African Journal of Science* 23: 282 (1926).

Perennial 150–300 mm high, forming low, rounded cushions or mat-forming; stolons present; basal sheaths white, shiny, persistent; leaves basal; stalked, crateriform glands on leaf margins and pedicels. Leaf blade 60–180 × 2–5 mm, expanded, rigid, margins smooth, darker coloured above than below; sheath mouth glabrous or hairy. Inflorescence open to spike-like, 20–50 × 10–30 mm, with ± 70 spikelets; pedicels not hidden by spikelets; axils hairy. Spikelet 4–6 mm long, awned or awnless; glumes acute, yellow, base greenish grey, glabrous; lemma 3 mm long, hairy at base, along keel and margins, apex lobed or acute; lateral awns 0.5 mm long (when present), not reaching glume apices; central awn 4 mm long (when present); palea glabrous; anthers 1.6 mm long.

*Flowering*: January. *Ecology*: Usually on basalt; in bare patches, areas of slight disturbances on margins of rock-sheets and frost hollows; high altitude grassland, alt. 2 400–3 000 m. *Frequency in southern Africa*: Common. *Distribution*: Endemic. L, FS, KZN, EC.

Anatomy vouchers: *Ellis 5694, 5704, 5705, 5720*; *Du Toit 660, 663, 668 & 2288.*
Voucher: *Jacot Guillarmond 2347.*



*Pentameris glacialis*

**Pentameris glacialis** N.P.Barker, in *Bothalia* 23: 44 (1993). Type: South Africa, Western Cape, Oudtshoorn, Waboomsberg, growing in humic gullies on south slopes, 14 Dec. 1991, *N.P. Barker 995* (BOL, holo.).

Slender, tufted to decumbent perennial; up to 550 mm high; leaves cauline; culm slender, up to 1.5 mm wide, flexuous, geniculate, purple tinged. Leaf blade up to 100 mm long, rolled, usually straight; leaf sheath glabrous or pubescent along margins, loosely adpressed to culm. Inflorescence lax to somewhat contracted, to 70 × 30 mm, lanceolate, with 6–12(–15) spikelets. Spikelet 12.0–14.5 × 2.5–5.5 mm; lemma 2.5–3.0 mm long, lobes acuminate, 1.0–1.9 mm long, adnate for less than $^1/_2$ its length to a lateral awn; lateral awns 3.0–4.5 mm long; central awn 10–12 mm long, column 3.5–5.5 mm long, bristle from knee to apex 7.5–8.5 mm long; lodicules cuneate, glabrous; ovary apex with a tuft of white hairs; fruit 2.5 × 1 mm, surface colliculately sculptured, pericarp brittle.

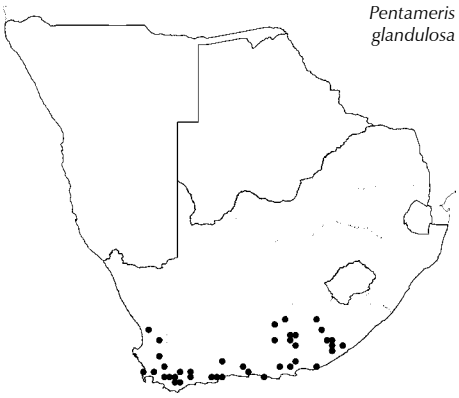
*Flowering*: October to December. *Ecology*: Moist, black humic sand; in narrow gullies, on rocky ledges and under overhangs that are usually associated with ice and snow in winter. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC.

Illustration: Barker: 46, fig. 15 (1993).
Anatomy vouchers: *Ellis 5605* & *5620*.
Voucher: *Barker 997, Ellis 5620*.

**Pentameris glandulosa** (Schrad.) Steud., in *Nomenclator Botanicus* (Steudel), ed. 2,2: 298 (1841). Type: South Africa, ?Western Cape, *Hesse* (?); *Bergius* (syntypes).

*Pentaschistis glandulosa* (Schrad.) H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 60 (1990).

*Pentaschistis angustifolia* (Nees) Stapf var. *micrathera* (Nees) Stapf, in *Flora capensis* 7: 503 (1899). Type: South Africa, Eastern Cape, Queenstown, Los-Tafelberg, *Drège*.


*Pentameris glandulosa*

Tufted perennial 100–350 mm high; basal sheath white, shiny, persistent; leaves basal; sunken glands on leaf blades, sunken or stalked glands on pedicels and glumes. Leaf blade 80–300 × 1–3 mm, U-shaped, rigid; margins smooth; sheath mouth hairy. Inflorescence open, 40–100 × 30–100 mm; with ± 200 spikelets; pedicels glabrous; axils hairy. Spikelet 4.0–5.5 mm long; glumes acute to acuminate, brownish, sparsely scaberulous along margins or keel; lemma 2–3 mm long, glabrous or hairy basally; lateral awn 2–3 mm long, extending up to and beyond glumes apices; central awn 5–10 mm long; palea glabrous; anthers 1.5–2.8 mm long.

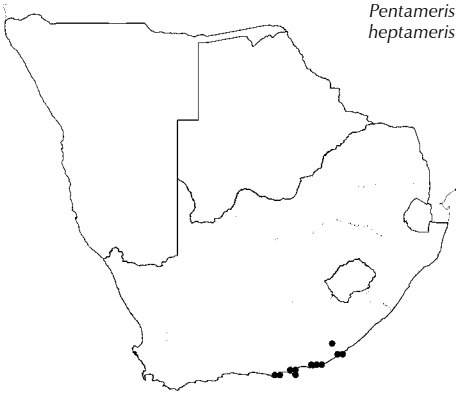
[Similar to *P. setifolia*, which is awnless; *P. oreodoxa* and certain forms of *P. pallida*.]

*Flowering*: October to December. *Ecology*: On nutrient rich soils derived from shales or granites. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC, EC.

Anatomy vouchers: *Ellis 629, 2569, 2610, 5603, 5630, 5631, 5808, 5815, 5817* & *5839*.
Voucher: *Smook 3683*.

**Pentameris heptameris** (Nees) Steud., in *Nomenclator Botanicus* (Steudel), ed. 2,2: 298 (1841). Type: South Africa, Eastern Cape, Uitenhage, in primaeval forest at Olifantshoek at Bosmanrivier, *Ecklon* (B, holo.).

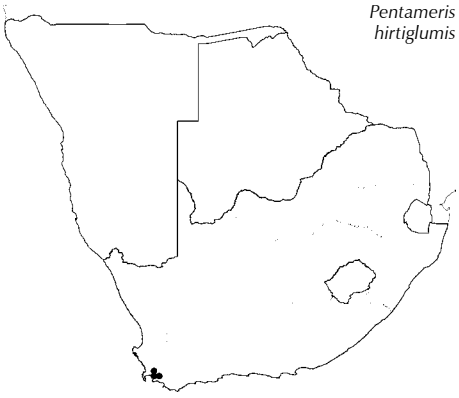
*Pentaschistis heptamera* (Nees) Stapf, in *Flora capensis* 7: 504 (1899).


*Pentameris heptameris*

Tufted perennial 200–300 mm high; basal sheath brown, soon rotting away; leaves cauline; glands absent. Leaf blade to 80 × to 0.5 mm, rolled, rigid, glabrous; margins smooth; sheath mouth glabrous. Inflorescence contracted, 30–50 × 10–30 mm, with ± 100 spikelets; pedicels hidden by spikelets, glabrous; nodes hairy. Spikelet 5–6 mm long; glumes acuminate, hyaline, glabrous or scaberulous along keels; lemma 2 mm long, hairy all over; lobes extended into 1–6 awns; lateral awns 6–10 mm long, extending up to and beyond glumes apices; central awn 10–15 mm long; palea glabrous, awned; anthers 1.5–2.1 mm long.

*Flowering*: November to December. *Ecology*: Restricted to coastal sands. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. EC.

Illustration: Chippindall: 258, fig. 225.8 (1955).
Anatomy vouchers: *Ellis 6007, 6008* & *Acocks 21839*.
Voucher: *Phillips 3367*.

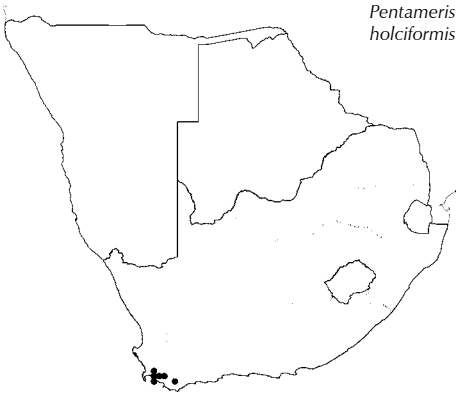

*Pentameris hirtiglumis*

**Pentameris hirtiglumis** N.P.Barker, in *Bothalia* 23: 39 (1993). Type: South Africa, Western Cape, Bosboukloof, Jonkershoek, locally very common, attractive, 980 ft. (600 m), Oct. 1967, *Kerfoot 6092* (PRE, holo.).

Cushion-like, somewhat decumbent or densely bushy, branched perennial, 200–750 mm high; culm with numerous nodes. Leaf blade up to 200 mm long, permanently rolled, falcate, apex soft, not pungent; sheath pubescent, at least along margins, rarely glabrous, persistent, not closely adpressed to culm, loose when dead. Inflorescence lax, 75–110 × 20–35 mm, lanceolate, with 15–50 spikelets. Spikelet 14.5–21.5 × 2.5–6.5 mm; glumes with one or both hairy; lemma 2.8–3.7 mm long; lobes acute, 1–2 mm long, adnate for half or less of their length to lateral awns; lateral awns 3.0–6.5 mm long; central awn 11–15 mm long; palea 4–5 mm long; lodicules cuneate, glabrous; anthers 3.5–5.0 mm long; ovary apex with tuft of white hairs; fruit 2.4 × 1.2 mm, broadly fusiform, surface colliculately sculptured, pericarp brittle.

*Flowering*: September to November. *Ecology*: Restricted to shale bands. *Frequency in southern Africa*: Abundant and locally common. *Distribution*: Endemic. Montane regions of Hottentots Holland Mountains. WC.

Illustration: Barker: 40, fig. 10 (1993).
Anatomy vouchers: *Ellis 4680 & 4682*.
Voucher: *Barker 93, Ellis 4680*.


*Pentameris holciformis*

**Pentameris holciformis** (Nees) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Palmiet River at Grietjiesgat, *Ecklon s.n.* (B, holo.).

*Pentaschistis holciformis* (Nees) H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 91 (1990).

Tufted perennial 400–600 mm high; stolons present, basal sheaths forming a sheath of burnt-off leaf bases, or white, shiny, persistent; leaves basal; glands absent. Leaf blade 150–200 × to 0.5 mm, rolled, rigid, glabrous; sheath mouth hairy. Inflorescence open, 70–150 × 30–100 mm, with ± 100 spikelets; pedicels glabrous; axils hairy. Spikelet 6–7 mm long; glumes acuminate, yellow, apices scaberulous; lemma 4.5–5.0 mm long, hairy all over; lateral awns absent or 0.1–0.9 mm long, not reaching glume apices; central awn 3–4 mm long, straight, erect; palea hairy all over; anthers 3.0–3.5 mm long.

*Flowering*: March. *Ecology*: On sandstone derived soils, usually in black soils; in the mountains on light disturbances, often on firebreaks; common after fires. Not found in mature vegetation. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC.

Voucher: *Boucher 1194*.

**Pentameris horrida** (Galley) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: Western Cape, Baviaansberg, north of the Hex River Mountains, 1 900 m, *H.P.Linder 6799* (ZH, holo.; NBG, PRE, iso.).

*Pentaschistis horrida* Galley, in *Bothalia* 36: 160 (2006).

Tufted or mat-forming perennial 150–400 mm high; older plants form large rings dying off in the centre; basal sheaths white, shiny, persistent; leaves cauline; glands absent. Leaf blades 150–300 ×

1 mm, rolled, rigid, sparsely hairy at base on upper surface, apex pungent; margins smooth; sheath mouth glabrous. Inflorescence open, 70–90 × to 50 mm, with 30–60 spikelets; pedicels scaberulous; axils sparsely to densely hairy. Spikelet 7.5 mm long; glumes acute to acuminate, pale green; lemma 2.3–3.0 mm long, hairs scattered; central awn 8 mm long, geniculate, column twisted; palea glabrous; anthers 2.1–2.8 mm long.

[Previously specimens were included under *P. rigidissima*, which has anthers 1.4–1.8 mm long and forms small tufts, never rings.]

*Flowering*: October to November. *Ecology*: In soils derived from sandstone; in dry areas usually with severe frosts in winter and high heat in summer; areas always open, never in rock crevices. *Frequency in southern Africa*: Fairly common. *Distribution*: NC, WC, EC.

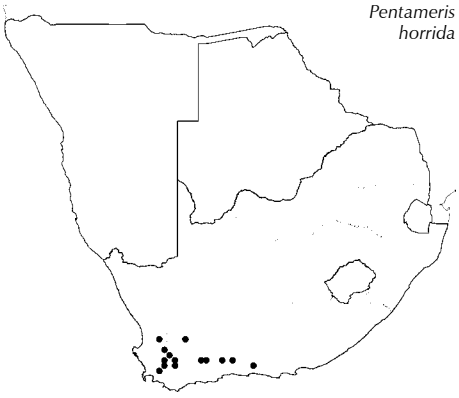
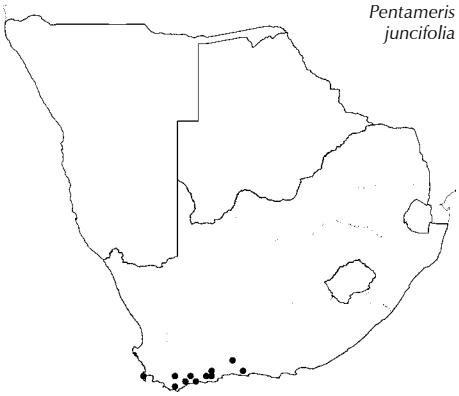

*Pentameris horrida*

Illustration: Galley & Linder: 161, fig. 3 (2006).
Anatomy vouchers: *Ellis 5812, 5831, 5974*; *Esterhuysen 26744* & *Acocks 19088*.
Voucher: *Linder 4464*.

**Pentameris juncifolia** (Stapf) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Swellendam area, Riversdale Division, Zoetemelks River, *Burchell 6750*; hills near Zoetmelksrivier, *Burchell 6761* (syntypes).

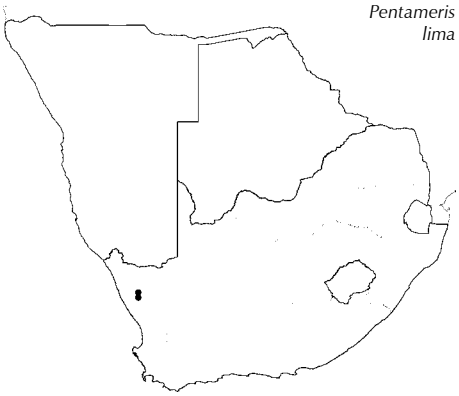
*Pentaschistis juncifolia* Stapf, in *Flora capensis* 7: 490 (1899).


*Pentameris juncifolia*

Densely tufted perennial 600–1 200 mm high; forming neat tussocks; basal sheaths white, shiny, persistent; leaves basal; glands absent. Leaf blade to 400 × to 1.5 mm, rolled, rigid, glabrous; margins smooth; leaf sheaths glabrous, if hairy not woolly hairy; sheath mouth not woolly hairy. Inflorescence contracted, 100–250 × 20–30 mm, with ± 100 spikelets; pedicels scabrid; axils hairy. Spikelet 8–12 mm long; glumes acuminate, white or light straw-coloured, sometimes tinged with purple at base, hyaline, glabrous; lemma hairy all over; lateral awns 5–6 mm long, extending up to glume apices; central awn 10–17 mm, geniculate; palea scantily hairy; anthers 2–3 mm long.

[This species was sunk into *P. eriostoma* by Linder & Ellis (1990), but Galley & Linder (2006) now recognise *P. juncifolia* as a separate species. *P. eriostoma* is woolly hairy on sheath and the sheath mouth, does not form neatly defined tussocks in the field, and occurs on shales and sandstones.]

*Flowering*: Early October. *Ecology*: Habitats associated with eroded silcrete surfaces; on the coastal plains between Bredasdorp and Riversdale. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC.


*Pentameris lima*

Anatomy vouchers: *Ellis 667, 5152* & *5455*.
Voucher: *Du Toit 2103*.

**Pentameris lima** (Nees) Steud., in *Nomenclator Botanicus* (Steudel), ed. 2,2: 299 (1841). Type: South Africa, Northern Cape, Kamiesberg, Krakkalkraal, *Drège 8117* (B, holo.).

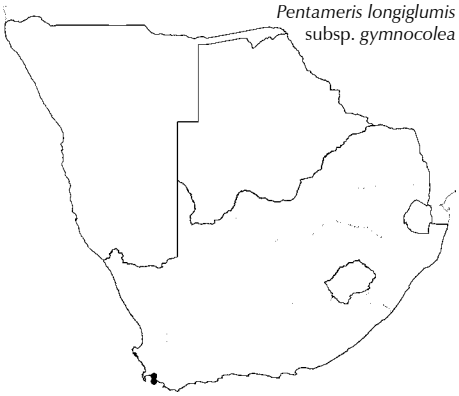
*Pentaschistis lima* (Nees) Stapf in *Flora capensis* 7: 496 (1899).

Tufted perennial about 450 mm high; stoloniferous; basal sheaths white, shiny, persistent; leaves basal; stalked, crateriform glands on pedicels and glumes. Leaf blade to 300 × to 0.5 mm, tightly rolled,

setaceous, scaberulous, rigid, acute to sometimes pungent; margins scabrid; sheath mouth hairy. Inflorescence contracted, 80–120 × 15 mm, with ± 100 spikelets; pedicels scaberulous; axils hairy. Spikelet 6–7 mm long; glumes acuminate, straw-coloured, scaberulous; lemma 3 mm long, glabrous or scaberulous; lateral awns 2 mm long, not reaching glume apices; central awn 6 mm long, erect, geniculate; palea glabrous; anthers 3 mm long.

*Flowering*: November to December. *Ecology*: On granitic soils. *Frequency in southern Africa*: Not known. *Distribution*: Endemic. NC.

Anatomy vouchers: *Ellis 5995, 5996 & 5998*.
Voucher: *Liebenberg 5598* (PRE), *Adamson 1475* (BOL).

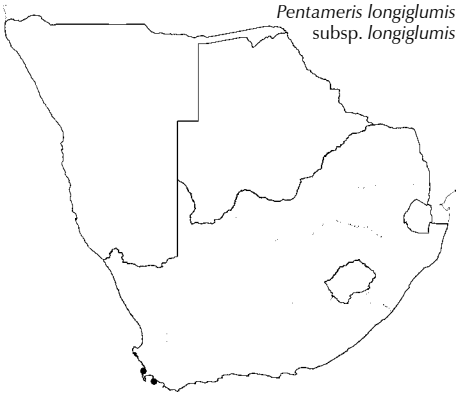

*Pentameris longiglumis* subsp. *gymnocolea*

**Pentameris longiglumis** (Nees) Steud. subsp. **gymnocolea** N.P.Barker, in *Bothalia* 23: 39 (1993). Type: South Africa, Western Cape, summit ridge of Platberg, Kogelberg, south side, edge of gully; 2650 ft. (900 m), *Taylor 7231* (PRE, holo.).

Tufted, erect, tussock-forming perennial to 1 700 mm high; basal sheath brown, persistent, loose or free from culm; culm branched or unbranched. Leaf blade to 550 × 4 mm, glabrous, rigid, rolled; leaf sheath glabrous, without auricles. Inflorescence up to 300 mm long, lax, globose, with 70–100 spikelets. Spikelet 19–24 × 3–10 mm; glumes 1-nerved, glabrous; lemma body 4.5–6.0 mm long; lobes acuminate, 3–4 mm long, adnate for most of their length to lateral awns; lateral awns 5.5–11.0 mm long; central awn 21.5–26.5 mm long; palea 7.5–9.5 mm long; lodicules glabrous; anthers 2.5–5.5 mm long; ovary apex with tuft of white hairs; fruit 3.5 × 1.3 mm, broadly fusiform, surface colliculately sculptured, pericarp brittle.

*Flowering*: September to December. *Ecology*: In moist areas on south-facing mountain slopes; only from Kogelberg Forest Reserve. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

Anatomy voucher: *Ellis 2341*.
Voucher: *Barker 738*.


*Pentameris longiglumis* subsp. *longiglumis*

**Pentameris longiglumis** (Nees) Steud. subsp. **longiglumis**, in *Bothalia* 23: 37 (1993). Type: South Africa, Western Cape, in summon monte tabulare (Dist. Cap.), *Bergius s.n.* (B, holo.).

*Danthonia longiglumis* Nees in *Florae Africanae australioris* 1: 306 (1841).

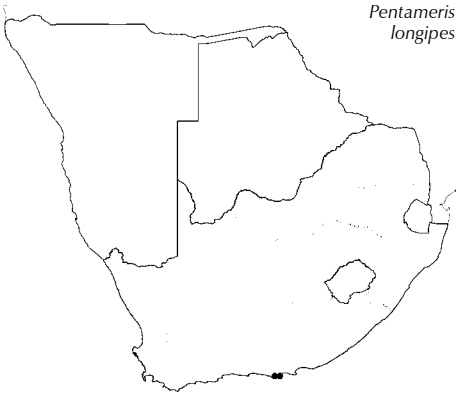
Densely tufted erect perennial; to 1.4 m high; basal sheath 120 × 10 mm or more, straw-coloured, persistent, loose or free from culm; culm branched or unbranched. Leaf blade to 550 × 4 mm, glabrous, rigid, rolled; leaf sheath pubescent, without auricles. Inflorescence up to 170 mm long, globose, lax, with 30–95 spikelets. Spikelet 15.0–19.5 × 3–10 mm; glumes 1-nerved, glabrous; lemma body 2.7–4.0 mm long; lobes acuminate, 2–3 mm long, adnate for most of their length to lateral awns; lateral awns 3.5–8.0 mm long; central awn 9.0–12.5 mm long; palea 5.5–6.5 mm long; lodicules glabrous; anthers 3.1–4.5 mm long; ovary apex with tuft of white hairs; fruit 3.5 × 1.3 mm, broadly fusiform, surface colliculately sculptured, pericarp brittle.

*Flowering*: September to December. *Ecology*: Slightly sloping, moist areas; probably dependent on fire. *Frequency in southern Africa*: Rare, only from Table Mountain, Cape Town. *Distribution*: Endemic. WC.

Anatomy voucher: *Marloth 3063*.
Voucher: *Barker 994, Marloth 3078*.

**Pentameris longipes** (Stapf) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Eastern Cape, Albany, *Bowie* (K, holo.).

*Pentaschistis longipes* Stapf, in *Flora capensis* 7: 509 (1899).


*Pentameris longipes*

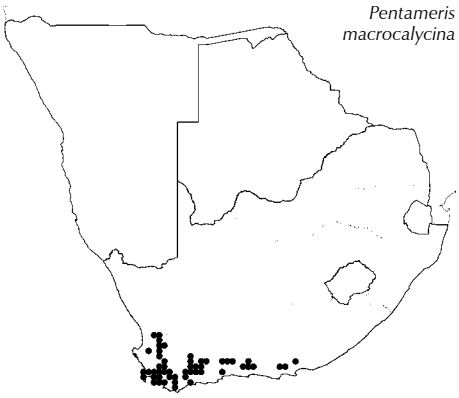
Tufted perennial 250–700 mm high; basal sheaths brown, soon rotting away; leaves basal; stalked, crateriform glands on leaf-margins and glumes. Leaf blade to 150 × to 4 mm, expanded, hairy; margins smooth; sheath mouth with a ring of bristles. Inflorescence open, 130 × 50 mm, with ± 100 spikelets; pedicel not hidden by spikelets, scaberulous, of variable length, shorter to longer than spikelets; axils hairy. Spikelet 4.5–5.0 mm long; glumes acuminate, pale green, scaberulous along keels; lemma 2.2 mm long, hairy basally and along keel and margins; lateral awns 1.5–2.5 mm long, extending up to and beyond glume apices; central awn 7 mm long, geniculate, erect; palea hairy in the upper third; anthers 1.6 mm long.

*Flowering*: November. *Ecology*: Coastal sand dunes; restricted to around Port Elizabeth. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. EC.

Anatomy voucher: *Ellis 6006*.
Voucher: *Liebenberg 3968*.

**Pentameris macrocalycina** (Steud.) Schweick., in *Feddes Repertorium* 43: 91 (1938). Type: South Africa, Western Cape, in summitate Montis Tabularis, *Ecklon 932* (OXF, lecto.).

*Pentameris speciosa* (Lehm. ex Nees) Stapf, in *Flora capensis* 7: 515 (1897). Type: South Africa, Western Cape, Genadenthal (Stellenbosch) & Dutoits kloof, *Drège s.n.* (syntypes).

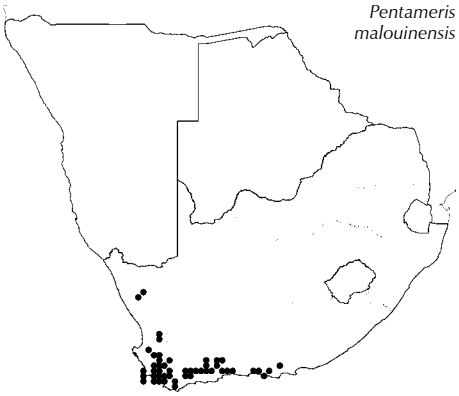

*Pentameris macrocalycina*

Tufted perennial, 400–1 100 mm high, culm branching basally. Leaf blade 30–350 × 1.5 mm, rigid, erect to curling, glabrous, setaceous, sometimes pungent, permanently folded into a cylinder with deep adaxial groove when seen in cross section; leaf sheath tightly adpressed to culm, bearded at the mouth, auricles absent. Inflorescence contracted, 60–120 mm long, lanceolate, with 10–50 spikelets. Spikelet 16–30 × 2.5–10.0 mm; glumes glabrous; lemma 3.5–5.5 mm long; lobes acuminate, 1.3–4.0 mm long, adnate for most of their length to the lateral awns; lateral awns 7.5–14.0 mm long; central awn 15–26 mm long; palea 6.5–11.0 mm long; lodicules glabrous; anther 4.2–6.5 mm long; ovary apex with tuft of white hairs; fruit 3.6 × 1.2 mm; broadly fusiform, surface colliculately sculptured, pericarp brittle.

[Plants are vegetatively variable as those growing soon after fire are rigid and robust whereas plants from older Fynbos are softer.]

*Flowering*: September to December. *Ecology*: In stony or sandy soils; rock crevices; common especially after fire. *Frequency in southern Africa*: Infrequent to common. *Distribution*: Endemic. Widespread. WC, EC.

Anatomy vouchers: *Zeyher 4546*; *Acocks 21589; Esterhuysen 28012*; *Ellis 2275, 2280, 2292, 2293, 2315, 2508, 5443* & *5608*. Ellis (1985d) has found this species to be anatomically quite constant.
Voucher: *Esterhuysen 23236*.


*Pentameris malouinensis*

**Pentameris malouinensis** (Steud.) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: Falkland Islands, *Urville* (CN, holo.) (note in Linder & Ellis 1990 – unlikely from Falklands, specimen probably with wrong label).

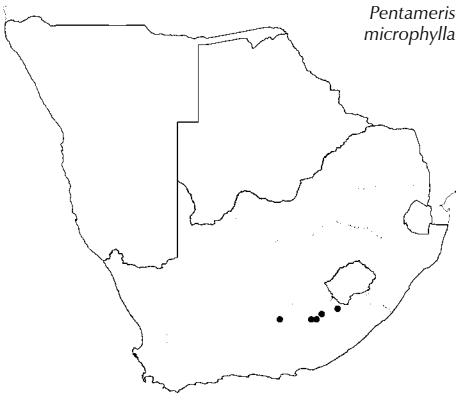
*Pentaschistis malouinensis* (Steud.) Clayton, in *Kew Bulletin* 23: 294 (1969).

*Pentaschistis steudelii* (Nees) McClean, in *South African Journal of Science* 23: 281 (1926). Type: South Africa, Western Cape, summit of Table Mt., *Ecklon 949* (K).

Tufted perennial 150–300 mm high; weakly geniculate; stolons present; basal sheaths white, shiny, persistent; leaves basal; glands absent. Leaf blade to 150 × to 0.5 mm, expanded or rolled, scaberulous; margins scabrid; sheath mouth glabrous. Inflorescence open to spike-like, 20–80 × 5–30 mm, with 5–50 spikelets; pedicels glabrous; axils sparsely hairy. Spikelet 3.5–4.5 mm long, awnless; glumes rounded, apices brown, shortly hairy; lemma 2.5–3.0 mm long, acute, hairy along nerves; palea hairy along keels; anthers 2.0–2.2 mm long.

*Flowering*: November to January. *Ecology*: Widespread in a wide range of habitats, from sparse vegetation to rock ledges; also over a wide altitudinal range; often in disturbed sites. *Frequency in southern Africa*: Common. *Distribution*: Endemic. NC, WC, EC.

Illustration: Chippindall: 269, fig. 240 (1955).
Anatomy vouchers: *Ellis 2248, 2345, 2346, 2538, 5153, 5503, 5542, 5583* & *5826*.
Voucher: *Esterhuysen 26927*.


*Pentameris microphylla*

**Pentameris microphylla** (Nees) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Eastern Cape, Stormberg, *Drège 3891* (B, holo.).

*Pentaschistis microphylla* (Nees) McClean, in *South African Journal of Science* 23: 282 (1926).

Perennial up to 300 mm high; cushion-forming or sometimes mat-forming; rhizomatous; leaves in basal rosettes; basal sheaths brown, soon rotting away; glands stalked, crateriform on pedicels. Leaf blade to 50 (90) × to 3 mm, expanded, rigid; margins scabrid; sheath mouth hairy. Inflorescence open, 60–70 × 60–80 mm, with ± 50 spikelets; pedicels not hidden by spikelets; axils glabrous or hairy. Spikelet 3.0–3.5 mm long, awnless; glumes acute, straw-coloured, glabrous or scaberulous along keels; lemma 2.0–2.5 mm long, truncate, base hairy; palea glabrous; anthers 1 mm long.

*Flowering*: December. *Ecology*: In shallow soils over bedrock; arid montane grassland in the Stormberg at ± 2 000 m. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. EC.

Illustration: Chippindall: 267, fig. 237 (1955).
Anatomy vouchers: *Ellis 2592* & *2593*.
Voucher: *Flanagan 1668*.

**Pentameris montana** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Worcester, Keeromsberg, *Linder 4413* (BOL, holo.).

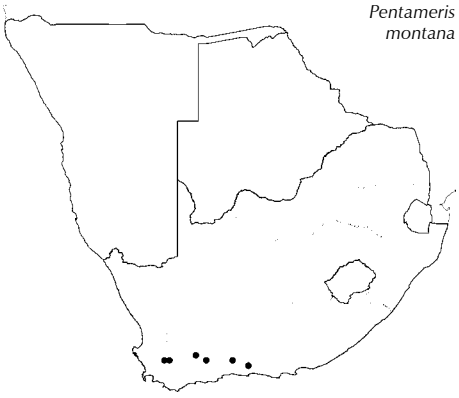
*Pentaschistis montana* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 83 (1990).

Densely tufted or mat-forming perennial 150–200 mm high; stolons very short; basal sheaths white, shiny, persistent; leaves basal;

glands absent. Leaf blade to 40 × to 0.5 mm, rolled, rigid and hard, glabrous; margins scabrid; sheath mouth hairy. Inflorescence open, 20–50 × 20–30 mm, with ± 50 spikelets; pedicels scaberulous; axils hairy. Spikelet 4.5–5.0 mm long; glumes acuminate, straw-coloured, base purple, scaberulous; lemma hairy all over or only along keel and margins; lateral awns 1.0–1.5 mm long, not reaching to reaching glume apices; central awn 5–6 mm long, geniculate; palea hairy in upper half; anthers 1.8 mm long.

*Flowering*: November. *Ecology*: In sandstone; on stony, arid upper slopes on high mountains. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC.

Illustration: Linder & Ellis: 86, fig. 13 (1990).
Anatomy voucher: *Ellis 2479*.
Voucher: *Esterhuysen 35723*.


*Pentameris montana*

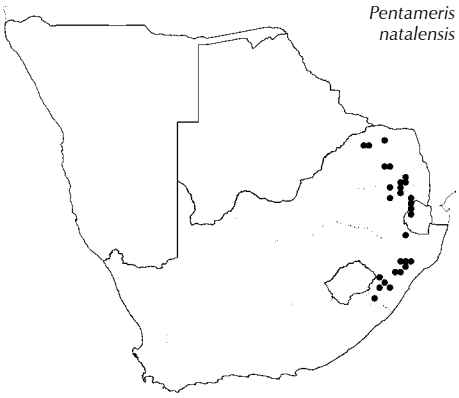
**Pentameris natalensis** (Stapf) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, KwaZulu-Natal, Riet Vlei, *Buchanan 283* (K, holo.).

*Pentaschistis natalensis* Stapf, in *Flora capensis* 7: 493 (1899).

Loosely tufted perennial 400–800 mm high, forming diffuse tussocks; basal sheaths white, shiny, persistent; leaves basal; minute glands only on glume keels. Leaf blade to 300 × 1–5 mm, expanded; margins smooth or scabrid; sheath mouth hairy with dense almost bristle-like hairs; longest pedicels longer than spikelets. Inflorescence open, 50–170 × 50–170 mm, with ± 50 spikelets; pedicels not hidden by spikelets, glabrous; axils glabrous or hairy. Spikelet 6–7 mm long; glumes acute, green to straw-coloured, glabrous, scaberulous or hairy in middle or along keels; lemma 2–3 mm long, hairy; lateral awns 3.5–7.0 mm long, extending up to and beyond glumes apices; central awn 9–13 mm long; palea hairy in upper third; anthers 2.5 mm long.

*Flowering*: November to February. *Ecology*: In sour grassland or near forest margins in the montane belt; often on damp slopes. *Frequency in southern Africa*: Infrequent. *Distribution*: Widespread, northwards to southern Tanzania; also Madagascar. S, LIM, M, KZN.

Illustration: Chippindall: 258, fig. 225.3 (1955).
Anatomy vouchers; *Ellis 225, 1542, 4461, 5735, 5736, 5737*; *Smook 7456* & *7457*.
Voucher: *Davidse 6854*.

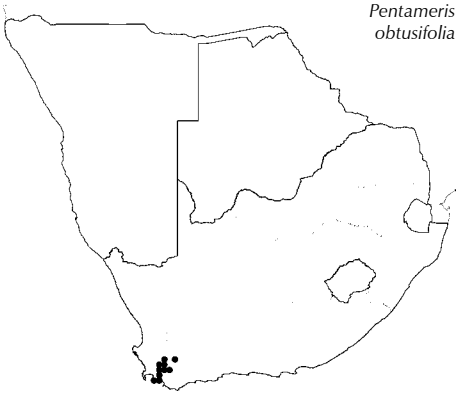

*Pentameris natalensis*

**Pentameris obtusifolia** (Hochst.) Schweick., in *Repertorium specierum novarum regni vegetabilis* 43: 91 (1938). Type: Pr. b. spei, *Ludwig s.n.*

*Pentameris squarrosa* Stapf, in *Flora capensis* 7: 515 (1899). Type: South Africa, Western Cape, Caledon dist., Houwhook Mountains, *Burchell 8076*.

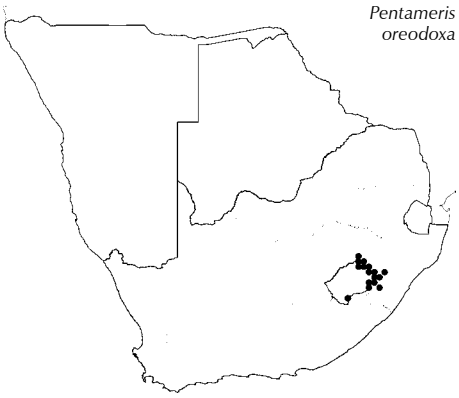
*Pseudopentameris obtusifolia* (Hochst.) N.P.Barker, in *Bothalia* 25: 145 (1995).

Woody perennial 400–1 500(–3 000) mm high, scandent, sometimes branched; leaves cauline. Leaf blade 25–150 × 7 mm, rolled, rigid, apex tapering into a blunt point. Inflorescence contracted, 50–130 mm long, with 8–45 spikelets. Spikelet 18–25 × 2–6 mm; glumes glabrous; lemma 4.5–6.0 mm long, 9-nerved; lateral awns 9–11 mm long; central awn 19–24 mm long; anthers 4.0–5.5 mm long; ovary apex with tufts of white hairs; fruit 4 mm long, pericarp brittle.


*Pentameris obtusifolia*

*Flowering*: November to April. *Ecology*: Rocky, stony or sandy slopes; common especially on lower slopes of Hottentots Holland and Kogelberg mountains. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC.

Anatomy vouchers: *Ellis 2342, Haynes 770 & Taylor 3023*.
Voucher: *Esterhuysen 35396*.


*Pentameris oreodoxa*

**Pentameris oreodoxa** (Schweick.) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, KwaZulu-Natal, Bergville, Mont aux Sources, *Bayer & McClean 273* (K, holo.).

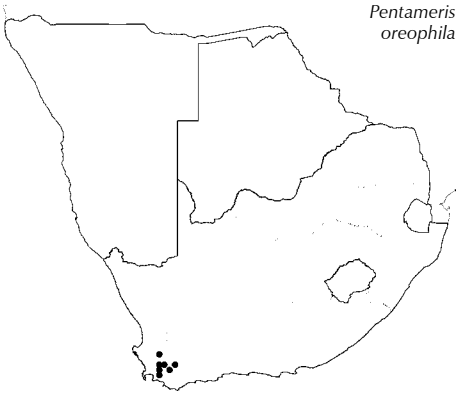
*Pentaschistis oreodoxa* Schweick., in *Repertorium specierum novarum regni vegetabilis* 43: 90 (1938).

Tufted perennial 200–500 mm high, tending towards cushion formation; base glabrous; basal sheaths either burnt-off or white, shiny, persistent; leaves basal; stalked, crateriform glands on leaves, pedicels and glumes or absent. Leaf blade to 300 × to 4 mm, expanded, glabrous or hairy; margins scabrid; sheath mouth hairy. Inflorescence open, 70–100 × 70–200 mm, with ± 200 spikelets; pedicels not hidden by spikelets; axils hairy, rarely glabrous. Spikelet 4–6 mm long; glumes acute, straw-coloured, glabrous or scaberulous along keels; lemma 3.0–3.5 mm long, nerves hairy; lateral awns 1–3 mm long not reaching to reaching beyond glume apices; central awn 6–10 mm long, geniculate, erect; palea hairy in upper half; anthers 2.0–2.2 mm long.

[Variable, especially in size, and two forms can be distinguished: a tall, soft lowland form and a small, purplish high altitude form.]

*Flowering*: January. *Ecology*: In sour grassland over a wide altitudinal range. *Frequency in southern Africa*: Common. *Distribution*: Endemic. L, FS, KZN.

Anatomy vouchers: *Ellis 2205, 3132, 3143, 5706, 5707, 5718, 5721, 5722, 5729* & *5731*.
Voucher: *Killick 1300*.


*Pentameris oreophila*

**Pentameris oreophila** N.P.Barker, in *Bothalia* 23: 41 (1993). Type: South Africa, Western Cape, Worcester Div., Jonah's Kop, 5000 ft. (1 500 m), *Esterhuysen 32681* (PRE, holo.).

*P. obtusifolia sensu* Ellis (1985d), Barker (1986, 1989).

*Pentameris* sp. 1. in Gibbs Russell et al.: 252 (1990).

Cushion-like or densely bushy, erect to somewhat decumbent perennial 250–530 mm high; leaves cauline; culm branched basally. Leaf blade 60–110 × 1.5 mm, tightly rolled, falcate to curved, pungent; leaf sheath persistent, loosely adpressed or free from culm, hairy along margins; without auricles. Inflorescence contracted, 30–80 mm long, with 8–20 spikelets. Spikelet 14–20 × 3–10 mm; glumes 1-nerved, usually glabrous; lemma 3–4 mm long, lobes acute to acuminate, 1.3–3.0 mm long, adnate for about half their length to lateral awns; lateral awns 5.5–10.5 mm; central awn 13.5–17.0 mm long; palea 5.5–8.5 mm long; lodicules glabrous; anthers 4.0–5.5 mm long; ovary apex with tuft of white hairs; fruit 3.5–4.0 × 1.6–2.0 mm, sub-globose, surface colliculately sculptured, pericarp brittle.

[This species is similar to *P. macrocalycina*, which has permanently folded, falcate leaf blades and leaf sheaths tightly adpressed to culm.]

*Flowering*: September to December. *Ecology*: High-altitude mountains prone to snow; reacts well to fire. *Frequency in southern Africa*: Locally common especially after fire. *Distribution*: Endemic; limited to the Hottentots Holland, Hex River and Riviersonderend mountains. WC.

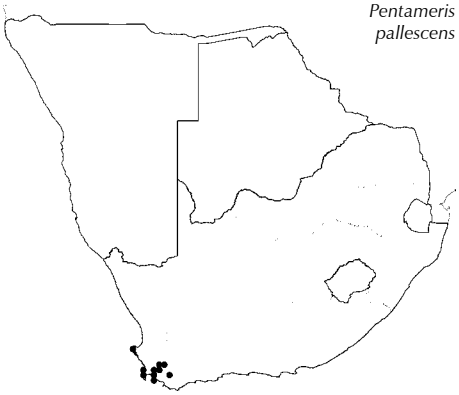
Anatomy vouchers: *Esterhuysen 11115, 16531, 18210, 22209, 26517, 27442* & *Ellis 4686*.
Voucher: *Esterhuysen 11115*.

**Pentameris pallescens** (Schrad.) Nees, in *Linnaea* 7: 312 (1832). Type: South Africa, *Hesse* (?).

*Pentaschistis pallescens* (Schrad.) Stapf, in *Flora capensis* 7: 487 (1899).

*Pentaschistis involuta* (Steud.) Adamson, in *Journal of South African Botany* 8: 272 (1942). Type: South Africa, Western Cape, *Kuhl s.n.* (P, holo.).

*Pentaschistis silvatica* Adamson, in *Journal of South African Botany* 10: 134 (1944). Type: South Africa, Western Cape, Kirstenbosch, *Adamson 3442* (BOL, holo.).


*Pentameris pallescens*

Tufted perennial 600–1 200 mm high; stoloniferous; basal sheaths white, shiny, persistent; leaves basal; linear glands on pedicels or absent. Leaf blade to 600 × 2–8 mm, expanded or rolled, blades much darker above than below, glabrous or hairy along entire length; margins smooth, thickened; sheath mouth hairy. Inflorescence open, 100–180 × 70–100 mm, with ± 200 spikelets; pedicels glabrous; axils hairy. Spikelet 10–12 mm long; glumes acuminate, green to golden-green, scaberulous all over or only along keel; lemma 4–6 mm long, sparsely hairy, hairs up to 1 mm long; lateral awns 3 mm long, included in glumes; central awn 9–15 mm long; palea hairy in upper half; anthers 3.5–4.0 mm long.

*Flowering*: November and December. *Ecology*: Sandstone; on lower slopes of mountains especially in areas of light disturbances; also after fire. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC.

Illustration: Chippindall: 258, fig. 225.1 (1955).
Anatomy vouchers: *Ellis 2250, 2251, 2277, 2309, 5572* & *5573*.
Voucher: *Esterhuysen 17614*.

**Pentameris pallida** (Thunb.) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Verkeerde Vlei, *Thunberg* in herb. Thunb. *2610* (lecto.) (syntypes).

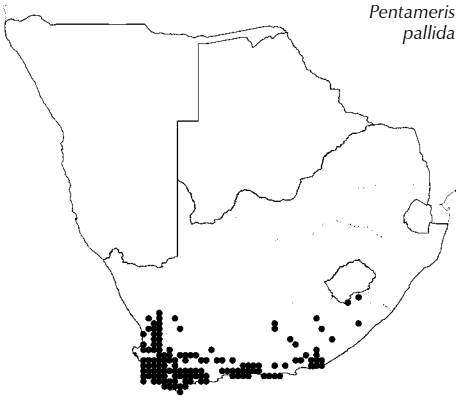
*Pentaschistis pallida* (Thunb.) H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 36 (1990).

*Pentaschistis angustifolia* (Nees) Stapf var. *albescens* Stapf, in *Flora capensis* 7: 503 (1899). Type: South Africa, Western Cape, Cape Peninsula, Upper North, *Wolley-Dod 2064* (K, holo.).

*Pentaschistis angustifolia* (Nees) Stapf var. *angustifolia*, in *Flora capensis* 7: 502 (1899). Type: South Africa, Eastern Cape, on fields at the Zwartkoprivier and at Adow, *Ecklon 839* (B, lecto.).

*Pentaschistis filiformis* (Nees) Stapf, in *Flora capensis* 7: 505 (1899). Type: South Africa, Northern Cape, Kamiesberg between Ezelsfontein and Modderfonteinsberg and on the slopes of the Roodeberg, *Drège 2577, 2584* (B, lecto.).

*Pentaschistis imperfecta* Stapf, in *Flora capensis* 7: 506 (1899). Type: South Africa, Western Cape, Takay Mt., *Wolley-Dod 407*; Constantiaberg, *Schlechter 449*.


*Pentameris pallida*

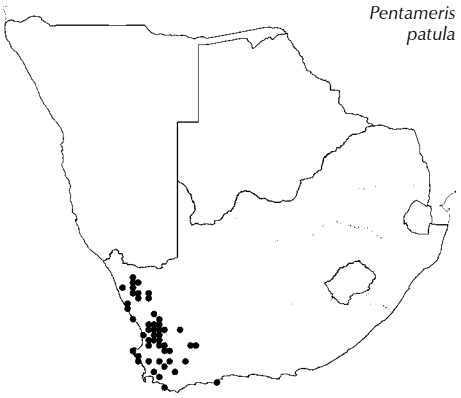
Densely to loosely tufted biennial or perennial 150–400 mm high; basal sheaths white, shiny, persistent; leaves basal; stalked, crateriform glands on leaves, pedicels and glumes or absent. Leaf blade

120–200 × 1–5 mm, expanded or rarely rolled, glabrous or hairy; margins smooth; sheath mouth glabrous or with a ring of bristles. Inflorescence open or contracted, 20–80 × 10–70 mm; with 30–100 spikelets; pedicels not hidden by spikelets; axils hairy. Spikelet 3–5 mm long; glumes acuminate, straw to purple-coloured, scaberulous all over or only along keels; lemma 2.0–2.5 mm long, hairy basally and along keel and margins; lateral awns 2 mm long, exserted from glumes; central awn 6–7 mm long, erect, geniculate; palea glabrous or hairy in upper third; anthers 1.5–2.0 mm long.

[Very variable species, seven morphological forms can be distinguished, but the variations are very complex and further studies are needed.]

*Flowering*: October to December. *Ecology*: Widespread and common at low altitudes especially with slight to heavy disturbance. *Frequency in southern Africa*: Common. *Distribution*: Endemic. NC, WC, EC.

Anatomy vouchers: *Ellis Form A: 647, 704; Form B: 1176, 1191, 1192, 2215, 2262, 2263, 2306, 2316, 2489, 5127, 5474, 5475, 5476, 5508, 5827; Form C: 612, 2329, 2335, 2356, 5602, 5980, 6003, 6004; Form D: 5601, 5821, 5823, 5825, 5830; Form E: 5633, 5634; Form F: 2440, 2441, 2442, 5482, 5507, 5509, 5588, 5779, 5780; Form G: 5819, 5820, 5599, 5600.*
Voucher: *Adamson 2684, Esterhuysen 19270* (BOL).



*Pentameris patula*

**Pentameris patula** (Nees) Steud., in *Nomenclator Botanicus* (Steudel), ed. 2,2: 299 (1841). Type: South Africa, Western Cape; near Ebenezer (Clanwilliam area), *Drège 2587*; Giftberg, *Drège* (syntypes).

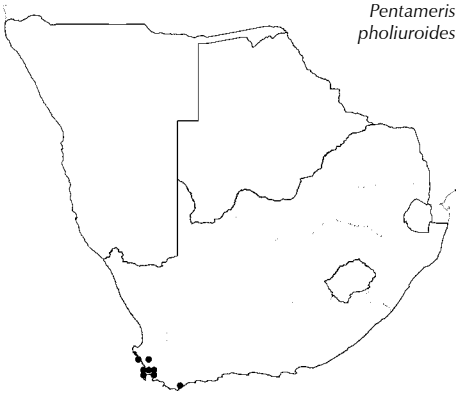
*Pentaschistis patula* (Nees) Stapf, in *Flora capensis* 7: 510 (1899).

*Pentaschistis euadenia* Stapf, in *Flora capensis* 7: 510 (1899). Type: South Africa, Northern Cape, Kamiesberg and Modderfonteinsberg, *Drège 2581* (B, holo.).

Annual 150–300 mm high; stalked, crateriform glands on leaf margins and pedicels or absent. Leaf blade to 50(100) × to 3 mm, expanded; margins smooth or scabrid; sheath mouth with a ring of bristles. Inflorescence open, 50–100 × 40–90 mm, up to ± 200 spikelets; pedicels glabrous or scaberulous; axils hairy. Spikelet 4–5 mm long; glumes acute to acuminate, greenish or yellow and purple, glabrous or scaberulous along keels; lemma 2.0–2.5 mm long, hairy; lateral awns 1–3 mm long, not reaching glume apices, central awn 4–12 mm long; palea glabrous or hairy; anthers 1.9–2.5 mm long.

[Highly variable species. Similar to *P. airoides*, which has anthers 0.3–1.0 mm long and *P. pallida*, which is perennial.]

*Flowering*: September to October. *Ecology*: In sandy soils; at the arid margins of the Fynbos and in Namaqualand. *Frequency in southern Africa*: Common. *Distribution*: Endemic. NC, WC.



*Pentameris pholiuroides*

Illustration: Linder & Ellis: 6, fig. 1 (1990).
Anatomy vouchers: *Ellis 5133 & 5981.*
Voucher: *Crook 1018*.

**Pentameris pholiuroides** (Stapf) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, damp hollows in Fish Hoek Valley, *Wolley Dod 3394* (K, holo.; BOL, PRE, iso.).

*Prionanthium pholiuroides* Stapf, in *Flora capensis* 7: 456 (1899).

Tufted annual 40–250 mm high; glume keels with sessile glands, rarely glands absent. Leaf blade 15–70 × 0.5–1.5 mm. Inflorescence spike-like, secund, 15–60 mm long; rachis triquetrous; spikelets arranged

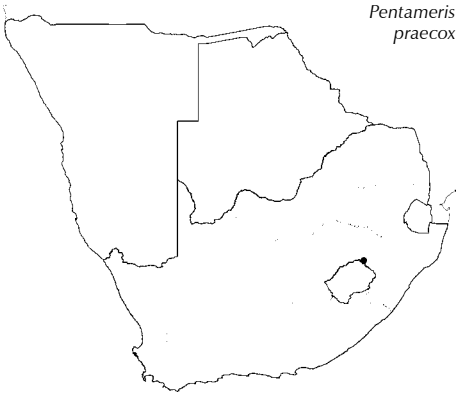
alternately, singly (rarely in pairs). Spikelet 3.1–7.5 × to 1.5 mm, awnless; lemma and palea glabrous; anthers 1.7–3.5 mm long.

*Flowering*: October to December. *Ecology*: Seasonally wet, shallow depressions. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

Illustration: Chippindall: 271, fig. 243 (1955); Davidse: 145, fig. 2D (1988).
Anatomy vouchers: *Ellis 5433, 5434, 5435* & *Davidse 34053*.
Voucher: *Anderson 8*.

**Pentameris praecox** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, KwaZulu-Natal, National Park area, Inner Tower Ravine, *Esterhuysen 30242* (BOL, holo.; PRE, iso.).

*Pentaschistis praecox* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 95 (1990).


*Pentameris praecox*

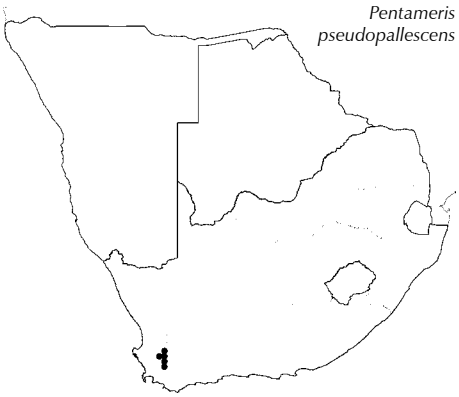
Tufted perennial 300–600 mm high; base compact with persistent sheaths often breaking up into fibres; leaves basal; glands absent. Leaf blade to 300 × to 0.5 mm, rolled, rigid, glabrous except inner surface near base; sheath mouth shortly hairy. Inflorescence contracted, almost linear, 40–120 × 10–20 mm, with ± 30 spikelets; pedicels not hidden by spikelets, glabrous; axils glabrous. Spikelet 8–11 mm long; glumes acuminate, golden-brown, glabrous; lemma 4.5–6.0 mm long, hairy, hairs arranged in ± 11 parallel rows; lobes 1.8–2.2 mm long; lateral awns 3–5 mm long, extending up to glume apices; central awn 8–10 mm long; palea as long as lemma; anthers 2–3 mm long.

*Flowering*: July to early September. *Ecology*: In montane sour grassland; habitat variable such as river banks, sandstone ridges and steep grassy slopes. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. KZN.

Voucher: *Gordon Gray 8000* (NU).

**Pentameris pseudopallescens** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Ceres, Milner Vlakte in the Hex River Mountains, *Linder 4483* (BOL, holo.; PRE, iso.).

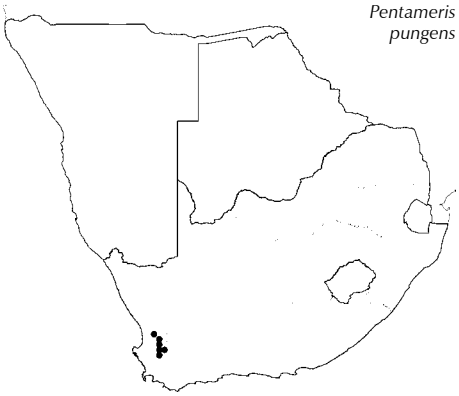
*Pentaschistis pseudopallescens* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 72 (1990).


*Pentameris pseudopallescens*

Tufted, weakly perennial 400–800 mm high; rhizomatous; basal sheaths brown, soon rotting away; leaves basal, rolled, curling when old; linear glands on leaf margins and pedicels, these may be obscure. Leaf blade to 300 × 2–6 mm, expanded or rolled, flaccid, inner surface hairy; margins smooth; sheath mouth hairy. Inflorescence open, (30)80–120 × 40–80 mm, with up to ± 100 spikelets; pedicels glabrous; axils hairy. Spikelet 10–12 mm long; glumes yellow, scaberulous, hairy all over; lemma hairy, 3–4 mm long, lateral awns 4–8 mm long, extending up to glume apices; central awn 12–17 mm long; palea glabrous; anthers 2.7–3.0 mm long.

*Flowering*: November and December. *Ecology*: In sand; along seeps and streams in the mountains; flowering the second year after fire. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. WC.

Illustration: Linder & Ellis: 73, fig. 9 (1990).
Anatomy vouchers: *Ellis 2227, 2228, 2250, 2260, 2261, 2272, 2276, 2277, 2309, 5501, 5523, 5565, 5572, 5573* & *5796*.
Voucher: *Esterhuysen 28696*.


*Pentameris pungens*

**Pentameris pungens** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Uitkyk Peak in the Cederberg, *Esterhuysen 34010* (BOL, holo.; PRE, iso.).

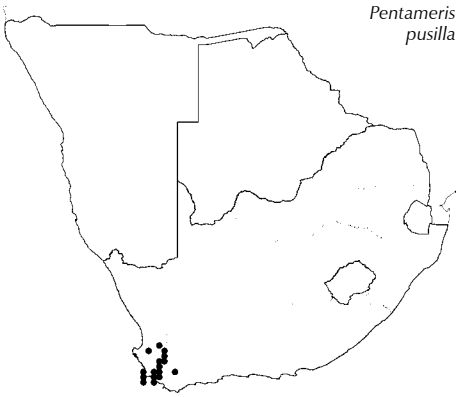
*Pentaschistis pungens* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 97 (1990).

Tufted biennial or weak perennial 200–500 mm high; base glabrous or hairy, hairs straight, adpressed; basal sheaths white, shiny, persistent; leaves basal; glands absent. Leaf blade to 120 × 2.5–4.0 mm; younger leaves often folded, rigid, hard, sometimes pungent, glabrous; old leaves flat and recurved; margins scabrid; sheath mouth glabrous rarely shortly hairy. Inflorescence somewhat contracted, 40–80(120) × 15–35(50) mm, with 20–50 spikelets; pedicels exposed, glabrous or scaberulous; axils hairy. Spikelet 11–15 mm long; glumes acuminate, glabrous or scaberulous all over, yellowish-brown to brown, flushed purple at base; lemma 4.5–5.5 mm long, untidily hairy along nerves, hairs 0.3–2.5 mm long, increasing in length from base to apex, usually hiding lobes; lateral awns 7–9 mm long, extending up to glume apices; central awn 17–20 mm long; palea hairy in upper half; anthers 3.3–4.0 mm long.

[Similar to *P. curvifolia*, which has swollen leaf margins.]

*Flowering*: November. *Ecology*: In mountains, usually in damp sand on sandy flats and along streams; usually after fire. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC.

Illustration: Linder & Ellis: 98, fig. 16 (1990).
Anatomy vouchers: *Ellis 2488, 2506, 5122, 5516, 5517, 5581, 5791* & *5795*.
Voucher: *Esterhuysen 13030*.


*Pentameris pusilla*

**Pentameris pusilla** (Nees) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Table Mt., *Drège* (B, holo.).

*Poagrostis pusilla* (Nees) Stapf, in *Flora capensis* 7: 760 (1900).

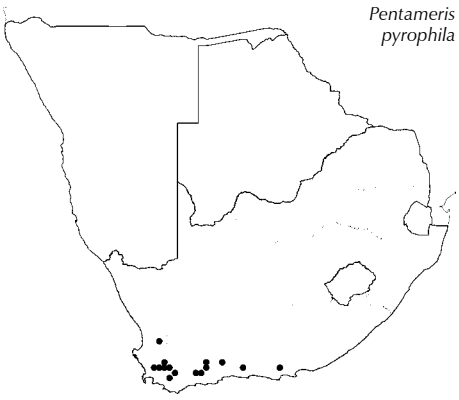
*Pentaschistis pusilla* (Nees) H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 89 (1990).

Cushion-forming perennial about 120 mm high, soft, pale green; basal sheaths brown, soon rotting away; leaves basal; glands absent. Leaf blade to 25 × to 1.5 mm, expanded or rolled, rigid, glabrous or hairy; margins smooth; sheath mouth with a ring of bristles. Inflorescence open, 20 × 15 mm, with ± 10 spikelets; pedicels not hidden by spikelets, scaberulous; axils glabrous. Spikelet 2.5–3.0 mm long, awnless, floret(s) 1, occasionally 2; glumes obtuse to acute, purplish-green, glabrous; lemma 1.5–3.0 mm long, hairy; palea glabrous or hairy with sparsely scattered hairs; anthers 1.8 mm long.

[Species very variable; especially in habit.]

*Flowering*: October to March. *Ecology*: Common in damp cool habitats in rock crevices, on ledges, and especially along streams and waterfalls. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC.

Illustration: Chippindall: 272, fig. 244 (1955).
Anatomy vouchers: *Ellis 2481* & *5590*.
Voucher: *Esterhuysen 26945*.


*Pentameris pyrophila*

**Pentameris pyrophila** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Ceres, Milner Peak in the Hex River Mountains, 3319AD, *Linder 4477* (BOL, holo.; PRE, iso.).

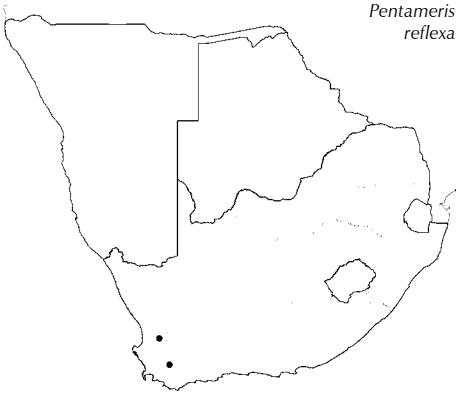
*Pentaschistis pyrophila* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 81 (1990).

Tufted perennial 200–600 mm high; base usually with burnt-off leaf sheaths; leaves basal; glands absent. Leaf blade 60–200 × 0.5–2.0 mm, rolled, rigid, apices usually pungent, glabrous; margins smooth; sheath mouth glabrous or with a ring of bristles. Inflorescence contracted, 15–90 × 10–60 mm, with ± 20–50(80) spikelets; pedicels not hidden by spikelets, glabrous or scaberulous; axils glabrous or hairy. Spikelet 10–12 mm long; glumes acuminate, yellow, glabrous or scaberulous along keels; lemma 4.5–6.0 mm long, densely hairy all over; lateral awns 4–6 mm long, extending up to glume apices, central awn 12–20 mm long; palea hairy between keels; anthers 3.5–4.0 mm long.

[Morphologically very variable.]

*Flowering*: November to January. *Ecology*: On sandstones; at high altitudes on stony slopes; grows well and usually flowers after fire. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC, EC.

Illustration: Linder & Ellis: 82, fig. 11 (1990).
Anatomy vouchers: *Ellis 5530, 5533, 5556, 5618, 5623, 5626, 5629, 5807* & *5809.*
Voucher: *Esterhuysen 28360* (PRE), *28598* (BOL).


*Pentameris reflexa*

**Pentameris reflexa** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Cederberg, slopes below Middelberg at Algeria, *Linder 4531* (BOL, holo.; PRE, STE, iso.).

*Pentaschistis reflexa* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 53 (1990).

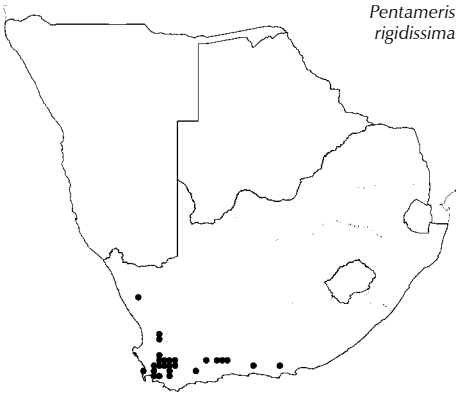
Weakly perennial 100–350 mm high; cushion-forming or tangled; stolons horizontal; basal sheaths brown, soon rotting away; leaves cauline; obscure stalked, crateriform glands on pedicels and glumes. Leaf blade to 30 × to 1.5 mm, expanded or rolled; margins scabrid; sheath mouth glabrous or with a ring of bristles. Inflorescence open, 20–60 × 15–30 mm, with 10–150 spikelets; pedicels often abruptly reflexed, giving inflorescence a jagged appearance, usually scaberulous; axils hairy. Spikelet 3–4 mm long, awnless or with three minute awns; glumes acuminate, yellow, scaberulous along keels; lemma 1.6–2.0 mm long, hairy, hairs clavate; palea glabrous; anthers 1.1–2.0 mm long.

*Flowering*: October to December. *Ecology*: Lower mountain slopes in arid fynbos; from Piketberg to Clanwilliam. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. WC.

Illustration: Linder & Ellis: 54, fig. 7 (1990).
Anatomy voucher: *Ellis 5578, 5579* & *5786*.
Voucher: *Galpin 142 & Esterhuysen 17931* (BOL).

**Pentameris rigidissima** (Pilg. ex H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Worcester, Milner Peak in the Hex River Mountains, *Esterhuysen 14903* (BOL, holo.; NBG, PRE, SAM, iso.).

*Pentaschistis rigidissima* Pilg. ex H.P. Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 85 (1990).

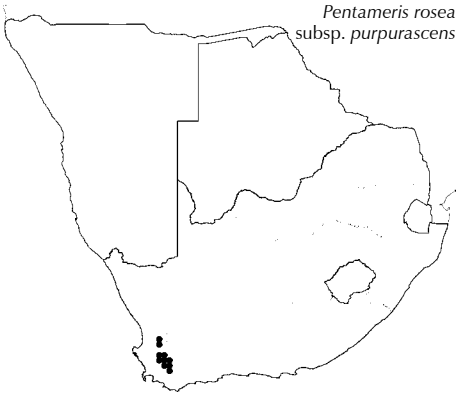

*Pentameris rigidissima*

Cushion-forming (usually) perennial 150–200 mm high, forming small tufts; basal sheaths white, shiny, persistent; leaves basal; glands absent. Leaf blade 40–100 × 0.5 mm, rolled, rigid, glabrous, apex sometimes pungent; margins smooth; sheath mouth glabrous. Inflorescence 20–60 × 7–15 mm, contracted, almost spikelike, with 5–15(25) spikelets; pedicels mostly erect, glabrous; axils hairy. Spikelet 6–8 mm long, greenish; glumes acuminate, hyaline, glabrous; lemma 3 mm long, hairy; lateral awns 2–5 mm long, extending up to glume apices; central awn 8–12 mm long; palea glabrous; anthers 1.4–1.8 mm long.

[Similar to *P. horrida*, specimens of which were previously placed in *P. rigidissima* (Linder & Ellis: 85 (1990)), differs with anthers 2.1–2.8 mm long and a different micro-habitat.]

*Flowering*: October to February. *Ecology*: Mesic coastal mountains; in crevices of sandstone, often in cool, shady, protected sites under and beside rocks. *Frequency in southern Africa*: Common. *Distribution*: Endemic. NC, WC, EC.

Illustration: Linder & Ellis: 88, fig. 14 (1990).
Anatomy vouchers: *Esterhuysen 28058, Ellis 5518, 5531, 5534, 5548, 5585, 5606, 5611, 5612, 5619 & 5622.*
Voucher: *Esterhuysen 23694.*


*Pentameris rosea* subsp. *purpurascens*

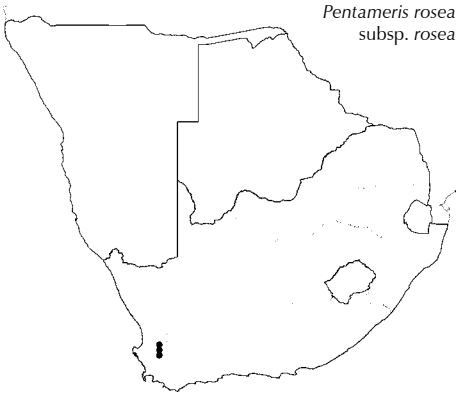
**Pentameris rosea** (H.P.Linder) Galley & H.P.Linder subsp. **purpurascens** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Ceres district, Milner Vlakte in the Hex River Mountains, *Linder 4403* (BOL, holo.; PRE, iso.).

*Pentaschistis rosea* H.P.Linder subsp. *purpurascens* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 72 (1990).

Cushion-forming, weakly perennial 150–400 mm high; basal sheath brown, soon rotting away; leaves cauline; linear glands on leaf margins and pedicels. Leaf blade 20–100 × 0.5–3.0 mm, expanded; margins smooth. Inflorescence open, 20–60 × 10–60 mm, with 5–30 spikelets; pedicels glabrous or scaberulous; axils hairy. Spikelet 8–12 mm long; glumes acuminate, reddish; lemma 2.5–3.5 mm long, hairy all over; lateral awns 6–9 mm long, not reaching to reaching glume apices; central awn 10–15 mm long; palea hairy on upper third.

*Flowering*: October to December. *Ecology*: On sandy flats and stony slopes; widely distributed (except on Porterville plateau) at higher altitudes; especially after fire. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC.

Anatomy vouchers: *Ellis 5514, 5532, 5535, 5580, 5582, 5586, 5800.*
Voucher: *Esterhuysen 18181, Linder 4403* (BOL).


*Pentameris rosea* subsp. *rosea*

**Pentameris rosea** (H.P.Linder) Galley & H.P.Linder subsp. **rosea**, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Porterville mountains, Groot Winterhoek forest reserve, Suurvlakte, *Linder 4777* (BOL, holo.).

*Pentaschistis rosea* H.P.Linder subsp. *rosea*, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 70 (1990).

ROOIGRAS

Tufted, weakly perennial 150–400 mm high; basal sheaths brown, soon rotting away; leaves basal; linear glands on leaf margins and

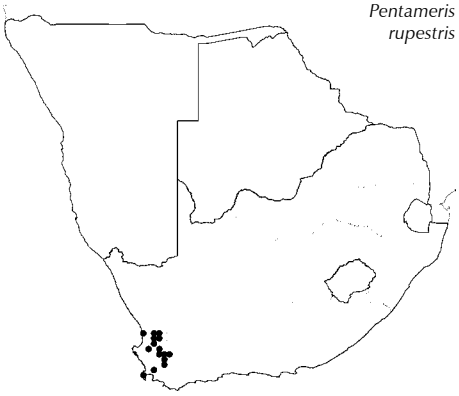
pedicels. Leaf blade 50–100 × 1.0–1.5 mm, rolled or margins incurved, linear, glabrous; margins smooth. Inflorescence open, 20–60 × 10–60 mm, with ± 50 spikelets; pedicels glabrous or scaberulous; axils hairy. Spikelet 11–12 mm long; glumes acuminate, straw-coloured, base purple; lemma 2.5–3.5 mm long, hairy all over; lateral awns 6–9 mm long; central awn 14–17 mm long; palea puberulous in upper half; anthers 2.5–4.0 mm long.

*Flowering*: October. *Ecology*: On deep sandy soils; restricted to plateaus on mountains around Porterville; reacts well to fire. *Frequency in southern Africa*: Locally dominant. *Distribution*: Endemic. WC. *Economics*: Locally regarded as a good grazing grass.

Anatomy vouchers: *Ellis 5483, 5793 & 5797.*
Voucher: *Taylor 11153, Esterhuysen 21885* (BOL).

**Pentameris rupestris** (Nees) Steud., in *Nomenclator Botanicus* (Steudel), ed. 2,2: 299 (1841). Type: South Africa, Western Cape, Cederberg, Blaauwberg, *Drège 1682b* (B, holo.).

*Pentaschistis rupestris* (Nees) Stapf, in *Flora capensis* 7: 498 (1899).


*Pentameris rupestris*

Tufted perennial 600–1 000 mm high; base sparsely hairy; basal sheaths white, shiny, persistent; leaves basal; stalked, crateriform glands on leaves, pedicels and glumes (highly variable in frequency and distribution). Leaf blade to 400 × to 6 mm, expanded or rolled, margins scabrid; sheath mouth with a ring of bristles. Inflorescence usually open, hemispherical, 100 × 90 mm, with ± 300 spikelets; pedicels not obscured by spikelets, glabrous or puberulous; axils hairy. Spikelet 7–8 mm long; glumes acuminate, greenish, glabrous or scaberulous along keels; lemma 3 mm long, hairy all over; lateral awns 0.3 mm long, extending up to glume apices; central awn 10 mm long; palea glabrous; anthers 3 mm long.

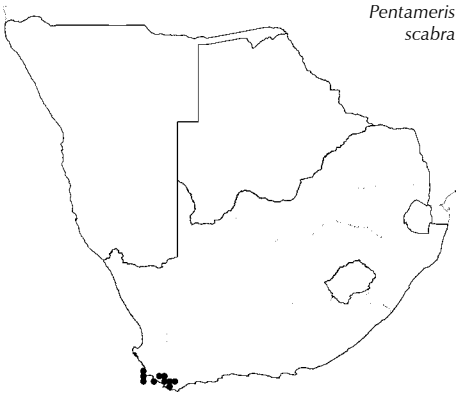
*Flowering*: October. *Ecology*: Restricted to sandstone-derived soils; habitat range wide; common in the Cederberg, occasionally found in mountains around Ceres and Porterville. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC.

Anatomy vouchers: *Ellis 2507, 5484, 5504, 5506, 5587, 5593, 5597, 5598, 5788 & 5793*.
Voucher: *Schlieben & Van Breda 9914, Linder 4468* (BOL).

**Pentameris scabra** (Nees) Steud. *Nomenclator Botanicus* (Steudel), ed. 2,2: 299 (1841). Type: South Africa, Western Cape, Cape Town, Table Mt., *Ecklon 936* (K).

*Pentaschistis papillosa* (Steud.) H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 32 (1990).

*Pentaschistis subulifolia* Stapf, in *Flora capensis* 7: 499 (1899). Type: South Africa, Western Cape, Cape Town, Harvey 300 (BOL); Table Mt., *MacOwan 1698*; Simonsbay, *Wright s.n.*; Paulsberg, *Wolley-Dod 2959*; Slangkop, *Wolley-Dod 3296* (syntypes).

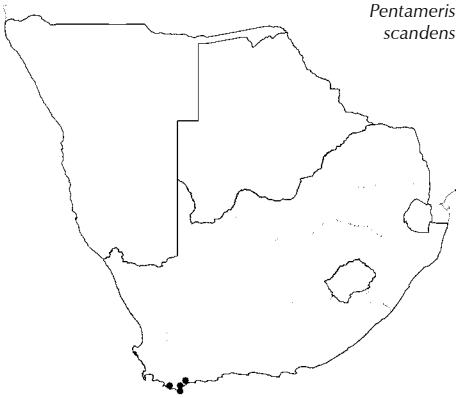

*Pentameris scabra*

Loosely tufted perennial 100–400 mm high; base glabrous; basal sheaths brown, soon rotting away; leaves cauline; culms spreading; stalked, crateriform or convex glands rare to absent on leaf margins, but common on pedicels and glumes. Leaf blade 35–100 × to 4 mm, expanded, rigid; margins smooth; sheath mouth glabrous or with a ring of bristles. Inflorescence usually open, 15–40 × 10–40 mm, with 5–150 spikelets; pedicels glabrous or with glands; axils glabrous or rarely hairy. Spikelet 5–7 mm long; glumes acumi-

nate, silvery-green to purple; glabrous or scaberulous basally; lemma 2.5–3.0 mm long, hairy; lateral awns 4–7 mm long, usually exserted from glumes; central awn 12–14 mm long; palea glabrous or hairy; anthers 2.3–3.0 mm long.

*Flowering*: October and November. *Ecology*: On sandstone (Table Mountain Sandstone); at low altitudes. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC.

Anatomy vouchers: *Ellis 2311, 2516, 5514, 7436, 5439, 5442* & *5989*.
Voucher: *Linder 4808, Leighton 2011* (BOL).



*Pentameris scandens*

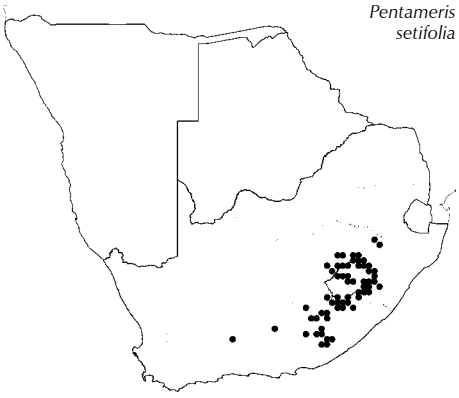
**Pentameris scandens** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Bredasdorp, Bontebok Park, *Acocks 22619* (PRE, holo.).

*Pentaschistis scandens* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 101 (1990).

Tangled perennial 300–500 mm high/long; shoots spreading through vegetation; stolons horizontal; basal sheaths soon rotting away; leaves cauline; glands absent. Leaf blade to 15 × to 0.5 mm, flat, spreading from long, scandent aerial stems; rigid, margins incurved, glabrous, smooth; sheath mouth with a ring of bristles. Inflorescence open, 40 × 20 mm, with 10 spikelets; pedicels mostly erect, glabrous; axils glabrous. Spikelet 10–11 mm long; glumes acuminate, yellow, base purple, scaberulous along keels; lemma 4 mm long, hairy all over, especially towards apex; lateral awns 6 mm long, extending up to glume apices; central awn 14 mm long; palea hairy in upper third; anthers 3 mm long.

*Flowering*: August. *Ecology*: In sandy soils; along the coast on the Bredasdorp plains. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. WC.

Illustration: Linder & Ellis: 108, fig. 18 (1990).
Anatomy vouchers: *Ellis 5986, 5987* & *5988*.
Voucher: *Burgers 2472, Linder 4766* (BOL).



*Pentameris setifolia*

**Pentameris setifolia** (Thunb.) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, *Thunberg* in herb. *Thunb. 23857* (UPS, holo., microfiche).

*Pentaschistis setifolia* (Thunb.) McClean, in *South African Journal of Science* 23: 282 (1926).

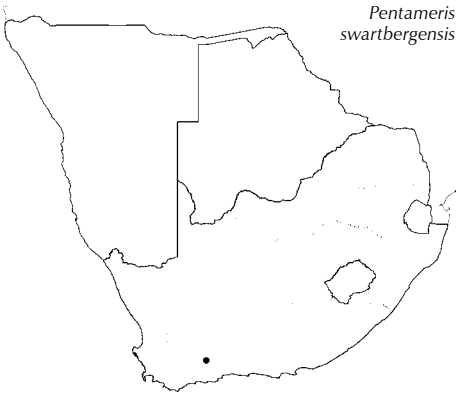
Tufted perennial 150–400 mm high; base glabrous; basal sheaths either forming a sheath of burnt-off bases or white, shiny, persistent; leaves basal; stalked or sunken glands present on leaves, pedicels and glumes or absent. Leaf blade to 300 × to 0.8 mm, rolled, rigid; margins scabrid; sheath mouth hairy. Inflorescence open, 30–70 × 20–50 mm, with ± 100 spikelets; pedicels not hidden by spikelets, glabrous; axils hairy. Spikelet 3.5–5.0 mm long, awnless or occasionally only one lemma awned; glumes usually obtuse, sometimes acuminate, generally purple below, drying straw-coloured, glabrous or scaberulous along keels; lemma 3.0–3.5 mm long, hairy all over or basally only, often dark-coloured; palea hairy in upper third; anthers 1.6–2.0 mm long.

[A variable species and delimitation from *P. oreodoxa*, *P. glandulosa* and *P. ampla* is often difficult.]

*Flowering*: December and January. *Ecology*: Sour grasslands; over a wide altitudinal range. *Frequency in southern Africa*: Dominant. *Distribution*: Endemic. L, FS, KZN, WC, EC.]

Illustration: Chippindall: 264, fig. 233 (spikelet) (1955).
Anatomy vouchers: *Ellis 308, 2374, 2377, 2378, 2380, 2388, 2389, 2595, 2596, 2601, 2611, 2612, 2613, 2614, 3301, 5719 & 5818.*
Voucher: *Ferreira F094, Linder 4860* (BOL).

**Pentameris swartbergensis** N.P.Barker, in *Bothalia* 23: 43 (1993). Type: South Africa, Western Cape, Toverkop, Swartberg near Ladismith, *Esterhuysen 26755* (PRE, holo.).

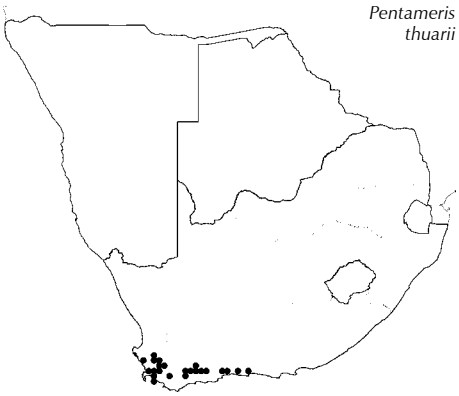

*Pentameris swartbergensis*

Tufted to decumbent perennial to 560 mm high; leaves cauline; culm basally branched. Leaf blade to 230 mm long, folded or rolled, sparsely hairy near base; sheath glabrous, adpressed to culm. Inflorescence somewhat lax, 80–90 × 20–35 mm, lanceolate, with 22–56 spikelets. Spikelet 11.5–13.0 × 2.5–3.0 mm; lemma 2.8–5.0 mm long; lobes acuminate, 1.4–1.5 mm long, adnate for about half their length to lateral awns; lateral awns 2.2–2.5 mm long; central awn 8.5–11.5 mm long, column 3 mm long, bristle from knee to apex 5.5–7.0 mm long; palea 4.5–5.0 mm long; lodicules cuneate, ciliolate at apex; anthers 3.1–3.5 mm long; ovary apex with tuft of white hairs; fruit 2.0–2.4 × 1 mm, broadly fusiform, surface colliculately sculptured, pericarp brittle.

*Flowering*: September to December. *Ecology*: In deep shade; rocky slopes, at base of cliffs and ledges; only in Klein Swartberg. *Frequency in southern Africa*: Locally abundant. *Distribution*: Endemic. WC.

Illustration: Barker: 45, fig. 14 (1993).
Voucher: *Esterhuysen 26750.*

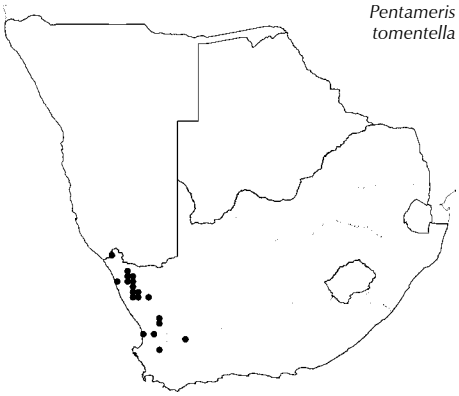
**Pentameris thuarii** P.Beauv., in *Essai d'une Nouvelle Agrostographie*: 92, t. 18, fig. 8 (1812). Type: South Africa, *Du Petit-Thouars s.n.* (P, lecto.).


*Pentameris thuarii*

Tufted or decumbent perennial, 350–2 000 mm high; culm single or branched. Leaf blade to 500 × 10 mm, open or folded, rarely rolled, glabrous to sparsely hairy; sheath hairy, persistent, with purple to dark brown or black auricles. Inflorescence globose, lax, 70–220 mm long, with 16–90 spikelets. Spikelet 15–22 × 3–5 mm; glumes glabrous; lemma 2.2–3.3 mm long; lobes truncate, 0.4–0.7 mm long, almost free from lateral awns; lateral awns 4–6 mm long; central awn 15–20 mm long; palea 2.8–4.0 mm long; lodicules glabrous; anthers 3.0–6.5 mm long; ovary apex with tuft of white hairs; fruits 2.5 × 1.7–2.0 mm, globose, surface colliculately sculptured, pericarp brittle.

*Flowering*: September to December. *Ecology*: Moist places such as in seeps, drainage lines and along river banks. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic, but widespread. WC.

Illustration: Chippindall: 252, fig. 222 (1955).
Anatomy vouchers: *Ellis 660, 2220, 2221, 4654, 4675, 4683*; *Kruger 798*; *Acocks 21743*; *Barker 7653* & *Davidse 33707.* It is anatomically distinct from the other species in the genus (Ellis 1985c).
Voucher: *McDonald 816*.


*Pentameris tomentella*

**Pentameris tomentella** (Stapf) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Northern Cape, Namaqualand, Modderfonteinberg, *Drège s.n.* (K, holo.).

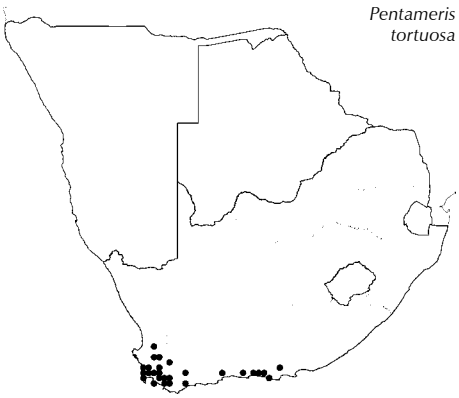
*Pentaschistis tomentella* Stapf, in *Flora capensis* 7: 502 (1899).

*Pentaschistis brachyathera* Stapf, in *Flora capensis* 7: 507 (1899). Type: South Africa, Northern Cape, Namaqualand, between Pedros Kloof and Lilifontein, *Drège 2580* (K, holo.).

Tufted or cushion-forming perennial 100–300 mm high; basal sheath white, shiny, persistent; leaves basal; stalked crateriform glands on leaf sheaths, pedicels and glumes. Leaf blade to 50 × to 3 mm, expanded; margins smooth; leaf sheaths with distinctive rows of stalked glands; sheath mouth hairy. Inflorescence contracted, dense, 30–50 × 30–40 mm, with ± 100 spikelets; pedicels glabrous or scaberulous, shorter than spikelets; axils glabrous. Spikelet 4–5 mm long; glumes acute, straw-coloured, glabrous or scaberulous along keels; lemma 2.0–2.5 mm long, hairy; lateral awns 1.0–1.5 mm long, not reaching glume apices; central awn 3–5 mm long; palea glabrous; anthers 2 mm long.

*Flowering*: September, rarely in October. *Ecology*: Widespread in the higher, cooler parts of Namaqualand. *Frequency in southern Africa*: Common. *Distribution*: Endemic. NC, WC.

Illustration: Chippindall: 258, fig. 225,2 (1955).
Anatomy vouchers: *Ellis 1141, 2198, 2199, 2458, 5392, 5393, 5771, 5772, 5774* & *5775*.
Voucher: *Taylor 1166*.


*Pentameris tortuosa*

**Pentameris tortuosa** (Trin.) Nees, in *Linnaea* 7: 310 (1832). Type: Illustration in Trinius (1827).

*Pentaschistis tortuosa* (Trin.) Stapf, in *Flora capensis* 7: 488 (1899).

*Pentaschistis nutans* (Nees) Stapf, in *Flora capensis* 7: 488 (1899). Type: South Africa, Western Cape, at the Rivierzondereinde River, *Drège 1682* (B, holo., frag.).

Tightly tufted tussock perennial 600–1 000 mm high, stolons present; basal sheaths white, shiny, persistent; leaves basal; glands absent. Leaf blade to 500 × to 4 mm, expanded or rolled, rigid, curly, linear; margins scabrid; sheath mouth glabrous. Inflorescence contracted, 80–200 × 20–40 mm, with ± 200 spikelets, brown, slender, often somewhat tangled, apex drooping; pedicels glabrous or scaberulous; axils glabrous. Spikelet 7–11 mm long; glumes acuminate, straw-coloured, glabrous or scaberulous apically or along keels; lemma 4–6 mm long, sparsely hairy all over; lateral awns 4–5 mm long, extending up to glume apices; central awn 10–15 mm long; palea hairy in upper third; anthers 3 mm long.

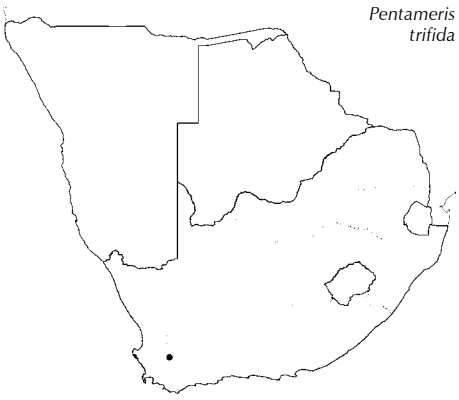
[In the herbarium difficult to separate from *P. colorata*, but the brown nodding inflorescence and tight tussock of linear leaves makes it distinctive in the field.]

*Flowering*: October to December. *Ecology*: Usually associated with sandstone soils; in damp places on mountains and foothills. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC, EC.

Anatomy vouchers: *Ellis 2226, 2227, 2228, 2260, 2261, 2310, 5603* & *5801*.
Vouchers: *Acocks 22819, Esterhuysen 34035* (BOL).

**Pentameris trifida** (Galley) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: Western Cape, Baviaansberg, north of the Hex River Mountains, 1 050 m, *C.A.Galley 577* (ZH, holo.; NBG, PRE, iso.).

*Pentaschistis trifida* Galley, in *Bothalia* 36: 157 (2006).


*Pentameris trifida*

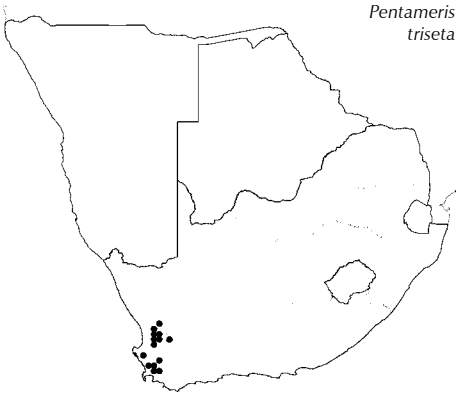
Perennial 80–200 mm high; basal sheaths white shiny, persistent; leaves basal; linear glands on inflorescence branches. Leaf blade 20–50 × 0.5–1.0 mm, rolled; margins scaberulous; sheath red-purple, mouth glabrous. Inflorescence open 50–75 × 40–60 mm, with 15–35 spikelets; trichotomously branched; axils glabrous. Spikelet 4.5–5.5 mm long, floret 1; glumes acute, pale yellow, base purplish, apex green; lemma 2.4–2.8 mm long, hairy, hairs scattered on back between nerves; lateral awns 6–8 mm long; central awn 18–24 mm long, geniculate, column twisted; palea glabrous; anthers 0.9–1.2 mm long.

*Flowering*: Late October to early November. *Ecology*: Deep, sandy soil derived from Table Mountain Sandstone; disturbed habitat. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC.

Illustrations: Galley & Linder: 158, fig. 1 (2006).
Voucher: *Galley 577* (ZH).

**Pentameris triseta** (Thunb.) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, *Thunberg* in herb. *Thunb. 2632* (UPS, holo., microfiche).

*Pentaschistis triseta* (Thunb.) Stapf, in *Flora capensis* 7: 495 (1899).


*Pentameris triseta*

Annual 80–600 mm high; obscure linear glands on leaves and pedicels. Leaf blade to 80 × to 4 mm, expanded, margins smooth; sheath mouth hairy. Inflorescence open, 70–100 × 30–90 mm long, with 5–15 spikelets; pedicels not hidden by spikelets; axils hairy. Spikelet 15–18 mm long; glumes acuminate, yellow to lime-green, bulbous-based hairs in middle or along margins; lemma 6–8 mm long, glabrous or hairy only at apex; lateral awns 12–17 mm long, exserted from glumes; central awn 25–35 mm long; anthers 3.5 mm long.

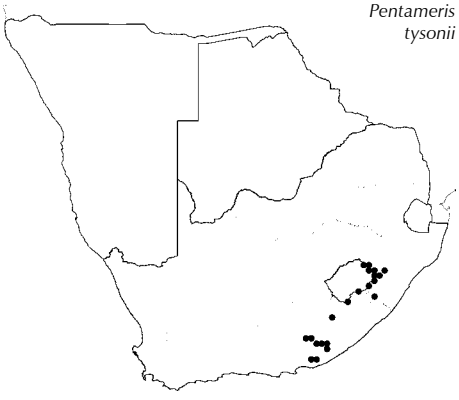
*Flowering*: September and October. *Ecology*: On acidic sandy soils; below 600 m; only flowering the first year after fire. *Frequency in southern Africa*: Locally common (after fire). *Distribution*: Endemic. NC, WC.

Illustration: Chippindall: 262, fig. 229 (1955).
Anatomy vouchers: *Ellis 5421, 5423, 5422, 5426, 5429* & *5783*.
Voucher: *Davidse 33416, Linder 4297* (BOL).

**Pentameris tysonii** (Stapf) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, KwaZulu-Natal, Mt. Currie, *Tyson 1312* (K, holo.; PRE, SAM, iso.).

*Pentaschistis tysonii* Stapf, *in Flora capensis* 7: 493 (1899).

*Pentaschistis fibrosa* Stapf, in *Flora capensis* 7: 492 (1899). Type: South Africa, Eastern Cape, Grahamstown, *MacOwan 1299* (K, holo.).

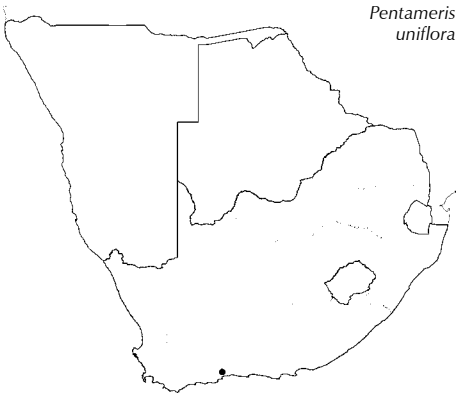

*Pentameris tysonii*

Tufted perennial 300–500 mm high; stolons present; basal sheath of burnt-off leaf-bases or fibrous; leaves basal; glands absent. Leaf blade to 300 × 0.5–2.0 mm, rolled, rigid, truncate, glabrous; margins smooth; sheath mouth hairy. Inflorescence open, 60–100 ×

60–90 mm, with ± 50 spikelets; pedicels not hidden by spikelets, glabrous; axils glabrous. Spikelet 6–10 mm long; glumes acute, green, glabrous; lemma 3.5 mm long, hairy all over; lateral awns 1–5 mm long, not reaching to exserted from glume apices (almost absent in Eastern Cape to well developed in KwaZulu-Natal); central awn 3–11 mm; palea hairy in upper half; anthers 3.2–4.0 mm long.

*Flowering*: October to November. *Ecology*: Sour grassland on high mountain slopes. *Frequency in southern Africa*: Common. *Distribution*: Endemic. FS, KZN, EC.

Anatomy vouchers: *Killick 2280*; *Ellis 1409, 3291, 3292, 3296, 3302* & *5725*.
Voucher: *Smook 1385, Acocks 21890, Linder 4833*.


*Pentameris uniflora*

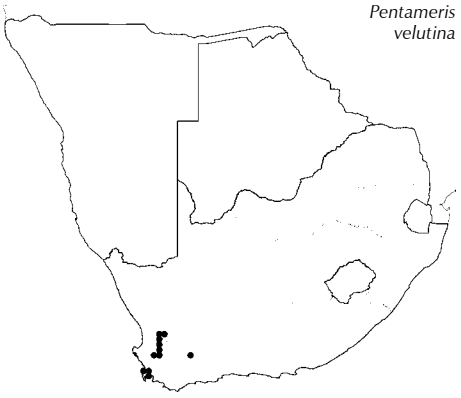
**Pentameris uniflora** N.P.Barker, in *Bothalia* 23: 35 (1993). Type: South Africa, Western Cape, Riversdale, Sleeping Beauty Peak. *Esterhuysen 31771* (PRE, holo.).

*Pentameris* sp. 2. in Gibbs Russell et al.: 253 (1990).

Decumbent, soft perennial to 650 mm high; culm slender, flexuous. Leaf blade to 130 × 1 mm, soft, filiform, open or folded; sheath glabrous or hairy only on margins, adpressed to culm, auricles absent. Inflorescence 40–60 mm long; with 5–20 spikelets. Spikelet 11–12 × 1.5–3.0 mm; floret 1; glumes 1-nerved, glabrous; lemma body 4–6 mm long, lobes acuminate, 1.5–3.0 mm long, almost fully adnate to lateral awns; lateral awns 2.5–4.5 mm long; central awn 10.5–11.0 mm long; palea 5.5–6.5 mm long; lodicules glabrous or minutely ciliate; anther 3–4 mm long; ovary apex with tuft of white hairs; fruit with brittle pericarp.

*Flowering*: September to December. *Ecology*: Damp, rocky, south-facing cliffs of Cape Fold Mountains. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic, with limited distribution, known only from three widely separated localities. WC.

Illustration: Barker: 34, fig. 4 (1993).
Anatomy voucher: *Ellis 2546*.
Voucher: *Ellis 2546*.


*Pentameris velutina*

**Pentameris velutina** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Porterville Mountains, on ridge on Berghof Farm, *Linder 4791* (BOL, holo.).

*Pentaschistis velutina* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 66 (1990).

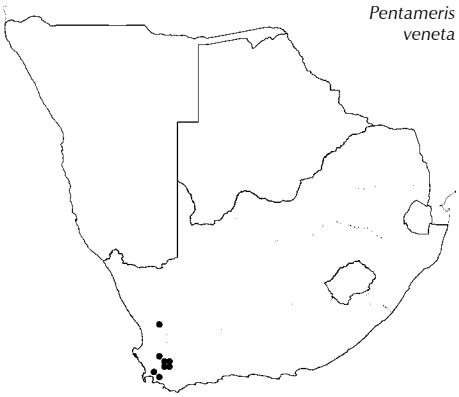
Tufted perennial 300–600 mm high; base swollen, densely woolly hairy; basal sheath brown, soon rotting away; obscure linear glands on pedicels only. Leaf blade to 180 × 1–2 mm, rolled, rigid, inner surface glabrous or hairy; margins scabrid; sheath mouth hairy. Inflorescence open, 70–180 × 60–120 mm, with ± 100 spikelets; pedicels and axils glabrous. Spikelet 12–15 mm long; glumes acuminate, straw-coloured, hairy basally or all over; lemma 3–4 mm long, hairy along nerves, hairs 0.4–0.8 mm long, longest towards apex; lateral awn 9–13 mm long, exserted from glumes; central awn 20–25 mm long; palea hairy in upper third; anthers 2.5 mm long.

*Flowering*: October and November. *Ecology*: On gravelly plateaus and shale bands in mountains. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. NC, WC.

Illustration: Linder & Ellis: 67, fig. 8 (1990).
Anatomy vouchers: *Ellis 4630, 5512, 5798* & *5799*.
Voucher: *Linder 4791*.

**Pentameris veneta** (H.P.Linder) Galley & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 327 (2010). Type: South Africa, Western Cape, Cederberg, Blaauwberg, *Drège* 1682b (K, holo.).

*Pentaschistis veneta* H.P.Linder, in Linder & Ellis, *Contributions from the Bolus Herbarium* 12: 29 (1990).


*Pentameris veneta*

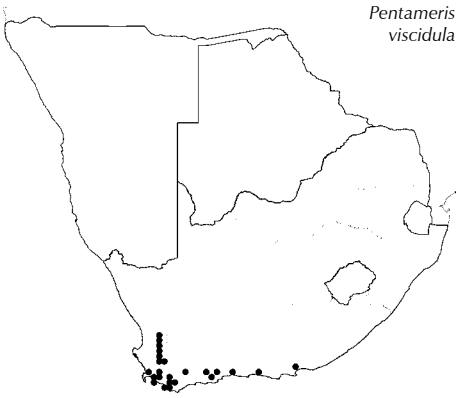
Tufted perennial 80–400 mm high; basal sheaths white, shiny, persistent; leaves basal; stalked, crateriform glands on leaf margins, leaves, pedicels and glumes. Leaf blade to 100 × to 4 mm, expanded, inner surface hairy; margins smooth; sheath mouth with a ring of bristles. Inflorescence open, 30–80 × 20–50 mm, with ± 100 spikelets; pedicels scaberulous, at least some longer than spikelets; axils hairy. Spikelet 5.0–6.5 mm long; glumes acuminate, hyaline, glabrous or scaberulous; lemma 2.8–3.0 mm long, hairy all over; lateral awns 2.0–3.5 mm long, extending up to and beyond glume apices; central awn 8–10 mm long; palea glabrous; anthers 2–3 mm long.

*Flowering*: December to January. *Ecology*: In black sand; in cool and shady habitats and in seeps or below cliffs; at mid- to upper altitudes in mountains. *Frequency in southern Africa*: Common. *Distribution*: Endemic. NC, WC.

Anatomy vouchers: *Ellis 5490, 5497, 5594, 5595* & *5596*.
Voucher: *Taylor 9753, Esterhuysen 15125*.

**Pentameris viscidula** (Nees) Steud., *Nomenclator Botanicus* (Steudel), ed. 2,2: 299 (1841). Type: South Africa, Western Cape, Ezelbank, *Drège 2579;* Tulbagh Waterfall, *Ecklon*; *Drège* (syntypes).

*Pentaschistis viscidula* (Nees) Stapf, in *Flora capensis* 7: 486 (1899).

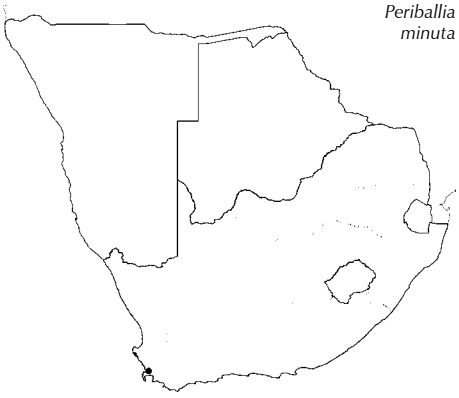

*Pentameris viscidula*

Geophytic perennial 200–500 mm high; base swollen, hairy; basal sheaths forming a sheath of burnt-off leaf bases; linear glands on pedicels. Leaf blade to 100 × 0.8–1.5 mm, rolled, inner surface glabrous, margins smooth; sheath mouth hairy with hairs extending down sheath margin. Inflorescence usually contracted, 30–90 × 15–40 mm, with ± 200 spikelets; pedicels glabrous; axils glabrous or hairy (hairy axils usually associated with hairy leaf sheaths). Spikelet 7–10 mm long; glumes acuminate, silvery, base purple, glabrous or scaberulous along keels; lemma 4–5 mm long, glabrous to sparsely hairy, hairs up to 0.5 mm long; lateral awns 6–12 mm long, exserted from glumes; central awn 15–20 mm long; palea glabrous or hairy, rounded; anthers 3–4 mm long.

[Difficult to separate from *P. argentea,* but distinguished by plant-base and leaf anatomy.]

*Flowering*: October and November. *Ecology*: On sandstone-derived soils; after fire or bush cutting. *Frequency in southern Africa*: Common. *Distribution*: Endemic. WC, EC.

Anatomy vouchers: *Ellis 5488, 5489, 5491, 5492, 5494, 5529* & *5558*.
Voucher: *Lamb 118, Esterhuysen 29946* (BOL).




## *Periballia Trin.

Trinius: 133 (1820); Chippindall: 86 (1955); Clayton & Renvoize: 131 (1986); Gibbs Russell et al.: 265 (1990); Watson & Dallwitz: 711 (1994).

Annual, tufted or culms solitary. **Leaf blade** linear, expanded or rolled; *ligule* an unfringed membrane. **Inflorescence** an open panicle; *spikelets* not secund, pedicelled. **Spikelet** small, less than 3 mm long, laterally compressed, disarticulating above glumes; *glumes* ± equal, shorter than spikelet, similar, membranous, 1–3-nerved, awnless. **Florets** 2, bisexual, separated by an elongated internode; *lemma* lanceolate, back rounded, irregularly toothed, 3–7-nerved, awnless; *callus* hairy; *palea* shorter than lemma, rounded on back. **Lodicules** 2. **Stamens** 3. **Ovary** glabrous. **Caryopsis** narrowly oblong, flattened on one face; hilum short; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (4).

**Species** 3, Mediterranean; 1 naturalised in southern Africa: **Periballia minuta* (L.) Asch. & Graebn., Western Cape.

Species treatment by M.T. Nembudani.

**Quick guide to easily confused taxa:**

Internode between florets elongated; glumes shorter than lemma; spikelet awnless . . . . . *__Periballia minuta__
Internode between florets very short; glumes longer than lemma; spikelet awned . . . . . *__Aira cupaniana__

***Periballia minuta** (L.) Asch. & Graebn., in *Synopsis der Mitteleuropäischen Flora* 2: 298 (1899). Type: Spain.

Alternate name: *Molineriella minuta* (L.) Rouy

Loosely tufted annual, 30–140 mm high. Leaf blade 7–30 × 1.5 mm. Spikelet 1–2 mm long; glumes shorter than lemma; lemma obtuse or truncate, awnless; palea not keeled.

*Flowering*: August to September. *Ecology*: Moist shallow soil over ironstone. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Naturalised from the Mediterranean; introduced into Portugal. WC. (Collected only once in 1943 in Simonstown). *Economics*: Weed.

Voucher: *Salter 8766*.



Figure 408.—*Perotis patens* spikelet (1.2–2.7 mm). Photographer: M. Koekemoer.

## Perotis Aiton

Aiton: 85 (1789); Stapf: 575 (1899); Stent: 256 (1924); Chippindall: 109 (1955); Launert: 149 (1970a); Clayton: 394 (1974); Clayton & Renvoize: 255 (1986); Gibbs Russell et al.: 265 (1990); Watson & Dallwitz: 713 (1994); Cope: 249 (1999).

Annual or short-lived perennial, loosely tufted. **Leaf blade** linear-lanceolate, expanded, acute, margins often fringed with bristle-like hairs; *ligule* an unfringed to fringed membrane. **Inflorescence** a solitary, cylindrical, terminal spike-like raceme, appears plumose or like a bottle-brush because of long capillary glume awns; *spikelets* soli-

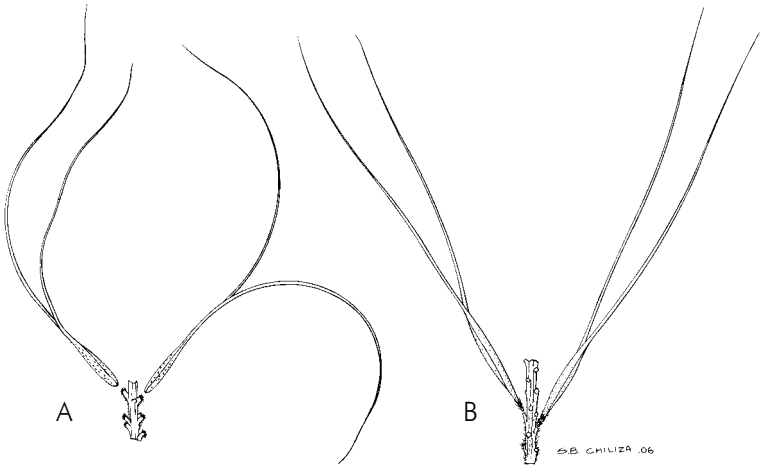



Figure 409.—*Perotis* spp. Several spikelets on portion of rachis. A, *P. patens*; B, *P. vaginata*. Artist: S.B. Chiliza.

tary, subsessile to pedicelled. **Spikelet** small, laterally compressed, falling with glumes, base rounded or elongated into a stipe-like callus; *glumes* ± equal, membranous, linear or linear-lanceolate, similar, 1-nerved, keeled, finely scabrid or hairy, awned; awn capillary, much longer than glumes. **Floret** 1, bisexual; *lemma* much shorter than glumes, less firm than glumes, hyaline, lanceolate, acute, 1-nerved, glabrous, awnless; *palea* very small, hyaline, nerveless. **Lodicules** 2, broad, cuneate. **Stamens** 3. **Ovary** ± ellipsoid, glabrous; styles short, united at base, plumose. **Caryopsis** linear-lanceolate, almost as long as glumes at maturity; hilum short; pericarp fused; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines even. PCR sheath extensions absent. PCR cell chloroplasts centripetal. **Cytology**: $x = 10$ (9) (polyploidy).

**Species** ± 10, Africa to Asia and Australia; 3 in southern Africa, northern Namibia, Botswana, Swaziland, North West, Limpopo, Mpumalanga, Gauteng, Free State and KwaZulu-Natal.

Species treatment by M.T. Nembudani.

**Key to species:**

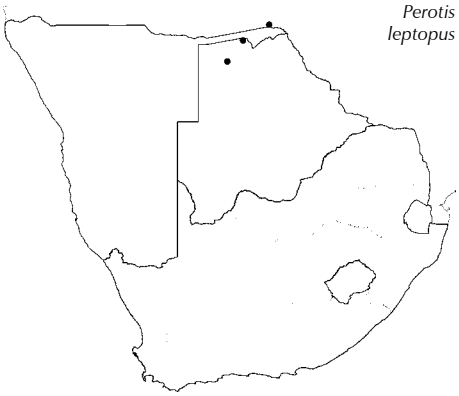
1. Base of spikelet rounded or flat, distinct callus absent; awns usually purple; widespread . . . . . **P. patens**
   Base of spikelet elongated into a narrow tapering stipe-like callus; awns usually green; northern Namibia and Botswana . . . . . 2
2. Spikelet 3.5–5.5 mm long (including stipe-like callus, excluding awns); lower glume awn 13–25 mm long . . . . . **P. vaginata**
   Spikelet 2.5–3.0 mm long (including stipe-like callus, excluding awns); lower glume awn 20–40 mm long . . . . . **P. leptopus**

**Perotis leptopus** Pilg., in *Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem* 11: 804 (1933). Type: Tanzania, Ulanga District, Mahenge, *Schlieben 2316* (B, holo.).

Loosely tufted, delicate annual 250–600 mm high. Leaf blade 10–40 × 2–5 mm. Inflorescence 20–110 mm long. Spikelet 2.5–3.0 mm long; glumes hairy, lower glume awn 20–40 mm long; upper glume awn 11–18 mm long, unequal, green or pallid, rarely purple-tinged; callus stipitate, 0.4–0.7 mm long; anther 0.6–0.9 mm long; caryopsis 1.5 mm long.

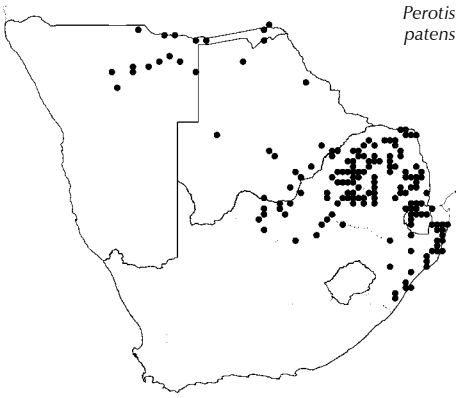



Figure 410.—*Perotis patens*. Artist: C.D. Bartman.



*Flowering*: February to March. *Ecology*: Open places in savanna woodland. *Distribution*: Angola and Tanzania. N, B.

Voucher: *Joubert & Du Toit 8*.



*Perotis patens*

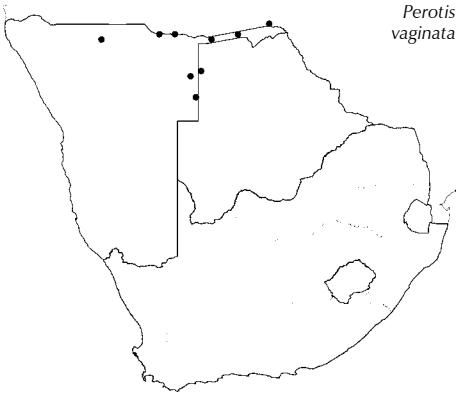
**Perotis patens** Gand., in *Bulletin Société Botanique de France* 66: 301 (1920). Type: South Africa, KwaZulu-Natal, Berea, *J.M. Wood 5925* (LY, holo.; PRE, iso.).

PURPLE SPIKE GRASS, BOTTLEBRUSH GRASS

Loosely tufted, short-lived perennial or annual 200–600 mm high. Leaf blade 10–70 × 3–12 mm. Inflorescence 40–185 mm long. Spikelet 1.2–2.7 mm long; glumes finely scabrid, both awns 9–17(25) mm long, purple or red; callus indistinct, not stipe-like; anther 0.5–0.7 mm long; caryopsis 0.5–2.0 mm long.

*Flowering*: January to December. *Ecology*: Dry, poor sandy soils; in bare ground and disturbed places. *Frequency in southern Africa*: Common. *Distribution*: Northwards to tropical Africa and Madagascar. N, B, S, LIM, NW, G, M, FS, KZN. *Economics*: A pioneer grass that is rarely grazed; an indicator of overgrazing or drought conditions; used in flower arrangements; frequently a ruderal weed.

Illustrations: Chippindall: 108, fig. 82 (1955); Cope: tab. 78 (1999).
Anatomy vouchers: *Ellis 1599, 1926 & 4051*.
Voucher: *Killick & Strey 2458*.



*Perotis vaginata*

**Perotis vaginata** Hack., in *Bulletin de l'Herbier Boissier.*, sér. 2, 6: 704 (1906). Type: Namibia, Ondonga to Uukuanyama, *Rautanen* (Z, holo.).

Loosely tufted annual; 120–400 mm high; culms robust. Leaf blade 10–40 × 1.5–6.0 mm. Inflorescence 20–140 mm long. Spikelet 3.5–5.5 mm long; glumes scabrid; both awns 13–25 mm long, green; callus stipitate, 0.7–1.2 mm long; anther 0.3–1.0 mm long; caryopsis 1.7–3.0 mm long.

*Flowering*: February to April. *Ecology*: In sandy soil; open savanna. *Distribution*: Angola, Zambia, Zimbabwe to DRC and Tanzania. N, B.

Illustration: Cope: 253, tab. 78 (1999).
Voucher: *De Winter & Wiss 4342*.

## **Phacelurus** Griseb.

Grisebach: 428 (1846); Chippindall: 488 (1955) under *Ischaemum* L.; Clayton: 175 (1978); Gibbs Russell et al.: 349 (1990); Watson & Dallwitz: 718 (1994); Cope: 159 (2002).

Tufted perennial. **Leaf blade** linear, flat or folded, rarely terete; *ligule* an unfringed membrane. **Inflorescence** terminal, usually of many ± flattened racemes, digitate to subdigitate; disarticulating transversely and often tardily; internodes and pedicels stout, clavate to inflated; *spikelets* in pairs, in long–short combinations: one sessile, the other pedicelled; pedicels free of rachis. **Sessile spikelet** dorsiventrally compressed, falling with glumes; *glumes* ± equal, glabrous, dissimilar, awnless; lower glume flattened on the back, 2-keeled, strongly ridged due to prominent nerves. **Florets** 2; *lower floret* male with a

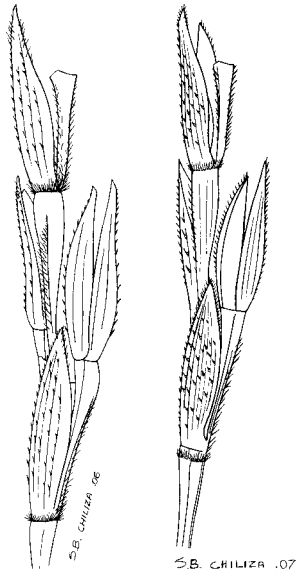



Figure 411.—*Phacelurus franksiae*. Portion of rachis with sessile and pedicelled spikelets (27.0 × 4.8 mm). Artist: S.B. Chiliza.



Figure 412.—*Phacelurus franksiae* spikelet pair (6–8 mm). Photographer: M. Koekemoer.

palea, or sterile and reduced to a lemma, awnless; *upper floret* bisexual; *lemma* entire, less firm in texture than glumes, hyaline, awnless; *callus* truncate, minute. **Lodicules** 2, fleshy, glabrous. **Stamens** 3. **Ovary** glabrous. **Caryopsis** oblong, dorsiventrally compressed; embryo large. **Pedicelled spikelet** resembling sessile spikelet, but usually smaller, up to 6 mm long; male or sterile, rarely bisexual; awnless. **Photosynthetic pathway**: $C_4$; XyMS-. PCR sheaths outline even. PCR sheaths extensions absent. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 10$ (polyploidy).

**Species** ± 9, Africa to Indo-China and Japan; 1 in southern Africa: *Phacelurus franksiae* (J.M.Wood) Clayton, Drakensberg (KwaZulu-Natal).

Species treatment by M.J. Moeaha.

**Phacelurus franksiae** (J.M.Wood) Clayton, in *Kew Bulletin* 33: 178 (1978). Type: South Africa, KwaZulu-Natal, Tabanhlope, *Wylie* in *Wood 10540* (K, holo.).

*Ischaemum franksiae* J.M.Wood, in *Bulletin of Miscellaneous Information, Kew* 1908: 226 (1908).

Tufted perennial 200–600 mm high; basal sheaths broad, papery, margins with long downy hairs. Leaf blade setaceous. Inflorescence pedicel and rachis internodes swollen. Sessile spikelet 6.0–8.5 mm long, dark purple; pedicelled spikelet up to 6 mm long. Both spikelets lower glumes hairy on the prominent nerves, hairs short, stiff, tubercle-based; the callus has a central peg; anther 2–3 mm long.

*Flowering*: October to January. *Ecology*: Mountain grassland, altitude 1 700–2 600 m. *Frequency in southern Africa*: Rare. *Distribution*: Zambia, Zimbabwe and DRC. KZN.

Illustration: Chippindall: 489, fig. 399 (1955).
Anatomy vouchers: *Ellis 1462, 3283 & 3284*.
Voucher: *Killick 1070*.

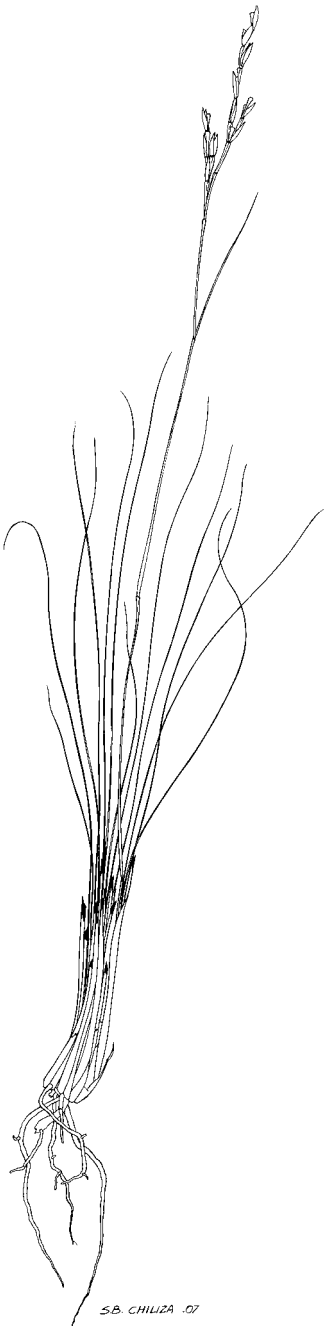
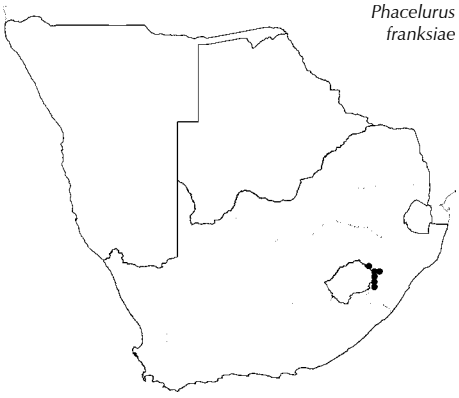



Figure 413.—*Phacelurus franksiae*. Artist: S.B. Chiliza.



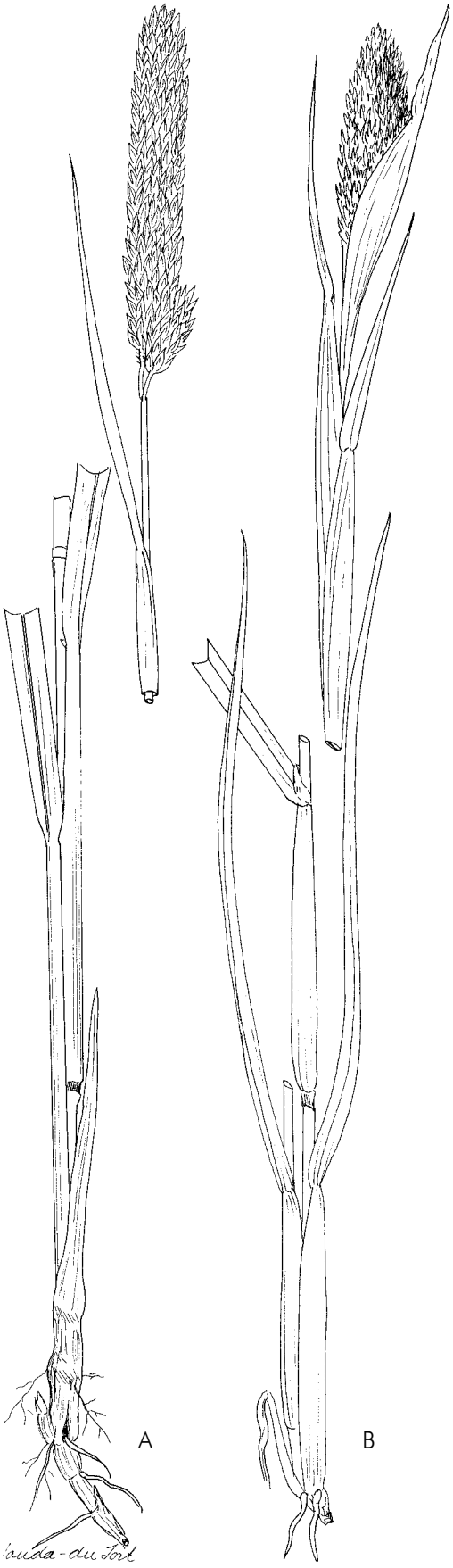



Figure 414.—A, *Phalaris aquatica;* B, *P. paradoxa*. Artist: H.W. du Toit.

## *Phalaris L.

Linnaeus: 54 (1753); Stapf: 682 (1900); Stent: 275 (1924); Hitchcock & Chase: 551 (1950); Chippindall: 88 (1955); Anderson: 1 (1961); Hubbard: 95 (1970); Launert: 81 (1971); Bor: 1771 (1985); Clayton & Renvoize: 133 (1986); Gibbs Russell et al.: 267 (1990); Baldini & Jarvis: 475 (1991); Watson & Dallwitz: 722 (1994); Baldini: 265 (1995); Barkworth: 764 (2007).

Annual or perennial, tufted; sometimes geniculate; often rhizomatous. **Leaf blade** linear to linear-lanceolate, expanded; *ligule* a conspicuous, unfringed membrane. **Inflorescence** a dense, oblong or spike-like panicle, sometimes sub-capitate or interrupted and lobed; *spikelets* shortly pedicelled, (exception *P. paradoxa* (see below)). **Spikelet** strongly laterally compressed, disarticulating above glumes; *glumes* ± equal, completely enclosing lemmas, membranous, boat-shaped, almost plano-convex in outline, subobtuse, 3-nerved, strongly keeled, keels often winged and toothed. **Florets** (2)3, *lowest* 1–2 *florets* sterile, reduced to rudimentary lemmas, varying from very small to more than half as long as upper lemma, glabrous to pubescent; *uppermost floret* bisexual; *lemma* firmer than glumes, chartaceous, ovate-elliptic or ovate-lanceolate, glabrous or sparsely to densely hairy, 5-nerved, obtuse or acute, awnless; *palea* relatively long, keelless. **Lodicules** 2, membranous, hyaline. **Stamens** 3. **Ovary** ellipsoid; styles distinct, plumose. **Caryopsis** ellipsoid; hilum long-linear; embryo large (up to a third of the grain). **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 6, 7$ (aneuploids, high polyploidy).

**Species** ± 16, north temperate, but mostly from the Mediterranean region, also South America; 6 naturalised in southern Africa, widespread weeds or escapes from cultivation.

Species treatment by M.T. Nembudani.

**Key to species:**

1. Spikelets in units of 1 fertile surrounded by 5 or 6 sterile spikelets, these often reduced to sterile knobs (these fall as a unit); fertile floret glabrous and usually only a few hairs at base of sterile florets; sterile floret reduced, 0.1–0.2 mm long . . . . . ***P. paradoxa**
   All spikelets fertile; fertile floret densely to sparsely pubescent; sterile floret 0.2–4.5 mm long . . . . . 2

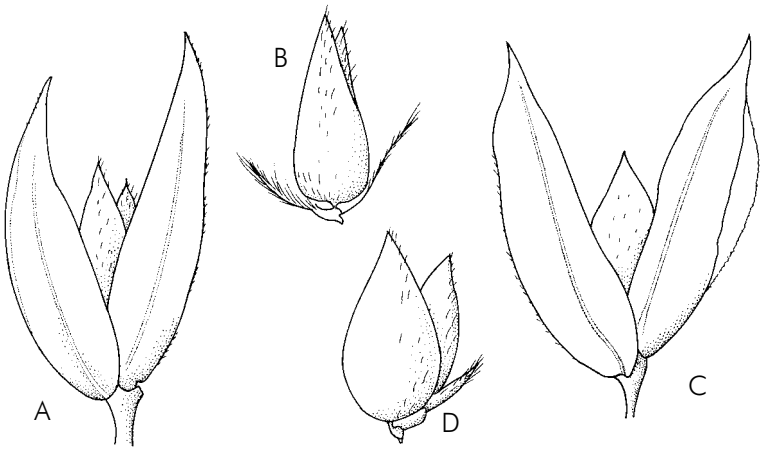



Figure 415.—A, B, *Phalaris arundinacea*; C, D, *P. minor*. A, C, spikelet; B, D, florets with glumes removed. Artist: G. Condy.

2. Perennial . . . . . 3
Annual . . . . . 4
3. Sterile florets 2, ± equal in length, 1.0–2.5 mm long; glumes wingless to narrowly winged . . . . . ***P. arundinacea***
Sterile floret 1, rarely a much reduced second floret shorter than 0.5 mm present; glumes broadly winged . . . . . ***P. aquatica***
4(2). Sterile floret 1 . . . . . ***P. minor***
Sterile florets 2 . . . . . 5
5. Sterile floret 2.5–4.5 mm long, more than $^1/_2$ the fertile lemma length, broad; glumes sparsely pubescent, very prominently winged, wings broadening upwards; inflorescence ovate to oblong-ovate . . . . . ***P. canariensis***
Sterile floret 0.5–1.5 mm long, less than $^1/_2$ the fertile lemma length, subulate; glumes glabrous, very narrowly winged, wings tapering abruptly to the apex; inflorescence narrowly cylindrical . . . . . ***P. angusta***



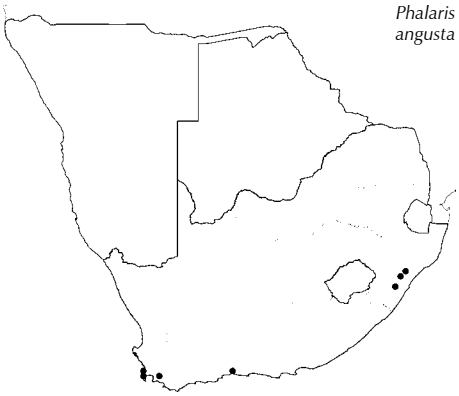
Figure 416.—*Phalaris aquatica* spikelet (4.5–7.5 mm). Photographer: M. Koekemoer.

***Phalaris angusta** Nees ex Trin., in *Species graminum iconibus et descriptionibus illustravit* 1, pl. 78 (1827). Type: South America.

Tufted annual to 1 500 mm high. Leaf blade 50–300 × 3–12 mm. Inflorescence narrowly cylindrical, 25–170 × 6–15 mm. Spikelet 2.9–5.5 mm long; glumes glabrous, pale green with dark green longitudinal stripes, very narrowly winged, wing tapering abruptly to apex; sterile florets two, 0.5–1.5 mm long, less than $^1/_2$ the fertile lemma length; fertile floret 2.2–3.8 × 0.9–1.5 mm, sparsely pubescent; anther 1.0–1.5 mm long.

*Flowering*: September to December. *Ecology*: Disturbed areas such as cultivated and fallow lands. *Frequency in southern Africa*: Infrequent. *Distribution*: South America, North America; naturalised in South Africa, Europe and Australia. KZN, WC. *Economics*: An adventive weed.

Illustrations: Hitchcock & Chase: 554, fig. 802 (1950); Barkworth: 772 (2007).
Anatomy voucher: *Ellis 70*.
Voucher: *Salter 9054*.




***Phalaris aquatica** L., in *Amoenitates Academicae* 4: 264 (1755). Type: Egypt.

*P. nodosa* Murray, in L., *Systema vegetabilium*, ed. 13: 88 (1774), *nom. superfl.*

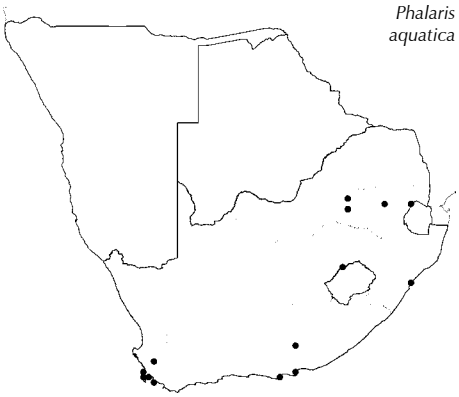
*P. tuberosa* L., in *Mantissa*, Pl. 2: 557 (1771). Type: Europe.

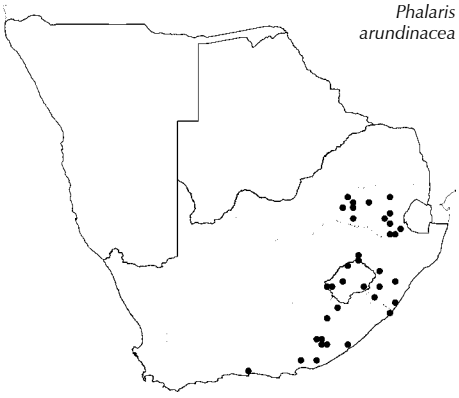
Towoomba canary grass

Loosely tufted perennial up to 1 500 mm high, culm base often bulbous, lateral culms geniculately ascending. Leaf blade 180–350 × 2–15 mm. Inflorescence 15–110 × 10–25 mm, occasionally interrupted at the base. Spikelet 4.5–7.5 mm long; glumes glabrous, pale green with dark green longitudinal stripes, broadly winged, margins entire; sterile floret usually one, 1.4–1.6 mm long, densely pubescent, rarely second sterile floret present, then shorter than 0.5 mm; fertile floret 3.1–4.6 × 1.2–1.5 mm, densely pubescent; anther 1.5–3.5 mm long.

*Flowering*: November to April. *Ecology*: Wet ground by streams and channels or in moist fields. *Frequency in southern Africa*: Locally common. *Distribution*: Mediterranean region eastwards to Iraq. Naturalised from the Mediterranean region. Introduced and cultivated in India, Africa, Australia and North America. G, M, FS, KZN, WC, EC. *Economics*: Planted for winter pasture; weed in cultivated fields.

Illustrations: Chippindall: 90, fig. 60 (1955); Barkworth: 769 (2007).
Anatomy voucher: *Ellis 1236*.
Voucher: *Oliver 6207*.




*Phalaris arundinacea*

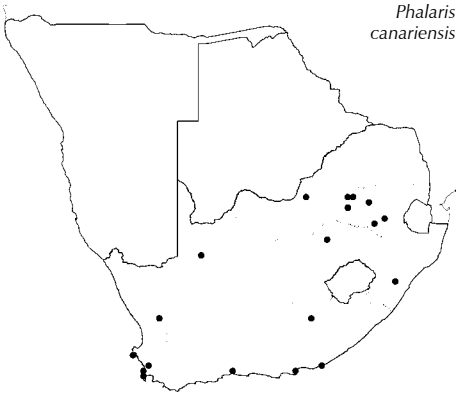
***Phalaris arundinacea** L., in *Species plantarum*: 55 (1753). Type: Europe.

Reed canary grass

Perennial 500–1 500 mm high; rhizome scaly, creeping. Leaf blade 50–200 × 5–15 mm. Inflorescence 70–180 × 10–30 mm, often interrupted in the lower part. Spikelet 3.5–7.5 mm long; glumes glabrous, pale green with dark green longitudinal stripes, usually purple tinged, wingless to narrowly winged, gradually tapering to the apex; sterile florets two, 1.0–2.5 mm long, densely pubescent; fertile floret 2.7–4.5 × 1.0–1.3 mm, sparsely pubescent.

*Flowering*: November to April. *Ecology*: Marshes, river banks, swamp margins and damp hollows in upland areas. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from northern USA. Introduced worldwide. L, G, M, FS, KZN, WC, EC. *Economics*: The var. *picta* L. has striped leaves and is planted in gardens as an ornamental.

Illustrations: Clayton et al.: 96, fig. 32 (1970); Hitchcock & Chase: 555, fig. 805 (1950).
Anatomy voucher: *Ellis 3782*.
Voucher: *Devenish 1387*.


*Phalaris canariensis*

***Phalaris canariensis** L., in *Species plantarum*: 54 (1753). Type: Canary Islands.

Common canary grass

Tufted annual 300–1 000 mm high; culms usually fascicled, erect or geniculately ascending. Leaf blade 100–260 × 3–12 mm. Inflorescence 15–40 × 10–15 mm, ovate to oblong-ovate. Spikelet 7–10 mm long; glumes pale green with dark green longitudinal stripes, sparsely hairy, prominently winged, wing entire, broadening upwards; sterile florets two, ± equal, 2.5–4.5 mm long, more than $^1/_2$ the fertile lemma length, broad and somewhat chaffy; fertile floret 4.8–6.8 × 1.0 mm, pilose; anther 2.5–3.5 mm long.

[Very similar to *P. minor*, which has one sterile floret and glumes with much narrower wings.]

*Flowering*: October to December. *Ecology*: Disturbed areas such as waste places, road verges, cultivated lands and pastures. *Frequency in southern Africa*: Locally common. *Distribution*: Possibly a native of northwest Africa and the Canary Islands. Naturalised and introduced to many parts of the world. NW, G, M, FS, KZN, EC, NC, WC. *Economics*: Cultivated in many countries, mainly as seed for cage birds; ruderal weed.

Illustrations: Hitchcock & Chase: 553, fig. 798 (1950); Barkworth: 769 (2007).
Voucher: *Dryfhout 701*.

***Phalaris minor** Retz., in *Observations Botanicae* 3: 8 (1783). Type: Orient.

Small canary grass

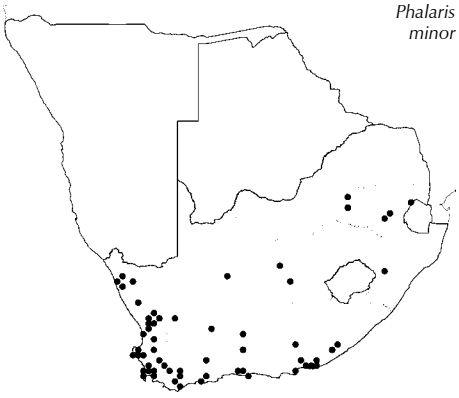
Loosely tufted annual (10–)200–1 000 mm high; culms erect or geniculately ascending. Leaf blade 50–250 × 5–10 mm. Inflorescence 10–60 × 10–15 mm. Spikelet 4.0–6.5 mm long; glumes gla-

brous, pale green with dark green longitudinal stripes, winged, wing usually irregularly dentate or toothed, sometimes entire; sterile floret one, 0.5–1.3 mm long (occasionally 0.2–0.3 mm long), sparsely pubescent; fertile floret 2.7–4.0 × 0.5–1.0 mm, pilose; anther 1.5–2.0 mm long.

[Very similar to *P. canariensis*, which has two sterile florets and broader glume wings, and *P. aquatica*, which has the glume wing entire.]

*Flowering*: September to January. *Ecology*: Disturbed areas such as cultivated and fallow lands, roadsides and waste places, often in damp situations. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from the Mediterranean. Introduced and naturalised in most temperate regions and in the tropics. G, M, FS, KZN, NC, WC, EC. *Economics*: Ruderal weed.

Illustrations: Hitchcock & Chase: 554, fig. 800 (1950); Barkworth: 769 (2007).
Anatomy vouchers: *Ellis 622, 1695, 2453* & *4616*.
Voucher: *Retief & Reid 483*.


*Phalaris minor*

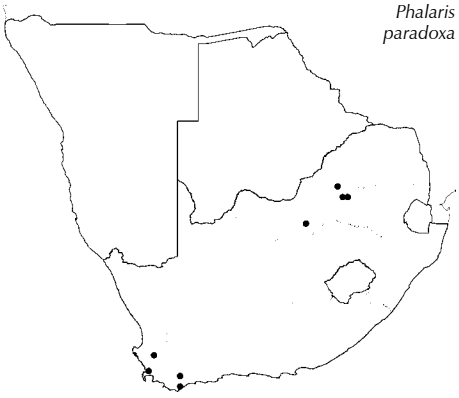
***Phalaris paradoxa** L., in *Species plantarum,* ed. 2. 2: 1665 (1763). Type: Orient.

*P. paradoxa* L. var. *praemorsa* Coss. & Durieu, in *Exploration scientifique de l'Algerie* 2: 25 (1855). Type: Europe.

Tufted annual 200–1 000 mm high; culms fascicled, erect or geniculately ascending. Leaf blade 50–300 × 2–6 mm. Inflorescence to 90 × 20 mm, often enclosed in an inflated leaf sheath; spikelets borne and falling in units of 6 or 7, one fertile surrounded by 5 or 6 sterile spikelets. Sterile spikelet 2.0–6.5 mm long, but often reduced to a clavate knob; glumes 2.0–6.5 mm long, pale green with dark green longitudinal stripes; sterile floret reduced, 0.1–0.2 mm long. Fertile spikelet 5.5–8.2 mm long; glumes 5.5–8.2 mm long, pale green with dark green longitudinal stripes, winged, wings lobed or toothed; anther 1.0–1.5 mm long.

*Flowering*: August to November. *Ecology*: In moist, often poorly drained soils; near ponds or irrigation channels, also in cultivated and fallow lands. *Frequency in southern Africa*: Rare. *Distribution*: Mediterranean. Introduced and naturalised in South Africa and many temperate regions worldwide. NW, G, WC. *Economics*: Weed.

Illustrations: Hitchcock & Chase: 552, fig. 797 (1950); Barkworth: 767 (2007).
Voucher: *Du Toit 1867*.


*Phalaris paradoxa*

## **Phragmites** Adans.

Adanson: 34, 559 (1763); Stapf: 540 (1899); Stent: 295 (1924); Chippindall: 228 (1955); Clayton: 113 (1967a); Clayton: 168 (1968); Clayton: 117 (1970); Gordon-Gray & Ward: 1 (1971); Launert: 91 (1971); Clayton & Renvoize: 182 (1986); Gibbs Russell et al.: 269 (1990); Watson & Dallwitz: 729 (1994); Phillips: 64 (1995).

Perennial reed; long-rhizomatous; culms erect, often woody and bamboo-like. **Leaves** cauline; leaf blade long, linear-lanceolate to lanceolate, expanded or inrolled from margins, deciduous at base of blade or at base of leaf sheath; auricles small, greenish, sometimes tinged brownish on margins, not clasping culms; *ligule* a fringed membrane or a fringe of hairs. **Inflorescence** a large, droop-

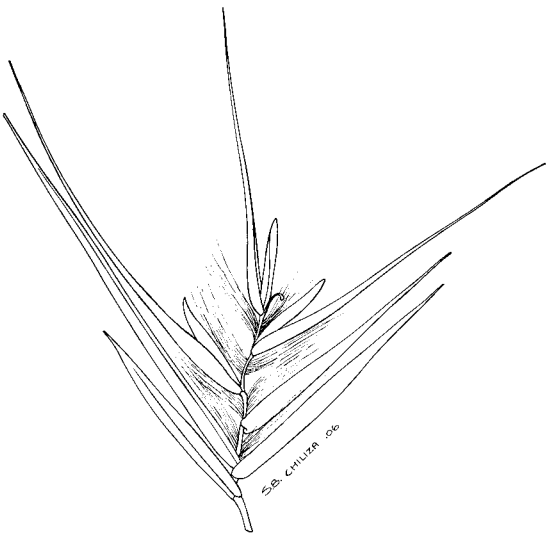


Figure 417.—*Phragmites australis* spikelet (17 × 8 mm). Artist: S.B. Chiliza.

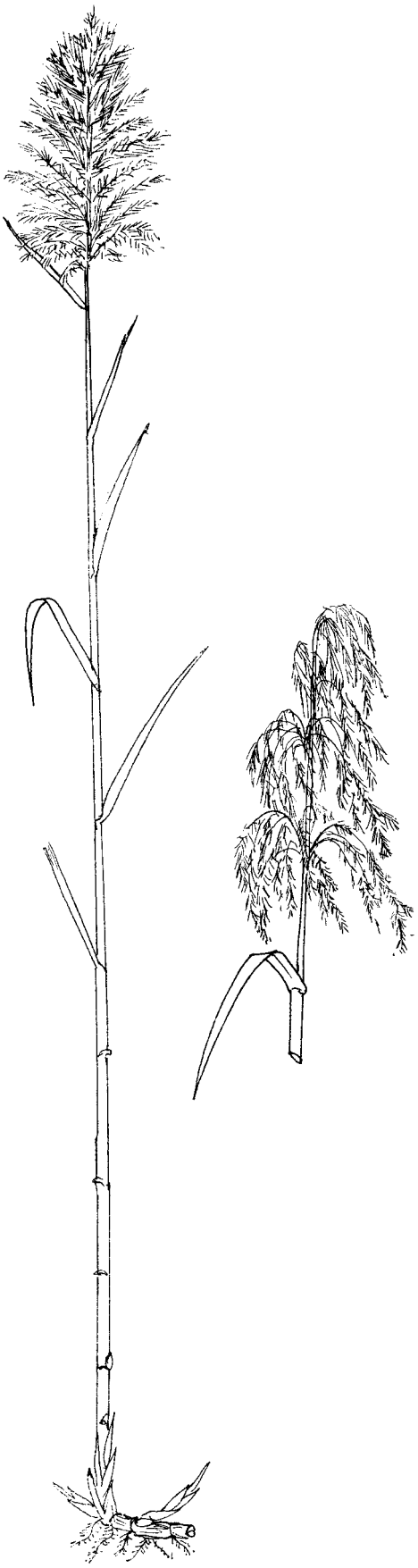


Figure 418.—*Phragmites australis*. Artist: H.W. du Toit.



Figure 419.—*Phragmites australis* spikelet (12–18 mm). Photographer: M. Koekemoer.

ing, densely plumose panicle, open or contracted; *spikelets* solitary, pedicelled. **Spikelet** laterally compressed, disarticulating above glumes; *glumes* very unequal, shorter than spikelet, membranous, 3–5-nerved, acuminate, subacute. **Florets** 3–11; *lowermost floret* male or sterile, usually 3-nerved, acuminate, awnless; *succeeding florets* bisexual or rarely uppermost reduced; *lemmas* decreasing in size upwards, similar in texture to glumes, membranous, linear-lanceolate, 1–3-nerved, glabrous but enveloped by long, silky hairs from callus, finely acuminate or tapering into an awn; *awn* straight, shorter than body of lemma; *callus* long, slender, blunt, hairy with long, silky hairs; *palea* shorter than lemma, oblong, linear-oblong or ovate-lanceolate; obtuse, 2-keeled, membranous or subhyaline. **Lodicules** 2. **Stamens** 3, sometimes 2 in lowest male floret, if present. **Ovary** glabrous; style distinct, stigma plumose. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 12$ (aneuploids, high polyploidy).

**Species** ± 3, cosmopolitan; 2 in southern Africa, widespread in aquatic or semi-aquatic habitats.

Species treatment by M.J. Moeaha.

**Quick guide to easily confused genera:**

Leaf base collar or auricle small, not clasping the culm; glumes very unequal in size, shorter than spikelet; lemma glabrous but enveloped by long hairs from the callus; mature inflorescence branches flexible, usually drooping; lowest inflorescence branches with silky hairs at base . . . . . **Phragmites**
Leaf base collar or auricle large, distinct and clasping the culm; glumes ± equal in size, as long as spikelet; lemma long-hairy; mature inflorescence branches stiff and ascending; lowest inflorescence branches without silky hairs at base . . . . . ***Arundo**

**Key to species:**

Upper glume 6–9 mm long; leaf deciduous at base of blade, leaving sheath behind on culm; callus hairs 6–10 mm long, acute; leaf blade tapering into a long filiform and flexible apex . . . **P. australis**
Upper glume 3–5 mm long, shortly acuminate; leaf deciduous at base of sheath, therefore old culm bare; callus hairs 4–7 mm long; leaf blade apex stiff and pungent . . . . . **P. mauritianus**

**Phragmites australis** (Cav.) Steud., in *Nomenclator botanicus* ed. 2,2: 324 (1841). Type: Australia.

*P. communis* Trin., in *Fundamenta agrostographiae*: 134 (1820). Type: Europe.

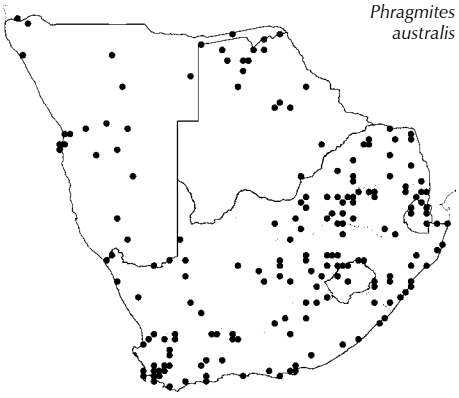
COMMON REED, FLUITJIESRIET

Robust perennial, up to 4 m high; rhizomes long; culms solitary, not tillering; leaves cauline, deciduous at base of blade, sheath persistent

on culm. Leaf blade 350 × 35 mm, apex filiform, flexuous. Inflorescence compact, 120–400 mm long; with a ring of silky hairs at base of lowest branches. Spikelet 10–18 mm long; upper glume 6–9 mm long, acute; lemma glabrous; callus hairs 6–10 mm long; anther 1.5–2.0 mm long.

*Flowering*: December to June. *Ecology*: In riverbeds and wet places. *Frequency in southern Africa*: Common or locally dominant. *Distribution*: Cosmopolitan. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Building, basketry, medicinally; erosion control; favourite nesting site for birds.

Illustration: Chippindall: 229, fig. 202 (1955).
Anatomy vouchers: *Ellis 187* & *Loxton & Ellis 986*.
Voucher: *Burtt Davy H610*.


*Phragmites australis*

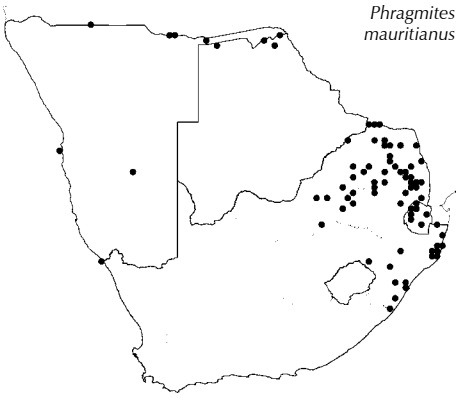
**Phragmites mauritianus** Kunth, in *Révision des graminées* 2: 277 (1830). Type: Mauritius, 'Mascarene Isles', Indian Ocean, *Desfontaines* (B, holo.).

LOWVELD REED, LAEVELDFLUITJIESRIET

Robust perennial up to 5 m high; rhizomes long; culms tillering from lower nodes; leaves cauline, deciduous at base of sheath. Leaf blade 300 × 30 mm, apex sharp, rigid (young leaves usually more rigid and spiny than *P. australis*), scabrid beneath (at least in upper half); Inflorescence broad, 200–400 mm long, with ring of silky hairs at base of lowest branches. Spikelet 7–15 mm long; upper glume 3–5 mm long, shortly acuminate; lemma glabrous; callus hairs 4–7 mm long; anther 1.5–2.0 mm long.

*Flowering*: January to June. *Ecology*: Riverbeds. *Distribution*: Northwards throughout tropical Africa. N, B, S, LIM, NW, G, M, FS, KZN. *Economics*: Basketry, building and fencing.

Anatomy vouchers: *Ellis 1584* & *1618*.
Voucher: *Galpin 13534*.


*Phragmites mauritianus*

## **Poa** L.

Linnaeus: 67 (1753); Stapf: 711 (1900); Stent: 302 (1924); Chippindall: 51 (1955); Clayton: 43 (1970); Launert: 152 (1970a); Launert: 47 (1971); Edmondson: 159 (1980); Clayton & Renvoize: 101 (1986); Gibbs Russell et al.: 270 (1990); Watson & Dallwitz: 748 (1994); Sell & Murrell: 159 (1999); Soreng: 486 (2007).

Tufted or decumbent annual or perennial; sometimes geniculate, rhizomatous and/or stoloniferous. **Leaf blade** expanded, rolled or folded; apex often boat-shaped; *ligule* an unfringed or rarely a fringed membrane. **Inflorescence** a panicle, open and often effuse or contracted; *spikelets* solitary, pedicelled, pedicels swollen at apex. **Spikelets** laterally compressed, disarticulating above glumes, sometimes viviparous; *glumes* ± equal or unequal, shorter than spikelet, similar, membranous, ovate or oblong, acute to obtuse, with median keel, awnless, mucronate or rarely awned; lower glume 1–3-nerved; upper glume usually 3-nerved. **Florets** 2–6, bisexual or uppermost reduced; *lemmas* decreasing in size upwards, similar in texture to glumes, membranous, lanceolate or oblong, obtuse or subacute, 5–7(–11)-nerved, entire, median-keeled, keel glabrous or hairy, especially towards base, usually awnless, rarely mucronate or



Figure 420.—*Poa annua* lemma (2.1 × 0.6 mm). Artist: S.B. Chiliza.

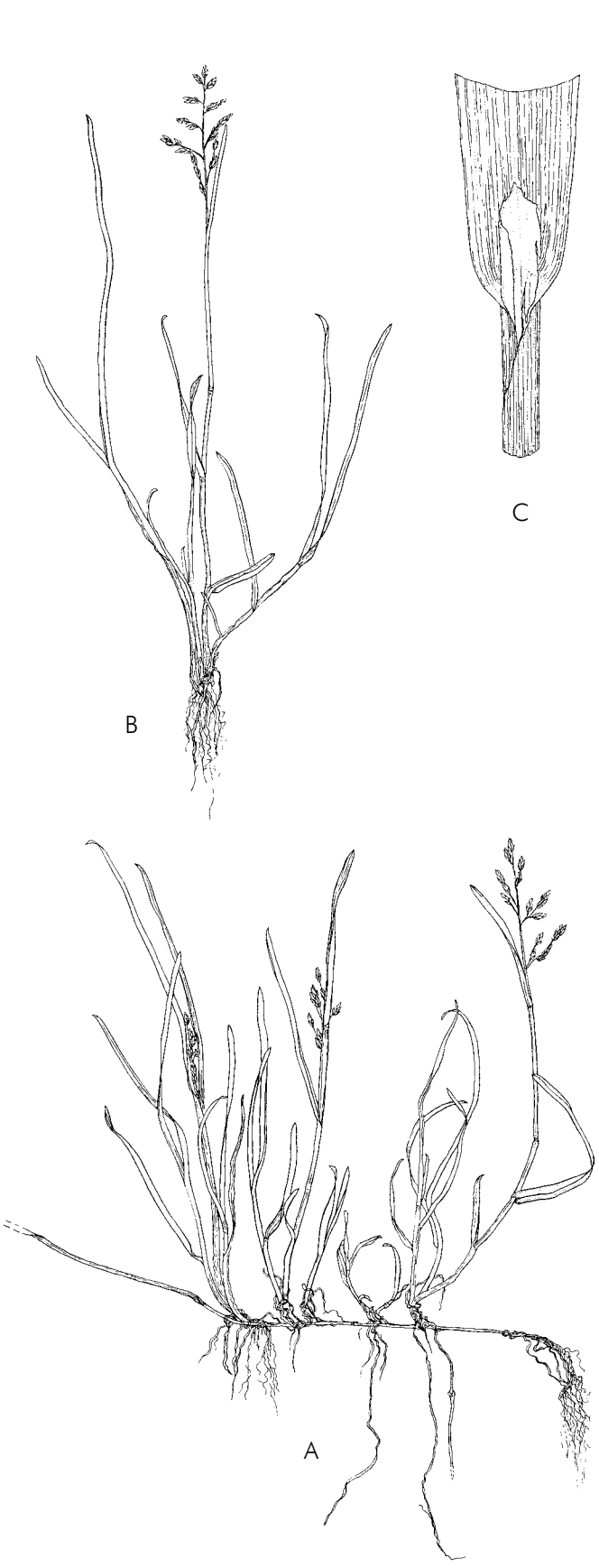



Figure 421.—*Poa annua*. A, B, plants; C, ligule. Artist: C.D. Bartman.




Figure 422.—*Poa bulbosa* subsp. *vivipara*. A, plant; B, proliferating spikelet. Artist: C. Letty.

awned; *callus* often with long woolly hairs; *palea* subequal to lemma, 2-keeled, thinner in texture than lemma. **Lodicules** 2, ± 2-lobed. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose. **Caryopsis** ellipsoid to ovoid; hilum short; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (aneuploids, high polyploidy).

**Species** ± 500, cosmopolitan; 6 in southern Africa, widespread. Naturalised and indigenous.

Species treatment by L. Fish.



Figure 423.—*Poa annua* spikelet (4–6 mm). Photographer: M. Koekemoer.

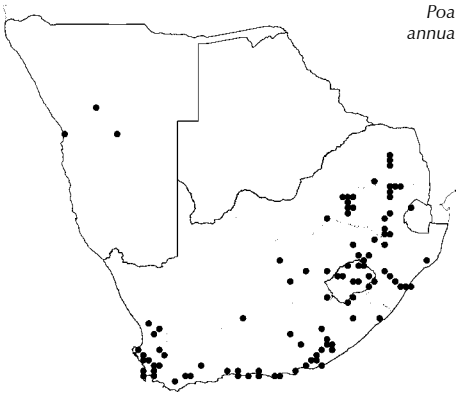
**Key to species:**

1. Spikelet viviparous, parts much distorted, often enlarged and elongated; culms bulbous at base . . . . . **P. bulbosa** subsp. **vivipara**
   Spikelet not viviparous, parts not distorted; culms not bulbous at base . . . . . 2
2. Inflorescence linear to spike-like, branches erect, adpressed to central axis, usually more than their own length apart; at least one branch at node short and with spikelets nearly to base, other branches with spikelets in upper part only . . . . . **P. leptoclada**
   Inflorescence ovate to pyramidal, branches spreading slightly or horizontally from central axis, less than their own length apart; all branches with spikelets only in upper ½ . . . . . 3
3. Annual or biennial; anther 0.6–0.8(1.2) mm long; leaves flaccid; lemma keel, margins and lateral nerves usually densely hairy, occasionally glabrous or sparsely hairy . . . . . ***P. annua**
   Perennial; anther (1.0)1.2–2.5 mm; leaves firm; lemma keels and/or margins hairy . . . . . 4
4. Basal sheaths splitting into fibres; rhizomes oblique; lemma sparsely long hairy near base or glabrous . . . . . **P. binata**
   Basal sheaths usually not fibrous; plants rhizomatous or stoloniferous; lemma base densely hairy . . . . . 5
5. Upper ligule truncate, rounded to obtuse, to 2(3) mm long; lemma hairy on keel and margins; plant rhizomatous; rhizomes stout, creeping . . . . . ***P. pratensis**
   Upper ligule acute to acuminate, 3–6 mm long; lemma keel hairy, margins usually glabrous (rarely sparsely hairy near margin base); plants stoloniferous; stolons leafy and slender . . . . . ***P. trivialis**

***Poa annua** L., in *Species plantarum*: 68 (1753). Type: Europe.

ANNUAL BLUE GRASS

Loosely to compactly tufted annual, sometimes biennial, 25–300 mm high; sometimes stoloniferous or rooting at nodes; culms usually geniculate at base. Leaf blade 20–50(–140) × 1–5 mm, expanded or folded, flaccid; ligule (0.5)2.0–5.0 mm long; obtuse to truncate. Inflorescence ± pyramidal, 10–120 mm long; branches solitary or paired, spreading horizontally or almost so at maturity, less than own length apart; spikelets aggregated in upper ½ of branches. Spikelet (3)4–6 mm long; 3–5-flowered; lower glume 1-nerved; lemmas strongly overlapping, membranous, margins and apex broad, white, delicate, densely to sparsely hairy on keel and margins near base or apex, occasionally glabrous; palea keels densely hairy or glabrous; anthers 0.6–0.8(1.0) mm long.

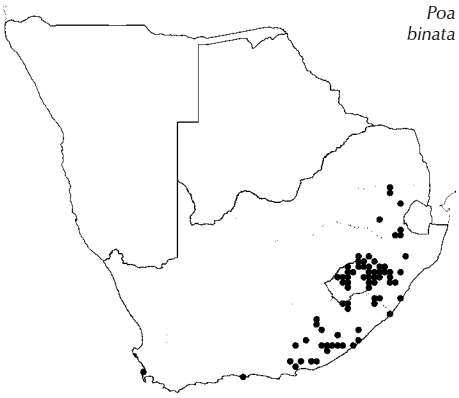


*Poa annua*

*Flowering*: January to December (usually in the rainy season of a particular region). *Ecology*: Damp places on roadsides, gardens and waste land or other disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Naturalised from Europe, Mediterranean region and eastwards to India and central Asia; introduced worldwide.

N, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Cosmopolitan weed; troublesome in lawns and sports fields.

Illustrations: Chippindall: 53, fig. 22 (1955); Soreng: 520 (2007).
Anatomy vouchers: *Ellis 415, 475* & *1487*.
Voucher: *Smook 3576*.



*Poa binata*

**Poa binata** Nees, in *Florae Africanae australioris*: 378 (1841). Type: South Africa, Eastern Cape, 'In montibus inter Intrivier et Klipplastsrivier flumina locis graminosis et paludosis alt 4000–5000, atque in monte Los Tafelberg', *Drège s.n.* (K, lecto.).

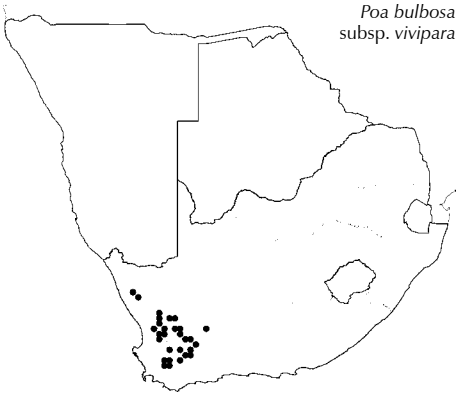
*P. atherstonei* Stapf, in *Flora capensis* 7: 713 (1900). Type: Eastern Cape, Graaff Reinet Division, summit of Compass Berg, *Atherstone 461* (K, holo.).

*P. heterogama* Hack., in *Records of the Albany Museum* 1: 112 (1904). Type: South Africa, Eastern Cape, Kentani, alt. 1000, Aug. 1902, *Miss Alice Pegler 50* (GRA, holo.; PRE, iso.).

Densely tufted perennial 150–600 mm high; rhizome oblique; old basal leaf sheaths split into fibres. Leaf blade 30–200 × 1–5 mm, expanded or folded; ligule to 2 mm long, obtuse. Inflorescence ovate to pyramidal, 50–150 mm long, branches solitary or binate at a node, slender, flexuous, smooth, usually splitting into two a distance away from central axis, usually less than their own length apart; spikelets aggregated on upper $^1/_2$ of branches. Spikelet 4–6 mm long, 3–5-flowered; lower glume 1-nerved, occassionally 1 or 2 additional nerves at base; lemma keel and margins sparsely long hairy from base to near middle (variable in same inflorescence) or glabrous; palea keels glabrous or sparsely ciliate; anthers 1.5–2.5 mm long.

*Flowering*: September to May. *Ecology*: Along mountains and escarpment in grassland; in moist areas, such as stream banks, in bogs and around vleis. *Frequency in southern Africa*: Common. *Distribution*: Mesic eastern southern Africa northwards into Zimbabwe. L, M, FS, KZN, WC, EC. [There is a specimen at PRE from Namibia, but as it seems totally out both in distribution and habitat, this distribution is therefore not accepted until more specimens are collected from this area.]

Illustration: Chippindall: 54, fig. 23 (1955).
Anatomy vouchers: *Ellis 1386, 2852, 4302, 4322* & *Smook 4818*.
Voucher: *Stirton 5421*.



*Poa bulbosa* subsp. *vivipara*

**Poa bulbosa** L. subsp. **vivipara** (Koeler) Arcang., in *Compendio della Flora italiana, ossia Manuale per de la Determinazione della Piante che trovansi selvatiche od inselvatichite nell'Italia e nella Isole adiacenti*: 785 (1882). Type: Europe.

*P. vivipara* (L.) Willd., in *Enumatio Plantarum Horti regii botanici berolinensis*: 103.

BULBOUS BLUEGRASS

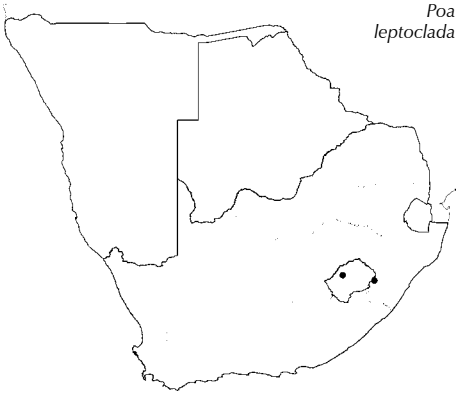
Tufted perennial 150–300(–500) mm high; roots fibrous; base bulbous and covered with scarious remains of old sheaths; most leaves basal. Leaf blade 20–90(–150) × 1–2 mm, filiform; ligule 4–6 mm long. Spikelet 4–6 mm long, 3–6-flowered, always viviparous with distorted and enlarged floret parts; lemma 3–5(–7) mm long, glabrous, sometimes woolly at base on keel and margins, sparsely scabrid on keel and marginal nerves, developing into a leaf in older florets; palea ciliate on keels; anthers 1.0–1.5 mm long.

[Two varieties have been recognised based on whether the spikelet is proliferous (var. *vivipara*) or not (var. *bulbosa*). It has been suggested that the population in southern Africa could be *P. sinaica* Steud. var. *vivipara* Täckh. but it could also be a species endemic to the FSA region. Since all southern African specimens so far recorded are viviparous, it makes it difficult to determine the species with confidence.]

*Flowering*: July to November. *Ecology*: On gravelly, well-drained soils in damp situations such as streamside and around seasonal pans. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Naturalised from Europe and introduced to many parts of the world or possibly endemic in FSA region (see above). NC, WC.

Illustration: Soreng: 517 (2007).
Anatomy voucher: *Ellis 2471*.
Voucher: *C.M. van Wyk 1407*.

**Poa leptoclada** Hochst. ex A.Rich., in *Tentamen Florae Abyssinicae* 2: 422 (1851). Type: Ethiopia, Tigre, Shire, *Schimper 1826* (many syntypes).


*Poa leptoclada*

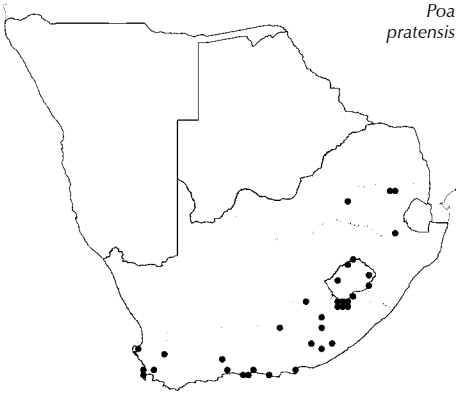
Straggling or compactly tufted perennial 200–600 mm high; lower leaf sheaths sometimes fibrous. Leaf blade 20–120 × 0.5–4.0 mm, filiform; ligule 0.5–3.5(6.0) mm long. Inflorescence 50–190 mm long, linear to spike-like, branches adpressed to central axis, usually more than their own length apart and in clusters of 2 to 3, of which one, at least, is very short with spikelets to near base while the other two are long with spikelets aggregated at the ends. Spikelet (2.1)3.0–4.5(–6.0) mm long, 2–5-flowered; lemma glabrous or hairy on nerves basally, sometimes hairy on back with or without a tuft of wool at keel base; palea ciliate on keels; anthers 0.5–1.0 mm long.

[Highly variable species, varying according to habitat.]

*Flowering*: Around July. *Ecology*: Wet places in the Drakensberg range; prefers moist shady places. *Frequency in southern Africa*: Extremely rare. *Distribution*: Northwards on the mountains to East Africa, Ethiopia and Cameroun; also Sudan and Yemen. L, KZN.

Voucher: *Hilliard & Burtt 17708* (NU) (Lesotho, Blue Mt Pass, 2927BD); *15339* (EK) KZN; (Underberg, headwaters of Mlahlangubo, 2929CB).

***Poa pratensis** L., in *Species plantarum*: 67 (1753). Type: Europe.


*Poa pratensis*

*P. bidentata* Stapf, in *Flora capensis* 7: 713 (1900). Type: South Africa, without precise locality, *Zeyher s.n.* (K, holo.).

Kentucky bluegrass, meadow grass

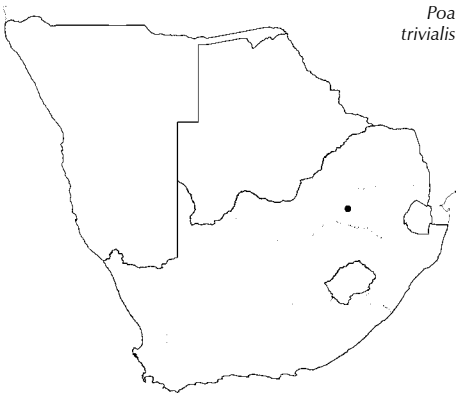
Loosely to compactly tufted, highly variable perennial 250–600(–800) mm high; rhizome long, stout and wiry or absent. Leaf blade 60–250 × 2–5 mm, flat or rolled; ligule truncate to rounded, 0.5–2.0(3.0) mm long. Inflorescence 50–200 mm long, ovate, lowest node with 3–6 branches; branches smooth or scabrid, less than own length apart; spikelets aggregated on upper part of branches. Spikelet 3.0–5.5(7.0) mm long, 2–5-flowered; lower glume 1–3-nerved; lemma 5-nerved, distinctly muriculate, keels and margin densely hairy to middle, base with long fine woolly hairs; palea keels ciliate to scabrid; anthers 1.2–2.0 mm long.

[A highly polymorphic species with many different forms, as well as hybrids both natural and artificial, and many cultivars. Even given

this, some of the specimens from Lesotho and the southern Drakensberg should be more closely examined as they may turn out to be new species.]

*Flowering*: September to January (and April). *Ecology*: Moist shady areas, usually in mountains. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised probably from Europe but found throughout Europe and central Asia and North America, introduced elsewhere and now established in the temperate regions throughout the world. L, G, M, KZN, WC, EC. *Economics*: Regarded as a valuable pasture in the past but now only cultivated to a limited extent for lawns as it is an important winter turf grass, although it needs fertile soil and plenty of moisture.

Illustration: Soreng: 524 & 525 (2007).
Anatomy voucher: *Ellis 4303*.
Voucher: *Devenish 1158*.



*Poa trivialis*

***Poa trivialis** L., in *Species plantarum*: 67 (1753). Type: Europe.

ROUGH STALK BLUE GRASS

Loosely to densely tufted perennial 200–900 mm high, spreading from a decumbent base; stolons creeping, leafy. Leaf blade 50–150 × 1–5 mm; ligule 3–10 mm long acute to acuminate. Inflorescence 75–200 mm long, ovate or pyramidal, open to contracted, branches in clusters of 3–7, undivided in lower parts, scabrid, less than own length apart; spikelets aggregated on upper part of branches. Spikelet (2)4–6 mm long, 2–5-flowered; lower glume 1-nerved; lemma keel short hairy from base to middle, margins glabrous rarely sparsely hairy near base, keel base densely woolly hairy; palea keels glabrous but scabrid; anthers 1.2–2.0 mm long.

*Flowering*: December and March. *Ecology*: Moist disturbed places. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from Europe. Introduced to temperate areas worldwide. G. *Economics*: Many cultivars are used as pastures and lawns.

Illustration: Soreng: 569 (2007).
Voucher: *Meredith PRE34056*.

## **Pogonarthria** Stapf

Stapf: 316 (1898); Hackel: 531 (1912); Stent: 295 (1924); Chippindall: 184 (1955); Launert: 303 (1966); Launert: 152 (1970a); Phillips: 267 (1974); Chippindall & Crook (1976); Clayton & Renvoize: 220 (1986); Gibbs Russell et al.: 272 (1990); Watson & Dallwitz: 756 (1994); Cope: 148 (1999).

Annual or perennial, tufted; sometimes rhizomatous. **Leaf blade** linear, expanded or rolled; *ligule* a fringe of hairs. **Inflorescence** of many 1-sided, spike-like racemes on a long central axis; racemes solitary or whorled, sometimes stiff, spreading, straight or curved like a herringbone; *spikelets* solitary, shortly pedicelled. **Spikelet** laterally compressed, disarticulating above glumes and variously between florets; *glumes* very unequal, similar, shorter than spikelet, coriaceous, acute or acuminate, keeled, 1-nerved, awnless; lower

glume ± ½ as long as upper glume. **Florets** 4–11, bisexual, sometimes uppermost reduced, decreasing in size upwards; *lemma* similar in texture to glumes, membranous, lanceolate or ovate-lanceolate, 3-nerved, glabrous, entire, acute, acuminate or minutely awned; *callus* 0; *palea* shorter than lemmas, acute, 2-keeled, similar in texture to lemma. **Lodicules** 2, minute, delicate, glabrous. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose. **Caryopsis** ellipsoid to fusiform; hilum short; pericarp fused; embryo large (about ½ grain length). **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines uneven to even (more even in *P. fleckii* than in *P. squarrosa*). PCR sheath extensions present, or absent. Maximum number of extension cells when present 1. PCR cell chloroplasts centripetal. **Cytology**: $x = 10$ (7) (polyploidy).



Figure 424.—*Pogonarthria squarrosa* spikelet (3.3–7.8 mm). Photographer: M. Koekemoer.

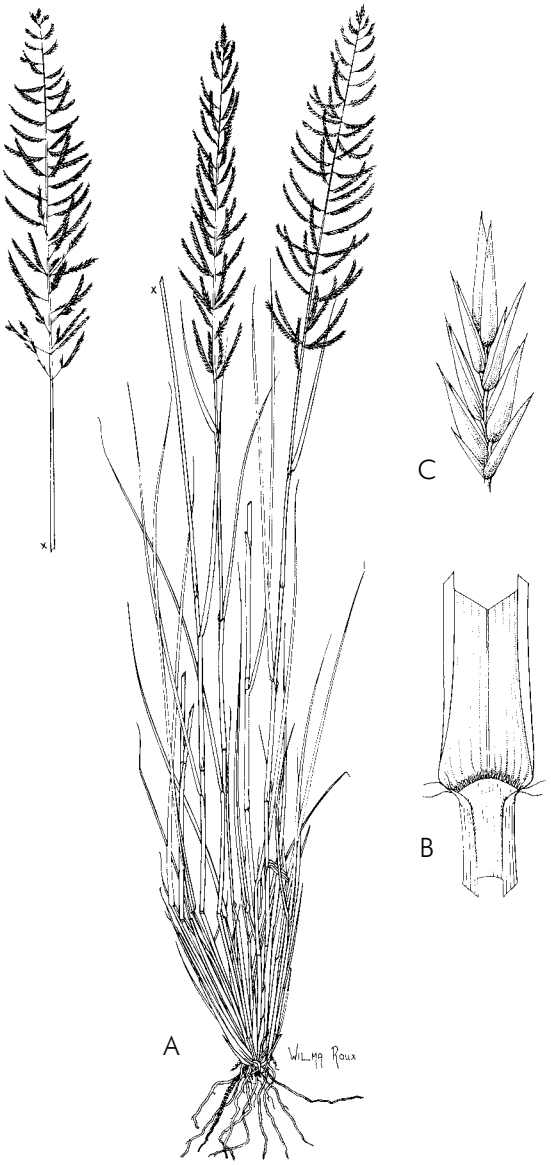



Figure 425.—*Pogonarthria squarrosa*. A, plant; B, ligule; C, spikelet. Artist: W. Roux.

**Species** 4, Africa; 3 in southern Africa, widespread, not recorded from Western Cape.

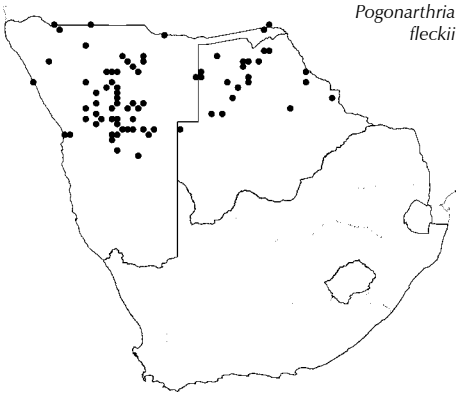
Species treatment by A.C. Mashau.

**Key to species:**

1. Upper glume 1.6–2.3 mm long; lemma ovate to lanceolate, sharply acuminate to shortly awned; racemes ascending or spreading, often falcately curved upwards; lower glume 0.8–1.5 mm long . . . . . **P. squarrosa**
   Upper glume 2.4–4.8 mm long; lemma ovate-oblong to elliptic-oblong, tapering to a slightly recurved awn; racemes spreading up to 90 degrees from the main axis, seldom falcately curved; lower glume 1.2–3.2 mm long . . . . . 2
2. Culms and leaves hairy; lower glume 1.2–2.3 mm long; upper glume 2.4–3.2 mm long; anther 0.8–1.2 mm long; plant slender, densely tufted, sometimes geniculate; spikelet 4–5-flowered; widespread . . . . . **P. fleckii**
   Culms and leaves glabrous; lower glume 2.1–3.2 mm long; upper glume 3.2–4.8 mm long; anther 1.5 mm long; plant robust, loosely tufted, erect; spikelet 5–6-flowered; Namibia only (rare) . . . . . **P. leiarthra**

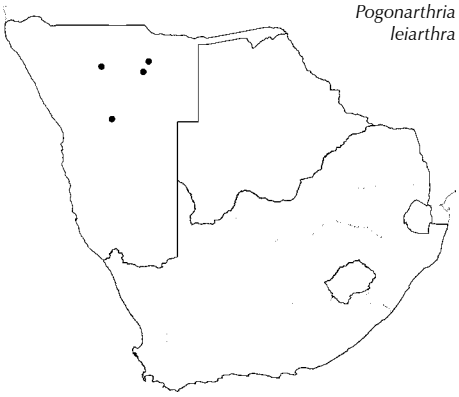
**Pogonarthria fleckii** (Hack.) Hack., in *Vierteljahrsschrift der Naturforschen den Gesellscaft in Zürich* 57: 532 (1912). Type: Namibia, Rehoboth, *Fleck s.n.* (Z).

Slender, densely tufted, decumbent annual 130–420 mm high; culms and leaves hairy. Leaf blade 60–180 × 3–6 mm. Inflorescence of racemes spreading up to 90 degrees from the main axis, seldom falcately curved. Spikelet 5–10 mm long, 4–5-flowered; glumes lanceolate, dark reddish brown; lower glume 1.2–2.3 mm long, acute; upper glume 2.4–3.2 mm long, acuminate; lemma elliptic-oblong to ovate-oblong, drawn out at apex into a minute, slightly recurved awn; anther 0.8–1.2 mm long.



*Flowering*: March to May. *Ecology*: Sandy or well-drained soils, often on Kalahari sands; in open bush or mopane veld, often in disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Northwards to Zimbabwe, Zambia and Mozambique. N, B. *Economics*: An indicator of over-utilisation in certain veld types.

Anatomy vouchers: *Ellis 2894, Gibbs Russell & Smook 5316, Smook 5077 & 5172*.
Voucher: *Seydel 4290*.


*Pogonarthria leiarthra*

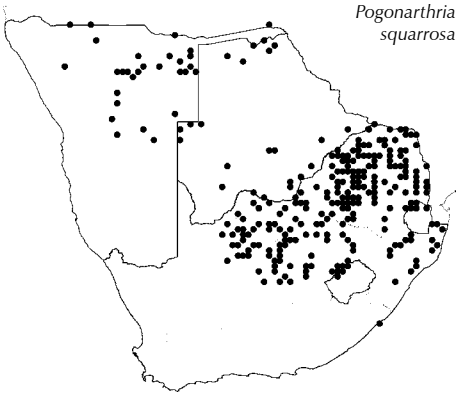
**Pogonarthria leiarthra** Hack., in *Vierteljahrsschrift der Naturforschen den Gesellscaft in Zürich* 57: 531 (1912). Type: Namibia, (Amboland); Ondonga, *Rautanen*.

Robust, loosely tufted, erect annual 250–800 mm high; culms and leaves glabrous. Leaf blade 70–200 × 3–4 mm. Inflorescence of racemes spreading up to 90 degrees from the main axis, seldom falcately curved. Spikelet 5–8 mm long, 5–6-flowered; glumes lanceolate, dark reddish brown; lower glume 2.1–3.2 mm long, acute; upper glume 3.2–4.8 mm long, acuminate; lemma ovate-oblong, drawn out at apex into a minute, slightly recurved awn; anther 1.5 mm long.

[This species looks like a more robust and glabrous form of *P. fleckii*.]

*Flowering*: February to March. *Ecology*: Red sand. *Frequency in southern Africa*: Rare. *Distribution*: N.

Voucher: *Schoenfelder S.575*.


*Pogonarthria squarrosa*

**Pogonarthria squarrosa** (Roem. & Schult.) Pilg., in *Notizblatt des Königlichen Botanischen Gartens und Museums zu Berlin* 5: 149 (1910). Type: South Africa, Northern Cape, near Kuruman [in the land of the Beetjuans near Rissipien], *Lichtenstein 66* (B, holo.).

HERRINGBONE GRASS, SEKELGRAS

Tufted perennial or possibly sometimes annual, 270–1 400 mm high; rhizome short. Leaf blade 40–330 × 2.0–5.5 mm; sheath glabrous. Inflorescence of racemes ascending or spreading, usually falcately curved upwards. Spikelet 3.3–7.8 mm long, 4–10-flowered; glumes lanceolate, dark reddish brown; lower glume 0.8–1.5 mm long, acute; upper glume 1.6–2.3 mm long, acuminate; lemma ovate-lanceolate, sharply acuminate to shortly awned; anther 0.9–1.3 mm long.

*Flowering*: November to May. *Ecology*: In light sandy soil; open veld or under trees, often in disturbed places. *Frequency in southern Africa*: Common. *Distribution*: Southern Africa northwards to East Africa and also West Africa. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, EC. *Economics*: A hard, unpalatable grass with a low yield; an indicator of old lands and poor soils; occasional weed.

Illustrations: Chippindall: 184, fig. 159 (1955); Clayton et al.: 268, fig. 73 (1970).
Anatomy vouchers: *Van Heerden 45, Ellis 424, 2042, 2043, 2089 & 2090*.
Voucher: *Smook 2639*.

## **Polevansia** De Winter

De Winter: 130 (1966); Clayton & Renvoize: 240 (1986); Gibbs Russell et al.: 274 (1990); Watson & Dallwitz: 763 (1994).



Figure 426.—*Polevansia rigida* spikelet (3.5–4.5 mm). Photographer: M. Koekemoer.

Perennial, decumbent, mat-forming, rooting at nodes; rhizomatous and stoloniferous. **Leaf blade** linear, expanded, tapering to an obtuse apex; sheaths chartaceous; *ligul*e a fringed membrane, minutely fimbriate. **Inflorescence** rigid, oblong; of a number of short, dense, 1-sided, spike-like racemes, adpressed and arranged alternately on the central axis; rachis branches and pedicels triangular in cross section; *spikelets* solitary, pedicelled; lower glume adaxial to rachis. **Spikelet** dorsiventrally compressed, disarticulating above glumes; *glumes* unequal, dissimilar, glabrous, awnless; lower glume lanceolate to narrowly ovate, subhyaline, nerveless, apex obtuse, truncate or emarginate; upper glume lanceolate, subcoriaceous, 1-nerved, slightly keeled towards apex, apex obtuse, as long as spikelet. **Floret** 1, bisexual; *lemma* subcoriaceous, narrowly lanceolate-oblong, entire, acute, not keeled, 3-nerved, lateral nerves hairy on lower half, very small mucro present, awnless; *callus* short, obtuse, shortly hairy; *palea* narrowly oblong-elliptic, 2-keeled, subhyaline, subcoriaceous, apex truncate, margins hairy on lower half. **Lodicules** 2, free, small, truncate. **Stamens** 3. **Ovary** oblong; styles distinct, plumose. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines even. PCR sheath extensions absent. PCR cell chloroplasts centripetal.

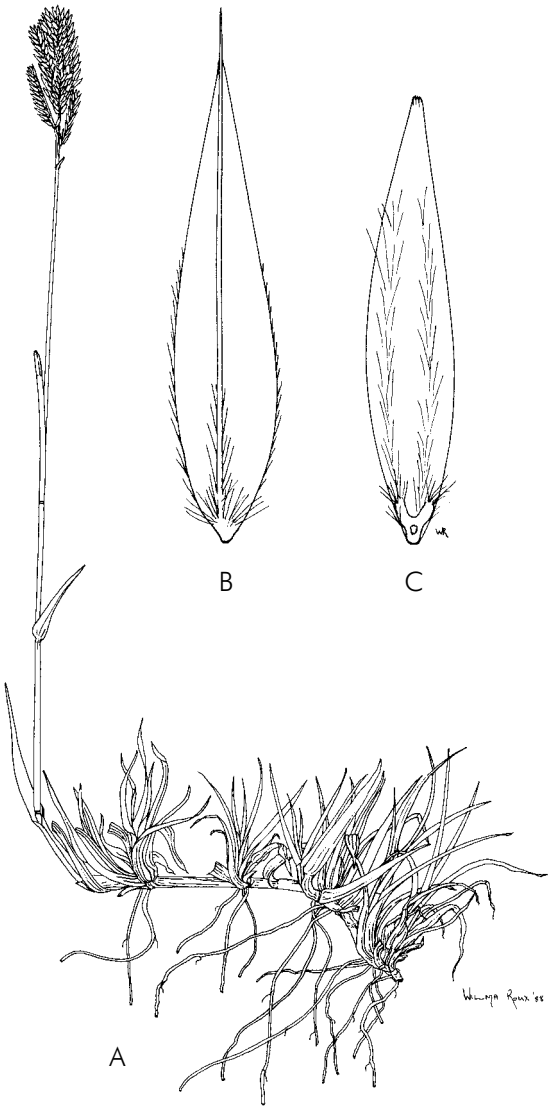



Figure 427.—*Polevansia rigida*. A, plant; B, lemma (4.2 × 1.0 mm); C, palea (3.6 × 0.6 mm). Artist: W. Roux.

**Species** 1, southern Africa: *Polevansia rigida* De Winter, Lesotho to bordering Eastern Cape.

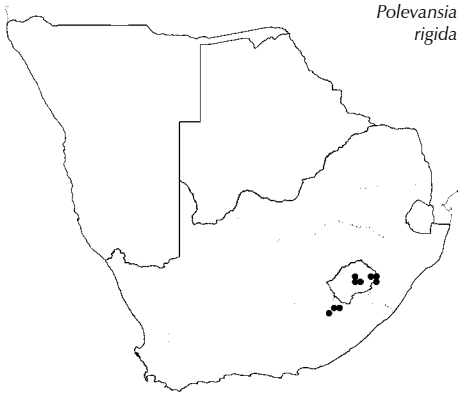
Species treatment by A.C. Mashau.

**Quick guide to easily confused genera:**

Callus long, pungent; lemma thinly membranous, acute or obtuse, mucronate; mainly in Namibia and Botswana . . . . **Willkommia**
Callus short, obtuse; lemma subcoriaceous, acute, awnless; only Lesotho and bordering Eastern Cape . . . . . **Polevansia**

**Polevansia rigida** De Winter, in *Bothalia* 9: 130 (1966). Type: Lesotho (Basutoland), near top of Lekhalabatesi Valley*, Pole Evans 12* (PRE, holo.).

Perennial 100–410 mm high, mat-forming; rhizomatous and stoloniferous. Leaf blade 10–30 × 1.5–2.0 mm; sheath loose and overlapping. Inflorescence oblong. Spikelet 3.5–4.5 mm long, dorsiventrally compressed, disarticulating above glumes; glumes unequal, with a single thick central nerve, awnless; lemma subcoriaceous, acute, awnless; callus short, obtuse; anther 2.5–3.0 mm long.



*Flowering*: February to May. *Ecology*: On degraded land or on rocky outcrops, often near water; at altitudes higher than 1 250 m. *Frequency in southern Africa*: Rare but locally common. *Distribution*: Endemic. L, EC.

Anatomy voucher: *Smook 6000*.
Voucher: *Killick 1983*.

## **Polypogon** Desf.

Desfontaines: 66 (1798); Stapf: 290 (1897); Chippindall: 96 (1955) under *Agrostis* L.; Hubbard: 98 (1970); Launert: 154 (1970); Launert: 83 (1971); Tutin: 235 (1980); Clayton & Renvoize: 139 (1986); Gibbs Russell et al.: 274 (1990); Watson & Dallwitz: 765 (1994); Cope: 116 (1995); Phillips: 43 (1995); Fish: 70 (2006).

Annual or perennial. **Leaf blade** linear to linear-lanceolate, usually expanded; *ligul*e an unfringed membrane. **Inflorescence** a densely contracted or spike-like, rarely open panicle; *spikelets* solitary, shortly pedicelled. **Spikelet** ± laterally compressed, narrowly ob-




Figure 428.—*Polypogon viridis*. A, plant; B, ligule. Artist: C.D. Bartman.




Figure 429.—*Polypogon monspeliensis*. A, plant; B, spikelet. Artist: C. Letty.

long to oblong, falling with glumes, and with the pedicel or part of it; *glumes* ± equal, longer than the spikelet, lanceolate, similar, membranous, 1-nerved, lightly keeled, hairy on the keels, entire or shortly 2-lobed, awnless to awned; awn sometimes short and inconspicuous. **Floret** 1, bisexual; *lemma* less firm than glumes, hyaline, lanceolate or broadly oblong, rounded, glabrous, 5-nerved, truncate or 2-lobed, mucronate, awnless or awned, awned usually from near the apex; *awn* very fine, shorter than to as long as the lemma, sometimes inconspicuous, often deciduous; *palea* delicate, slightly to much shorter than the lemma, acute, 2-keeled. **Lodicules** 2, delicate, membranous, glabrous. **Stamens** 3. **Ovary** glabrous; styles distinct, short, plumose. **Caryopsis** ellipsoid; hilum short; embryo large (rarely), or small. **Cytology**: $x = 7$ (10) (high polyploidy).

**Species** ± 18, tropics and warm temperate regions; 4 naturalised or indigenous in southern Africa, 1 endemic in Western and Eastern Cape, the rest widespread.

Species treatment by M.J. Moeaha.



Figure 430.—*Polypogon monspeliensis*. Two spikelets (2–3 mm). Photographer: M. Koekemoer.

**Quick guide to easily confused genera:**

Spikelet falling entire with the pedicel or part thereof; lemma central awn arising at or near the apex . . . . . **Polypogon**
Spikelet breaking up above the glumes; lemma central awn arising well below the apex or at the base . . . . . **Agrostis**

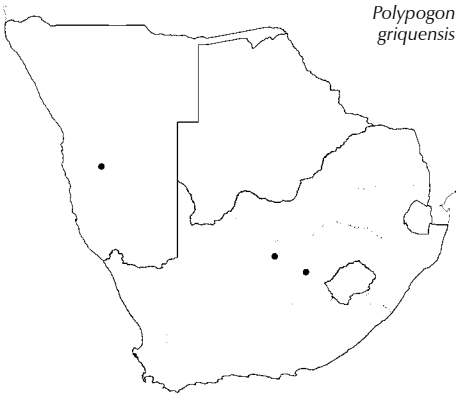
**Key to species:**

1. Glumes with long, conspicuous awns . . . . . 2
   Glumes awnless or rarely with short inconspicuous awns . . . . . 3
2. Glume awn (8–)10–15 mm long; lemma awn 4–10 mm long . . . . . **P. strictus**
   Glume awn 4–8(–10) mm long; lemma awnless or with a short awn to 2.5 mm long . . . . . ***P. monspeliensis**
3(1). Spikelet 1.5–2.0 mm long; anther 0.4–0.5 mm; lemma and glumes awnless; panicle ± open, branches ascending . . . . . ***P. viridis**
   Spikelet 1.0–1.4 mm long; anther 0.25–0.30 mm, lemma apex with a short fine awn; glumes sometimes with short awns; panicle narrowly cylindrical, branches adpressed . . . . . **P. griquensis**

**Polypogon griquensis** (Stapf) Gibbs Russ. & Fish, in *Bothalia* 36: 70 (2006). Type: South Africa, Northern Cape, near Griquatown, December 1811, *Burchell 1863* (K, holo.).

*Agrostis griquensis* Stapf, in *Kew Bulletin, Additional ser.* 1897: 290 (1897).

*P. minutiflorus* Pilg., in *Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem* 15: 453 (1941).

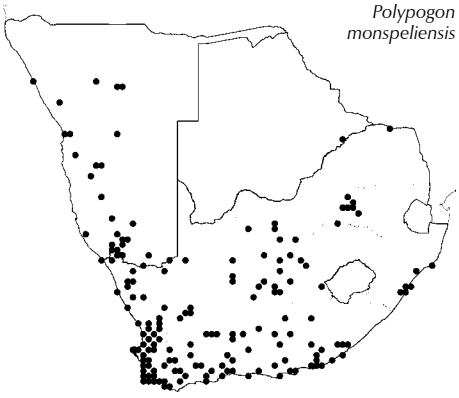


*Polypogon griquensis*

Tufted annual 30–200 mm high. Leaf blade to 60 × 1.0–1.5 mm. Inflorescence cylindrical, dense, spike-like, branches adpressed. Spikelet 1.0–1.4 mm long; glumes scabrid on the back, margins minutely hairy, occasionally with short awns; lemma apex with a short fine awn; anther 0.25–0.30 mm long.

*Flowering*: October. *Ecology*: Wet places. *Frequency in southern Africa*: Rare. *Distribution*: Endemic or possibly naturalised, see Fish (2006). N, FS, NC.

Voucher: *Acocks 2466*.


*Polypogon monspeliensis*

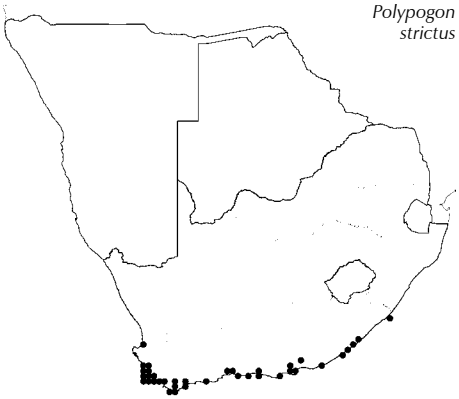
***Polypogon monspeliensis** (L.) Desf., in *Flora Atlantica* 1: 67 (1798). Type: Europe.

ANNUAL BEARD GRASS, BEARD GRASS, RABBIT FOOT GRASS, BRAKBAARDGRAS

Tufted annual 60–500 mm high; sometimes culms creeping. Leaf blade 50–200 × 2–8 mm. Inflorescence dense, narrowly elliptic, sometimes lobed. Spikelet 2–3 mm long (excluding awns), narrowly oblong; glumes scabrid on the back, margins minutely hairy, awn 4–8(10) mm long, spreading; lemma awnless or with a short awn to 2.5 mm, lateral nerves sometimes minutely extended; anther ± 0.5 mm long.

*Flowering*: September to April. *Ecology*: Often in brackish soils; in damp and disturbed places. *Frequency in southern Africa*: Common. *Distribution*: Naturalised from southern Europe and Turkey, introduced and widely naturalised in warm temperate regions. N, B, LIM, NW, G, FS, KZN, NC, WC, EC. *Economics*: As grazing in many parts of the world e.g. India; cultivated as an ornamental grass; weed.

Illustration: Launert: 84, tab. 26 (1971).
Anatomy vouchers: *Ellis 662, 4353* & *5138*.
Voucher: *Codd 636*.

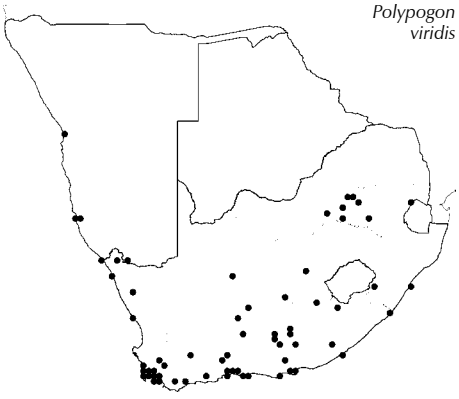

*Polypogon strictus*

**Polypogon strictus** Nees, in *Linnaea* 7: 297 (1832). Type: South Africa, Western Cape, 'Feuchte Stellen bei Seekuhvallei in der Capschen Fläche', *Ecklon*.

Tufted annual 70–700 mm high. Leaf blade to 200 × 1–5 mm. Inflorescence dense, contracted. Spikelet narrowly oblong, 1.8–2.6 mm (excluding awns); glumes scabrid on back, margins minutely hairy, awns (8)10–15 mm long; lemma awn 4–10 mm long; anther 0.4–0.5 mm.

*Flowering*: October to April. *Ecology*: Wet places, usually in coastal areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC, EC.

Anatomy vouchers: *Van Heerden 73, Ellis 271* & *5183*.
Voucher: *Compton 2613*.


*Polypogon viridis*

***Polypogon viridis** (Gouan) Breistr., in *Bulletin de la Societe botanique de France* 110 (Sess. Extr.): 56 (1966). Type: France.

*Agrostis semiverticillata* (Forssk.) C.Christ., in *Dansk Botanisk Arkiv Arsskrift* 4(3): 12 (1922). Type: Egypt.

*P. semiverticillatus* (Forssk.) Hyl., in *Uppsala Universitets Årsskrrift* (7): 74 (1945).

Perennial or annual 150–600 mm high; stoloniferous; culms often rooting at the nodes. Leaf blade to 150 × to 7 mm. Inflorescence open, interrupted, branches ascending. Spikelet 1.5–2.0 mm long, narrowly oblong; glumes scabrid across the back, margins minutely hairy, awnless; lemma awnless; anther 0.4–0.5 mm.

[Chromosome number: 2x = 28 (Tutin 1980).]

*Flowering*: September to April. *Ecology*: Wet places, especially river banks. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from the Mediterranean; Asia into India; introduced to many parts of the world. N, S, NW, G, M, FS, KZN, NC, WC, EC.

Anatomy vouchers: *Smook 2558, Ellis 757* & *1322*.
Voucher: *Seydel 822*.

## **Prosphytochloa** Schweick.

Stapf: 659 (1900) under *Potamophila* R.Br.; De Winter: 117 (1951) under *Potamophila* R.Br.; Chippindall: 33 (1955) under *Potamophila* R.Br.; Schweickerdt: 193 (1961); Clayton & Renvoize: 73 (1986); Gibbs Russell et al.: 277 (1990); Watson & Dallwitz: 774 (1994).



Figure 431.—*Prosphytochloa prehensilis* spikelet (6–9 mm). Photographer: M. Koekemoer.

Perennial; climbing forest grass; long-rhizomatous; culms erect, scandent. **Leaf blade** heterophyllous (of 2 dissimilar kinds), margins scabrid with minute, short, retrorse barbs; lower leaves lanceolate, acuminate, expanded, ± flaccid, caudate; upper leaves filiform, longer than lower leaves, apex long filiform; *ligule* an unfringed membrane, usually truncate, eventually becoming laciniate. **Inflorescence** an open panicle, terminal on the main culm and lateral branches; *spikelets* solitary, pedicelled. **Spikelet** slightly laterally compressed, broadly lanceolate, slightly twisted; *glumes* very reduced, ± equal, joined to form a small cup, awnless. **Florets** 3; *lower* 2 *florets* sterile; lemma subulate, variable in length, with minute hyaline spines; palea 0; *uppermost floret* bisexual; *lemma* acuminate, boat-shaped, coarsely covered with hyaline spines, entire, margins inflexed, 5-nerved, scarcely keeled, awnless; *callus* 0; *palea* acuminate, coriaceous, 3-nerved. **Lodicules** 2, broadly ovate, obtuse, fleshy, indistinctly nerved. **Stamens** 6. **Ovary** glabrous, subglobose; styles distinct, plumose. **Caryopsis** medium-sized, 5–6 mm long, fusiform, longitudinally grooved, brown; hilum long-linear; embryo small. **Photosynthetic pathway**: $C_3$: XyMS+. **Cytology**: $x = 12$.

**Species** 1, southern Africa: *Prosphytochloa prehensilis* (Nees) Schweick., Limpopo, Mpumalanga to KwaZulu-Natal and Eastern Cape.

Species treatment by M.T. Nembudani.




Figure 432.—*Prosphytochloa prehensilis*. A, plant; B, spikelet (9.7 × 2.2 mm). Artists: A, G.E. Lawrence; B, W. Roux.

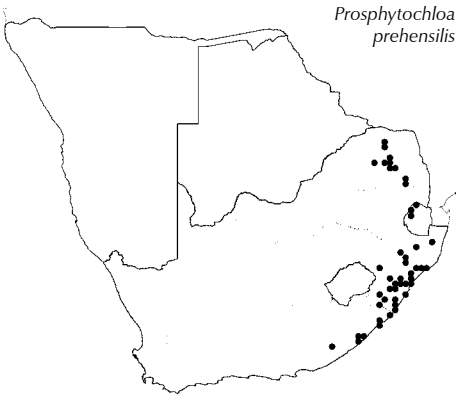
### Quick guide to easily confused genera:

1. Glumes absent or reduced to a very obscure rim at apex of pedicel; spikelet 3–5 mm long . . . . . **Leersia**
   Glumes 2, reduced at base of the fertile floret; spikelet 5–11 mm long . . . . . 2
2. Lemma awned (mucronate or awnless in cultivated forms), strongly keeled; spikelet strongly laterally compressed . . . . . **Oryza**
   Lemma awnless, scarcely keeled; spikelet slightly laterally compressed . . . . . **Prosphytochloa**

**Prosphytochloa prehensilis** (Nees) Schweick., in *Der Züchter* 31: 194 (1961). Type: South Africa, KwaZulu-Natal, *Drége s.n.*

*Potamophila prehensilis* (Nees) Benth., in *Journal of the Linnean Society of London* 19: 55 (1881).

Perennial, climber up to 10 m high. Leaf blades of 2 dissimilar kinds, margins scabrid; lower leaves 50–160 mm long, lanceolate, acute, expanded, ± flaccid, caudate; upper leaves filiform, 200–220 mm



long, with very long filiform apices. Inflorescence 50–120 mm long, ovate, open. Spikelet 6–9 mm long, awnless; glumes minute, cup-like; lower two florets sterile, subulate, uppermost floret fertile; anther 4.5–6.0 mm long.

*Flowering*: November to April. *Ecology*: Moist forests, where it climbs in dense masses. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. S, LIM, M, KZN, EC.

Anatomy vouchers: *Ellis 1596, 1863, 3783 & 5191.*
Voucher: *Codd 8411.*

## **Pseudechinolaena** Stapf

Stapf: 494 (1919); Chippindall: 364 (1955); Clayton & Renvoize: 545 (1982); Clayton & Renvoize: 270 (1986); Clayton: 3 (1989); Gibbs Russell et al.: 277 (1990); Watson & Dallwitz: 781 (1994).

Annual or short-lived perennial; decumbent; culms trailing. **Leaf blade** lanceolate, soft and thin, acute; pseudopetiolate; sometimes cross-veined; *ligule* a thin, unfringed or fringed membrane. **Inflorescence** of 2–6 racemes, scattered on a slender central axis, rachis narrow; *spikelets* paired or appearing solitary because one of the pair often very reduced, pedicelled. **Spikelet** laterally compressed, often gaping, ovoid, falling with glumes; *glumes* ± equal, dissimilar, herbaceous; lower glume $^3/_4$ as long as spikelet, 3-nerved, glabrous, awnless; upper glume gibbous, as long as spikelet, 7-nerved, convex on keel, with longitudinal, translucent spots between nerves, after fertilisation few to many rigid hooks develop from spots. **Florets** 2; *lower floret* male or sterile; lemma oblong-lanceolate, chartaceous, with membranous margins, glabrous, awnless; palea convolute, chartaceous; *upper floret* bisexual, *lemma* laterally compressed, similar to, to firmer in texture than glumes, chartaceous, ovate-lanceolate to oblong, entire, subacute, faintly 3–5-nerved, awnless; *palea* similar to lemma in texture, faintly 2-nerved, acute. **Lodicules** 2, cuneate, fleshy. **Stamens** 3. **Ovary** glabrous; styles free, plumose. **Caryopsis**




Figure 433.—*Pseudechinolaena polystachya*. Artist: G.E. Lawrence.

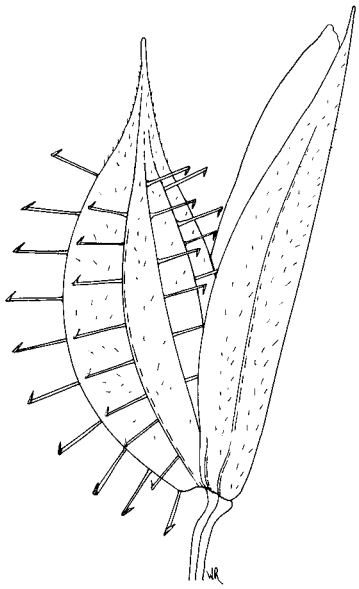


Figure 434.—*Pseudechinolaena polystachya* spikelet (4.3 × 3.3 mm). Artist: W. Roux.



Figure 435.—*Pseudechinolaena polystachya* spikelet (3.5–5.0 mm). Photographer: M. Koekemoer.

up to 1.5 mm long, obliquely ellipsoid, flattened on ventral side; hilum short; embryo large. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 9$ (polyploidy).

**Species** 6, 5 in Madagascar, 1 pantropical; *Pseudechinolaena polystachya* (Kunth) Stapf, KwaZulu-Natal to Eastern Cape.

Species treatment by M.J. Moeaha.

**Pseudechinolaena polystachya** (Kunth) Stapf, in *Flora tropical Africa* 9: 495 (1919). Type: Colombia.

Soft slender, short-lived perennial or annual up to 400 mm high, often mat-forming; culms prostrate or trailing. Leaf blade 10–80 × to 14 mm; ligule an unfringed membrane, thin, truncate. Spikelet 3.5–5.0 mm long, obliquely ovoid, often burr-like; upper glume usually with stiff hooked hairs after fertilisation; anthers 1.0–1.5 mm long.

[Inflorescences appear different with time as the hooks only develop after fertilisation and the delayed maturation of the sessile spikelets causes an extended flowering period. These conditions are regarded as adaptations to animal dispersal in a forest environment as the hooks on the upper glume aid in dispersing the mature spikelets. Similar in habit to other forest grasses such as *Panicum* and *Oplismenus* species, but these all lack the hook-like hairs on the upper glume.]

*Flowering*: August to September and December to April. *Ecology*: In forest shade. *Frequency in southern Africa*: Locally common. *Distribution*: Throughout tropics. KZN, EC.

Illustration: Cope: 5, tab. 2 (1989).
Anatomy vouchers: *Ellis 1465, 3395, 3785, 3786, 5181* & *Smook 5473*.
Voucher: *Schweickerdt 1442*.

## **Pseudopentameris** Conert

Stapf: 516 (1899) under *Danthonia* DC.; Chippindall: 241 (1955) under *Danthonia* DC.; Conert: 303, pl. 1 (1971); Ellis: 561 (1985); Clayton & Renvoize: 174 (1986); Gibbs Russell et al.: 278 (1990); Watson & Dallwitz: 787 (1994); Barker: 141 (1995); Linder et al.: 306 (2010).

Perennial, tufted; culm erect, branched or simple. **Leaf blade** linear, rigid or soft, open and flat to rolled; sheaths adpressed to culms; *ligule* a fringe of hairs. **Inflorescence** a panicle, somewhat contracted; *spikelets* pedicelled. **Spikelet** large, conspicuous, lanceolate, laterally compressed, disarticulating above glumes; *glumes* ± equal, longer than spikelet, chartaceous, lanceolate, 3–5(–9)-nerved, minutely scabrid, acuminate, awnless. **Florets** 2, bisexual; highly reduced third floret rarely present; *lemma* oblong, dorsally convex, firmer in texture than glumes, chartaceous to cartilaginous, variously hairy, 7–9-nerved, incised, 2-lobed; lobes awned, awns not geniculate; *central awn* from between lobes very long, glabrous, scabrid, geniculate, consisting of a twisted brown column and whitish bristle; *callus* elongated, slender, densely hairy; *palea* longer than lemma body, glabrous or pubescent, narrowly lanceolate, apex bifid, 2-keeled, nerves prominent. **Lodicules** 2, glabrous or sparsely to densely ciliolate. **Stamens** 3. **Ovary** glabrous, with apical pseudostigmata; styles short or 0, plumose. **Caryopsis** 4–6 mm long, sur-

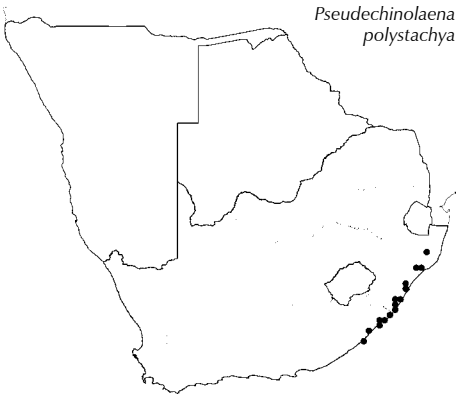






Figure 436.—*Pseudopentameris brachyphylla*. A, plant; B, lemma with long twisted awn, awned lobes and long callus (35.0 × 1.5 mm). Artist: W. Roux.



Figure 437.—*Pseudopentameris macrantha* spikelet (30–40 mm). Photographer: M. Koekemoer.

face reticulately sculptured; hilum long-linear; pericarp fused. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 6$.

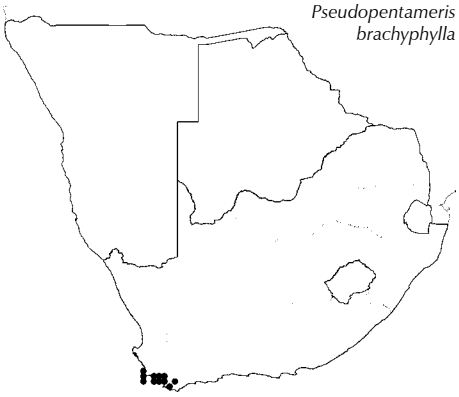
**Species** 3, southern Africa, mountainous areas of Western Cape.

Species treatment by M.T. Nembudani.

**Key to species:**

1. Lemma entirely hairy . . . . . **P. brachyphylla**
   Lemma hairy on upper half, glabrous on lower half . . . . . 2
2. Lemma lobes 9–12 mm long (including awns); central awn 16–23 mm long; aerial stems branched, especially when old . . . **P. macrantha**
   Lemma lobes 15–18 mm long (including awns); central awn 29–49 mm long; branched aerial stems absent . . . **P. caespitosa**

   [Until more research has been done 'stem' is used here following Barker (1995), to differentiate the aerial stems produced in this genus from the below-ground rhizomes and annually produced above-ground culms.]



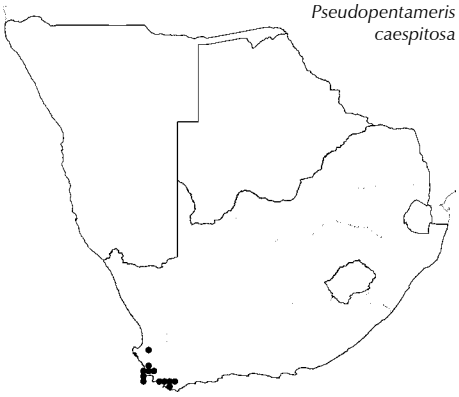

**Pseudopentameris brachyphylla** (Stapf) Conert, in *Mitteilungen der Botanischen Staatssammlung München* 10: 304 (1971). Type: Locality ?, *Zeyher 1826α* (K, holo.).

*Danthonia brachyphylla* Stapf, in *Flora capensis* 7: 520 (1899).

Tufted perennial 300–900 mm high; leaves clustered basally, obviously distichous; base woody and fibrous; branched aerial stems absent. Leaf blade to 150 × 4 mm, flat or folded; dead leaves characteristically curled. Inflorescence of 8–20 spikelets. Spikelet 27–37 × 4–10 mm (excluding awns); glumes 27–37 mm long, 5–7-nerved, all nerves extend to apex; lemma body 5.5–6.5 mm long, hairy all over, 7–9-nerved; lobes 10–19 mm long (including awns); central awn 19–30 mm long; anther 5–9 mm long; caryopsis 4.5–6.0 mm long.

*Flowering*: June to November. *Ecology*: Rocky, gravelly or sandy lower slopes of the Cape Fold Mountains. *Frequency in southern Africa*: Locally common especially on hills behind Hermanus and Betty's Bay. *Distribution*: Endemic. WC.

Anatomy vouchers: *Kruger 149, Boucher 357a, Ellis 2343* & *5991*. [Found to be very similar to *P. macrantha* (Ellis 1985).]
Voucher: *Zeyher 1825b*.




**Pseudopentameris caespitosa** N.P.Barker, in *Bothalia* 25: 147 (1995). Type: South Africa, Western Cape, Caledon, Bredasdorp, eastern corner of farm Buffeljagt, 19-10-1987, *Linder 4362* (BOL, holo.).

Tufted perennial with annual culms, 700–1 200 mm high; underground parts woody or fibrous; leaves mainly basal; branched aerial stems absent. Leaf blade 45–500 × 4.5 mm, flat or rolled, curled when old. Inflorescence with 10–20 spikelets. Spikelet 33–60 × 4.5–6.0 mm; glumes 33–60 mm long, 5–9-nerved; lemma body 8–10 mm long, hairy in upper half, glabrous in lower half, 9–11-nerved; lobes 15–18 mm long (including awn), awn 15–30 mm long; central awn 29–49 mm long; anther 6–8 mm long; caryopsis 5–6 mm long.

*Flowering*: October to November. *Ecology*: In sand; near disturbed areas. *Distribution*: Endemic. WC.

Anatomy vouchers: *Ellis 1171, 2265, 2266* & *2515*.
Voucher: *Esterhuysen 31747*.

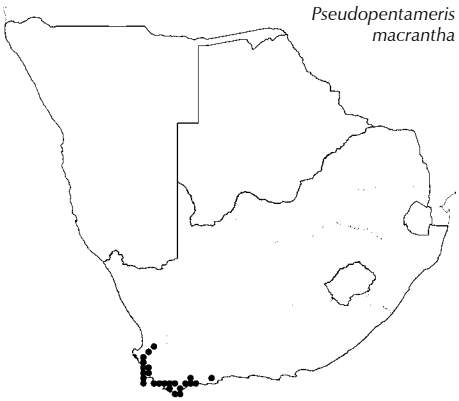
**Pseudopentameris macrantha** (Schrad.) Conert, in *Mitteilungen der Botanischen Staatssammlung München* 10: 304 (1971). Type: South Africa, Western Cape, Table Mountain above Kirstenbosch, *White 5518* (PRE, neo.).

*Danthonia macrantha* Schrad., in *J.A. Schultes*: 385 (1824).

Tufted perennial 500–1 400 mm high, base woody; leaves basally clustered; branched aerial stems present. Leaf blade to 350 × 4 mm, open or involute in cross section; dead leaves falcate but not tightly curled. Inflorescence with 10–25 spikelets, rarely more. Spikelet 22–50 × 3–8 mm (excluding awns); glumes 22–50 mm long, 5(–7)-nerved; lemma body 5–8 mm long, back glabrous in lower half, hairy in upper half including lobes, 9–11-nerved; lobes 9–12 mm long (including awns), awn 9–15 mm long; central awn 16–23 mm long; anther 3.5–7.5 mm long; caryopsis 4.5–6.0 mm long.

*Flowering*: August to December. *Ecology*: Rocky, stony or sandy slopes in both Table Mountain Sandstone and limestone geologies. *Frequency in southern Africa*: Locally common especially on the lower slopes of Table Mountain. *Distribution*: Endemic. WC.

Anatomy vouchers: *Ellis 2308, 2326, 2327, 2338, 2339, 2526, 2551* & *5576*. [Ellis (1985) considers this species to be anatomically almost identical to *P. brachyphylla*.] Voucher: *Sandwith 73*.




## **Puccinellia** Parl.

Parlatore: 366 (1848) name conserved; Stapf: 716 (1900) as *Atropis* Griseb.; Chippindall: 49 (1955); Launert: 158 (1970a); Hughes & Halliday: 167 (1980); Clayton & Renvoize: 99 (1986); Gibbs Russell et al.: 279 (1990); Watson & Dallwitz: 802 (1994); Edgar: 27 (1996); Edgar & Connor: 197 (2000); Davis & Consaul (2007).

Tufted perennial. **Leaf blade** narrow, folded; *ligule* an unfringed membrane. **Inflorescence** a panicle, open or contracted, sometimes almost spike-like; *spikelets* solitary, shortly pedicelled. **Spikelet** laterally compressed, disarticulating above glumes; *glumes* very unequal, shorter than spikelet, oblong, acute to obtuse, membranous, not keeled, awnless; lower glume 1-nerved; upper glume 3-nerved. **Florets** 2–12, bisexual; *uppermost floret* reduced, rachilla prolonged; *lemma* 2 or 3(4) mm long, similar in texture to glumes, membranous, lanceolate, oblong or ovate-oblong, tip scabrous, obtuse or blunt, often ragged, entire, rounded on back, 3–5-nerved, glabrous or sometimes hairy towards base, awnless; *callus* glabrous; *palea* subequal to lemma, lanceolate, 2-keeled, keels scaberulous to ciliate. **Lodicules** 2, ovate, hyaline. **Stamens** 3. **Ovary** glabrous; styles distinct, delicately plumose. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (high polyploidy).



Figure 438.—*Puccinellia acroxantha* spikelet (3–5 mm). Photographer: M. Koekemoer.

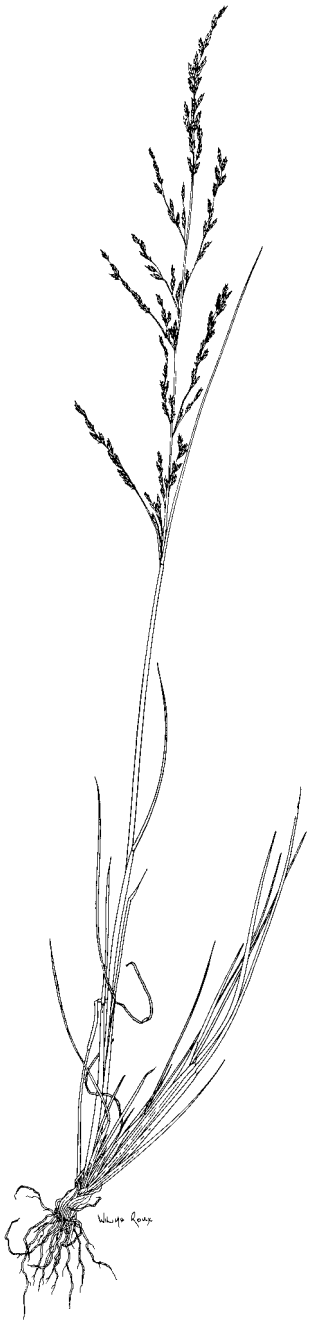


Figure 439.—*Puccinellia fasciculata*. Artist: W. Roux.

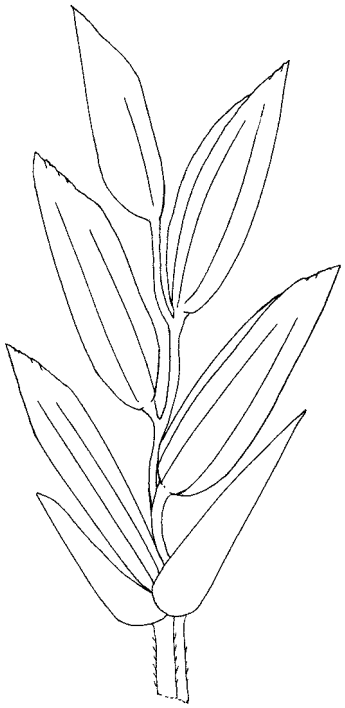


Figure 440.—*Puccinellia fasciculata* spikelet (6.0 × 2.5 mm). Artist: W. Roux.

**Species** ± 80, north temperate regions, mainly Asia; ± 4 in southern Africa, Namibia, Free State, Northern and Western Cape. Naturalised and indigenous.

Genus in need of revision for the FSA region.

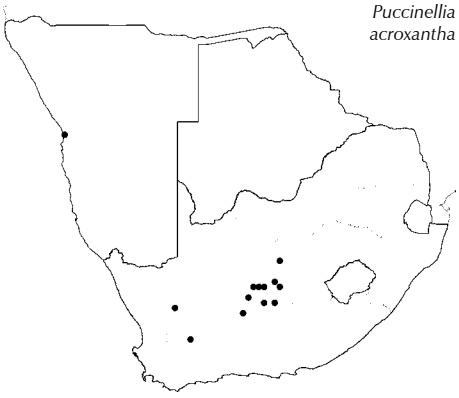
Species treatment by M.J. Moeaha and L. Fish.

### Quick guide to easily confused genera/taxa:

1. Ligule a fringe of hairs or a fringed membrane . . . . . 2
   Ligule an unfringed membrane . . . . . 3
2. Lemma nerves hairy . . . . . **Leptochloa eleusine**
   Lemma nerves glabrous . . . . . **Eragrostis**
3(1). Upper glume 1-nerved . . . . . **Leptochloa**
   Upper glume 3–5-nerved . . . . . 4
4. Spikelets 4–8 mm long; lemma margins membranous . . . . . **Puccinellia**
   Spikelets 6–20 mm long; lemma margins firm not membranous . . . . . **Festuca**

### Key to species:

1. Most lemmas with 5 prominent raised nerves . . . . . **P. angusta**
   Most lemmas with nerves inconspicuous or only 3 visible . . . . 2
2. Spikelets usually their own length apart, if overlapping then not for more than $^1/_2$ their length; inflorescence branches very slender, adpressed or very slightly spreading . . . . . **P. acroxantha**
   Spikelets dense, overlapping for more than $^1/_2$ their length; inflorescence branches slender or stout, at least lower ones spreading, horizontal or deflexed . . . . . 3
3. Inflorescence lower branches slender, often deflexed, with spikelets in upper $^2/_3$; lemma broadly obtuse to rounded . . . ***P. distans**
   Inflorescence lower branches stout, stiff, with spikelets nearly to the base; lemma acute to obtuse . . . . . ***P. fasciculata**



*Puccinellia acroxantha*

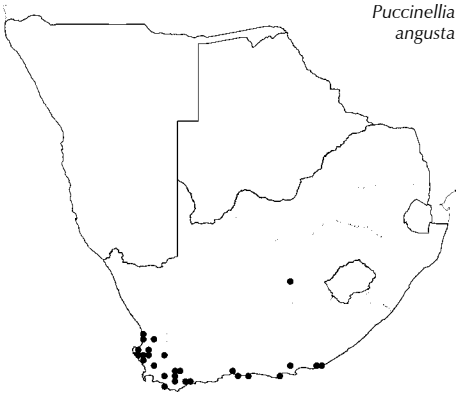
**Puccinellia acroxantha** C.A.Sm. & C.E.Hubb., in *Kew Bulletin* 1929: 86 (1929). Type: Free State, Fauresmith, Knoffelsfontein, *Smith 5415* (K, holo.; PRE, iso.).

Loosely tufted perennial 100–600 mm high; often glaucous; basal sheath white, dull, shorter than 50 mm, usually not overlapping; culm 2-noded. Leaf blade 50–200 × 1–3 mm. Inflorescence ± linear, 100–300 mm × 5–15 mm in diameter contracted or very slightly open, branches very slender, usually erect, often exserted from upper sheath; spikelets mostly to the base of branches and their own length apart but not overlapping for more than half their length. Spikelet 3–5 × to 1.5 mm; glumes obtuse to subacute; lemma 2.0–2.8 mm long, obtuse to rounded, glabrous or nerves hairy near base, upper margin broadly membranous, nerves inconspicuous; palea keels ciliate, margins glabrous; anthers 0.5–0.8 mm long.

*Flowering*: January. *Ecology*: On Karoo-turf soils of varying salinity; in depressions periodically flushed with fresh water. Tolerates high levels of salinity. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. N, FS, NC.

Anatomy vouchers: *Smook & Gibbs Russell 2460* & *Smook 3383A*.
Voucher: *Smith 5415*.

**Puccinellia angusta** (Nees) C.A.Sm. & C.E.Hubb., in *Kew Bulletin of Miscellaneous Information* 1929: 85 (1929). Type: South Africa, Eastern Cape, Uitenhage, along the Swartkops River, *Ecklon s.n.* (SAM, lecto.).

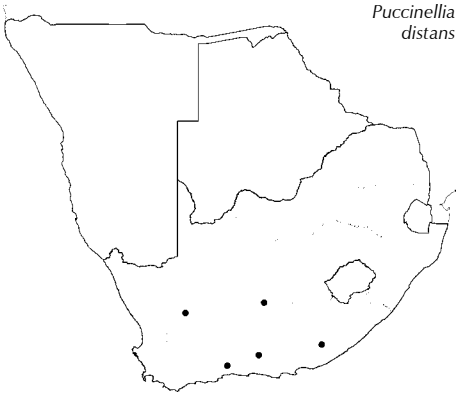

*Puccinellia angusta*

Densely tufted perennial 300–600 mm high; basal leaf sheaths shining, longer than 50 mm; sheaths usually overlapping and enclosing the culms. Leaf blade 75–100(–300) × 1.0–1.5(–2.5) mm. Inflorescence 30–120 mm long, linear, contracted or open, branches slender, adpressed to slightly spreading; lower part of panicle not exerted from leaf; spikelets usually their own length apart and not overlapping for more than half their length. Spikelet 4.0–5.5 × 1.0–1.5 mm; glumes acute to obtuse; lemma 1.8–2.2 mm long, obtuse to rounded, prominently 5-nerved, glabrous except hairy on nerves towards base; margins narrowly membranous; palea keels minutely scabrid; anthers 0.6–0.8 mm long.

*Flowering*: August to October. *Ecology*: On moist strongly saline soils; in disturbed areas. The voucher and type specimens were collected in abnormally high-saline soils where few other plants survived. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Endemic. FS, WC, EC. *Economics*: Said to be a good winter pasture.

Anatomy vouchers: *Ellis 1674* & *5139*.
Voucher: *Smith 4385*.

***Puccinellia distans** (L.) Parl., in *Flora italiana* 1: 367 (1848). Type: Austria.


*Puccinellia distans*

Reflexed salt grass

Loosely to densely tufted perennial 250–650 mm high; culms 2–3-noded. Leaf blade 70–180 × 2–4 mm. Inflorescence pyramidal to elongate, more than 15 mm in diameter, open or contracted; lower branches slender, erect and spreading or deflexed, spikelets in upper $^2/_3$, sometimes in the lower $^1/_2$ on some branches; spikelets dense, overlapping for more than $^1/_2$ their own length. Spikelet 4–9 × 1–2 mm; glumes subacute to obtuse; lemma 1.5–4.0 mm long, back rounded, apex broadly obtuse to rounded, margin broadly membranous, apex often minutely hairy, nerves inconspicuous, glabrous to hairy at the base; palea bifid, keels ciliate; anthers 0.6–1.2 mm long.

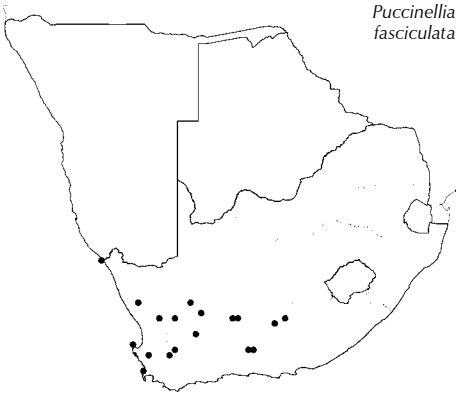
*Flowering*: April, June, July and October. *Ecology*: In wet, often very saline habitats; along rivers, irrigation canals and furrows. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from Europe. Cosmopolitan in temperate regions of the world. NC, WC, EC. *Economics*: Reclamation of salty areas; weed.

Illustrations: Davis & Consaul: 474 (2007).
Anatomy voucher: *Ellis 1629*.
Voucher: *Smook 3383*.

***Puccinellia fasciculata** (Torr.) E.P.Bicknell, in *Bulletin of the Torrey Botanical Club* 35: 197 (1908). Type: USA.

Salt grass

Loosely to densely tufted perennial 200–400 mm high; culms 1–3-noded. Leaf blade 80–200 × 2–5 mm. Inflorescence ellipsoid, rather compact rarely open; lower branches stout, stiff, bearing


*Puccinellia fasciculata*

spikelets nearly to the base; spikelets densely clustered, overlapping for more than $^1/_2$ their length. Spikelet 4–7 × 1–2 mm; glumes rounded on the back, usually obtuse; lemma 1.5–2.5 mm long, subacute to obtuse, nerves inconspicuous or only 3 conspicuous, glabrous except for short hairs at base and lower part of nerves, midrib reaching apex; palea keels minutely hairy; anthers 0.6–1.0 mm long.

*Flowering*: September to January. *Ecology*: In wet, saline habitats; salt marshes, often in disturbed areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Naturalised from North America and Europe, now in many parts of the world. NC, WC, EC.

Illustration: Davis & Consaul: 464 (2007).
Anatomy vouchers: *Ellis 1285, 1648* & *4662*.
Voucher: *Adamson 2989*.

## **Rendlia** Chiov.

Stapf: 637 (1900) under *Microchloa* R.Br.; Chiovenda: 53 (1914); Chippindall: 193 (1955); Pilger: 90 (1956); Renvoize: 329 (1974); Clayton & Renvoize: 241 (1986) included in *Microchloa* R.Br.; Gibbs Russell et al.: 281 (1990); Watson & Dallwitz: 817 (1994); Cope: 231 (1999) included in *Microchloa*.

Perennial, densely tufted, cushion-like; basal leaf sheaths densely woolly, splitting into fibres when old. **Leaf blade** folded, narrow, blunt at apex; *ligule* a fringed, usually firm, membrane. **Inflorescence** a solitary, rarely paired, terminal, 1-sided (secund) raceme; rachis tough, narrow, convex on back with membranous margins; spikelets densely packed and often at right angles to rachis; *spikelets* solitary. **Spikelet** disarticulating between glumes; *glumes* ± equal, longer than spikelet, dissimilar, 1-nerved, awnless; lower glume obliquely compressed, 1-keeled; upper glume dorsally compressed. **Florets** 2; *lower floret* bisexual; *upper floret* male or sterile; *lower lemma* similar in texture to glumes, keeled, 3-nerved, densely hairy on keel and margins, rarely glabrous, shortly 2-lobed, awnless; *palea* glabrous, 2-keeled, hyaline; upper lemma slightly shorter and glabrous, palea reduced or 0. **Lodicules** 2, sometimes 0. **Stamens** 3. **Ovary** obovoid; styles plumose. **Caryopsis** ellipsoid to broadly trigonous; hilum short; embryo small (seemingly, judged from immature material). **Photosynthetic pathway**: $C_4$; XyMS+. PCR cell chloroplasts centripetal.

**Species** 1, Africa: *Rendlia altera* (Rendle) Chiov., high eastern regions of southern Africa.

Species treatment by A.C. Mashau.

### Quick guide to easily confused genera:

Spikelet 4.0–5.5 mm long, florets two . . . . . **Rendlia**
Spikelet 2.3–4.5 mm long, floret one . . . . . **Microchloa**

[The distinction of the strictly 1-flowered *Microchloa* with the 2 or more-flowered *Rendlia* is regarded by some as not important and *Rendlia* is then placed into synonymy under *Microchloa*.]

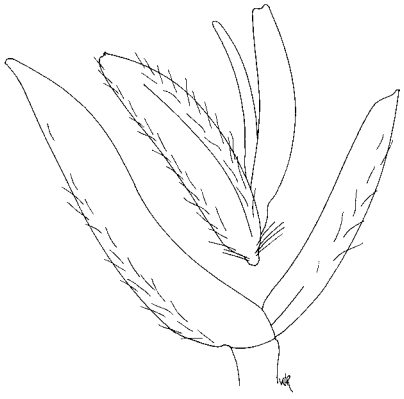


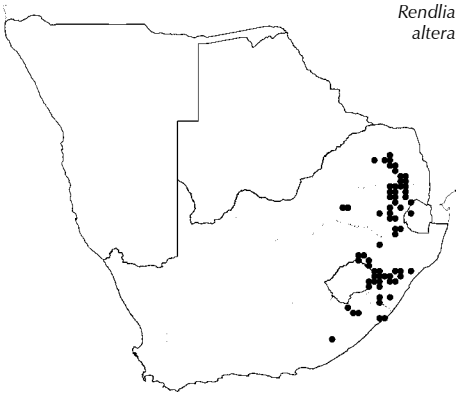
Figure 441.—*Rendlia altera*. Spikelet opened to show glumes, hairy lower lemma and glabrous upper floret (4.8 × 4.6 mm). Artist: W. Roux.



Figure 442.—*Rendlia altera*. Several spikelets (4.0–4.5 mm). Photographer: M. Koekemoer.




Figure 443.—*Rendlia altera*. Artist: C.D. Bartman.




**Rendlia altera** (Rendle) Chiov., in *Annali di botanica* (*Roma*) 13: 53 (1914). Type: Malawi, Mt. Mlanje, *Whyte 64*.

*R. nelsonii* (Stapf) Chiov., in *Annali di botanica* (*Roma*) 13: 54 (1914). Type: South Africa, 'Transvaal' (no precise locality), *Nelson 14* (K, holo; PRE, iso.).

*Microchloa altera* (Rendle) Stapf, in *Flora capensis* 7: 637 (1900).

MAHEM'S CREST, KLEINROLBLAAR

Tufted perennial, cushion-like, 200–400 mm high; leaf bases persistent and becoming fibrous with age. Leaf blade 30–250 × less than 1.5 mm. Inflorescence a raceme (solitary 'toothbrush'), 20–50 mm long. Spikelet 4.0–5.5 mm long; glumes twice as long as florets; lower glume glabrous; upper glume glabrous, crispate-hirsute or with a barbellate line on either side of the midnerve; lower lemma pubescent on keel or rarely glabrous, densely white to reddish hairy on margins; upper floret banana-shaped; anther 1.5–2.5 mm long.

[A very variable species, often subject to taxonomic subdivision, but characters intergrade so much that no clear separations are possible.]

*Flowering*: September to May. *Ecology*: Shallow humiferous or well-drained sandy soils. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Tanzania and DRC. S, LIM, G, M, FS, KZN, EC. *Economics*: Only grazed early in the season and/or after a veld fire.

Illustration: Chippindall: 193, fig. 169 (1955); Clayton et al.: 331, fig. 93 (1974); Cope: 232, tab. 69 (1999).
Anatomy vouchers: *Ellis 54, 2800, 2805, 2819* & *3277*.
Voucher: *Du Toit 2502*.

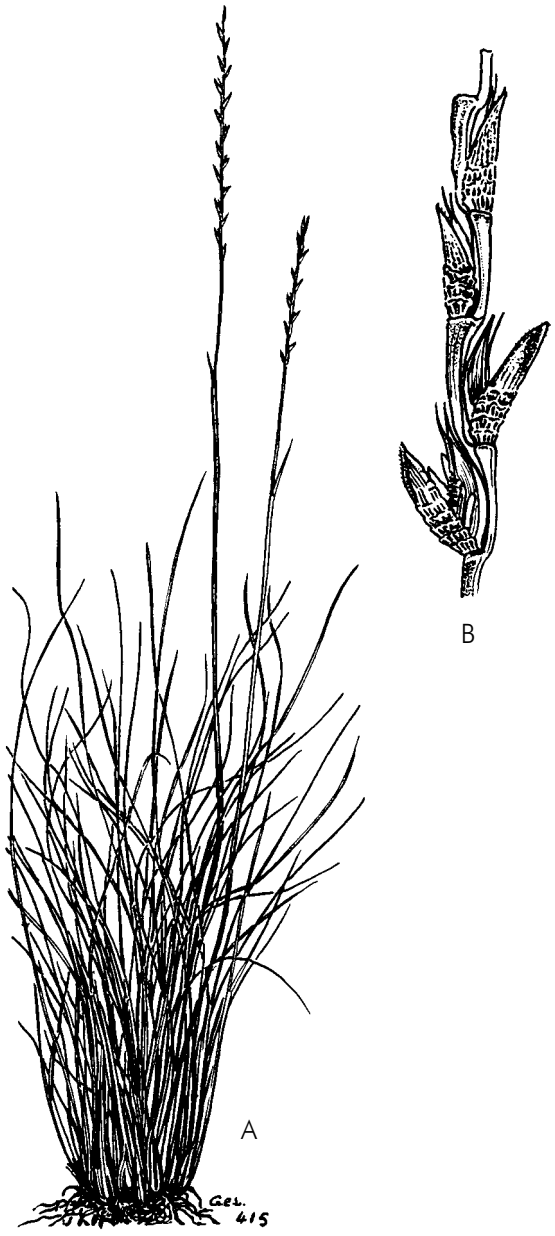



Figure 444.—*Rhytachne rottboellioides*. A, plant; B, several spikelets. Artist: G.E. Lawrence.

## **Rhytachne** Desv.

Desvaux: 11 (1825); Stapf: 81 (1917); Chippindall: 519 (1955); Clayton & Renvoize: 843, fig. 198 (1982); Clayton & Renvoize: 364 (1986); Gibbs Russell et al.: 281 (1990); Watson & Dallwitz: 825 (1994); Cope: 168 (2002).



Figure 445—*Rhytachne rottboellioides*. Spikelet pair (3–5 mm). Photographer: M. Koekemoer.

Perennial, rarely annual, tufted. **Leaf blade** long, narrow, often setaceous; *ligule* a short, unfringed membrane. **Inflorescence** a solitary, terminal, rigid or flexuous, cylindrical raceme; raceme joints transverse; internodes clavate, as long as or longer than spikelets; *spikelets* in pairs, in long–short combinations: one sessile, the other pedicelled; pedicels free. **Sessile spikelet** dorsiventrally compressed, falling with glumes; *glumes* ± equal, awned or awnless (sometimes one or the other or both); lower glume coriaceous, rugose or strongly ribbed, 2-keeled or rounded on the flanks, sharply inflexed on lower part, rarely winged; upper glume membranous or hyaline, with or without a terminal bristle-like awn. **Florets** 2; *lower floret* male, rarely sterile; palea reduced; *upper floret* bisexual; *lemma* hyaline, awnless; *callus* truncate with a

central peg; *palea* hyaline, shorter than lemma. **Lodicules** 2, fleshy. **Stamens** 3. **Ovary** glabrous; styles short, plumose. **Caryopsis** oblong, dorsiventrally compressed. **Pedicelled spikelet** male, sterile or much suppressed, often only represented by a bristle or awn, up to 5 mm long, and a pedicel. **Photosynthetic pathway**: $C_4$; XyMS- (seemingly). PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 10$.

**Species** 12, tropical and southern Africa, Madagascar and tropical South America; 2 in southern Africa, northern KwaZulu-Natal and northeastern Eastern Cape.

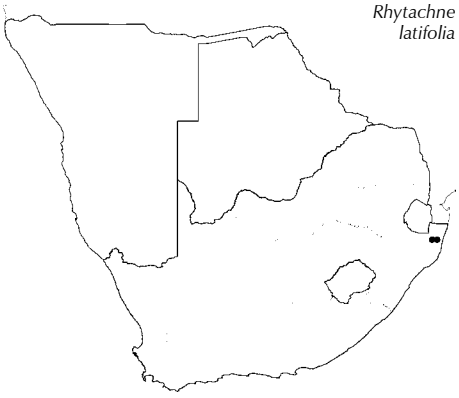
Species treatment by A.C. Mashau.

**Key to species:**

Leaf setaceous; sessile spikelet 3–5 mm long; lower glume strongly transversely rugose, longitudinal nerves indistinct . . . . . **R. rottboellioides**

Leaf flat; sessile spikelet 5.5–8.0 mm long; lower glume smooth or granular, longitudinal nerves distinct . . . . . **R. latifolia**

**Rhytachne latifolia** Clayton, in *Kew Bulletin* 32: 770 (1978). Type: Tanzania, Kilosa District, Kipiri water hole, *Greenway & Kanuri 15454* (K, holo.; PRE, iso.).

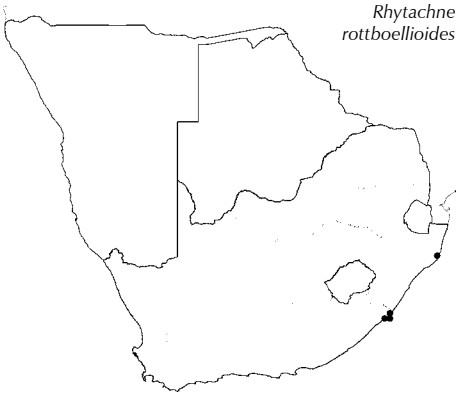

*Rhytachne latifolia*

Tufted perennial, 400–1 000 mm high; green with mainly the lower basal parts purplish. Leaf blade 150–500 × 6–10 mm, flat; sheath brown, collar present. Inflorescence 150–190 mm long, internodes and pedicels glabrous. Sessile spikelet 5.5–8.0 mm long; lower glume smooth or granular, longitudinal nerves distinct; upper glume awnless; anther 3.4–3.7 mm long. Pedicellate spikelet reduced to a scale less than 1 mm long.

*Flowering*: January to March. *Ecology*: Shaded streamsides and woodland pans. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to Tanzania. KZN.

Anatomy vouchers: *Ellis 3550, 3551, 3636 & 4536*.
Voucher: *Tinley 895*.

**Rhytachne rottboellioides** Desv., in W. Hamilton, *Prodromus plantarum Indiae occidentalis* 12 (1825) & *Opuscules sur les sciences physiques et naturelles*: 75, fig. 6/1 (1831). Type: West Indies.


*Rhytachne rottboellioides*

Slender, densely tufted perennial, 250–1 000 mm high; mainly reddish or purplish brown. Leaf blade 300 mm long, setaceous, narrow; sheath collar present. Inflorescence 25–100 mm long, internodes and pedicels glabrous. Sessile spikelet 3–5 mm long; lower glume strongly transversely rugose, longitudinal nerves indistinct; glumes awnless or awns up to 5 mm long; anther 1.3–2.0 mm long. Pedicellate spikelet reduced, sometimes to an awn up to 5 mm long.

*Flowering*: November to February. *Ecology*: Vleis and seasonally wet grasslands. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to tropical Africa, Madagascar; also West Indies and South America. KZN, EC.

Illustration: Clayton et al.: 844, fig. 198 (1982).
Anatomy vouchers: *Ellis 3398, 3421 & 5189*.
Voucher: *Huntley 779*.

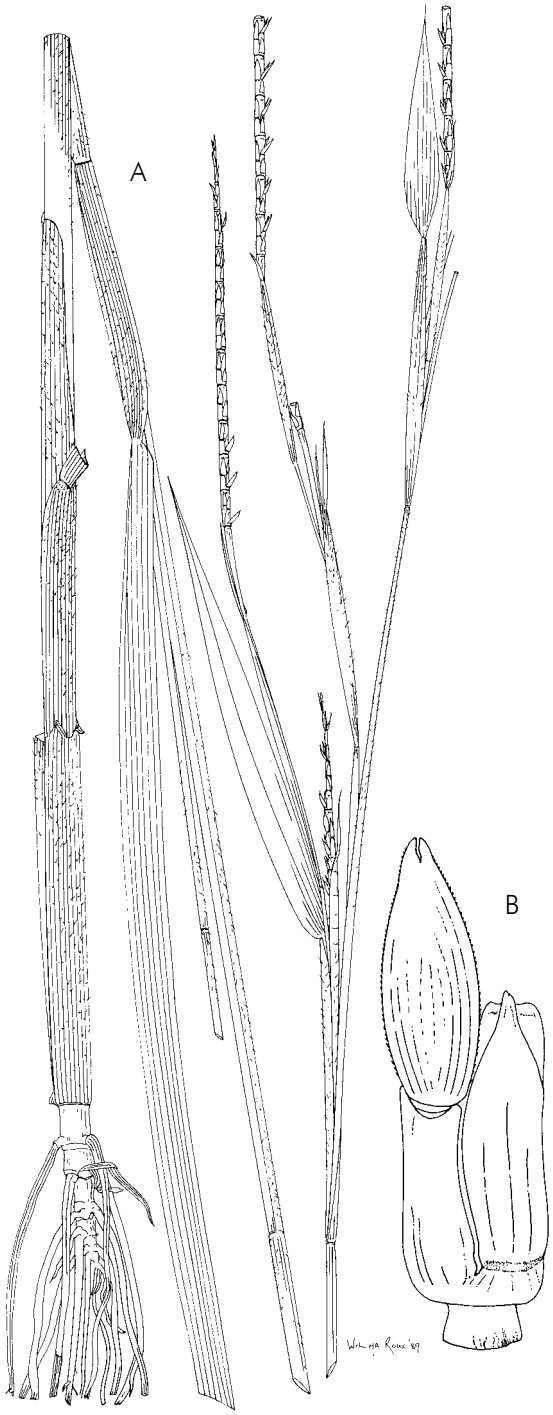



Figure 446.—*Rottboellia cochinchinensis*. A, plant; B, sessile–pedicelled spikelet pair showing central peg below (9.5 × 2.5 mm). Artist: W. Roux.

## **Rottboellia** L.f.

Linnaeus f.: 13, 114 (1782) name conserved, not of Scop.; Stapf: 72 (1917); Pilger: 266 (1954); Chippindall: 520 (1955); Clayton & Renvoize: 853 (1982); Simon: 564, fig. 203 (1982); Clayton & Renvoize: 366 (1986); Gibbs Russell et al.: 283 (1990); Watson & Dallwitz: 829 (1994); Cope: 174 (2002).

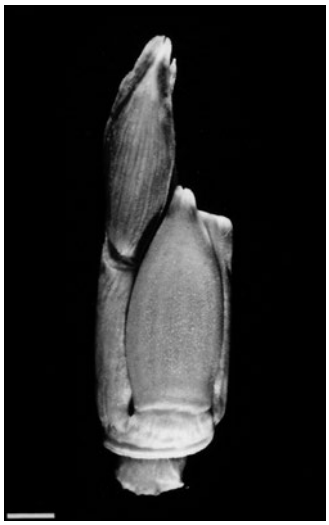


Figure 447.—*Rottboellia cochinchinensis*. Spikelet pair (4–7 mm). Photographer: M. Koekemoer.

Annual, robust, tufted, erect; frequently with stilt roots from lower nodes. **Leaf blade** broad, flat; blade and sheath usually hairy with stiff conspicuous, often irritant, tubercle-based hairs; *ligule* a short, narrow, fringed membrane. **Inflorescence** a solitary cylindrical raceme, terminal or aggregated into a spatheate false panicle; fragile; internode squatly clavate, fused to adjacent pedicel; *spikelets* sunken, in pairs, in long–short combinations: one sessile, the other pedicelled but appearing sessile due to almost complete fusion of pedicel with rachis. **Sessile spikelet** dorsiventrally compressed, falling with glumes; *glumes* ± equal, dissimilar, awnless; lower glume coriaceous, flat-backed, smooth, 2-keeled, narrowly winged at the apex, many-nerved. **Florets** 2; *lower floret* male; lemma with membranous incurved margins, awnless; palea well developed; *upper floret* bisexual; *lemma* less firm than glumes, ± hyaline, entire, glabrous, awnless; *callus* truncate, with a prominent peg; *palea* lanceolate, flattened dorsally, membranous. **Lodicules** 2, fleshy, glabrous. **Stamens** 3. **Ovary** ovoid, glabrous; styles 2, distinct, plumose. **Caryopsis** ovate in face view, crescentic in side view; hilum short; embryo large. **Pedicelled spikelet** slightly smaller than sessile spikelet, male or sterile, falling separately, pedicel oblong, scarcely distinguishable from internode, compressed. **Photosynthesis pathway**: $C_4$; XyMS-. PCR cells with suberised lamella. PCR cell chloroplasts with reduced grana; centrifugal/peripheral. **Cytology**: $x = 9$, 10 (polyploidy).

**Species** 4, tropical and subtropical Africa and Asia; 1 in southern Africa: *Rottboellia cochinchinensis* (Lour.) Clayton, northern Namibia, Botswana, Swaziland, Limpopo, Mpumalanga and northern KwaZulu-Natal.

Species treatment by A.C. Mashau.

**Rottboellia cochinchinensis** (Lour.) Clayton, in *Kew Bulletin* 35: 817 (1981). Type: China.

*R. exaltata* L.f., in *Supplementum plantarum*: 114 ('1781'). Type: India.

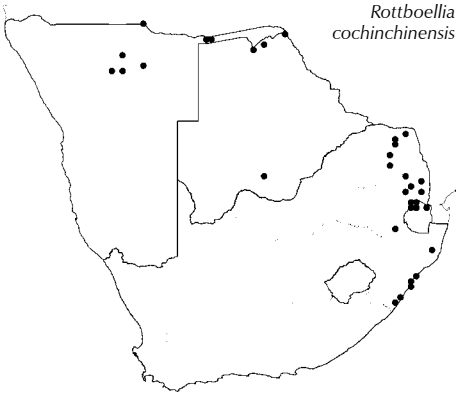
GUINEAFOWL GRASS, KOKOMA GRASS, TARENTAALGRAS

Robust annual 300–3 000 mm high; stilt roots usually present; basal sheaths with stiff irritating hairs. Leaf blade 600 × 10–30 mm. Inflorescence a cylindrical raceme, spikelets sunken. Sessile spikelet

4–7 mm long, awnless; palea well developed; anther 1–2 mm long. Pedicelled spikelet 3–5 mm long, hardly discernible as internodes fused to adjacent pedicels.

*Flowering*: December to June. *Ecology*: Often on black turf soil; wet places and in disturbed areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Throughout Old World tropics, introduced to America. N, B, S, LIM, M, KZN. *Economics*: Can become a problematic weed of cultivation.

Illustration: Chippindall: 521, fig. 416 (1955); Clayton et al.: 854, fig. 203 (1982).
Anatomy vouchers: *Ellis 2113, 3745, 3852* & *4428*.
Voucher: *Ward 2118*.



## **Sacciolepis** Nash

Nash: 89 (1901); Stapf: 386 (1899); Stapf: 747 (1920); Chippindall: 356 (1955); Launert: 163 (1970b); Simon: 372 (1972); Clayton & Renvoize: 454 (1982); Clayton & Renvoize: 277 (1986); Clayton: 41 (1989); Gibbs Russell et al.: 284 (1990); Watson & Dallwitz: 835 (1994).

Annual or perennial, tufted or decumbent, rhizomatous. **Leaf blade** expanded or rolled; *ligule* a narrow, fringed or unfringed membrane. **Inflorescence** a panicle, usually spike-like, dense and cylindrical, rarely open; *spikelets* pedicelled. **Spikelet** almost spherical, laterally to dorsiventrally to not noticeably compressed, asymmetrical or gibbous; *glumes* very unequal, dissimilar, awnless, distinctly ribbed; lower glume shorter than spikelet, sometimes reduced to a small scale; upper glume as long as spikelet, usually gibbous or saccate at base, glabrous. **Florets** 2 (in some species the spikelets are prone to proliferation giving a false appearance of many florets but these are disorganised sterile scales); *lower floret* male or sterile; lemma similar to upper glume but less gibbous, distinctly ribbed, glabrous, awnless, with or without a palea; *upper floret* bisexual; *lemma* firmer than glumes, entire, indurated, brittle, smooth, glossy, obscurely 3–5-nerved, margins inrolled and clasping edges of palea, awnless; *palea* similar to lemma. **Lodicules** 2, broadly cuneate. **Stamens** 3. **Ovary** ellipsoid, glabrous; styles distinct, plumose near ends. **Caryopsis** obliquely ellipsoid. **Cytology**: $x = 9$ (polyploidy). **Photosynthetic pathway**: $C_3$; XyMS+.

**Species** 30, tropics, mainly Africa; 8 indigenous and naturalised in southern Africa, Namibia, Botswana, Swaziland, North West, Limpopo, Mpumalanga, Gauteng, KwaZulu-Natal and Eastern Cape.

Species treatment by L. Fish and M.J. Moeaha.

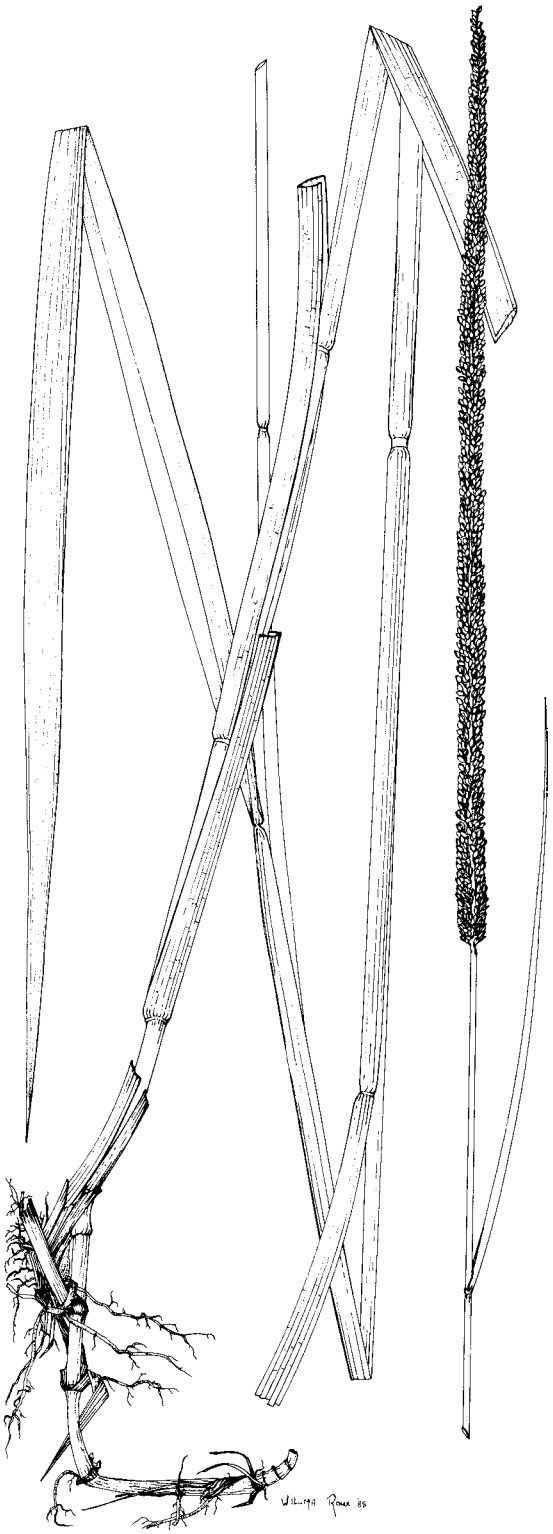


Figure 448.—*Sacciolepis typhura*. Artist: W. Roux.

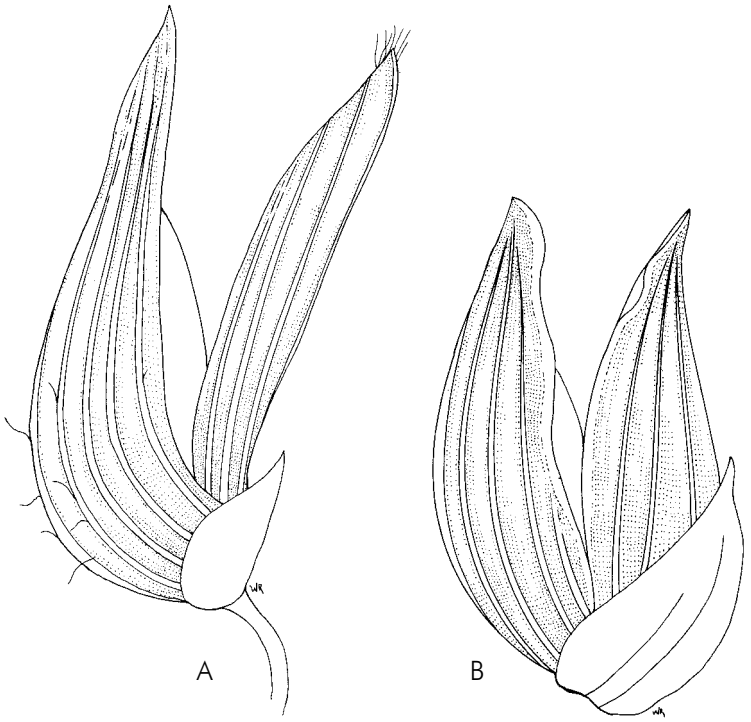



Figure 449.—*Sacciolepis* spp. spikelets. A, *S. curvata* (2.9 × 1.1 mm); B, *S. typhura* (2.3 × 1.3 mm). Artist: W. Roux.

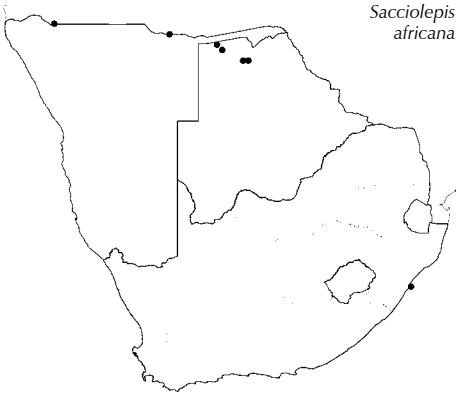
**Key to species:**

1. Inflorescence a loosely contracted panicle; lower glume reduced, scale-like, 0.2–0.5 mm long . . . . . **S. curvata**
   Inflorescence spike-like, ± cylindrical; lower glume $^1/_4$–$^2/_3$ as long as spikelet . . . . . 2
2. Spikelet ± laterally compressed . . . . . 3
   Spikelet ± dorsally compressed . . . . . 7
3. Lower floret palea much shorter than lemma; annual . . . . . 4
   Lower floret palea $^2/_3$ to nearly as long as lemma; perennial . . . . 5
4. Leaf blade papillose above; spikelet 1.0–1.8(2.0) mm long . . . . . **S. spiciformis**
   Leaf blade not papillose above; spikelet (1.5)2.7–3.1 mm long . . . . . **S. indica**
5(3). Spikelet 3.0–4.5 mm long . . . . . **S. rigens**
   Spikelet 1.5–2.5 mm long . . . . . 6
6. Leaf-blade subterete, convolute or tightly rolled, narrow; culms hard; lower leaf-sheath rarely cross-veined; spikelet usually hairy . . . . . **S. chevalieri**
   Leaf-blade flattened or folded, broad; culms soft; lower leaf-sheath cross-veins usually present; spikelet usually glabrous . . . **S. typhura**
7(2). Upper floret 2.2–3.2 mm long; spikelet obtuse to subacute, plump, elliptic; lower palea 1.5–1.8 mm long . . . . . **S. africana**
   Upper floret 3.2–3.5 mm long; spikelet acute to acuminate, narrowly elliptic; lower palea 2.0–2.2 mm long . . . . . **S. interrupta**



Figure 450.—*Sacciolepis typhura* spikelet (1.7–2.5 mm). Photographer: M. Koekemoer.

**Sacciolepis africana** C.E.Hubb. & Snowden, in *Kew Bulletin* 1936: 294 (1936). Type: Nigeria, Sokoto, *Dalziel 478* (K, holo.).

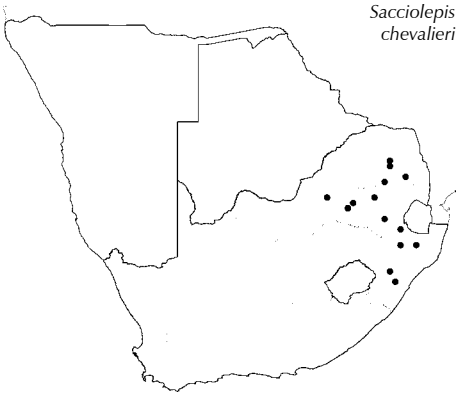



Hydro- to hygrophytic perennial 300–1 800 mm high; rhizomatous; leaf sheaths with cross-veins; culms thick, spongy often decumbent and rooting at nodes or floating. Leaf blade 50–400 × 3–15 mm, conspicuously ciliate on margins. Inflorescence dense, spike-like, 40–300 mm long; pedicels smooth. Spikelet 2.5–4.1 mm long, dorsally compressed, obtuse to subacute, plump, elliptic, light green to brown; lower glume subrotund, 5–7-nerved, $^1/_4$–$^1/_3$ spikelet length; upper glume 9–11-nerved; lower floret sterile, palea ± reduced, 1.5–1.8 mm long; upper floret 2.2–3.2 mm long, white to pale brown; anthers 0.8–1.1 mm long.

[Similar to *S. interrupta*, which has spikelet 3.5–4.5 mm long, acute to acuminate, and a mainly Asian distribution with a few records in Africa. Intermediate specimens are difficult to place.]

*Flowering*: February to May. *Ecology*: Standing or floating in water; in swampy or seasonally flooded areas and along river banks. *Frequency in southern Africa*: Infrequent. *Distribution*: Throughout tropical Africa. N, B, KZN.

Illustration: Clayton: 42, tab. 9 (1989).
Voucher: *De Winter & Marais 4528*.




**Sacciolepis chevalieri** Stapf, in *Flora tropical Africa*. 9: 754 (1920). Type: Mali, Sanguiana to Mussaia, *Chevalier 466*; Central African Republic, Ndellé, *Chevalier 6820*; and Koundè, *Chevalier 7714* (syntypes).

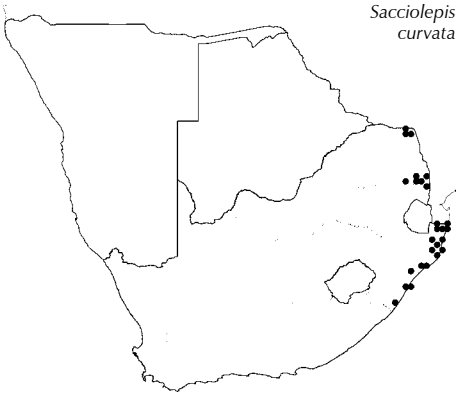
Tufted perennial 200–900 mm high; rhizomes short; basal sheaths usually without cross-veins; culms hard. Leaf blade 50–200 × 1–3 mm, subterete, convolute or tightly rolled or folded, strongly ribbed, occasionally papillose. Inflorescence cylindrical, spike-like, scanty, often interrupted, 20–160 mm long. Spikelet 1.5–2.2 mm

long, ovate, laterally compressed, usually hairy; lower glume ± 1/2 as long as spikelet; upper glume 4/5 the spikelet length; lower floret male, palea almost as long as lemma; anthers 0.6–1.0 mm long.

[Similar to *S. typhura*, which has softer culms and broader leaves (2–10 mm wide) but the variation is continuous and intermediates are common. The two species may only be habitat forms of a single species.]

*Flowering*: October to March. *Ecology*: Usually black turf and wet soils; in swamps, vleis or along streams. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to tropical Africa; also Madagascar. LIM, NW, G, M, KZN.

Voucher: *Reid 426*.


*Sacciolepis curvata*

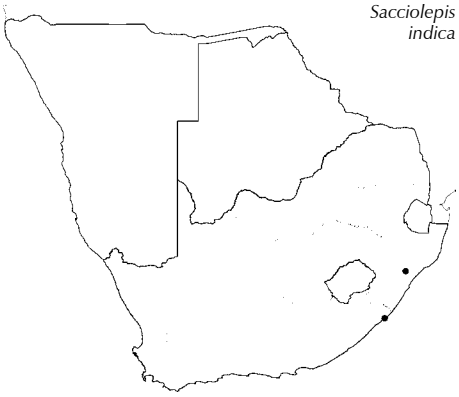
**Sacciolepis curvata** (L.) Chase, in *Proceedings of the Biological Society of Washington* 21: 8 (1908). Type: India.

FOREST HOOD GRASS, KAPPIEGRAS

Tufted to trailing short-lived perennial or annual 200–900 mm high; rhizome slender; prostrate at base; leaves mostly cauline; culm weak, rooting at lower nodes. Leaf blade 20–110 × 3–7 mm, narrowly lanceolate, soft and thin. Inflorescence open to loosely contracted, not spike-like; spikelet distinctly pedicellate. Spikelet 2.0–3.5 mm long, conspicuously asymmetrical, laterally compressed, glabrous to slightly hairy; lower glume a tiny scale 0.2–0.5 mm long; upper glume more than 5 × longer than lower glume, gibbose at base, prominently ribbed; lower floret male; anthers 0.6–1.0 mm long. Chromosome number: 2x = 18, 36 (Simon 1972).

*Flowering*: mainly October to April. *Ecology*: In damp shady places; along rivers or streams and in forest undergrowth, occasionally in woodlands and mopaneveld. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Zimbabwe, Mozambique, Kenya, Tanzania and Madagascar; also India and Sri Lanka. LIM, M, KZN. *Economics*: Natural pastures, but too slender to be productive; weed.

Illustration: Chippindall: 357, fig. 307 (1955).
Anatomy vouchers: *Ellis 3386* & *3568*.
Voucher: *Smook 5717*.


*Sacciolepis indica*

**Sacciolepis indica** (L.) Chase, in *Proceedings of the Biological Society of Washington* 21: 8 (1908). Type: India.

*S. auriculata* Stapf, in *Flora tropical Africa* 9: 762 (1920). Type: Nigeria, Borgu, *Barter 732* (K, lectotype).

Tufted annual 100–1 000 mm high; basal leaves few; culms slender, 1.0–2.5 mm in diameter, solid, decumbent or ascending; lower nodes often with aerial roots. Leaf blade 20–200 × 1–7 mm, broadly linear-lanceolate, rigid, flat, not ribbed or papillose, glabrous or often hairy; leaf sheaths auricles 1.5–2.5 mm long or absent. Inflorescence 10–130 mm long, spike-like, cylindrical to oblong; pedicels smooth. Spikelet (1.5)2.7–3.1 mm long, laterally compressed, obtuse, glabrous or hairy; glumes with broad hyaline margins and apices; lower glume 1.0–1.5 mm long, 1/2 the spikelet length, 3(–5)-nerved; upper glume equalling spikelet, 7–9-nerved; lower floret male or sterile; lower

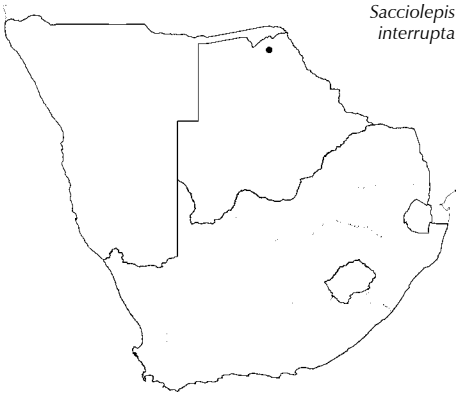
palea 0.5–1.8 mm long, much shorter than lemma; upper lemma pallid; anthers 0.6 mm long.

[Similar to *S. spiciformis*, which has leaves with papillae and spikelets 1.0–1.7(2.0) mm long; and *S. rigens*, which is a shortly rhizomatous perennial.]

*Flowering*: November to April. *Ecology*: In sandy soils; along stream, rivers and in marshy places. *Frequency in southern Africa*: Rare. *Distribution*: Old world tropics. KZN, EC.

Anatomy voucher: *Ellis 5211*.
Voucher: *Schackleton 472*.

**Sacciolepis interrupta** (Willd.) Stapf, in *Flora tropical Africa* 9: 757 (1920). Type: India.


*Sacciolepis interrupta*

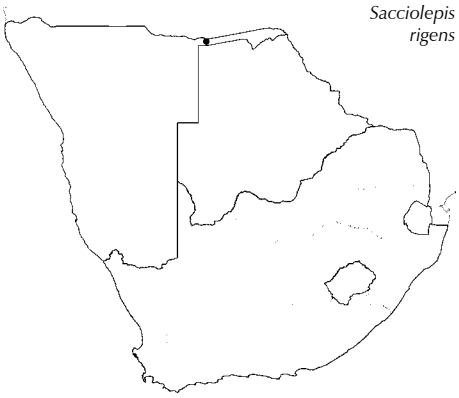
Hygrophytic perennial 300–1 500 mm high; rhizomatous; culms thick, spongy; culm decumbent, rooting at lower nodes. Leaf blade 50–300 × 3–17 mm, margins smooth; lower leaf sheaths without cross-veins. Inflorescence cylindrical, spike-like, 50–300 mm long, not very dense. Spikelet 3.5–5.0 mm long, dorsally compressed, acute to acuminate, light green to yellowish; lower glume subrotund; upper glume prominently ribbed; lower floret sterile, palea reduced, 2.0–2.2 mm long; upper floret 3.2–3.5 mm long; anthers 1 mm long.

[Similar to *S. africana*, which has a spikelet 2.5–3.5 mm long, obtuse to subacute, but intermediate specimens have been found.]

*Flowering*: July and March. *Ecology*: In shallow water and swampy areas. *Frequency in southern Africa*: Rare. *Distribution*: Zambia, Zimbabwe and Tanzania; Asia (India to southeast Asia); possibly introduced into tropical Africa. B.

Voucher: *Cresswell 19*.

**Sacciolepis rigens** (Mez) A.Chev., in *Revue de Botanique Appliquee et d'agriculture tropicale* 14: 29 (1934). Type: Togo, Sokodè to Bassari, *Kersting 595*.

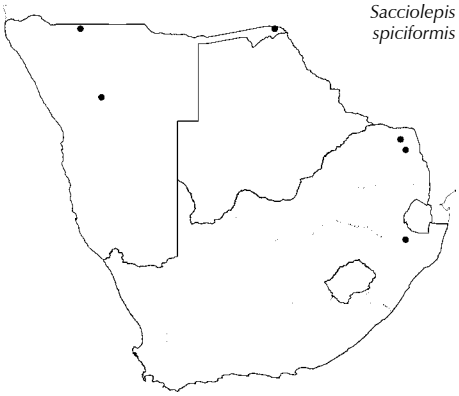

*Sacciolepis rigens*

Loosely tufted perennial 600–2 000 mm high; rhizome short, oblique; culms 1.0–2.5 mm in diameter, solid. Leaf blade 100–400 × 2–6 mm, linear, flaccid, flat; leaf sheaths with auricles 1.5–4.0 mm long. Inflorescence cylindrical, spike-like, 60–200 mm long; pedicels smooth. Spikelet 3.0–4.5 mm long, narrowly ovate, laterally compressed, glabrous or rarely hairy, purplish brown; lower glume 1.8–2.9 mm long, $^1/_2$ the spikelet length; upper glume equalling spikelet; lower floret male, palea 1.8–2.8 mm long, nearly as long as lemma; anthers up to 1 mm long.

[Difficult to separate from the annual *S. indica* when basal parts are missing.]

*Flowering*: around January. *Ecology*: Sandy and moist soils; along rivers or streams. *Frequency in southern Africa*: Rare. *Distribution*: Widely but unevenly distributed throughout tropical Africa. N.

Voucher: *De Winter & Wiss 4310*.


*Sacciolepis spiciformis*

**Sacciolepis spiciformis** (A.Rich.) Stapf, in *Flora tropical Africa* 9: 756 (1920). Type: Ethiopia, TU, Shire [Chirè], *Schimper 1825* (P, holo.).

*S. huillensis* (Rendle) Stapf, in *Flora tropical Africa* 9: 755 (1920). Type: Angola, Humpata, *Welwitsch 2699*.

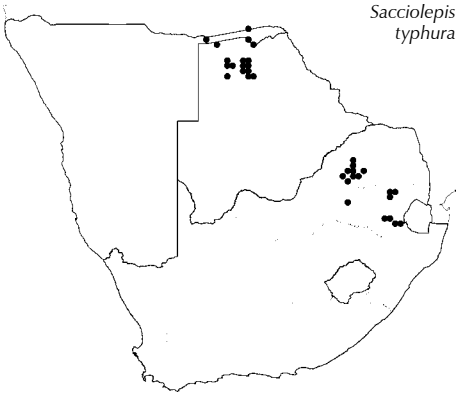
ANNUAL SWAMP GRASS

Hydro- to hygrophytic, loosely tufted short-lived perennial or annual 100–250(–500) mm high. Leaf blade 15–120 × 1–5 mm, upper surface ribbed, papillose, glabrous. Inflorescence spike-like, cylindrical; spikelet shortly pedicellate; pedicel scabrid. Spikelet 1.0–1.8(2.0) mm long, laterally compressed, obtuse, purplish grey; lower glume 0.8–1.4 mm long, $^1/_3$–$^2/_3$ the spikelet length, 3–5-nerved; upper glume ± equalling spikelet, 7–9-nerved; lower floret sterile, palea up to $^1/_2$ as long as lemma, 0.2–0.9 mm long; upper lemma pallid or light brown; anthers 0.6–0.8 mm long.

[Similar to *S. indica*, which has no papillae on leaves and spikelet (1.5)2.7–3.1 mm long.]

*Flowering*: March to June. *Ecology*: At high altitudes in sandy soils; at water edges, sometimes partly submerged in water. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to East Africa and Ethiopia, west to Cameroon; also Madagascar. N, LIM, KZN.

Anatomy vouchers: *Ellis 3716* & *3717*.
Voucher: *Johnstone 356*.


*Sacciolepis typhura*

**Sacciolepis typhura** (Stapf) Stapf, in *Flora tropical Africa* 9: 790 (1920). Type: South Africa, Limpopo, Naboomspruit, *Nelson 74*.

*S. cinereo-vestita* (Pilg.) C.E.Hubb., in *Kew Bulletin* 1934: 110 (1934). Type: Zambia, Bangeulu, *Fries 897* (UPS, holo.).

*S. glaucescens* Stapf, in *Flora tropical Africa* 9: 759 (1920). Type: Zimbabwe, Charter District, *Mundy*; *Dept. of Agric. 2102* (many syntypes).

PURPLE HOOD GRASS

Robust, erect, hygrophytic perennial 500–1 500 mm high; rhizome creeping, branched; basal sheaths papery with prominent cross-veins; culms usually spongy at base. Leaf blade 100–350 × 2–10 mm, strongly ribbed, papillose or hairy. Inflorescence dense, spike-like, cylindrical, 100–300 × 4–7 mm. Spikelet 1.7–2.5 mm long, narrowly ovate, laterally compressed, usually glabrous; lower glume ± $^1/_2$ the spikelet length; lower floret male, palea as long as lemma; anthers 0.8–1.0 mm long.

[Sometimes spikelets proliferate – appearing to have many florets – but are composed of disorganised sterile scales. Similar to *S. chevalieri*, which has harder culms and narrower, 1–2 mm wide, leaves, but the variation is continuous and intermediates are common. The two species may be habitat forms of the same species.]

*Flowering*: December to May. *Ecology*: Wet soils; in seasonal swamps, marshy places or floodplains; often submerged. *Frequency in southern Africa*: Locally common. *Distribution*: Throughout tropical Africa. N, B, LIM, G, M.

Illustration: Chippindall: 358, fig. 308 (1955).
Anatomy vouchers: *Ellis 92, 1527, 3702, 4440* & *4441*.
Voucher: *Smith 2682*.

## **Sartidia** De Winter

De Winter: 137 (1963); De Winter: 381 (1965); Melderis: 95 (1971); Clayton & Renvoize: 185 (1986); Gibbs Russell et al.: 286 (1990); Watson & Dallwitz: 836 (1994); Barkwell et al.: 598 (2011).

Perennial, densely tufted, rhizomatous. **Leaf blade** often rolled, reddish brown when dry; *ligul*e a dense fringe of hairs. **Inflorescence** a panicle, erect, narrow, usually interrupted, branches solitary or paired; *spikelets* solitary, pedicelled. **Spikelet** not noticeably compressed, disarticulating above glumes; *glumes* ± equal, narrow, acute to acuminate, flat to rounded on back, with or without apical awns, glabrous; lower glume usually 3-nerved; upper glume 3–5-nerved, nerves evanescent. **Floret** 1, bisexual; *lemma* firmer than glumes, coriaceous, sub-cylindrical, somewhat dorsiventrally compressed, slightly tapering upwards, grooved ventrally with involute margins, glabrous and smooth or scabrid, 3-nerved, without an articulation, 3-awned; *awns* glabrous or scabrid, spreading, collectively laxly spirally contorted at base when mature, column, when present, somewhat twisted; *callus* well developed, acute, obtuse or shallowly bifid, densely but shortly hairy; *palea* small, scale-like, not indurated, usually coriaceous below, 2-keeled, 2-nerved, apex obtuse. **Lodicules** 2, membranous, ± as long as palea, many-nerved. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose. **Caryopsis** dorsiventrally compressed, with deep ventral groove. **Cytology**: $x = 11$.

**Species** 5, Africa and Madagascar; 3 in southern Africa; northern Namibia, Limpopo and Mpumalanga.

Species treatment by L. Fish.

**Key to species:**

1. Spikelet (including awns) 90–120 mm long; callus acute . . . . . **S. angolensis**
   Spikelet (including awns) 30–60 mm long; callus obtuse to bifid . . .2



Figure 451.—*Sartidia angolensis* spikelet. Photographer: M. Koekemoer.

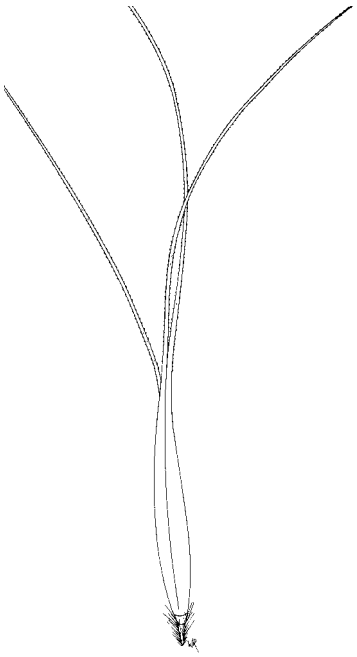
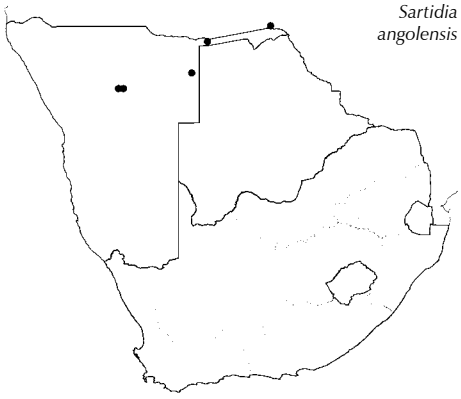


Figure 452.—*Sartidia jucunda*. Lemma with awns. Artist: W. Roux.



Figure 453.—*Sartidia jucunda* specimen.

2. Spikelet 50–60 mm long (including awns); lateral awns ± same length as central awn; callus obtuse . . . . . **S. jucunda**
Spikelet 30–40(55) mm long (including awns); lateral awns shorter than central awn; callus bifid . . . . . **S. dewinteri**


*Sartidia angolensis*

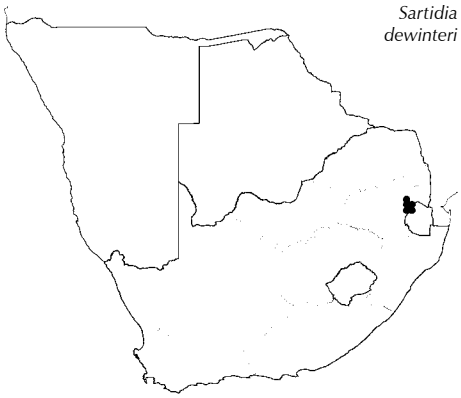
**Sartidia angolensis** (C.E.Hubb.) De Winter, in *Kirkia* 3: 137 (1963). Type: Angola, Benguella, country of the Ganguellas and Ambuellas, *Grossweiler 4099A*.

*Aristida angolensis* C.E.Hubb., in *Kew Bulletin* 1949: 359 (1949).

Tufted erect perennial 1 000–2 000 mm high; rhizomatous; culm terete, striate. Leaf blade to 350 × 2–4 mm, narrowed below. Inflorescence narrow, rigid, branches with 1–few spikelets near the apex. Spikelet 90–120 mm long (including awns); glumes subequal, acute; lateral awns about same length as central awn; callus acute.

*Flowering*: February to July. *Ecology*: On Kalahari sand; often in depressions. *Frequency in southern Africa*: Rare. *Distribution*: Angola, Zimbabwe and Zambia. N.

Illustration: De Winter: 385 (1965); Melderis: 96, tab. 29 (1971).
Voucher: *De Winter 2779*.


*Sartidia dewinteri*

**Sartidia dewinteri** J.Munday & Fish, in *South African Journal of Botany* 77: 598–607 (2011). Type: South Africa: Mpumalanga, Carolina district, Stoltzburg syncline on the farm Groenvaly 701 JT (–DD), 30/3/1994, *Balkwill 9043* (J, holo.).

*Sartidia* sp. (= *Muller 2174*) in *Grasses of southern Africa*: 287 (1990).

Erect, densely tufted perennial 400–1 000 mm high; rhizomatous; base sometimes flattened; basal sheaths glabrous, indistinctly striate, inner hard, shiny. Leaf blade (240–)263–405(–550) × 1.0–2.3(–3.0) mm, linear, rolled (involute) or expanded, green turning reddish brown; glabrous or long hairy, margins scabrid to smooth. Inflorescence erect, broad, open, often interrupted (145–)156–250(–300) mm long, well exserted from upper leaf; much branched; main axis rounded on one side, flattened on other, margin scabrid; spikelets many; pedicels (2.0–)3.5–13.0(–20.0) mm long. Spikelet 30–40(–55) mm long (including awns); glumes almost equal; lower glume 16–25 mm long, apex long acuminate, pale to rusty brown, awned, scabrid, 3–5-nerved, nerves scabridulous; upper glume 15–20(–24) mm long, 3-nerved; lemma 10–13 mm long, narrowly spindle-shaped, involute, ventrally grooved; column absent or of variable length (as lemma matures and fills out, the closely adpressed awns separate and the column becomes less distinct and shorter), scabrid, pale green or brown and purplish near base, or entirely purple, or pale to dark brown when mature; awns spreading or deflexed, spirally contorted basally at maturity, shallowly grooved on inner surface, scabrid, green to yellowish green, becoming brownish yellow at maturity; lateral awns 8–25(–31) mm long, filiform, usually shorter than median awn; median awn (19–)25–41 mm long, narrowly linear, stouter; callus bluntly bifid to emarginate, densely hairy, hairs 2-ranked, short hairs on callus sides and long hairs at base of lemma, tip glabrous; palea ovate, glabrous, apex broadly emarginate or dentate; anthers 4–6 mm long; caryopsis linear, ventrally grooved, glabrous.

*Flowering*: December to April. *Ecology*: Serpentine soils. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. S, M.

Anatomy vouchers: *Ellis 6370* & *6371*.
Voucher: *Muller 2174*.

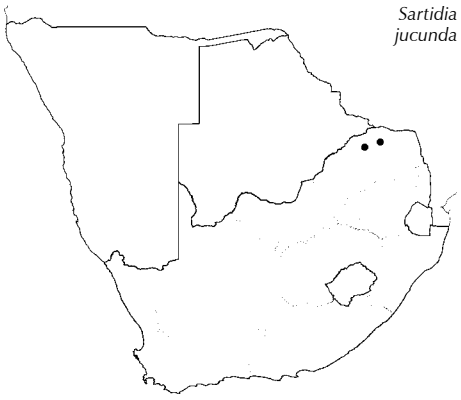
**Sartidia jucunda** (Schweick.) De Winter, in *Kirkia* 3: 137 (1963). Type: South Africa, Limpopo, Blaauberg, *Schweickerdt 1807* (UPR, holo.).

*Aristida jucunda* Schweick., in *Botanische Jahrbücher* 76: 221 (1954).

Densely tufted perennial to 1 000 mm high; rhizomatous; culm finely striated. Leaf blade to 450 × 3–4 mm; old leaves reddish brown. Inflorescence narrow; spikelets few. Spikelet 50–60 mm long (including awns); glumes reddish brown; lemma lateral awns about the same length as central awn; awns flattered; callus obtuse.

*Flowering*: April to May. *Ecology*: Rocky hillsides, altitudes 1 300–2 000 m. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. LIM.

Illustration: Chippindall: 307, fig. 272 (1955); De Winter: 382 (1965).
Anatomy voucher: *Smook 7501*.
Voucher: *Codd 8686*.




## **Schismus** P.Beauv.

Palisot de Beauvois: 73 (1812); Stapf: 692 (1900); Chippindall: 240 (1955); Conert & Türpe: 289 (1969); Launert: 165 (1970a); Conert & Türpe: 1 (1974); Clayton & Renvoize: 176 (1986); Gibbs Russell et al.: 287 (1990); Watson & Dallwitz: 843 (1994); Linder et al.: 352 (2010).



Figure 454.—*Schismus barbatus* spikelet (4–7 mm). Photographer: M. Koekemoer.

Annual or perennial, tufted. **Leaf blade** expanded or rolled, glabrous; *ligule* a fringe of hairs. **Inflorescence** a panicle, open to contracted or spike-like; *spikelets* solitary, shortly pedicelled. **Spikelet** slightly laterally compressed, disarticulating above glumes or falling with glumes; *glumes* ± equal, shorter than and rarely as long as spikelet, membranous, margins hyaline, 3–7-nerved, glabrous, awnless. **Florets** 3–7, bisexual; *lemma* similar in texture to glumes, with hyaline margins, 9-nerved, hairs scattered, or marginal tufts or in longitudinal lines, hairs linear or sometimes clavate/club-shaped; 2-lobed or minutely notched (emarginate), lobes rounded, acute to acuminate; awned, awnless or mucronate; *awn* usually short and straight, rarely well developed with a twisted column; *callus* short, hairy; *palea* ± equalling lemma, obovate to lorate, 2-keeled, 2-nerved, hyaline, glabrous or sometimes tufted on margin. **Lodicules** 2, ciliate. **Stamens** 3. **Ovary** subglobose, glabrous; styles distinct, plumose above. **Caryopsis** ellipsoid to obovate. **Photosynthetic pathway**: $C_3$; XyMS+.

**Species** 5, Africa, Mediterranean region; 4 in southern Africa, Namibia, Free State, Eastern, Western and Northern Cape provinces.

Species treatment by L. Fish and M.J. Moeaha.




Figure 455.—*Schismus barbatus*. A, plant; B, spikelet. Artists: A, C. Letty; B, G.E. Lawrence.

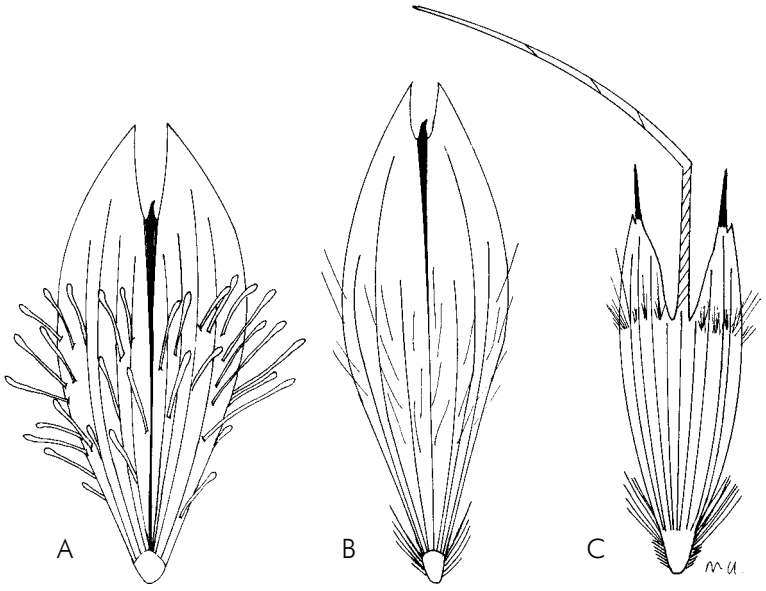
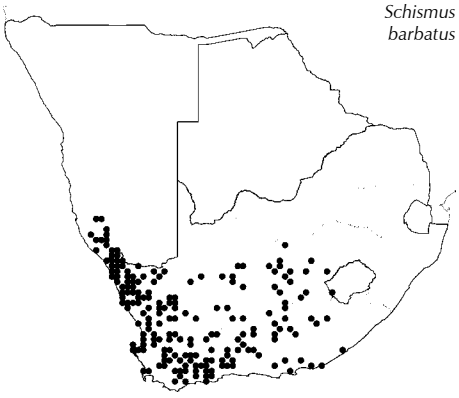



Figure 456.—*Schismus* spp. lemmas. A, *S. barbatus* (2.0 × 0.6 mm); B, *S. inermis* (3 × 1 mm); C, *S. schismoides* (5.2 × 1.0 mm). Artist: M. Ueckermann.

**Key to species:**

1. Lemma awn 3.0–4.5 mm long, usually geniculate, twisted column present . . . . . **S. schismoides**
   Lemma awnless, if mucro or awn present then less than 1 mm long, straight, twisted column absent . . . . . 2
2. Anther 0.2–0.4 mm long; lemma hairs often club-shaped; spikelet to 1.5 mm wide, narrowly lanceolate; annual . . . . . **S. barbatus**
   Anther 0.6–1.2 mm long; lemma hairs never club-shaped; spikelet 1.5–4.0 mm wide, ovate; perennial . . . . . 3
3. Lemma lobes nerveless, broad, truncate to obtuse or rounded . . . . . **S. scaberrimus**
   Lemma lobes 1-nerved, narrow, acute to subacute . . . **S. inermis**



*Schismus barbatus*

**Schismus barbatus** (Loefl. ex L.) Thell., in *Bulletin de l' Herbier Boissier* Sér. 2, 7: 391 (1907). Type: Spain.

HAASGRAS

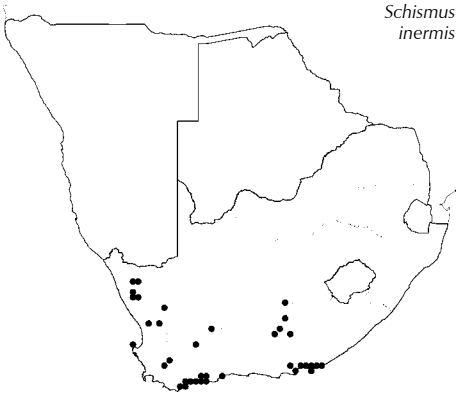
Tufted annual 50–250 mm high. Leaf blade 10–50 × to 1.5 mm, involute. Inflorescence 10–50 mm long. Spikelet 4–7 × 1.5 mm, narrowly lanceolate, mostly light green, sometimes purple; 5–10-flowered; lemma pubescent, hairs 0.2–0.5 mm long and usually club-shaped, lobes obtuse, distinct, a short mucro of less than 1 mm long present between lobes in sinus or absent; anther 0.2–0.4 mm long.

*Flowering*: June to December. *Ecology*: Alluvial soils and disturbed sandy areas. *Frequency in southern Africa*: Common. *Distribution*: North Africa, Middle East and southwestern Asia; introduced into many parts of the world. N, ?B, L, NW, FS, NC, WC, EC. Recorded in *A checklist of Botswana grasses*, by M. Kabelo & D. Mafokate in SABONET Report 24 (2004). *Economics*: Grazed by sheep; weed particularly in gardens.

Illustration: Conert & Türpe: 35, fig. 6 (1974).
Anatomy vouchers: *De Winter 9551*; *Ellis 2134, 2136, 2137, 2196, 2425, 2429* & *Van Heerden 67*.
Voucher: *Oliver, Tölken & Venter 367*.

**Schismus inermis** (Stapf) C.E.Hubb., in Hill, *Flora tropical Africa* 10: 147 (1937). Type: South Africa, Eastern Cape, Port Elizabeth, *E.S.C.A. Herb., 178*.

*Danthonia inermis* Stapf, in Thiselton-Dyer, *Flora capensis* 7: 534 (1899).

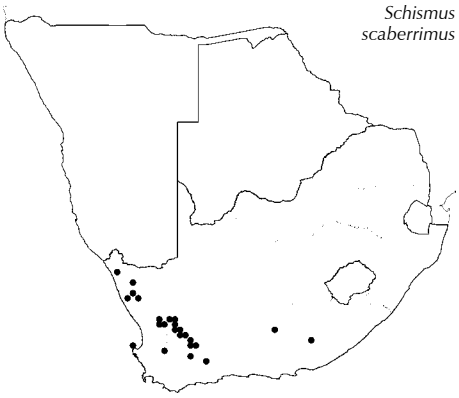

*Schismus inermis*

Tufted perennial 120–400 mm high. Leaf blade to 300 × about 1 mm. Inflorescence 25–70 mm long, contracted, dense. Spikelet 4.5–7.0 × 2.5–4.0 mm, ovate, green or purple; 4–6-flowered; lemma sparsely to densely pubescent, never glabrous, hairs 1.0–1.5 mm long, never club-shaped; lobes subacute to acute, narrow, 1-nerved; central slender awn or mucro up to 1 mm long in sinus between lobes; palea hairy between and on keels; anther 0.6–1.2 mm long.

*Flowering*: June to February. *Ecology*: On dense grassy slopes and rocky areas. *Frequency in southern Africa*: Common. *Distribution*: Endemic. NC, WC, EC.

Illustration: Conert & Türpe: 56 & 57, figs 11 & 12 (1974).
Anatomy vouchers: *Ellis 611, 596, 1280, 1671, 2527, 2529, 2562, 2563* & *Acocks 23916*.
Voucher: *Archibald 4541/41*.

**Schismus scaberrimus** Nees, in *Florae Africanae australioris* 1: 423 (1841). Type: South Africa, Northern Cape, Kamiesbergen inter Kuil et Modderfontein, *Drège* (lectotype).


*Schismus scaberrimus*

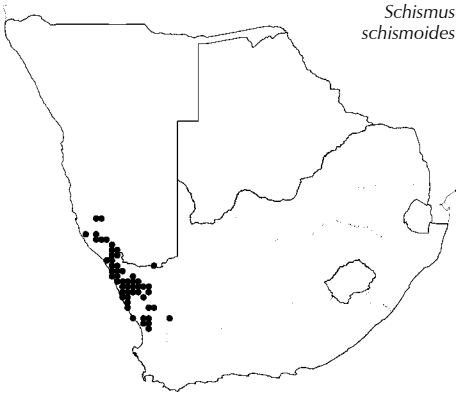
Tufted perennial 100–450 mm high. Leaf blade 30–200 × to 1.5 mm, somewhat scabrid. Inflorescence 10–50 mm long. Spikelet 5–7 × 1.5–2.5 mm, ovate to broadly ovate; 4–6-flowered; lemma back sparsely pubescent with scattered hairs, margins densely hairy to almost glabrous; lobes truncate, obtuse or rounded, broad, sinus shallow to deep, nerveless as all nerves except midrib end well below apex; a short mucro or awn up to 1 mm long extends between lobes or is absent; palea hairy between keels below; anther 0.8–1.2 mm long.

*Flowering*: September and October. *Ecology*: Sandy areas; dry riverbeds. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. NC, WC, EC.

Illustration: Conert & Türpe: 61, fig. 15 (1974).
Anatomy vouchers: *Ellis 710, 2416, 2418, 2456, 2459, 2460, 2461* & *2468*.
Voucher: *De Winter & Verdoorn 9038*.

**Schismus schismoides** (Stapf ex Conert) Verboom & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 306–364 (2010). Type: South Africa, Northern Cape, Namaland, Great Bushman land, *Schlechter s.n* (K, holo.).

*Karroochloa schismoides* (Stapf ex Conert) Conert & Türpe, in *Senckenbergiana Biologica* 50: 299 (1969).


*Schismus schismoides*

Tufted annual 50–150 mm high. Leaf blade to 60 × about 0.5 mm, linear, open or rolled, glabrous or pubescent but not hispid; leaf sheath usually glabrous. Inflorescence 10–20 mm long. Spikelet 4.5–6.0 × ± 1 mm, 3–5-flowered; glumes 3.5–5.0 mm long; lemma 2.5–4.0 mm long (including lobes), long hairs across middle at level of awn insertion, sometimes these in indistinct tufts, rest of back with short hairs or glabrous, and a fringe of hairs along each margin; lobes acuminate, awned, glabrous; central awn 3.0–4.5 mm long, column present, twisted; palea 2.2–2.4 mm long, pubescent between keels; callus elongate, 0.4–0.5 mm long; anthers 1.5–2.0 mm long.

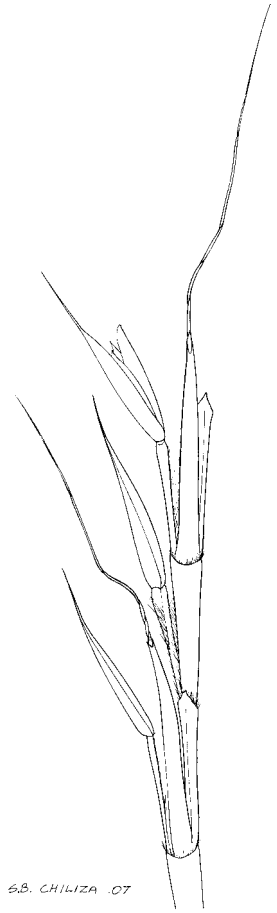



Figure 457.—*Schizachyrium sanguineum*. Spikelet pairs consisting of long-awned sessile and short-awned pedicelled spikelets, with pedicels and internodes. Artist: S.B. Chiliza.



Figure 458.—*Schizachyrium sanguineum* specimen.

*Flowering*: Usually in July to October, but dependent upon rainfall. *Ecology*: Mountains in drier parts. *Frequency in southern Africa*: Common. *Distribution*: Endemic. N, NC, WC.

Illustration: Conert & Türpe (under *Karroochloa*): 300, fig. 13–19, spikelet parts (1969).
Anatomy vouchers: *Ellis 2190, 2428* & *5396*.
Voucher: *Du Toit 2178*.

## **Schizachyrium** Nees

Nees ab Esenbeck: 331 (1829); Stapf: 334 (1898); Stapf: 194 (1917); Chippindall: 502 (1955); Clayton & Renvoize: 754 (1982); Clayton & Renvoize: 352 (1986); Gibbs Russell et al.: 288 (1990); Watson & Dallwitz: 845 (1994); Sales: 81 (2002).

Annual or perennial; tufted. **Leaf blade** linear, usually folded, midrib forming a keel, apex acute to obtuse; *ligule* a narrow, fringed membrane. **Inflorescence** sometimes solitary and terminal, usually in a spatheate false panicle with solitary, cylindrical, narrow racemes; internode and pedicels linear to clavate; *spikelets* paired, dissimilar, in long–short combination: one sessile, the other pedicelled. **Sessile spikelet** dorsiventrally compressed or squeezed between internode and pedicel, falling with glumes and adjacent internode of rachis; *glumes* ± equal, dissimilar, lower chartaceous to subcoriaceous, rounded or flattened on back, glabrous or hairy, 2-keeled or sharply inflexed (both sometimes together), keels lateral to frontal with several intercarinal nerves, mucronate or awnless; upper glume membranous, keeled at least upwards, rarely awned. **Florets** 2; *lower floret* reduced to a lemma, hyaline, awnless; *upper floret* bisexual; *lemma* less firm than glumes, rarely entire, incised, deeply or shallowly 2-lobed, rarely awnless, usually awned from sinus; *awn* glabrous, geniculate, usually short, sometimes inconspicuous; *callus* obtuse, short, hairy at base, inserted in the crateriform and scariously rimmed top of internode; *palea* 0. **Lodicules** 2, minute. **Stamens** 2 or 3. **Ovary** glabrous; stigmas laterally exserted, plumose above. **Caryopsis** linear, subterete; hilum short; embryo large. **Pedicelled spikelet** symmetrical, commonly smaller than sessile spikelet, male or sterile; lower glume sometimes awned; spikelet sometimes reduced to a glume. **Photosynthetic pathway**: $C_4$; biochemical type NADP-ME (1 species): XyMS-. PCR outlines uneven. PCR cell chloroplasts centrifugal.

**Species** ± 60, throughout the tropics; 6 in southern Africa, northern Namibia, northern Botswana, Swaziland, North West, Gauteng, Limpopo, Mpumalanga and KwaZulu-Natal.

Species treatment by M.T. Nembudani.

### Quick guide to easily confused taxa:

Upper lemma awned; plant loosely tufted; leaf blade 2 mm and wider . . . . . **Schizachyrium jeffreysii**
Upper lemma awnless; plant densely tufted; leaf blade up to 2 mm wide . . . . . **Elionurus muticus**

### Key to species:

1. Plant annual . . . . . .2
   Plant perennial . . . . . 3
2. Sessile spikelet 2.5–3.0 mm long; lower leaves with blade apex obtuse; inflorescence exserted from spatheole at maturity . . . . . **S. brevifolium**

Sessile spikelet 5–6 mm long; all leaves with blade apex tapering; inflorescence always partially included in spatheole at maturity . . . . . **S. exile**

3(1). Raceme appears glabrous, hairs only along margins of rachis and pedicel . . . . . 4
Raceme obviously hairy, hairs present along margins and backs of rachis and pedicel . . . . . 5

4. Sessile spikelet laterally compressed, upper lemma bifid for almost whole length, lower glume glabrous, linear; pedicelled spikelet awn 2–6 mm long; plant usually red to varying degrees . . . . . **S. sanguineum**
Sessile spikelet dorsally compressed, upper lemma bifid for 1/4–1/3 of its length, lower glume sparsely pubescent, narrowly elliptic; pedicelled spikelet mucronate or awn up to 2 mm long; plant never red . . . . . **S. rupestre**

5(3). Pedicelled spikelet densely hairy, hairs longer than 2 mm; raceme hairs usually yellowish or cream-coloured, rarely white; leaf blade folded; basal sheaths fanlike . . . . . **S. ursulus**
Pedicelled spikelet sparsely hairy, hairs shorter than 2 mm; raceme hairs usually white, rarely cream-coloured; leaf blade expanded; basal sheaths not fanlike . . . . . **S. jeffreysii**



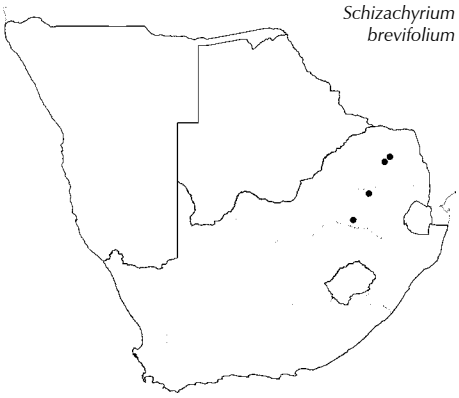
Figure 459.—*Scizachyrium sanguineum* spikelet pair (6–9 mm). Photographer: M. Koekemoer.

**Schizachyrium brevifolium** (Sw.) Nees ex Büse, in Miquel, *Plantae Junghuhnianae*: 359 (1854). Type: Jamaica.

Delicate, scrambling, sometimes erect annual 50–600 mm high. Leaf blade to 70 × 2–5 mm, lower blade apex obtuse; ligule undivided. Inflorescence exserted from spatheole at maturity; raceme glabrous or sometimes hairy throughout; internode and pedicel filiform, linear to narrowly clavate. Sessile spikelet 2.5–3.0 mm long, dorsally compressed; lower glume glabrous, occasionally hairy; upper lemma bifid for almost whole length, awn 7–12 mm long; anther 0.5–0.7 mm long. Pedicellate spikelet reduced to a glume; awn straight, up to 6 mm long.

*Flowering*: February to April. *Ecology*: Open, damp places such as vleis; often shaded by taller grasses. *Frequency in southern Africa*: Rare. *Distribution*: Pantropical. LIM, G, M.

Voucher: *Scheepers 933*.



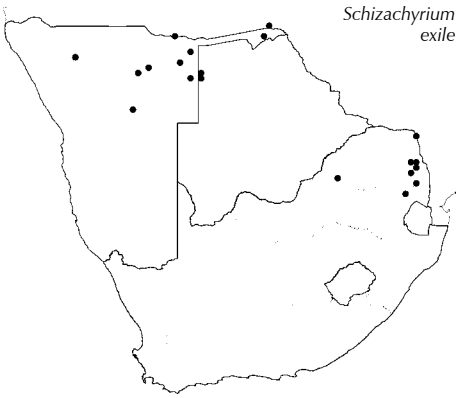

**Schizachyrium exile** (Hochst.) Pilg., in *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflazengeographie* 54: 284 (March 1917). Type: Sudan, Arashkol (Arash-Cool), *Kotschy 19 & 370* (syntypes).

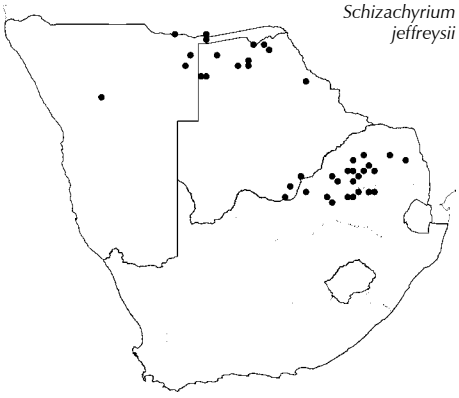
*S. inclusum* Stent, in *Bothalia* 1: 172 (1963). Type: Zimbabwe, Enterprise, *Eyles 1646* (PRE, iso.).

Tufted, robust annual 500–1 000 mm high. Leaf blade 20–150 × 2–3 mm, apex tapering; ligule undivided. Inflorescence always partly enveloped by a broad spatheole; raceme usually villous, sometimes glabrescent; internode clavate; pedicel flattened. Sessile spikelet 5–6 mm long, laterally compressed; lower glume glabrescent to villous; upper lemma bifid for 3/4 its length, awn (7)10–25 mm long; anther 0.4–0.7 mm long. Pedicellate spikelet much smaller, reduced to a glume 0.8–2.4 mm long, awn 3–10 mm long.

*Flowering*: March to June. *Ecology*: Often in poor dry soils; open places. *Frequency in southern Africa*: Infrequent. *Distribution*: Through tropical Africa to Asia. N, B, LIM, M.

Anatomy vouchers: *Ellis 3462, 3687* & *3689*.
Voucher: *Volk 363*.




*Schizachyrium jeffreysii*

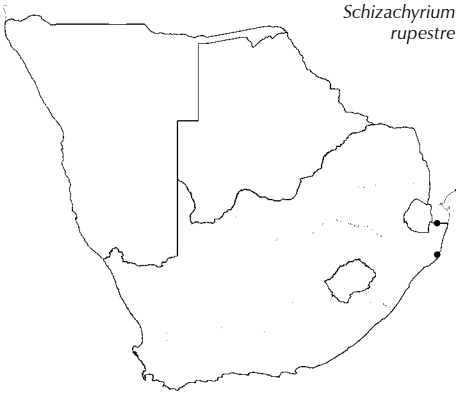
**Schizachyrium jeffreysii** (Hack.) Stapf, in *Flora tropical Africa* 9: 198 (1919). Type: Zimbabwe, Bulawayo, *Jeffreys 78*.

SILKY AUTUMN GRASS, SLITGRAS

Loosely tufted perennial 600–1 000 mm high. Leaf blade to 200 × 2–5 mm, glabrous or hairy; ligule undivided. Inflorescence raceme with conspicuous white hairs along margins and backs of rachis and pedicels. Sessile spikelet 7–8 mm long, dorsally compressed; lower glume densely hairy; upper lemma bifid for $^{1}/_{2}$–$^{2}/_{3}$ of its length, awn 13–22 mm long; anther 2.5–4.0 mm long. Pedicellate spikelet 5.0–7.4 mm long, awn 1.0–3.5 mm long.

*Flowering*: February to June. *Ecology*: Open veld. *Frequency in southern Africa*: Common. *Distribution*: Southern tropical Africa. N, B, LIM, NW, G, M. *Economics*: Seldom grazed; used for thatching if nothing else is available.

Anatomy vouchers: *Van Heerden 18*; *Ellis 832, 1120, 2044, 2051* & *2066*.
Voucher: *Giess 9926*.


*Schizachyrium rupestre*

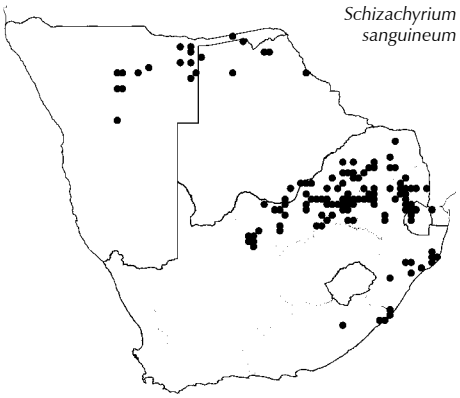
**Schizachyrium rupestre** (K.Schum.) Stapf, in *Flora tropical Africa* 9: 204 (1919). Type: Togo, Misahöhe, *Bauman 361*.

Tufted perennial 300–1 500 mm high; basal leaf sheath glabrous or sometimes sparsely pubescent. Leaf blade 150–300 × 1–5 mm, acute; ligule undivided. Inflorescence delicate; raceme hairy with conspicuous white hairs only on margins of internodes and pedicels; internode and pedicel clavate to almost linear. Sessile spikelet 4.0–6.5 mm long, dorsally compressed; lower glume sparsely pilose on the lower part, narrowly elliptic; upper lemma bifid for $^{1}/_{4}$–$^{1}/_{3}$ of its length; awn 10–16 mm long; anther 1.5–2.5 mm long. Pedicellate spikelet 3.0–6.5 mm long, acuminate or with an awn point up to 2 mm long.

[Said to be allied to *S. jeffreysii*.]

*Flowering*: March. *Ecology*: Moist places in coastal bush. *Frequency in southern Africa*: Rare. *Distribution*: Senegal to Nigeria and Tanzania. KZN. (Known only by two collections of R.P. Ellis from St Lucia (iSimangaliso area), far south of its reported range).

Anatomy vouchers: *Ellis 3420* & *4497*.
Voucher: *Ellis 4497*.


*Schizachyrium sanguineum*

**Schizachyrium sanguineum** (Retz.) Alston, in Thwaites, *Enumeratio Plantarum Zeyllaniae*/ *An Enumeration of Ceylon Plants* Suppl.: 334 (1931). Type: China.

*S. semiberbe* Nees, in *Agrostologia brasiliensis* 2: 336 (1892). Type: Brazil.

RED AUTUMN GRASS, ROOIDEKGRAS

Tufted perennial 400–1 200 mm high; often conspicuously red; rhizome shortly creeping. Leaf blade 60–300 × 7 mm, apex rounded or abruptly pointed; ligule undivided. Inflorescence raceme nearly glabrous, hairs present only along margins of rachis and pedicels; internode and pedicel clavate. Sessile spikelet 6–9 mm long, narrowly elliptic, laterally compressed; lower glume glabrous; upper lemma bifid for almost whole length, awn 8–21 mm long; anther 2.5–3.8 mm long. Pedicellate spikelet 4–7 mm long, awn 2–6 mm long.

*Flowering*: January to May. *Ecology*: Open veld. *Frequency in southern Africa*: Very common. *Distribution*: Throughout tropics. N, B, S, LIM, NW, G, M, KZN, NC, EC. *Economics*: Not an important grazing grass as too hard, especially late in the season; used for thatching.

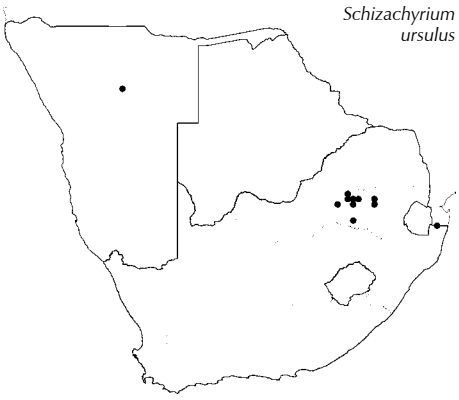
Illustration: Chippindall: pl. 22 (1955); Clayton et al.: 757, fig. 178 (1982).
Anatomy vouchers: *Ellis 136, 464, 1359, 4500* & *5208*.
Voucher: *Giess 10072*.

**Schizachyrium ursulus** Stapf, in *Flora tropical Africa* 9: 197 (1919). Type: Angola, Benguella, country of the Ganguellas and Ambuellas, *Grossweiler 2988*.

Densely tufted perennial 300–700 mm high; tufts round; basal sheaths numerous, yellow, turning brown later, fanlike, eventually glabrous, glossy. Leaf blade to 400 × 2–3 mm, hairy, folded, curved; ligule undivided. Inflorescence raceme with conspicuous yellowish or cream-coloured hairs on margins and backs of internodes and pedicels. Sessile spikelet 7–9 mm long, dorsally compressed; lower glume densely pubescent; upper lemma bifid for $^1/_3$–$^1/_2$ its length, awn 11–17 mm long; anther 3.5–4.0 mm long. Pedicellate spikelet shorter, awn 1–4 mm long.

*Flowering*: January to April. *Ecology*: Open sour veld. *Frequency in southern Africa*: Infrequent. *Distribution*: Southern tropical Africa. N, NW, G, M, KZN (although KZN specimens have white hairs, it is closest to *S. ursulus* and similar to a specimen from Mozambique, near Maputo).

Voucher: *De Winter 273*.




## **Schmidtia** Steud. ex J.A.Schmidt

Schmidt: 144 (1852) name conserved, not of Moench, not of Tratt.; Chippindall: 231 (1955); Launert: 303 (1965); Launert: 168 (1970a); Renvoize: 165 (1970); Launert: 149 (1971); Clayton & Renvoize: 189 (1986); Gibbs Russell et al.: 290 (1990); Watson & Dallwitz: 848 (1994).



Figure 460.—*Schmidtia pappophoroides* spikelet (8–15 mm). Photographer: M. Koekemoer.

Tufted perennial or annual; sometimes decumbent at base; stoloniferous; culms decumbent, more rarely erect, sometimes rooting from nodes. **Leaf blade** and sheaths usually bearing gland-tipped hairs, often viscid; *ligule* a fringe of hairs. **Inflorescence** a panicle, open or contracted; *spikelets* solitary, shortly pedicelled to subsessile. **Spikelet** slightly laterally compressed, disarticulating above glumes; *glumes* unequal to ± equal, ± as long as spikelet, similar, lanceolate, 7–11(–14)-nerved, membranous, green or grey, glabrous or hairy, hairs sometimes glandular, awnless. **Florets** 4–9, bisexual; *upper* 1 or 2 *florets* usually reduced and sterile; *lemma* dorsally rounded, firmer than glumes, 9-nerved, subcoria-




Figure 461.—*Schmidtia pappophoroides*. Artist: H.W. du Toit.

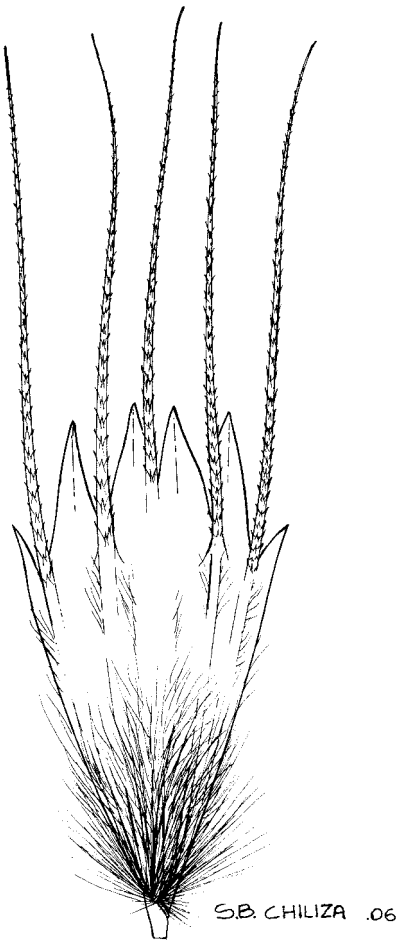



Figure 462.—*Schmidtia pappophoroides* lemma. Artist: S.B. Chiliza.

ceous, dorsally long-villous towards base, usually scabrid, 6-lobed; lobes alternating with 5 straight, scabrid *awns* from between lobes; *callus* minute, pointed, hairy; *palea* longer than lemma, oblong or elliptic-oblong, 2-keeled, with narrow flaps, stiffly ciliate along keels, cilia very often with interspersed glandular-tipped hairs. **Lodicules** 2, minute, cuneate, truncate or often with apex shallowly bilobed with gland-tipped hairs. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose. **Caryopsis** small, ± 2.5 mm long, ellipsoid; hilum short; pericarp fused; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines uneven, without extensions. PCR cell chloroplasts centrifugal/peripheral.

**Species** 2, Africa and Pakistan; 2 widespread in southern Africa.

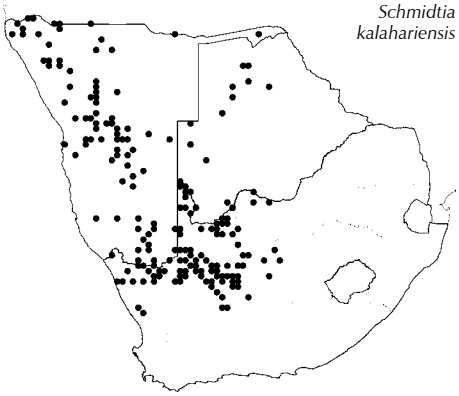
Species treatment by M.J. Moeaha.

**Quick guide to easily confused genera:**

Lemma 5-awned, awn scabrid, awned lobes alternating with hyaline lobes . . . . . **Schmidtia**
Lemma 9-awned, awn plumose or scabrid, without alternating hyaline lobes . . . . . **Enneapogon**

**Key to species:**

Perennial with knotty rootstock; culm base swollen; palea keels with or without a few gland-tipped hairs (only towards apex); leaf blades usually less than 7 mm wide; glumes usually light green or grey-green . . . . . **S. pappophoroides**
Annual with fibrous roots; culm base not swollen; palea keels always with gland-tipped hairs scattered along whole length, rarely confined only to upper $^1/_3$, usually conspicuously overtopping the cilia; leaf blades usually more than 7 mm wide; glumes usually dark greenish grey . . . . . **S. kalahariensis**



*Schmidtia kalahariensis*

**Schmidtia kalahariensis** Stent, in *Bothalia* 2: 421, 423 (1928) ('*kalihariensis*' in error). Type: South Africa, Northern Cape, Little Bushmanland, Kraaiwater, 19.v.1898, *Schlechter 84* (?, lecto.; PRE, synlecto.).

Tufted annual up to 1 000 mm high; culm base not swollen; plant coarsely glandular hairy, viscid causing a sticky feeling; has a strong unpleasant smell. Leaf blade 70–150 × 8–10 mm, tapering abruptly at apex. Spikelet 6–17 mm long; glumes usually dark greenish grey; keels of palea always with gland-tipped hairs, these usually conspicuously overtopping the cilia and scattered over the whole length of the keels, rarely confined to upper $^1/_3$.

*Flowering*: January to December, but most commonly in mid- to late summer. *Ecology*: Usually in poor sandy soils; in grassland, open woodland and on hillsides; important pioneer grass occurring as a dominant grass after droughts or in overgrazed veld. *Frequency in southern Africa*: Common, or locally dominant. *Distribution*: Through Angola north to Chad and Sudan. N, B, NW, FS, NC, WC. *Economics*: Hay and pasture but said to cause blistering of horses' mouths; a good indicator of the deterioration of veld.

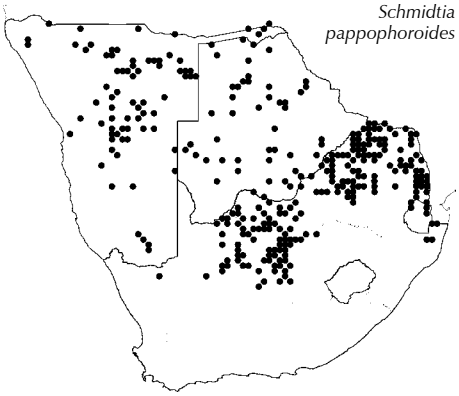
Illustration: Chippindall: 233, fig. 207 (1955).
Anatomy vouchers: *Botha & Panagos 7, 11, 25, 39*; *Ellis 862 & 2205*.
Voucher: *Theron 1985*.

**Schmidtia pappophoroides** Steud., in J.A Schmidt, in *Beiträge zur Flora der Cape Verderdischen Insel*: 145 (1852). Type: Cape Verde Is., Boa Vista, 20.ii.1851, *J.A. Schmidt s.n.*, plate 1, fig. 1–10 (P, holo.).

*S. bulbosa* Stapf, in *Flora capensis* 7: 658 (1900). Type: South Africa, Northern Cape, Griqualand West; Hünernest Kloof, *Rehmann 3401*; St. Clair, Douglas, *Orpen 196*; Free State, *Buchanan 52*; Mpumalanga, on the plains, *McLea 136*; Bosch Veld at Klippan, *Rehmann 5365*; near Lydenburg, *Atherstone* s.n.; Botswana, Chooi Desert near Giraffe Station, *Burchell 2361* (syntypes).

*S. glabra* Pilg., in Engler *Botanische Jahbrücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 43: 386 (1909). Type: Mpumalanga, Komati Poort, xii.1897, *Schlechter 11850* (B, holo.).

KALAHARI SANDKWEEK, VAALGRAS




Tufted perennial 150–900 mm high; knotty rootstock present, stoloniferous; hairy to nearly glabrous, not viscid as *S. kalahariensis*; culm base swollen. Leaf blade 50–160 × 2–7 mm, tapering gradually to a long fine apex, often blue-green or glaucous. Spikelet 8–15 mm long; glumes usually light green or grey-green; keels of palea with or without a few gland-tipped hairs, then only towards the apex.

*Flowering*: January to December, but most commonly in summer. *Ecology*: Open veld in a variety of soils and habitats, particularly sandveld and bushveld. *Frequency in southern Africa*: Common, or locally dominant. *Economics*: Palatable, drought resistant grass that can withstand fairly heavy grazing. *Distribution*: Northwards to eastern and central tropical Africa; and Cape Verde Islands. N, B, S, LIM, NW, G, M, FS, KZN, NC.

Illustrations: Chippindall: 232, fig. 206 (1955); Launert: 151, tab. 40 (1971).
Anatomy vouchers: *Ellis 837, 929, 1313, 1587, 2028* & *5182*.
Voucher: *Werdermann & Oberdieck 2369*.

## **Schoenefeldia** Kunth

Kunth: 86 (1829); Pilger: 95 (1956); Hubbard: 309 (1974); Clayton & Renvoize: 244 (1986); Gibbs Russell et al.: 291 (1990); Watson & Dallwitz: 850 (1994); Cope: 243 (1999).

Perennial or annual; tufted, sometimes geniculate. **Leaf blade** narrowly linear; *ligule* reduced to a short, fringed membrane. **Inflorescence** of solitary, paired or digitate, slender, 1-sided racemes; *spikelets* solitary, subsessile. **Spikelet** strongly laterally compressed, disarticulating above glumes; *glumes* very unequal, longer than spikelet, similar, membranous, 1-nerved, keeled, acute, mucronate or shortly awned. **Florets** 1 or 2; lowest bisexual; *uppermost floret* vestigial but awned; lowest *lemma* firmer than glumes, chartaceous or cartilaginous, shorter than glumes, ovate-elliptic, keeled, 3-nerved, nerves hairy, minutely 2-lobed, awned from between lobes; *awn* long, flexuous, entangled with awns of other spikelets in inflorescence; *callus* hairy; *palea* 2-nerved, 2-keeled. **Lodicules** 2. **Stamens** 3. **Ovary** glabrous; styles 2, plumose. **Caryopsis** (achene) narrowly ellipsoid, laterally compressed; pericarp free; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+.

**Species** 2, Africa, Madagascar and India; 1 in southern Africa: *Schoenefeldia transiens* (Pilg.) Chiov., Mpumalanga.

Species treatment by A.C. Mashau.

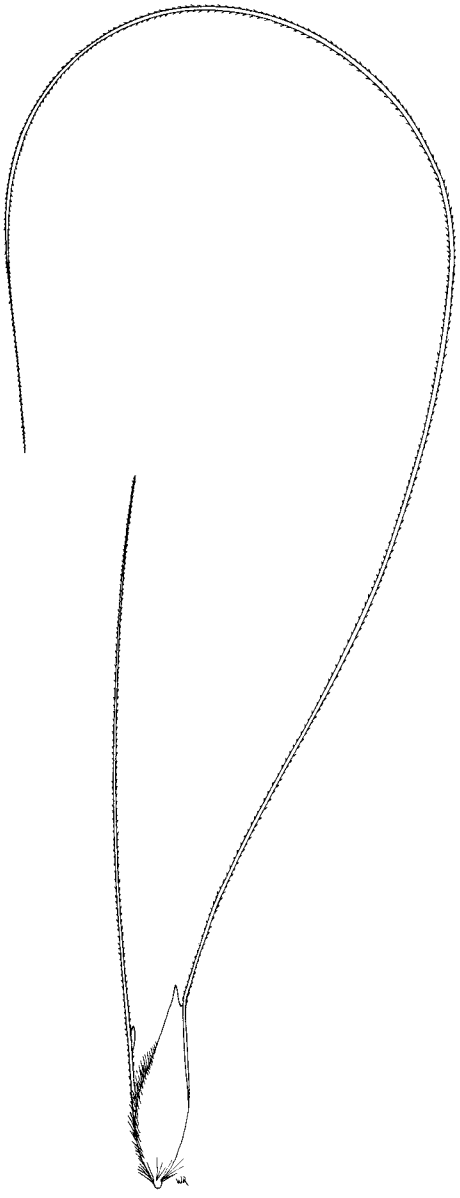


Figure 463.—*Schoenfeldia transiens*. Long-awned lower floret and short-awned vestigial upper floret. Artist: W. Roux.

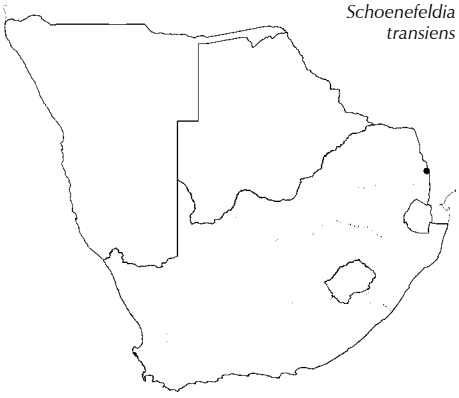






Figure 464.—*Secale strictum* subsp. *africanum*. Artist: W. Roux.



Figure 465.—*Schoenefeldia transiens* specimen.



Figure 466.—*Schoenefeldia transiens* spikelet (3.5–5.0 mm). Photographer: M. Koekemoer.

**Schoenefeldia transiens** (Pilg.) Chiov., in *Resultati scientifici della missione Stefanini-Paoli nella Somalia italiana. Le collezione botaniche* 1: 186 (1916). Type: Tanzania, Pare District, KwaSengiwa-Majiyajuu, *Uhlig 882* (B, holo.).

*Chloris transiensis* Pilg., in *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 51: 418 (1914). Type as above.

Densely tufted perennial 700–1 200 mm high. Leaf blade 350 × 5 mm. Inflorescence 2–4 digitate racemes, racemes 130–200 mm long, obviously secund; spikelets solitary at point of attachment to rachis. Spikelet 3.5–5.0 mm long, small in comparison to awns; fertile lemma awn 10–25 mm, sterile lemma awn 25–45 mm long, awns flexuous, curving gracefully, becoming entangled with awns of other spikelets; anther 0.7–1.0 mm long.

[Reported to be cleistogamous.]

*Flowering*: January to February. *Ecology*: Heavy soils; seasonally flooded flats. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to East Africa, Somalia and Sudan. M.

Illustrations: Clayton et al.: 310, fig. 86 (1982); Cope: 243, tab. 74 (1999).
Anatomy vouchers: *Ellis 3542, 3543, 3548* & *3867.*
Voucher: *Gertenbach 4931.*

## **Secale** L.

Linnaeus: 84 (1753); Stapf: 764 (1900); Chippindall: 70 (1955); Löve: 504 (1984); Clayton & Renvoize: 155 (1986); Hammer et al.: 135 (1987); Gibbs Russell et al.: 292 (1990); Watson & Dallwitz: 861 (1994); Frederiksen & Petersen: 399 (1998); Barkworth: 259 (2007).

Annual or perennial, tufted. **Leaf blade** linear, expanded or rolled, flaccid; *ligule* an unfringed membrane. **Inflorescence** a bristly single spike; *spikelets* distichously imbricate on main axis, solitary, sessile. **Spike-**

**let** laterally compressed, falling with glumes (not disarticulating in cultivated species); *glumes* narrow, unequal, ± as long as spikelet (excluding awns), strongly keeled, acuminate to awned, upper glume 1-nerved. **Florets** 2 or 3, bisexual or *uppermost floret* reduced and sterile; *lemma* oblong, lanceolate, glabrous, strongly keeled with single median keel on back, 5-nerved, nerves apically non-confluent, awned; *awn* usually obvious, straight, glabrous; *palea* 2-keeled, bidentate, almost equalling lemma. **Lodicules** 2, hyaline, ciliate. **Stamens** 3. **Ovary** obovoid, hairy; styles distinct, plumose above. **Caryopsis** hilum long-linear; embryo small. **Photosynthetic pathway**: $C_3$. XyMS+.

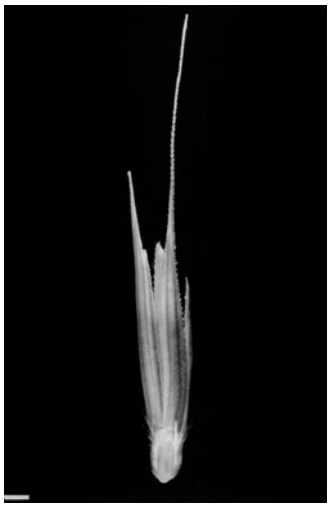


Figure 467.—*Secale strictum* subsp. *africanum* spikelet (10–15 mm). Photographer: M. Koekemoer.

**Species** ± 5, Mediterranean, eastern Europe to central Asia; 1 in southern Africa: *Secale strictum* (J.Presl) J.Presl subsp. *africanum* (Stapf) K.Hammer, Northern Cape (Roggeveld area).

Species treatment by A.C. Mashau.

**Key to species:**

Annual; lemma smooth, keel fringed with stiff hairs, awn up to 50 mm long; inflorescence rachis does not break up at maturity . . . . . ***S. cereale** (cultivated)

Perennial; lemma scabrid, keel minutely hairy, awn up to 20 mm long; inflorescence rachis breaking up at maturity . . . . . **S. strictum** subsp**. africanum**



Figure 468.—*Secale strictum* subsp. *africanum*. Spikelet (36 × 3 mm). Artist: W. Roux.

**Secale strictum** (J.Presl) J.Presl subsp. **africanum** (Stapf) K.Hammer, in Hammer et al., *Kulturpflanze* 35: 142 (1987). Type: South Africa, Northern Cape, Calvinia Div., 'Lowermost Roggeveld', near Wilhelm Steenkamp's Farm (Elands Fountain of Burchell's map), about twenty miles southeast of Calvinia (*UPS herb. n.v. Thunberg* (*IDC 2701*), holo.).

*S. africanum* Stapf, in *Hooker's Icones Plantarum*, ser. 4, vol. 7: pl. 2601 (1899).

WILD RYE, WILDEROG

Loosely tufted perennial 1 000 mm high. Leaf blade 200–350 × 4–9 mm. Inflorescence a spike, 80–120 mm long, linear, very dense; rachis fringed with short hairs, breaking up at maturity. Spikelet 10–15 mm long (excluding awns); glumes ± as long as spikelet; lemma scabrid, keel minutely hairy, awn up to 20 mm long; anther 6.5–7.5 mm long.

*Flowering*: December. *Ecology*: Undisturbed places on river banks. *Frequency in southern Africa*: Rare. Reported to have occurred abundantly during earlier years hence the area named Roggeveld, but now apparently only known to occur naturally on the farm Kanariesfontein. The Department of Agriculture in the Western Cape is trying to reintroduce it into the Roggeveld. *Distribution*: Endemic. NC. *Economics*: Potential pasture; liked by birds and livestock.

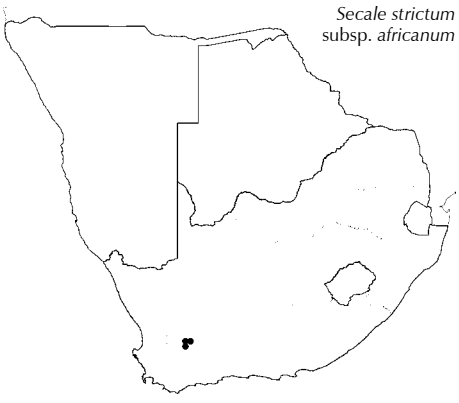



Illustration: Chippindall: 71, fig. 43 (1955).
Anatomy vouchers: *Ellis 1213* (cultivated).
Voucher: *Schweickerdt 1927.*

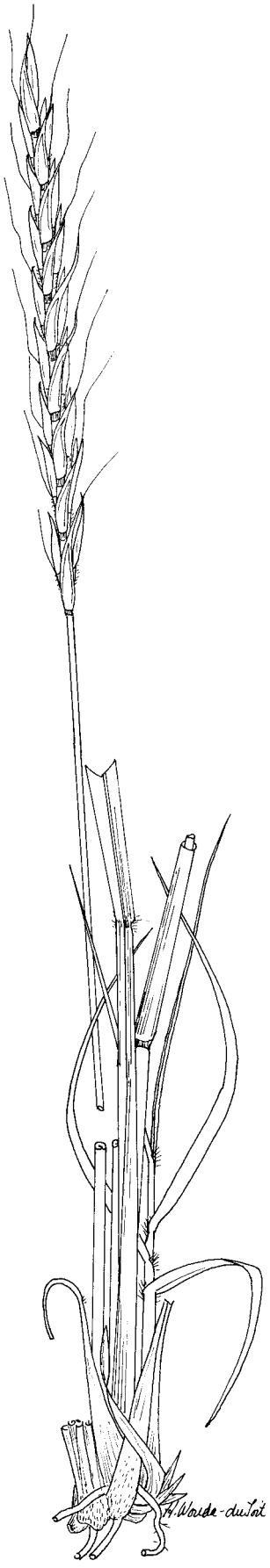


Figure 469.—*Sehima galpinii*. Artist: H.W. du Toit.

## **Sehima** Forssk.

Forsskål: 178 (1775); Stapf: 35 (1917); Chippindall: 489 (1955); Clayton & Renvoize: 749 (1982); Clayton & Renvoize: 348 (1986); Gibbs Russell et al.: 292 (1990); Watson & Dallwitz: 862 (1994); Cope: 54 (2002).



Figure 470.—*Sehima galpinii* spikelet (12–15 mm). Photographer: M. Koekemoer.

Tufted annual or perennial. **Leaf blade** linear, expanded, glabrous; *ligule* a fringed membrane to a fringe of long hairs. **Inflorescence** a single, spike-like, terminal, cylindrical raceme, exserted from the sheath; internodes stoutly linear to subclavate; rachis and pedicels hairy on either side with conspicuous woolly hairs; *spikelets* secund, paired, in long–short combinations: one sessile, the other pedicelled, pedicels free from rachis. **Sessile spikelet** usually ± laterally compressed, disarticulating with glumes; *glumes* ± equal, dissimilar; lower glume coriaceous, deeply grooved or flat on the back, 2-lobed or not lobed, 2-keeled, narrowly winged towards apex, mucronate; upper glume boat-shaped, keeled upwards, produced into a long, fine bristle-like awn. **Florets** 2; *lower floret* male; lemma hyaline, entire; palea well developed; *upper floret* bisexual; *lemma* less firm than glumes, hyaline, hairy or glabrous, 2-lobed, awned from sinus; *awn* geniculate, much longer than body of lemma, glabrous or hairy; *callus* obtuse, inserted in the concave apex of internode; *palea* well developed, lanceolate, hyaline. **Lodicules** 2, fleshy, glabrous. **Stamens** 3. **Ovary** glabrous. **Caryopsis** lanceolate-oblong, dorsiventrally compressed; hilum short; embryo large. **Pedicelled spikelet** strongly dorsiventrally compressed, flat; lower glume usually distinctly nerved; male or sterile; lemma awnless. **Photosynthetic pathway**: $C_4$; XyMS-. PCR sheath extensions absent. PCR cell chloroplasts centrifugal/peripheral.

**Species** 7, Africa, India and Australia; 2 in southern Africa: *Sehima galpinii* Stent from Namibia, Limpopo, Mpumalanga and Gauteng to northern KwaZulu-Natal, and *Sehima ischaemoides* Forssk., in Grootfontein area of Namibia and in northern Botswana.

Species treatment by M.J. Moeaha.

### Quick guide to easily confused genera:

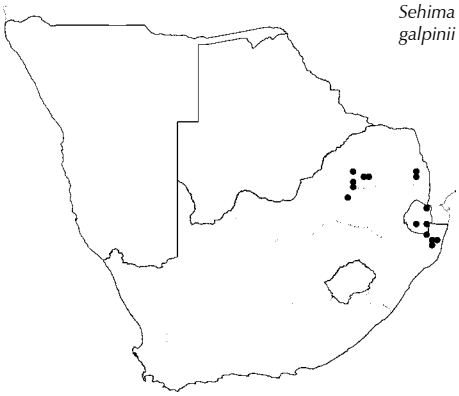
1. Ligule a fringed membrane or fringe of hairs . . . . . **Sehima**
   Ligule an unfringed membrane . . . . . 2
2. Pedicelled spikelet with lower glume drawn out into an awn 5–120 mm long; sessile and/or pedicelled spikelets lemma awnless . . . . . **Urelytrum**
   Long-pedicelled spikelet with lower glume awnless; shortly pedicelled spikelet lemma awned . . . . . **Trachypogon**

### Key to species:

Annual; sessile spikelet lower glume deeply grooved in lower half, apex membranous, deeply 2-toothed . . . . . **S. ischaemoides**

Perennial, densely tufted; sessile spikelet lower glume flat or slightly convex, apex membranous, shallowly 2-toothed . . . . . **S. galpinii**

**Sehima galpinii** Stent, in *Bothalia* 1: 239, t. 2 (1924). Type: South Africa, Limpopo, Farm Geluk, Springbok Flats, Waterberg, *Galpin M.557* (PRE, holo.).


*Sehima galpinii*

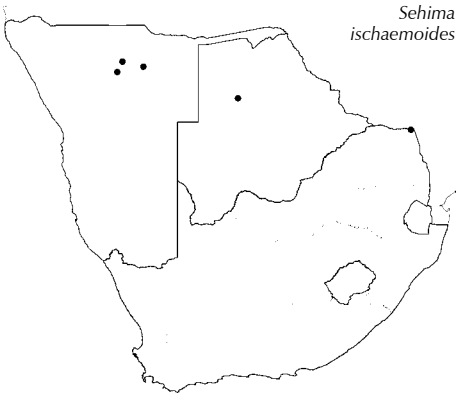
Dekgras

Tufted, robust perennial, up to 1 800 mm high; basal leaf sheaths usually densely hairy. Leaf blade 3–6 mm, tapering into long fine apex, often curling with age. Inflorescence 80–160 mm long. Sessile spikelet 12–15 mm long; lower glume flattish, apex shallowly 2-toothed; upper lemma awn 40–120 mm long, dark brown to black, coiled part ciliate/hairy, upper part scabrid; anthers 3.5–4.0 mm long. Pedicelled 10–13 mm long; awnless.

*Flowering*: October to April. *Ecology*: Black turf soil. *Frequency in southern Africa*: Infrequent. *Distribution*: Mozambique. S, LIM, G, M, KZN. *Economics*: Domestic use such as thatching.

Anatomy vouchers: *Ellis 1752, 3326 & 3639.*
Voucher: *Galpin M557.*

**Sehima ischaemoides** Forssk., in *Flora aegyptico-arabica*: 178 (1775). Type: Yemen.


*Sehima ischaemoides*

Annual 200–600 mm high. Leaf blade 50–300 × 1–3 mm. Inflorescence 30–60 mm long. Sessile spikelet 9–15 mm long; lower glume deeply grooved below, apex deeply 2-toothed; upper lemma awn 40–120 mm long; awn dark brown to black, coiled part ciliate/hairy, upper part scabrid. Pedicelled spikelet 7–15 mm long, awnless.

*Flowering*: February to May. *Ecology*: Dry soils in savanna. *Distribution*: Northwards to tropical Africa then eastwards through Arabia to Pakistan. N, B, LIM.

Anatomy voucher: *Giess, Volk & Bleissner 6479.*
Voucher: *De Winter 2932.*

## **Setaria** P.Beauv.

Palisot de Beauvois: 51 (1812) name conserved; Stapf: 419 (1899); Stapf: 768 (1930); De Wit: 1 (1941); Hitchcock & Chase: 697 (1950); Chippindall: 338 (1955); Launert: 170, 227 (1970a); Chippindall & Crook: 89 (1976); Clayton & Renvoize: 520 (1982); Clayton & Renvoize: 290 (1986); Clayton: 94 (1989); Gibbs Russell et al.: 293 (1990); Watson & Dallwitz: 867 (1994); Rominger: 539 (2003).

*Cymbosetaria* Schweick.: t. 3320 (1936); Chippindall: 355 (1955).

Annual or perennial; caespitose or decumbent; sometimes rhizomatous or stoloniferous. **Leaf blade** expanded or folded, rarely rolled, sometimes pleated longitudinally, occasionally sagittate; *ligule* a fringed membrane or fringe of hairs. **Inflorescence** a panicle, open or spike-like, then dense and cylindrical with branches reduced to stumps; *spikelets* solitary or clustered, shortly pedicelled or subsessile, each spikelet or cluster subtended by 1 to many bristles, these persist on axis after spikelet(s) falls, bristles either shorter or longer than spikelet, scabrid rarely hairy, often coloured; spikelets when




Figure 471.—*Setaria lindenbergiana*. Artist: W. Roux.

clustered usually not all fully developed. **Spikelet** elliptic to oblong to ovate, compressed dorsiventrally, falling with glumes (not disarticulating in cultivated forms); *glumes* unequal, membranous, awnless; lower glume up to half as long as spikelet, ovate, clasping base, 3–6-nerved; upper glume a third to as long as spikelet, 3–9-nerved. **Florets** 2; *lower floret* male or sterile; lemma as long as spikelet, 5–7-nerved, rounded, flat, or longitudinally grooved dorsally, awnless; palea well developed or minute to 0; *upper floret* bisexual; *lemma* firmer than glumes, usually indurated, often finely or coarsely transversely rugose, more rarely smooth and glossy, glabrous, entire, margins inrolled and clasping only edges of palea (paspalum-type), awnless; *palea* similar to lemma, relatively long. **Lodicules** 2, broadly cuneate. **Stamens** 3. **Ovary** ellipsoid, glabrous; styles distinct, plumose above. **Caryopsis** oblong or ellipsoid; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; NADP-ME (5 species); XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 9$, 10 (high polyploidy).

**Species** ± 110, tropics and subtropics; 18 in southern Africa, widespread.

Species treatment by M.T. Nembudani and L. Fish.

### Quick guide to easily confused genera/taxa:

1. Lemma 9-lobed; spikelet not subtended by bristles . . . **Enneapogon**
   Lemma not 9-lobed; spikelet subtended by bristle(s) . . . . . 2
2. Bristles persistent on the inflorescence . . . . . **Setaria**
   Bristles and/or spines fall with the spikelet . . . . . 3
3. Bristles and/or spines free throughout, always ± filiform . . . . . **Pennisetum**
   Bristles and/or spines connate to a greater or lesser degree to form a disc (may be minute) . . . . . **Cenchrus ciliaris**

### Key to species:

1. Leaf blade base, at least lower leaves, sagittate (base lobes may be minute or long and obvious on same plant) . . . . . 2
   Leaf blade base not sagittate . . . . . 3
2. Perennial; culm nodes sparsely or densely hairy; leaf blade not pseudopetiolate; upper lemma not conspicuously gibbous or keeled, deeply rugose below . . . . . **S. appendiculata**
   Annual; culm nodes glabrous; leaf blade pseudopetiolate; upper lemma conspicuously gibbous and keeled, finely, densely rugose below . . . . . **S. sagittifolia**

3(1). Inflorescence not spike-like, open to contracted; bristles usually solitary . . . . . 4
   Inflorescence spike-like, cylindrical; bristles usually in clusters of up to 10, except *S. obscura* with bristles solitary and very sparsely distributed . . . . . 10

4. Leaf blade flat, not plicate . . . . . 5
   Leaf blade plicate (sometimes only visible at base of young leaves) . . . . . 7

5. Lower glume and lower lemma acuminate; plant annual . . . **S. finita**
   Lower glume and lower lemma acute, subacute to obtuse; plant perennial . . . . . 6

6. Upper lemma smooth at apex, indistinctly rugose at base; spikelet 3.0–3.5 mm long; panicle loose, flexuous . . . . **S. pseudaristata**
   Upper lemma distinctly rugose throughout; spikelet 2–3 mm long; panicle contracted, rarely open then not flexuous . . . . . **S. lindenbergiana**

7(4). Plant annual . . . . . **S. homonyma**
   Plant perennial . . . . . 8

8. Upper lemma distinctly rugose throughout; leaf blade finely plicate (look at young leaves) . . . . . **S. lindenbergiana**




Figure 472.—*Setaria sagittifolia*. Artist: C.D. Bartman.




Figure 473.—*Setaria sphacelata*. A, plant; B, ligule. Artist: C. Smith.

Upper lemma smooth, obscurely rugose or rugose only at the base, rarely rugose throughout; leaf blade coarsely plicate . . . . 9

9. Plant robust, 900–3 000 mm high; culm erect; upper lemma smooth or rugose at the base, rarely rugose throughout; leaf sheath usually densely pubescent (at least margins hairy); culm 4–10 mm in diameter; leaf blade 10–110 mm wide, lanceolate . . . . . **S. megaphylla**

Plant slender, 500–1 500 mm high; culm geniculate; upper lemma smooth or obscurely rugose; leaf sheath usually glabrous; culm 2–3(–5) mm in diameter; leaf blade 8–35 mm wide, narrowly lanceolate to broadly linear . . . . . **S. plicatilis**

10(3). Culm nodes sparsely to densely hairy, rarely glabrous; upper glume (5)7–9(–11)-nerved . . . . . 11

Culm nodes glabrous; upper glume 3–5-nerved . . . . . 12

11. Basal sheaths straw-coloured to light brown or reddish; rhizome not robust, mostly oblique; spikelet 2.5–3.0(–3.7) mm long; panicle tapering at apex . . . . . **S. incrassata**

Basal sheaths very dark brown; rhizomes very robust and branches far apart; spikelet 3.5–5.0 mm long; panicle cylindrical at apex . . . . . **S. nigrirostris**

12(10). Annual . . . . . 13

Perennial . . . . . 15

13. Bristles retrorsely barbed . . . . . **S. verticillata**

Bristles antrorsely barbed . . . . . 14

14. Spikelet persistent, upper floret reluctantly disarticulating at maturity; bristles 2–5; upper lemma smooth or rugulose; lower palea absent or very reduced . . . . . *__S. italica__

Spikelet deciduous as a whole; bristles 6–10; upper lemma rugose to corrugate; lower palea as long as lemma . . . . . **S. pumila**

15(12). Bristles solitary, obscure, sparsely distributed on inflorescence; spikelet 4.0–4.6 mm long; upper lemma smooth . . . . **S. obscura**

Bristles clusters of 2–15 per spikelet; spikelet 1.5–3.5 mm long; upper lemma rugose . . . . . 16

16. Lower glume 1-nerved, lower palea absent; bristles sometimes with long white hairs on lower half . . . . . **S. rigida**

Lower glume 3-nerved, lower palea well developed; bristles without long white hairs . . . . . 17

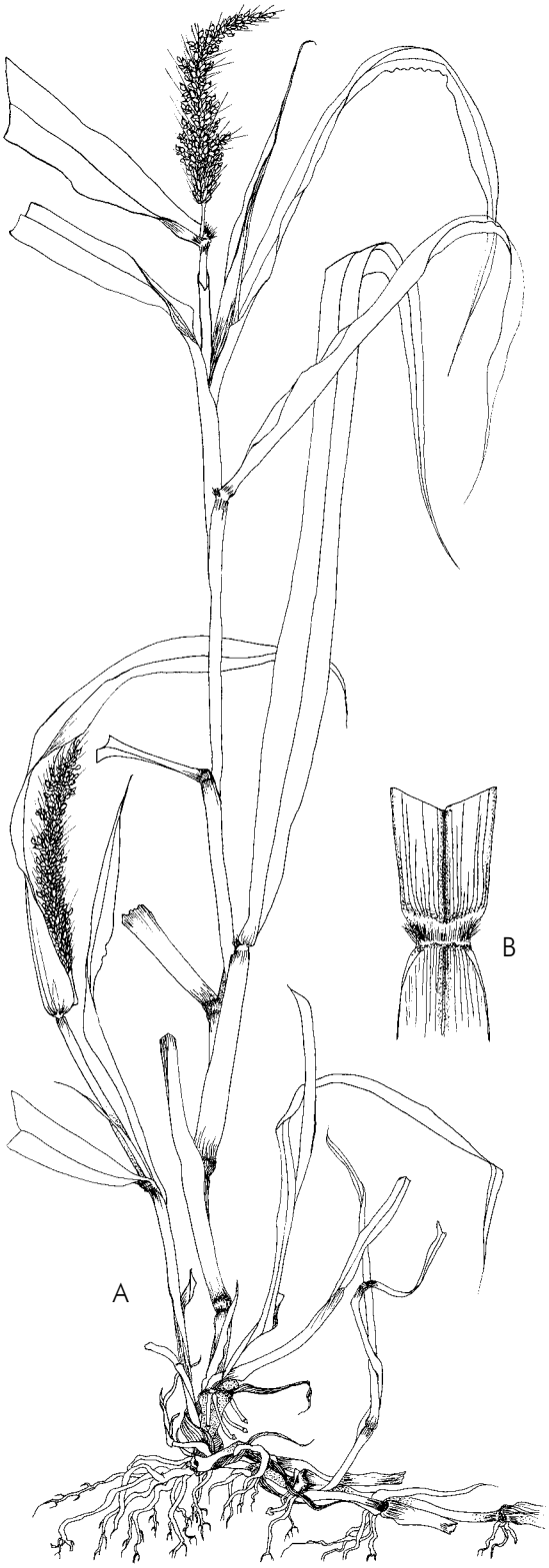



Figure 474.—*Setaria verticillata*. A, plant; B, ligule. Artist: L. Spies.

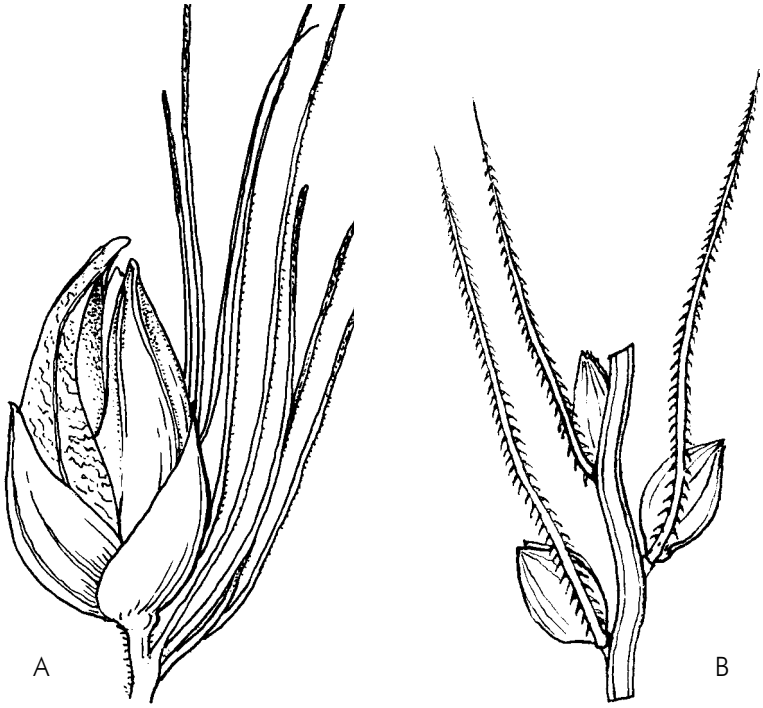



Figure 475.—Spikelets. A, *Setaria sphacelata*; B, *S. verticillata*. Artists: A, C. Smith; B, B. Connell.

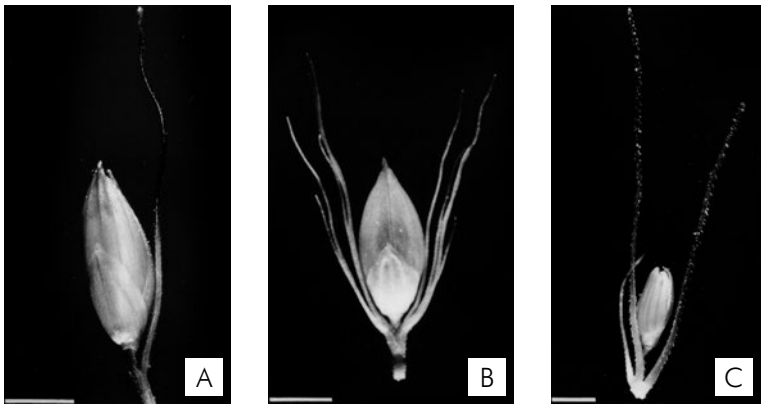



Figure 476.—Spikelets. A, *Setaria lindenbergiana* (2.0–3.5 mm); B, *S. sphacelata* (2.5–3.0 mm); C, *S. verticillata* (1.5–2.5 mm). Photographer: M. Koekemoer.

17. Rhizome knotty, very slender; culms wiry ..... *__S__. __parviflora__
Rhizome when obvious, thick, oblique or creeping; culms not wiry .....18

[Note: *S. sphacelata* is a highly variable polymorphic species and although the varieties intergrade completely, for practical purposes the following varieties are recognised.]

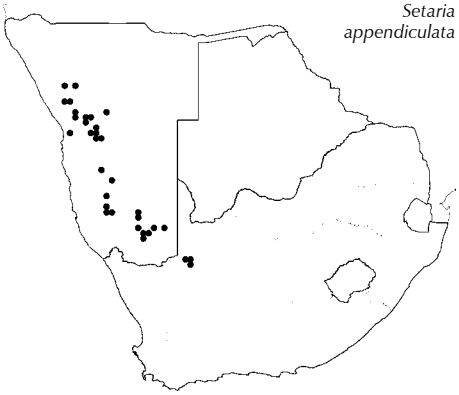
18. Leaf blade 1–4(6) mm wide; culm 1–3 mm in diameter; basal sheaths usually not flabellate ..... 19
Leaf blade 3–18 mm wide; culm 3–12 mm in diameter; basal sheaths usually ± flabellate ..... 20

19. Bristles mostly pale, dark purple or darkening only towards tips; inflorescence usually 25–45 mm long ..... **S**. **sphacelata** var. **torta**
Bristles yellow or dark brown; inflorescence usually 30–150 mm long ..... **S**. **sphacelata** var. **sphacelata**

20(18). Culm 3–6 mm in diameter; leaf blade 3–10 mm wide ..... ..... **S**. **sphacelata** var. **sericea**
Culm 6–10 mm in diameter; leaf blade 6–18 mm wide ..... ..... **S**. **sphacelata** var. **splendida**

**Setaria appendiculata** (Hack.) Stapf, in *Flora capensis* 7: 422 (1899). Type: Namibia, am Fluβ Onanis, *Belck 63/c* (W, holo.).

HILL BRISTLE GRASS, BERGGRAS


*Setaria appendiculata*

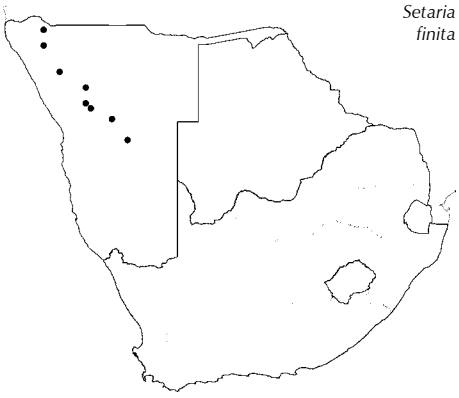
Densely or loosely tufted perennial 500–1 000 mm high; rhizome oblique; culm nodes sparsely to densely hairy. Leaf blade 70–300 × 3–12 mm, folded at first, later expanded, tapering to a long, setaceous point; lower leaves sagittate at base with thin lobes up to 12 mm long (these easily break off especially in dry material) or absent on same plant, not pseudopetiolate, glabrous. Inflorescence 60–150 × 12–25 mm, linear to lanceolate, contracted, not spike-like; bristles solitary, to 6 mm long, slender, scabrid, green or purple. Spikelet 2.0–2.7 mm long, obtuse to subacute, light green, often tinged purple; lower glume 3-nerved; upper glume 7–9-nerved; lower floret male, lemma smooth, grooved along middle; upper lemma not laterally compressed, not conspicuously gibbous or keeled, smooth to finely transversely rugose at apex becoming more deeply rugose downwards to base; anther 1–2 mm long.

[Distinguished from other hairy-noded *Setaria* species by the sagittate leaf base. *S. sagittifolia* leaf blade is pseudopetiolate and the culm node glabrous.]

*Flowering*: January to May. *Ecology*: Rocky outcrops, among bushes and in dry riverbeds, often in shady places. *Frequency in southern Af-*

*rica*: Locally common in drier western parts. *Distribution*: Endemic. N, NC. *Economics*: Valuable palatable grass of high nutritional value.

Illustrations: Chippindall: 344, fig. 298 (1955); Müller: 143 (2007).
Anatomy vouchers: *Botha & Panagos 30, Ellis 905 & 4739.*
Voucher: *Giess 8477.*

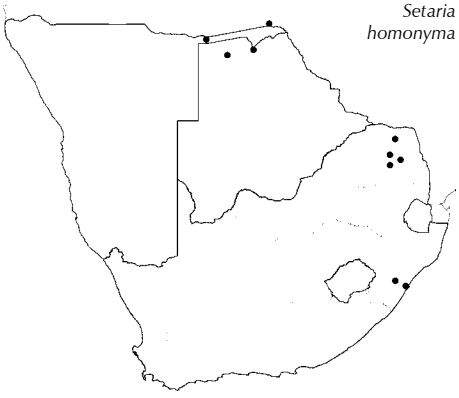

*Setaria finita*

**Setaria finita** Launert, in *Prodromus einer Flora von Südwestafrica* 160: 227 (1970). Type: Namibia, Okahandja, *De Winter & Giess 7122* (M, holo.; PRE, iso.).

Loosely tufted annual 350–1 000 mm high; culm erect or geniculate, rooting at nodes, node glabrous. Leaf blade 100–350 × 4–12 mm, linear, flat, glabrous. Inflorescence up to 250 mm long, open; branches delicate, lax; bristles solitary, up to 10 mm long, scaberulous, delicate, purplish green. Spikelet 3.2–3.5 mm long, upper glume and lower lemma acuminate, mucronate, apices deflected outwards; lower glume 3-nerved; upper glume 5-nerved; lower floret male, lemma scabrid in upper half; upper lemma finely rugose, sometimes becomes black at maturity; anther 1.5–2.0 mm long.

*Flowering*: January to March. *Ecology*: Mostly in shade along rivers, occasionally in disturbed places. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. N. *Economics*: Although palatable it is of low grazing value as it does not occur in abundance; seeds used as flour.

Illustration: Müller: 253 (2007).
Anatomy vouchers: *Ellis 4719, Gibbs Russell & Smook 5315 & Smook 5076A.*
Voucher: *Giess 7771, Smook 9794.*


*Setaria homonyma*

**Setaria homonyma** (Steud.) Chiov., in *Nuovo Giornale botanico italiano*, nov. ser. 26: 78 (1919). Type: India.

Fan-leaved bristle grass

Loosely tufted annual 250–1 000 mm high; culm erect or geniculately ascending, rooting at nodes; nodes sparsely to densely hairy. Leaf blade 45–300 × 5–35 mm, lanceolate, plicate at first, later expanded and mostly flat, sparsely hairy. Inflorescence open, branches raceme-like, stiff, spreading or suberect, sometimes terminated by a bristle; bristles solitary, up to 13 mm long, scabrid, green, flushed purple. Spikelet 2.3–2.8 mm long, upper glume and lower lemma obtuse or subacute; lower glume 3-nerved; upper lemma rugose; anther 0.8–1.0 mm long.

*Flowering*: February to June. *Ecology*: Shady places in woodlands and forests; on river banks and floodplains on moist sandy soils; often in disturbed areas. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to Cameroon and Ethiopia, also India. N, B, LIM, KZN. *Economics*: Natural pasture with average forage value; a weed of cultivation.

Illustration: Clayton: 106, tab. 27 (1989).
Anatomy vouchers: *Ellis 3436.*
Voucher: *Smook 1984.*

**Setaria incrassata** (Hochst.) Hack., in *Abhandlungen der Preussischen Akademie der Wissenschaften* 2: 122 (1891). Type: Ethiopia, Gandawa, *Schimper* in *Buchinger 1211.*

*S. eylesii* Stapf & C.E.Hubb., in *Flora tropical Africa* 9: 831 (1930). Type: Zimbabwe, Mutare, *Eyles 3035* (K, holo.; PRE, iso.).

*S. gerrardii* Stapf, in *Flora capensis* 7: 424 (1899). Type: South Africa, KwaZulu-Natal, *Gerrard 681*; *Buchanan 302* (syntypes).

*S. holstii* Herrm., in *Beiträge zur Biologie der Pflanzen* 10: 45 (1910). Type: Tanzania, *Holts 3992* (many syntypes).

*S. pabularis* Stapf, in *Flora tropical Africa* 9: 789 (1930). Type: Zimbabwe, Harare, *Mundy 36* and a number of other types (syntypes).

*S. palustris* Stapf, in *Flora tropical Africa* 9: 785 (1930). Type: Malawi, Chiromo, *Scott* (K, holo.).

*S. perberbis* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 31 (1941). Type: South Africa, Limpopo, Tzaneen, *Sampson 4393* (PRE, holo.).

*S. phragmitoides* Stapf, in *Flora tropical Africa* 9: 782 (1930). Type: Malawi, Elephant Marsh, *Kirk* (many syntypes).

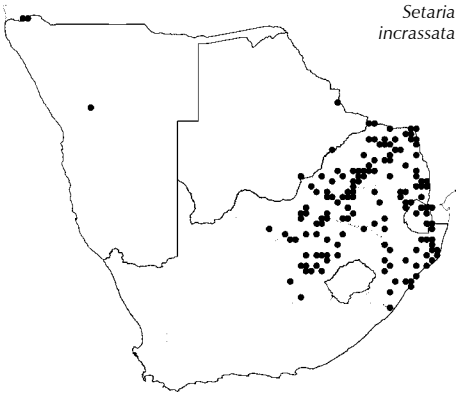
*S. porphyrantha* Stapf, in *Flora Tropical Africa* 9: 788 (1930). Type: South Africa, Limpopo, Limvubu River, *Nelson 42*.

*S. rudifolia* Stapf, in *Flora tropical Africa* 9: 787 (1930). Type: Zimbabwe, Harare, *Eyles 2890*; Mazowe, *Eyles 2246* (syntype).

*S. woodii* Hack. subsp. *bechuanica* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 36 (1941). Type: Botswana, Francistown to Basoli, *Pole Evans in PRE 8860* (PRE, holo.).

*S. woodii* Hack. var. *fonssalutis* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 36 (1941). Type: South Africa, Free State, *Goossens 442* (PRE, holo.).

*S. woodii* Hack. var. *woodii*, in *Bulletin de l' Herbier Boissier* 7: 24 (1899). Type: South Africa, KwaZulu-Natal, Umhlanga, *Wood 6063*.


*Setaria incrassata*

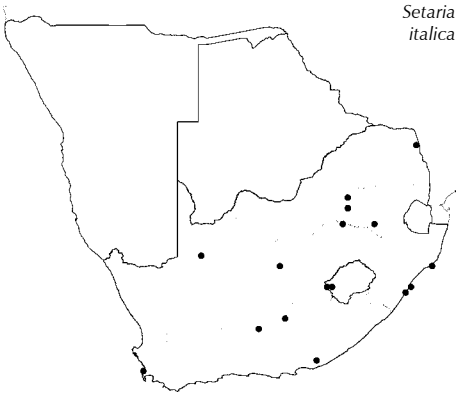
Vlei bristle grass

Tufted perennial 300–2 000 mm high; rhizome short, oblique, creeping, not robust; basal sheaths straw-coloured to light brown or reddish; culm node hairy, rarely glabrous. Leaf blade 150–600 × 3–14 mm. Inflorescence spike-like, tapering towards apex, often interrupted at base; bristles several, 2–15 mm long, scaberulous, slender, usually tapering to apex, green, often with purple. Spikelet 2.5–3.0(–3.7) mm long; lower glume 3-nerved; upper glume (5)7–9(–11)-nerved; lower lemma firmly membranous; upper lemma punctate to obscurely rugose.

[Very similar to *S. nigrirostris*, which has a well-developed and much branched rhizome; basal sheaths dark coloured and spikelet 3.5–5.0 mm long. Easily distinguished from *S. sphacelata*, which has culm nodes glabrous and upper glume (3)5-nerved.]

*Flowering*: October to May. *Ecology*: Mostly on black clay; in moist areas such as swamps, vleis, stream banks and forest margins, also rocky hillsides. *Frequency in southern Africa*: Common. *Distribution*: Tropical Africa. N, B, S, LIM, NW, G, M, FS, KZN.

Illustrations: Chippindall: 347, fig. 301 (1955); Clayton: 97, 24 (1989); Phillips: 239, fig. 96, 4–5 (1995).
Anatomy vouchers: *Ellis 3354, 3500 & 4533*.
Voucher: *Smook & Gibbs Russell 2162*.


*Setaria italica*

***Setaria italica** (L.) P. Beauv., in *Essai dúne nouvelle Agrostographie* 51: 170, 178 (1812). Type: India.

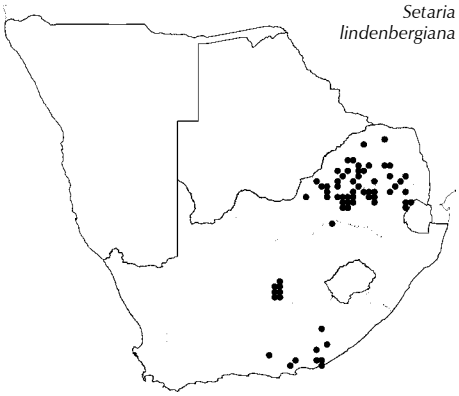
Foxtail millet

Annual 350–1 500 mm high; leaves mainly cauline; culm erect, solitary to densely tufted, node glabrous. Leaf blade 150–450 × 6–20 mm, expanded, linear, glabrous, usually scabrid. Inflorescence 8–24 mm wide, spike-like; bristles 2–5, up to 15 mm long, slender, scabrid, purple or yellow. Spikelet 2.0–3.5 mm long; lower flo-

ret persistent, upper floret reluctantly disarticulating; lower glume 3-nerved; upper glume 5–7-nerved; lower floret usually reduced to a lemma, rarely with a minute palea; upper lemma smooth, shiny or rugulose; anther 0.5–1.0 mm long.

*Flowering*: January to April. *Ecology*: Cultivated; often as an escape from cultivation, in gardens and other disturbed areas. *Frequency in southern Africa*: Rare in the natural state. *Distribution*: Naturalised from Asia. Tropical and subtropical regions worldwide. L, LIM, G, M, FS, KZN, NC, WC, EC. *Economics*: Cultivated as a cereal in China and fodder or birdseed in other parts of the world. Not cultivated extensively in South Africa but then mainly for bird seed.

Illustration: Rominger: 557 (2003).
Voucher: *Van der Schijff PRE 33148*.



*Setaria lindenbergiana*

**Setaria lindenbergiana** (Nees) Stapf, in *Flora capensis* 7: 422 (1899). Type: South Africa, Eastern Cape: Grahamstown to Mt. Bothas, *Ecklon s.n.;* Swart Kei River (Zwarte-Key) *Ecklon s.n.*; Glenfilling *Drège s.n.*; Katriviers Poort, *Drège s.n.* (syntypes).

*S. phillipsii* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 21 (1941). Type: South Africa. KwaZulu-Natal, Umzimkulu gorge, *McClean 425* (NH, holo.).

MOUNTAIN BRISTLE GRASS, BERGSETARIA

Densely tufted perennial 300–1 200 mm high; rhizome short, creeping; culm node glabrous. Leaf blade 100–450 × 1.5–7.0(–13.0) mm, linear, finely plicate though mostly only when young, flat or inrolled, base slender, often pseudopetiolate, glabrous or hairy. Inflorescence contracted, but not spike-like, sometimes open, not flexuous; bristles solitary, 2–10 mm long, slender, scabrid, green or purple. Spikelet 2.0–3.5 mm long; lower glume 3-nerved; upper glume $^1/_2$ to as long as spikelet; upper lemma distinctly but finely rugose throughout, extreme apex often less conspicuously so; anther 1.5–2.0 mm long.

[Similar to *S. plicatilis*, which is loosely tufted and has narrowly lanceolate, coarsely plicate leaf blades and a smooth to obscurely rugose upper lemma.]

*Flowering*: October to May. *Ecology*: Usually in crevices on rocky or stony hillsides but also in open woodland. *Frequency in southern Africa*: Common. *Distribution*: Northwards to DRC and Tanzania. LIM, NW, G, M, FS, NC, EC. *Economics*: Palatable grazing grass and useful for making hay; fairly drought resistant but susceptible to frost; possibly as an ornamental grass in gardens.

Illustration: Clayton: 108, tab. 28 (1989).
Anatomy vouchers: *Ellis 594, 724, 745* & *2808*.
Voucher: *Smook 2664, 2831*.

**Setaria megaphylla** (Steud.) T.Durand & Schinz, in *Conspectus Florae Africae* 5: 773 (1894). Type: Gabon, *Jardin* (P, holo.).

*S. chevalieri* Stapf ex Stapf & C.E.Hubb., in *Flora tropical Africa* 9: 842 (1930). Type: Nigeria, Opobo, *Jeffreys 13* (syntype).

*S. insignis* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 13 (1941). Type: South Africa, Eastern Cape, Port St Johns, *Howlett 35* (PRE, holo.).

RIBBON BRISTLE GRASS, RIFFELBLAAR-SETARIA

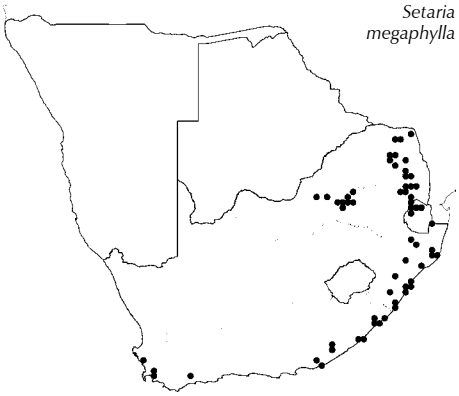
Very tall, robust, tufted perennial 900–3 000 mm high; rhizome short; culm 4–10 mm in diameter, erect, occasionally rooting at

nodes, nodes glabrous. Leaf blade 150–800 × 10–110 mm, lanceolate, conspicuously and coarsely plicate, sometimes pseudopetiolate, sparsely hairy with tubercle-based hairs; leaf sheath usually densely hairy or at least margins hairy. Inflorescence 400–600 mm long, open; bristles solitary, slender, 3–15 mm long, finely scabrid. Spikelet 2–3 mm long; lower glume 3-nerved; lower lemma firmly membranous; upper lemma usually smooth, often shining, sometimes rugose at the base, rarely rugose throughout; anther 1.8 mm long.

[Intergrades with *S. plicatilis*, which is a smaller plant with much narrower leaves and a shorter, sparser panicle; also closely related to *S. lindenbergiana*, which has much narrower, linear, finely plicate leaves.]

*Flowering*: September to May. *Ecology*: On damp soils, mostly in shade; riverine or forest grass extending to forest margins and disturbed places such as road cuttings. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical Africa; tropical America and a few records from India. S, LIM, NW, G, M, KZN, WC, EC. *Economics*: Very palatable natural pasture; as ornamentals or for birds in gardens; can become a serious weed in commercial forestry areas.

Illustrations: Chippindall: 341, 342, fig. 296 & 297 (1955); Phillips: 239, fig. 96, 1–2 (1995).
Anatomy vouchers: *Ellis 358, 736, 737* & *1540*.
Voucher: *Smook 5480*.


*Setaria megaphylla*

**Setaria nigrirostris** (Nees) T.Durand & Schinz, in *Conspectus florae Africae* 5: 774 (1894). Type: South Africa, Eastern Cape, Omsamwubo, *Drège s.n.*

Tufted perennial 500–1 200 mm high; rhizome stout, very well developed, often much branched; basal sheaths robust, very dark brown; basal leaves few; culm node hairy. Leaf blade 100–550 × 4–10 mm, expanded, tapering to a fine point, mostly conspicuously narrowed at base, densely hairy or glabrous. Inflorescence 20–160 mm long, cylindrical, spike-like; each spikelet or cluster subtended by up to 10 bristles; bristles 5–10 mm long, rather coarse, scabrid, straw-coloured, apices slightly thickened, usually dark purple. Spikelet 3.5–5.0 mm long; glumes apices distinctly dark coloured; lower glume 3-nerved; lower lemma deeply grooved; upper lemma finely rugose, tip with a distinct dark patch; anther 2.0–2.5 mm long.

[Very similar to *S. incrassata*, which has an oblique, creeping rhizome, basal parts straw-coloured to light brown, and spikelet 2.5–3.0(–3.7) mm long.]

*Flowering*: October to April. *Ecology*: Often on black turf; in open grassland or on river banks. *Frequency in southern Africa*: Common. *Distribution*: One collection reported for Malawi. S, L, LIM, NW, G, M, FS, KZN, EC.

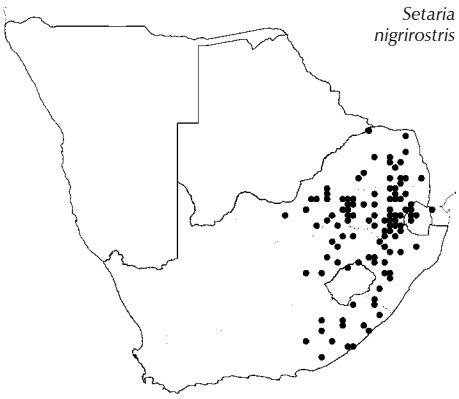
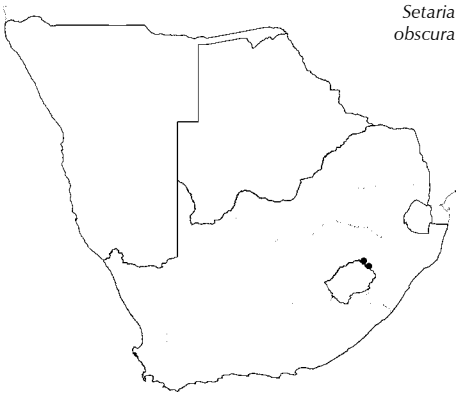

*Setaria nigrirostris*

Illustration: Chippindall: 345, fig. 300 (1955).
Anatomy vouchers: *Ellis 421, 787, 1214, 3498* & *4304*.
Voucher: *Liebenberg 8373*.

**Setaria obscura** de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg* III. 17 (1): 45 (1941). Type: South Africa, KwaZulu-Natal, Bushmans River Valley, *Medley Wood 10554* (NH).

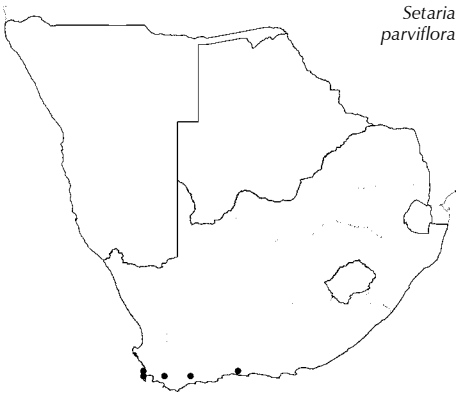
Hard, densely tufted perennial 500–1 000 mm high; culm node glabrous. Leaf blade 100–350 × 3–4 mm, rigid, apex pungent. Inflores-


*Setaria obscura*

cence spike-like; bristles obscure as only a few spikelets are subtended by a solitary bristle; bristle up to 10 mm long, scabrid, yellowish. Spikelet 4.0–4.6 mm long, disarticulating below glumes; lower glume 3-nerved; lower lemma middle nerve prominent, sunk in a deep narrow groove; upper lemma smooth; anther 2.0–2.4 mm long.

*Flowering*: November to April. *Ecology*: Stream banks in high mountain grassland above 2 000 m. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. KZN.

Illustration: Chippindall: 345, fig. 299 (1955).
Voucher: *Killick 1614*.


*Setaria parviflora*

***Setaria parviflora** (Poir.) Kerguélen, in *Lejeunia*, ns 120: 161 (1987). Type: Puerto Rico.

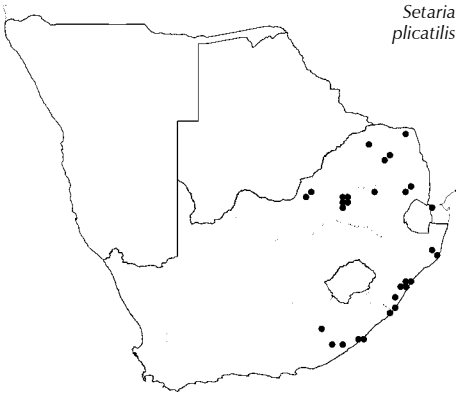
*S. geniculata* (Lam.) P.Beauv. in *Essai dúne nouvelle agrostographie*: 51, 169, 178 (1812).

KNOTROOT BRISTLE GRASS

Perennial 300–800 mm high; rhizome knotty, very slender, branching profusely; culm wiry, node glabrous. Leaf blade 150–300 × 3–4 mm, linear, flat. Inflorescence cylindrical, spike-like, 20–90 mm long; spikelets subtended by 2–12 bristles; bristles up to 8 mm long, slender, scabrid, yellowish. Spikelet 2.2–3.0 mm long; lower glume 3-nerved; lower floret male or sterile, lemma deeply grooved, palea well developed; upper lemma transversely rugose; anther 0.5–0.7 mm.

*Flowering*: December, January and June. *Ecology*: Mostly in cultivated lands, occasionally adventive in disturbed areas. *Frequency in southern Africa*: Rare. *Distribution*: Naturalised from America. WC.

Illustration: Rominger: 559 (2003).
Voucher: *Taylor 7626*.


*Setaria plicatilis*

**Setaria plicatilis** (Hochst.) Hack. ex Engl., in *Uber der Hochgebirgsflora des tropischen Afrikas*: 121 (1891). Type: Ethiopia, *Schimper* in *Buchinger 1456*.

FOLDED LEAF TUSSOCK GRASS, BREËBLAARPOLGRAS

Loosely tufted, perennial 500–1 500 mm high; rhizome short; culm 2–3(–5) mm in diameter, often geniculate, node glabrous. Leaf blade 100–350 × 8–35 mm, broadly linear to narrowly lanceolate, coarsely and conspicuously plicate, sometimes pseudopetiolate, very sparsely hairy with tubercle-based hairs; sheath usually glabrous. Inflorescence open, branches flexuous; bristle solitary, slender, 3–15 mm long, scabrid, greenish yellow to dark purple. Spikelet 2.5–3.3 mm long; lower glume 3-nerved; upper glume 5–7-nerved; lower lemma firmly membranous; upper lemma smooth or obscurely rugose; anther 1.5–2.0 mm long.

[Intermediate between *S. lindenbergiana*, which is densely tufted, has much narrower, finely plicate, linear leaves and rugose lemma; and *S. megaphylla*, which is very robust with leaf blade up to 800 × 110 mm.]

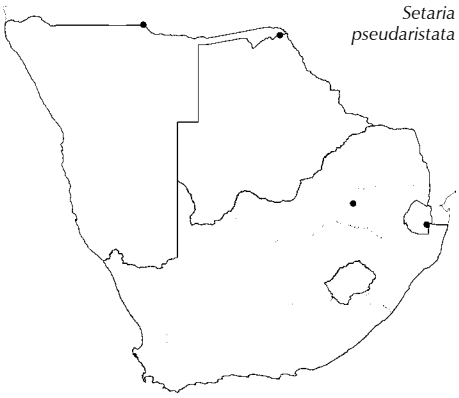
*Flowering*: October to March. *Ecology*: Coastal and inland forests in semi-shade, extending to forest margins and occasionally into woodlands. *Frequency in southern Africa*: Locally common. *Distribution*:

Northwards to tropical Africa; and Sudan, Ethiopia and Yemen. S, LIM, NW, G, M, KZN, EC.

Voucher: *Culverwell 643*, *Van Jaarsveld 177*.

**Setaria pseudaristata** (Peter) Pilg., in Engl. & Prantl, *Die natürlichen Pflanzenfamilien*, ed. 2, 14e: 72 (1940). Type: Tanzania, Tabora/Dodoma District, Chaya [Tschaya] to Tura, *Peter 34269* (B, holo.).

*S. tenuiseta* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 15 (1941). Type: Botswana, Kabulabula, *Pole Evans & Van Rensburg H 24630* (PRE, ?holo.).


*Setaria pseudaristata*

Loosely tufted perennial 500–1 000 mm high; rhizome short; culm erect but sometimes very slender, node glabrous. Leaf blade 100–300 × 2–6 mm, linear, flat, not plicate. Inflorescence open, lax, flexuous; bristle solitary, slender, 3–20 mm long, scabrid, delicate, dark purple. Spikelet 3.0–3.5 mm long; glumes acute; lower glume 3-nerved; upper glume $^{2}/_{3}$–$^{3}/_{4}$ as long as spikelet; upper lemma smooth, obscurely rugose at the base; anther 1.5–2.0 mm long.

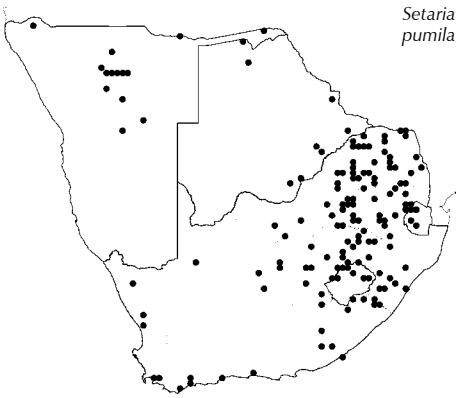
*Flowering*: February to March. *Ecology*: In the shade of riverine forest. *Frequency in southern Africa*: Rare. *Distribution*: Northwards to Zambia, Zimbabwe and Tanzania. N, B, ?S, ?G.

Voucher: *De Winter & Marais 5023*.

**Setaria pumila** (Poir.) Roem. & Schult., in *Systema Vegetabilium* 2: 891 (1817). Type: Mediterranean.

*S. pallide-fusca* (Schumach.) Stapf & C.E.Hubb., in *Kew Bulletin* 1930: 259 (1930). Type: Ghana, *Thonning* (C, holo.).

*S. ustilata* De Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17(1): 59, 61 (1941). Type: South Africa, Mpumalanga, Barberton, *Mathews 13* (PRE, holo.).

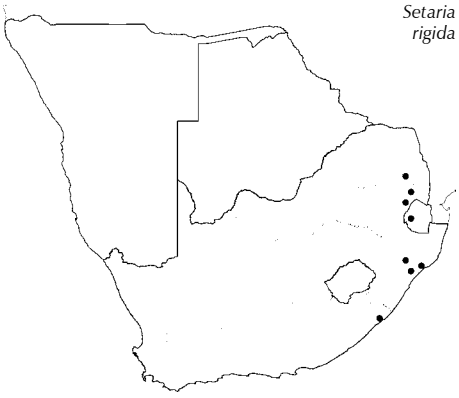

*Setaria pumila*

Loosely tufted annual 50–1 300 mm high; culm erect or geniculate, node glabrous. Leaf blade 30–300 × 2–12 mm, expanded, soft, thin, glabrous or hairy towards ligule. Inflorescence 10–100(–200) mm long, cylindrical, spike-like; bristles 4–10, 3–12 mm long, slender, slightly scabrid, yellowish to brownish, copper coloured or greenish with golden brown apices or green. Spikelet 1.5–3.5 mm long, apex acute, not deflexed; lower glume 3-nerved; lower floret male or sterile, lemma widely grooved, palea ± as long as lemma; upper lemma rugose to corrugate, rarely almost smooth; anther 0.6–1.5 mm long.

[Closely related to the tufted perennial *S. sphacelata*; specimens lacking basal parts are often indistinguishable; difficult to separate from *S. parviflora*, a short-lived perennial with a short, knotty rhizome.]

*Flowering*: December to May. *Ecology*: In damp soils in disturbed weedy places and cultivation or drier bushveld regions in shade of trees and bushes. *Frequency in southern Africa*: Infrequent to common. *Distribution*: Tropical and warm temperate regions of the Old World, introduced to North America. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Serious weed of cultivation, but also useful for erosion control as pioneer of bare ground.

Illustrations: Chippindall: 354, fig. 305; Rominger: 559 (2003).
Anatomy vouchers: *Loxton & Ellis 956, 973*; *Ellis 213, 226, 1234* & *Smook 5330*.
Voucher: *Smook & Gibbs Russell 2177*; *Smook 2619*; *Hardy, Retief & Herman 5331*.


*Setaria rigida*

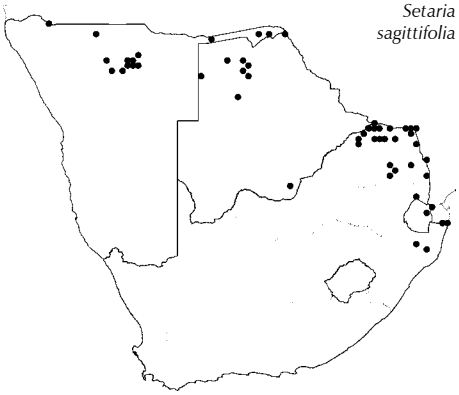
**Setaria rigida** Stapf, in *Flora capensis* 7: 426 (1899). Type: South Africa, KwaZulu-Natal, Umpumulo *Buchanan 12* & *173* (syntypes).

Robust, erect perennial 1.0–1.8 m high; rhizome stout, oblique; culm node glabrous. Leaf blade 100–300 × 3–6 mm, often inrolled; rigid, tapering to a spiny point; loosely to densely hairy or glabrous. Inflorescence up to 200 mm long, spike-like; bristles 4–9, up to 12 mm long, antrorsely barbed, often grooved and sometimes with sparse long hairs in lower part, light or yellowish green. Spikelet 2.3–2.8 mm long; lower glume 1-nerved; lower lemma shallow to deeply grooved, palea absent; upper lemma rugose; anther 1–2 mm long.

[Distinguished from *S. verticillata*, which also has 1-nerved lower glume, but is annual and has retrorsely barbed bristles.]

*Flowering*: February to March. *Ecology*: On stream banks and in swampy areas. *Frequency in southern Africa*: Infrequent, or locally common. *Distribution*: Endemic. S, M, KZN, EC.

Voucher: *Smook 5539*.


*Setaria sagittifolia*

**Setaria sagittifolia** (A.Rich.) Walp., in *Annales botanices systematicae* 3: 721 (1852–53). Type: Ethiopia, Tacaze, *Schimper 1655* & *Tchélatchékanne*, in *Quartin Dillon* (syntypes).

*Cymbosetaria sagittifolia* (A.Rich.) Schweick., in *Hooker's f. Icones Plantarum* 34 (tab. 3320): 1 (1936).

Arrow grass

Loosely tufted, slender annual 120–800 mm high; culm node glabrous. Leaf blade 50–300 × (3)5–11(–18) mm, broadly linear to narrowly lanceolate, at least lower ones pseudopetiolate, base sagittate with lobes minute or to 30 mm long or absent (variable on same plant). Inflorescence open, spikelets secund; each spikelet subtended by a solitary bristle 4–10 mm long, scabrid, green flushed purple. Spikelet 2 × 1–2 mm, laterally compressed; lower glume 3-nerved; lower lemma grooved in middle; upper lemma conspicuously gibbous, keeled, finely and densely rugose though apex often smooth.

[In FSA the only other *Setaria* with sagittate leaf base, *S. appendiculata*, is perennial, lacks pseudo-petioles and has culm nodes hairy.]

*Flowering*: January to March. *Ecology*: Pioneer in shady places in savanna woodland or open glades in forests. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to Sudan and Yemen. N, B, S, LIM, M, KZN. *Economics*: Palatable grass but of little value as it does not occur in abundance except after very good rains.

Illustrations: Chippindall: 356, fig. 306 (1955), Clayton et al.: 534, fig. 128 (1982); Müller: 255 (2007).
Anatomy vouchers: *Ellis 521, 1911, 1939 & 2085*.
Voucher: *Smook 5397*.

**Setaria sphacelata** (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss

This species is a polyploid complex, running from diploid to decaploid, and although the different ploidy levels cross freely there appears to be little or no correlation with morphological characters. It is for practical purposes that the varieties given below are used, but they all intergrade and are not real entities.

**Setaria sphacelata** (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. **sericea** (Stapf) Clayton, in *Kew Bulletin* 33: 506 (1979). Type: Sudan, Seriba Ghattas, *Schweinfurth 182* (K, holo.).

*S. almaspicata* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 47 (1941). Type: South Africa, Limpopo, Palmaryville, *Koker 25* (PRE, holo.).

*S. anceps* Stapf ex Massey, in *Flora tropical Africa* 9*:* 743 (1930). Type: Ghana, Takoradi, *Howes 983* (syntype).

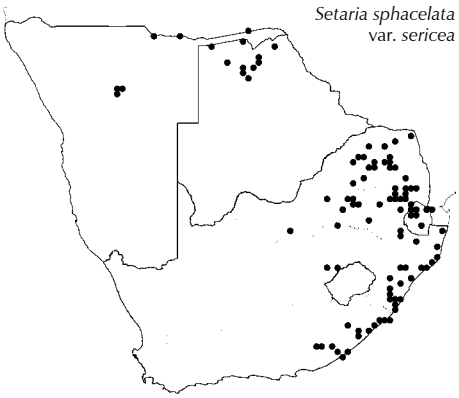
*S. cana* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 30 (1941). Type: Namibia, Waterberg, *Boss 36343* (PRE, holo.).

*S. flabelliformis* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 40 (1941). Type: South Africa, Mpumalanga, Barberton, *de Wit 790* (PRE, holo.).

*S. sphacelata* (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss subsp. *nodosa* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 52 (1941). Type: South Africa, KwaZulu-Natal, Mtunzini, *Mogg 4366* (PRE, holo.).

*S. sphacelata* (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss subsp. *pyropea* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 52 (1941). Type: South Africa, KwaZulu-Natal, Dargle Road, *Mogg 6873* (PRE, holo.).

GOLDEN BRISTLE GRASS


*Setaria sphacelata* var. *sericea*

Tufted, perennial 1 000–2 000 mm high; rhizome short; basal sheaths glabrous, or densely to sparsely pubescent, often flabellate; culm 3–6 mm in diameter, 4–10-noded, nodes glabrous. Leaf blade 100–500 × 3–10 mm, often folded, glabrous, or sparsely to densely hairy. Inflorescence 70–250 mm long, spike-like; bristle to 8 mm long, slender, finely scabrid, golden-yellow to reddish brown. Spikelet 1.5–3.5 mm long; lower glume 3-nerved; upper glume 3–5-nerved; lower lemma widely grooved, upper lemma rugose; anther 1.0–1.5 mm long.

[Intergrades with *S. sphacelata* var. *sphacelata*, which is smaller with narrower leaves; and *S. sphacelata* var. *splendida*, which is larger, more robust and has wider leaves.]

*Flowering*: October to June. *Ecology*: Occupies a wide range of habitats ranging from riversides and swampy areas to rocky hillsides. *Frequency in southern Africa*: Common. *Distribution*: Tropical Africa, cultivated elsewhere. N, B, S, LIM, NW, G, M, FS, KZN, EC. *Economics*: Good for hay and pasture.

Voucher*: Smook 2583, Webster 8*.

**Setaria sphacelata** (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. **sphacelata**, in *Kew Bulletin* 1929: 195 (1929). Type: Ghana, *Thonning* (C, holo.).

*S. decipiens* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 28 (1941). Type: South Africa, Western Cape, Albertinia, *Muir 1344* (PRE, holo.).

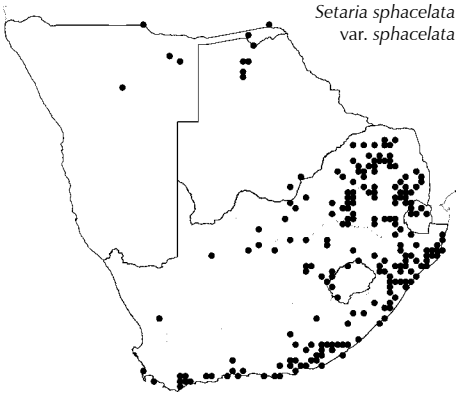
*S. flabellata* Stapf subsp. *flabellata*, in *Flora capensis* 7: 427 (1899). Type: South Africa, Eastern Cape, Grahamstown, *MacOwan 1310* (syntype).

*S. neglecta* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 49 (1941). Type: South Africa, Eastern Cape, Albany, *Dyer 1831* (PRE, holo.).

*S. perennis* Hack., in *Bulletin de l'Herbier Boissier* 3: 379 (1895). Type: South Africa, Gauteng, Kuduspoort, *Rehmann 4698* (syntype).

*S. sphacelata* (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss subsp. *aquamontana* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 52 (1941). Type: Namibia, Waterberg, *Boss H 35135* (PRE, holo.).

*S. sphacelata* (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. *stolonifera* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 53 (1941). Type: South Africa, Free State, *Goossens 1023* (PRE, holo.).


*Setaria sphacelata* var. *sphacelata*

*S. stenantha* Stapf, in *Flora tropical Africa* 9: 804 (1930). Type: Malawi, *Buchanan 236* (BM, holo.).

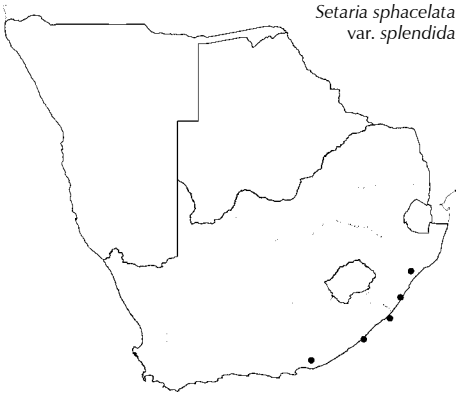
COMMON BRISTLE GRASS

Tufted, fairly robust, perennial 400–1 000 mm high; culm 1–3 mm in diameter, 2–4-noded, nodes glabrous. Leaf blade 100–350 × 2–5 mm, flat, glabrous or sparsely to densely hairy. Inflorescence 30–150 mm long, spike-like; bristles 6–10, 4.0–5.5 mm long, slender, finely scabrid, green, golden-yellow to reddish brown. Spikelet 1.5–3.5 mm long; lower glume 3-nerved; upper glume 3–5-nerved; lower lemma widely grooved; upper lemma coarsely rugose; anther 0.7–1.0 mm long.

[Very difficult to separate from the other varieties of *S. sphacelata* and intermediates are common.]

*Flowering*: October to June. *Ecology*: Usually on well-drained soils; occupies a wide range of habitats ranging from streamsides and moist places to rocky hillsides. Frequency: Common. *Distribution*: Tropical Africa. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Cultivated as hay and for pasture.

Illustration: Chippindall: 348 & 350, fig. 302 & 303 (1955).
Voucher: *Smook 5437, Codd 5373*.


*Setaria sphacelata* var. *splendida*

**Setaria sphacelata** (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. **splendida** (Stapf) Clayton, in *Kew Bulletin* 33: 506 (1979). Type: Sudan, Kagula swamp, *Cartwright 18* (many syntypes).

*S. splendida* Stapf, in *Flora tropical Africa* 9: 799 (1930).

Tufted, extremely robust, almost reed-like perennial 1.8–3.0 m high, glabrous, sometimes shortly rhizomatous; occasionally with stilt roots; usually with only a few basal leaves; culm 6–10 mm in diameter, node glabrous. Leaf blade 300–800 × 6–18 mm, linear, glabrous. Inflorescence 150–300(–500) mm long, spike-like; bristles 7–15, to 10 mm long, slender, finely scabrid, golden-yellow. Spikelet 2.3–2.7 mm long; lower glume 3-nerved; upper glume 3–5-nerved; lower lemma back grooved; upper lemma rugose; anther 1.5–1.8 mm long.

[The most robust variety in the *S. sphacelata* complex.]

*Flowering*: January to June. *Ecology*: Swampy areas or floodplains, often in water. *Frequency in southern Africa*: Rare in the wild but often cultivated. *Distribution*: Scattered localities northwards through East Africa to Sudan. KZN, EC. *Economics*: Good hay and pasture.

Anatomy voucher: *Ellis 5212*.
Voucher: *Killick & Leistner 3412*.

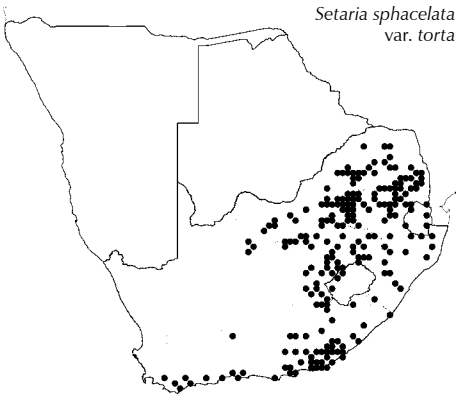
**Setaria sphacelata** (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. **torta** (Stapf) Clayton, in *Kew Bulletin* 33: 506 (1979). Type: Zimbabwe, Harare, *Eyles 2912*; *Charter*; *Eyles 4569* (syntypes).

*S. flabellata* Stapf subsp. *natalensis* de Wit, in *Bulletin of the Botanic Gardens, Buitenzorg*, ser. 3, 17: 38 (1941). Type: South Africa, Meteor Ridge, *Mogg 3413* (PRE, holo.).

*S. homblei* De Willd., in *Annals de la Société Scientifique de Bruxelles* 39, Mém.: 134 (1920). Type: DRC, Shinsenda, *Homble 557*.

*S. torta* Stapf, in *Flora tropical Africa* 9: 801 (1930).

TWISTED LEAF BRISTLE GRASS, CREEPING BRISTLE GRASS


*Setaria sphacelata* var. *torta*

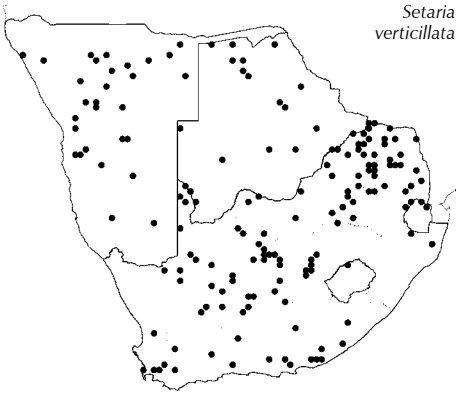
Tufted perennial 300–500(–1 000) mm high; rhizome creeping; basal sheaths usually strongly keeled, often flabellate; leaves mostly basal, old leaves curly; culm diameter 1–3 mm, occasionally flat, rooting at nodes, node glabrous. Leaf blade 100–300 × 1–3 mm, glabrous or hairy, mostly folded or inrolled. Inflorescence spike-like, 25–45 mm long; bristles 7–15, to 6 mm long, slender, finely scabrid, usually dark purple-brown. Spikelet 2.5–3.0 mm long; lower glume 3-nerved; upper glume 3–5-nerved; lower lemma back grooved; upper lemma rugose; anther 1.0–1.5 mm long.

[Very slender and small compared to the other varieties, representing the smallest extreme of the *S. sphacelata* complex. It also has a very distinct growth form especially the rhizome and given its habitat, it may represent a different species in the FSA region.]

*Flowering*: September to March. *Ecology*: On well-drained soils; on rocky outcrops, hillsides, open woods and grassland.

*Frequency in southern Africa*: Common, usually scattered amongst other grasses. *Distribution*: Northwards to Tanzania and DRC. S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Good palatable grass used as natural pasture.

Anatomy vouchers: *Ellis 24* & *1271*.
Voucher: *Scheepers 1451, Manders 4*.


*Setaria verticillata*

**Setaria verticillata** (L.) P.Beauv., in *Essai düne nouvelle Agrostographie*: 51 (1812). Type: Southern Europe.

Bur bristle grass, klitssetaria, klitsgras

Loosely tufted annual 300–1 000 mm high, often sprawling; culm node glabrous. Leaf blade 50–300 × 6–22 mm, broadly linear, usually loosely hairy, rarely glabrous; sheath margin hairy or glabrous. Inflorescence 20–150 mm long, spike-like, often shortly branched and interrupted in lower part; bristles 1–4, 4–16 mm long, rigid, retrorsely barbed therefore inflorescences often entangled, green tinged purple. Spikelet 1.5–2.5 mm long; lower glume 1-nerved; lower floret sterile, palea reduced; upper lemma finely rugose; anther 0.5–1.0 mm long.

[Uniquely distinguished from other FSA *Setaria* species by retrorsely barbed bristles.]

*Flowering*: December to May. *Ecology*: Ruderal in disturbed areas, such as cultivated fields, cattle kraals and along paths; often in damp, shady places. *Frequency in southern Africa*: Common. *Distribution*: Old world tropics, introduced to the USA and Australia. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Palatable therefore used as pasture, hay and forage; in East Africa, the inflorescences are used to keep rats from harvested grains; used for weaving hats and toys; can be a problem as inflorescences adhere to animals such as sheep, causing much suffering and wool damage; a persistent weed that can spread uncontrollably, regarded as a noxious weed in parts of Australia.

Illustration: Clayton et al.: 523, fig. 127 (1982).
Anatomy vouchers: *Ellis 411, 764* & *1317*.
Voucher: *Dahlstrand 2485, Du Toit 174*.




Figure 477.—*Sorghastrum nudipes*. A, plant; B, spikelet pair: awned, sessile spikelet and empty pedicel (13.0 × 1.4 mm). Artists: A, G.E. Lawrence; B, S.B. Chiliza.

## **Sorghastrum** Nash

Nash: 71 (1901); Chippindall: 463 (1955); Clayton & Renvoize: 731 (1982); Clayton & Renvoize: 341 (1986); Gibbs Russell et al.: 300 (1990); Watson & Dallwitz: 882 (1994); Setshogo: 137 (2000); Setshogo: 27 (2002).



Figure 478.—*Sorghastrum nudipes* spikelets (5–7 mm). Photographer: M. Koekemoer.

Tall, tufted perennial; sometimes shortly rhizomatous. **Leaf blade** linear; *ligule* an unfringed to a fringed membrane. **Inflorescence** a terminal panicle, narrow, loose to somewhat dense; branches filiform, primary branches appearing whorled, divided almost from base into flexuous peduncles bearing fragile racemes (sometimes these reduced to a single sessile spikelet); internodes and pedicels filiform, hairy; *spikelets* paired, appearing solitary since pedicelled spikelet usually reduced to a pedicel; pedicel free from rachis. **Sessile spikelet** dorsiventrally compressed, plump; *glumes* ± equal, dissimilar, awnless; lower glume dorsiventrally compressed, back flat or rounded, truncate, keeled only on the apex, 9-nerved, back often hairy; upper glume broadly convex on the back, glabrous, slightly keeled above, 5-nerved. **Florets** 2; *lower floret* sterile, reduced to a hyaline lemma, 2-keeled, margins inflexed, hairy, 2-nerved, awnless; *upper floret* bisexual; *lemma* less firm than glumes, hyaline, 2-lobed, almost reduced to an awn, awned from sinus between lobes; *awn* long, glabrous; *callus* obtuse to pungent, usually not conspicuously hairy; *palea* delicate, hyaline, lanceolate. **Lodicules** 2, cuneate, fleshy, glabrous. **Stamens** 3. **Ovary** ellipsoid, glabrous; styles plumose. **Caryopsis** oblong; hilum short; embryo large. **Pedicelled spikelet** reduced to a filiform, hairy, barren pedicel somewhat shorter than sessile spikelet, occasionally with a spikelet similar to a sessile spikelet on the same inflorescence. **Photosynthetic pathway**: $C_4$; biochemical type NADP-ME (*S. nutans*); XyMS-. PCR sheath outlines uneven. PCR sheaths extensions present or absent. PCR cell chloroplast with reduced grana; centrifugal/peripheral. **Cytology**: $x = 10$ (polyploidy).

**Species** ± 20, mainly tropical and subtropical America and Africa; 2 in southern Africa, northern Namibia and northern Botswana, Swaziland, Limpopo, Mpumalanga and northern KwaZulu-Natal.

Species treatment by M.J. Moeaha.

**Key to species:**

Leaf sheath without auricles at apex; upper lemma awn 3–8(–10) mm long, straight or bent and twisted; leaf blade base expanded; lowest node of culm up to 5 mm long . . . . . **S. nudipes**
Leaf sheath with erect auricles at apex; upper lemma awn 8–16 mm long, always only bent and twisted; leaf blade base narrower than middle portion of blade; lowest node of culm up to 10 mm long . . . . . **S. stipoides**

**Sorghastrum nudipes** Nash, in *North American Flora* 17: 129 (1912). Type: Mexico.

*S. friesii* (Pilg.) Pilg., in *Notizblblatt des Botanischen Gartens und Museums zu Berlin-Dahlem* 14: 96 (1938). Type: Zambia, Bangweulu, *Fries 965* & *974* (synypes).

Tufted perennial 700–1 200 mm high; lowest culm node up to 5 mm long. Leaf blade to 200 × 2–6 mm, base expanded; auricles absent; ligule a fringed membrane, hairs as long as membrane. Inflorescence an open panicle; spikelets paired, all alike, each pair with one spikelet and an empty pedicel. Spikelet 5–7(–8) mm long; upper lemma awn 3–8(–10) mm long, straight or bent and twisted; anther 2.5–3.5 mm long.

*Flowering*: January to April. *Ecology*: Often on poor sandy soils; wet places such as swamps, road drains and stream banks. *Frequency in southern Africa*: Infrequent. *Distribution*: Zambia, Zimbabwe, Malawi and Mozambique. N, B, LIM, M.

Anatomy vouchers: *Ellis 2082, 2083, 2084* & *3695*.
Voucher: *Pole Evans 17-4-1934*.

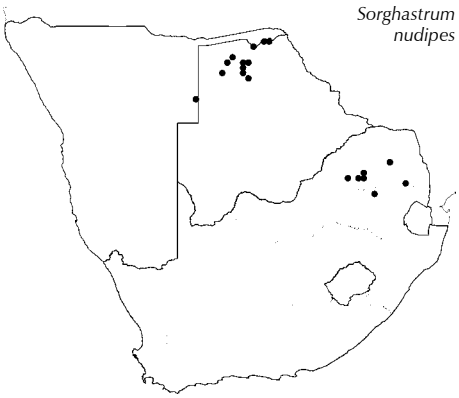
**Sorghastrum stipoides** (Kunth) Nash, in *North American Flora*. Type: Colombia.

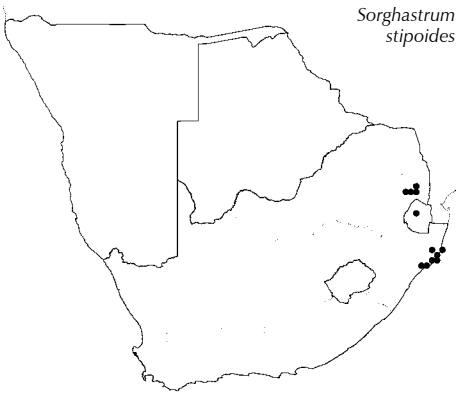
*S. rigidifolium* (Stapf) Chippind., in Pole-Evans, in *Memoirs of the Botanical Survey of South Africa* 22: 247 (1948). Type: Kenya, Nairobi, *Lyne 146* (syntype).

Tufted perennial up to 1 500 mm high; lowest culm node up to 10 mm long. Leaf blade to 450 × 2–5 mm, base tightly rolled, narrower than middle portion of blade; erect auricles present; ligule a fringed membrane, hairs minute, shorter than membrane. Inflorescence 200 mm long, spikelets paired, all alike, each pair with one sessile spikelet and an empty pedicel. Spikelet 4–7 mm long; upper lemma awn 8–16 mm long, never straight, always bent and twisted; anther 2.0–2.5 mm long.

*Flowering*: December to April. *Ecology*: Wet places. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to tropical Africa; and tropical South America. S, LIM, M, KZN.

Illustration: Hennessy: t. 1963 (1988); Setshogo: 33, tab. 12 (2002).
Anatomy vouchers: *Ellis 3382* & *4508*.
Voucher: *Ward 6085*.



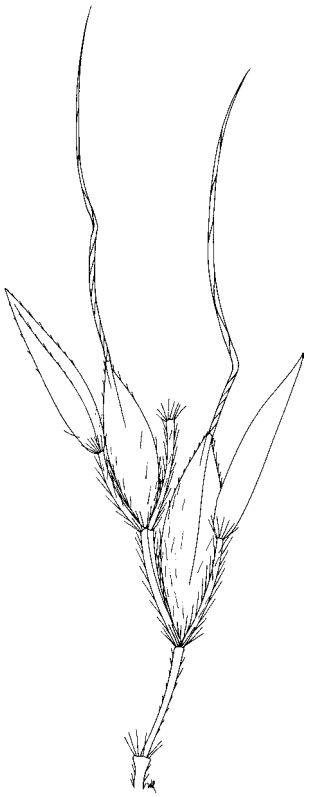



Figure 479.—*Sorghum bicolor* subsp. *arundinaceum*. Spikelet pairs: awned and awnless pedicelled spikelets, linear pedicels and internodes. Artist: W. Roux.

## **Sorghum** Moench

Moench: 207 (1794) name conserved; Stapf: 104 (1917); Stapf: 346 (1898); Snowden: 191 (1954); Chippindall: 457 (1955); De Wet: 477 (1978); Clayton & Renvoize: 726 (1982); Clayton & Renvoize: 339 (1986); Gibbs Russell et al.: 301 (1990); Watson & Dallwitz: 883 (1994); Phillips: 297 (1995); Henderson: 18 (2001); Setshogo: 21 (2002); Barkworth: 626 (2003); Spangler: 294 (2003); Wiersema & Dahlberg: 947 (2007).

Annual or perennial; tufted, usually robust; sometimes rhizomatous. **Leaf blade** expanded; *ligule* an unfringed to a fringed membrane or rarely a fringe of hairs. **Inflorescence** a large, terminal, open panicle (densely contracted in the cultivated grain species), branches bearing short fragile racemes (non-disarticulating in cultivated forms), internodes and pedicels filiform; *spikelets* in pairs, terminally in triplets, dissimilar, in long–short combination: one sessile, the other pedicelled, pedicels free from rachis. **Sessile spikelet** dorsiventrally compressed,




Figure 480.—*Sorghum halepense*. A, plant; B, inflorescence; C, spikelet. Artist: M.E. Connell.

falling with glumes (not disarticulating in cultivated forms); *glumes* ± equal, dissimilar, awnless or upper glume rarely awned; lower glume dorsally compressed, usually leathery and glossy at maturity, flat or rounded on back, 2-keeled and narrowly winged near apex. **Florets** 2; *lower floret* sterile, reduced to a hyaline lemma, awnless; *upper floret* bisexual; *lemma* less firm than glumes, not becoming indurated, incised, usually 2-lobed, awnless or awned from between lobes; *awn* shorter to longer than body of lemma, geniculate, twisted, frequently short and straight in cultivars; *callus* obtuse, rarely pungent, hairy or glabrous; *palea* present or 0. **Lodicules** 2, fleshy, usually ciliate. **Stamens** 3. **Ovary** ellipsoid, glabrous; styles 2, terminal or subterminal, plumose. **Caryopsis** mostly obovoid, dorsiventrally compressed; hilum short; embryo large. **Pedicelled spikelet** narrower than sessile spikelet, awnless, male or sterile, or reduced to a glume. **Photosynthetic pathway**: $C_4$; biochemical type NADP-ME (3 species); XyMS-. PCR sheath outline uneven. PCR cell chloroplasts with reduced grana; centrifugal/peripheral. **Cytology**: $x = 5$ (aneuploids, high polyploidy).



Figure 481.—*Sorghum bicolor* subsp. *arundinaceum*. Spikelet pair (5–7 mm). Photographer: M. Koekemoer.

**Species** ± 24, tropical and subtropical regions of the Old World; 3 in southern Africa, widespread.

[The species of *Sorghum* occurring in the FSA region fall into two sections. Section *Sorghum*, which is sometimes divided into the complexes *Arundinacea* and *Halepensia*, both of which are extensively cultivated either as grain or fodder. The *Arundinacea* complex comprises many forms of the cultivated sorghum and its wild progenitor and the intermediates between the two are due to hybridisation and backcrossing, and these are all recognised as representing one biological species and are therefore included under *S. bicolor* at subspecific and cultivar level. *Halepensia* includes *S. halepense,* which introgresses with *S. bicolor,* making the species and hybrids very difficult to distinguish. *Sorghum versicolor*, section *Parasorghum*, found in northern Namibia, Botswana, North West, Limpopo, Mpumalanga, Gauteng and KwaZulu-Natal, has apparently not played a role in the evolution of the cultivated sorghums. See Phillips: 297 (1995) and Setshogo: 21 (2002).]

Species treatment by A.C. Mashau.

**Key to species:**

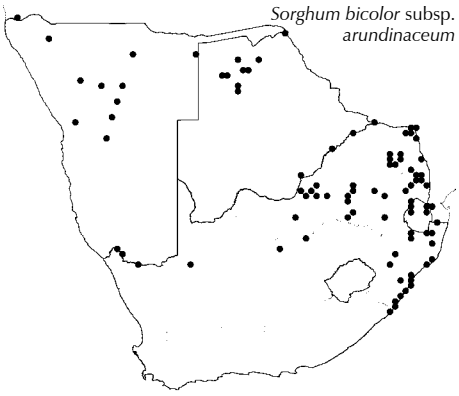
1. Culm node with a ring of spreading white hairs; sessile spikelet black at maturity . . . . . **S. versicolor**
   Culm node without spreading white hairs; sessile spikelet variously coloured at maturity . . . . . 2
2. Perennial, rhizomes long; lower glume adpressed pubescent . . . . . ***S. halepense**
   Annual or short-lived perennial, rhizomes absent; lower glume densely to loosely hairy or glabrous at maturity . . . . . 3
3. Leaf blade less than 15 mm wide; racemes branches tardily disarticulating; pedicelled spikelet persistent . . . . . **S. bicolor** subsp. **drummondii**

Leaf blade more than 20 mm wide; racemes readily disarticulating; pedicelled spikelet deciduous . . . . . **S. bicolor** subsp. **arundinaceum**

**Sorghum bicolor** (L.) Moench subsp. **arundinaceum** (Desv.) de Wet & Harlan, in Harlan, de Wet and Stemler, *Origins of African Plant Domestication*: 455 (1976). Type: Ghana [Guinea], *Isert* (B, holo.).

*S. verticilliflorum* (Steud.) Stapf, in *Flora tropical Africa* 9: 116 (1917). Type: Rèunion.

COMMON WILD SORGHUM, WILDEGRAANSORGHUM


*Sorghum bicolor* subsp. *arundinaceum*

Short-lived perennial or annual to 2 500 mm high; rhizomes absent; culm nodes without spreading white hairs. Leaf blade 20–30 mm wide. Inflorescence open or contracted; branches obliquely ascending or spreading, sometimes pendulous, racemes readily disarticulating. Sessile spikelet 5–7 mm long, lanceolate-elliptic, variously coloured at maturity; lower glume densely to loosely hairy, at maturity glossy and often almost glabrous; upper lemma awn 10–16(rarely 18) mm long, geniculate and partly twisted; anther 2.0–3.5 mm long. Pedicelled spikelet 5–7 mm long, linear to lanceolate, awnless, deciduous, pale greenish yellow or often reddish to purplish.

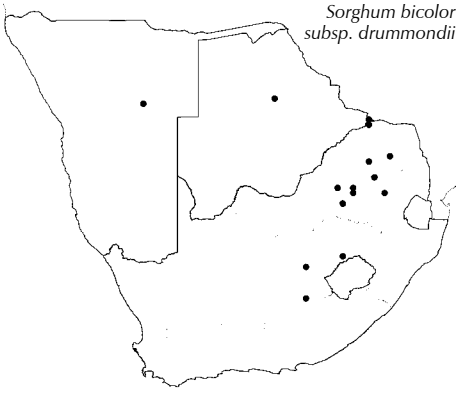
*Flowering*: January to June. *Ecology*: Moist and disturbed places. *Frequency in southern Africa*: Locally common. *Distribution*: Throughout tropical Africa to India, introduced to Australia and tropical America. N, B, LIM, NW, G, M, FS, KZN, NC, EC. *Economics*: Weed of cultivation.

Illustration: Setshogo: 24, tab. 9 (2002).
Anatomy vouchers: *Ellis 65* & *506*.
Voucher: *De Winter & Leistner 5163*.

**Sorghum bicolor** (L.) Moench subsp. **drummondii** (Steud.) de Wet, in *American Journal Botany* 65: 481 (1978). Type: U.S.A.

*S. sudanense* (Piper) Stapf, in *Flora tropical Africa* 9: 113 (1917).

SUDAN GRASS, SHATTERCANE, WITKORING

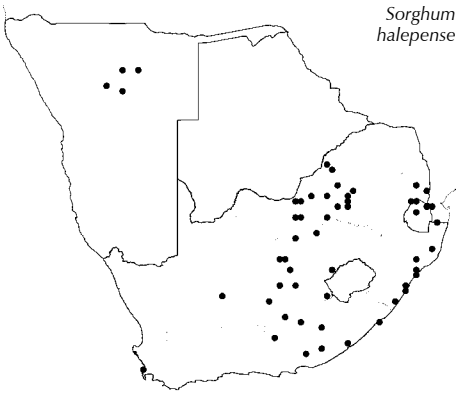

*Sorghum bicolor* subsp. *drummondii*

Annual to 3 000 mm high; culm node without spreading white hairs. Leaf blade 8–15 mm wide. inflorescence compact, usually rather contracted; racemes tardily disarticulating. Sessile spikelet 6–7 mm long, lanceolate-elliptic, variously coloured at maturity; lower glume loosely hairy, glossy at maturity, often almost glabrous; upper lemma shortly lobed, awn up to 16 mm long; anther 2.5–4.0 mm long. Pedicelled spikelet 6–7 mm long, narrower than sessile spikelet, awnless, persistent, pale greenish yellow or often reddish to purplish.

[This is a weedy derivative of hybridisation between the crop plant *S. bicolor* subsp. *bicolor* and the presumed wild progenitor *S. bicolor* subsp. *arundinaceum*.]

*Flowering*: January to June. *Ecology*: Disturbed places and cultivated lands. *Frequency in southern Africa*: Infrequent. *Distribution*: N, B, LIM, NW, G, M, FS, EC. *Economics*: Planted as a fodder but can contain prussic acid; a weed of cultivation.

Voucher: *Nat. Herb Pretoria B*.


*Sorghum halepense*

***Sorghum halepense** (L.) Pers., in *Synopsis plantarum* 1: 101 (1805). Type: U.S.A.

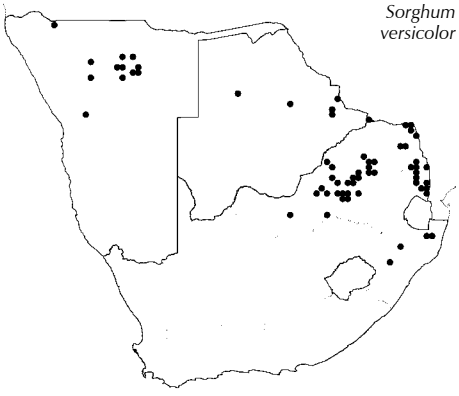
JOHNSON GRASS, COLUMBUS GRASS

Usually strongly long-rhizomatous perennial to 2 500 mm high; culm node without spreading white hairs. Leaf blade 200–600 × 10–30 mm. Inflorescence open; branches slender, often somewhat pendulous. Sessile spikelet 4.0–5.5(–7.0) mm long, ovate, variously coloured at maturity; lower glume indurate, shiny, adpressed pubescent; upper lemma minutely bilobed, awnless or awned; awn 10–16 mm long, geniculate, twisted; anther 2.1–4.5 mm long. Pedicelled spikelet 5–7 mm long, lanceolate, awnless.

[*S.* × *almum* Parodi, in *Argentina de agronomia Revista* 10: 361 (1943), is a rhizomatous hybrid between *S. bicolor* and *S. halepense*. It is often cultivated and if it backcrosses to *S. halepense*, it results in an aggressive weed.]

*Flowering*: usually December to May (occasionally at other times). *Ecology*: In disturbed places, watercourses, roadsides and cultivated lands. *Frequency in southern Africa*: Common. *Distribution*: Naturalised from southern Eurasia and India, widely naturalised worldwide in warm areas. N, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Weed, declared invader and is especially difficult to eradicate because of its long, deeply buried rhizomes. Reported to be toxic with prussic acid under certain conditions.

Illustrations: Chippindall: 460, fig. 377 (1955); Barkworth: 629 (2003).
Anatomy vouchers: *Ellis 735, 1822, 3906 & 4429*.
Voucher: *Webber 2-2-23*.


*Sorghum versicolor*

**Sorghum versicolor** Andersson, in Peters, *Naturwissenschaftliche Reise nach Mosambique, Bot*. 2: 563 (1863). Type: Mozambique, Boror, *Peters*.

Alternate name: *Sarga versicolor* (Andersson) Sprangler

BLACK WILD SORGHUM, SWARTSAADGRAS

Short-lived perennial or annual 600–1 200 mm high; culm nodes with spreading white hairs. Leaf blade 4–8 mm wide. Inflorescence narrowly oblong; primary branches whorled. Sessile spikelet 4–7 mm long; black at maturity; lower glume elliptic-oblong, hard, reddish brown to black at maturity, glossy, glabrous to loosely hairy; upper lemma awn 30–45 mm long, bent, twisted; anther 2.0–3.8 mm long. Pedicelled spikelet 3–5 mm long, linear to lanceolate, awnless, loosely hairy, green.

*Flowering*: December to May. *Ecology*: Black turf soil. *Frequency in southern Africa*: Common. *Distribution*: Northwards to central and East Africa. N, B, LIM, NW, G, M, KZN.

Illustrations: Chippindall: pl. 14 (1955); Setshogo: 26, tab. 10 (2002).
Anatomy vouchers: *Ellis 133, 776, 1612 & 1891*.
Voucher: *De Winter 2915*.

## **Spartina** Schreb.

Schreber: 43 (1789); Stapf: 632 (1900); Chippindall: 208 (1955); Mobberly: 471 (1956); Launert: 176 (1970a); Clayton & Renvoize: 244 (1986); Gibbs Russell et al.: 302 (1990); Sell & Murrell: 232 (1996).



Figure 482.—*Spartina maritima* spikelet (12–15 mm). Photographer: M. Koekemoer.

Perennial, tufted; rhizomatous or stoloniferous. **Leaf blade** flat or folded, rigid; *ligule* a minute fringe of hairs. **Inflorescence** of (1)2 or 3 long, 1-sided, persistent, spike-like racemes, subdigitate; rachis keeled on face, flattened dorsally, elongated at apex into a sharp point; *spikelets* 2-ranked on rachis, solitary, subsessile. **Spikelet** strongly laterally compressed, falling entire at maturity; *glumes* very unequal, dissimilar, softly and shortly hairy, keeled, shortly awned or awnless; lower glume linear, acute or obtuse, 1-nerved; upper glume membranous or subcoriaceous, 3-nerved. **Floret** 1, bisexual; *lemma* oblong, membranous, keeled, minutely hairy upwards, 1-nerved, awnless; *palea* equalling lemma, 2-nerved, hyaline. **Lodicules** often 0. **Stamens** 3. **Ovary** glabrous; styles long, connate at base, plumose above. **Caryopsis** fusiform; hilum short; pericarp fused; embryo large. **Photosynthetic pathway**: $C_4$; PCK (*S. anglica*); XyMS+. PCR sheath outlines uneven. PCR sheath extensions present. Maximum number of extension cells 7–8. PCR cell chloroplasts with well-developed grana; centrifugal/peripheral. **Cytology**: $x = 7$, 10 (high polyploidy).

**Species** ± 16, temperate America, coastal Europe and Africa; 1 in southern Africa: *Spartina maritima* (Curtis) Fernald, Namibia and shores of Western and Eastern Cape.

Species treatment by A.C. Mashau.

**Spartina maritima** (Curtis) Fernald, in *Rhodora* 18: 180 (1916). Type: Portugal.

*S. capensis* Nees, in *Mémoires del' Académie impériale Sciences de Saint-Pétersbourg, (Classe des Sciences physiques et mathématiques)* ser. 6,4(1–2): 111 (1840). Type: South Africa, Eastern Cape, Zwartkops River mouth, *Drège 2050* (PRE, fg.).

Cape cord grass, strandkweek

Hygrophytic perennial 200–800 mm high; rhizomatous or stoloniferous; leaves mainly cauline. Leaf blade 120–190 mm long, erect, inrolled, apex pungent. Inflorescence 50–150 mm long; robust, racemes usually 2 or 3 (rarely 1), not spreading, solitary at point of attachment to rachis, secund. Spikelet 12–15 mm long; glumes very unequal; lemma awnless or mucronate; anther 5–6 mm long.

[Hybridisation, back-crossing and poly-haploidy complicate the taxonomy in this genus.]

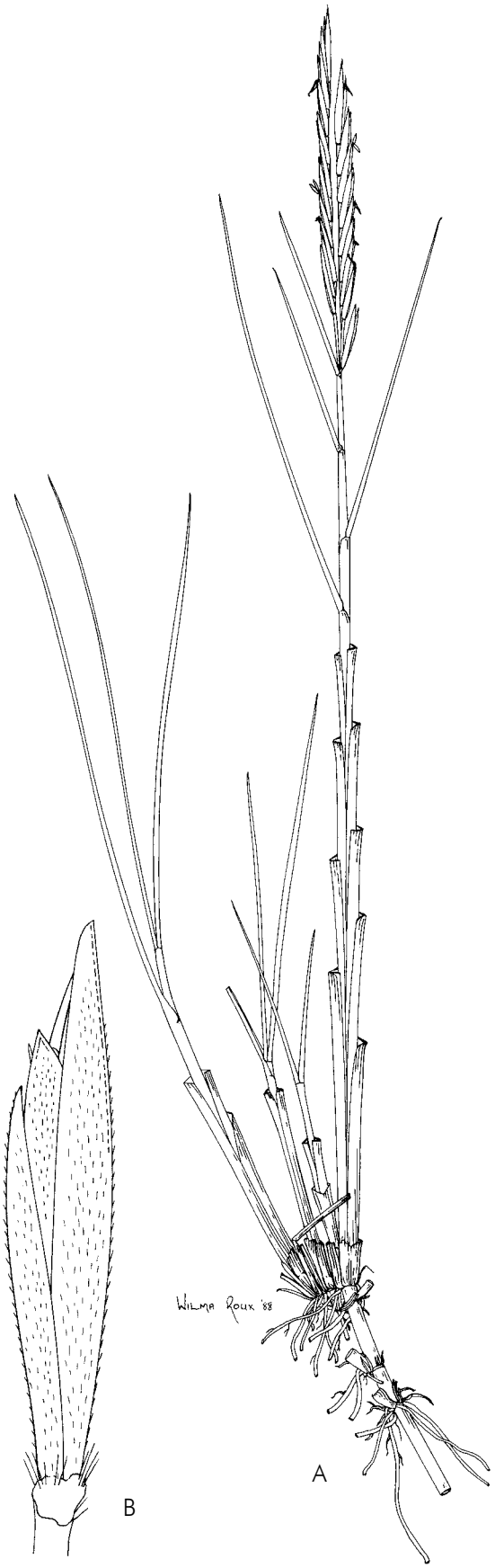
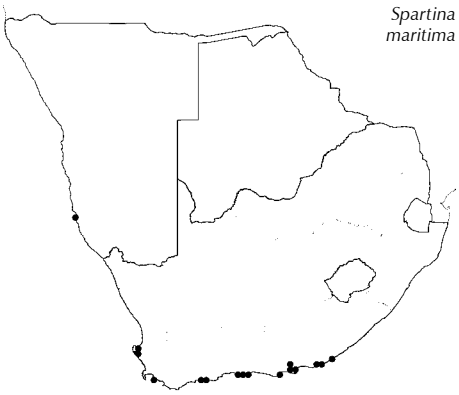



Figure 483.—*Spartina maritima*. A, plant; B, spikelet (16.0 × 2.6 mm). Artist: W. Roux.




*Flowering*: November to April. *Ecology*: Along coasts on intertidal mud flats, around estuaries or submerged in lagoons. *Frequency in southern Africa*: Locally common. *Distribution*: Atlantic coastlines. N, WC, EC.

Illustration: Chippindall: 208, fig. 185 (1955).
Anatomy vouchers: *Ellis 1300* & *3266*.
Voucher: *Boucher 2999*.

## *Sphenopus Trin.

Trinius: 135 (1820); Stace: 159 (1980); Bor: 1740 (1985); Clayton & Renvoize: 106 (1986); Gibbs Russell et al.: 303 (1990); Watson & Dallwitz: 893 (1994).

Annual, small, tufted; sometimes geniculate. **Leaf blade** expanded to rolled, almost filiform; *ligule* a long unfringed membrane. **Inflorescence** an open panicle, branches capillary and conspicuously divaricate; *spikelets* solitary, pedicelled; pedicel club-shaped at apex. **Spikelet** laterally compressed; disarticulating above glumes and between florets; *glumes* very unequal, shorter than spikelet, awnless; lower glume minute or almost absent, nerveless; upper glume 1-nerved. **Florets** 2–7, bisexual; *lemma* similar in texture to glumes, membranous, obtuse to rounded, glabrous, 3-nerved, keeled on all 3 nerves, awnless or minutely awned to mucronate; *callus* short, glabrous; *palea* bilobed, 2-keeled. **Lodicules** 2. **Stamens** 3, ovoid. **Ovary** glabrous; styles plumose. **Caryopsis** oblong-ellipsoid; hilum short. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 6, 7$ (polyploidy).

**Species** 2, Mediterranean to Iran; 1 naturalised in southern Africa: **Sphenopus divaricatus* (Gouan) Rchb., western Northern Cape and Western Cape.

Species treatment by M.T. Nembudani.



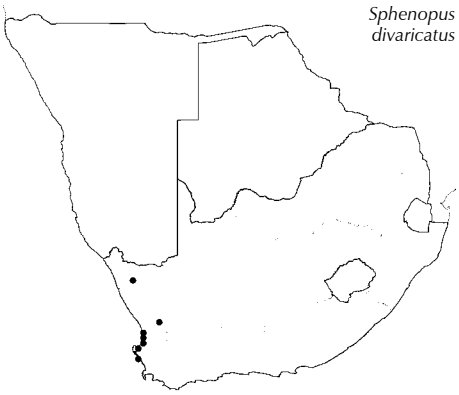

Figure 484.—*Sphenopus divaricatus*. Artist: W. Roux.



Figure 485.—*Sphenopus divaricatus*. Two spikelets with pedicels. Artist: W. Roux.



Figure 486.—*Sphenopus divaricatus* spikelet (2–3 mm). Photographer: M. Koekemoer.


*Sphenopus divaricatus*

***Sphenopus divaricatus** (Gouan) Rchb., in *Flora germmanica excursoria*: 45 (1830). Type: France.

*Poa divaricata* Gouan, in *Illustrationes et observationes botanicae* 4 pl. 2. f. l. (1773).

Slender, tufted annual; 70–200(–300) mm high; outer culms geniculate and spreading from base. Leaf blade 30–70 × 1 mm, setaceous, rolled; ligule to 4 mm long, membranous. Inflorescence open, delicate, much branched; pedicels 1.5–7.0 mm long. Spikelet 2–3 mm long; 2–5-flowered; glumes unequal, hyaline; lower glume scale-like; upper glume to 1 mm long; lemma 1.25–1.50 mm long, obtuse or rounded, awnless or minutely awned, scabrid; anther 0.2–0.3 mm long.

*Flowering*: August to October. *Ecology*: Coastal areas on mud flats along rivers or salty marshes or in hollows between dunes. *Frequency in southern Africa*: Rare but locally common. *Distribution*: Southwestern Europe, Mediterranean region eastwards to central Asia. Introduced and naturalised in South Africa and Australia. NC, WC.

Anatomy vouchers: *Ellis 5430* & *5431*.
Voucher: *Smook 3650*.

## **Sporobolus** R.Br.

Brown: 169 (1810); Stapf: 578 (1900); Stent: 247 (1927b); Goossens (1938); Chippindall: 209 (1955); Launert: 176 (1970a); Clayton: 353 (1974); De Winter & Vorster: 295 (1974); Chippindall & Crook: 109 (1976); Clayton & Renvoize: 224 (1986); Gibbs Russell et al.: 304 (1990); Baaijens & Veldkamp: 393 (1991); Watson & Dallwitz: 897 (1994); Phillips: 142 (1995); Cope: 166 (1999).

Annual or perennial, tufted, sometimes rhizomatous or stoloniferous or mat-forming. **Leaf blade** linear, flat, folded or rolled; *ligule* a short, inconspicuous, fringed membrane or a fringe of hairs. **Inflorescence** a panicle, open, ovoid or pyramidal, or contracted, sometimes spike-like; branches, especially lowermost, whorled or not; *spikelets* subsessile or pedicelled. **Spikelet** small, laterally to not noticeably compressed, disarticulating above glumes; *glumes* ± equal to unequal, shorter to longer than spikelet, 1-nerved, glabrous, keeled to keel-less, awnless, upper glume not to slightly 1-keeled. **Floret** 1, bisexual, rarely rudiment of a second floret present; *lemma* similar to upper glume, similar in texture to glumes, membranous, often shining, 1–3-nerved, entire, glabrous, awnless, occasionally with a subulate apex; *palea* 2-nerved, often grooved between nerves. **Lodicules** 2, hyaline, truncate or 0. **Stamens** 2 or 3. **Ovary** often globose; styles free, plumose above. **Caryopsis** globose to ellipsoid, rounded or truncate, with a thin pericarp that swells and becomes detached from seed when wet, forcibly ejecting seed; hilum short; embryo large. **Photosynthetic pathway and related features**: $C_4$; PCK (6 species), or NAD-ME (4 species); XyMS+. PCR sheath outlines uneven or even. PCR sheath extensions present or absent. Maximum number of extensions cells when present 2–5. PCR cell chloroplasts ovoid or elongated; with well-developed grana; centrifugal/peripheral, or centripetal. **Cytology**: $x = 9$, 10 (high polyploidy).

**Species** ± 160, tropical and warm temperate; 38 in southern Africa, widespread.

Species treatment by A.C. Mashau and L. Fish.




Figure 487.—*Sporobolus africanus*. A, plant; B, ligule. Artist: C.D. Bartman.

**Key to species:**

1. Inflorescence with primary branches in whorls, or at least lowermost branches in a single whorl . . . . . 2
Inflorescence with primary branches not whorled . . . . . 15
2. Plant less than 180 mm high at maturity; leaf blade 10–30 × 1–5 mm forming a basal rosette, margins with stiff spreading hairs; culm 1-noded; spikelets pendulous at maturity; grain discoid; lower glume 1/2 as long as spikelet . . . . . **S. discosporus**
Characters not in above combination . . . . . 3
3. Plant annual . . . . . 4
Plant perennial . . . . . 7
4. Spikelets longer than 2 mm, fewer than 4 per primary branch; grain 1.2–1.9 mm in diameter; inflorescence lacking viscid glandular patches on central axis and primary branches . . . . **S. panicoides**
Spikelets shorter than 2 mm, more than 4 per primary branch; grain less than 1 mm in diameter; inflorescence with viscid glandular patches on central axis and primary branches . . . . . 5
5. Lower glume 1/2 as long as spikelet, linear, apex acute to acuminate; spikelet 0.9–1.6 mm long . . . . . **S. paniculatus**
Lower glume 1/5–2/5 as long as spikelet, oblong, apex obtuse or denticulate; spikelet 1–2 mm long . . . . . 6
6. Spikelet 1.3–2.0 mm long; anther (0.7)1.0–1.3(1.5) mm long . . . . . **S. cordofanus**
Spikelet 1.0–1.5 mm long; anther 0.30–0.50(0.65) mm long . . . . . **S. coromandelianus**
7(3). Spikelet 1.2–1.5 mm; upper glume prominently keeled, keel scabrid, central nerve lighter in colour than rest of glume; primary branches with spikelets in upper half . . . . . **S. nitens**
Spikelet longer than 1.5 mm; upper glume rounded, central nerve not distinctly coloured; primary branches with spikelets over whole length or upper part only . . . . . 8
8. Lower glume 1/2–3/4 as long as spikelet . . . . . 9
Lower glume less than 1/2 as long as spikelet . . . . . 12
9. Spikelets very densely clustered on upper 1/3 of primary branches; upper glume as long as spikelet; lower glume 1/2 as long as spikelet; rhizomes long, horizontally creeping . . . . . **S. pectinatus**
Spikelets loosely to not clustered, covering the whole length or only on the upper 2/3 of the branches; upper glume longer than spikelet; lower glume 1/2–3/4 as long as spikelet; rhizomes when present, short, oblique . . . . . 10
10. Leaf blade wide, flat; panicle open, pyramidal, with fewer than 10 whorls . . . . . **S. congoensis**
Leaf blade setaceous or filiform; panicle contracted, unobtrusively or only lowest branches distinctly whorled . . . . . 11
11. Spikelets clustered at apices of the branches; basal leaf sheaths hard, brittle, glossy . . . . . **S. centrifugus**
Spikelets evenly distributed along the distal half of the primary branches; basal leaf sheaths papery . . . . . **S. subulatus**
12(8). Inflorescence linear to lanceolate; spikelet usually reddish . . . . . **S. sanguineus**
Inflorescence pyramidal to ovate; spikelet pallid to greyish-green . . . . . 13
13. Leaf blade rigid, shorter than 30 mm; rhizomes with very short internodes, creeping horizontally and branching profusely . . . . . **S. ludwigii**
Leaf blade not rigid, longer than 30 mm; rhizomes not horizontally creeping or profusely branched . . . . . 14
14. Basal leaf sheath yellow, hard, glossy and brittle; culm erect; plant seldom stoloniferous; leaf blade less than 3 mm wide, often inrolled, 30–140 mm long . . . . . **S. rangei**
Basal leaf sheath dull and papery; culm geniculate; plant usually stoloniferous; leaf blade flat, more than 5 mm wide, 20–300 mm long . . . . . **S. ioclados**
15(1). Inflorescence branches not dichotomous; spikelets borne along entire length of the branchlets (if loosely grouped at the apices, see *S. nervosus*) . . . . . 16

Inflorescence branches dichotomous to sub-dichotomous; spikelets at apices of the branchlets . . . . . 35
16. Inflorescence narrow, spike-like . . . . . 17
Inflorescence linear to open, not spike-like . . . . . 21
17. Lower glume $^{2}/_{3}$–$^{3}/_{4}$ as long as spikelet . . . . . **S. virginicus**
Lower glume up to $^{1}/_{2}$ as long as spikelet . . . . . 18
18. Spikelets very densely clustered so that central axis is not visible; primary branches shorter than 3 mm; inflorescence to 5 mm wide . . . . . **S. spicatus**
Spikelets clustered but central axis visible; primary branches to 30 mm long; inflorescence wider than 5 mm . . . . . 19
19. Leaf blade longer than 200 mm; upper glume $^{1}/_{2}$ as long as the spikelet; spikelets very dense on inflorescence . . . . . **S. africanus**
Leaf blade shorter than 200 mm; upper glume $^{2}/_{3}$–$^{4}/_{5}$ as long as the spikelet; spikelets somewhat loose on inflorescence . . . . . 20
20. Plant 200–360 mm high; leaf blade 5–12 × 1 mm; spikelet 2.2–2.5 mm long; glumes and lemmas membranous . . . . **S. albicans**
Plant 500–800 mm high; leaf blade 120–200 × 3.0–3.5 mm; spikelet 2.5–3.0 mm long; glumes and lemmas cartilaginous . . . . . **S. bechuanicus**
21(16). Inflorescence pyramidal or ovate, open, not more than 3 × longer than wide . . . . . 22
Inflorescence linear, open or contracted, more than 5 × longer than wide (in *S. fourcadii* sometimes ovate) . . . . . 26
22. Upper glume $^{1}/_{2}$–$^{2}/_{3}$ as long as spikelet; old leaf sheaths splitting into fibres with age; rhizomes absent . . . . . 23
Upper glume $^{3}/_{4}$–$^{4}/_{5}$ as long as spikelet; old leaf sheaths not splitting into fibres; rhizomes present . . . . . 24
23. Basal leaf sheaths densely woolly hairy between fibres . . . . . **S. stapfianus**
Basal leaf sheaths lacking woolly hairs between fibres . . . . **S. festivus**
24(22). Lemma apex subobtuse; lower glume $^{1}/_{2}$ as long as spikelet . . . . . **S. tenellus**
Lemma apex acute; lower glume $^{1}/_{2}$–$^{2}/_{3}$ as long as spikelet . . . 25
25. Glumes keeled along whole length or at apices only, keel scabrid; rhizomes long, deeply buried; leaves rigid . . . . . **S. oxyphyllus**
Glumes not keeled; rhizomes compact with short internodes, creeping horizontally at ground level; leaves fine and curly . . . . . **S. nervosus**
26(21). Lemma notably long and fine, to 1.5 times the spikelet length; plant annual . . . . . **S. molleri**
Lemma as long as spikelet; plant perennial . . . . . 27
27. Old leaf sheaths splitting into fibres with age; leaves setaceous or filiform, relatively short and forming a cushion at the base . . . . . **S. pellucidus**
Old leaf sheaths not splitting into fibres; leaves not setaceous or forming a cushion at the base . . . . . 28
28. Lower glume $^{4}/_{5}$ as long as spikelet, 1-nerved; glumes keeled, keel scabrid; plant reed-like . . . . . **S. consimilis**
Lower glume up to $^{2}/_{3}$ as long as spikelet, nerveless; glumes not keeled; plant not reed-like . . . . . 29
29. Upper glume obtuse . . . . . 30
Upper glume acute to subacute . . . . . 31
30. Lower glume $^{1}/_{5}$–$^{1}/_{3}$ as long as spikelet. . . . . **S. pyramidalis**
Lower glume $^{1}/_{2}$–$^{2}/_{3}$ as long as spikelet. . . . . **S. macranthelus**
31(29). Culm 3 mm and more in diameter at the base **S. macranthelus**
Culm up to 3 mm in diameter at the base . . . . . 32
32. Inflorescence ± contracted, primary branches hardly spreading, spikelets very densely clustered on relatively short primary branches; grain (0.8)1.1–1.2 mm long . . . . . **S. africanus**
Inflorescence open, primary branches spreading, spikelets not densely clustered; grain to 1 mm long . . . . . 33
33. Plant usually small, 250–400(–700) mm high; inflorescence with a few branches, these far apart, branches almost horizontally spreading at maturity . . . . . **S. fourcadii**




Figure 488.—*Sporobolus centrifugus*. Artist: C.D. Bartman.




Figure 489.—*Sporobolus discosporus*. A, plant; B, inflorescence; C, branchlet with spikelets showing grain; D, ligule. Artist: W. Roux.




Figure 490.—*Sporobolus ludwigii*. Artist: C. Letty.

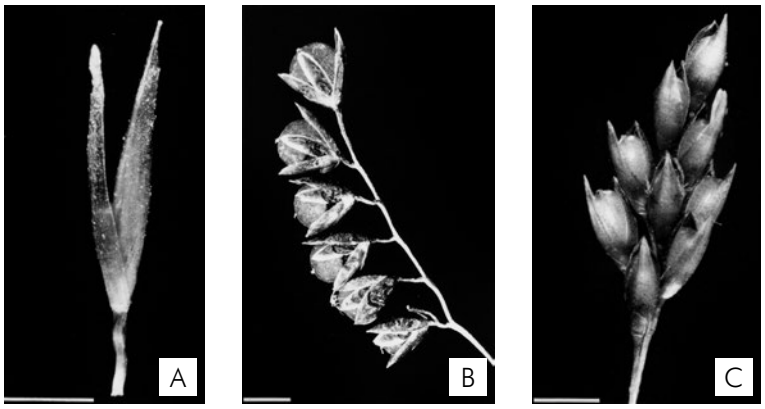



Figure 491.—Spikelets. A, *Sporobolus centrifugus* (2.5–4.2 mm); B, *S. discosporus* (1.0–1.7 mm); C, *S. fimbriatus* (1.4–2.2 mm). Photographer: M. Koekemoer.

Plant usually higher than 1 000 mm, often robust; inflorescence fairly dense with numerous branches, branches never spreading more than 60° from main axis at maturity . . . . . 34

34. Rhizomes oblique; lower leaf sheaths herbaceous; upper glume ± $^{4}/_{5}$ to as long as spikelet . . . . . **S. fimbriatus**
Rhizomes not obvious or absent; lower leaf sheaths papery; upper glume ± $^{2}/_{3}$ as long as spikelet . . . . . **S. natalensis**

35(15). Inflorescence branches with long stiff hyaline hairs in all or at least some axils (2–15 hairs per axil) . . . . . 36
Inflorescence branches lacking hairs in all axils . . . . . 38

36. Inflorescence branches with very few hairs occurring in only some axils (or hairs absent); glumes unequal; upper glume $^{2}/_{3}$ as long as spikelet . . . . . **S. welwitschii**
Inflorescence branches with many hairs in almost all the axils; glumes ± equal; upper glume $^{1}/_{2}$ as long as spikelet . . . . . 37

37. Rachilla extension present (rarely absent); plant base not fibrous; lemma 3-nerved . . . . . **S. subtilis**
Rachilla extension absent; plant base fibrous; lemma 1-nerved . . . . . **S. conrathii**

38(35). Basal leaf sheaths splitting into fibres at maturity . . . . . 39
Basal leaf sheaths not splitting into fibres . . . . . 40

39. Basal leaf sheaths densely woolly hairy between fibres . . . . . **S. stapfianus**
Basal leaf sheaths lacking woolly hairs between fibres . . . . . **S. festivus**

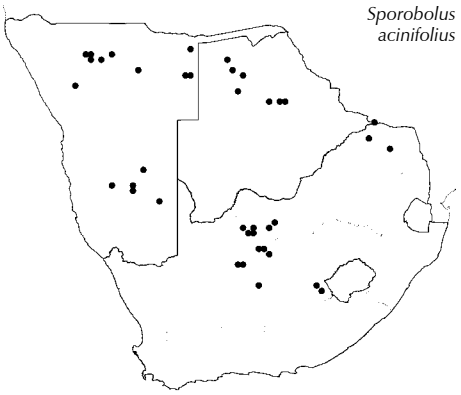
40(38). Lower glume $^{1}/_{3}$ the spikelet length; spikelet 2.0–2.9 mm long . . . . . **S. salsus**
Lower glume $^{2}/_{5}$–$^{2}/_{3}$ the spikelet length; spikelet usually shorter than 2 mm (occasionally as long as 2.2 mm) . . . . . 41

41. Plant annual; leaf blade flat, 2–5 mm wide . . . . . **S. engleri**
Plant perennial; leaf blade setaceous or to 3 mm wide . . . . . 42

42. Leaf blade setaceous; rhizome sparsely branched . . . . . 43
Leaf blade flat; rhizome much branched, creeping . . . . . 44

43. Glumes ± equal; leaves straight, erect, rigid; plant fine, delicate; old dead leaves and sheaths persistent, forming a dense cushion below the new growth; plant 70–300 mm high . . . **S. nebulosus**
Glumes unequal; leaves hard but wavy; plant hard, wiry; leaves and sheaths not persistent; plant 600–700 mm high . . . . . **S. welwitschii**

44(42). Leaf blade shorter than 35 mm, broadly obtuse, margins not white cartilaginous, apex rounded; culm usually 1-noded; leaves mostly basal, with cauline leaves much shorter than basal ones . . . . . **S. tenellus**
Leaf blade 40–120 mm long, broadly triangular, margins conspicuously white cartilaginous, tapering to a fine point; culm 2–5-noded; leaves basal and cauline, with cauline leaves usually much longer than the basal ones . . . . . **S. acinifolius**


*Sporobolus acinifolius*

**Sporobolus acinifolius** Stapf, in *Flora capensis* 7: 581 (1900). Type: South Africa, Northern Cape, Griqualand West, Hay Division, at Griqua Town, *Burchell 1846*.

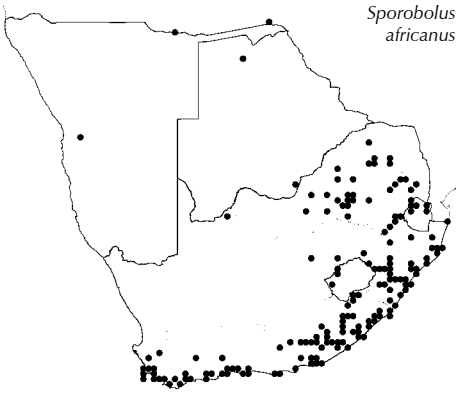
LIMESTONE DROPSEED, KALKGRAS

Mat-forming perennial 150–430 mm high; rhizomes long, much branched; cauline leaves usually much longer than basal leaves. Leaf blade 40–120 × to 3 mm, broadly triangular, margins conspicuously white cartilaginous; apex tapering to a fine point. Inflorescence dichotomously branched; axils with a distinct pulvinus, hairless; spikelets solitary at branchlet apex. Spikelet 1 to 2 mm long; glumes unequal, apices obtuse; lower glume $^{2}/_{5}$–$^{3}/_{5}$ as long as spikelet; upper glume $^{2}/_{3}$–$^{4}/_{5}$ as long as spikelet; lemma as long as spikelet, ovate-elliptic; anther 1.2–1.9 mm long.

[Very similar to *S. tenellus*, which has leaf blades shorter than 35 mm and leaf apices rounded; and *S. salsus*, which has larger spikelets, 2.0–2.9 mm long.]

*Flowering*: February to May. *Ecology*: Brackish calcareous soil; on pans or at water's edge. *Frequency in southern Africa*: Locally common. *Distribution*: ?Endemic. N, B, LIM, NW, FS, NC.

Illustration: Chippindall: 214, fig. 189 (1955).
Anatomy vouchers: *Gibbs-Russell & Smook 5485A, 5485B & 5485C*.
Voucher: *Smith 195*.


*Sporobolus africanus*

**Sporobolus africanus** (Poir.) Robyns & Tournay, in *Bulletin du Jardin botanique de l'État* 25: 242 (1955). Type: South Africa, *Thunberg* (UPS, holo.; K, microfiche).

*S. capensis* (P.Beauv.) Kunth, in *Enumeratio Plantarum omnium hususque cognitarum* 1: 212 (1833).

DROPSEED, TAAIPOL

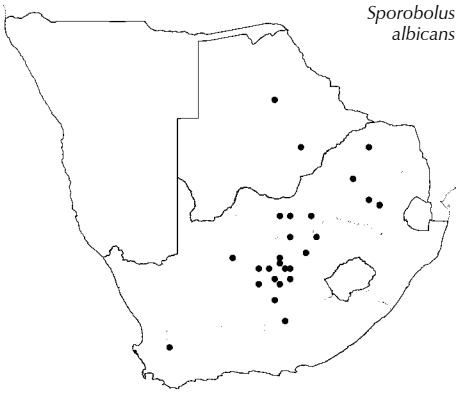
Tufted perennial 280–1 500 mm high; rhizomatous. Leaf blade 200–400 × 1–4 mm. Inflorescence dense, almost spike-like, branches not whorled, relatively short, rigid, central axis usually visible. Spikelet 2.0–2.8 mm long; glumes unequal; lower glume $^{1}/_{4}$–$^{1}/_{2}$ as long as spikelet, broadly oblong, apex obtuse, nerveless; upper glume $^{1}/_{2}$ the spikelet length, narrowly ovate, apex acute; lemma ovate-elliptic, apex acute; grain ellipsoid, 1.1–1.2 mm long; anther 0.8–1.0 mm long.

[Belongs to a complex and the typical form can be easily distinguished from *S. fourcadii*, *S. fimbriatus*, *S. pyramidalis, S. natalensis* and *S. macranthelus*, by its contracted, almost spike-like panicle with short firm branches and longer grains. The species of the complex form an interlaced group of species, in which the typical forms are overshadowed by a large number of intermediates, for which Clayton (1974) suggests hybrid origins. Further research is needed to distinguish these species satisfactorily. Also similar to *S. indicus* from America and the Asiatic *S. fertilis*.]

*Flowering*: October to April. *Ecology*: Mainly disturbed places and along streams. *Frequency in southern Africa*: Common. *Distribution*: Northwards through tropical East Africa to Ethiopia; Cameroon; and Arabia. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Indicator of trampled and poor veld; used in traditional medicine as local application to wounds and for snake bite.

Illustration: Chippindall: 225, fig. 198 (1955).
Anatomy vouchers: *Ellis 263, 278* & *345; Van Heerden 70*.
Voucher: *Smook 5456, Pole Evans 139*.

**Sporobolus albicans** (Nees ex Trin.) Nees, in *Florae Africanae australioris*: 154 (1841). Type: South Africa, Eastern Cape, Los Tafelberg and Wildschutberg, *Drège* (PRE, fg.) (syntypes?).


*Sporobolus albicans*

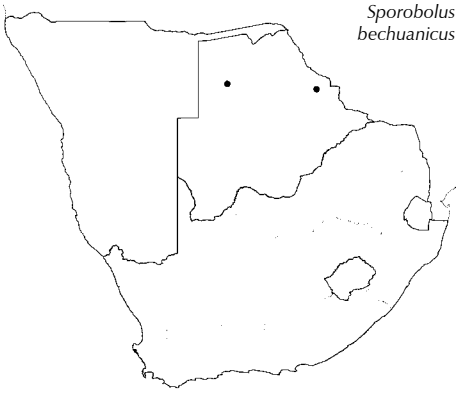
Mat-forming perennial 200–360 mm high; rhizomatous. Leaf blade 5–12 × 1 mm. Inflorescence 25–30 mm wide, spike-like, spikelets not clustered densely enough to hide central axis. Spikelet 2.0–2.5 mm long; glumes and lemmas membranous, pale yellow; lower glume $^1/_3$ as long as spikelet; upper glume $^2/_3$ as long as spikelet; lemma ovate-elliptic, apex obtuse; anther 0.7–1.0 mm long.

[Very similar to *S. virginicus*, which has longer glumes, $^3/_4$ to as long or slightly longer than spikelet; and *S. bechuanicus*, which has a longer spikelet (2.5–3.0 mm long) and a cartilaginous lemma.]

*Flowering*: February to April. *Ecology*: Limestone pans or dried up depressions. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. B, LIM, NW, M, FS, NC, WC, EC.

Anatomy vouchers*: Ellis 4327, 4328* & *Smook 2876*.
Voucher: *Smook & Gibbs Russell 2439*.

**Sporobolus bechuanicus** Gooss., in *Bulletin of Miscellaneous Information, Kew* 1934: 197, fig. 2 (1934). Type: Botswana, Pentz in *Herb. Pretoria 8417, Pole Evans 3277* & *3279* (syntypes).


*Sporobolus bechuanicus*

Tufted perennial 500–800 mm high. Leaf blade 120–200 × 3.0–3.5 mm. Inflorescence spike-like, more than 5 mm wide; spikelets not dense, central axis obvious. Spikelet 2.5–3.0 mm long; glumes and lemmas cartilaginous; lower glume $^1/_3$–$^1/_2$ as long as spikelet, ovate, apex subobtuse; upper glume $^2/_3$–$^4/_5$ as long as spikelet, ovate, sub-acuminate, apex acute; lemma ovate, subacute; anther 1.3–1.6 mm long.

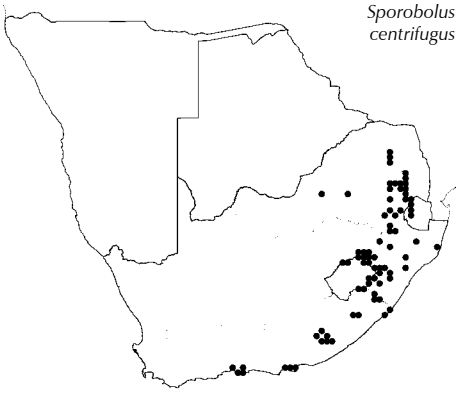
[Very similar to *S. albicans*, which has a smaller spikelet and lemma membranous; and *S. virginicus*, which has longer glumes, $^3/_4$ to as long or slightly longer than spikelet.]

*Flowering*: January to April. *Ecology*: Brackish soil; on seasonally flooded pans. *Frequency in southern Africa*: Rare. *Distribution*: Zimbabwe. B.

Voucher: *Pole Evans 3277*.

**Sporobolus centrifugus** (Trin.) Nees, in *Florae Africanae australioris*: 158 (1841). Type: South Africa, Eastern Cape, Windvogel Mt. to Zwart Kei R., *Drège* (B, lecto.).

*S. schlechteri* Schweick., in *Kew Bulletin* 1935: 208 (1935). Type: South Africa, Mpumalanga, Lydenburg, *Schlechter 3965* (PRE, iso.).


*Sporobolus centrifugus*

Olive dropseed

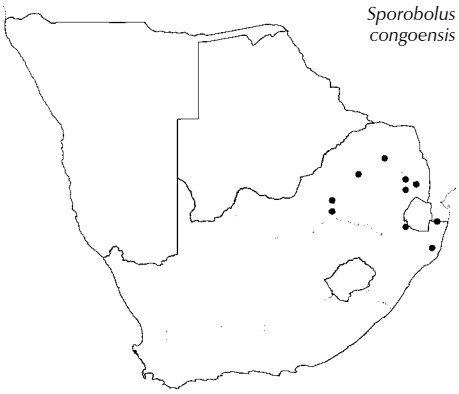
Perennial 180–900(–1 060) mm high; rhizome short, oblique; basal sheath hard, brittle, glossy, yellow or brown. Leaf blade 60–300 × 1.0–1.5 mm, setaceous, margins smooth or scabrid, rarely pectinate with tubercle-based setae. Inflorescence contracted with branches

unobtrusively whorled; spikelets clustered at apices of branches, often sterile and disarticulating at maturity in lowest whorl. Spikelet 2.5–4.2 mm long; glume apices acuminate; lower glume longer than $^2/_3$ as long as spikelet; upper glume longer than spikelet; lemma lanceolate to narrowly ovate; anther 1.5–2.1 mm long.

[Similar to *S. subulatus*, *S. sanguineus* and *S. congoensis*, which have shorter lower glumes, $^1/_2$–$^3/_4$ as long as spikelet; and fertile spikelets in the lowest whorl.]

*Flowering*: October to April. *Ecology*: On humiferous well-drained soils; high mountain veld or Highveld. *Frequency in southern Africa*: Locally common. *Distribution*: Zambia, Zimbabwe, Malawi to East Africa. S, L, LIM, NW, G, M, FS, KZN, WC, EC.

Anatomy vouchers: *Ellis 446, 1418, 1426, 1491, 2803, 3172 & 3340*.
Voucher: *Wedermann & Oberdieck 2188, Davidse 6790*.


*Sporobolus congoensis*

**Sporobolus congoensis** Franch., in *Bulletin de la Société d'histoire naturelle d'Autun* 8: 369 (1893). Type: Congo, Brazzaville, *Brazza & Thollon 594* (P, holo.).

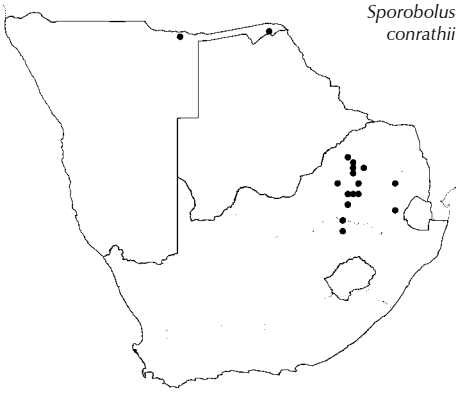
*S. eylesii* Stent & J.M.Rattray, in *Proceedings of Rhodesian Scientific Association* 32: 52 (1933). Type: Zimbabwe, Salisbury, *Eyles 2896* (SRGH, holo.; PRE, iso.).

Perennial 380–920 mm high; rhizome short, oblique. Leaf blade 60–220 × 3–10 mm, margins pectinate–ciliate with tubercle-based setae. Inflorescence 100–200 mm long, branches whorled, whorls fewer than 10; spikelets loosely clustered on upper $^2/_3$ of the branches. Spikelet 3.0–4.5 mm long; glumes unequal; lower glume 1.7–4.0 mm long, $^1/_2$–$^3/_4$ as long as spikelet, apex acute to acuminate; upper glume longer than spikelet, apex acute; lemma lanceolate–elliptic; anther 1.5–2.5 mm long.

[Similar to *S. sanguineus*, which has a larger inflorescence, whorls more than 10 and lower glume shorter, less than $^1/_2$ as long as spikelet; *S. subulatus* with glabrous or scabrid leaf blade margins; and *S. centrifugus*, which has a longer lower glume, longer than $^2/_3$ as long as spikelet and sterile spikelets in the lowest whorl.]

*Flowering*: November to January. *Ecology*: Shallow, rocky soil on sandstone and quartzite. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to Kenya, Tanzania and Congo (Brazzaville). LIM, G, M, KZN.

Anatomy voucher: *Ellis 4081*.
Voucher: *Acocks & Hafstrom 54*.


*Sporobolus conrathii*

**Sporobolus conrathii** Chiov., in *Annli di botanica di* (Roma) 13: 49 (1914). Type: South Africa, Gauteng, Modderfontein, *Conrath*.

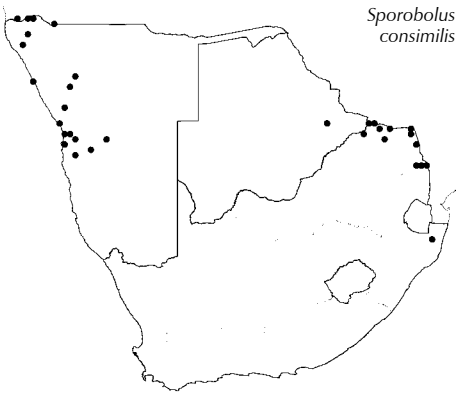
Tufted perennial 200–480 mm high; base fibrous. Leaf blade 100–180 × 1.0–1.5 mm. Inflorescence dichotomously branched; axils with stiff long hairs on a distinct pulvinus. Spikelet 1.5–1.9 mm long; glumes about equal, $^1/_3$–$^1/_2$ as long as spikelet; lemma as long as spikelet, 1-nerved; anther 0.7–1.1 mm long.

[Similar to *S. welwitschii*, which has a inflorescence with very few hairs and only in some axils, unequal glumes and a longer upper glume; and *S. subtilis*, which has a rachilla extension and lacks a fibrous base.]

*Flowering*: December to March. *Ecology*: Shallow soils on rocky slopes or outcrops. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, LIM, NW, G, M, FS.

Anatomy voucher: *Ellis 1797*.
Voucher: *Du Toit 80*.

**Sporobolus consimilis** Fresen., in *Museum Senckenbergianum Abhandlungen aus dem Gebietes der beschreibenden Naturgeschichte* 2: 140 (1837). Type: Eritrea, Massaua [Massaiwa], *Rüppell* (FR, holo.).


*Sporobolus consimilis*

VLEIGRAS

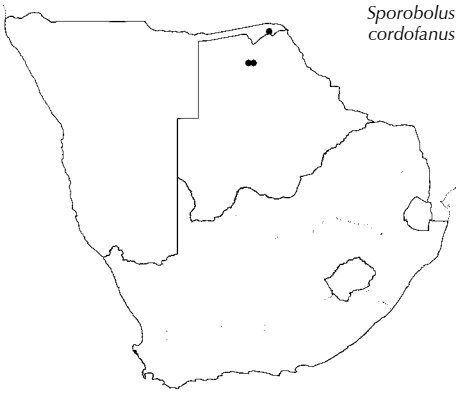
Robust, reed-like perennial 880–1 600 mm high; rhizomatous. Leaf blade 300–600 × 6–10 mm. Inflorescence linear, more than 5 × longer than wide, branches not whorled. Spikelet 1.7–2.5 mm long; glumes ± equal, as long as spikelet, keeled, keel scabrid; lower glume $^4/_5$ as long as spikelet, 1-nerved; upper glume equalling or little shorter than lower glume, narrowly ovate, apex acute; lemma as long as spikelet, similar to upper glume; anther 0.9–1.2 mm long.

[Distinguished from other species that have linear inflorescences and branches not whorled by its reed-like appearance and keeled glumes that are the spikelet length.]

*Flowering*: November to May. *Ecology*: On sand or turf soils; in riverbeds, on sand banks and near brackish springs. *Frequency in southern Africa*: Common. *Distribution*: Zambia, Zimbabwe, Malawi, Mozambique, Somalia and Chad; and Yemen and Oman. N, B, LIM, M, KZN.

Anatomy vouchers: *Ellis 531, 934, 3199, 4356; Smook 7658*.
Voucher: *De Winter & Leistner 5804*.

**Sporobolus cordofanus** (Hochst. ex Steud.) Henriq. ex Coss., in *Bulletin de la Société botanique de France*. Paris 36: 253 (1889). Type: Sudan, Blue Nile Province, Abu Gerad, *Kotschy 30*.


*Sporobolus cordofanus*

Tufted annual up to 600 mm high. Leaf blade 40–120 × 3–6 mm, usually flat. Inflorescence branches in a succession of whorls, smooth, with scattered, elongated, viscid glandular patches. Spikelet 1.3–2.0 mm long; glumes unequal; lower glume $^1/_5$–$^2/_5$ as long as spikelet, oblong, obtuse or denticulate at apex; upper glume as long as spikelet, elliptic, apex acute; lemma as long as spikelet, elliptic; anther (0.7)1.0–1.3(1.5) mm long.

*Flowering*: July to March. *Ecology*: On alluvial sands and clays; at low altitudes in mopane woodland; on riverbank sand, also disturbed sandy ground. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical Africa, mostly in the east and south. N, B.

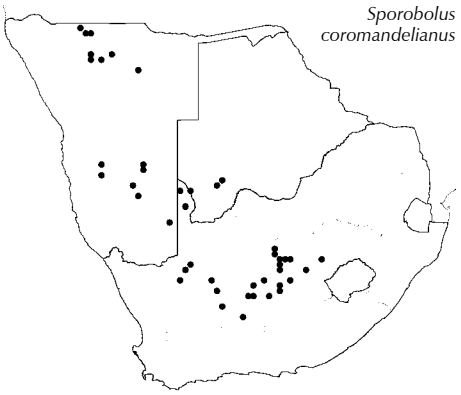
Voucher: *Smith 1942*.

**Sporobolus coromandelianus** (Retz.) Kunth, in *Révision des graminées* 1: 68 (1829). Type: India.

*S. parvulus* Stent, in *Bothalia* 2: 273 (1927). Type: South Africa, Free State, Smithfield, *Burtt Davy 10127* (PRE, holo.).

SMALL DROPSEED

Tufted annual 100–340 mm high. Leaf blade 20–100 mm × 2–4 mm. Inflorescence with all branches whorled; central axis and branches

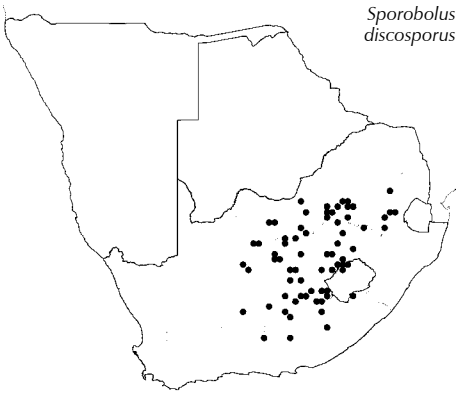

*Sporobolus coromandelianus*

with viscid patches that are more than 3 × longer than wide. Spikelet 1.0–1.5 mm long; glumes unequal; lower glume $^1/_4$–$^1/_3$ as long as spikelet, 0.1–0.5 mm long, oblong, apex obtuse; upper glume as long as spikelet, apex acute; lemma as long as spikelet, oblong-elliptic; anther 0.30–0.50(0.65) mm long.

[Similar to the perennials *S. nitens* and *S. ludwigii*, and annuals *S. cordofanus* and *S. uniglumis*.]

*Flowering*: February to April. *Ecology*: Usually on fine clayey soils; in or near brackish pans. *Frequency in southern Africa*: Locally common. *Distribution*: Old World tropics to India. N, B, FS, NC.

Anatomy voucher: *Ellis 912, 5266; Smook 2841; Gibbs-Russell & Smook 5484.*
Voucher: *Giess & Loutit 14146*.


*Sporobolus discosporus*

**Sporobolus discosporus** Nees, in *Florae Africanae australioris*: 158 (1841). Type: South Africa, Eastern Cape, Kraai R., *Drège*.

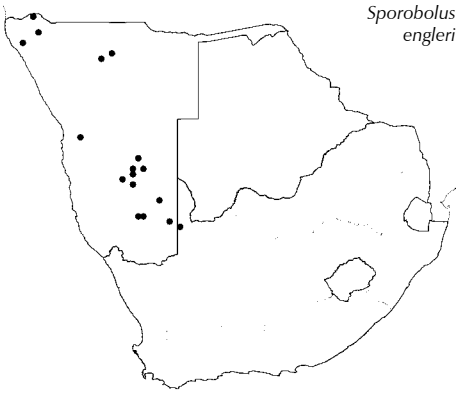
Disc dropseed, oortjiesgras

Tufted perennial or annual, 55–180 mm high; shortly rhizomatous; culms 1-noded. Leaf blade 10–30 × 2–5 mm, short, broad, in a basal rosette, margins with stiff spreading hairs. Inflorescence branches whorled; spikelets pendulous at maturity. Spikelet 1.0–1.7 mm long; glumes unequal; lower glume $^1/_2$ as long as spikelet, narrowly lanceolate; upper glume as long as spikelet, narrowly ovate; lemma narrowly ovate; anther 0.2–0.3 mm long; grain discoid.

[Easily distinguished by its small size, short, wide, pectinately ciliate leaf blades, pendulous spikelets and discoid grain.]

*Flowering*: November to May. *Ecology*: Sandy depressions on Cape Sandstone, on exposed bedrock, or often on clayey soils; in bare patches or wet areas. *Frequency in southern Africa*: Locally common. *Distribution*: East Africa to Ethiopia. L, NW, G, M, FS, NC, EC.

Illustrations: Chippindall: 219, fig. 194 (1955); Phillips: 146, fig. 60,3 (1995).
Anatomy vouchers: *Ellis 4324, Smook 2046, Loxton & Ellis 981.*
Voucher: *Smook & Gibbs Russell 2341.*


*Sporobolus engleri*

**Sporobolus engleri** Pilg. in *Botanische Jahrbücher* 51: 413 (1914). Type: Namibia, Haribis, *Engler 6591*; Kamelboom, *Dinter 2070* (syntypes).

Tufted annual 120–600 mm high; basal leaf sheaths not splitting into fibres; culms 1 to 2 mm in diameter. Leaf blade 40–150 × 2–5 mm, flat. Inflorescence dichotomously branched, axils without hairs; spikelets solitary at the branchlet apices. Spikelet 1.0–1.5 mm long; glumes unequal; lower glume $^1/_3$ as long as spikelet; upper glume $^2/_3$ as long as spikelet; lemma as long as spikelet; anther 1.2–1.5 mm long.

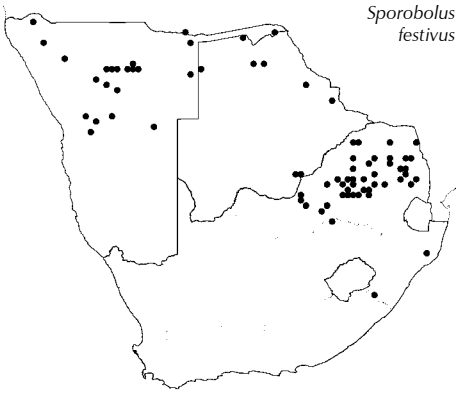
[Very similar to the perennials *S. nebulosus*, which has setaceous leaf blades; and *S. festivus* and *S. stapfianus*, which have fibrous old basal leaf sheaths.]

*Flowering*: March to May. *Ecology*: Deep sand, also on rocky soil; on dunes and in dry riverbeds, and often in shady places. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NC.

Anatomy vouchers: *Ellis 4766, Gibbs-Russell & Smook 5486*.
Voucher: *Van Vuuren & Giess 1167*.

**Sporobolus festivus** Hochst. ex A.Rich., in *Tentament florae Abyssinicae* 2: 398 (1851). Type: Ethiopia, Tigre, Djeladjeranne [Tchelatcheranne], *Schimper 1692*; and Avar Semmaka, *Quartin Dillon* (syntypes).

*S. festivus* A.Rich. var. *fibrosus* Stent, in *Bothalia* 2: 264 (1927). Type: Democratic Republic of Congo, Dais, *Chevalier 8626*; Lake Iro, *Chevalier 9225* (syntypes).




RED DROPSEED, ROOIGRAS

Tufted perennial 100–550 mm high; old leaf sheaths splitting into fibres, no woolly hairs between the fibres. Leaf blade 20–70 × 1 to 2 mm. Inflorescence dichotomously or not dichotomously branched, axils without hairs. Spikelet 0.8–1.5 mm long; lower glume up to $^1/_3$ as long as spikelet, apex obtuse; upper glume $^1/_2$–$^2/_3$ as long as spikelet, apex acute or cuspidate; lemma as long as spikelet, narrowly ovate, acute; anther 0.6–0.8 mm long.

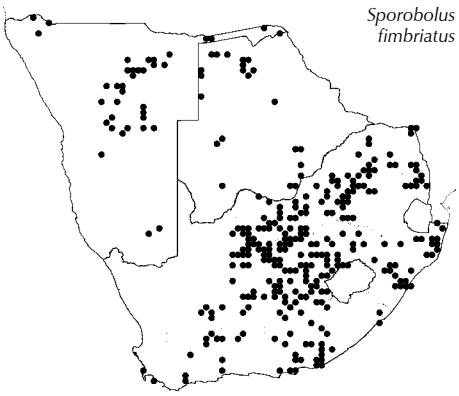
[Very similar to *S. stapfianus*, which has the basal fibres with dense woolly hairs between; *S. englerii*, an annual; and *S. nebulosus*, which lacks fibres at the base.]

*Flowering*: December to May. *Ecology*: On exposed bedrock in sand-filled depressions; in vleis, on pan edges; and in mopane woodland. *Frequency in southern Africa*: Locally common to common. *Distribution*: Northwards to East Africa and Somalia, also Mauritania. N, B, LIM, NW, G, M, FS, KZN. *Economics*: Palatable, but low leaf production; soil stabiliser; food for warthog.

Anatomy vouchers: *Ellis 2903, Van Heerden 46*.
Voucher: *Story 6236*.

**Sporobolus fimbriatus** (Trin.) Nees, in *Florae Africanae australioris*: 156 (1841). Type: South Africa, Eastern Cape, Zwartkops River, *Ecklon*; Slengerfontein, *Drège* (syntypes).

*S. fimbriatus* (Trin.) Nees var. *latifolius* Stent, in *Bothalia* 1: 279 (1923). Type: South Africa, Limpopo, Naboomspruit, *Galpin M.460* & *M.461* (PRE, isosyn.); *Burtt-Davy 1086* (syntypes).




DROPSEED, BLOUSAADGRAS

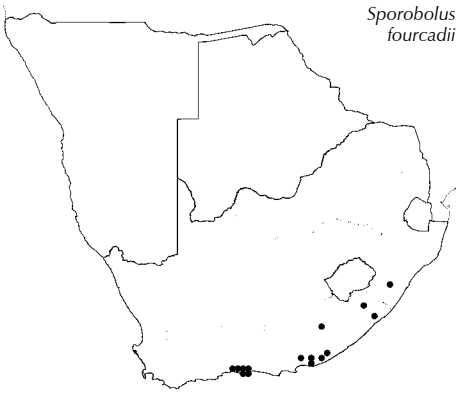
Densely tufted perennial 240–1 600 mm high; rhizome characteristically oblique; lower leaf sheaths herbaceous. Leaf blade to 300 × 2–4 mm. Inflorescence open, branches numerous, not whorled, not spreading more than 60 degrees. Spikelet 1.4–2.2 mm long; glumes unequal; lower glume $^1/_4$–$^3/_4$ as long as spikelet, obtuse to subacute, nerveless; upper glume ± $^4/_5$ to as long as spikelet, apex acute; lemma almost as long as spikelet, narrowly ovate; anther 0.8–1.5 mm long.

[See the comment under *S. africanus*.]

*Flowering*: December to May. *Ecology*: Sandy, well-drained loam; near water, often in disturbed areas or in shady spots. *Frequency in southern Africa*: Common. *Distribution*: Northwards to tropical East Africa; Sudan and Somalia. N, B, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Palatable grazing grass; as food and drink,

seeds pulverised for porridge in times of famine, or chemicals, as wilted plants have hydrocyanic acid.

Illustration: Chippindall: 223, fig. 197 (1955); Clayton et al.: 379, fig. 101 (1974).
Anatomy vouchers: *Ellis 3351, 3566, 3565 & 4074; Smook 4656; Loxton & Ellis 951 & 983*.
Voucher: *Smook 2779*.


*Sporobolus fourcadii*

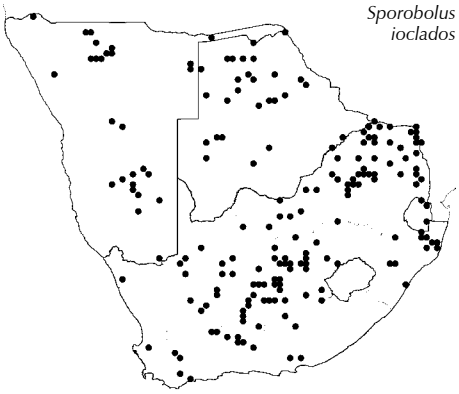
**Sporobolus fourcadii** Stent, in *Bothalia* 2: 269 (1927). Type: South Africa, Eastern Cape, Humansdorp division: Humansdorp, *Fourcade 1986* (PRE, iso.).

Tufted perennial 250–400(–700) mm high; rhizomatous. Leaf blade 80–350 × 4–7 mm. Inflorescence much longer than wide, branches not whorled, spreading almost horizontally at maturity. Spikelet 2.0–2.6 mm long; glumes unequal; lower glume $^1/_3$ as long as spikelet, nerveless; upper glume $^2/_3$ as long as spikelet, apex acute; lemma as long as spikelet; anther 0.7–1.0 mm long.

[Distinguished from *S. fimbriatus*, *S. pyramidalis*, *S. natalensis* and *S. africanus* by the key characters.]

*Flowering*: November to March. *Ecology*: On the edge of floodplains or on forest margins. *Frequency in southern Africa*: Locally common. *Distribution*: ?Endemic. KZN, WC, EC.

Anatomy voucher: *Smook 5406*.
Voucher: *Giffen 658*.


*Sporobolus ioclados*

**Sporobolus ioclados** (Trin.) Nees, in *Florae Africanae australioris*: 161 (1841). Type: South Africa, Northern Cape, Nieuwjaarsfontein, *Drège*; Wonderhuivel, *Drège* (plus several other syntypes).

*S. ioclados* (Trin.) Nees var. *usitatus* (Stent) Chippind., in Meredith, *Grasses and Pastures of South Africa*: 217 (1955).

*S. kentrophyllus* (K.Schum.) Clayton, in *Kew Bulletin* 25: 248 (1971). Type: Tanzania, Tanga district, Moa [Muoa], *Holst 3126*.

*S. marginatus* Hochst. ex A.Rich., in *Tentament Florae abyssinicae* 2: 397 (1851). Type: Ethiopia, Tigre, Modat, *Schimper 1777*; Shire, *Quartin Dillon* (syntypes).

*S. smutsii* Stent, in *Bothalia* 1: 281 (1924). Type: South Africa, Gauteng, Pretoria district, *Pole-Evans 590, 556, 271* (PRE)*, 536*; Leeuwkraal, *Pole-Evans 668* (syntypes).

*S. usitatus* Stent, in *Bothalia* 2: 257 (1927). Type: South Africa, Gauteng, Meintjies Kop, *Stent in Nat. Herb. H. 21624* (PRE, iso.).

PAN DROPSEED

Perennial, often mat-forming, 250–1 000 mm high; rhizomes and stolons present; basal leaf sheaths papery; culm geniculate. Leaf blade 20–300 × 2.0–12.0 mm, flat, margins sometimes ciliate with tubercle-based hairs. Inflorescence whorled. Spikelet 1.5–2.5 mm long, pallid to greyish-green; glumes unequal, glabrous or minutely hispidulous; lower glume $^1/_4$–$^1/_3$ as long as spikelet, apex obtuse or denticulate to acute; upper glume as long as or longer than spikelet, apex acute; lemma similar to upper glume; anther 0.9–1.2 mm long.

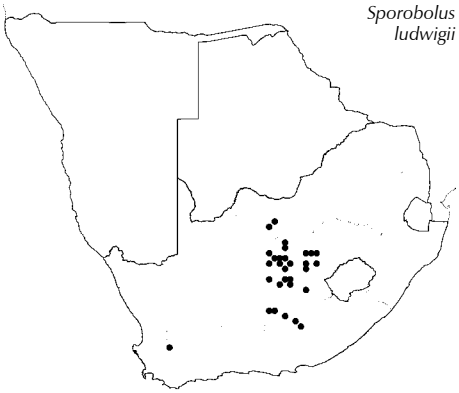
[Inflorescence similar to *S. ludwigii*, which is mat-forming, has a horizontally creeping rhizome and shorter leaf blade, 10–30 × 2–3 mm; and to *S. rangei*, which is seldom stoloniferous and has a shorter and narrower leaf blade, 30–140 × to 3 mm.]

*Flowering*: January to April. *Ecology*: A variety of soil types, including black turf and sand; often in disturbed places. *Frequency in southern Africa*: Common. *Distribution*: Northwards to tropical Africa; and through Arabia, Pakistan to India. N, B, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Well-eaten natural pasture in brackish and saline soils.

Illustration: Chippindall: 217, fig. 192 (1955).
Anatomy voucher: *Ellis 533, 914, 1573, 3214, 3213, 3334, 3353, 3479, 3623, 4661 & 4783; Smook & Gibbs-Russell 2458; Botha & Panagos 33*.
Voucher: *De Winter & Codd 340*.

**Sporobolus ludwigii** Hochst., in *Flora* 29: 118 (1846). Type: South Africa, ? [information not found].

BRAKVLEIGRAS


*Sporobolus ludwigii*

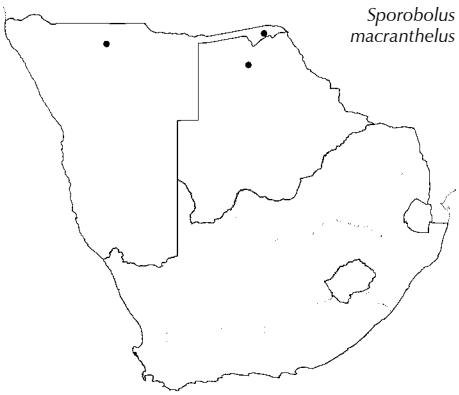
Mat-forming perennial 100–450 mm high; rhizome long, creeping, profusely branched. Leaf blade 10–30 × 2–3 mm, margins not ciliate. Inflorescence branches whorled. Spikelet 1.5–2.0 mm long, pallid to greyish-green; lower glume 1/3 as long as spikelet; upper glume as long as spikelet; lemma lanceolate-oblong; anther 1.1–1.3 mm long.

[Superficially similar to *S. nitens*, which has a smaller spikelet, 1.2–1.5 mm long; *S. ioclados*, which has a longer leaf blade, 20–300 × 2–12 mm and is usually stoloniferous; and the annual *S. coromandelianus*.]

*Flowering*: January to May. *Ecology*: Fine, damp calcareous soils; in vleis or near pans. *Frequency in southern Africa*: Locally common. *Distribution*: ?Endemic. NW, FS, NC, WC, EC.

Anatomy vouchers: *Ellis 850, 3621 & 3622; Smook 2795*.
Voucher: *Esterhuysen 2018*.

**Sporobolus macranthelus** Chiov., in *Flora Somala* 2: 452 (1932). Type: Somali Republic (S.), Kolbio, *Senni 276* (FI, holo.).


*Sporobolus macranthelus*

Robust perennial 1 050–1 700 mm high; rhizomatous; culm 3–7 mm in diameter. Leaf blade to 450 × 4–7 mm. Inflorescence 350–750 mm long, lax, much branched, linear, branches not whorled. Spikelet 1.6–2.4 mm long; lower glume 1/2 as long as spikelet, nerveless; upper glume almost as long as spikelet, narrowly ovate, apex obtuse to subacute; lemma ovate, apex obtuse to subacute; anther 1.0–1.2 mm long.

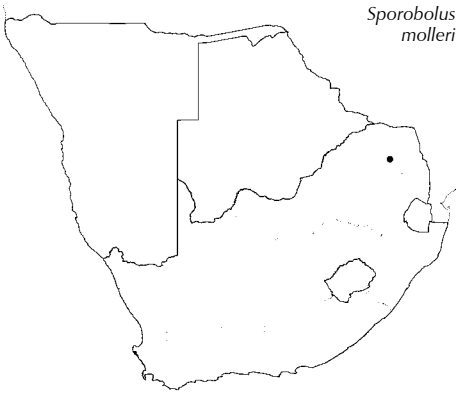
[Grades into *S. fimbriatus* and is distinguished from it and *S. africanus*, *S. fourcadii* and *S. natalensis* by its robust habit and large panicle.]

*Flowering*: January to February. *Ecology*: Often in the shade of riverine woodland or edge of floodplains on fertile loam. *Frequency in southern Africa*: Rare. *Distribution*: Zambia and tropical East Africa to Sudan and Somalia. N, B.

Voucher: *Smith 803*.

**?*Sporobolus molleri** Hack., in *Boletim da Sociedade Broteriana* 5: 213 (1887). Type: Sao Thomé, *Moller 153*.

Loosely tufted annual 110–360 mm high. Leaf blade 20–250 × 1–5 mm, flat. Inflorescence linear, more than 5 × longer than wide, branches not whorled. Spikelet 1.7–2.0 mm long; glumes une-

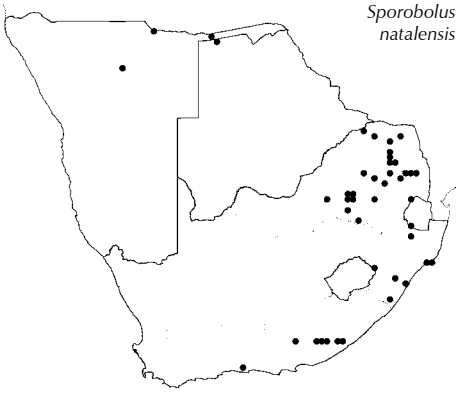

*Sporobolus molleri*

qual; lower glume a tiny oblong hyaline scale, 0.2–0.3 mm long; upper glume $^1/_3$–$^2/_3$ as long as spikelet, abruptly acuminate, usually prolonged into an awn-point; lemma narrow, needle-like, notably longer (to 1.5 times) than rest of spikelet, smooth to scaberulous, apex acuminate to subulate; anther 0.2 mm long.

[The long narrow lemma of this species is unique for the genus.]

*Flowering*: February to April. *Ecology*: Well-drained soil; on abandoned or cultivated lands. *Frequency in southern Africa*: Rare. *Distribution*: Northwards and throughout tropical Africa. LIM (a single collection is known from near Tzaneen). *Economics*: Weed, but easily controlled.

Voucher: *Retief 33*.


*Sporobolus natalensis*

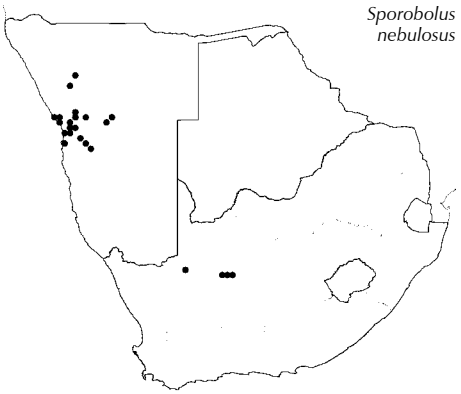
**Sporobolus natalensis** (Steud.) T.Durand & Schinz, in *Conspectus florae Africae* 5: 822 (1895). Type: South Africa, KwaZulu-Natal, Umzimkulu [Omsamculo] to Umkomaas [Omcamas] rivers, *Drège*.

Tufted perennial 550–1 450 mm high; obvious rhizomes absent; lower leaf sheaths papery. Leaf blade 250–500 × 2–4 mm. Inflorescence fairly dense, branches numerous, not whorled, somewhat contracted to spreading. Spikelet 1.6–2.3 mm long; glumes unequal; lower glume $^1/_3$–$^1/_2$ as long as spikelet, apex irregularly toothed or erose, nerveless; upper glume $^1/_2$–$^2/_3$ as long as spikelet, apex subacute to acute; lemma as long as spikelet, narrowly ovate; anther 0.8–1.0 mm long.

[See comments under *S. africanus*.]

*Flowering*: December to April. *Ecology*: Sandy, well-drained soil; near water or in woodlands, often in disturbed places. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to East Africa, Ethiopia and Cameroon. N, B, LIM, NW, G, M, KZN, WC, EC.

Anatomy voucher: *Ellis 5257*.
Voucher: *Liebenberg 8661*.


*Sporobolus nebulosus*

**Sporobolus nebulosus** Hack., in *Botanische Jahrbücher* 11: 402 (1889). Type: Namibia, Hykamchab, *Marloth 1208*.

Densely tufted perennial 70–300 mm high, delicate, fine; rhizome hardly branched; old dead leaves and sheaths form a hard, dense cushion below the new growth. Leaf blade 15–50 × 0.3–1.0 mm, filiform, rigid, erect. Inflorescence dichotomously branched, axils without hairs on a pulvinus; spikelets solitary at branchlet apices. Spikelet 0.8–1.4 mm long; glumes subequal, $^2/_3$ as long as spikelet; lemma as long as spikelet; anther 1.1–1.5 mm long.

[Similar to the annual *S. englerii*; and perennials *S. festivus* and *S. stapfianus*, in which the old leaf sheaths split into fibres.]

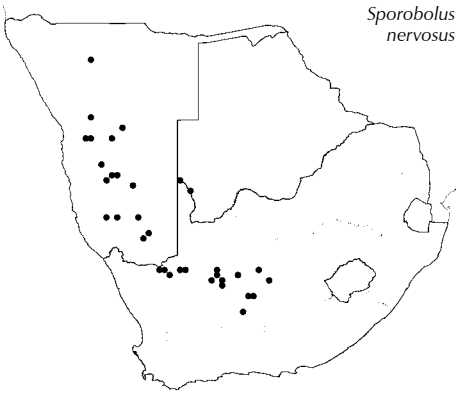
*Flowering*: January to May. *Ecology*: In deep sand; in depressions or moist places. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NC.

Illustration: Chippindall: 213, fig. 188 (1955).
Anatomy vouchers: *Ellis 4348 & 4765, Botha & Panagos 10*.
Voucher: *Volk 58*.

**Sporobolus nervosus** Hochst., in *Flora* 38: 202 (1855). Type: Ethiopia, Agau, Gurrasarfa, *Schimper in Herb. Buchinger 1309*.

*S. lampranthus* Pilg., in *Botanische Jahrbücher* 48: 345 (1912). Type: Namibia, Bullsport flats, *Dinter 2135* (PRE, fg.).

*S. sladenianus* F.Bolus, in *Annals of the South African Museum* 9: 236 (1915). Type: Namibia, Schakalskuppe, *Pearson 4779*; Narudas Süd to Krai Kluft, *Pearson 8103* (syntypes).

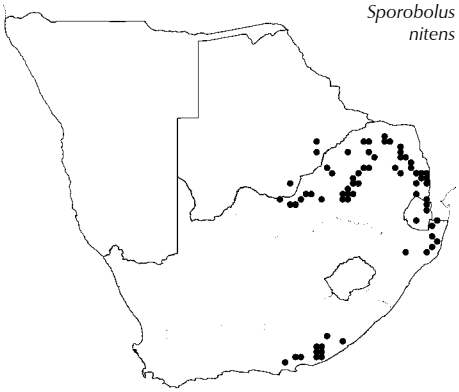

*Sporobolus nervosus*

Perennial 180–530 mm high; rhizomes compact, internodes short, creeping horizontally at ground level. Leaf blade 40–100 × 1–3 mm, fine, curly. Inflorescence not whorled, pyramidal to ovate, not more than 3 × longer than wide; spikelets loosely grouped at branchlet apices. Spikelet 1.7–2.4 mm long; glumes unequal, not keeled, apex acute, lower glume $^{1}/_{2}$–$^{2}/_{3}$ as long as spikelet, upper glume $^{3}/_{4}$–$^{4}/_{5}$ as long as spikelet; lemma as long as spikelet, narrowly ovate; anther 0.7–1.1 mm long.

*Flowering*: February to May. *Ecology*: In sandy red soil, limestone or shale; on flats or in moist depressions. *Frequency in southern Africa*: Locally common. *Distribution*: East Africa, Ethiopia, Somalia, Mauritania; and southern Arabia. N, FS, NC.

Illustrations: Chippindall: 215, fig. 190 (1955); Clayton et al.: 381, fig. 102 (1974); Phillips: 154, fig. 63,5 (1995).
Anatomy vouchers: *Ellis 4777 & 902*, *Smook 2796*.
Voucher: *De Winter & Hardy 8014*.

**Sporobolus nitens** Stent, in *Bothalia* 1: 281, t. 8 (1924). Type: South Africa, Gauteng, Pretoria, foot of Magaliesberg Mountains, *Schlechter 3679*; Pretoria district, Rooikop Bushveld, *Pole Evans 667*; Pretoria, Gezina, *Fouché & Stent* in *National Herb. H. 21445*; between Warmbaths and Nylstroom, *Pole Evans 691* (PRE, syntypes).

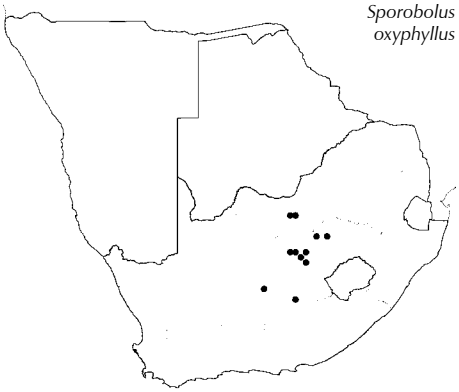

*Sporobolus nitens*

Perennial 190–520 mm high; rhizomes and stolons present. Leaf blade 35–90 × 4–8 mm, margins wavy, scabrid or ciliate. Inflorescence lowest branches whorled; spikelets clustered on upper half of primary branches. Spikelet 1.2–1.5 mm long; glumes unequal; lower glume $^{1}/_{2}$ as long as spikelet, apex subacute to acute; upper glume as long as spikelet, apex acuminate to subcaudate, prominently keeled, keel scabrid; lemma ovate-acuminate; anther 0.2–0.4 mm long.

[Superficially similar to the annual *S. coromandelianus*; and to *S. ludwigii*, which has a larger spikelet 1.5–2.0 mm long.]

*Flowering*: November to April. *Ecology*: In bare patches and in overgrazed veld, also in gardens and other disturbed places. *Frequency in southern Africa*: Common. *Distribution*: Zambia, Zimbabwe and Mozambique. B, S, LIM, NW, G, M, KZN, EC.

Illustration: Chippindall: 218, fig. 193 (1955).
Anatomy vouchers: *Ellis 516, 1222, 1343, 1571 & 3475*.
Voucher: *De Winter & Codd 510*.


*Sporobolus oxyphyllus*

**Sporobolus oxyphyllus** Fish, in *Bothalia* 36: 71 (2006). Type: South Africa, North West, Delareyville, Barberspan, *Ellis 3628* (PRE, holo.).

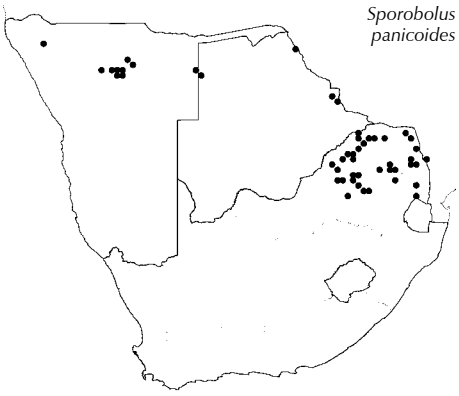
Mat-forming perennial 130–320 mm high; rhizome long, deeply buried. Leaf blade 20–100 × 3.0–4.5 mm, mostly inrolled, rigid. Inflorescence ovate, branches not whorled, less than 3 × longer than wide. Spikelet 1.8–2.9 mm long; glumes unequal, usually keeled

along whole length or at least at apex, keel scabrid; lower glume $^2/_3$ to slightly shorter than spikelet; upper glume $^3/_4$ to slightly longer than spikelet; lemma ovate-elliptic, apex acute; anther 1.2–1.5 mm long.

[Although this species is habitat specific and can easily be distinguished from other *Sporobolus* species, its status is a little uncertain. Spikelet characters are very variable within a single inflorescence and of little use in identification, possibly indicating a hybrid origin.]

*Flowering*: November to April. *Ecology*: Brackish soils; in or near salt pans. *Frequency in southern Africa*: Locally common (brackish soils). *Distribution*: Endemic. NW, FS, NC, EC.

Anatomy voucher: *Smook 2721*.
Voucher: *Smook 3429*.


*Sporobolus panicoides*

**Sporobolus panicoides** A.Rich., in *Tentamen florae abyssinicae* 2: 399 (1851). Type: Ethiopia, TU, Shire, *Quartin Dillon s.n.*; near Adua, Gaptia, *Schimper 1181* (syntypes).

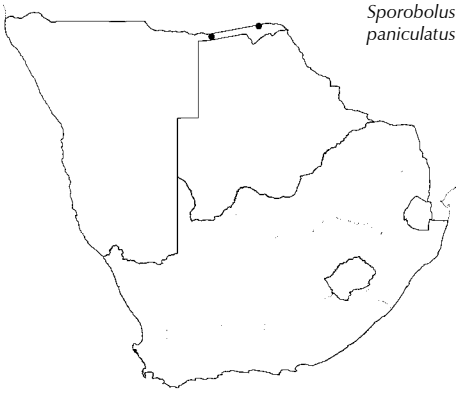
FAMINE GRASS

Loosely tufted annual 190–960 mm high, erect, slender. Leaf blade 50–300 × 2–6 mm. Inflorescence branches whorled; central axis and primary branches lacking viscid patches; spikelets large, sparse, sterile in lowest whorl. Spikelet 2.0–3.3 mm long; glumes unequal; lower glume $^1/_3$–$^2/_5$ as long as spikelet, apex obtuse to subacute; upper glume as long as spikelet, apex acute; lemma a little shorter than spikelet, elliptic-ovate; anther 1.3–1.5 mm long; grain almost spherical, bright brown or orange coloured, 1.2–1.9 mm in diameter.

[Characterised by the few large spikelets and brightly coloured large grains.]

*Flowering*: December to May. *Ecology*: Sandy, rocky areas; on steep slopes or flats, most often on roadsides or in other disturbed areas, sometimes in the shade. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical East Africa; Ethiopia, Somalia and tropical Arabia. N, B, LIM, G, M. *Economics*: Grains are used as drink and food in times of famine.

Illustrations: Chippindall: 222, fig. 196 (1955); Clayton et al.: 360, fig. 100 (1974).
Anatomy vouchers: *Ellis 191, 1929, 1930, 2891 & 3239; Smook 2638*.
Voucher: *Fourie 2541*.


*Sporobolus paniculatus*

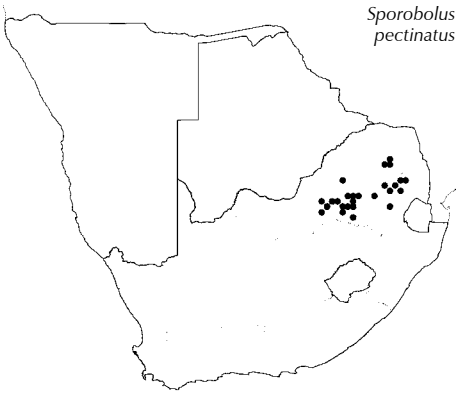
**Sporobolus paniculatus** (Trin.) T.Durand & Schinz, in *Conspectus florae Africae* 5: 823 (1895). Type: Sierra Leone, specimen acquired from *Lindely*.

Tufted annual 290–950 mm high, erect. Leaf blade 10–60 × 2–6 mm, margins pectinately ciliate. Inflorescence branches in whorls, rachis and branches with abundant elongated, viscid glandular patches. Spikelet 0.9–1.6 mm long; glumes unequal; lower glume longer than 0.5 mm, at least $^1/_2$ the spikelet length, linear, apex acute to acuminate; upper glume slightly shorter than the spikelet, apex acute to acuminate; lemma ovate-elliptic; anther 1.0–1.2 mm long.

*Flowering*: January to May. *Ecology*: On sandy soil; amongst trees. *Frequency in southern Africa*: Rare. *Distribution*: Zambia, Malawi and throughout tropical Africa. N, B (reported in *Flora zambesiaca*).

Voucher: *De Winter 9216*.

**Sporobolus pectinatus** Hack., in *Öesterreichische Botanische Zeitschrift* 53: 198 (1903). Type: South Africa, Gauteng, Modderfontein, *P. Conrath* (PRE, fg.).


*Sporobolus pectinatus*

FRINGED DROPSEED, KAMMETJIESGRAS

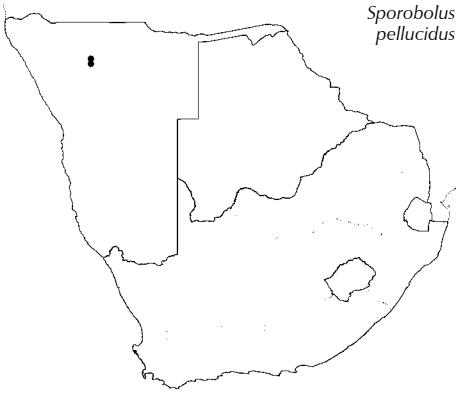
Perennial 240–740 mm high; older plants with long, horizontally creeping rhizomes. Leaf blade 50–300 × 5–8 mm, flat, sometimes inrolled, pectinately ciliate. Inflorescence branches whorled; spikelets very densely clustered on upper $^1/_3$ of branches, leaving lower part bare. Spikelet 3.0–3.7 mm long; glumes unequal; lower glume $^1/_2$ as long as spikelet; upper glume as long as spikelet; lemma little shorter than upper glume; anther 1.9–2.2 mm long.

[Characterised by the spikelet arrangement in the inflorescence.]

*Flowering*: November to February. *Ecology*: Shallow rocky soils; on outcrops or quartzite ridges. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. LIM, NW, G, M.

Illustration: Chippindall: 221, fig. 195 (1955).
Anatomy vouchers: *Ellis 1241, 1330* & *1804*.
Voucher: *Louw 3924*.

**Sporobolus pellucidus** Hochst., in *Flora* 38: 201 (1855). Type: Ethiopia, *Schimper in Herb. Buchinger 1174*.

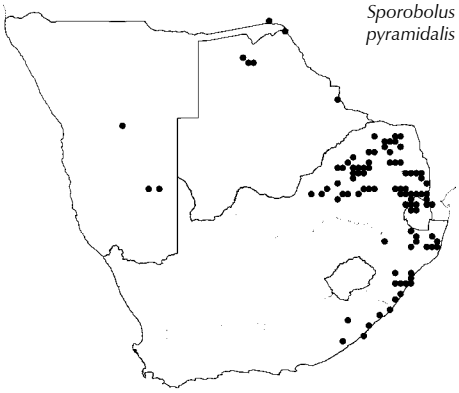

*Sporobolus pellucidus*

Densely tufted perennial 150–640 mm high; rhizomatous; old leaf sheaths splitting into fibres, forming a cushion at the base. Leaf blade 40–150 × 1–2 mm, filiform, setaceous. Inflorescence 60–200 mm long, linear, contracted, more than 5 × longer than wide, branches not whorled. Spikelet 1.7–2.0 mm long; glumes unequal; lower glume $^1/_3$–$^1/_2$ as long as spikelet, oblong to ovate, obtuse to acute; upper glume $^1/_2$ to slightly longer than spikelet, narrowly ovate, acute; lemma as long as spikelet, ovate-elliptic, acute; anther 1.1 mm long.

*Flowering*: January to March. *Ecology*: Calcareous soils. *Frequency in southern Africa*: Rare. *Distribution*: Tropical East Africa to Ethiopia. N.

Voucher: *Giess & Loutit 14102*.

**Sporobolus pyramidalis** P.Beauv., in *Flore d'Oware* 2: 36, t. 80 (1816). Type: Nigeria, *Palisot de Beauvois* (G, holo.).


*Sporobolus pyramidalis*

CAT'S-TAIL GRASS, VLEIGRAS, TAAIPOL

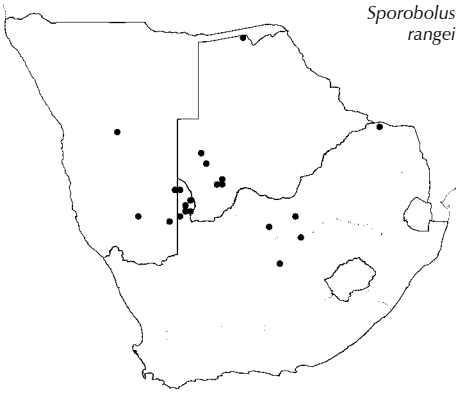
Densely tufted perennial 700–1 600 mm high; rhizomatous. Leaf blade 100–500 × 3–10 mm. Inflorescence linear, more than 5 × longer than wide. Spikelet 1.7–2.0 mm long; glumes obtuse to truncate; lower glume $^1/_5$–$^1/_3$ as long as spikelet, nerveless; upper glume $^1/_3$–$^1/_2$ as long as spikelet; lemma as long as spikelet, ovate-elliptic, apex acute; anther 0.7–1.3 mm long.

[See comment under *S. africanus*. Vegetatively very similar to the other *taaipol*, *Eragrostis plana*, which has several florets per spikelet.]

*Flowering*: November to May. *Ecology*: On sandy soil or heavy clay; vleis, watercourses, periodically flooded areas or near dams. *Frequency in southern Africa*: Common. *Distribution*: Northwards and throughout tropical Africa; and Madagascar, Mauritius, Yemen; in-

troduced elsewhere. N, B, S, LIM, NW, G, M, KZN, EC. *Economics*: Tough and very unpalatable; indicator of overgrazing; used for erosion control such as in trampled areas; weed in pastures and crops.

Illustration: Cope: 185, Tab. 52 (1999).
Anatomy vouchers: *Ellis 403, 790, 1539* & *2811*.
Voucher: *Smook 5043*.


*Sporobolus rangei*

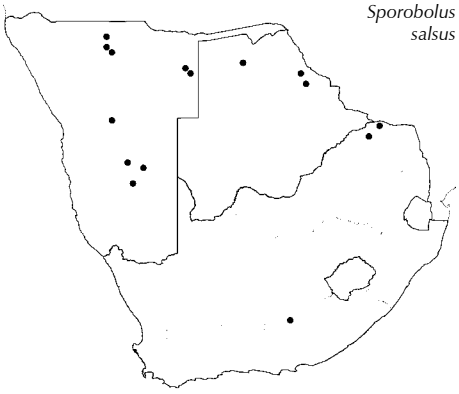
**Sporobolus rangei** Pilg., in *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 43: 385 (1909). Type: Namibia, Chammis, *Range 470* (B, holo.).

Usually a robust perennial 350–460 mm high; rhizomes usually horizontal; seldom stoloniferous; basal leaf sheaths hard, glossy, brittle; culms erect. Leaf blade 30–140 × to 3 mm, setaceous. Inflorescence with lowest branches whorled. Spikelet 1.7–2.7 mm long, pallid to greyish-green; glumes unequal; lower glume less than $^1/_2$ as long as spikelet; upper glume as long as spikelet; lemma similar to upper glume, but a little shorter; anther 1.2–1.7 mm long.

[Similar to *S. ioclados*, which has geniculate culms, wider and longer leaf blades, 20–300 × 2–12 mm.]

*Flowering*: November to March. *Ecology*: Calcareous sandy soils; in shallow pans or near watercourses. *Frequency in southern Africa*: Infrequent. *Distribution*: Tropical East Africa, Zaire. N, B, LIM, NW, FS, NC.

Anatomy voucher: *Van Vuuren & Giess 1159*.
Voucher: *Merxmueller 1051*.


*Sporobolus salsus*

**Sporobolus salsus** Mez, in *Feddes Repertorium* 17: 296 (1921). Type: Namibia, Onamutoni, *Dinter 2294*.

Perennial 270–700 mm high; rhizomatous. Leaf blade 45–150 × 1–4 mm. Inflorescence dichotomously branched, axils without long hairs on the pulvinus; spikelets large and solitary at the branchlet apices. Spikelet 2.0–2.9 mm long; glumes unequal; lower glume $^1/_3$ as long as spikelet; upper glume $^2/_3$ as long as spikelet; lemma as long as spikelet, apex truncate; anther 1.2–2.0 mm long.

[Very similar to *S. tenellus* and *S. acinifolius*, which have smaller spikelets.]

*Flowering*: January to September. *Ecology*: Seasonally flooded brackish pans and near hot springs or rivers. *Frequency in southern Africa*: Locally common. *Distribution*: ?Endemic. N, B, LIM, EC.

Anatomy voucher: *Ellis 2921*.
Voucher: *De Winter & Codd 339*.

**Sporobolus sanguineus** Rendle, in *Catalogue of the African plants collected by Dr F. Welwitsch* 2: 209 (1899). Type: Angola, Huila, Lopollo, *Welwitsch 2660*.

*S. rhodesiensis* Stent & J.M.Rattray, in *Proceedings of the Rhodesian Scientific Association*. 32: 50 (1933). Type: Zimbabwe, Harare, *Stent* in *GHS 5565*.

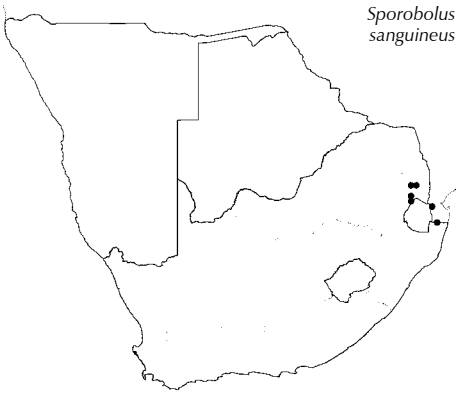
Loosely tufted perennial 600–1 020 mm high; rhizomatous. Leaf blade 100–400 × 1.5–6.0 mm, margins ciliate. Inflorescence 200–

430 mm long, linear to lanceolate, branches whorled, with more than 10 whorls. Spikelet 2.0–3.5 mm long, reddish; glumes unequal; lower glume less than $^1/_2$ as long as spikelet, lanceolate, apex obtuse; upper glume longer than spikelet, lanceolate-elliptic, apex acute to acuminate; lemma lanceolate-elliptic; anther 1.5–2.0 mm long.

[Similar to *S. congoensis*, which has a shorter, 100–200 mm long, pyramidal inflorescence with fewer than 10 whorls; *S. subulatus*, which has glabrous or scabrid leaf blade margins; and *S. centrifugus*, which has glumes $^2/_3$ to longer than the spikelet.]

*Flowering*: November to April. *Ecology*: Stony hill slopes and high-lying grasslands. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards and throughout tropical Africa. S, LIM, M, KZN.

Illustration: Cope: 175, Tab. 50 (1999).
Voucher: *Van der Schijff 4060*.


*Sporobolus sanguineus*

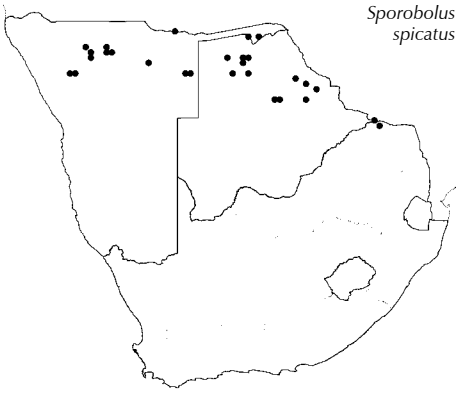
**Sporobolus spicatus** (Vahl) Kunth, in *Révision des graminées* 1: 67 (1829). Type: Egypt, *Forsskål* (C, holo.).

Mat-forming, wiry perennial 250–1 000 mm high; rhizomatous; stolons present. Leaf blade 20–300 × 1–4 mm, rigid, spiny-tipped. Inflorescence spike-like, less than 5 mm wide, branches not whorled; spikelets very densely clustered, central axis hidden completely. Spikelet 1.4–2.8 mm long; glumes unequal; lower glume $^1/_4$–$^1/_3$ as long as spikelet, broadly ovate to lanceolate; upper glume $^2/_3$ to as long as spikelet, narrowly ovate; lemma oblong-elliptic; anther 1.0–1.5 mm long.

[Very similar to *S. albicans* and *S. bechuanicus*, which have inflorescences wider than 5 mm; *S. virginicus*, which has lower glume $^2/_3$–$^3/_4$ as long as spikelet and a wider inflorescence, 6–7 mm wide.]

*Flowering*: December to June. *Ecology*: Brackish sandy soils to very saline soils; grassy vleis, on pans or in riverbeds. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical East Africa and drier regions of Africa to the Mediterranean coast and eastwards to India. N, B, LIM.

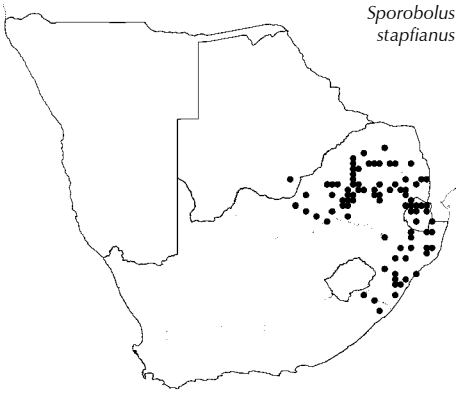
Illustrations: Chippindall: 212, fig. 199 & 187 (1955); Cope: 182, Tab. 51 (1999).
Anatomy vouchers: *Ellis 3706* & *2920*.
Voucher: *Codd & Dyer 3804*.


*Sporobolus spicatus*

**Sporobolus stapfianus** Gand., in *Bulletin de la Société de France* 66: 302 (1920). Type: South Africa, Gauteng, Wonderboompoort, *Schlechter 3595*; Mpumalanga, Crocodile R., *Schlechter 3900* (syntypes).

FIBROUS DROPSEED, FYNBLOUSAADGRAS

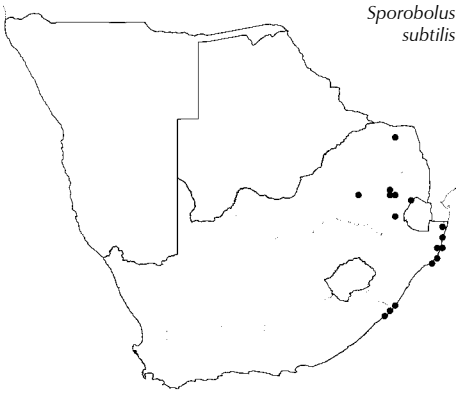
Tufted perennial 150–550 mm high; old leaf sheaths fibrous with a mass of woolly hairs between fibres. Leaf blade 30–150 × 1–2 mm. Inflorescence open, dichotomously or not dichotomously branched; axils without long hairs on a pulvinus. Spikelet 1.4–2.1 mm long; glumes unequal; lower glume $^1/_3$–$^2/_3$ as long as spikelet, apex acute to acuminate or obtuse-denticulate; upper glume $^1/_2$–$^2/_3$ as long as spikelet, apex acute; lemma as long as spikelet, narrowly ovate, acute; anther 1.0–1.2 mm long.


*Sporobolus stapfianus*

[Similar to *S. festivus*, which lacks woolly hairs between the basal sheath fibres; *S. englerii*, an annual; and *S. nebulosus*, which does not have a fibrous base.]

*Flowering*: October to March. *Ecology*: Sandy, well-drained to very compacted soils; on rocky outcrops or near streams. *Frequency in southern Africa*: Common. *Distribution*: Northwards to tropical Africa; also in Madagascar and Yemen. B, S, LIM, NW, G, M, KZN, EC.

Illustration: Chippindall: 212, fig. 187 (1955).
Anatomy vouchers: *Ellis 9, 395, 777, 1233, 1344, 1756, 2806* & *2837.*
Voucher: *Burtt-Davy 2683*.


*Sporobolus subtilis*

**Sporobolus subtilis** Kunth, in *Révision des graminées* 2: 421 (1831). Type: Madagascar, *Du Petit-Thouars* (P, holo.).

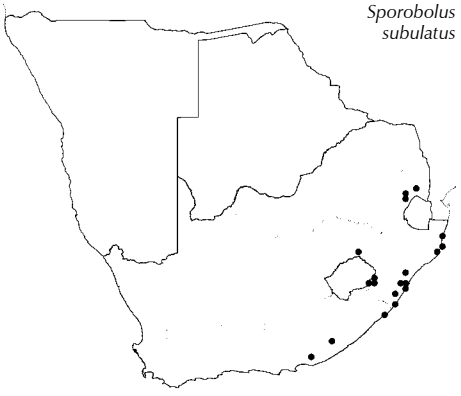
MISTY DROPSEED

Tufted perennial 320–600 mm high; rhizome slender, creeping; sometimes stoloniferous; culms wiry; leaves few, basal. Leaf blade 40–150 mm long; filiform. Inflorescence dichotomously branched; branchlets and pedicels very slender and hair-like; axils with many long stiff hairs on a pulvinus. Spikelet 1.5–3.0 mm long; glumes ± $^{1}/_{2}$–$^{4}/_{5}$ as long as spikelet; rachilla extension present, rarely absent; lemma as long as spikelet, apex obtuse to subacute, 3-nerved; anther 0.9–1.2 mm long.

[The rachilla extension in this species is unique for the genus. Similar to *S. conrathii*, which has a fibrous base; and *S. welwitschii*, which has an inflorescence with only a few hairs in the inflorescence branch axils.]

*Flowering*: November to January. *Ecology*: Shallow sandy soils in moist areas. *Frequency in southern Africa*: Locally common (often in pure stands). *Distribution*: Northwards to Tanzania and West Africa from Sierra Leone to DRC; also Madagascar. LIM, G, M, KZN, EC.

Illustrations: Chippindall: 211, fig. 186 (1955); Clayton: 387, fig. 103 (1974); Cope: 197, Tab. 55 (1999).
Anatomy vouchers: *Ellis 4056, 4055, 3408, 6017, 3787* & *3792.*
Voucher: *Huntley 700*.


*Sporobolus subulatus*

**Sporobolus subulatus** Hack., in *The Journal of the Linnean Society, Botany* 29: 65 (1891). Type: Madagascar.

*S. artus* Stent, in *Bothalia* 2: 260 (1927). Type: South Africa, KwaZulu-Natal, Inanda, *Rehmann 8254*; *Wood 1578*; Claremont, *Schlechter 3044*; Zululand, *Buchanan 300* (syntypes).

[Also referred to as *S. mauritianus* (Steud.) T.Durand & Schinz; see Veldkamp (1990) and Cope (1999).]

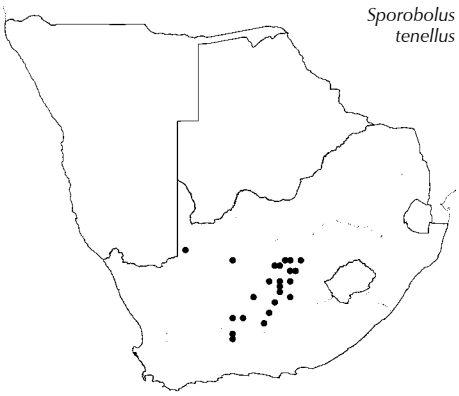
Densely tufted perennial 170–430 mm high; rhizomatous; basal sheaths papery, not glossy. Leaf blade 50–250 × 1–6 mm, often filiform. Inflorescence lowest branches whorled, primary branches short, contracted; spikelets evenly distributed along the distal half of the branches. Spikelet 2.5–5.0 mm long; lower glume $^{2}/_{3}$–$^{3}/_{4}$ as long as spikelet, apex acute; upper glume longer than spikelet, apex acute to acuminate; lemma oblong to narrowly ovate; anther 1.9–2.4 mm long.

[Similar to *S. congoensis* and *S. sanguineus*, which have flexuous hairs longer than 0.5 mm on the leaf margins; and *S. centrifugus*, which has sterile spikelets in the lowest whorl and a lower glume longer than $^{2}/_{3}$ the spikelet length.]

*Flowering*: October to January. *Ecology*: Poorly drained soils; in marshy areas or on coastal sand flats; fairly frequent in sourveld. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to tropical Africa, Madagascar and Mauritius. M, FS, KZN, EC.

Anatomy vouchers: *Ellis 3780, 3424* & *3573*.
Voucher: *Schrire 613*.

**Sporobolus tenellus** (Spreng.) Kunth, in *Enumeratio Plantarum omnium hususque cognitarum* 1: 215 (1833). Type: South Africa, Eastern Cape, Uitenhage, *Zeyher 141*.


*Sporobolus tenellus*

PANKWEEK

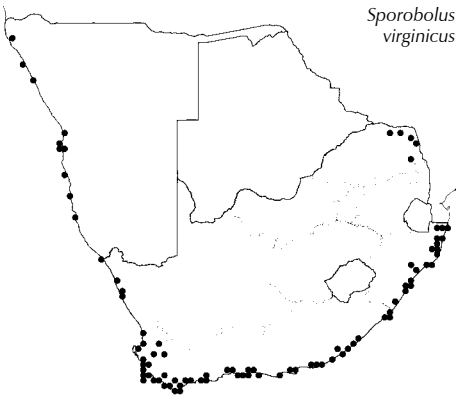
Mat-forming perennial 60–280 mm high; rhizome long, profusely branched; leaves mostly basal; culms usually one-noded. Leaf blade 5–35 × 1–3 mm, broadly obtuse, margins not white cartilaginous, apex short, rounded. Inflorescence not obviously dichotomously branched; axils without long hairs; spikelets solitary at branch apices. Spikelet 1.5–1.8(2.2) mm long; glumes unequal, obtuse, ovate-oblong; lower glume $^{1}/_{2}$ as long as spikelet; upper glume $^{2}/_{3}$ as long as spikelet; lemma broadly oblong, apex subobtuse; anther 1.3–1.7 mm long.

[Very similar to *S. salsus*, which has a larger spikelet, 2.0–2.9 mm long; and *S. acinifolius*, with leaf blades 40–120 mm long and tapering to a fine point.]

*Flowering*: November to April. *Ecology*: Shallow soils; at pan edges or in moist depressions. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N?, FS, NC, WC.

Anatomy vouchers: *Smook 2808* & *2874; Ellis 4330*.
Voucher: *Acocks 12511*.

**Sporobolus virginicus** (L.) Kunth, in *Révision des Graminées* 1: 67 (1829). Type: USA.

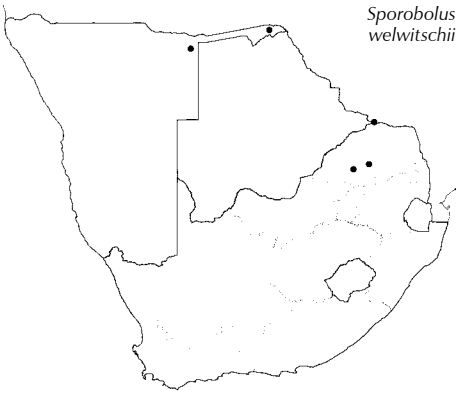

*Sporobolus virginicus*

SEASIDE RUSH GRASS

Mat-forming perennial 110–770 mm high; rhizomes extensively creeping; stolons present; leaves cauline. Leaf blade 50–150 × 1–7 mm, convolute, pungent. Inflorescence 6–7 mm wide, spike-like, branches not whorled. Spikelet 1.7–2.5 mm long; glumes unequal, apices acute; lower glume $^{2}/_{3}$–$^{3}/_{4}$ as long as spikelet; upper glume as long to slightly longer than spikelet; lemma ovate-elliptic; anther 1.2–1.5 mm long.

[Specimens of this species can vary from soft, very fine, delicate plants to large and robust plants. Similar to *S. albicans*, *S. bechuanicus* and *S. spicatus*, which all have shorter glumes.]

*Flowering*: October to April. *Ecology*: On sand; mostly along the coast, on dunes, beaches and along tidal streams; also inland at saline water edges. *Frequency in southern Africa*: Common. *Distribu-*



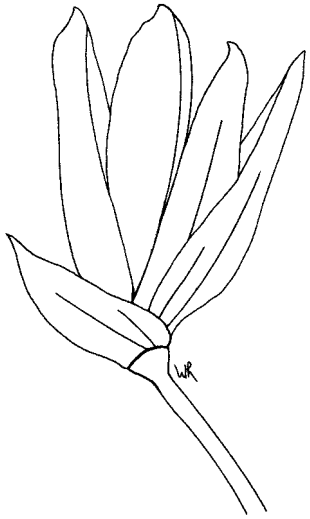



Figure 492.—*Steinchisma hians* spikelet (2.1 × 1.3 mm). Artist: W. Roux.



Figure 493.—*Steinchisma hians* specimen.

*tion*: Tropical and subtropical regions worldwide. N, LIM, KZN, NC, WC, EC. *Economics*: Erosion control on sand dunes.

Illustrations: Chippindall: 226, fig. 200 (1955); Peterson et al.: 123 (2003).
Anatomy vouchers: *Ellis 264, 539, 1109, 1115, 1167, 1232, 1269, 1286, 1668, 3251, 3257, 3262, 3263, 3846, 3463, 4064, 4072, 4078* & *4757*.
Voucher: *Strey 7325*.

**Sporobolus welwitschii** Rendle, in Hiern, *Catalogue of the African plants collected by Dr F. Welwitsch* 2: 207 (1899). Type: Angola, Huilla, poor pastures in the Lopollo district, *Welwitsch 2690*.

*S. baumianus* Pilg., in Warburg, *Kunene-Sambesi-Expedition*. H. Baum: 175 (1903). Type: Angola.

*S. macrothrix* Pilg., in Fries, *Wissenschaftliche Ergebnisse der Schwedischen Rhodesia-Kongo Expedition*: 206 (1916). Type: Zambia, *Fries 944*.

Tufted perennial 600–700 mm high; rhizome short, not much branched; plant wiry with few leaves; leaves mostly cauline. Leaf blade 40–80 × to 2 mm, mostly filiform. Inflorescence dichotomously branched, branches delicate, axils with a pulvinus with a few long stiff hairs or glabrous; spikelets solitary on apices of branches. Spikelet 0.8–2.1 mm long; glumes unequal; lower glume $^1/_2$ as long as spikelet; upper glume $^2/_3$ as long as spikelet; lemma narrowly ovate, apex subacute; anther 0.7–1.2 mm long.

[Similar to *S. conrathii* and *S. subtilis*, which have inflorescences with many hairs in almost all the axils, glumes ± equal and $^1/_2$ as long as spikelet.]

*Flowering*: December to February. *Ecology*: Brackish sandy loam; on edges of pans or in woodlands. *Frequency in southern Africa*: Rare. Locally common. *Distribution*: Zambia, Zimbabwe, Mozambique, Angola and DRC. N, LIM.

Voucher: *Rogers 25106*.

## *Steinchisma Raf.

Zuloaga: 359 (1989); Gibbs Russell et al.: 238 (1990); Zuloaga et al.: 647 (1998); Freckmann & Lelong: 563 (2003).

Tufted perennial; rhizomes short, slender; culms slender, often compressed. **Leaf blade** expanded or rolled; sheath usually keeled; ligule an unfringed (sometimes erose) membrane or a fringed membrane. **Inflorescence** a terminal, open to contracted panicle; primary branches few, slender; pedicels short, to 1 mm. **Spikelet** ellipsoid or lanceolate, initially somewhat compressed, ultimately expanding greatly; *glumes* glabrous, lower glume $^1/_3$–$^1/_2$ as long as the spikelet, usually 3–(5)-nerved, acute; upper glume and lower lemma subequal, 3–5(–7)-nerved. **Florets** 2; *lower floret* sterile or male, often standing apart from upper floret at maturity, *palea* longer than lemma, indurate, greatly inflated at maturity; *upper floret* bisexual, ovoid or ellipsoid; *lemma* usually dull-coloured, minutely papillose, papillae in longitudinal rows, apex acute. **Caryopsis** ellipsoid. **Photosynthetic pathway**: Photosynthesis intermediate between $C_3$ and $C_4$ plants. Leaf blade exhibits Kranz anatomy, with few organelles in the external sheath and 5–7 isodiametric mesophyll cells between the vascular bundles. **Cytology**: $x = 9$ or 10.

**Species** 5–6, 1 naturalised in southern Africa: *Steinchisma hians* (Elliot) Nash & Small, KwaZulu-Natal.

Species treatment by M.J. Moeaha.

*__Steinchisma hians__ (Elliott) Nash & Small, in *Flora of South Eastern United States*: 105 (1903). Type: USA.

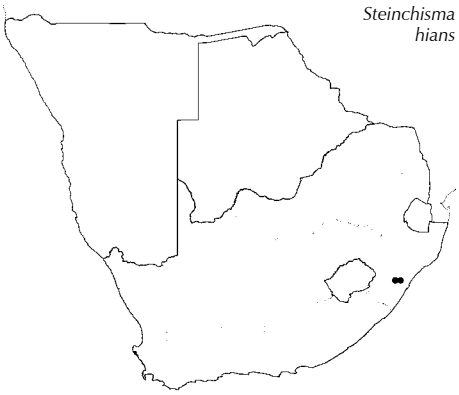
*Panicum hians* Elliott, in *A sketch of the Botany of South Carolina* 1: 118 (1816).

GAPING PANIC GRASS

Erect, tufted perennial, up to 600 mm high; sometimes decumbent to procumbent. Leaf blade 200 × 2.5 mm, long, slender, expanded or folded, glabrous abaxially, mostly glabrous adaxially but sparsely pilose basally. Inflorescence (50)100–140 mm long, delicate; primary branches flexible, spreading or drooping, secondary branches and pedicels short, dense; spikelets adpressed. Spikelet 2.2–2.4 mm long, often purplish, glabrous; lower glume to ½ the spikelet length, membranous; lower floret male, lemma 5-nerved, palea coriaceous, well developed and longer than the lemma; upper floret bisexual, lemma pale, papillose; anther 0.5–1.0 mm long.

*Flowering*: November to January. *Ecology*: Usually open, moist or wet sandy areas; in disturbed places around ponds and streams. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from the Americas. KZN.

Illustrations: Zuloaga et al.: 648, fig. 8 (1998); Freckman & Lelong: 564 (2003).
Voucher: *Wells 1011*.




## **Stenotaphrum** Trin.

Trinius: 175 (1820); Stapf: 438 (1899); Chippindall: 367 (1955); Sauer: 202 (1972); Clayton & Renvoize: 547 (1982); Clayton & Renvoize: 293 (1986); Clayton: 111 (1989); Gibbs Russell et al.: 314 (1990); Watson & Dallwitz: 901 (1994); Allred: 560 (2003).

Annual or perennial; tufted; stoloniferous; usually creeping; rooting at nodes; culms and overlapping leaf sheaths usually compressed, abruptly contracted at base, often grouped in a fan-shaped arrangement; *ligule* a narrow, fringed membrane. **Inflorescence** mostly terminal, spike-like, secund, of several to many short racemes embedded in cavities in a thickened central axis, each raceme bearing up to 8 spikelets on a rachis that is sometimes produced beyond upper spikelet to a subulate tip; *spikelets* sessile to shortly pedicelled, falling entire at maturity or together with adjacent internode of central axis; lower glume abaxial. **Spikelet** dorsiventrally compressed, lanceolate or ovate, plump, awnless; *glumes* very unequal, dissimilar, membranous, awnless; lower glume generally shorter than spikelet, nerveless; upper glume similar to lower or ± as long as spikelet, 5–9-nerved. **Florets** 2; *lower floret* male or sterile; lemma chartaceous to coriaceous, acute or acuminate, 3–9-nerved; palea well developed; *upper floret* bisexual; *lemma* firmer than glumes, not becoming indurated, similar to lower but smaller, faintly 3–5-nerved, glabrous, entire, margins inrolled and covering palea but leaving apex free, awnless; *palea* usually indurated, 2-nerved. **Lodicules** 2. **Stamens** 3. **Ovary** glabrous; styles free, plumose above. **Caryopsis** lanceolate to oblong, plano-convex; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; XyMS-. PCR cell chloroplast centrifugal/peripheral. **Cytology**: $x = 9$ (polyploidy).

**Species** 7, tropics and subtropics; 2 in southern Africa.

Species treatment by M.J. Moeaha and L. Fish.

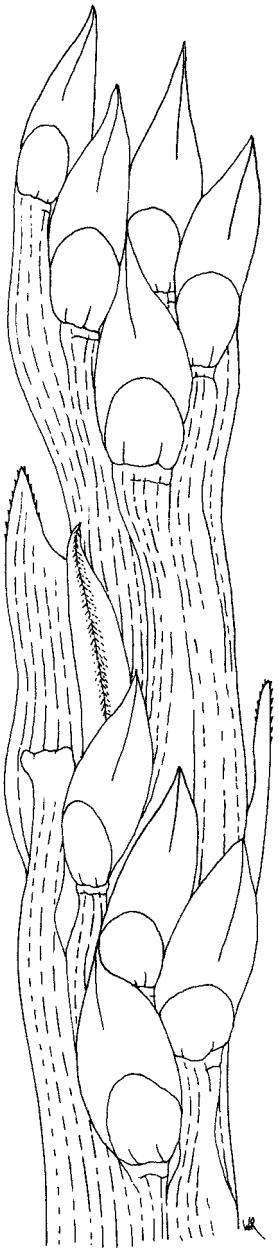


Figure 494.—*Stenotaphrum dimidiatum*. Portion of inflorescence showing thickened central axis with racemes and spikelets (34.0 × 4.7 mm). Artist: W. Roux.



Figure 495.—*Stenotaphrum secundatum*. Two spikelets (4–5 mm). Photographer: M. Koekemoer.

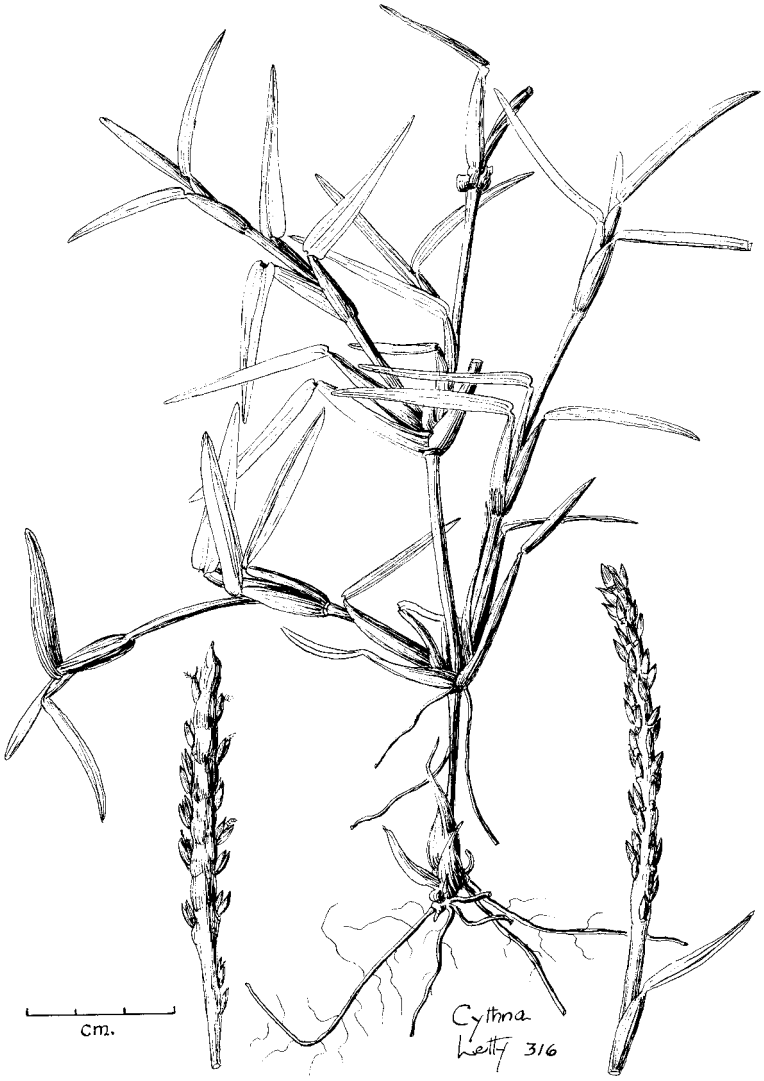
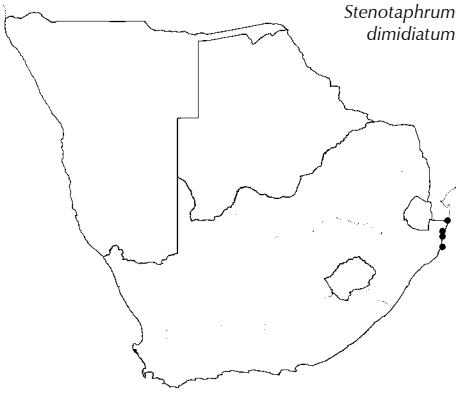



Figure 496.—*Stenotaphrum secundatum*. Artist: C. Letty.

**Key to species:**

Axis of inflorescence not corky, wing produced into a tooth at the back, at least on upper cavities (not to be confused with the raceme projection beyond the last spikelet); spikelets 3–7 per raceme . . . . . **S. dimidiatum**
Axis of inflorescence corky, not toothed; spikelets 1–3 per raceme . . . . . **S. secundatum**



*Stenotaphrum dimidiatum*

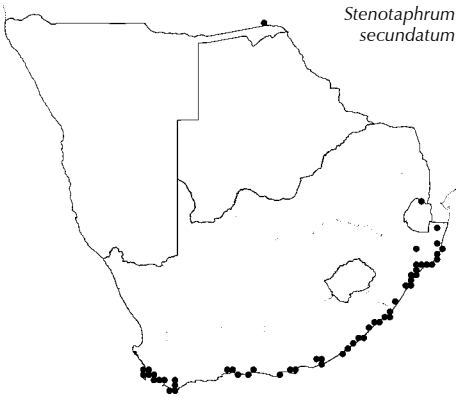
**Stenotaphrum dimidiatum** (L.) Brongn., in Duperrey, *Voyage autour du Monde sur la Corvette de sa Majesté, Botanique*: 127 (1832). Type: India.

Perennial 60–400 mm high; extensively stoloniferous, forming dense swards; sheaths strongly flattened, often grouped in fan-shaped arrangements. Leaf blade 50–80 × 8–12 mm, folded when young, keeled, obtuse and rounded at apex. Inflorescence spike-like, compact, compressed, central axis thickened, not corky, flat on one side, hollowed out on the other, each cavity is borne alternately on either side of a wavy, winged midrib, wing at the edge of the cavity is formed into a broad acute tooth (at least on upper part of the inflorescence); racemes short, ending in a narrow, sharp, naked pro-

jection, 3–7 spikelets per raceme. Spikelet 4–5 mm; lower glume 1.0–1.5 mm long, shorter than spikelet, nerveless, obtuse; upper glume 4–5 mm long, as long as spikelet, 7–9-nerved, acute or acuminate; lower lemma 4–5 mm long, 5–7-nerved, broadly convex or flat on back; upper lemma not hardened, 5-nerved; lower palea acuminate; anthers 1.7–2.2 mm long.

*Flowering*: October to May. *Ecology*: Along beaches and marshes; in saline and fresh water; coastal pioneer. Introduced inland. *Frequency in southern Africa*: Infrequent. *Distribution*: Indian Ocean shores of Africa to Sri Lanka with introductions inland in Zimbabwe and East Africa. KZN. *Economics*: Pasture and lawn grass.

Illustration: Clayton: 112 (1989).
Anatomy voucher: *Ellis 3572*.
Voucher: *Eglington 34412*.




**Stenotaphrum secundatum** (Walter) Kuntze, in *Revisio Generum Plantarum vascularium omnium* 2: 794 (1891). Type: USA.

Buffalo grass, St Augustine grass

Perennial 60–400 mm high; extensively stoloniferous, forming dense swards; sheaths strongly flattened, and often grouped in fan-shaped arrangements; culms rooting at the nodes. Leaf blade 50–150 × 4–10 mm long, keeled, apex acute to obtuse or rounded. Inflorescence spike-like, compact; central axis thick, swollen and corky, flat on one side and deeply hollowed out on the other; each cavity is borne alternately on either side of a wavy, slightly winged midrib, ending in a narrow, sharp, naked projection beyond the last spikelet, cavity not toothed, each raceme with 1–3 spikelets. Spikelet 4–5 mm; lower glume 0.8–2.0 mm long, shorter than spikelet, nerveless, obtuse or truncate; upper glume 4–5 mm long, acute or acuminate, 5–7-nerved; lower lemma 4–5 mm long, 7–9-nerved, convex or flat on back; upper lemma not hardened, 5-nerved; lower palea acute or acuminate; anthers 1.8–2.4 mm long.

*Flowering*: October to May. *Ecology*: Along beaches and marshes; saline and fresh water; coastal pioneer. *Frequency in southern Africa*: Locally common. *Distribution*: Tropical shores of the Atlantic Ocean, along the shores of South Africa to Mozambique. Introduced into Australia and the Pacific. N, S, KZN, WC, EC. *Economics*: Pasture and as lawn grass, the Cape deme (a sterile triploid clone) is widely cultivated; causes hay fever.

Illustration: Allred: 562 (2003).
Anatomy vouchers: *Ellis 79, 602, 1110, 3267* & *3572*.
Voucher: *Smook 3130*.

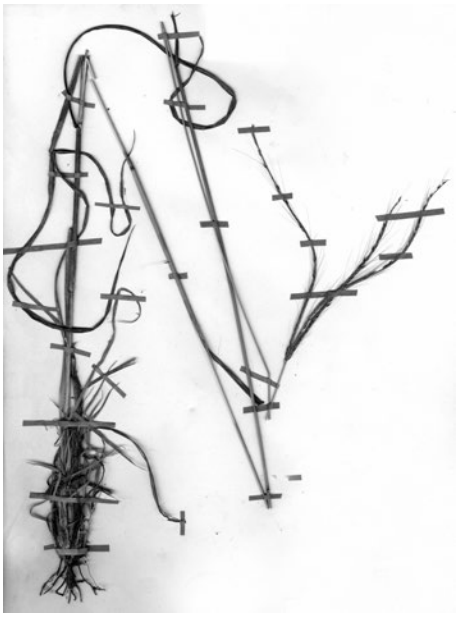


Figure 497.—*Stereochlaena cameronii* specimen.

## **Stereochlaena** Hack.

Hackel: 65 (1908); Chippindall: 425 (1955); Clayton & Renvoize: 655 (1982); Clayton & Renvoize: 298 (1986); Clayton: 128 (1989); Gibbs Russell et al.: 315 (1990); Watson & Dallwitz: 904 (1994).

Perennial, tufted; sometimes stoloniferous. **Leaf blade** expanded, usually hairy, margins thickened, white; *ligule* a narrow, fringed membrane. **Inflorescence** digitate, with spike-like racemes, slender, 1-sided; rachis triquetrous with narrow, fringed wings; *spikelets* paired, unequally pedicelled. **Spikelet** narrowly lanceolate, dor-

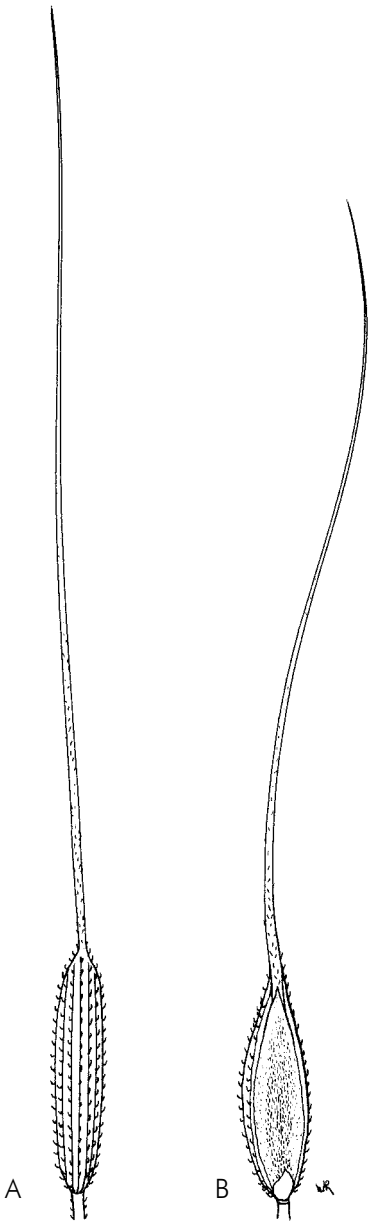
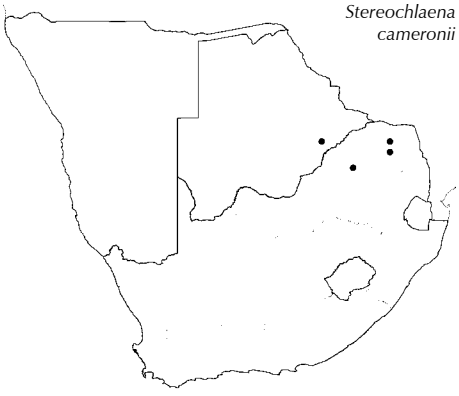



Figure 498.—*Stereochlaena cameronii* spikelet. A, showing long awned lemma; B, showing scale-like upper glume and awnless upper lemma within long-awned lower lemma. Artist: W. Roux.




siventrally compressed, falling with glumes; *glumes* unequal; lower glume absent; upper glume a minute scale. **Florets** 2; *lower floret* sterile; lemma flat on back with rounded sides, prominently 5–7-nerved, coarsely scabrid on nerves, awned from entire apex; awn 5–26 mm long, fine, straight; palea minute; *upper floret* bisexual; *lemma* firmer than glumes, papery, dark brown, margins thin, hyaline, enfolding and concealing palea, awnless; palea as long as lemma, dark brown. **Lodicules** 0. **Stamens** 3. **Ovary** glabrous, ovoid or ellipsoid; styles distinct, terminally exserted. **Caryopsis** narrowly ellipsoid, dorsally flattened; hilum short; embryo large. **Photosynthetic pathway**: $C_4$. XyMS-. PCR cell chloroplasts centrifugal/peripheral.



Figure 499.—*Stereochlaena cameronii*. Two spikelets (2.0–3.5 mm). Photographer: M. Koekemoer.

**Species** 5, tropical East Africa to South Africa; 1 in southern Africa: *Stereochlaena cameronii* (Stapf) Pilg., Botswana, Limpopo.

Species treatment by A.C. Mashau.

**Quick guide to easily confused genera:**

1. Lemma awnless . . . . . **Digitaria**
   Lemma awned . . . . . 2
2. Spikelet laterally compressed, disarticulating above glumes . . . . . **Chloris**
   Spikelet dorsiventrally compressed, falling with glumes . . . . . **Stereochlaena**

**Stereochlaena cameronii** (Stapf) Pilg., in Engler & Prantl, *Der natürlichen Pflanzenfamilien*, ed. 2, 14e: 45 (1940). Type: Malawi, Namasi, *Cameron 15* (K, holo.).

Tufted perennial 600–1 000(–1 200) mm high; sometimes stoloniferous; basal sheaths hairy. Leaf blade 80–250 × 2–8 mm. Inflorescence of 2–6 racemes, racemes 60–120 mm long. Spikelet 2.0–3.5 mm long, purple; lower glume absent; upper glume a minute scale, obtuse to acute; lower lemma longer than spikelet, scabrid, nerves prominent, awn 5–20 mm long, straight, purple; upper floret dark brown at maturity, lemma awnless, anther 1.5–2.0 mm long.

*Flowering*: January to May. *Ecology*: Dry sandy grassland. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to tropical East Africa. B, LIM.

Illustration: Chippindall: 452, fig. 353 (1955).
Voucher: *Galpin 11345*.

## **Stiburus** Stapf

Stapf: 696 (1900); Stent: 301 (1924); Chippindall: 186 (1955); Pilger: 22 (1956); Phillips: 159 (1982); Clayton & Renvoize: 215 (1986) included in *Eragrostis* Wolf; Gibbs Russell et al.: 315 (1990); Watson & Dallwitz: 907 (1994); Cope: 122 (1999) included in *Eragrostis* Wolf.



Figure 500.—*Stiburus alopecuroides* spikelet (2.7–4.0 mm). Photographer: M. Koekemoer.

Tufted perennial; rhizomatous. **Leaf blade** setaceous, often overtopping inflorescence; *ligule* a short, fringed membrane or a fringe of hairs. **Inflorescence** a spike-like panicle, hairy; *spikelets* solitary, pedicelled. **Spikelet** laterally compressed, disarticulating above glumes and between florets; *glumes* unequal or ± equal, shorter than the spikelet or upper glume, longer than the spikelet, 1-nerved, acute to acuminate, densely hairy with tubercle-based hairs. **Florets** 2–6; *lower florets* bisexual; *uppermost floret* reduced; *lemma* similar to glumes, 3-nerved, acute to acuminate, mucronate, densely hairy with long hairs all over; *callus* minute, hairy; *palea* shorter than lemma, 2-keeled, membranous. **Lodicules** 2, minute, glabrous. **Ovary** glabrous; styles distinct, plumose above. **Caryopsis** ± 2 mm long, oblong-elliptic; hilum short; pericarp probably fused. **Photosynthetic pathway**: $C_4$; XyMS+, the MS cells are larger than the PCR cells, with very thick cell walls. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 10$.

**Species** 2, southern Africa, Lesotho, Swaziland, Limpopo, Mpumalanga, Gauteng, Free State, KwaZulu-Natal and Eastern Cape.

Species treatment by M.J. Moeaha and L. Fish.

**Key to species:**

Glumes and lemmas acuminate; inflorescence (20)30–90 mm long, dark purple to black; spikelet 2.7–4.5 mm long; flowering February to May . . . . . **S. alopecuroides**
Glumes and lemmas acute; inflorescence less than 45 mm long, usually light purple to yellow; spikelet 1.7–3.0 mm long; flowering August to December . . . . . **S. conrathii**

**Stiburus alopecuroides** (Hack.) Stapf, in *Flora capensis* 7: 697 (1900). Type: KwaZulu-Natal, Karkloof, *Rehmann 7361*.

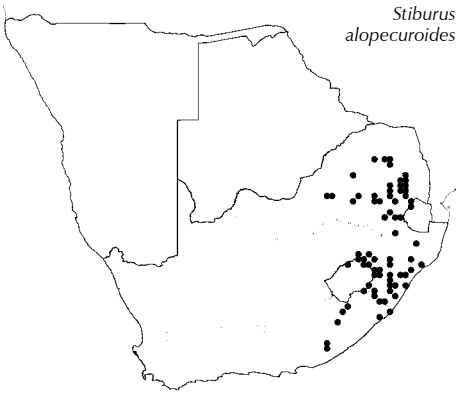
*Lasiochloa alopecuroides* Hack., in *Bulletin de l'Herbier Boissier* 3: 393 (1895).

*Eragrostis tincta* S.M.Phillips., in *Kew Bulletin* 37(1): 133–162 (1982).

Tufted perennial 170–630 mm high; rhizomatous. Leaf blade (5)90–360 × 1–2 mm; ligule a fringe of hairs. Inflorescence a dense compact, rarely interrupted panicle; lowest branches not whorled. Spikelet 2.7–4.5 mm long; glumes ± equal, dark purple to black, very densely hairy, acuminate, rarely acute; lemma keeled, dark purple to black, acuminate, very densely hairy; anthers 0.7–1.0 mm long; caryopsis oblong-elliptic.



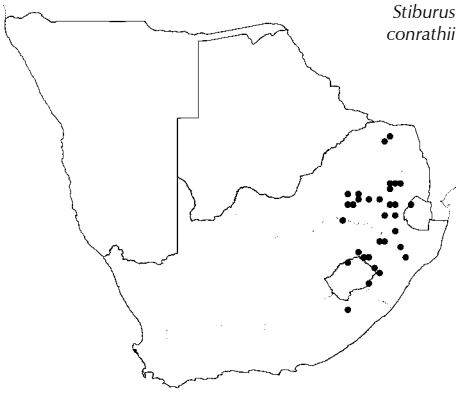

Figure 501.—*Stiburus alopecuroides*. A, plant; B, spikelet (5.0 × 3.5 mm). Artist: W. Roux.


*Stiburus alopecuroides*

[Differs from *S. conrathii*, which has a short, light purple to yellow inflorescence rather than a long, dark purple to black inflorescence and flowers at a different time.]

*Flowering*: February to May. *Ecology*: In fertile soil and wet areas; open veld, mostly sourveld, at fairly high altitudes. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe. S, L, LIM, NW, G, M, FS, KZN, EC. *Economics*: Unpalatable, but forms dense stands, which can be important for filtration of water. As it makes a beautiful display in veld during flowering season, it would be a good garden subject.

Illustration: Chippindall: 186, fig. 161 (1955); Cope: 123, tab. 59 (under *Eragrostis tincta*) (1999).
Anatomy vouchers: *Ellis 437, 492, 1566, 1569, 4100, 5738, 6163* & *De Winter 9399*.
Voucher: *Mohle 351*.


*Stiburus conrathii*

**Stiburus conrathii** Hack., in Öesterreichische Botanische Zeitschrift 52: 374 (1902). Type: Gauteng, near Modderfontein, *Conrath s.n.*

*Eragrostis conrathii* S.M.Phillips., in *Kew Bulletin* 37: 169 (1982).

Tufted perennial 100–410 mm high; rhizomatous. Leaf blade 30–100 mm long; ligule a fringe of hairs. Inflorescence a short open, interrupted panicle. Spikelet 1.7–3.0 mm long; glumes light purple to yellow, acute, hairy; lemma light purple to yellow, acute, hairy; anthers 0.8–1.0 mm long.

[Differs from *S. alopecuroides*, which has a long, dark purple to black inflorescence and a different flowering time.]

*Flowering*: August to December. *Ecology*: Damp or wet areas in mountain sourveld. *Frequency in southern Africa*: Locally common to infrequent. *Distribution*: S, L, LIM, G, M, FS, KZN, EC.

Anatomy voucher: *Ellis 2851*.
Voucher: *Rogers 24049*.

## **Stipa** L.

Linnaeus: 78 (1753); Stapf: 571 (1899); De Winter: 212 (1965); Clayton: 114 (1970); Clayton & Renvoize: 83 (1986); Moraldo: 203 (1986); Freitag: 124 (1989); Barkworth: 597 (1990); Gibbs Russell et al.: 316 (1990); Barkworth: 1 (1993); Watson & Dallwitz: 908 (1994); Jacobs & Everett: 579 (1996); Barkworth: 154 (2007); Hamasha et al.: 298 (2012); Röser: 91 (2012).

Perennial or annual, tufted, rhizomatous. **Leaf blade** linear, expanded, folded or rolled; *ligule* an unfringed or fringed membrane, auricles present or absent. **Inflorescence** an open or contracted panicle, often linear or oblong; spikelets all alike, pedicelled. **Spikelet** usually terete to slightly laterally compressed, disarticulating above glumes, rachilla extension absent; *glumes* ± equal to unequal, as long as to longer than spikelet, not gibbous, similar, awned or awnless, 1–3-nerved. **Floret** 1; *lemma* firmer in texture than glumes, thickly membranous to coriaceous, becoming indurated, back rounded, margins slightly overlapping, involute or open, entire or bilobed, glabrous or hairy, 3–7-nerved, awned from sinus or apex; *awn* longer than body of lemma, extending beyond glumes, geniculate, column usually twisted basally, glabrous to long hairy; *palea* not

keeled, 2-nerved, nerves extending to the apex, shorter to ± as long as lemma, glabrous; *callus* pungent to obtuse, hairy. **Lodicules** 2 or 3, glabrous or hairy. **Stamens** 3. **Ovary** glabrous; stigmas rarely 3. **Caryopsis** fusiform, laterally flattened; embryo ¼ (seldom ⅓) the length of caryopsis; hilum always reaching the top of the caryopsis or almost so, linear; pericarp fused; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+.

[The broader interpretation of the genus *Stipa* is followed here until more studies have been completed to give the most appropriate circumscription of the genus.]

**Species** ± 200, tropical and temperate regions of both hemispheres; 2 indigenous in southern Africa: North West, Limpopo, Mpumalanga, Free State, KwaZulu-Natal, Northern, Western and Eastern Cape.

Species treatment by L. Fish.



Figure 502.—*Stipa dregeana* var. *elongata* spikelet (5–7 mm). Photographer: M. Koekemoer.

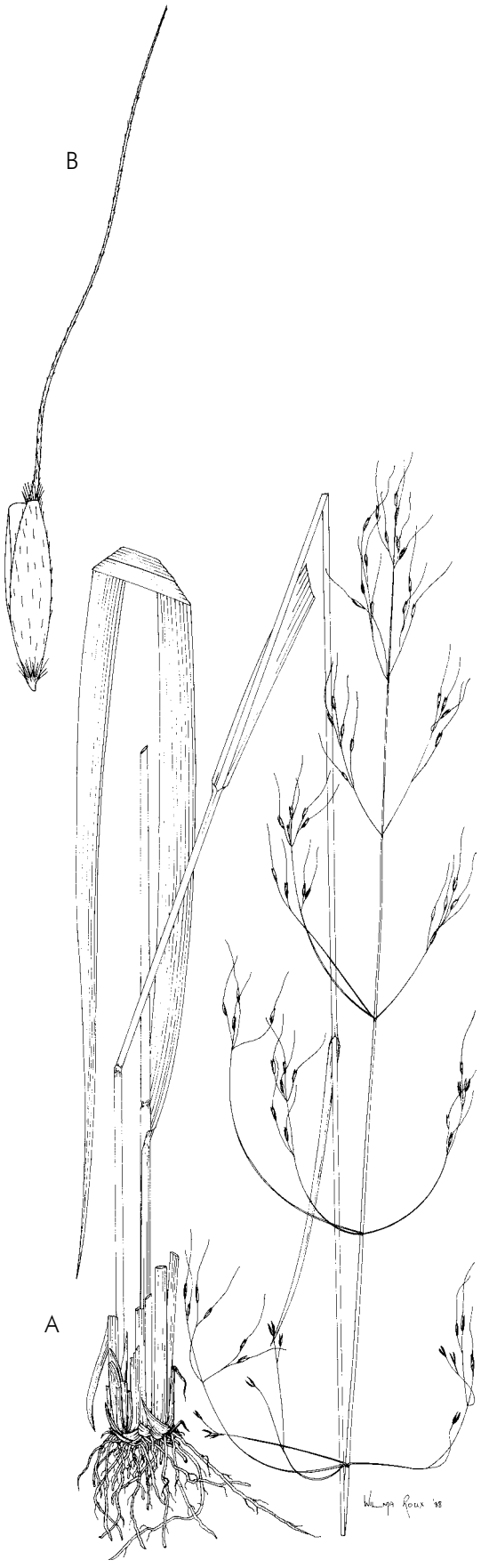



Figure 503.—*Stipa dregeana* var. *elongata*. A, plant; B, floret (20 × 1 mm). Artist: W. Roux.

### Quick guide to easily confused genera/taxa in southern Africa:

**A**

Lemma glabrous . . . . . **Festuca africana**
Lemma hairy . . . . . **Stipa dregeana**

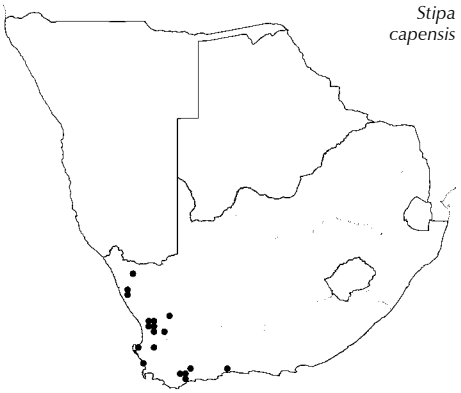
**B**

1. Lemma apex fused into a crown . . . . . ***Nassella**
   Lemma apex without crown . . . . . 2
2. Lemma apex and/or lower part of awn with a plume of long hairs 4–8 mm long . . . . . 3
   Lemma apex and/or awn base glabrous or hairy, then hairs less than 3.5 mm, not plume-like . . . . . 4
3. Lemma apex and base of awn with a plume of long hairs; callus obtuse; perennial . . . . . ***Jarava plumosa**
   Only basal part of awn with a plume of long hairs above articulation; callus pungent; annual . . . . . **Stipagrostis anomala**
4(2). Awn 30–100 mm long; callus pungent . . . . . 5
   Awn up to 25 mm long; callus blunt . . . . . 6
5. Plant perennial; awn lower part not obviously twisted . . . . . ***Austrostipa variabilis**
   Plant annual; awn lower part strongly and obviously twisted . . . . . **Stipa capensis**
6(4). Plant annual; callus hairs up to 2.5 mm long . . . . **Aristida parvula**
   Plant perennial; callus hairs up to 1 mm long . . . . . 7
7. Leaves flat . . . . . **Stipa dregeana**
   Leaves convolute or rolled . . . . . ***Amelichloa clandestina**

### Key to species:

1. Glumes 12–10 mm long; lemma awn 50–100 mm long, lower part hairy; anther apex hairy; callus 1.7–2.3 mm long, pungent; annual . . . . . **S. capensis**

Glumes 5–7 mm long; lemma awn 10–20 mm long, scabrid; anther apex glabrous; callus 0.5 mm long, obtuse; perennial . . . . 2
2. Inflorescences branches short, bearing spikelets from near base; panicle usually dense and contracted . . . . . **S. dregeana** var. **dregeana**
Inflorescence branches long, spreading, flexuous, bearing spikelets only towards the apex; panicle open . . . **S. dregeana** var. **elongata**


*Stipa capensis*

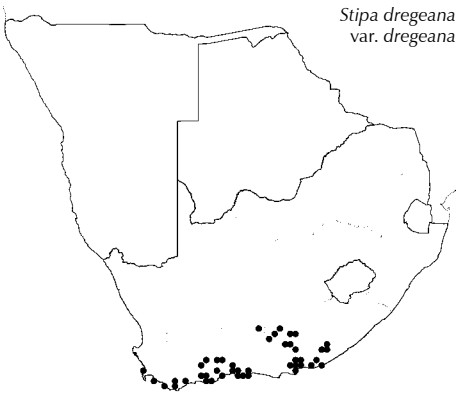
**Stipa capensis** Thunb., in *Prodromus plantarum capensium*: 19 (1794). Type: South Africa, Cape of Good Hope, *C.P. Thunberg 2560* (UPS, holo.).

Alternate name: *Stipellula capensis* (Thunb.) M.Röser & H.R.Hamasha

Annual 100–500(–1 000) mm high. Leaf blade 50–200 × to 3 mm, rolled, hairy; ligule a fringed membrane. Inflorescence up to 15 mm long, contracted, often partially enclosed in upper leaf. Spikelet 12–16 mm long (excluding awn); glumes long acuminate, colourless, translucent, shining, much longer than spikelet; lower glume 12–18 mm long, equal to longer than upper; lemma laterally compressed to ± terete, margins strongly overlapping, hairy; awn 50–100 mm long, bent, strongly twisted basally, base conspicuously hairy, hairs ± 1 mm long, upper scabrid; palea 2-nerved, glabrous, rounded, much shorter than lemma; callus elongate, up to 2 mm long, pungent, hairy; anther 2.0–2.5 mm long, hairy at apex.

*Flowering*: August to November. *Ecology*: Open veld and disturbed places; in arid winter rainfall regions. *Frequency in southern Africa*: Infrequent. *Distribution*: Mediterranean, also in North Africa and the Middle East. NC, WC. *Economics*: Introduced into North America where possible invader of natural vegetation; used in some parts of the world to make fine paper.

Illustration: Chippindall: 289, fig. 259 (1955); Barkworth: 156 (2007).
Anatomy vouchers: *Ellis 5098* & *5106*.
Voucher: *Acocks 14736*.


*Stipa dregeana* var. *dregeana*

**Stipa dregeana** Steud. var. **dregeana**, in *Synopsis plantarum glumacearum* 1: 132 (1854). Type: South Africa, Eastern Cape, Albany, hills near Grahamstown, *Drège s.n.* (B†; PRE, fg.).

Tufted perennial 800–1 200 mm high; rhizomes short, knotted. Leaf blade to 60 × 12(14) mm, flat; margins scabrid. Inflorescence narrow, branches to 100 mm long, bearing spikelets from near the base. Spikelet 5–7 mm long (excluding awn); glumes equal, as long as to slightly longer than lemma, acute to acuminate, 3-nerved, scaberulous; lemma laterally compressed, margin slightly overlapping or open, apex minutely bi-lobed, hairy; awn 10–20 mm long, straight or bent and weakly twisted, glabrous, scabrid; palea ± equal to lemma, acute, nerves conspicuous, hairy between nerves; callus 0.5 mm long, obtuse, hairy; anther 3.0–3.5 mm long, apex not hairy.

*Ecology*: Forest. *Distribution*: Endemic. WC, EC.

Anatomy vouchers: *Ellis 2334* & *5155*.
Voucher: *Brynard 30*.

**Stipa dregeana** Steud. var. **elongata** (Nees) Stapf, in *Flora capensis* 7: 573 (1898). Type: South Africa, Cape Province, *Drège s.n.* (B†, holo.).

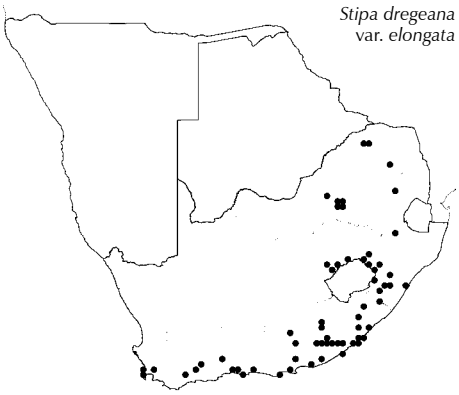
*Stipa keneinsis* (Pilg.) Freitag, in Kit Tan (ed.) Davis & Hedge Festchrift: 124 (1989).

Alternate name: *Aristella keniensis* (Pilg.) M.Röser & H.R.Hamasha

Tufted perennial 900–1 200 mm high; rhizome short, knotty. Leaf blade to 60 × 5–12(14) mm, flat; margins scabrid. Inflorescence open, to 200 mm long; branches slender, spreading, drooping; spikelets clustered on upper half only. Spikelet 5–7 mm long (excluding awn); glumes ± equal, as long as to slightly longer than lemma, acute to acuminate, 3-nerved, scaberulous; lemma laterally compressed, margins slightly overlapping or open, apex minutely bi-lobed, hairy; awn 10–20 mm long, straight or bent and weakly twisted, glabrous, scabrid; palea acute, nerves conspicuous, hairy between nerves, slightly shorter to as long as lemma; callus 0.5 mm long, obtuse, hairy; anther 2.5–4.0 mm long, apex not hairy.

*Flowering*: August to May, most commonly in summer. *Ecology*: Forest, in moist places. *Frequency in southern Africa*: Locally common. *Distribution*: South Africa and East African highlands. LIM, NW, G, M, FS, KZN, WC, EC.

Illustration: Chippindall: 288, fig. 258 (1955); Phillips: 14 (1995).
Anatomy vouchers: *Loxton & Ellis 995; Ellis 217* & *1461.*
Voucher: *Killick & Vahrmeijer 4050*.




## **Stipagrostis** Nees

Nees ab Esenbeck: 290 (1832); Stapf: 551 (1899); Henrard: 1 (1926–1933) under *Aristida* L.; Henrard: 45 (1929–1933) under *Aristida* L.; Chippindall: 291 (1955) under *Aristida* L.; Pilger: 123 (1956); De Winter: 307 (1965); Clayton: 137 (1970); Launert: 187 (1970a); Kers: 199 (1971); Melderis: 131 (1971); Chippindall & Crook: 56 (1976);Clayton & Renvoize: 185 (1986); De Winter: 82 (1990); Gibbs Russell et al.: 318 (1990); Watson & Dallwitz: 910 (1994); Fish: 69 (2006); Müller 148 (2007).

Perennial (sometimes short-lived) or annual, densely tufted, sometimes shrubs or dwarf shrubs, erect to geniculate, often with a well-developed knotty rhizomatous base. **Leaf blade** usually long and narrow; *ligule* a dense fringe of hairs. **Inflorescence** a narrow or open panicle, sometimes spike-like, often interrupted; *spikelets* solitary or in fascicles, pedicelled. **Spikelet** disarticulating above glumes; *glumes* ± equal or unequal, narrow, as long as to longer than spikelet, 3–11-nerved, glabrous or hairy, obtuse to acuminate, awnless; lower glume usually 3-nerved. **Floret** 1, bisexual; *lemma* narrow, cylindrical, firmer than glumes, ventrally grooved or margins involute, indurated at maturity, 3-awned, appearing as 1 awn with 3 branches due to fusion, rarely solitary as laterals reduced; *awns* with or without a column, all, or only central awn plumose or with only a pencil of hairs at apex of column, articulation present at or above middle of lemma or between base of column and body of lemma, or absent; *callus* well developed, pungent or minutely bifid, usually oblique, bearded or glabrous; *palea* usually much less than half as long as lemma, indurated, 2-nerved, glabrous. **Lodicules** usually 2, or 0, obtuse. **Stamens** 3. **Ovary** glabrous; styles free, plumose above. **Caryopsis** fusiform; hilum long-linear; pericarp fused; embryo large.










Figure 504.—*Stipagrostis* spp. spikelets. A, *S. anomala* (11–14 mm); B, *S. zeyheri* subsp. *zeyheri* (16–19 mm); C, *S. uniplumis* var. *neesii*. (10.0–14.5 mm). Photographer: M. Koekemoer.

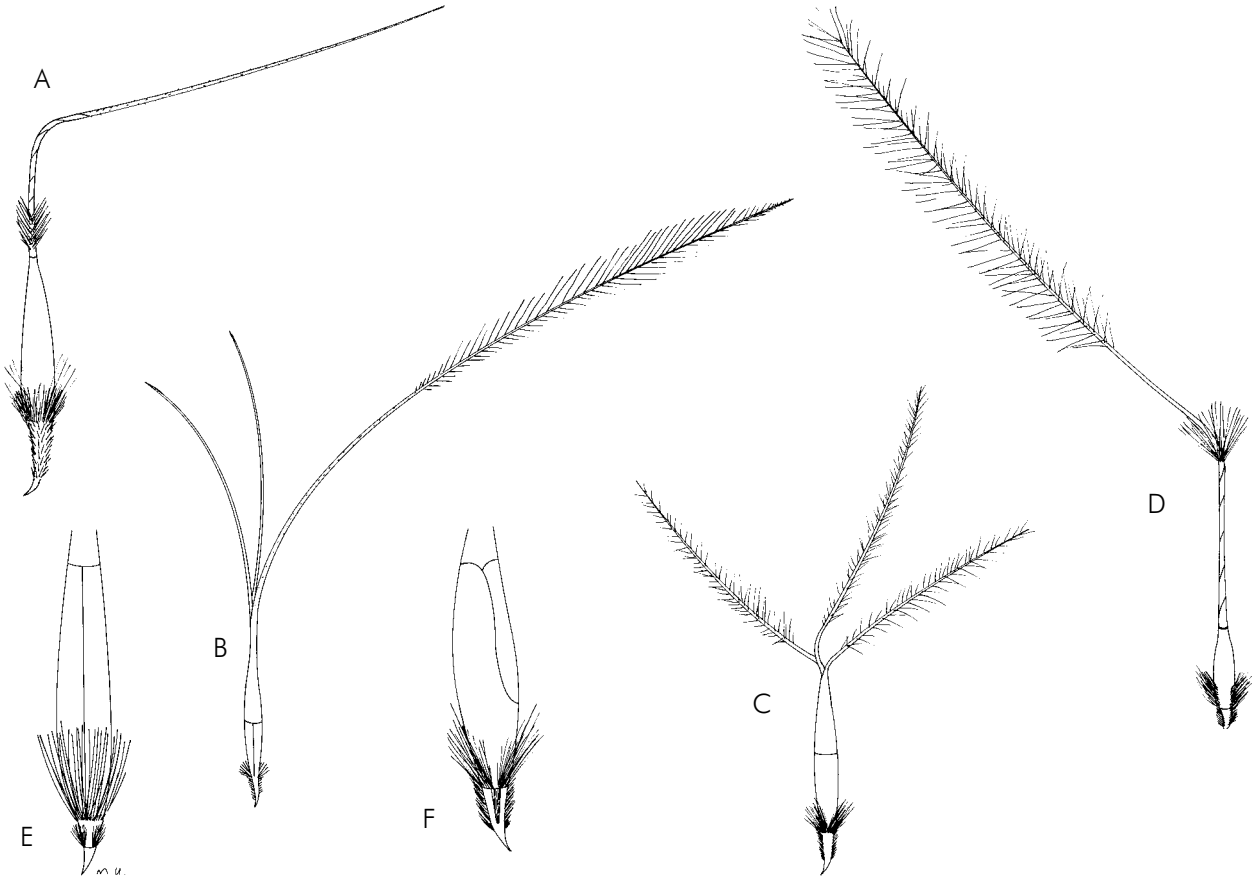



Figure 505.—*Stipagrostis* spp. A–D, lemmas; A, *S. anomala*; B, *S. ciliata* var. *capensis*; C, *S. namaquensis*; D, *S. uniplumis*. E, F, callus; E, *S. hirtigluma*; F, *S. uniplumis*. Artist: M. Ueckermann.



Figure 506.—*Stipagrostis anomala* specimen.

**Photosynthetic pathway**: $C_4$; XyMS+ (and PCR sheath single, by contrast with *Aristida*). **Cytology**: $x = 11$ (polyploidy).

**Species** ± 50, Africa, northwestern India and southwestern Asia; 29 in southern Africa, widespread.

Species treatment by A.C. Mashau.

### Quick guide to easily confused genera (in southern Africa):

1. Ligule a fringed membrane; lemma articulation never present . . . . . **Stipa**
   Ligule a dense fringe of hairs; lemma articulation present or absent . . . . . 2
2. Awns, all or only the central awn plumose . . . . . **Stipagrostis**
   Awns never plumose . . . . . 3
3. Awns spirally contorted at base at maturity . . . . . **Sartidia**
   Awns not spirally contorted at base at maturity . . . . . **Aristida**

### Key to species:

1. Awn solitary (protuberances indicating two lateral awns sometimes present), awn not plumose except for a pencil of long white hairs around base of column; articulation present between lemma apex and column base . . . . . **S. anomala**
   Awns three, either all three or only central awn distinctly and densely plumose; articulation present or absent . . . . . 2
2. Lemma articulation absent . . . . . **S. zeyheri** subsp. **sericans**
   Lemma articulation present . . . . . 3

3. Callus minutely bifid . . . . . 4
Callus never bifid . . . . . 5
4. Basal sheaths glabrous or hairy, but then hairs not woolly and densely matted; lemma articulation between lemma apex and column base . . . . . **S. obtusa**
Basal sheaths covered with densely matted woolly hairs; lemma articulation slightly below middle of lemma . . . . . **S. pellytronis**
5(3). All three awns distinctly plumose with long hairs (lateral awns rarely sparsely plumose; see note under *S. zeyheri* subsp. *macropus*) . . . . . 6
Only central awn distinctly plumose (lateral awns glabrous, rarely with few scattered hairs) . . . . . 17
6. Lemma articulation near middle of lemma . . . . . 7
Lemma articulation near apex of lemma . . . . . 8
7. Spikelet to 14 mm long (including awns); upper glume 7–9 mm long . . . . . **S. proxima**
Spikelet 15–30 mm long (including awns); upper glume 10–14 mm long . . . . . **S. namaquensis**
8(6). Plant delicate, culm to 1.2 mm wide; upper glume 7–9 mm long; lower leaf surface rough, densely covered with prickles . . . . . **S. ramulosa**
Plant robust or reed-like, culm 1.2–5.0 mm wide; upper glume 9–25 mm long; lower leaf surface smooth, prickles absent, or present only on side of nerves in the intercostal cavities . . . . . 9
9. Column very short and stout; leaves rigid, straight, pungent, overtopping the narrow dense inflorescence . . . . . 10
Column long, or if short, then slender; inflorescence usually extending beyond the leaves, if overtopped by leaves, then leaves flaccid and often curling with age . . . . . 11
10. Inflorescence spike-like, 143–235 mm long, branches not reflexed at maturity; leaf blade 250–600 mm long; glumes not curved . . . . . **S. sabulicola**
Inflorescence open, 20–50 mm long, branches reflexed at maturity; leaf blade (15)40–70(140) mm long; glumes curved . . . . . **S. seelyae**
11(9). Column hairy with long hairs for at least some distance below branching point of awns . . . . . 12
Column glabrous or scaberulous or with only a few scattered hairs around branching point of the awns . . . . . 14
12. Glumes densely hairy with long hairs or sometimes only glume apex hairy . . . . . **S. zeyheri** subsp. **sericans**
Glumes glabrous, puberulous or scabrid . . . . . 13
13. Leaves erect and rigid; inflorescence usually open; glumes frequently purple; plant often tinged purple . . . . . **S. zeyheri** subsp. **zeyheri**
Leaves flaccid, often curling; inflorescence usually narrow; glumes pallid, slightly darker at the base; plant sometimes faintly flushed with purple . . . . . **S. zeyheri** subsp**. barbata**
14(11). Inflorescence narrow, compact, branches adpressed to main axis; callus bluntly rounded; awns plumose with long silver-white hairs . . . . . **S. damarensis**
Inflorescence open; callus pungent; awns plumose with long dirty-white, yellow or silver hairs . . . . . 15
15. Glumes longer than 15 mm; awns plumose with long dirty-white or yellow hairs . . . . . **S. zeyheri** subsp. **macropus**
Glumes shorter than 15 mm; awns plumose with long silvery hairs . . . . . 16
16. Inflorescence branch axils glabrous; culm nodes glabrous . . . . . **S. lutescens** var. **lutescens**
Inflorescence branch axils distinctly bearded; culm nodes hairy . . . . . **S. lutescens** var. **marlothii**
17(5). Lemma articulation at or just above middle of lemma body . . . . 18
Lemma articulation at lemma apex . . . . . 24
18. Lower glume narrowly oblong to oblong, apex firm, obtuse to truncate . . . . . 19
Lower glume linear to lanceolate, apex membranous, acute to long-acuminate . . . . . 20

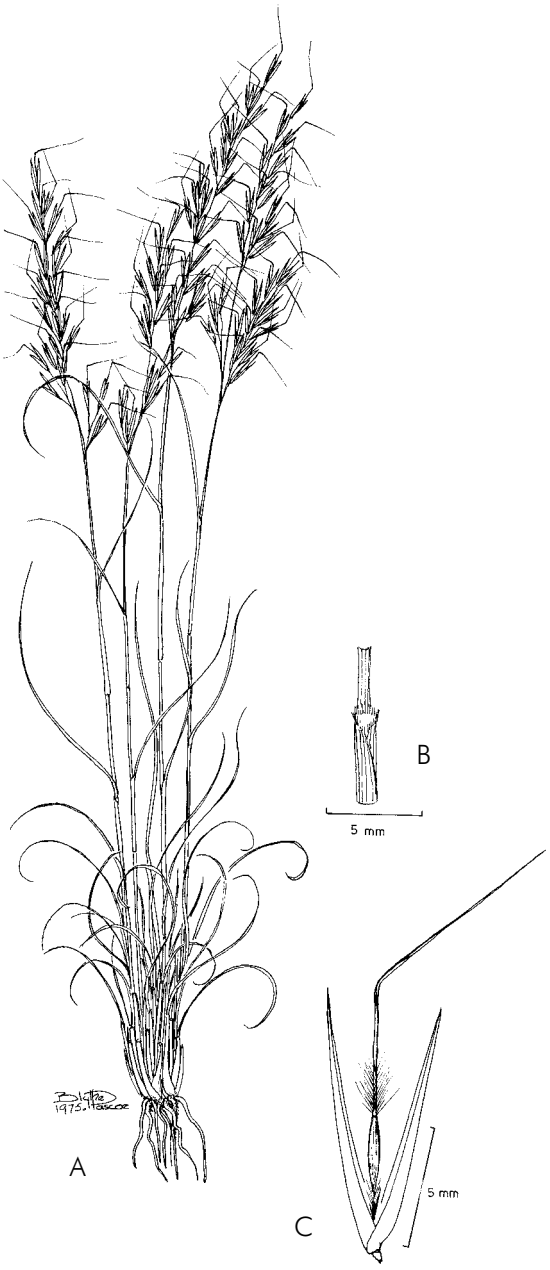



Figure 507.—*Stipagrostis anomala*. A, plant; B, ligule; C, spikelet. Artist: B. Pascoe.




Figure 508.—*Stipagrostis namaquensis*. Artist: G.E. Lawrence.

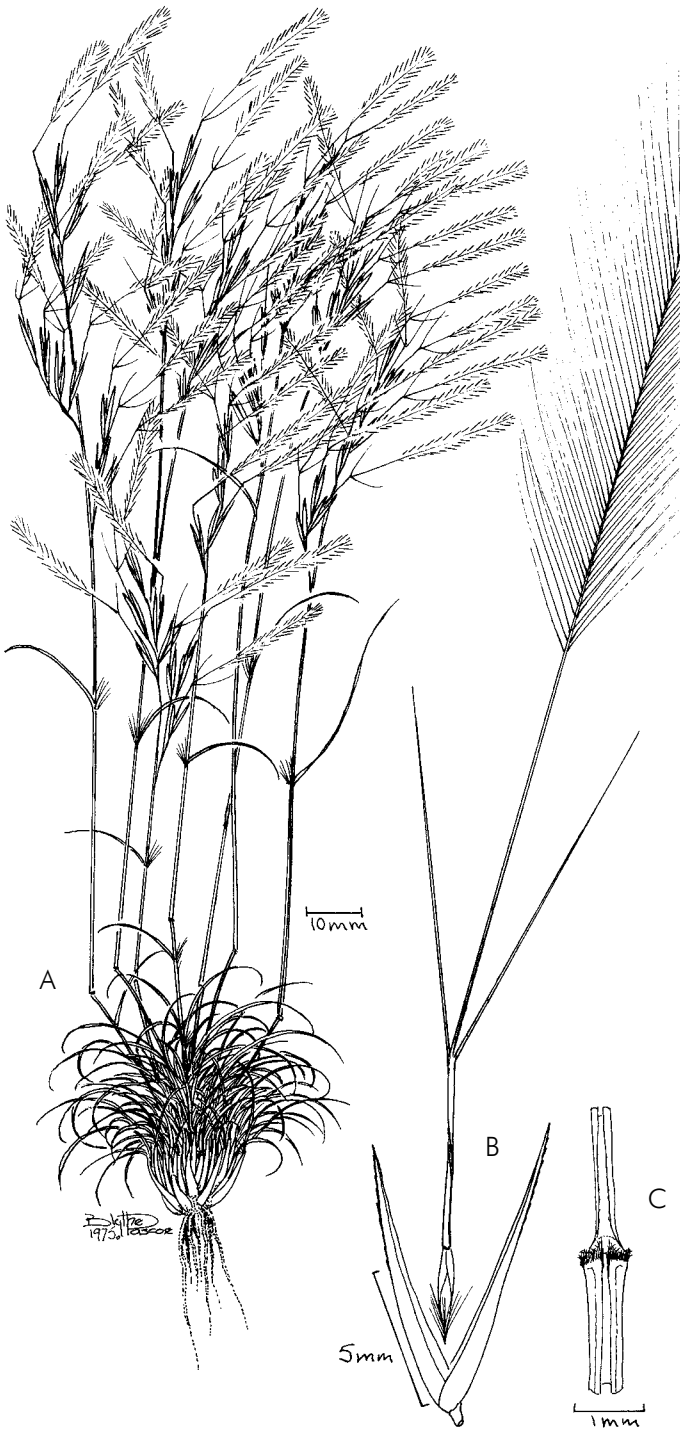



Figure 509.—*Stipagrostis obtusa*. A, plant; B, spikelet; C, ligule. Artist: B. Pascoe.

## STIPAGROSTIS

19. Culm nodes bearded with a ring of long, spreading white hairs; lower leaf sheaths without a mat of woolly hairs . . . . . **S. ciliata** var. **capensis**
Culm nodes glabrous; lower leaf sheaths sparsely to densely covered with matted, woolly hairs . . . . . **S. schaeferi**

20(18). Plant suffrutescent; culm branches fascicled; central awn usually to 35 mm long . . . . . **S. amabilis**
Plant tufted, not woody; culms branched or unbranched, branches not fascicled; central awn usually 40–100 mm long . . . . . 21

21. Inflorescence narrow, spike-like, unbranched . . . . . 22
Inflorescence narrow, interrupted, branched . . . . . 23

22. Lower glume with long, rigid, erect hairs (pilose) . . . . . **S. hochstetteriana** var. **hochstetteriana**
Lower glume glabrous . . . . . **S. hochstetteriana** var. **secalina**

23(21). Glumes softly pilose, especially along margins near apex; central awn plumose right to the tip; lateral awns up to 1/3 as long as central awn; culms with striations indistinct or widely separate, densely scabrid, covered with conspicuous prickles . . . **S. dinteri**
Glumes not softly pilose; central awn excurrent into a delicate naked tip; lateral awns at least 1/2 as long as central awn; culms with striations distinct and close together, smooth or minutely scaberulous, with small inconspicuous prickles (Note: *S. giessii* × *hochstetteriana* has glumes with long stiff hairs) . . . . . **S. giessii**

24(17). Leaves mainly cauline; leaf blades poorly to well developed; plant usually suffruticose . . . . . 25
Leaves apparently mainly basal; leaf blades well developed; plant not woody . . . . . 30

25. Glumes with long white hairs . . . . . 26
Glumes glabrous or with only very short hairs . . . . . 27

26. Inflorescence not or only slightly exserted from uppermost leaf sheath, spikelet fascicles densely clustered, lowermost sometimes separated from the rest; leaf blades poorly developed . . . . . **S. geminifolia**
Inflorescence well exserted from uppermost leaf sheath; spikelet fascicles much interrupted along the main axis; leaf blades well developed . . . . . **S. fastigiata**

27(25). Plant with raised, round glands . . . . . **S. brevifolia**
Plant without raised, round glands . . . . . 28

28. Plant slender in upper parts; leaves to 1 mm wide, flexuous, usually held at an angle of 45 degrees from the culm . . . . . **S. garubensis**
Plant robust in upper parts; leaves 1–2 mm wide, rigid, usually at an angle of 90 degrees from the culm . . . . . 29

29. Inflorescence branch axils glabrous; culm nodes glabrous . . . . . **S. lutescens** var. **lutescens**
Inflorescence branch axils distinctly bearded; culm nodes hairy . . . . . **S. lutescens** var. **marlothii**

30(24). Glumes with obvious, long hairs, sometimes only along the margins . . . . . 31
Glumes puberulous, scabrid or glabrous . . . . . 37

31. Inflorescence spiciform, sub-secund; culm not visibly or obviously striate, usually densely scabrid . . . . . **S. gonatostachys**
Inflorescence open, if contracted not spiciform and sub-secund; culms conspicuously striate, smooth . . . . . 32

32. Callus with short hairs along entire length (except for naked apex) till the long hairs at the junction between lemma and callus (uniplumis-type) . . . . . 33
Callus with a distinct glabrous break between short hairs of the callus and long hairs at the junction of lemma and callus (hirtigluma-type, best seen at back) . . . . . 35

33. Plant annual . . . . . **S. uniplumis** var. **intermedia**
Plant perennial . . . . . 34

34. Glumes 8–10(–11) mm long . . . . . **S. uniplumis** var. **uniplumis**
Glumes longer than 12 mm . . . . . **S. uniplumis** × **S. hirtigluma**

35(32). Inflorescence narrow, when fully exserted much longer than wide; plant annual . . . . . **S. hirtigluma** subsp. **hirtigluma**
Inflorescence open, spreading, when fully exserted not much longer than wide; plant annual or perennial . . . . . 36

36. Plant annual with very few leaves at the base . . . . . **S. hirtigluma** subsp. **pearsonii**




Figure 510.—*Stipagrostis zeyheri* subsp. *sericans*. Artist: W. Roux.

Plant perennial with dense tuft of basal leaves . . . . . **S. hirtigluma** subsp. **patula**

37(30). Branching point of awns and a short distance down the column with a densely hairy, hairs longer than 1.5 mm . . . . . 38
Branching point of awns and a short distance down the column glabrous, scabrid or with hairs shorter than 1.5 mm . . . . . 39

38. Inflorescence with numerous spikelets; glumes usually to 10 mm long; lemma central awn usually straight . . . . . **S. uniplumis** var. **uniplumis**
Inflorescence with a few spikelets; glumes 10 mm or longer; lemma central awn bent at right angles . . . . . **S. uniplumis** var. **neesii**

39(37). Inflorescence sub-secund, branched only in the lower part, spikelets in upper parts solitary, borne on robust, rigid pedicels directly on the main axis . . . . . **S. gonatostachys**
Inflorescence not sub-secund, much branched for most of its length, spikelets paired or solitary, borne on slender, usually flexuous pedicels on the branches . . . . . 40

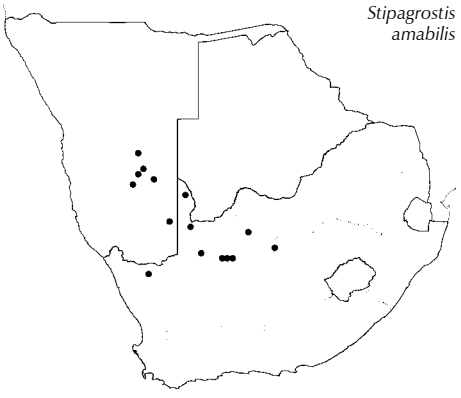
40. Inflorescence contracted and very dense, main axis hidden . . . .41
Inflorescence open or contracted, interrupted, main axis clearly visible . . . . . 42

41. Column densely short-hairy at swollen branching point of awns; callus 1.5 mm long; culms well developed and extending somewhat beyond basal tufts of leaves . . . . . **S. hermannii**
Column glabrous, sometimes with few scattered hairs around branching point of awns; callus 0.8–1.0 mm long; culms very poorly developed and short . . . . . **S. subacaulis**

42(40). Column hairy; plant annual . . . . . **S. namibensis**
Column smooth, glabrous or densely scabrid; plant usually perennial . . . . . 43

43. Glumes dark; awn column smooth; inflorescence open, branches with long naked basal parts . . . . . **S. dregeana**
Glumes pallid; awn column usually densely scabrid; inflorescence contracted, interrupted, branches bearing spikelets to near the base . . . . . 44

44. Lower leaf sheaths densely covered all over with matted woolly hairs; plant rare . . . . . **S. lanipes**
Lower leaf sheaths glabrous, if hairy these not matted woolly hairs and present only at the very base; plant common . . . . **S. obtusa**



*Stipagrostis amabilis*

**Stipagrostis amabilis** (Schweick.) De Winter, in *Kirkia* 3: 133 (1963). Type: Namibia, Gibeon, *Keet 1641* (PRE, ?holo.).

*Aristida amabilis* Schweick., in *Botanische Jahrbücher* 76,2: 217 (1954).

KALAHARI DUNE BUSHMAN GRASS, DUINEKWEEK

Tufted shrub or dwarf shrub 1 500–2 000 mm high; rhizome long, creeping; culm erect or horizontal, branches fascicled at nodes, internodes distinct. Leaf blade to 250 × to 2.5 mm, curved, sharp. Inflorescence narrow, interrupted, spikelets crowded, pedicels erect. Spikelet 11–14 mm long; glumes unequal; lower glume lanceolate, long-acuminate; lemma smooth, articulation at about the middle of the lemma; central awn to 35 mm long, plumose for the upper $^2/_3$, lateral awns not plumose; column short to almost absent; callus 1.5 mm long, apex naked, pungent; anther 3.6–5.0 mm long.

[Similar to *S. namaquensis*, which has all three awns plumose and shorter more pungent leaves.]

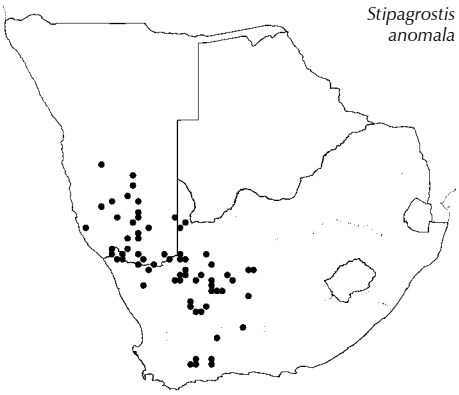
*Flowering*: Sporadic from August to May. *Ecology*: Crest of Kalahari sand dunes. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NW, NC. *Economics*: Erosion control, sand binder on dune crests.

Illustration: Müller: 267 (2007).
Anatomy voucher: *De Winter 3398*.
Voucher: *Leistner 1365*.

**Stipagrostis anomala** De Winter, in *Kirkia* 3: 133 (1963). Type: Northern Cape, Namaqualand, *Dinter 2602* (leg. Koppel) (B, holo; PRE, fragment).

*Stipa namaquensis* Pilg., in *Botanische Jahrbücher* 51; 12: 412 (1914).

TORRO-BOESMANGRAS


*Stipagrostis anomala*

Densely tufted, weakly perennial or annual 100–600 mm high; erect or slightly geniculate near base; leaves mainly basal, often curved. Leaf blade 10–200 × to 1.5 mm, setaceous, scabrid. Inflorescence narrow, interrupted, spikelets erect, crowded along main axis. Spikelet 9–12 mm long; glumes unequal, scaberulous; lemma articulation between apex of lemma and base of column; awn solitary, not plumose except for long stiff hairs at the base of the column, diverging at right angles at maturity, protuberances indicating rudimentary lateral awns sometimes present; column twisted; callus 1.5 mm long, pungent; anther 2.1–4.0 mm long.

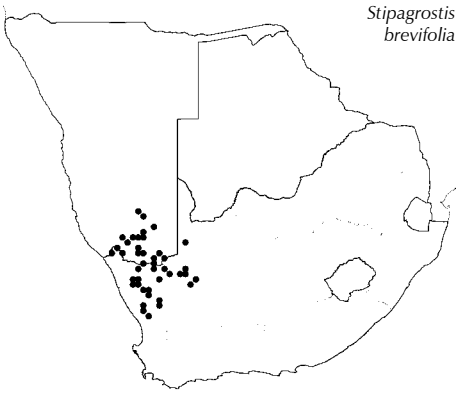
*Flowering*: January to June (and August and September). *Ecology*: Shallow sandy soils; over rocks on slopes and gravel plains. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NC, WC.

Illustration: Chippindall: 290, fig. 260 (1955); Müller: 269 (2007).
Anatomy vouchers: *Scott PRE 20131, Ellis 886* & *1742*.
Voucher: *Leistner 2362*.

**Stipagrostis brevifolia** (Nees) De Winter, in *Kirkia* 3: 133 (1963). Type: South Africa, Northern Cape, Namaqualand, *Drège*.

*Aristida brevifolia* (Nees) Steud., in *Nomenclator botanicus* 2: 130 (1841).

LANGBEENTWAGRAS, KORTBLAARBOESMANGRAS


*Stipagrostis brevifolia*

Robust shrub or dwarf shrub to 1 000 mm high; rhizomes branched, woody; leaves mainly cauline; culm much branched; nodes densely covered with woolly hairs; vegetative parts with raised round glands. Leaf blade usually very short, 5–80(–120) × 1–3 mm, rolled or expanded. Inflorescence narrow, sometimes interrupted, branches adpressed to main axis. Spikelet 12–15 mm long; glumes long-acuminate, glabrous; lemma articulation between apex of lemma and base of column; only central awn plumose, lower $^1/_4$ scabrid, apex not plumose; column distinct, scabrid; callus 2.0–2.5 mm long, apex naked, pungent; anther 4.8–6.6 mm long.

[Hybridises with *S. namaquensis*, (*De Winter 3266*).]

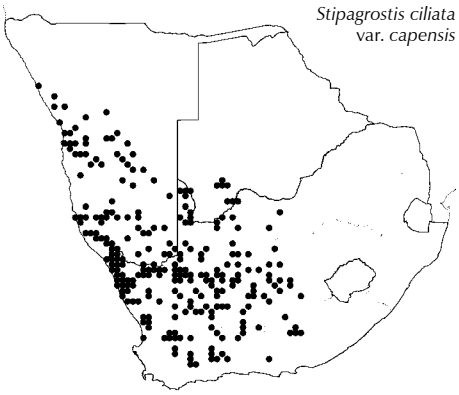
*Flowering*: September to May. *Ecology*: Sand over rocks; on plains and especially in drainage areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NC, WC. *Economics*: Drought resistant grass, palatable only when green.

Illustration: Chippindall: 304, fig. 270 (1955); Müller: 149 (2007).
Anatomy voucher: *Ellis 1738*.
Voucher: *De Winter & Hardy 7852*.

**Stipagrostis ciliata** (Desf.) De Winter var. **capensis** (Trin. & Rupr.) De Winter, in *Kirkia* 3: 133 (1963). Type: South Africa, Western Cape, Dweka and Zwartbulletje, *Drège*.

*Aristida ciliata* Desf., in Schrad., in *Neues Journal Botanik* 3: 255 (1809).

*Aristida ciliata* Desf. var. *capensis* Trin. & Rupr., in *Graminum stipaceorum*: 164 (1842).


*Stipagrostis ciliata* var. *capensis*

*Aristida ciliata* Desf. var. *pectinata* Henrard, in *A Critical Revision of the genus* Aristida 1: 95 (1926). Type: Namibia, Zwartbankberg, *Stapf 9*.

*Aristida ciliata* Desf. var. *tricholaena* Hack., in *Bulletin de l'Herbier Boissier* 4,3: 18 (1896). Type: Namibia, Luderitzhafen, *Schinz 672*; zwischen Ugama und Tschrib, *Schenck 10* (syntypes).

*Aristida ciliata* Desf. var. *villosa* Hack., in *Bulletin de l'Herbier Boissier* 4,3: 18 (1896). Type: Namibia, zwischen Aus und dem Oranjefluss, *Schenck 327*.

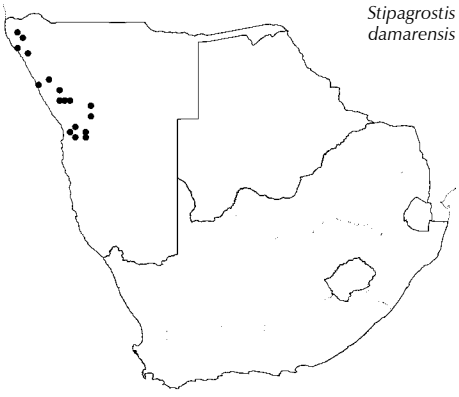
TALL BUSHMAN GRASS, LANGBEENBOESMANGRAS

Densely or laxly tufted, 850–1 000 mm high; leaves mainly basal; culm erect or occasionally geniculate, nodes with long stiff spreading hairs. Leaf blade to 300 × to 1.5 mm; sheaths hairy but not woolly, or glabrous. Inflorescence narrow or open, branches flexuous; spikelets variable in size. Spikelet 6.5–12.0 mm long, straw-coloured, often purple at base; glumes equal to subequal, lower glume oblong to narrowly oblong, apex obtuse to truncate, firm; lemma articulation about in the middle; only central awn plumose, hairs usually silvery, occasionally golden; column length variable; callus 2.0–2.5 mm long, point naked, pungent; anther 5.0–5.8 mm long.

[Variable, occasionally hybridises with *S. zeyherii* subsp. *macropus* (*Acocks 14817*). Closely allied to *S. schaeferii*, which has glabrous nodes and is far less common.]

*Flowering*: August to October and February to June. *Ecology*: Coarse sandy soils; in riverbeds or on gravel plains. *Frequency in southern Africa*: Locally common. *Distribution*: Tunisia and Egypt. N, B, NW, FS, NC, WC, EC.

Illustration: Chippindall: 299, fig. 265 (1955); Müller: 271 (2007).
Anatomy vouchers: *Ellis 883, 885, 893, 906, 907, 1737* & *2171*.
Voucher: *Smook 2896, Oliver, Muller & Steenkamp 6612*.


*Stipagrostis damarensis*

**Stipagrostis damarensis** (Mez) De Winter, in *Kirkia* 3: 134 (1963). Type: Namibia, Damaraland, Haigamkab, *Galpin & Pearson 7577* (PRE, iso.).

*Aristida damarensis* Mez, in *Feddes Repertorium* 17: 152 (1921).

Laxly tufted, robust perennial to 1 200 mm high, much branched near base; rhizome well developed when present; culm 1.2–5.0 mm wide. Leaf blade to 300 × 2–3 mm; lower surface with prickles on the nerves but sunk in intercostal cavities. Inflorescence extending beyond the leaves, elongate, narrow, compact, often interrupted, branches adpressed to main axis; spikelets erect. Spikelet 12–14 mm long; glumes glabrous or pilose near apex and on margins; upper glume 10–15 mm long; lemma articulation between apex of lemma and base of column; column well developed, long, glabrous; all three awns completely plumose, hairs long, silver-white; callus 1 mm long, hairy almost to apex, apex bluntly rounded; anther 4.2–5.0 mm long.

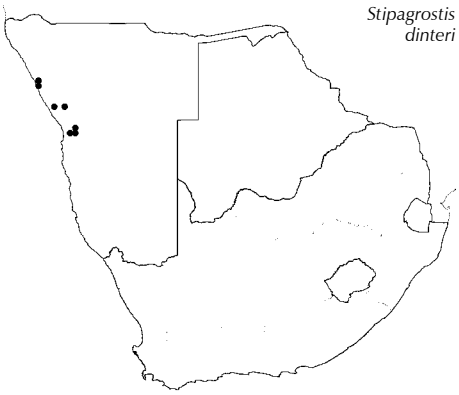
[Resembles *S. namaquensis*, which has the articulation in the middle of the lemma and the column not well developed.]

*Flowering*: March to June. *Ecology*: Riverbeds and drainage lines. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N.

Illustration: Müller: 151 (2007).
Voucher: *De Winter & Hardy 8131, Giess 7912*.

**Stipagrostis dinteri** (Hack.) De Winter, in *Kirkia* 3: 134 (1963). Type: Namibia, Hereroland, Kan, *Dinter 1485*.

*Aristida dinteri* Hack., in *Bulletin de l'Herbier Boissier* 2,1: 767 (1901).


*Stipagrostis dinteri*

Densely tufted slender perennial to 400 mm high; vegetative parts densely scabrid, often with round, usually crateriform glands; culm indistinctly striate or striations widely separate, densely covered with conspicuous prickles, if branched, not in fascicles. Leaf blade to 150 × to 1 mm. Inflorescence narrow, branched, interrupted. Spikelet 15–16 mm long; glumes pilose with short hairs (at least on margins); lower glume linear to lanceolate, tapering to a long acuminate apex; lemma articulation just above middle of lemma; column of variable length; central awn 40–100 mm long, plumose from lower $^1/_3$ to apex, lateral awns to $^1/_3$ the length of the central awn, not plumose; callus 2 mm long, apex distinct, naked, pungent; anther 5.0–7.2 mm long.

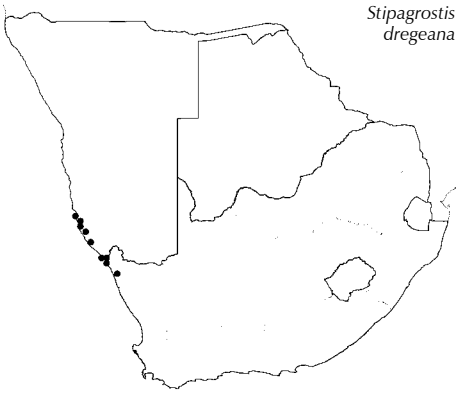
*Flowering*: November and February to May. *Ecology*: Loose sand; in riverbeds and on hills. *Frequency in southern Africa*: Locally common. *Distribution*: Angola. N.

Illustration: Müller: 273 (2007).
Anatomy voucher: *De Winter & Hardy 8209*.
Voucher: *Giess, Volk & Bleisner 6249; Giess 7984*.

**Stipagrostis dregeana** Nees, in *Florae Africanae australioris*: 172 (1841). Type: South Africa, Northern Cape, Little Namaqualand, near the mouth of the Orange River, *Drège 2543*.

*Aristida dregeana* (Nees) Trin. & Rupr., in *Graminum stipaceorum*: 169 (1842).

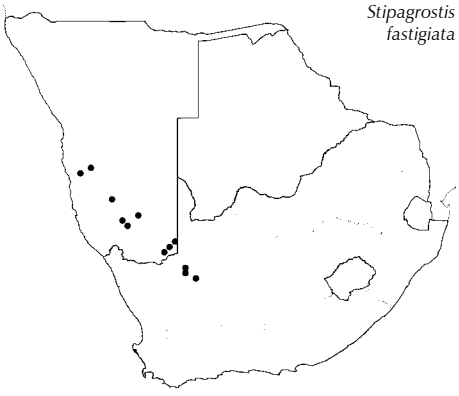
ROCK BUSHMAN GRASS


*Stipagrostis dregeana*

Laxly to densely tufted perennial to 300 mm high; erect to geniculate, branched at base; leaves mainly basal. Leaf blade to 135 mm long, setaceous, smooth, margins scabrid. Inflorescence open, nearly as long as wide, main axis visible, branches somewhat flexuous, with long naked basal parts; pedicels slender. Spikelet to 12 mm long; glumes glabrous, dark; lemma articulation between apex of lemma and base of column; column smooth, glabrous to branching point of the awns; only central awn plumose; callus 1–3 mm long, apex naked, pungent; anther 4.5–5.5 mm long.

*Flowering*: August and April. *Ecology*: Coarse sandy soils or shallow soils; between rocks and in depressions along roadside. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. N, NC.

Anatomy vouchers: *Kings 2572* & *Ellis 5077*.
Voucher: *Giess & Van Vuuren 682*.


*Stipagrostis fastigiata*

**Stipagrostis fastigiata** (Hack.) De Winter, in *Kirkia* 3: 134 (1963). Type: Namibia, Inachab, *Dinter 1120*.

*Aristida fastigiata* Hack., apud Schinz, in *Bulletin de l'Herbier Boissier* 1: 768 (1901).

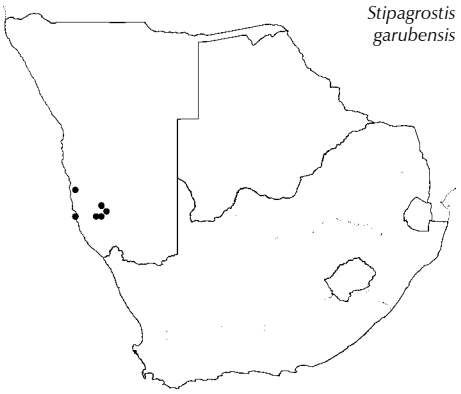
Suffruticose shrub or dwarf shrub to 600 mm high; rhizomes thick, much branched; leaves mainly cauline; culms fascicled. Leaf blade well developed, to 80 × 2–3 mm, often much shorter. Inflorescence usually elongate, exserted from uppermost leaf sheaths; spikelets in fascicles that are lax and interrupted along the inflorescence. Spike-

let 15 mm long; glumes densely hairy with long white hairs; lemma smooth, articulation between apex of lemma and base of column; column well developed, twisted; only central awn plumose; callus 2 mm long, apex naked, pungent; anther 4.2–5.7 mm long.

[Similar to *S. geminifolia*, which is usually smaller than 300 mm, the inflorescence as long as wide and the lower part enclosed in the swollen upper leaf sheath, and spikelet fascicles densely clustered.]

*Flowering*: February to June. *Ecology*: Sandy and alkaline soils. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NC. *Economics*: Pasture.

Illustration: Müller: 274 (2007).
Voucher: *Acocks 21790, Giess 13436*.


*Stipagrostis garubensis*

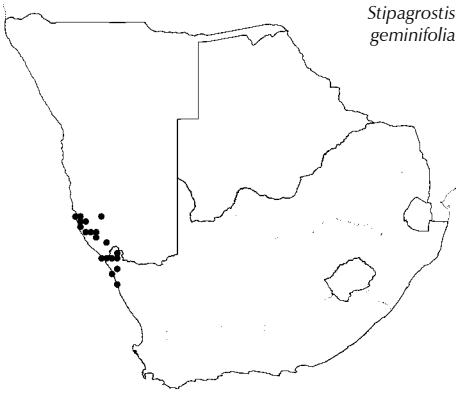
**Stipagrostis garubensis** (Pilg.) De Winter, in *Kirkia* 3: 134 (1963). Type: Namibia, Garub, Keisboden und Felsen bei 900 m.ü.m., *Range 508*; desgl. Bei 1300 m.ü.m., *Range 536* (syntypes).

*Aristida garubensis* Pilg., in *Engler Botanische Jahrbücher* 118: 343 (1912).

Shrub or dwarf shrub to 600 mm high; base robust, woody and branched; plant slender in upper parts; leaves flexuous, held at 45 degree angles from the culms. Leaf blade to 120 × to 1 mm, pungent. Spikelet 12–14 mm long; glumes often dark at the base; lemma apex densely tuberculate, articulation between apex of lemma and base of the column; column well developed, slender; only central awn plumose; callus 1.0–1.5 mm long, apex naked, pungent; anther 4.3–5.3 mm long.

*Flowering*: June, July and September. *Ecology*: Between rocks, especially granite; on hill slopes and in riverbeds. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N.

Anatomy voucher: *Kinges 2289*.
Voucher: *Kinges 2289*.


*Stipagrostis geminifolia*

**Stipagrostis geminifolia** Nees, in *Florae Africanae australioris*: 173 (1841). Type: South Africa, Northern Cape, Little Namaqualand, *Drège 2561*.

*Aristida geminifolia* (Nees) Trin. & Rupr., in *Graminum stipaceorum*: 169 (1842).

Shrub or dwarf shrub to 250 mm high, erect or geniculate; leaves mainly cauline. Leaf blade 10(–20) × to 2 mm, not well developed, usually very short, expanded, rigid. Inflorescence ovate to oblong, not or only slightly exserted from uppermost leaf sheath; spikelet fascicles densely clustered, the uppermost sometimes separated from the rest. Spikelet 10–14 mm long; glumes densely covered with long white hairs; lemma smooth; articulation between apex of lemma and base of column; column short, glabrous; only central awn plumose, hairs usually golden; callus 2 mm long, apex naked, pungent; anther 3.2–4.3 m long.

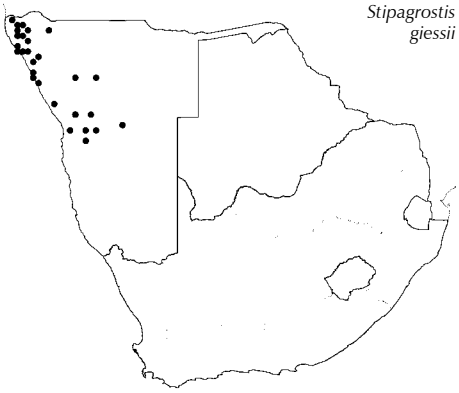
[Similar to *S. fastigiata*, which has an elongated inflorescence exserted from the upper leaf sheath and spikelet fascicles not densely clustered.]

*Flowering*: August to October and January to June. *Ecology*: Coarse, sandy soils in watercourses and open places on gravel plains. *Fre-*

*quency in southern Africa*: Infrequent to locally common. *Distribution*: Endemic. N, NC. *Economics*: Pasture.

Illustration: Chippindall: 302, fig. 268 (1955).
Anatomy vouchers: *Marloth 12415*; *Ellis 2168, 2169* & *2181*.
Voucher: *Ellis 2181*.

**Stipagrostis giessii** Kers, in *Svensk Botanisk Tidskrift*, Bd 65: 199–207 (1971). Type: Namibia, Kaokoveld, near Orupembe waterhole, *Kers 1736*.


*Stipagrostis giessii*

Tufted perennial to 800 mm high; vegetative parts scabrid; leaves mainly basal; culm striations distinct and close together, smooth or scaberulous with minute prickles. Leaf blade 70–250 × to 2 mm. Inflorescence narrow, branches of variable lengths; pedicels short, thick, erect. Spikelet 13–22 mm long; glumes papery, lower glume linear to lanceolate, glabrous, acuminate, tuberculate; lemma articulation at ± middle of lemma; column long, slender, twisted; central awn 40–100 mm long, plumose with long hairs on upper half and excurrent into a delicate naked apex; lateral awns not plumose, stout, at least $^1/_2$ the length of central awn; callus 2 mm long, apex naked, pungent; anther 5.0–6.8 mm long.

[Variable; differs from *S. hochstetteriana*, which has an unbranched inflorescence; hybrids with *S. hochstetteriana* have been reported (*De Winter & Hardy 8058*).]

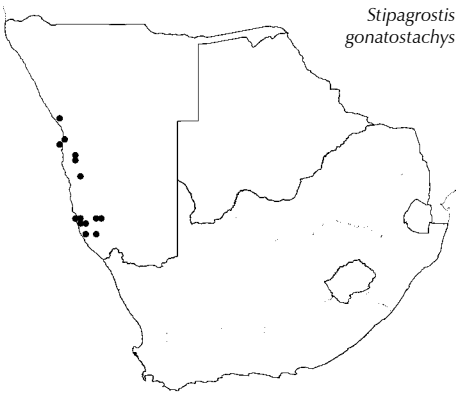
*Flowering*: November and March to June. *Ecology*: Sandy riverbeds, stony hills and gravel plains. *Frequency in southern Africa*: Locally common. *Distribution*: Angola. N.

Illustration: Müller: 277 (2007).
Anatomy voucher: *Smook 7737*.
Voucher: *De Winter & Hardy 8185, Giess & Leippert 7413*.

**Stipagrostis gonatostachys** (Pilg.) De Winter, in *Kirkia* 3: 134 (1963). Type: Namibia, Rote Kuppe, *Range 188; Dinter 1022* (syntypes).

*Aristida gonatostachys* Pilg., in Engler, *Botanische Jahrbücher* 48: 343 (1912).

ROUGH LEAVED BUSHMAN GRASS

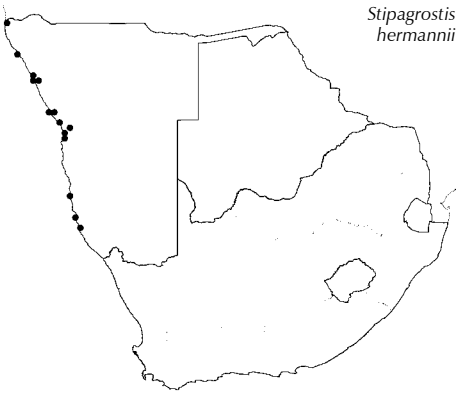

*Stipagrostis gonatostachys*

Densely tufted perennial to 200 mm high; leaves mainly basal; vegetative parts densely scabrid; culms not conspicuously striate. Leaf blade 40–50 mm long, folded. Inflorescence elongate, narrow, spiciform, sub-secund, base usually enclosed in upper leaf sheath. Spikelet 8–10 mm long; glumes scabrid or densely covered with long hairs; lemma smooth, articulation between apex of lemma and branching point of column; column well developed, scaberulous, if hairy at branching point, hairs less than 1.5 mm long; only central awn plumose; callus 1.5 mm long apex naked, pungent; anther 2.5–4.5 mm long.

[Easily confused with the more widespread *S. obtusa*, which has a shorter callus, an inflorescence which is not sub-secund and is well exserted from the upper leaf sheath.]

*Flowering*: September to December and March to June. *Ecology*: Coarse to fine sand; between rocks on mountain slopes, and in depression on plains where water collects. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. N.

Voucher: *Giess 13421, De Winter & Hardy 8098*.


*Stipagrostis hermannii*

**Stipagrostis hermannii** (Mez) De Winter, in *Kirkia* 3: 134 (1963). Type: Namibia, Lüderitzbucht, *Hermann 42*.

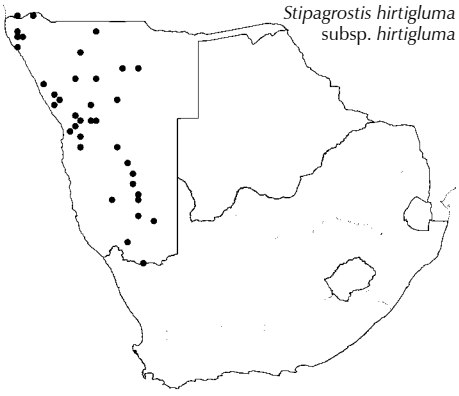
*Aristida hermannii* Mez, in *Feddes Repertorium* 17: 153 (1921).

Laxly tufted annual to 150 mm high, geniculate to prostrate; culms well developed, extending somewhat from the basal tuft of leaves. Leaf blade 10–20 × to 2 mm, densely scabrid. Inflorescence narrow, dense, much branched for most of its length, main axis hidden, base partly enclosed in the upper leaf sheath. Spikelet 9–14 mm long; glumes glabrous, apex long tapering, acuminate; lemma articulation between apex of lemma and base of column; column length variable, densely short-hairy, hairs shorter than 1.5 mm long on the swollen branching point of awns; only central awn plumose; callus 1.5 mm long, apex naked, pungent; anther 1.8–2.3 mm long.

[Closely allied to *S. subacaulis*, which has a glabrous column and a callus 0.8–1.0 mm long.]

*Flowering*: January to August. *Ecology*: Sandy areas; on hills and plains. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N.

Anatomy voucher: *Kinges 2634*.
Voucher: *Giess & Robinson 13212, Dinter 6396*.


*Stipagrostis hirtigluma* subsp. *hirtigluma*

**Stipagrostis hirtigluma** (Trin. & Rupr.) De Winter subsp. **hirtigluma**, in *Kirkia* 3: 134 (1963). Type: Arabia.

*Aristida hirtigluma* Trin. & Rupr., in *Graminum stipaceorum*: 171 (1842).

Tufted, erect annual to 500 mm high; leaves mainly basal; culm conspicuously striate, smooth. Leaf blade 60–200 mm long, setaceous. Inflorescence narrow, much longer than wide. Spikelet 10–15 mm long; glumes hairy, long hairs on both sides of central nerve along inner and outer surfaces; lemma articulation between apex of the lemma and base of column; column variable in length and hairiness; only central awn plumose; callus 0.4 mm long, with a distinct glabrous break between the short hairs on callus body and the long hairs at the junction between lemma and callus (best seen at the back), apex long, naked, pungent; anther 3.5–4.5 mm long.

[Barely distinguishable from subsp. *pearsonii*, which has an open, spreading inflorescence not much longer than wide, and subsp. *patula*, a perennial.]

*Flowering*: April to May. *Ecology*: Not habitat selective; grows on sandy or gravelly soils as well as rocky substrates. *Frequency in southern Africa*: Locally common. *Distribution*: To Angola, North Africa, and the desert areas of West Africa and the Middle East . N.

Illustration: Müller: 279 (2007).
Anatomy voucher: *Ellis 908*.
Voucher: *Giess 3034*.

**Stipagrostis hirtigluma** (Trin. & Rupr.) De Winter subsp. **patula** (Hack.) De Winter, in *Kirkia* 3: 134 (1963). Type: Mozambique, Boroma, *Menyharth 601* (Z, holo.).

*Aristida gracilior* Pilg. var. *gracilior*, in Engler, *Botanische Jahrbücher* 40: 80 (1907).

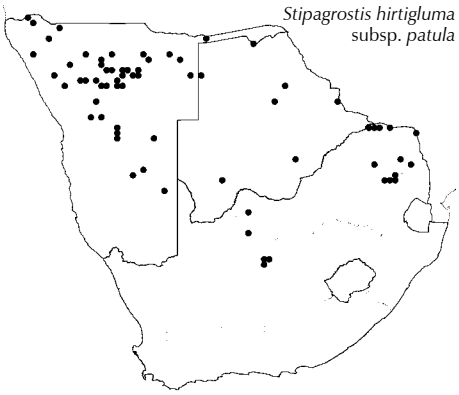
Densely tufted erect perennial to 600 mm high; leaves mostly in dense basal tufts; culm conspicuously striate, smooth. Leaf blade to

200 mm long, setaceous. Inflorescence open, spreading, not much longer than wide. Spikelet 12–13 mm long; glumes brown, usually flushed purple, densely hairy; lemma densely tuberculate; articulation between apex of lemma and base of column; column well developed, stout; only central awn plumose, long spreading hairs cover entire awn and extend for varying lengths down the column; callus 0.7 mm long, with a distinct glabrous break between short hairs on the callus body and long hairs at the junction of the lemma and callus apex pungent, naked; anther 3.2–4.0 mm long.

[Hybrids between subsp. *patula* and *S. uniplumis* var. *neesii* have been reported; they are recognised by being perennial, with hairy glumes and a *S. uniplumis*-type callus (*Volk 2338*).]

*Flowering*: February to July. *Ecology*: Calcareous soils or sandy areas near limestone; around pans, on floodplains or rocky ridges. *Frequency in southern Africa*: Locally common. *Distribution*: Tropical Africa. N, B, LIM, M, NW, NC.

Illustration: Müller: 281 (2007).
Voucher: *De Winter & Giess 7135*.


*Stipagrostis hirtigluma* subsp. *patula*

**Stipagrostis hirtigluma** (Trin. & Rupr.) De Winter subsp. **pearsonii** (Henrard) De Winter, in *Kirkia* 3: 134 (1963). Type: Angola, between Mossamedes and River Coroca, *Pearson 2249*.

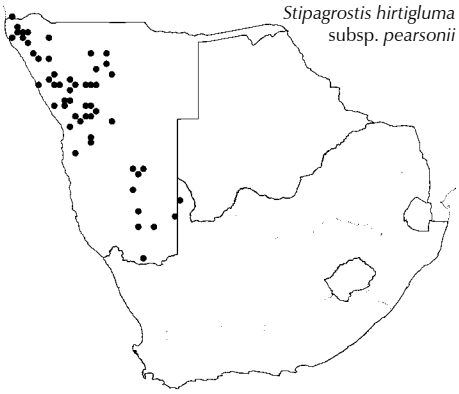
*Aristida gracilior* Pilg. var. *pearsonii* Henrard, in *A Critical Revision of* Aristida 3: 695 (1928).

Densely tufted annual to 800 mm high; leaves basal, sparse; culm erect or geniculate, conspicuously striate, smooth. Leaf blade to 200 mm long, setaceous. Inflorescence open, spreading, not much longer than wide. Spikelet 10–13 mm long; glumes densely hairy; lemma articulation between apex of lemma and base of column; column thick; callus 0.7 mm long, with a distinct glabrous break between short hairs on the callus body and the long hairs at the junction of the lemma and callus, apex naked, pungent; anther 3.5–5.3 mm long.

[Barely distinguishable from subsp. *hirtigluma*, which has a much narrower inflorescence that is longer than wide when fully exserted; and from subsp. *patula*, which is a definite perennial.]

*Flowering*: January to May. *Ecology*: Sandy soils; on gravel flats, and stony hills between rocks. *Frequency in southern Africa*: Locally common. *Distribution*: Angola. N, NC. *Economics*: Not highly palatable but utilised.

Illustration: Müller: 283 (2007).
Voucher: *Oertendahl 158, De Winter & Leistner 5621.*

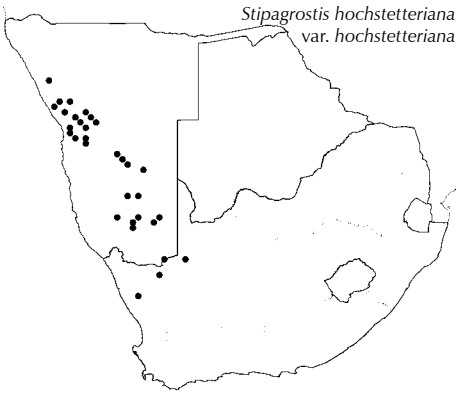

*Stipagrostis hirtigluma* subsp. *pearsonii*

**Stipagrostis hochstetteriana** (Beck ex Hack.) De Winter var. **hochstetteriana**, in *Kirkia* 3: 134 (1963). Type: Namibia, 100 km east of Walfish Bay, *Wyley s.n.*

*Aristida hochstetteriana* Beck ex Hack., in *Verhandlungen des Botanischen Vereins der Provinz Brandenburg* 30: 144 (1888).

SPIKE BUSHMAN GRASS

Densely tufted erect perennial to 900 mm high; leaves mainly basal. Leaf blade 250–400 × 2.0–2.5 mm. Inflorescence spike-like, narrow, unbranched; pedicels thick. Spikelet 15–20 mm long; lower

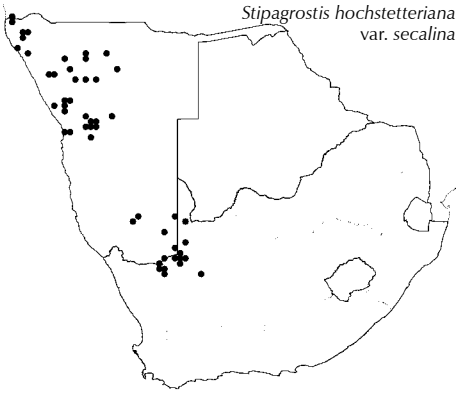

*Stipagrostis hochstetteriana* var. *hochstetteriana*

glume linear to lanceolate, with long, rigid, erect hairs usually on either side of the keel, apex long acuminate, membranous; lemma articulation around middle of lemma; column well developed, slender; central awn 40–100 mm long, plumose in upper $^{2}/_{3}$; lateral awns not plumose; callus 2 mm long, apex naked, pungent; anther 5.0–6.2 mm long.

[Distinguished from var. *secalina*, which has lower glume hairless; and from *S. giessii*, which has the inflorescences branched; hybrids with *S. giessii* have been reported (*De Winter & Hardy 8097*).]

*Flowering*: November to June. *Ecology*: Sandy to clay, and often calcareous soils; on rocky slopes and on gravels, disturbed areas at roadsides or in river courses. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic, possibly occurring in Angola. N, NC.

Illustration: Chippindall: 297, fig. 263 (1955); Müller: 153 (2007).
Anatomy vouchers: *Gerstner 6310, De Winter 2660* & *Ellis 909*.
Voucher: *Muller 116, De Winter 3254*.


*Stipagrostis hochstetteriana* var. *secalina*

**Stipagrostis hochstetteriana** (Beck ex Hack.) De Winter var. **secalina** (Henrard) De Winter, in *Kirkia* 3: 134 (1963). Type: Namibia, between Walfish Bay and Okahandja in Hereroland, *Lüderitz 43* & *73* (syntypes).

*Aristida secalina* Henrard, in *A Critical Revision of* Aristida 3: 552 (1928).

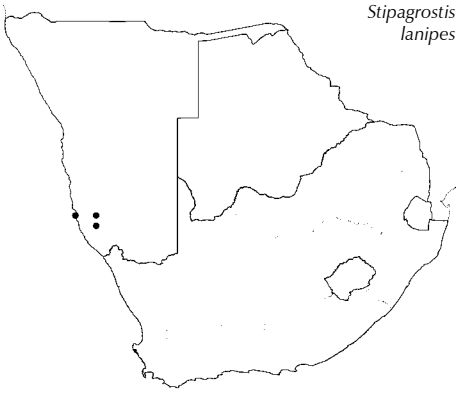
Rye bushman grass

Densely tufted erect perennial to 900 mm high; leaves mainly basal. Leaf blade to 400 × 2 mm. Inflorescence spike-like, narrow, unbranched; pedicels thick. Spikelet 15–20 mm long; lower glume linear to lanceolate, apex long acuminate, membranous, glabrous; lemma articulation around middle of lemma; column well developed, slender; central awn 40–100 mm long, plumose, hairs only on upper $^{2}/_{3}$; lateral awns not plumose; callus 2 mm long, apex naked, pungent; anther 6.0–7.0 mm long.

[Distinguished from var. *hochstetteriana*, which has erect hairs on back of lower glume; and from *S. giessii*, which has a branched inflorescence.]

*Flowering*: February to June. *Ecology*: Sandy soil and limestone; on rocky slopes. *Frequency in southern Africa*: Locally common. *Distribution*: North to Angola. N, NC. *Economics*: Said to cause grass balls in sheep.

Illustration: Müller: 155 (2007).
Anatomy voucher: *De Winter 3408*.
Voucher: *Theron 3834, De Winter 3048*.


*Stipagrostis lanipes*

**Stipagrostis lanipes** (Mez) De Winter, in *Kirkia* 3: 135 (1963). Type: Namibia, Luderitz Bay, 50 km west of Kuibis, *Range 1822*.

*Aristida lanipes* Mez, in *Feddes Repertorium* 17: 153 (1921).

Woolly bushman grass

Densely tufted perennial to 600 mm high; basal leaf sheaths densely woolly hairy; leaves mainly basal. Leaf blade to 25 mm long. Inflorescence contracted, interrupted, much branched, branches bearing spikelets to near the base. Spikelet to 9.5 mm long; glumes glabrous, pallid; lemma articulation between apex of lemma and base of col-

umn; column densely scabrid; only central awn distinctly plumose; callus 1.4–1.6 mm long; anther 4.3–4.8 mm long.

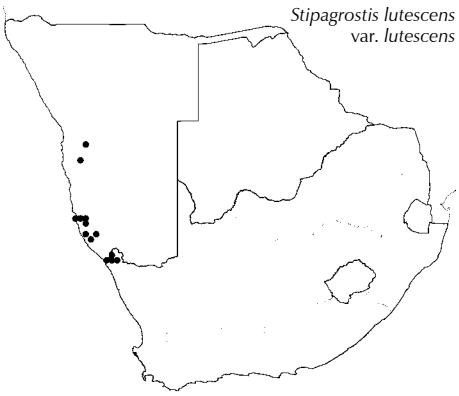
[There are very few specimens that can definitely be identified as *S. lanipes* and its status as a species distinct from *S. obtusa* is somewhat doubtful.]

*Flowering*: August. *Ecology*: Sandy soils on slopes. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. (if distinct from *S. obtusa*, which occurs in North Africa, Sinai Peninsula and Iraq to Pakistan). N. (around Luderitz).

Anatomy voucher: *De Winter & Giess 6133*.
Voucher: *De Winter & Giess 6133*.

**Stipagrostis lutescens** (Nees) De Winter var. **lutescens**, in *Kirkia* 3: 135 (1963). Type: South Africa, Northern Cape, Zilverfontein, *Drège 2040*.

*Aristida lutescens* (Nees) Trin. & Rupr., in *Graminum stipaceorum*: 173 (1842).


*Stipagrostis lutescens* var. *lutescens*

Shrub or dwarf shrub 700–1 000 mm high; rhizome long, branched; plant robust in upper parts; leaves mainly cauline, rigid, usually held at 90 degree angles from the culm; culms stout, much branched, fascicled in lower parts, nodes glabrous. Leaf blade relatively short to 100 × to 2 mm, flat or folded, distinctly pungent. Inflorescence open, axils of branches glabrous. Spikelet 12–14 mm long; glumes 8–14 mm long, glabrous; lemma articulation between apex of lemma and base of column; column well developed, glabrous or occasionally hairy; all three awns or only central awn plumose; callus 2.0–2.5 mm long, apex narrow, naked, pungent; anther 4.5–5.0 mm long.

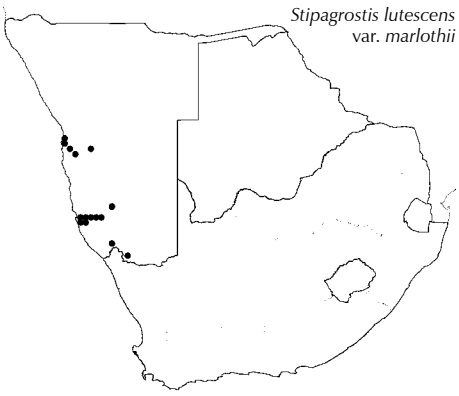
[Similar to var. *marlothii*, which has hairy nodes and hairs in the axils of the inflorescence branches.]

*Flowering*: March, and July to October. *Ecology*: Sandy soils. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. N, NC.

Anatomy voucher: *Ellis 2167*.
Voucher: *Schlieben 11480*.

**Stipagrostis lutescens** (Nees) De Winter var. **marlothii** (Hack.) De Winter, in *Kirkia* 3: 135 (1963). Type: Namibia, Sandfontein near Walfish Bay, *Marloth 1176*.

*Aristida marlothii* Hack. in Engler, *Botanische Jahrbücher* 11: 400 (1889).


*Stipagrostis lutescens* var. *marlothii*

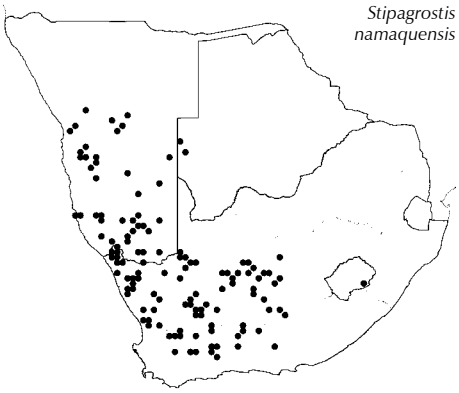
LEEUGRAS

Shrub or dwarf shrub to 1 500 mm high; plant robust in upper parts; rhizome long, strong, branched; leaves mainly cauline, usually held at 90 degree angles from culm; culms branched, fascicled in lower part, nodes bearded with long spreading hairs. Leaf blade relatively short, to 150 (usually shorter) × 2–3 mm, rigid, flat or folded, distinctly pungent. Inflorescence open, hairy in axils of branches. Spikelet 12–14 mm long; glumes 8–14 mm long, glabrous; lemma articulation between apex of lemma and base of column; column well developed, glabrous or with occasional hairs; all three awns or only central awn plumose, hairs long, silvery; callus 2.0–2.5 mm long, apex narrow, naked, pungent; anther 5.5–6.3 mm long.

[Differs from var. *lutescens*, which has glabrous nodes and no hairs in axils of inflorescence branches.]

*Flowering*: January to December. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N.

Anatomy vouchers: *Strey 2445*.
Voucher: *De Winter & Hardy 7891*.


*Stipagrostis namaquensis*

**Stipagrostis namaquensis** (Nees) De Winter, in *Kirkia* 3: 135 (1963). Type: South Africa, Northern Cape, Namaqualand, *Ecklon*; Namaqualand, *Zeyher* 39 (syntypes).

*Aristida namaquensis* (Nees) Trin. & Rupr., in *Graminum stipaceorum*: 174 (1842).

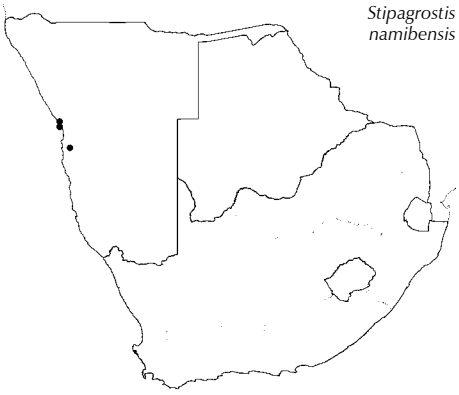
River bushman grass, steekriet boesmangras

Robust to slender shrub or dwarf shrub to 2 000 mm high, erect, densely tufted or sprawling; rhizomes long, robust; culm branches usually fascicled from nodes, rarely solitary; plant glabrous and smooth, except upper and basal leaf sheaths, which are adpressed woolly hairy; leaf blades break off early, leaving the sheaths, and exposing the upper part of the internode, which is usually dark, giving the characteristic banded appearance. Leaf blade 60–100 mm long, setaceous, often pungent. Inflorescence elongate, narrow, interrupted; spikelets clustered. Spikelet 15–30 mm long (including awns); glumes straw-coloured; upper glume 10–14 mm long; lemma articulation at about middle of lemma; beak short, twisted; all three awns plumose; callus 1.5 mm long, apex naked, pungent; anther 4.7–6.0 mm long.

[Similar to *S. amabalis*, which has only the central awn plumose and longer, less pungent leaves. Hybridises with *S. brevifolia* (*De Winter 3266*).]

*Flowering*: February to May and July to December. *Ecology*: On loose gravelly soils; dry river courses, rarely on sand dunes. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, B, ?L (more specimens are needed to confirm this distribution), FS, NC, WC, EC. *Economics*: Drought resistant; grazed by karakul sheep; erosion control as a good sand binder and silt catcher.

Illustration: Chippindall: 298, fig. 264 (1955); Müller: 285 (2007).
Anatomy vouchers: *Ellis 859, 881, 882 & 1736*.
Voucher: *Ward 254, Smook 4488, Du Toit 2614* (L).


*Stipagrostis namibensis*

**Stipagrostis namibensis** De Winter, in *Bothalia* 8: 173 (1964). Type: Namibia, Omaruru District, 11 miles east of Omaruru River mouth, *De Winter & Hardy 8119* (PRE, holo.).

Tufted or sprawling lax annual to 300 mm high; leaves mainly basal. Leaf blade to 30 × to 1 mm, scabrid, flat or slightly folded. Inflorescence narrow but open, much branched, main axis visible. Spikelet 8–9 mm long; glumes firm, glabrous, apex membranous; lemma granular, especially around the articulation; articulation between apex of lemma and base of column; column length variable, hairy, hairs shorter than 1.5 mm; only central awn plumose; callus 1.0–1.6 mm long, apex naked, pungent; anther 3–4 mm long.

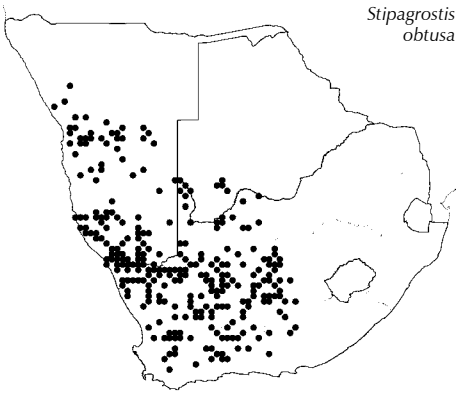
*Flowering*: March to June. *Ecology*: On sandy and gravel plains; in depressions where water collects. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic, possibly Angola. N.

Voucher: *Giess, Volk & Bleissner 5739*.

**Stipagrostis obtusa** (Delile) Nees, in *Linnaea* 7: 293 (1832). Type: Egypt.

*Aristida obtusa* Delile, in *Flore d' Egypte with explications des planches* 2: 175, t. 13, fig. 2 (1813).

KORTBEENBOESMANGRAS

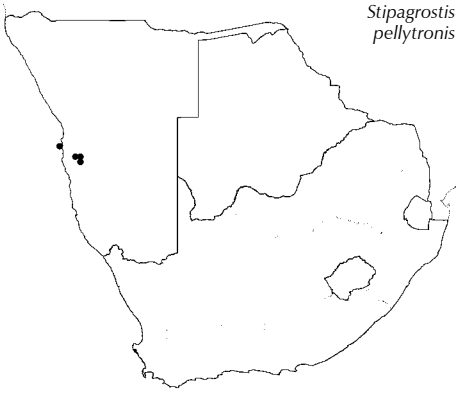

*Stipagrostis obtusa*

Compact, densely tufted to 600 mm high; basal sheaths glabrous or hairy, but not with densely matted, woolly hairs; leaves markedly basal, often curved, glabrous or with scattered long bulbous-based hairs. Leaf blade 10–250 × to 1 mm. Inflorescence usually contracted, interrupted; much branched, branches bearing spikelets to near base. Spikelet 11–12 mm long; glumes pallid, firm, apices and margins membranous, glabrous, scabrid; lemma articulation between apex of lemma and base of column; column length variable, scabrid to branching point of awns; only central awn plumose; callus 1.5 mm long, apex naked, varying from pungent to minutely bifid; anther 3.3–4.4 mm long.

*Flowering*: July to May. *Ecology*: Mainly sandy soils; in dry areas. *Frequency in southern Africa*: Common. *Distribution*: Disjunct distribution, also in North Africa, Sinai Peninsula and Iraq to Pakistan. N, B, NW, FS, NC, WC, EC. *Economics*: Good fodder; sand binder for erosion control.

Illustration: Chippindall: 303, fig. 269 (1955); Müller: 287 (2007).
Anatomy vouchers: *Ellis 771, 854, 873, 876 & 887.*
Voucher: *Smook 4515; Oliver, Muller & Steenkamp 6615; Skarpe 5240*.

**Stipagrostis pellytronis** De Winter, in *Bothalia* 20: 85 (1990). Type: Namibia, Namib Naukluft Park, Tsondab Vlei, on south-facing scree slope, *Jensen (Seely) s.n.* (PRE, holo.).


*Stipagrostis pellytronis*

Caespitose perennial 300–400 mm high; leaves mainly basal; basal sheaths covered with woolly hairs; culm nodes covered by a raised ring of dense woolly hairs. Leaf blade (10–)40(–110) × 3–5 mm, expanded. Inflorescence spike-like, short, borne singly or several together, enclosed in upper leaf sheaths. Spikelet 12–16 mm long; glumes lanceolate, pallid, chartaceous; lemma articulation slightly below middle; only central awn densely plumose with spreading silver hairs, column absent; callus ± 2.5 mm long, strongly spirally twisted when matured, tapering into a glabrous bifid point; anther 6 mm long.

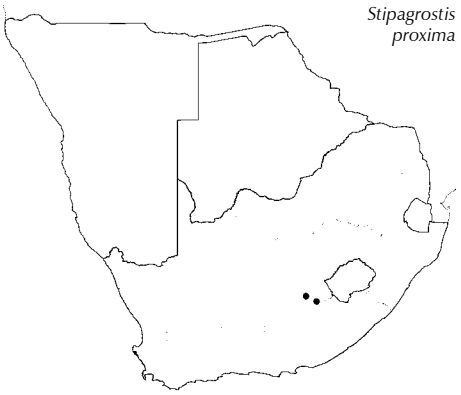
*Flowering*: September to May. *Ecology*: Occurs in red sandy soils on scree slopes at base of sandstone cliffs or at the edge of gravel mountains. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. Apparently limited to exposures of Tsondap Sandstone within the Central Namib dune sea. N.

Voucher: *Ward 256*.

**Stipagrostis proxima** (Steud.) De Winter, in *Kirkia* 3: 135 (1963). Type: South Africa, Eastern Cape, Aliwal North; between Kraai River and Witte Bergen, *Zeyher 194*.

*Aristida proxima* Steud., in *Synopsis plantarum glumacearum*: 145 (1855).

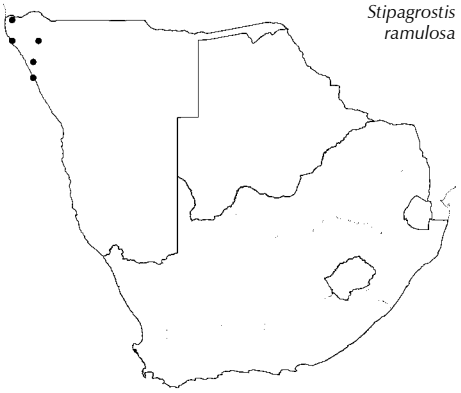
Tufted, erect shrub or dwarf shrub to 600 mm high; rhizomes long; culms and leaves grooved with dense adpressed hairs, hairs becom-


*Stipagrostis proxima*

ing denser, longer and more obvious below nodes. Leaf blade to 100 mm long, usually less, setaceous, rolled. Inflorescence narrow, branches densely hairy, hairs longer and thicker on swollen part just below spikelet. Spikelet to 14 mm long (including awns); glumes firm, acute; upper glume 7–9 mm long; lemma articulation about middle of lemma; column short, stout; all three awns plumose down to branching point and just below on column; callus 1.5–2.0 mm long, narrow, apex very short, pungent; anther 3.3–3.5 mm long.

*Flowering*: November. *Ecology*: Sandy soils; in disturbed areas. *Frequency in southern Africa*: Rare. Infrequent. *Distribution*: Endemic. FS, EC.

Anatomy voucher: *Flanagan 1892*.
Voucher: *Vorster 85, Flanagan 1657*.

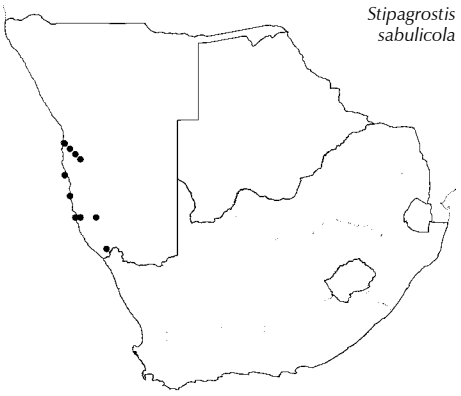

*Stipagrostis ramulosa*

**Stipagrostis ramulosa** De Winter, in *Bothalia* 8: 173 (1964). Type: Namibia, Outjo, Unjab River mouth 12.9 miles north of Torra Bay on coast road, *De Winter & Hardy 8197* (PRE, holo.).

Densely tufted slender perennial 400–600 mm high; plant delicate; leaves pungent, erect, usually overtopping the inflorescence; culm to 1.2 mm wide, slender, fascicled from the nodes. Leaf blade to 110 mm long, lower leaf surface rough, densely covered with adpressed prickles. Inflorescence elongate, narrow, sparsely branched, spikelets few. Spikelet to 9 mm long; upper glume 7–9 mm long; lemma articulation near apex of lemma; column very short; all three awns plumose to branching point of awns, apices not plumose; callus 2 mm long, narrow, apex naked, pungent; anther 1.8–2.3 mm long.

*Flowering*: November, January, and April. *Ecology*: Sandy soils; between small dunes, in riverbeds, near water. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. N. *Economics*: Grazed by game.

Voucher: *Giess, Volk & Bleissner 6294, sheet 1 & 2*.


*Stipagrostis sabulicola*

**Stipagrostis sabulicola** (Pilg.) De Winter, in *Kirkia* 3: 135 (1963). Type: Namibia, Rooibank near Walfish Bay, *Schultze 379*; Zwartbank along Kuiseb River, *Gürich 119* (syntypes).

*Aristida sabulicola* Pilg., in Engler, *Botanische Jahrbücher* 40: 81 (1908).

Namib dune bushman grass

Lax to densely tufted reed-like shrub or dwarf shrub to 2 000 mm high; rhizomes robust, much branched; culm 1.2–5.0 mm wide, fasciculately branched from nodes; leaves erect, overtopping inflorescence. Leaf blade 250–600 × to 3 mm, folded, straight, rigid, pungent. Inflorescence narrow, spike-like, dense, elongate, 143–235 mm long, usually partly enclosed in uppermost leaf sheath. Spikelet 8–14 mm long; glumes not curved, straw-coloured, turning brown with age; lemma articulation near apex of lemma; column short, stout; all three awns plumose down to and around the branching point, equal to subequal; callus 1.5–2.0 mm long, apex pungent but barely naked; anther 3.5–4.5 mm long.

*Flowering*: December to January. *Ecology*: Dune tops, sandy gullies and riverbeds. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N. *Economics*: Plaited into mats to cover huts.

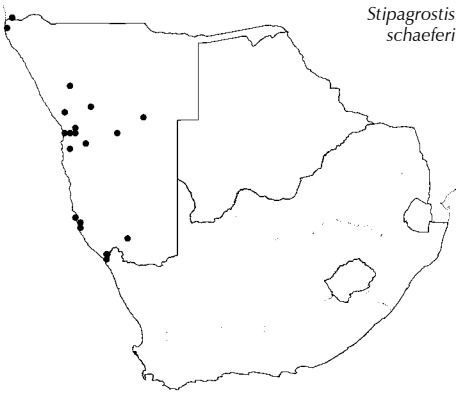
Anatomy voucher: *Keet 1612*.
Voucher: *Coetzee & Werger 1791a, Giess & Robinson 13233*.

**Stipagrostis schaeferi** (Mez) De Winter, in *Kirkia* 3: 136 (1963). Type: Namibia, Pomona, *Schäfer 549*.

*Aristida schaeferi* Mez var. *biseriata* Henrard, in *Monograph of the genus* Aristida 1: 41 (1929). Type: Namibia, Welwitschia (Khorixas), *Galpin & Pearson 7590* (PRE, iso.).

*Aristida schaeferi* Mez var. *schaeferi*, in *Feddes Repertorium* 17: 152 (1921).

WOOLLY LEAVED BUSHMAN GRASS


*Stipagrostis schaeferi*

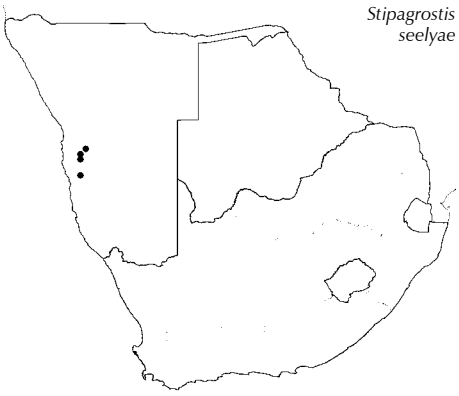
Densely tufted perennial to 700 mm high, cushion-forming; rhizome short, knotty; basal young sheaths usually woolly hairy; leaves mainly basal, basal leaves shorter than cauline leaves; culm nodes glabrous. Leaf blade to 100 × to 2 mm. Inflorescence narrow or open, pedicels always flexuous. Spikelet 12–15 mm long; glumes firm; lower glume narrowly oblong to oblong, apex obtuse to truncate, firm, glabrous or with rigid hairs; lemma articulation near middle of lemma; column well developed, scabrid; only central awn plumose, hairs often yellowish; callus 2 mm long, apex naked, pungent; anther 4.5–6.0 mm long.

[Closely allied to *S. ciliata* var. *capensis*, which has culm nodes with long spreading hairs and is more common and widespread.]

*Flowering*: August to November, and March to June. *Ecology*: Sandy gravel soils; in hollows in rocky outcrops or on gravel plains and along dry watercourses. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NC.

Anatomy vouchers: *Kinges 2423, 2586; Volk 26*.
Voucher: *Giess & Van Vuuren 662*.

**Stipagrostis seelyae** De Winter, in *Bothalia* 20: 82 (1990). Type: Namibia, Namib Naukluft, Mniszechi's Vley, *Seely 2156* (PRE, holo.).


*Stipagrostis seelyae*

Sparse to densely tufted perennial, robust ± 1 000 mm high; rhizomes short, woody; leaf sheaths glabrous, smooth, straw-coloured, basal ones reduced to cataphylls; leaves overtopping inflorescence; culm nodes glabrous. Leaf blade (15)40–70(140) × ± 2 mm, rigid, terete, canaliculate, pungent, slightly curved, stiffly erect or spreading. Inflorescence 20–50 mm long, somewhat open, branches reflexed at maturity. Spikelet 11–12 mm long (including awns); glumes usually curved, straw-coloured, firmly chartaceous, margins thin; lower glume ovate-lanceolate, apex obtuse; upper glume 8–9 mm long; lemma articulation ± 1 mm below branching point of awns, column absent; all three awns densely plumose with silvery spreading hairs; callus about ± 1.5 mm long, densely hairy, apex pungent; anther 4 mm long.

*Flowering*: October to June. *Ecology*: Occurs extensively in the eastern Namib dunes on the middle and upper dune slopes. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N.

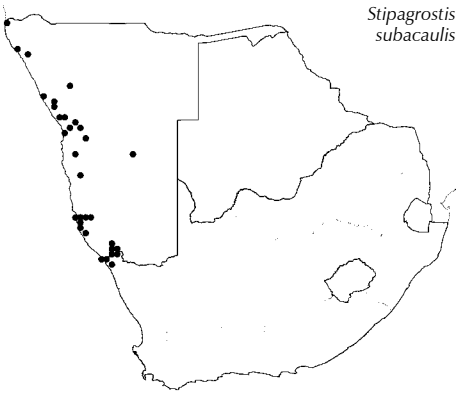
Voucher: *Seely 2155*.

**Stipagrostis subacaulis** (Nees) De Winter, in *Kirkia* 3: 136 (1963). Type: South Africa, Northern Cape, Verleptpram, *Drège* (PRE, iso.).

*Aristida subacaulis* Nees ex Steud., in *Nomenclator botanicus* 2,1: 132 (1842).

STEMLESS BUSHMAN GRASS

Compactly tufted to prostrate and spreading annual to 100 mm high; leaves mainly basal; culms short, very poorly developed. Leaf blade to 30 × to 1 mm. Inflorescence contracted, dense, much branched,

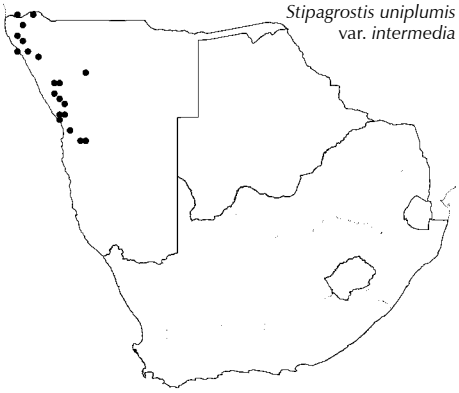

*Stipagrostis subacaulis*

main axis not visible. Spikelet 15–16 mm long; glumes glabrous; lemma articulation between apex of lemma and base of column; column very long, glabrous or sometimes with a few scattered hairs shorter than 1.5 mm; only central awn plumose; callus 0.8–1.0 mm long, apex naked, pungent; anther 1.7–2.5 mm long.

[Similar to and often occurring with *S. hermannii*, which has the column densely hairy on the swollen area at the branching point of awns, and callus 1.5 mm long.]

*Flowering*: January to November. *Ecology*: Coarse sandy soils, often in soils with gypsum; on stony hillsides, and depressions on gravel flats. *Frequency in southern Africa*: Locally common. *Distribution*: Southern Angola. N, NC.

Illustration: Chippindall: 301, fig. 267 (1955).
Anatomy vouchers: *Kinges 2633* & *Schweickerdt 2241*.
Voucher: *Giess 7844*.


*Stipagrostis uniplumis* var. *intermedia*

**Stipagrostis uniplumis** (Licht.) De Winter var. **intermedia** (Schweick.) De Winter, in *Bothalia* 8: 173 (1964). Type: Namibia, Damaraland, *Galpin & Pearson 7402*.

*Aristida gracilior* Pilg. var. *intermedia* Schweick., in *Bothalia* 4,1: 124 (1941).

Tufted annual to 600 mm high; leaves mainly basal; culms conspicuously striate. Leaf blade 100–200 × to 1 mm, flat or folded. Inflorescence dense, branches long, flexuous. Spikelets 8–10 mm long; glumes hairy, apex membranous; lemma densely tuberculate around point of articulation, lemma articulation between apex of lemma and base of column; column well developed, a distinct pencil of long spreading hairs at branching point of awns and down for a variable distance; central awn distinctly plumose except in lower $^1/_3$; only central awn plumose; callus 0.5–1.5 mm long, with long hairs at junction between lemma and callus and short hairs for the rest of its length, apex naked, pungent; anther 2.2–4.2 mm long.

[Easily confused with var. *uniplumis*. Somewhat intermediate between *S. uniplumis* var. *uniplumis*, which has a callus with short hairs over the entire length, and *S. hirtigluma*, which has hairy glumes and a distinct glabrous break between the short hairs along the length of callus and the long hairs at junction of the lemma and callus.]

*Flowering*: March to June (rain dependent). *Ecology*: On sandy and gravel plains; in depressions where water collects. *Frequency in southern Africa*: Infrequent to common. *Distribution*: Endemic, (possibly in southern Angola). N.

Illustration: Müller: 289 (2007).
Anatomy voucher: *De Winter 3059*.
Voucher: *De Winter & Hardy 8160, Giess 7848*.

**Stipagrostis uniplumis** (Licht.) De Winter var. **neesii** (Trin. & Rupr.) De Winter, in *Kirkia* 3: 136 (1963). Type: South Africa, Northern Cape, Colesberg, *Drège*.

*Aristida uniplumis* Licht. var. *neesii* Trin. & Rupr., in *Graminum stipaceorum*: 173 (1842).

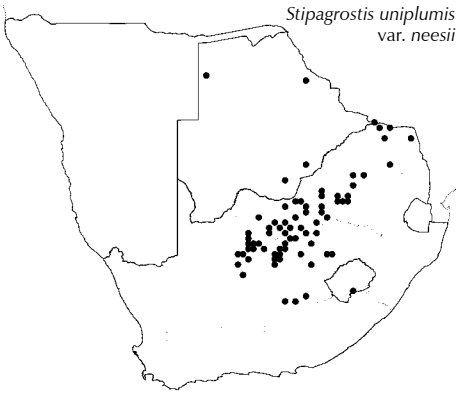
Laxly tufted perennial to 900 mm high, erect; rhizomes short, branched; leaves mainly basal. Leaf blade to 160 mm long, seta-

ceous. Inflorescence narrow; spikelets few. Spikelet 10.0–14.5 mm long; glumes 10 mm or longer, glabrous; lemma tuberculate just below articulation point, articulation between apex of lemma and base of column; column well developed and plumed in upper half of its length, hairs longer than 1.5 mm; only central awn plumose, usually hairy to branching point but not the apex, diverging at right angles from the column; callus 1.0–1.5 mm long, with short hairs along the entire length and long hairs at the junction of lemma, apex naked, pungent; anther 3.7–4.7 mm long.

[Grades into var. *uniplumis*, which has more spikelets in the panicle, shorter glumes and a straight central awn.]

*Flowering*: December to May. *Ecology*: Mainly gravel soils, sometimes sandy soils on dolomite or over surface limestone; rocky slopes. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. B, L, LIM, NW, G, FS, NC, EC. *Economics*: Good grazing.

Anatomy vouchers: *De Winter 793* & *Ellis 1501*.
Voucher: *De Winter 793, Scheepers 1516*.


*Stipagrostis uniplumis* var. *neesii*

**Stipagrostis uniplumis** (Licht.) De Winter var. **uniplumis**, in *Kirkia* 3: 136 (1963). Type: South Africa, Western Cape, by the Gamka River, *Lichtenstein s.n.*

*Aristida uniplumis* Licht. var. *pearsonii* Henrard, in *A critical revision of the genus* Aristida, 54b: 647 (1928). Type: Angola, Inter Gambes Mission Station, *Pearson 2482*.

*Aristida uniplumis* Licht. var. *uniplumis*, in Roem & Schult., in *Systema Vegetabilium* 2: 401 (1817).

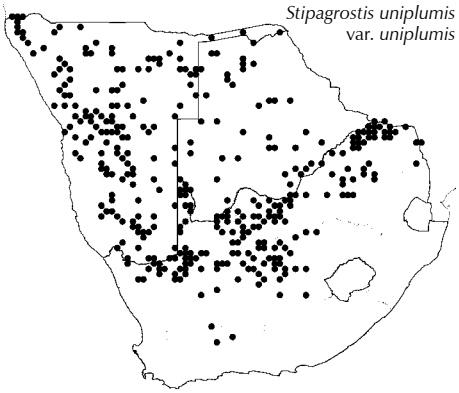
Silky bushman grass, blinkaarboesmangras

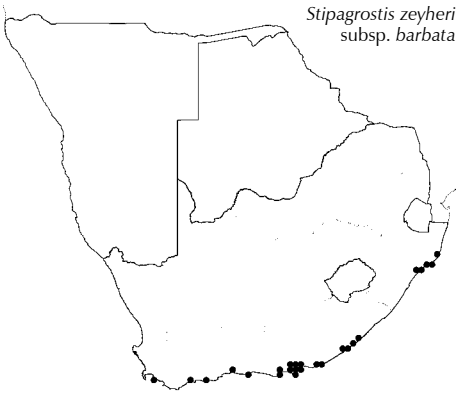
Densely to laxly tufted perennial to sub-perennial or annual?, to 900 mm high, erect to geniculate; leaves mainly basal; culms simple or branched well above the base. Leaf blade to 200 × to 2 mm, setaceous. Inflorescence narrow or effuse; spikelets many. Spikelet 8–10 mm long; glumes usually shorter than 10 mm, glabrous or long hairy, if hairy, hairs dense or sparsely scattered but at least always present on margins; lemma tuberculate around point of articulation, articulation between apex of lemma and base of column; column well developed, plumed in upper half, hairs longer than 1.5 mm; only central awn plumose, hairs occur to $^1/_3$ above or down to branching point of awns, with a distinct pencil of long spreading hairs at branching point of awns, apex without hairs; callus 0.5–1.2 mm long, short hairs along entire length and long hairs at junction of lemma and callus, apex naked, pungent; anther 2.5–4.5 mm long.

[A variable taxon, which grades into var. *neesii*, which has a panicle with fewer spikelets; and not easily distinguishable from the annual, var. *intermedia*. Hybridises with *S. hirtigluma* (*De Winter 5710*).]

*Flowering*: December to May. *Ecology*: Usually on sandy soils; disturbed areas and floodplains. *Frequency in southern Africa*: Common. *Distribution*: Zimbabwe, Angola, Uganda, Somalia to Senegal. N, B, LIM, NW, G, FS, NC, WC. *Economics*: Valuable pasture.

Illustration: Müller: 291 (2007).
Anatomy vouchers: *Ellis 336, 924* & *1314*.
Voucher: *Acocks 1938*.


*Stipagrostis uniplumis* var. *uniplumis*


*Stipagrostis zeyheri* subsp. *barbata*

**Stipagrostis zeyheri** (Nees) De Winter subsp. **barbata** (Stapf) De Winter, in *Kirkia* 3: 136 (1963). Type: South Africa, Eastern Cape, Uitenhage District, on the downs between the Koega and the Zwartkops Rivers, *Ecklon & Zeyher 502* (many syntypes).

*Aristida capensis* Thunb. var. *barbata* Stapf, in *Flora capensis* 7: 565 (1900).

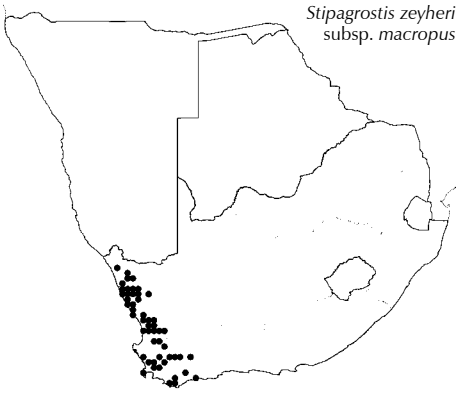
Cape bushman grass

Erect densely tufted, robust perennial to 900 mm high, rhizomes short, knotty; leaves almost overtopping the inflorescence; culms 1.2–5.0 mm wide. Leaf blade to 500 mm long, setaceous, flaccid, often curling. Inflorescence contracted, dense. Spikelet 16–18 mm long; glumes glabrous, pallid, slightly darker at base; lemma articulation between apex of lemma and base of column; column with long hairs below branching point of awns; all three awns plumose to branching point, excurrent into a long naked apex; callus 2.0–2.5 mm long, apex distinctly naked; anther 3.5–4.9 mm long.

[Not well differentiated from subsp. *zeyheri*, which is apparently limited to the winter rainfall area.]

*Flowering*: January to May (and July, October and November). *Ecology*: Coastal dunes. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. KZN, WC, EC.

Anatomy vouchers: *Ellis 1656* & *2107*.
Voucher: *Acocks 13588, Smook 1862*.


*Stipagrostis zeyheri* subsp. *macropus*

**Stipagrostis zeyheri** (Nees) De Winter subsp. **macropus** (Nees) De Winter, in *Kirkia* 3: 136 (1963). Type: South Africa, Northern Cape, Little Namaqualand, Kamiesberg, *Ecklon*; between Kuil and Modderfontein and between Goedemanskraal and Kaus, *Drège* (many syntypes).

*Aristida capensis* Thunb., not *Stipagrostis capensis*, in *Prodromus plantarum capensium*: 19 (1794).

*Aristida capensis* Thunb. var. *genuina* Henrard, in A *Critical Revision of the genus* Aristida 1: 77 (1926).

*Aristida capensis* Thunb. var. *macropus* (Nees) Trin. & Rupr., in *Florae Africanae Australioris illustrationes monographicae*: 176 (1841).

Bushman grass

Robust perennial to 720 mm high; shortly rhizomatous; leaves mainly basal; culms 1.2–5.0 mm wide. Leaf blade to 200 mm long, setaceous. Inflorescence open, divaricate, spikelets at end of branches. Spikelet 17–18 mm long; glumes longer than 15 mm, usually dark, glabrous; lemma articulation between apex of lemma and base of column; column smooth, glabrous; all three awns plumose to branching point and excurrent into a naked apex, hairs dirty white to golden; callus 2.0–2.5 mm long, apex distinct, naked, pungent; anther 4.5–6.0 mm long.

[A specimen collected in Namaqua National Park differs from other subsp. *macropus* specimens in not having awns plumed right down to the point where the awns split. It also differs from all *S. zeyheri* specimens in having only one awn plumose, which would place it in a totally other group, but it matches subsp. *macropus* in all other characters, therefore it is best regarded as an aberrant form of subsp. *macropus* for now. Also reported to hybridise with *S. ciliata* var. *capensis* (*Acocks 14817*). This hybrid was assigned the name *Aristida schlechteri* by Henrard, but was not accepted by De Winter (1965).]

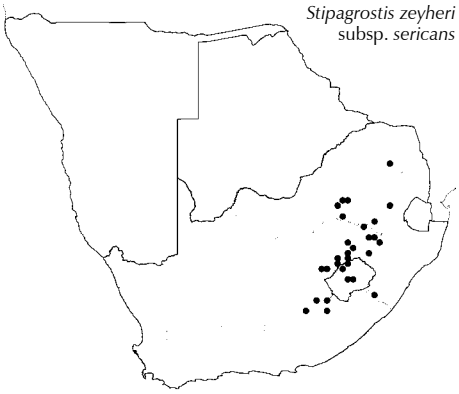
*Flowering*: August to November. *Ecology*: Sandy soils; old cultivated lands. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC, NC.

Anatomy vouchers: *Ellis 1163, 1704, 2195* & *Liebenberg 4302*.
Voucher: *Davidse 33311, Van Breda 775*.

**Stipagrostis zeyheri** (Nees) De Winter subsp. **sericans** (Hack.) De Winter, in *Kirkia* 3: 136 (1963). Type: South Africa, Mpumalanga, Barberton, *Rehman 6793*; Gauteng, Pretoria, *Rehman 4046* (syntypes).

*Aristida capensis* Thunb. var. *dieterleniana* Schweick., in *Kew Bulletin* 1939: 613 (1939). Type: South Africa, Free State, Ladybrand district, Westminster, *Celliers 11* (PRE, iso.).

*Aristida sericans* Hack., in writings of Schinz, in *Bulletin de l'Herbier Boissier* 3: 381 (1895).


*Stipagrostis zeyheri* subsp. *sericans*

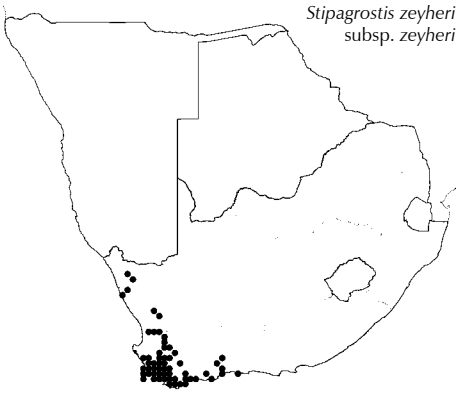
Densely tufted erect, robust perennial to 750 mm high; inflorescence extending well above leaves; culm 1.2–5.0 mm wide. Leaf blade to 300 mm long, setaceous, rolled. Inflorescence usually narrow, never effuse, spikelets few. Spikelet to 14 mm long; glumes pallid, long hairy; lemma articulation at apex of lemma or absent; column stout, with long hairs for some distance below branching point; all three awns plumose to branching point of awns, excurrent into a naked apex; callus 1.0–1.5 mm long, apex naked, pungent; anther 4–6 mm long.

*Flowering*: January to May. *Ecology*: Sandy soils; on rocky outcrops and disturbed areas such as old lands. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Endemic. L, LIM, G, M, FS, KZN, EC.

Voucher: *Smook 6358, Ferreira F213*.

**Stipagrostis zeyheri** (Nees) De Winter subsp. **zeyheri**, in *Kirkia* 3: 136 (1963). Type: South Africa, Western Cape, Worcester, *Ecklon* (other syntypes).

*Aristida capensis* Thunb. var. *canescens* Trin. & Rupr., in *Graminum stipaceorum*: 178 (1842). Type: South Africa, Western Cape, Table Mountain, Cape Town, *Ecklon & Zeyher 72* (PRE, syntype).


*Stipagrostis zeyheri* subsp. *zeyheri*

Tufted erect, robust perennial to 750 mm high; rhizomes short, knotty; culms 1.2–5.0 mm wide; leaves erect, rigid. Leaf blade to 500 mm long, setaceous, folded. Inflorescence open, divaricate, branches and pedicels flexuous, with spikelets at end of the branches. Spikelet 16–19 mm long; glumes glabrous; lemma articulation between apex of lemma and base of column; column long-hairy; all three awns plumose to branching point of awns, excurrent into a naked apex; callus 2 mm long, apex naked, pungent; anther 5–6 mm long.

[Not well differentiated from subsp. *barbata*, which is common along the east coast of the Cape.]

*Flowering*: October to March (May and July). *Ecology*: Sandy slopes and limestone hills, disturbed areas, especially on recently burnt areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. NC, WC.

Anatomy voucher: *Ellis 677*.
Voucher: *Taylor 5602*.

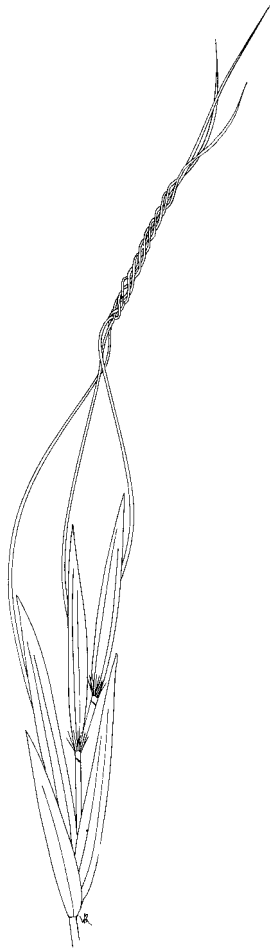


Figure 511.—*Streblochaete longiarista* spikelet (53 × 3 mm). Artist: W. Roux.



Figure 512.—*Streblochaete longiarista* specimen.

## **Streblochaete** Pilg.

Pilger: 61 (1906); Chippindall: 82 (1955); Hubbard: 74 (1970); Launert: 66 (1971); Clayton & Renvoize: 115 (1986); Gibbs Russell et al.: 329 (1990); Watson & Dallwitz: 912 (1994).

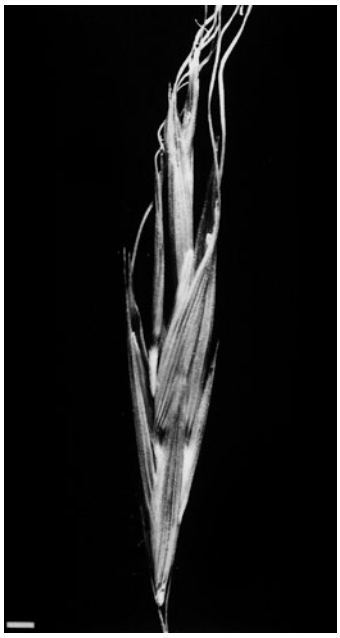


Figure 513.—*Streblochaete longiarista* spikelet (15–25 mm). Photographer: M. Koekemoer.

Perennial, tufted. **Leaf blade** linear-lanceolate, flaccid; *ligule* a short, unfringed membrane. **Inflorescence** an open panicle, ± 1-sided, branches filiform, drooping, mostly solitary or paired, rather far apart on central axis; *spikelets* pedicelled. **Spikelet** not noticeably compressed, disarticulating above glumes; *glumes* unequal, shorter than spikelet, similar, membranous, margins hyaline, rounded on the back, apex subacute to acute, awnless; lower glume 3-nerved; upper glume 5-nerved, often with cross venation. **Florets** 2–6, loosely arranged; *lower* 2–4 *florets* usually bisexual; *uppermost floret* male, sterile or greatly reduced; lower *lemmas* lanceolate to narrowly elliptic, similar to firmer in texture to glumes, becoming indurated, chartaceous at maturity, back rounded, distinctly 7-nerved, shortly 2-lobed, rarely entire, awned from back beneath sinus of lobes; *awn* geniculate, up to 3 times longer than lemma, flexuous, scaberulous, intertwined with awns from other florets so that spikelet falls as unit; *callus* long, pointed, hairy; *palea* shorter than lemma, 2-keeled, linear. **Lodicules** 2, minute, cuneate-truncate, glabrous or ciliate. **Stamens** 3. **Ovary** glabrous, oblong; styles distinct, plumose above. **Caryopsis** linear; hilum short; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 10$.

**Species** 1, tropical Africa, Reunion, Indonesia, Philippines: *Streblochaete longiarista* (A. Rich.) Pilg., Eastern Cape.

Species treatment by M.T. Nembudani.

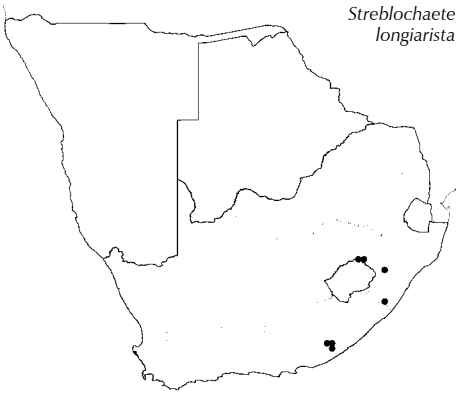
**Streblochaete longiarista** (A.Rich.) Pilg. in *Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem* 9: 516 (1926). Type: Ethiopia, Simien, Mt. Silke, *Schimper 683* (P, holo.).

Loosely tufted perennial, 300–900 mm high. Leaf blade to 250 × 3–11 mm, flat, narrowed towards base; sheath tubular. Spikelet 16–28 mm long (excluding awns); lemma nerves prominent, awn up to 40 mm long, fine, twisted; callus 2–3 mm long, sharp, hairs dense, short, white; anther 1.4–2.0 mm long.

[The hygroscopic awns of the florets intertwine, thereby detaching the florets from the panicle in clusters and making this a good aid for seed dispersal.]

*Flowering*: April to May. *Ecology*: Open places in mountain forests. *Frequency in southern Africa*: Rare. *Distribution*: Northwards through East African highlands to Ethiopia; also Reunion, Java and the Philippines. KZN, EC.

Illustration: Chippindall: 82, fig. 53 (1955); Hubbard: 75, fig. 25 (1970).
Anatomy vouchers: *Ellis 2097, 2098* & *2101*.
Voucher: *Chippindall 356*.




## **Styppeiochloa** De Winter

Goossens: 200 (1934); Phillips: 123 (1951) under *Crinipes* Hochst.; Chippindall: 123 (1955) under *Crinipes* Hochst.; De Winter: 134 (1966); Clayton & Renvoize: 172 (1986); Gibbs Russell et al.: 330 (1990); Watson & Dallwitz: 918 (1994); Cope: 4 (1999).

Perennial; dense, sclerophyllous tufts, with hard, fibrous basal sheaths, forming thick, dense, fire-resistant mats. **Leaf blade** rolled, setaceous; *ligule* a fringe of hairs. **Inflorescence** a scanty contracted panicle; *spikelets* adpressed to branches, pedicelled. **Spikelet** laterally compressed, disarticulating above glumes; *glumes* unequal, shorter than spikelet, lanceolate, apex 3-lobed or entire, with a short awn-point; lower glume 1-nerved; upper glume 1–3-nerved. **Florets** 2–5, bisexual; *uppermost floret* sterile or reduced to a lemma; *lemma* lanceolate, similar in texture to glumes, 3–5(7)-nerved, hairy on margins near base, lateral nerves glabrous or minutely hairy, incised, 3-lobed, lobes with awns or mucros; *central awn* straight, shorter than body of lemma; *callus* short and hairy; *palea* narrowly lanceolate, sub-equalling lemma. **Lodicules** 2, small, truncate, glabrous. **Stamens** 3. **Ovary** elliptic-oblong, glabrous; style bases knob-like. **Caryopsis** ± 2 mm long, fusiform; hilum long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+.

**Species** 3, mountainous areas of south and southeast tropical Africa; 1 in southern Africa: *Styppeiochloa gynoglossa* (Gooss.) De Winter, Swaziland, Mpumalanga, KwaZulu-Natal and Eastern Cape.

Species treatment by M.J. Moeaha.




Figure 514.—*Styppeiochloa gynoglossa*. A, spikelet (6.3 × 2.5 mm); B, floret. Artist: W. Roux.



Figure 515.—*Styppeiochloa gynoglossa* spikelet (5–7 mm). Photographer: M. Koekemoer.

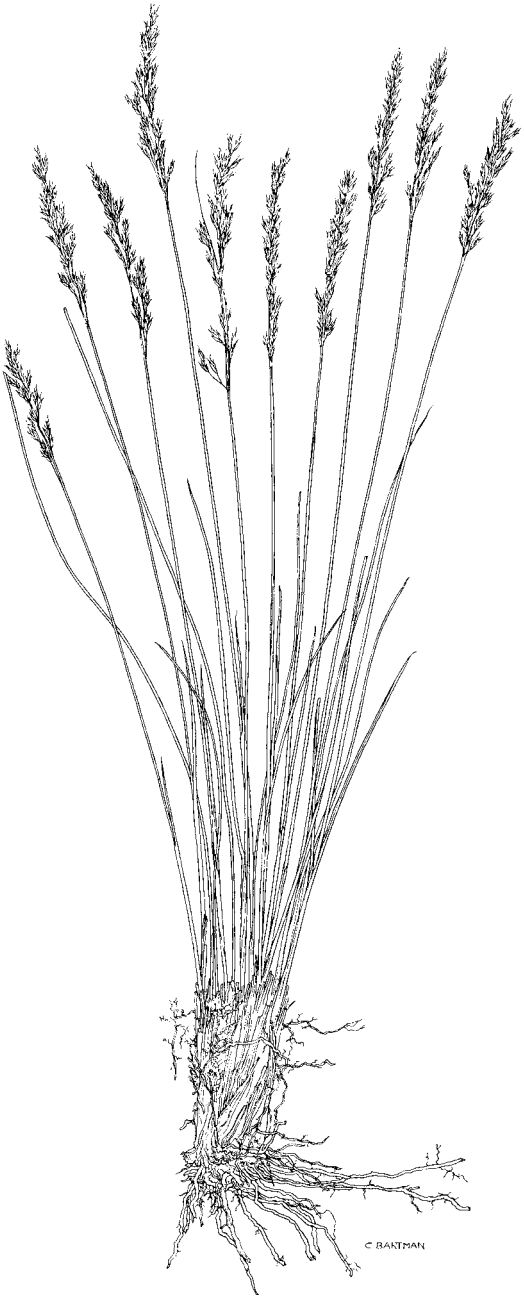
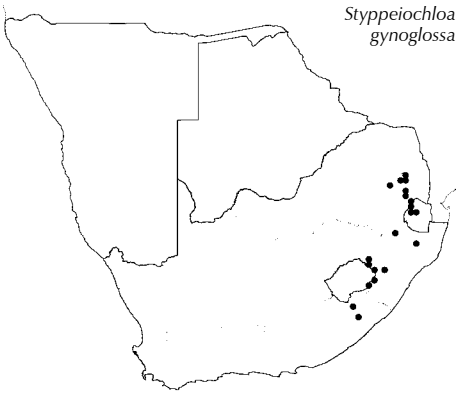



Figure 516.—*Styppeiochloa gynoglossa*. Artist: C.D. Bartman.




**Styppeiochloa gynoglossa** (Gooss.) De Winter, in *Bothalia* 9: 136 (1966). Type: South Africa, Mpumalanga, Barberton, Devil's Kantoor, Kaapsche Hoop, *Pole Evans* 1022 (PRE, holo.).

*Crinipes gynoglossa* Gooss., in *Kew Bulletin* 1932: 200 (1934). Type as above.

Mat forming or tufted perennial 100–700 mm high; leaf sheaths split with age, forming a dense, fibrous base. Leaf blade 100–400 × to 1.2 mm. Inflorescence 15–80(100) mm long, usually dense and contracted. Spikelet (4.5)5.0–7.5 mm long; glumes 1–3-nerved, unequal, acute to acuminate, sometimes very shortly awned; lemma 3–5(–7)-nerved, nerves prominent, margins hairy basally, apex trilobed, awn 1.5–3.0 mm long; anthers 1.5–2.0 mm long.

*Flowering*: September to January, even later to the north. *Ecology*: Rock crevices and seepage areas over rocks; high rainfall areas (800 mm or more) at high altitudes. *Frequency in southern Africa*: Locally dominant. *Distribution*: Zimbabwe and southern Mozambique at altitudes as low as 610 m. S, M, KZN, EC (along the Drakensberg escarpment).

Illustration: Chippindall: 124, fig. 96 (1955); Cope: 5, tab. 2 (1999).
Anatomy vouchers: *Killick & Vahrmeyer; Ellis 3288, 3293; Acocks 21912; Mcallister 155* & *Killick 1013*.
Voucher: *Devenish 1815*.

## **Tarigidia** Stent

Stent: 151 (1932); Chippindall: 422 (1955); Launert: 202 (1970a); Clayton & Renvoize: 300 (1986); Gibbs Russell et al.: 331 (1990); Watson & Dallwitz: 927 (1994).



Figure 517.—*Tarigidia aequiglumis* spikelet (4.0–4.5 mm). Photographer: M. Koekemoer.

Perennial, tufted, glaucous. **Leaf blade** linear, long, flat; *ligule* an unfringed membrane. **Inflorescence** a spike-like, cylindrical, contracted panicle, rarely with lower branches shortly produced, hairy; *spikelets* shortly pedicelled, clustered, usually in pairs on lower branches. **Spikelet** dorsiventrally compressed, narrowly elliptic, subacute to acute, falling with glumes; *glumes* ± equal, acuminate, awnless; lower glume 1-nerved, two-thirds as long as spikelet, hairy or glabrous except near margins; upper glume 3-nerved, hairy. **Florets** 2; *lower floret* reduced to a lemma, lemma 5–7-nerved, hairy with long, spreading hairs between nerves and near margins; *upper floret* bisexual, *lemma* ± as long as lower lemma, similar in texture to glumes, chartaceous, glabrous, without median keel, back rounded, at least at base, margins lying flat and exposed on palea (digitaria-type), awnless; *palea* equalling lemma, chartaceous, 2-nerved. **Lodicules** minute, cuneate. **Stamens** 3. **Ovary** glabrous; styles connate at base, plumose. **Photosynthetic pathway**: $C_4$; XyMS-. PCR cell chloroplasts centrifugal/ peripheral.



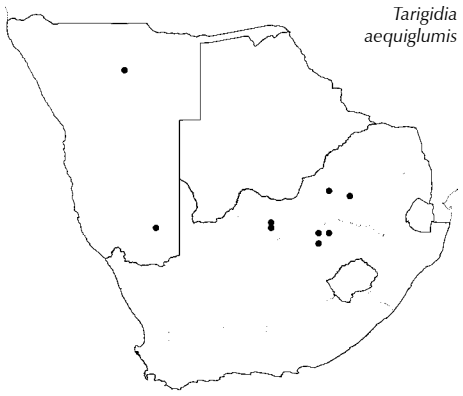

Figure 518.—*Tarigidia aequiglumis*. A, plant; B, spikelet cluster. Artist: C. Letty.

**Species** 1, southern Africa: *Tarigidia aequiglumis* (Gooss.) Stent, sporadic in Namibia, North West, Gauteng and Free State.

Species treatment by A.C. Mashau.

### Quick guide to easily confused genera:

1. Lower glume very small or absent; upper glume less than 1/4 as long as spikelet . . . . . **Digitaria** (some taxa)
   Lower glume 2.5–3.0 mm long; upper glume 2.7–3.5 mm long . . . 2
2. Inflorescence of clustered sessile spikelets, each cluster enclosed in an involucre formed by lower glumes of the outer spikelets, which are hardened and joined at the base . . . . . **Anthephora**
   Inflorescence of shortly pedicelled spikelet clusters (usually in pairs on lower branches), clusters not enclosed in a hard involucre . . . . . .**Tarigidia**




**Tarigidia aequiglumis** (Gooss.) Stent, in *Kew Bulletin of Miscellaneous Information* 1932: 151 (1932). Type: South Africa, Free State, Hoopstad District, Odendaalsrust, on an empty plot, *Schultz* in *Nat. Herb. Pretoria 8344*.

*Anthephora aequiglumis* Gooss., in *Transactions of the Royal Society of South Africa* 20: 195, f. 3. (1932).

*Digitaria otaviensis* Launert, in *Mitteilungen der Botanischen Staatssammlung München* 16: 307 (1957). Type: Namibia, *Dinter 5589* (PRE, iso.).



Figure 519.—*Tenaxia disticha*. Artist: G.E. Lawrence.

Densely tufted perennial 800–1 500 mm high. Leaf blade 350 × 3–5 mm. Inflorescence spike-like or narrowly conical, branches short, adpressed to somewhat spreading below. Spikelet 4.0–4.5 mm long, woolly, awnless; glumes ± equal; lower glume $^{2}/_{3}$ as long as spikelet; upper glume not gibbous; anther 2.3–2.6 mm long.

*Flowering*: January to May. *Ecology*: Open veld or among rocks. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. N, NW, G, FS.

Anatomy voucher: *Giess 2448* (epidermis only).
Voucher: *Dinter 5589*.

## **Tenaxia** N.P.Barker & H.P.Linder

Stapf: 516 (1899) under *Danthonia* DC.; Chippindall: 241 (1955) under *Danthonia* DC.; Conert: 129 (1970); Conert: 145 (1975); Ellis: 185 (1980a); Ellis: 191 (1980b); Ellis: 493 (1981b); Ellis: 95 (1982b); Clayton & Renvoize: 175 (1986) under *Rytidosperma* Steud.; Gibbs Russell et al.: 213 (1990) under *Merxmuellera*; Watson & Dallwitz: 593 (1994); Benesch: 11 (1995); Linder et al.: 350 (2010); Linder et al.: 428 (2014).

*Danthonia* DC., in part, Stapf: 516 (1899).

*Merxmuellera* Conert in part, Conert: 129 (1970).

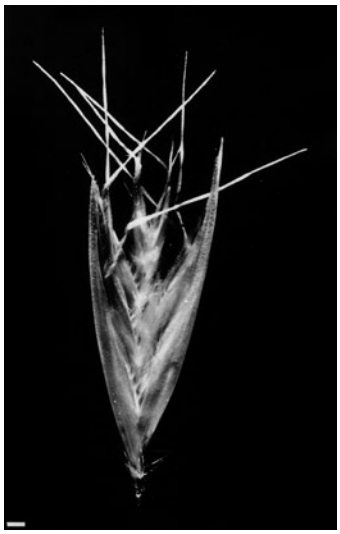


Figure 520.—*Tenaxia stricta* spikelet (to 23 mm). Photographer: M. Koekemoer.

Tufted wiry perennial; basal sheath shiny, persistent. **Leaf blade** usually rolled or setaceous, rarely flat; ligule a fringe of hairs. **Inflorescence** a panicle or raceme, narrow, contracted to open, secund; *spikelets* pedicelled. **Spikelet** laterally compressed; disarticulating above glumes and between florets; *glumes* ± as long as spikelet, 1–11-nerved, awnless. **Florets** 2–7; *lemma* 6–15 mm long, back rounded, similar in texture to glumes, 7–9-nerved, variously hairy, always with 1 to many tufts of hairs, these usually marginal, deeply 2-lobed, lobes nearly as long as spikelet, usually awned; central awn from sinus; *awn* usually geniculate, column twisted; *callus* rounded, hairy; *palea* awnless, 2-keeled, lanceolate, similar in texture to lemma, hyaline, glabrous, keel margins hairy. **Lodicules** 2, cuneate to rhomboid, membranous, often ciliate to hairy. **Stamens** 3. **Ovary** ovoid, glabrous; styles 2, long and plumose. **Fruit** a caryopsis or a nutlet. **Cytology**: 2n = 12, 36 & 56.

**Species** 8 African mountains and reaching the Himalayas; 5 in southern Africa; Namibia, Lesotho, Free State, KwaZulu-Natal, Eastern, Western, and Northern Cape provinces.

Species treatment by L. Fish and A.C. Mashau.

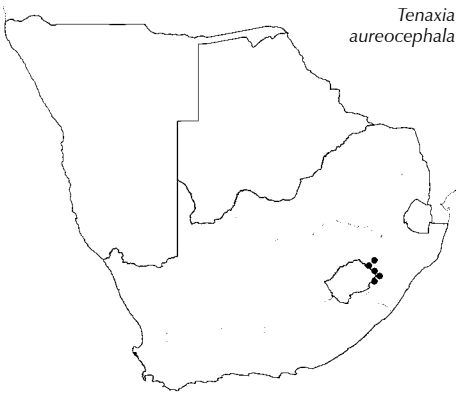
**Key to species:**

1. Inflorescence spike-like, spikelets distichous . . . . . **T. disticha**
   Inflorescence open or contracted, spikelets not distichous . . . . 2
2. Lemma with 2 to 3 tufts of long hairs near margins, usually just below lobes, lowest tufts on the margins; KwaZulu-Natal (if Eastern, Western or Northern Cape see *T. dura*) . . . . **T. aureocephala**
   Lemma with 3 or more tufts along the margins, but well below the lobes, lowest tufts are near the base usually just away from the margins, hairs always present but tufts may be indistinct . . . . . 3
3. Lemma pubescent, at least down along central nerve, sometimes completely pubescent between hair tufts; lemma lobes 3 mm long . . . . . **T. guillarmodiae**
   Lemma glabrous in centre of back between hair tufts; lemma lobes 3.5–7.0 mm long . . . . . 4
4. Lemma lobes with the awn adnate to one side of the lobe for a distance; lemma 6–9 mm long . . . . . **T. stricta**
   Lemma lobes ending abruptly and awned from middle; lemma 7–12 mm long (if KwaZulu-Natal see *T. aureocephala*) . . . **T. dura**

**Tenaxia aureocephala** (J.G.Anderson) N.P.Barker & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 350 (2010). Type: South Africa, KwaZulu-Natal, Bergville, *Killick 1727* (PRE, holo.).

*Merxmuellera aureocephala* (J.G.Anderson) Conert, in *Senckenbergiana Biologica* 51: 132 (1970).

*Danthonia aureocephala* J.G.Anderson, in *Bothalia* 8 (2): 170 (1964).


*Tenaxia aureocephala*

Densely tufted perennial 900 mm high. Leaf blade 400 × 1.5 mm. Inflorescence to 170 mm long, contracted, interrupted; spikelets not distichous. Spikelet to 23 (including awns) × to 10 mm, 3–4-flowered; glume 15–20 mm long, 3–5-nerved, golden-brown; lemma 10–13 mm long, including lobes and awns which are 5.5–7.0 mm long, lobes free from central awn, upper back with 2 to 3 tufts of white hairs on either side of middle nerve, lowermost tufts on the margins; central awn to 15 mm long, sometimes strongly geniculate; anther 2.0–4.7 mm long.

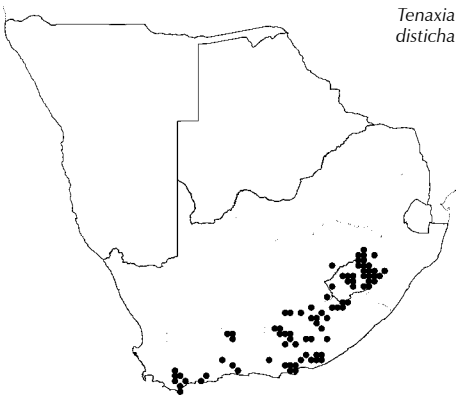
*Flowering*: July to August. *Ecology*: High Drakensberg Mountains in xeric areas such as steep grassy slopes above 2 000 m. *Frequency in southern Africa*: Locally common in Giant's Castle and Cathkin Peak. *Distribution*: Endemic. KZN.

Anatomy vouchers: *Killick 3450* & *Edwards 843*.
Voucher: *Edwards 2453*.

**Tenaxia disticha** (Nees) N.P.Barker & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 350 (2010).

*Merxmuellera disticha* (Nees) Conert, in *Senckenbergiana Biologica* 51: 132 (1970).

*Danthonia disticha* Nees, in *Florae Africae australioris*: 335 (1841).


*Tenaxia disticha*

Tufted perennial 150–700 mm high. Leaf blade 100–500 × to 3.5 mm. Inflorescence spike-like, 20–100 mm long; spikelets distichous. Spikelet to 18 (including awns) × to 3 mm; glumes 9–20 mm long, 1–3-nerved; 2(–5)-flowered; lemma 10–15 mm long (including lobes); lobes 7–9 mm long, awns long; margins hairy, with tufts of white hairs on the margins near the base; central awn 10–16 mm long, geniculate; anther 4.0–5.5 mm long.

[This taxon may be confused with *Pentameris basutorum*, which has long, lax hairs covering the lemma.]

*Flowering*: October to May. *Ecology*: A variety of habitats, from coastal regions to high altitude montane bogs. *Frequency in southern Africa*: Common in certain veld types. *Distribution*: Zimbabwe. L, FS, KZN, NC, WC, EC. *Economics*: Weed, can usurp valuable grazing grasses in some areas.

Anatomy vouchers: According to Ellis there are three anatomical forms that may also be distinguished morphologically (Ellis 1980a). The forms as quoted in *Bothalia* 13 (1980). Typical form: *Liebenberg 6656* & *7713*; *Acocks 1961*; *Ellis 669, 1263, 2564, 2572, 2603* & 2391. Drakensberg form: *McAllister 112*; *Ellis 1404, 2382, 3133, 3152, 3157* & *3185*. Alpine bog form: *Du Toit* 699 & *2207*; *Ellis 1393, 3183, 3192, 3309, 3315* & *3316*.

Recently it has been shown that there are four distinct anatomical–morphological varieties in this species.

**Key to varieties:**

1. Spikelet with 2(3) florets; summit plateau of the Drakensberg above 2 500 m . . . . . 2
   Spikelet with (2)3–8 florets; below 2 500 m, generally widespread . . . . . 3
2. Leaf blade terete, macro-hairs present; glumes 9–12 mm long; typically in bogs . . . . . var. *lustricola*
   Leaf blade flattened, macro-hairs absent; glumes 11–17 mm long; drier habitats . . . . . var. *dracmontana*

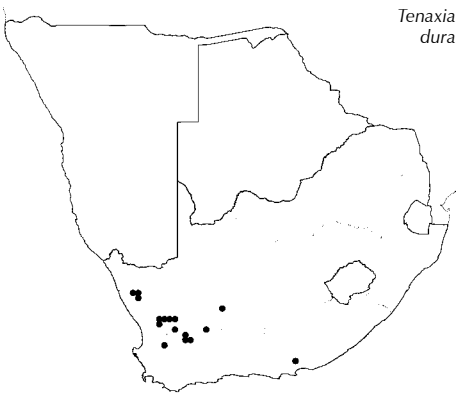
3(1). Inflorescence 85 mm long; florets (2)3–6; lower glume 10–20 mm long; widespread . . . . . var. *disticha*
   Inflorescence 60 mm long; florets 2–10 mm long; lower glume 10–15 mm long; only from the Great Swartberg foothills around Oudtshoorn . . . . . var. *volkii*

var. *disticha*. Type: South Africa, Eastern Cape, in siccis ad Sternbergspruit, *Drège, s.n.* (lecto.). *Distribution*: Widespread from Cape Agulhas to Zimbabwe (Inyanga). Voucher: *Ellis 2391*.

var. *volkii* H.P.Linder. Type: South Africa, Western Cape, Oudtshoorn, *Perl 10* (Z, holo.). *Distribution*: Great Swartberg, around Oudsthoorn. Voucher: *Moffett 365, Van Breda 4628*.

var. *dracmontana* H.P.Linder. Type: South Africa, KwaZulu-Natal, Camel on Organ Pipes, *Clark & Keevey* in *Perl* 31 (Z, holo.). *Distribution*: L, FS, KZN. Voucher: *Ellis 3157, 3315*.

var. *lustricola* H.P.Linder. Type: South Africa, KwaZulu-Natal, top of Organ Pipes pass, *Clark & Keevey* in *Perl 29* (Z, holo.). *Distribution*: L, KZN. Voucher: *Ellis 3183, Du Toit 2207*.



*Tenaxia dura*

**Tenaxia dura** (Stapf) N.P.Barker & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 350 (2010). Type: South Africa, Northern Cape, Little Namaqualand; Kamies Bergen, between Pedros Kloof and Lily Fontein, *Drège s.n.* (K, holo.).

*Merxmuellera dura* (Stapf) Conert, in *Senckenbergiana Biologica* 51: 132 (1970).

*Danthonia dura* Stapf, in *Flora capensis* 7: 527 (1899).

Perennial 600–900 mm high; rhizome short. Leaf blade to 600 × to 1.5 mm. Inflorescence 100–180 mm long, loosely contracted, slightly nodding. Spikelet 20–25 (including awns) × 6–8 mm, 4–7-flowered; glumes 13–18 mm long, 3–5-nerved; lemma 7–12 mm long (including lobes); lobes 4–7 mm long, terminating abruptly into a short awn; back glabrous except for marginal tufts of white hairs near the base

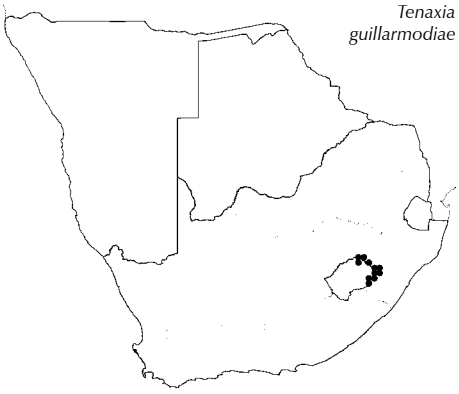
and smaller tufts at base of central awn; central awn 10–15 mm long; anther 2.7–3.5 mm long.

*Flowering*: July to November. *Ecology*: Stony or sandy soils; in arid areas. *Frequency in southern Africa*: Locally common in the Carnarvon and Calvinia districts. *Distribution*: Endemic. NC, WC, EC.

Anatomy vouchers: *Middelmost 2166*, *Ellis 1719*, *2455, 2464, 2465* & *5107*. Ellis (1982b) considers this species to be anatomically distinct from *T. stricta*, despite some morphological similarities.
Voucher: *Acocks 17295*.

**Tenaxia guillarmodiae** (Conert) N.P.Barker & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 350 (2010). Type: Lesotho, Butha Buthe District, Ischlanyana Valley, *A. Jacot Guillarmod 2320* (RUH, holo.).

*Merxmuellera guillarmodiae* Conert, in *Senckenbergiana Biologica* 56: 145 (1975).


*Tenaxia guillarmodiae*

Tufted perennial 120–400(–700) mm high. Leaf blade 200–400 × 0.4–0.6 mm. Inflorescence 40–90 mm long, interrupted; spikelets not distichous. Spikelet 12–15 (including awns) × 6–8 mm, 3–4(–5)-flowered; glumes 9–14 mm long, 3–5-nerved; lemma 6–7 mm long (including lobes); lobes 3 mm long, tapers into a short awn; back varying in pubescence from a quite dense to almost glabrous, but with a few scattered hairs each side of central nerve; 4 or more marginal tufts of white hairs present near the base, tufts sometimes indistinct; central awn 5–11 mm long; anther 2.0–3.3 mm long.

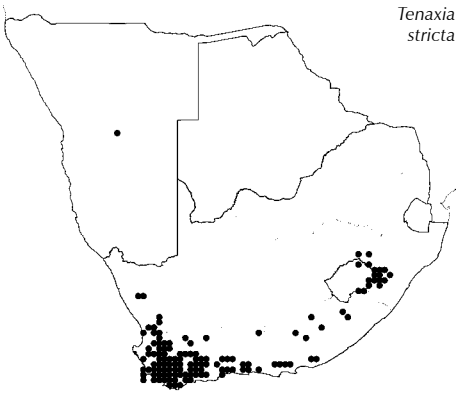
*Flowering*: November to February. *Ecology*: Grassland and rocky areas above about 2 000 m. *Frequency in southern Africa*: Locally common on the Drakensberg. *Distribution*: Endemic. L, KZN.

Illustration: Conert: 147 (1975).
Anatomy vouchers: *Liebenberg 5729; Ellis 2372, 3295* & *3297*.
Voucher: *Jacot Guillarmod 3727*.

**Tenaxia stricta** (Schrad.) N.P.Barker & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 350 (2010). Type: South Africa, Western Cape, Cape Good Hope, *Hesse s.n*. (GOET 2247, holo.).

*Merxmuellera stricta* (Schrad.) Conert, in *Senckenbergiana Biologica* 51: 133.

*Danthonia stricta* Schrad., in Schultes, *Mantissa Pl.* 2: 383 (1824).


*Tenaxia stricta*

Tufted perennial 300–800 mm high. Leaf blade 100–450 × to 0.5 mm. Inflorescence loosely contracted, interrupted, 30–130 mm long; spikelets not distichous. Spikelet to 23 (including awns) × to 10 mm; 5–7-flowered; glumes 11–22 mm long, 3–7-nerved; lemma 6–9 mm long, (including lobes); lobes 3.5–5.5 mm long, awn short, adnate for a distance to one side of the lobe; back with 3 to 4 or more, tufts of white hairs along the margins, lowest tufts just in from the margins, occasionally tufts indistinct; central awn 6–12(–17) mm long; anther 2.5–3.3 mm long.

*Flowering*: August to March. *Ecology*: A variety of habitats. *Frequency in southern Africa*: Common in Fynbos and Renosterbosveld veld. *Distribution*: Endemic. N, L, FS, KZN, NC, WC, EC.

Anatomy vouchers: This taxon consists of two anatomical forms (Ellis 1980a). Typical form: *Acocks 16112; V.d. Walt 184; Fairall 240; Roberts 2034; Ellis 643, 688, 2579, 2317, 2318* & *2514*. Drakensberg form: *Acocks 22069; Story 4522; Ellis 243, 1151, 1705, 2241, 2242, 2258, 2476, 3290, 3318, 3321* & *3322*.
Voucher: *Acocks 15457, Mcallister 84* & *Moll 669*.

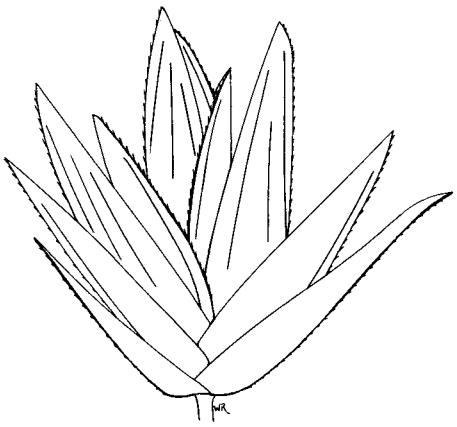


Figure 521.—*Tetrachne dregei* spikelet with glumes separated from florets (5.6 × 5.0 mm). Artist: W. Roux.




Figure 522.—*Tetrachne dregei*. Artist: C. Letty.

## **Tetrachne** Nees

Nees ab Esenbeck: 375 (1841); Stapf: 709 (1900); Chippindall: 188 (1955); Clayton & Renvoize: 201 (1986); Gibbs Russell et al.: 331 (1990); Watson & Dallwitz: 931 (1994).



Figure 523.—*Tetrachne dregei* spikelet (4–6 mm). Photographer: M. Koekemoer.

Perennial, densely tufted; rhizomatous. **Leaf blade** rolling early, glabrous except at sheath-mouth; *ligule* a dense fringe of hairs. **Inflorescence** of few to many dense, secund spike-like racemes mostly scattered on the central axis, usually adpressed to axis; pedicels very short. **Spikelet** laterally compressed, falling with the glumes, not disarticulating between florets; *glumes* ± equal, shorter than spikelet, glabrous, keels winged, 1-nerved, awnless. **Florets** 5 or 6, *lowest 2 florets* reduced to lemmas; *uppermost floret* reduced; the rest bisexual; sterile lemma similar to glumes; *bisexual lemmas* 5-nerved, entire, keeled, hairy on keel, slightly winged, awnless; *palea* equal or sub-equal lemma, 2-keeled, keels winged. **Lodicules** 2, small, cuneate, glabrous. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose above. **Caryopsis** small, 2.5 mm long, fusiform; hilum short; pericarp fused, or loosely adherent (removable with difficulty after soaking); embryo large, about $^2/_3$ the length of caryopsis. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines fairly even. PCR cell chloroplasts centripetal. **Cytology**: $x = 10$.

**Species** 1, southern Africa and Pakistan; *Tetrachne dregei* Nees, Lesotho, Free State, Northern, Western and Eastern Cape.

Species treatment by M.T. Nembudani.

**Tetrachne dregei** Nees, in *Florae Africae australioris*: 376 (1841). Types: South Africa, Eastern Cape, Klipplaat River, near Shiloh; between Compass Berg and Rhenoster Berg; Wonderheuvel; Swart Kei River; Witte Bergen, *Drège* (many syntypes).

ROBIES COCKSFOOT, SOUTH AFRICAN COCKSFOOT, KROPAARGRAS

Tufted perennial, 320–860 mm high; rhizomatous; base robust or woody; culm branches freely. Leaf blade 50–125 × 1 mm, curly. Inflorescence (70)120–230 mm long, spike-like, racemes more than 4, 10–40 mm long, stout, ± their own length apart, not spreading far from the central axis. Spikelet 4–6 mm long; glumes usually light to dark grey; lemma apex and margins often flushed grey; anther 1.5–2.0 mm long.

*Flowering*: November to March. *Ecology*: Sandy soil; on river banks, rocky outcrops or mountain slopes; at altitudes higher than 1 250 m. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Pakistan. L, FS, NC, WC, EC. *Economics*: Good grazing, mostly in natural veld but also cultivated on a small scale; becomes

semi-procumbent forming dense stands when grazed; as it is highly palatable it is easily overgrazed and then disappears.

Anatomy vouchers: *Loxton & Ellis 947, Smook & Gibbs Russell 2186A & Ellis 2602*. Voucher: *Van Breda 26, Jarman 120*.

## **Tetrapogon** Desf.

Desfontaines: 388 (1799); Chippindall: 198 (1955); Pilger: 100 (1956); Launert: 202 (1970a); Renvoize: 347 (1974); Clayton & Renvoize: 236 (1986); Gibbs Russell et al.: 332 (1990); Watson & Dallwitz: 933 (1994); Cope: 207 (1999).



Figure 524.—*Tetrapogon tenellus* spikelet (3.5–5.0 mm). Photographer: M. Koekemoer.

Annual or perennial (often short-lived), tufted. **Leaf blade** linear, flat or folded, tapering, acute; *ligule* a narrow, fringed membrane. **Inflorescence** terminal, solitary (rarely paired), dense, 1-sided spike, often ciliate or villous; *spikelets* solitary or paired, subsessile, alternate in 2 rows on a tough rachis. **Spikelet** cuneate, laterally compressed, disarticulating above glumes, not between florets; *glumes* ± equal, nearly to as long as spikelet, similar, membranous, glabrous, 1-nerved, acute, acuminate, awnless or awn-tipped from near apex. **Florets** 4–7, *lower florets* bisexual, *upper florets* sterile, reduced to clavate lemmas; sterile lemma glabrous to rarely hairy, awnless; fertile *lemma* firmer in texture than glumes, coriaceous, keeled, 3–5-nerved, usually hairy on lateral nerves and keel, entire or 2-lobed, with a subterminal central awn; *awn* 3–11 mm long, straight; *callus* acute, hairy; *palea* ciliolate on keels. **Lodicules** 2, ± oblong, glabrous. **Stamens** 3. **Ovary** oblong, glabrous; styles distinct, plumose above. **Caryopsis** an achene, oblong-ellipsoid; hilum short; pericarp free; embryo large. **Photosynthetic pathways**: $C_4$; XyMS+. PCR sheath extensions absent. PCR cell chloroplasts centripetal. **Cytology**: $x = 10$.

**Species** 5, Middle East, India and Africa; 1 in southern Africa: *Tetrapogon tenellus* (Roxb.) Chiov., northern Namibia, Limpopo and Mpumalanga.

Species treatment by M.J. Moeaha.

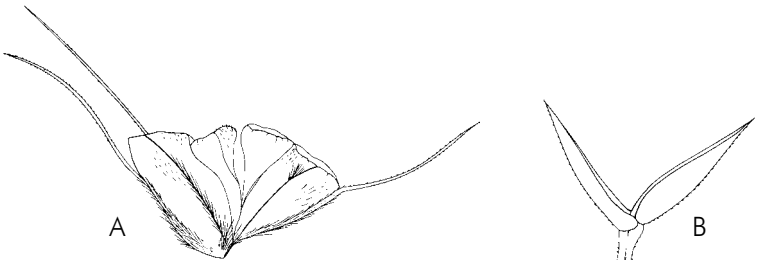
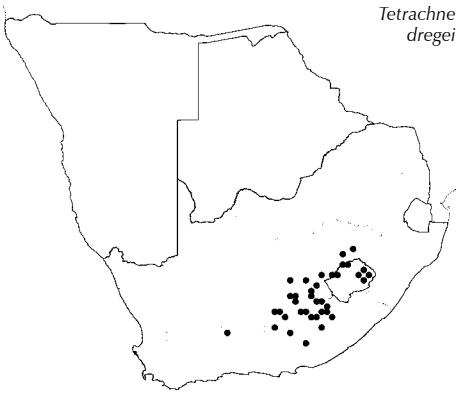



Figure 525.—*Tetrapogon tenellus*. Spikelet: A, four florets (12.0 × 5.5 mm); B, glumes (5.0 × 4.3 mm). Artist: W. Roux.



*Tetrachne dregei*



Figure 526.—*Tetrapogon tenellus*. Artist: W. Roux.




Figure 527.—*Thamnocalamus tessellatus*. A, leafy branch; B, rhizome; C, culm leaf (inside view); D, section of leaf blade showing cartilaginous margin and tessellate venation. Artist: A.R. Tangerini, Botany Dept., National Museum of Natural History, Smithsonian Institution, USA.

**Tetrapogon tenellus** (Roxb.) Chiov., in Pirotta, *Flora Eritrea*: 352 (1908). Type: India.

Loosely tufted, short-lived perennial or annual 130–750 mm high; culms erect. Leaf blade 100–240 × 2–4 mm. Inflorescence (40)50–80 mm long, a spike-like raceme, solitary or rarely paired. Spikelet 3.5–5.0 mm long; 4–6-flowered; glumes 2.8–5.0 mm long, persistent, often tinged purplish; lemma 4.0–6.5 mm long, obovate-triangular in side view, coriaceous, keeled; awn 3–11 mm long; anther 1.4–2.5 mm long; caryopsis 1.8–3.0 mm long, oblong.

*Flowering*: January to April. *Ecology*: Often in disturbed rocky soils and on limestone; usually in shade in open or dense bushveld. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to eastern Africa, Sudan and Angola; and in southwest Asia extending to India. LIM, M. *Economics*: Potential pasture grass in dry places.

Illustration: Cope: 208, tab. 60 (1999).
Anatomy vouchers: *Ellis 1909, 1910, 3209, 3858* & *3859*.
Voucher: *Van der Schijff 5204*.

## **Thamnocalamus** Munro

Munro: 33 (1868); Chippindall: 30 (1955); Soderstrom & Ellis: 53 (1982); Clayton & Renvoize: 43 (1986); Gibbs Russell et al.: 333 (1990); Watson & Dallwitz: 935 (1994).

Perennial, woody, tree-like, tufted; rhizomes sympodial; culms hollow. **Culm leaves** including blades ± persistent. **Foliage leaf blade** expanded, strongly cross-veined and forming a tessellate pattern, pseudopetiolate; *ligule* a fringed membrane. **Inflorescence** compound, of several racemes, each of 3–5 spikelets subtended by bracts, gathered into a fascicle and partly enveloped by spathes; lowermost spikelet sessile. **Spikelet** ovoid, not noticeably compressed; *glumes* ± equal; lower glume shorter than upper, acute; upper glume pointed. **Florets** 1-several, bisexual; *lemma* 10–11-nerved, awnless or awned; *palea* with several nerves. **Lodicules** 3, membranous, ciliate. **Stamens** 3. **Ovary** glabrous; stigmas 3. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 12$.



Figure 528.—*Thamnocalamus tessellatus* spikelet (16–18 mm). Photographer: M. Koekemoer.

**Species** ± 6, East Asia, Africa; 1 in southern Africa: *Thamnocalamus tessellatus* (Nees) Soderstr. & R.P.Ellis, Lesotho, Free State, KwaZulu-Natal and Eastern Cape

Species treatment by M.T. Nembudani.

**Thamnocalamus tessellatus** (Nees) Soderstr. & R.P.Ellis, in *Bothalia* 14: 54 (1982). Type: South Africa, Eastern Cape, 'in monte Katberg, alt. 500'', *Drège s.n.*

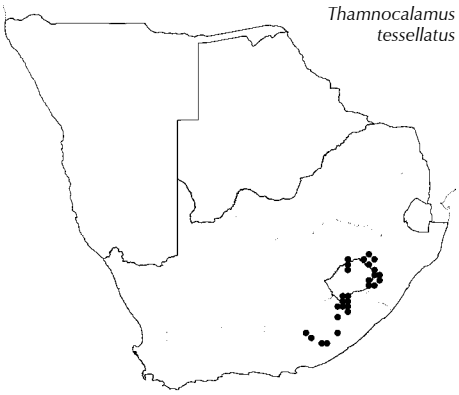
*Arundinaria tessellata* (Nees) Munro, in *Transactions of the Linnean Society* 26: 31 (1868).

BERGBAMBOES

Loosely tufted bamboo 1–5 m high; growth habit sympodial with each new rhizome becoming a culm; rhizome stout, woody; culm to 20 mm in diameter, profusely branched above, dark maroon when young. Leaf blade 50–150 × 8–15 mm, stiff, narrowly lanceolate, tapering to an acuminate apex forming a hard point, strongly crossed veined (therefore the specific name *tessellatus*). Spikelet 16–18 mm long, with tessellate venation; glumes 9.9–15.0 mm long; palea 10.0–12.5 mm long; anther 7.8–8.0 mm long.

*Flowering*: In local populations for many years, followed by death (herbarium records seen by Soderstrom & Ellis (1982) show flowering in 1908 & 1953). *Ecology*: Mountain sides, in wet places and sheltered ravines, at 1 600–2 700 m. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. L, FS, KZN, EC.

Illustration: Chippindall: 31, fig. 1 (1955).
Voucher: *Soderstrom & Du Toit* 1610.




## **Thelepogon** Roth ex Roem. & Schult.

Roemer & Schultes: 46 (1817); Clayton & Renvoize: 744 (1982); Clayton & Renvoize: 346 (1986); Gibbs Russell et al.: 334 (1990); Watson & Dallwitz: 938 (1994); Cope: 54 (2002).

Annual, coarse; often with prop/stilt roots. **Leaf blade** lanceolate, base amplexicaul, expanded; *ligul*e an unfringed or fringed membrane. **Inflorescence** terminal, with many racemes, digitate or subdigitate;

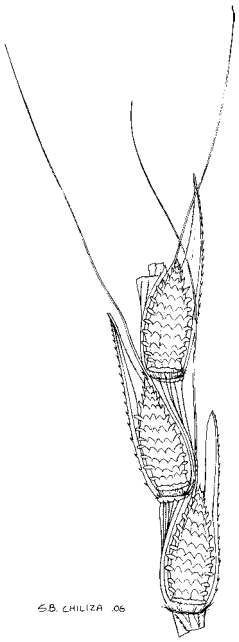



Figure 529.—*Thelepogon elegans* spikelet pair (5–13 mm). Photographer: M. Koekemoer.

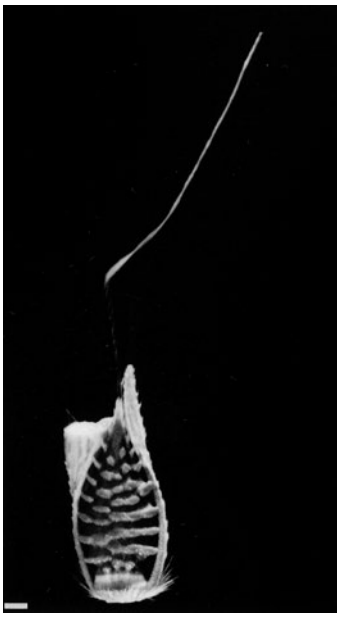


Figure 530.—*Thelepogon elegans* spikelet pair (5–13 mm). Photographer: M. Koekemoer.



Figure 531.—*Thelepogon elegans* specimen.

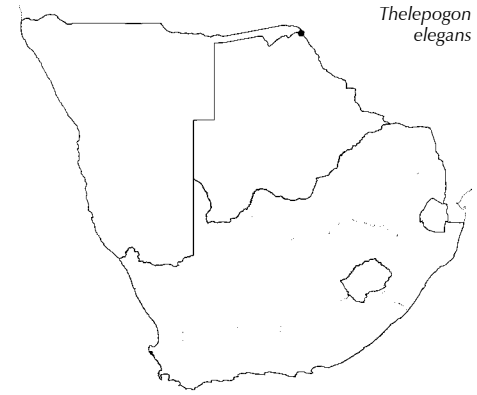






Figure 532.—*Themeda triandra*. A, plant; B, ligule. Artist: C.D. Bartman.

internodes thickened, clavate, disarticulating transversely; *spikelets* in pairs, in long–short combination: one sessile, the other pedicelled; pedicelled spikelet reduced or represented by a pedicel only. **Sessile spikelet** dorsiventrally compressed; falling with glumes, internode and pedicel; *glumes* ± equal, longer than spikelet, dissimilar, rugose, glabrous, awnless, wingless; lower glume crustaceous, without keels, rounded on flanks. **Florets** 2; *lower floret* male; lemma hyaline; palea well developed; *upper floret* bisexual; *lemma* less firm than glumes, 2-lobed, awned between lobes; *awn* glabrous, much longer than body of lemma; *callus* obtuse, hairy, fitting into concave apex of internode; *palea* present. **Lodicules** 2, fleshy, glabrous. **Stamens** 3. **Ovary** glabrous. **Caryopsis** ellipsoid, small, about 3 mm long; hilum short; embryo large, about half the length of caryopsis. **Pedicelled spikelet** reduced or represented by flattened, linear pedicel. **Photosynthetic pathway**: $C_4$; XyMS-. **Cytology**: $x = 5$.

**Species** 1, tropical Africa extending eastwards to Indonesia: *Thelepogon elegans* Roem. & Schult., Namibia (Caprivi).

Species treatment by M.T. Nembudani.

**Thelepogon elegans** Roem. & Schult., in *Systema vegetabilium*. 2: 277 (1817). Type: India (B, holo.†).

Coarse annual, 100–1 500 mm high. Leaf blade 40–200 × 5–30 mm, spiny or glabrous. Inflorescence of 2–12 racemes, 40–150 mm long, fragile. Sessile spikelet 5–13 mm long; lower glume prominently rugose; upper lemma awn 15–25 mm long, column brown and twisted, bristle white and scabrid. Pedicelled spikelet reduced or represented by flattened, linear pedicel.

*Flowering*: May. *Ecology*: Black turf soil. *Distribution*: Northwards throughout tropical Africa to India and Indonesia. N.

Illustration: Clayton et al.: 745, fig. 174 (1982).
Anatomy voucher: *Ellis 3742*.
Voucher: *Ellis 3742*.

## **Themeda** Forssk.

Forsskål: 178 (1775); Stapf: 366 (1898); Stapf: 415 (1919); Chippindall: 490 (1955); Clayton & Renvoize: 829 (1982); Clayton & Renvoize: 360 (1986); Gibbs Russell et al.: 334 (1990); Watson & Dallwitz: 940 (1994); Cope: 148 (2002).

Tufted annual or perennial. **Leaf blade** linear, flat or folded; lower leaf sheaths often compressed and keeled; *ligule* a fringed to unfringed membrane, truncate. **Inflorescence** of solitary racemes embraced by sheathing spatheoles, these single or in dense branches on flexuous peduncles and gathered into a leafy false panicle; racemes very short, composed of a single, awned sessile spikelet and 2 pedicelled spikelets, the whole enclosed by an involucre of 4 sterile spikelets; internodes and pedicels linear, homogamous spikelets all sessile. **Sessile spikelet** ± terete, usually deciduous; *glumes* ± equal, coriaceous except at apices, awnless; lower glume obtuse, usually not grooved. **Florets** 2; *lower floret* sterile, reduced to a hyaline lemma, nerveless, awnless; *upper floret* bisexual; *lemma* stipitiform, passing directly into a hairy, stout geniculate *awn*; *callus* obtuse to pungent, hairy; *palea* minute or 0. **Lodicules** 2, fleshy, glabrous. **Stamens** 3. **Ovary** glabrous. **Caryopsis** lanceolate, channelled on

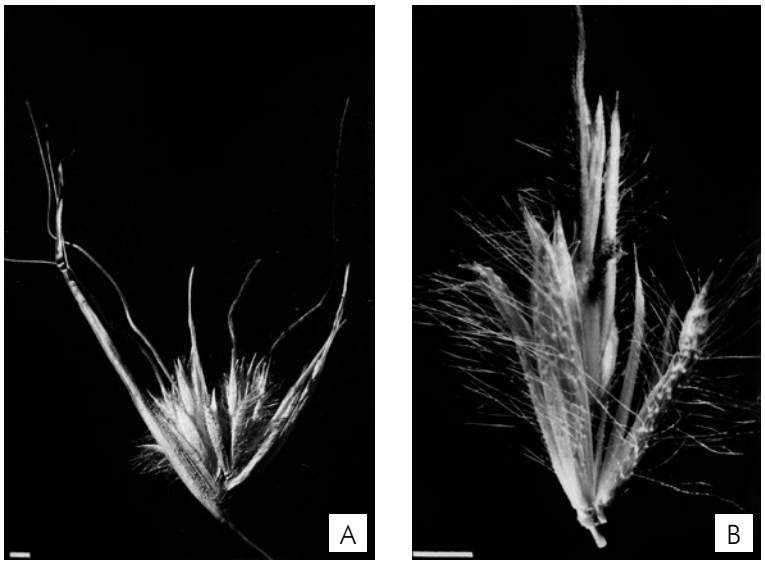



Figure 533.—*Themeda triandra*. A, spikelet cluster (about 60 mm); B, spikelet pair (5–7 mm). Photographer: M. Koekemoer.

one side; hilum short; embryo large. **Pedicelled spikelet** narrowly lanceolate, male or sterile, awnless; callus long and slender, as long as or longer than pedicel, which is often reduced to a stump. **Photosynthetic pathway**: $C_4$; XyMS-. PCR sheath outline uneven. PCR cell chloroplasts with reduced grana; centrifugal/peripheral. **Cytology**: $x = 5, 10$ (aneuploids, high polyploidy).

**Species** 18, tropical and subtropical regions of Old World, but mainly in Asia; 1 in southern Africa: *Themeda triandra* Forssk., widespread and very variable.

Species treatment by M.J. Moeaha.

**Themeda triandra** Forssk., in *Flora aegyptiaco-arabica*: 178 (1775). Type: Egypt.

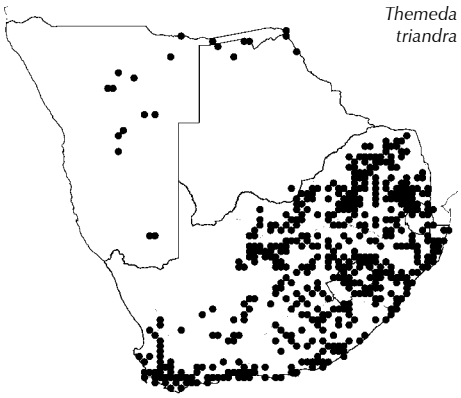
*T. imberbis* (Retz) T.Cooke, in *Flora of Bombay* 2: 993 (1908).

*T. triandra* Forssk. var. *burchellii* (Hack.) Stapf, in *Bibliotheca Botanica* 85: 280 (1915). Type: South Africa, Northern Cape, Griqualand West, *Burchell 1844* & *2095* (syntypes).

*T. triandra* Forssk. var. *hispida* (Nees) Stapf, in *Flora tropical Africa* 9: 418 (1919). Type: South Africa, Western Cape, Clanwilliam, *Drège* (K, holo.).

*T. triandra* Forssk. var. *trachyspathea* Gooss., in *Kew Bulletin* 1934: 195 (1934). Type: Swaziland, Hlumi, *Van Vuuren in PRE 10082* (PRE, holo.).

ROOIGRAS




Perennial 300–1 500 mm high; rhizomatous. Leaf blade to 300 × 1–8 mm, sheath compressed; blade tips abruptly or gradually tapering; ligule a lacerated membrane. Fertile spikelets and bract-like sterile spikelets are wedge-shaped or in drooping triangular clusters within reddish spathes. Sessile spikelet 5–7 mm, long-awned; anther 3.5–4.0 mm long. Pedicelled spikelet equalling sessile to somewhat longer, up to 8.5 mm long.

[A highly variable species.]

*Flowering*: September to June. *Ecology*: Undisturbed veld; resistant to fire; increases in veld unless the veld is overgrazed. *Frequency in south-*

*ern Africa*: Widely dominant and very common. *Distribution*: Northwards to tropical Africa; Old World tropics, subtropics and warm temperate regions. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Important grazing grass often forming dominant stands.

Illustration: Chippindall: pl. 18 (1955); Killick & Kimpton: 1741 (1976); Cope: 149, tab. 48 (2002); Müller: 293 (2007); .
Anatomy vouchers: *Manders 6*; *Ellis 84, 3800, 5178* & *5250*.
Voucher: *De Winter 2748*.

## **Thinopyrum** Á.Löve

Stapf: 743 (1900); Chippindall: 69 (1955) under *Agropyron* Gaertn.; Melderis: 383 (1978); Löve: 351 (1980); Dewey: 209 (1984); Löve: 475 (1984); Clayton & Renvoize: 150 (1986) included in *Elymus* L.; Gibbs Russell et al.: 336 (1990); Jarvie: 155 (1992); Watson & Dallwitz: 942 (1994).

*Elymus* an alternative genus name.

Perennial, erect and rigid or creeping and rooting at nodes, stoloniferous. **Leaf blade** linear, expanded or rolled, rigid; *ligule* an unfringed membrane. **Inflorescence** a single true spike, rachis disarticulating and spikelets falling with internodes; *spikelets* adpressed to rachis, solitary, sessile to subsessile. **Spikelet** laterally compressed, falling with the glumes; *glumes* ± equal, shorter than spikelet, similar, many-nerved, awnless. **Florets** 5–11, bisexual, *uppermost floret* reduced; *lemma* similar in texture to glumes, glabrous, 5-nerved, usually 3-toothed, awned, *awn* minute, straight; *palea* present, keels winged. **Lodicules** 2, membranous, ciliate. **Stamens** 3. **Ovary** hairy. **Caryopsis** medium sized; hilum long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (polyploidy).



Figure 535.—*Thinopyrum distichum* spikelet (28–40 mm). Photographer: M. Koekemoer.

**Species** ± 5, coasts of Europe; 1 in southern Africa: *Thinopyrum distichum* (Thunb.) A.Löve, Western and Eastern Cape.

Species treatment by A.C. Mashau.

**Thinopyrum distichum** (Thunb.) A.Löve, in *Prodromus plantarum capensium* 1: 23, 100 (1794). Type: South Africa, Cape Good Hope [only information].

*Agropyron distichum* (Thunb.) P.Beauv., in *Essai d'une nouvelle Agrostographie*: 102, 146, 180 (1812).

Alternate name: *Elymus distichus* (Thunb.) Melderis

COASTAL WHEAT GRASS, STRANDKORINGGRAS

Hard, robust perennial, 400–600(900) mm high; stoloniferous, underground parts thick and creeping, profusely rooting at nodes;

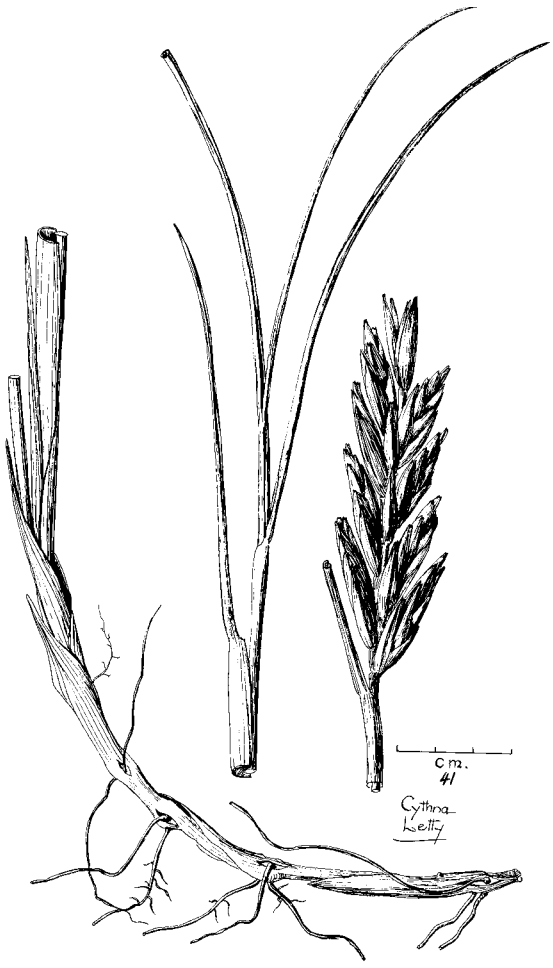
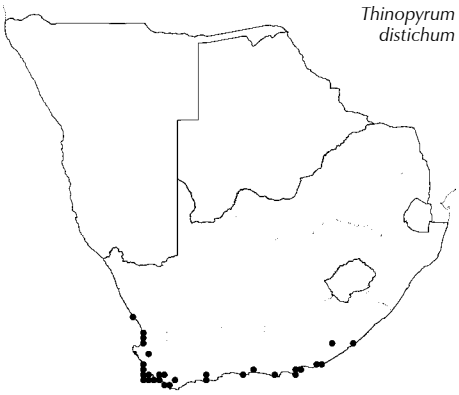



Figure 534.—*Thinopyrum distichum*. Artist: C. Letty.

culms often branched below with tufts of leaves from the nodes. Leaf blade 200–400(500) × 5–7 mm; flat at first, rolled later, rigid, pungent. Inflorescence a true spike 60–250 mm long, rachis breaking up easily, spikelets arranged alternately, adpressed to rachis, not secund. Spikelet (15)28–40 mm long, hard, smooth, falling with glumes, awnless; glumes ± equal; 5–11-flowered, lowest floret bisexual, anther 6–7 mm long.

*Flowering*: October to January. *Ecology*: On coastal sand dunes, usually in areas exposed to sea winds and salt spray, can also tolerate inundation by spring tides. *Frequency in southern Africa*: Locally common. *Distribution*: ?Endemic. WC, EC. *Economics*: As food and drink, (culms chewed for the juicy sweet sap); erosion control and reclamation work as it is an efficient sand binder.

Anatomy vouchers: *Ellis 603, 1169, 2361* & *5480*.
Voucher: *Moffett 3816*.




## **Trachypogon** Nees

Nees ab Esenbeck: 341 (1829); Stapf: 331 (1898); Chippindall: 494 (1955); Anderson: t. 1512 (1967); Clayton & Renvoize: 707 (1982); Clayton & Renvoize: 338 (1986); Gibbs Russell et al.: 336 (1990); Watson & Dallwitz: 955 (1994); Clayton: 19 (2002).



Figure 536.—*Trachypogon spicatus* spikelet pair (4–8 mm). Photographer: M. Koekemoer.

Perennial; densely tufted; sometimes with shortly creeping rhizomes; culm bearded at nodes with a ring of white adpressed hairs. **Leaf blade** narrowly linear, rolled or expanded; *ligule* an unfringed membrane. **Inflorescence** a terminal, cylindrical, spike-like, solitary raceme, rarely digitate, internodes slender, semi-terete to linear, very obliquely articulated below spikelets; *spikelets* paired, in long–short combinations, one subsessile, the other pedicelled, dissimilar. **Subsessile spikelet** persistent, flattened dorsally or somewhat terete, awnless, usually male or sterile, otherwise resembling pedicelled spikelet; callus 0. **Pedicelled spikelet** falling separately, not noticeably compressed, somewhat terete; *glumes* ± equal, dissimilar, awnless; lower glume firmly chartaceous to coriaceous, glabrous to hairy, finely 2-keeled upwards, margins inflexed, very narrow, obscurely nerved; upper glume thinner, grooved on either side of rounded keel. **Florets** 2, *lower floret* sterile, reduced to a lemma, hyaline, 2-nerved, ciliate or ciliolate upwards, awnless; *upper floret* bisexual; *lemma* stipitate, less firm than glumes, hyaline at base, awned; *awn* flexuous or geniculate, hairy; *callus* pungent to acute, densely hairy, obliquely attached to pedicel; *palea* minute, hyaline or 0. **Lodicules** 2, small, glabrous. **Stamens** 3. **Ovary** glabrous; styles terminal, plumose. **Caryopsis** terete; embryo large. **Photosynthetic pathway**: $C_4$; XyMS- (but there is some approaching XyMS+ condition found). **Cytology**: $x = 5$, 10 (polyploidy).



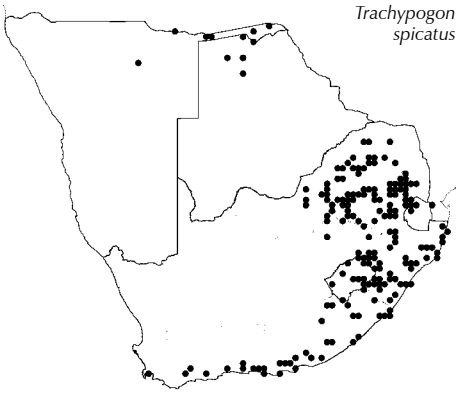

Figure 537.—*Trachypogon spicatus*. A, plant; B, sessile and pedicelled spikelet pair (53 × 2 mm). Artists: A, R. Holcroft; B, W. Roux.

**Species** ± 3–13, Africa, Madagascar and tropical America; 1 in southern Africa: *Trachypogon spicatus* (L.f.) Kuntze, widespread, not in very dry areas.

Species treatment by M.T. Nembudani.

**Quick guide to easily confused genera/species:**

1. Culm nodes with a ring of white adpressed hairs . . . . . **Trachypogon spicatus**
   Culm nodes without a ring of white hairs . . . . . 2
2. Inflorescence with scabrid awns throughout its length; pedicelled spikelets awned; ligule an unfringed membrane; tastes bitter . . . . . **Urelytrum**
   Inflorescence with velvety hairy awns in upper half only; pedicelled spikelets awnless; ligule a fringed membrane; lacks bitter taste . . . . . **Heteropogon**



*Trachypogon spicatus*

**Trachypogon spicatus** (L.f.) Kuntze, in *Revisio generum plantarum vascularium omnium* 2: 794 (1891). Type: South Africa, Cape, *Thunberg* (LINN, holo.).

*T. capensis* (Thunb.) Trin., in *Mémoires de l'Académie Impériale des Sciences de Saint Petersbourg* sér. 6, 2: 257 (1832), nom. superfl., based on *Stipa spicata* L.f.

Giant spear grass, reuse pylgras

Tufted perennial, 300–1 200 mm high; rhizomatous; culm nodes adpressed white hairy. Leaf blade 50–200 × 5 mm, becomes hard as it ages; ligule membranous, splitting into three lobes. Inflorescence a single raceme, rarely with up to 5 racemes, 40–170 mm long, with velvety awns throughout its length. Subsessile spikelet 6–8 mm long; awnless. Long-pedicellate spikelet 8–13 mm long; upper lemma awn hairy, twisted, hygroscopic; callus white hairy; anther 5.0–5.5 mm long.

[At maturity the awned spikelets fall off leaving only the awnless spikelets arranged alternately on either side of rachis. Awn together with the callus is used for seed dispersal.]

*Flowering*: October to May. *Ecology*: Bushveld and sourveld. *Frequency in southern Africa*: Common. *Distribution*: Northwards to tropical Africa, also South America. N, B, S, L, LIM, NW, G, M, FS, KZN, WC, EC. *Economics*: Unpalatable grass; considered as an indicator of under-utilised veld; indicator of sour grassland.

Illustration: Chippindall: pl. 20 (1955); Clayton: 20, tab. 8 (2002).
Anatomy vouchers: *Ellis 143, 211, 426, 451, 1846, 2091, 3722* & *6168*.
Voucher: *Ward 2778*.

## **Tragus** Haller

Haller: 203 (1768) name conserved; Stapf: 577 (1900); Schweickerdt: 15 (1941); Chippindall: 105 (1955); Launert: 205 (1970a); Clayton: 399 (1974); Anton: 55 (1982); Clayton & Renvoize: 253 (1986); Gibbs Russell et al.: 337 (1990); Watson & Dallwitz: 957 (1994); Cope: 246 (1999).

Annual or perennial, tufted; sometimes decumbent; rhizomatous and stoloniferous; often creeping. **Leaf blade** expanded, pectinate-ciliate on margins; *ligule* a short, fringed membrane or a fringe

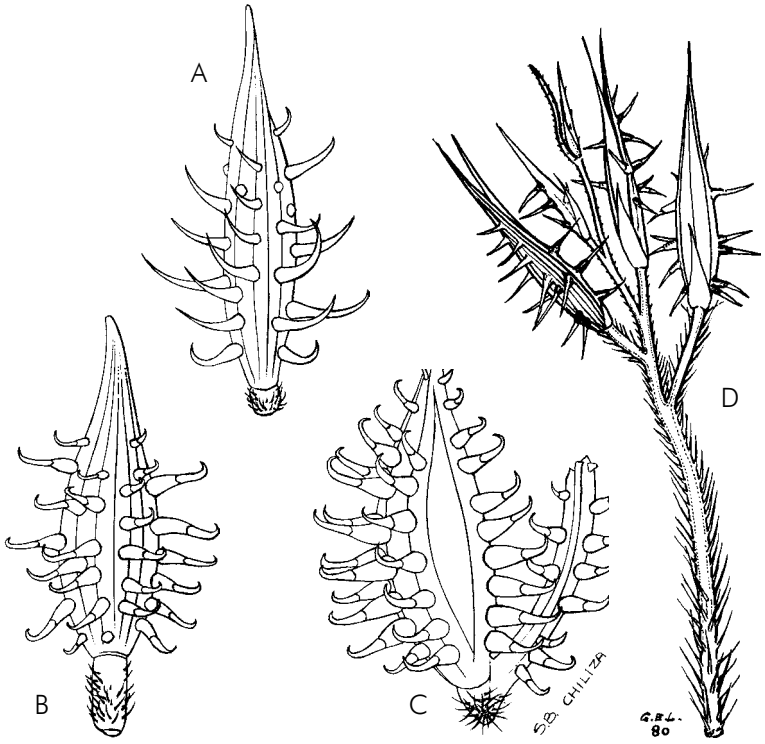



Figure 538.—*Tragus* spp.; spikelet showing upper glume. A, *T. koelerioides* (4.4 × 2.2 mm); B, *T. racemosus* (5.0 × 2.6 mm); C, *T. berteronianus* (3.0 × 2.5 mm); D, *T. pedunculatus* spikelet cluster on long pedicel. Artist: A–C, S.B. Chiliza; D, G.E. Lawrence.

of hairs. **Inflorescence** stiff, dense, cylindrical, spike-like; *spikelets* in subsessile deciduous clusters, each cluster composed of 2–5 spikelets on a reduced or rarely a long peduncle; spikelets of a cluster all alike or upper ± reduced. **Spikelet** dorsiventrally compressed, lanceolate to ovate, falling in clusters with glumes; *glumes* unequal, dissimilar, awnless; lower glume a minute scale or suppressed; upper glume as long as spikelet, 5–7-nerved, nerves formed into prominent ribs bearing hooked, curved or straight prickles/spines. **Floret** 1, bisexual; *lemma* almost as long as upper glume, membranous, entire, 3-nerved, awnless; *palea* as long as lemma, 2-nerved. **Lodicules** 2, broad, cuneate. **Stamens** 3. **Ovary** glabrous; styles distinct, plumose above. **Caryopsis** ellipsoid to oblong, slightly dorsiventrally compressed; hilum short; pericarp fused; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines even. PCR sheath extensions present. Maximum number of extension cells 1. PCR cell chloroplasts with well-developed grana; centripetal. **Cytology**: $x = 10$ (polyploidy).

**Species** 7, throughout tropics but mainly Africa; 4 in southern Africa, widespread in disturbed areas.

Species treatment by M.T. Nembudani.

**Key to species:**

1. Glume spines straight, apex never curved or hooked; inflorescence open; peduncles long; upper glume of lowest spikelet in each cluster longer than 6 mm . . . . . **T. pedunculatus**
   Glume spines curved or hooked at the apex; inflorescence spike-like; peduncles short; upper glume of lowest spikelet in each cluster shorter than 5 mm . . . . . 2




Figure 539.—*Tragus berteronianus*. Artist: W. Roux.

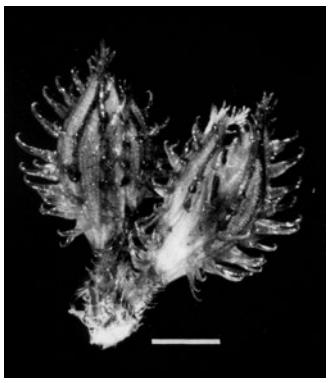
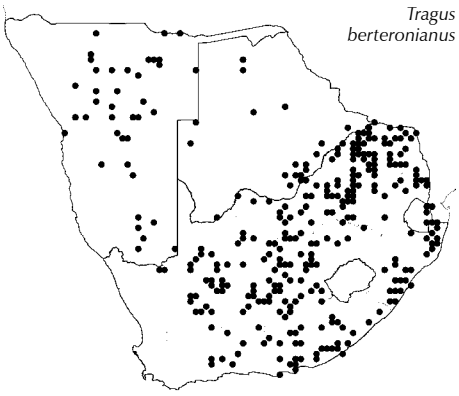


Figure 540.—*Tragus berteronianus* spikelet cluster (2.0–3.8 mm). Photographer: M. Koekemoer.

2. Glume spines curved, not hooked at apex; a stoloniferous perennial; anther 1.8–2.5 mm long . . . . . **T. koelerioides**
Glume spines hooked at apex; annual, culms sometimes rooting at lower nodes; anther less than 1 mm long . . . . . 3
3. Upper glume 5-nerved (space between nerves wide); lowest spikelet in each cluster 2.0–3.8 mm long; anther 0.4–0.6 mm long . . . . . **T. berteronianus**
Upper glume 7-nerved (space between nerves narrow); lowest spikelet in each cluster 3.5–5.0 mm long; anther 0.6–0.8 mm long . . . . . **T. racemosus**


*Tragus berteronianus*

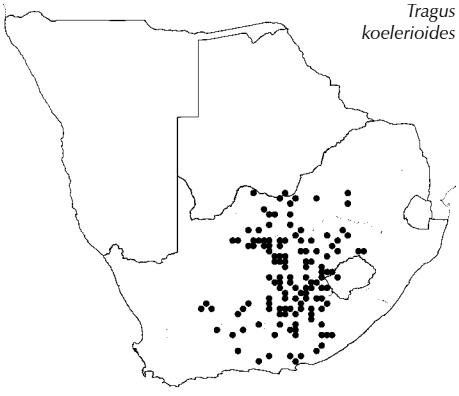
**Tragus berteronianus** Schult., in *Mantissa* 2: 205 (1824). Type: West Indies, Dominican Republic.

SMALL CARROT-SEED GRASS, KOUSKLITS

Loosely tufted annual 50–600 mm high; sometimes rooting at nodes. Leaf blade 10–60 × 2–5 mm. Inflorescence 20–120 mm long, narrowly spike-like; spikelets clustered on peduncles much shorter than spikelets. Lowest spikelet in each cluster 2.0–3.8 mm long; a reduced lower glume occasionally present; upper glume 5-nerved, spaces between nerves 2–5 times wider in the middle and tapering sharply at the ends, bulbous-based spines hooked at the apices; anther 0.4–0.6 mm long.

*Flowering*: January to December, most commonly in summer. *Ecology*: Disturbed places. *Frequency in southern Africa*: Common. *Distribution*: Throughout Africa and in Arabia, Afghanistan, China and New World tropics and subtropics. N, B, S, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Occurrence indicates veld retrogression; spines create problems with wool-bearing sheep; ruderal weed.

Illustration: Chippindall: 107, fig. 79 (1955), Clayton et al.: 401, fig. 108 (1974).
Anatomy vouchers: *Van Heerden 62*; *Ellis 73, 365* & *2021*.
Voucher: *Pott 5533*.


*Tragus koelerioides*

**Tragus koelerioides** Asch., in *Verhandlungen des Botanischen Vereins der Provinz Brandenburg* 20: 30 (1878). Type: South Africa, am Grootrivier, 14. ii. 1833, gesammelt, *Drège 4335*; Eastern Cape, Uitenhage Steenbokvlakte, nördl. vom Winterhoekberg, *Ecklon & Zeyher* (syntypes).

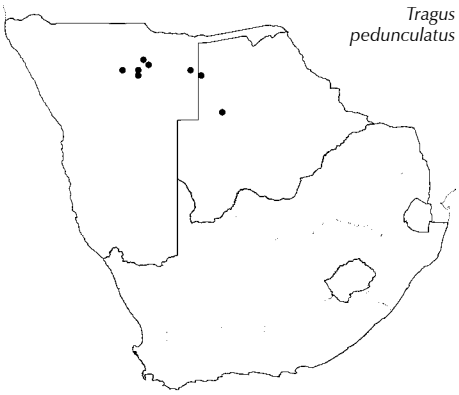
CREEPING CARROT-SEED GRASS, KOPHAARGRAS

Perennial 120–650 mm high; with rhizomes and stolons. Leaf blade 10–50(–80) × 3 mm. Inflorescence 20–70 mm long, narrowly spike-like; spikelets clustered on peduncles much shorter than spikelets. Lowest spikelet in each cluster 3.5–4.8 mm long; upper glume 5-nerved, bulbous-based spines straight or curved, not hooked at the apices; anther 1.8–2.5 mm long.

*Flowering*: October to May. *Ecology*: On a variety of soil types; open veld. *Frequency in southern Africa*: Infrequent. *Distribution*: Southern Africa with a record in Zimbabwe. B, L, NW, G, FS, NC, WC, EC.

Illustration: Chippindall: 105, fig. 77 (1955).
Anatomy vouchers: *Van Heerden 60*; *Ellis 843, 3602* & *Smook* 2148.
Vouchers: *Smook 3372, 6940*.

**Tragus pedunculatus** Pilg., in Engler, *Botanische Jahrbücher* 45: 208 (1910). Type: Namibia, Grootfontein, *Dinter 689*.

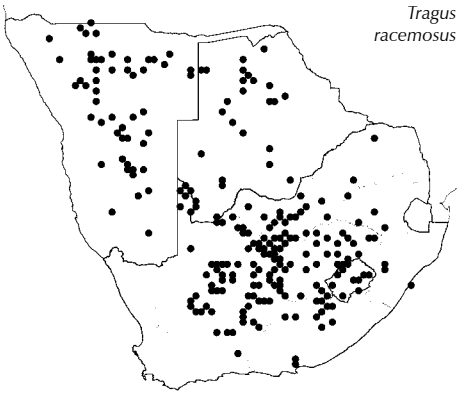

*Tragus pedunculatus*

Annual 100–400 mm high; culms branched above, sometimes decumbent. Leaf blade 20–60 × 2 mm. Inflorescence 20–70 mm long, open, appearing branched; spikelets clustered on peduncles about as long as the spikelets. Lowest spikelet in each cluster 6–10 mm long; upper glume 7–9-nerved, bulbous-based spines straight; anther 0.6–2.0 mm long.

*Flowering*: January to April. *Ecology*: Shallow sand over limestone. *Distribution*: Endemic. N, B.

Voucher: *Dinter 5698*.

**Tragus racemosus** (L.) All., in *Flora Pedemontana* 2: 241 (1785). Type: Europe.


*Tragus racemosus*

LARGE CARROT-SEED GRASS, KLITSGRAS

Annual 110–400 mm high, culms usually decumbent. Leaf blade 20–60 × 2–4 mm. Inflorescence 25–100 mm long, loosely spike-like; spikelets clustered on peduncles much shorter than spikelets. Lowest spikelet in each cluster 3.5–5.0 mm long; upper glume 7-nerved, spaces between nerves about same width for entire length, bulbous-based spines hooked at apices; anther 0.6–0.8 mm long.

*Flowering*: November to May. *Ecology*: Limestone and sandy soils; often in moist places and disturbed areas. Ruderal weed. *Frequency in southern Africa*: Common. *Distribution*: Northwards throughout tropical Africa, Mediterranean region, southwestern Asia, introduced to America. N, B, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Weed.

Illustration: Chippindall: 106, fig. 78 (1955).
Anatomy vouchers: *Ellis 245, 857, 915, 3578* & *5262*.
Voucher: *Smook 2774*.

## **Tribolium** Desv.

Desvaux: 64 (1831); Renvoize: 795 (1985); Clayton & Renvoize: 169 (1986); Gibbs Russell et al.: 339 (1990); Watson & Dallwitz: 959 (1994); Linder & Davidse: 445 (1997); Verboom et al.: 337 (2006); Linder et al.: 306 (2010).

*Lasiochloa* Kunth: 556 (1832); Chippindall: 116 (1955).

*Plagiochloa* Adamson & Sprague: 89 (1941); Chippindall: 113 (1955).

*Urochlaena* Nees: 437 (1841); Stapf: 700 (1900); Chippindall: 117 (1955); Clayton & Renvoize: 170 (1986); Gibbs Russell et al.: 350 (1990).

*Karroochloa* Conert & Türpe in *Senckenbergiana Biologica* 50: 295 (1969) in part. Conert & Türpe: 289 (1969); Stapf: 516 (1899) under *Danthonia* Stapf; Chippindall: 241 (1955) under *Danthonia* Stapf; Conert: 175 (1965); Launert: 124 (1970a); Clayton & Renvoize: 175 (1986) under *Rytidosperma* Steud.; Gibbs Russell et al.: 192 (1990); Watson & Dallwitz: 510 (1994).

*Danthonia* Stapf: 516 (1899) in part.


Figure 541.—*Tribolium purpureum* spikelet (5–7 mm). Photographer: M. Koekemoer.

Tufted annual or perennial; erect to decumbent and mat-forming; rhizomes or stolons present or absent. **Leaf blade** expanded, rolled




Figure 542.—*Tribolium* spp.; glumes and lemma. A, *T. uniolae*; B, *T. brachystachyum*; C, *T. acutiflorum*; D, *T. utriculosum*; E, *T. obliterum*; F, *T. pusillum*; G, *T. obtusifolium*; H, *T. ciliare*; I, *T. echinatum*; J, *T. hispidum*; K, *T. tenellum*. Artists: A–L, M. Ueckerman; K, W. Roux.

## TRIBOLIUM

or setaceous; *ligule* a fringed membrane to a fringe of hairs. **Inflorescence** a panicle or single spike or raceme, contracted or capitate, sometimes open, rarely partially enclosed by a much enlarged flag leaf and disarticulating below flag leaf and falling as a unit; secund or not; *spikelets* 2-ranked. **Spikelet** laterally to not noticeably compressed, usually disarticulating above glumes and tardily between florets; *glumes* ± equal to unequal, shorter to longer than spikelet, similar, acute to acuminate, 3–5-nerved, glabrous or with tubercle-based glassy hairs, awnless or awned. **Florets** 2–10, bisexual; *lemma* less firm to similar in texture to glumes, acute to long-acuminate or lobed, lobes rounded, acute to acuminate; 7–9-nerved; hairy, hairs acute or club-shaped, covering lower part, along keel, in marginal rows, in fringes or tufts to variously scattered; awnless, or awned; awn short and straight or long and usually geniculate, with a basal twisted column and straight bristle; *callus* short, glabrous; *palea* obovate or lorate, acute, rounded, emarginate or bilobed, often with tufts of long hairs on margins. **Lodicules** 2, cuneate. **Stamens** 3. **Ovary** glabrous. **Caryopsis** ellipsoid or obovate; hilum short; pericarp fairly loosely adherent; embryo small. **Cytology**: 2n = 12, 24, 36. **Photosynthetic pathway**: $C_3$; XyMS+.

**Species** ± 14, southern Africa, mainly southern Namibia, Lesotho, Free State, Eastern Cape, Western Cape and Northern Cape provinces.

Species treatment by L. Fish and M.J. Moeaha.

[Measurements refer to lowest florets unless otherwise specified.]

**Key to species:**

1. Glume awn longer than glume body; a dehiscence node present below the flag-leaf . . . . . **T. pusillum**
   Glume awn not longer than glume body or awnless; no dehiscence node below flag-leaf . . . . . 2



Figure 543.—*Tribolium pusillum* spikelet (5–6 mm). Photographer: M. Koekemoer.



Figure 544.—*Tribolium uniolae* spikelet (to 6 mm). Photographer: M. Koekemoer.

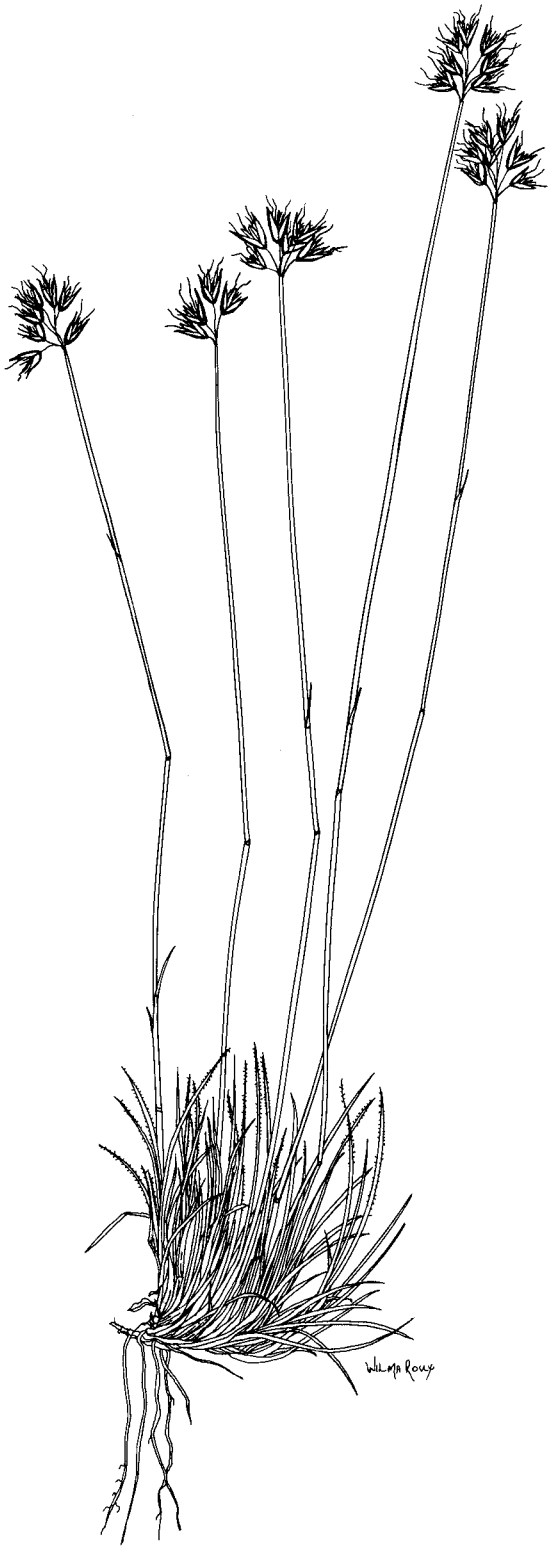


Figure 545.—*Tribolium purpureum*. Artist: W. Roux.



Figure 546.—*Tribolium uniolae*. Artist: W. Roux.

2. Lemma deeply lobed, awned, central awn with a twisted column and bristle, often geniculate . . . . . 3
Lemma entire or shallowly lobed, awnless, mucronate or awned, central awn if present straight and without a column and bristle . . . . . 5
3. Lemma lobes narrow, acuminate to awned; lemma hairs not in distinct tufts; leaves usually glabrous, if pubescent never hispid . . . . . **T. curvum**
Lemma lobes broad, rounded or truncate sometimes acute, awnless; lemma hairs in distinct tufts; leaves and sheaths sparsely hispid . . . . . 4
4. Rhizomatous perennial forming small cushions; palea keels densely short ciliate from middle to almost the apex, (sometimes only on one side); lemma margins very shortly hairy . . . . . **T. purpureum**
Tufted annual; palea keels sparsely long ciliate from middle to a distance below apex; lemma margins usually glabrous . . . . . **T. tenellum**.
5(2). Lemma awned (may be minute) . . . . . 6
Lemma awnless or mucronate . . . . . 8
6. Lemma central awn 1.0–1.5 mm long . . . . . **T. pleuropogon**
Lemma central awn 0.3–0.5 mm long . . . . . 7
7. Lemma keel glabrous . . . . . **T. obliterum**
Lemma keel hairy, hairs club-shaped . . . . . **T. acutiflorum**
8(5). Inflorescence a solitary raceme with spikelets distichously arranged (may branch below) . . . . . 9
Inflorescence a panicle with spikelets not distichously arranged . . . . . 10
9. Spikelet 4–5 mm long; innovation buds intravaginal; glumes always hairy; plants with a restricted distribution, usually in montane seepage areas; leaves and culms soft . . **T. brachystachyum**
Spikelet 5–10 mm long; innovation buds extravaginal; glumes glabrous or hairy; plants widespread, usually in dry habitats, from sea-level to 1 000 m; leaves and culms stiff, hard . . . . **T. uniolae**
10(8). Lemma marginal hairs club-shaped . . . . . **T. utriculosum**
Lemma hairs all acute . . . . . 11
11. Glumes glabrous and/or scaberulous or scabrid . . . . . 12
Glume hairy, hairs long, often bulbous-based . . . . . 13
12. Anthers 0.3–0.5 mm long; glumes shorter than spikelet; florets 5–10 . . . . . **T. obliterum**
Anthers 0.8–2.0 mm long; glumes as long as spikelet; florets 3–6 . . . . . **T. obtusifolium**
13(11). Annual . . . . . 14
Perennial . . . . . 15
14. Spikelet 3.5–5.0 mm long; lemma long acuminate; anthers 0.8–2.0 mm long . . . . . **T. echinatum**
Spikelet 2.0–3.0 mm long; lemma acute; anthers 0.5–0.6 mm long . . . . . **T. ciliare**
15(13). Leaves glabrous; palea obtuse, glabrous between keels; florets 3–6 . . . . . **T. obtusifolium**
Leaves usually hairy; palea acute, hairy between keels; florets 2–3(4) . . . . . **T. hispidum**

**Tribolium acutiflorum** (Nees) Renvoize, in *Kew Bulletin* 40: 798 (1985). Type: South Africa, Western Cape, 'in dumetis ad Ebenezer et in Groenvalley ad montane Piquetberg'. *Drège s.n.* (K, lecto.).

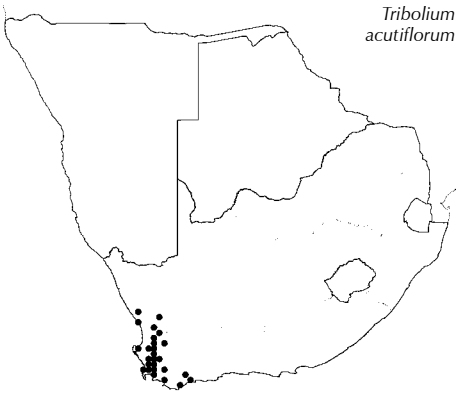
*Plagiochloa acutiflora* (Nees) Adamson & Sprague, in *Journal of South African Botany* 7: 90 (1941).

Slender, tufted perennial 100–300 mm high; stolons present or absent. Leaf blade 20–300 × 1–3 mm, expanded, glabrous or hairy with tubercle-based hairs. Inflorescence a terminal and/or axillary panicle, contracted, cylindrical, 15–50 × 5–10 mm, partly enclosed in uppermost leaf; a dehiscence node absent below flag-leaf. Spikelet 4.0–6.5 mm long, not distichous; florets 4–9; glumes shorter than spikelet, acute, glabrous, keel scabrid except near base; lemma 3.0–3.5 mm

long, acute to acuminate, awned, awn 0.3–0.5 mm long, without column and bristle; club-shaped hairs along keel and lower ½ of margins or marginal hairs acute; palea rounded, glabrous between keels; marginal hair tufts absent; anthers 0.4–0.8 mm long. Chromosome number: 2x = 24 (Spies et al. 1992; Visser & Spies 1994a).

*Flowering*: September to January. *Ecology*: Restricted to eutrophic soils of the Swartland lowlands and granites of Namaqualand; sandy soils and disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. Introduced into Australia. NC, WC. *Economics*: Invasive weed of wet depressions in Australia.

Illustration: Linder & Davidse: 478, fig. 10 (1997).
Anatomy vouchers: *Ellis 683, 684, 699, 1146* & *2431*.
Voucher: *Davidse 33415A*.


*Tribolium acutiflorum*

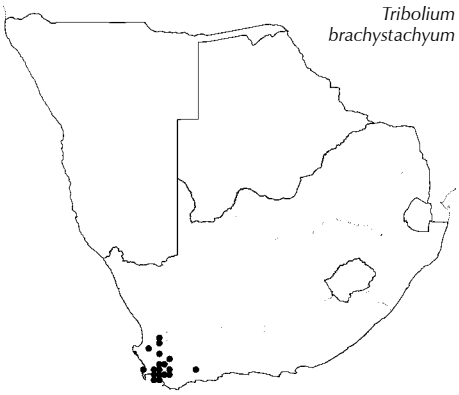
**Tribolium brachystachyum** (Nees) Renvoize in *Kew Bulletin* 40: 798 (1985). Type: South Africa, Western Cape, Du Toit's Kloof, solo turfoso argillaceo subhumido alt. 2500–3000', *Drège s.n.* (B, holo.).

*Plagiochloa brachystachya* (Nees) Adamson & Sprague, in *Journal of South African Botany* 7: 91 (1941).

Prostrate cushion-forming to tufted perennial up to 300 mm high; stolons absent. Leaf blade 10–120 (rarely longer) × to 2.5 mm, expanded, soft, long hairy. Inflorescence terminal, spike-like, contracted, sometimes secund, ovate or cylindrical to 25 mm long, exerted from uppermost leaf; a dehiscence node absent below flag-leaf. Spikelet 4–5 × to 3.5 mm; florets (4–)5–9, distichous; glumes shorter to as long as spikelet, acuminate, usually with long, tubercle-based glassy hairs; lemma acute to obtuse, awnless, lower half evenly hairy; hairs 0.2 mm long, club-shaped; palea acute, keels may be slightly winged, glabrous or hairy between keels, margins long hairy; anthers 2.0–2.2 mm long. Chromosome number: 2x = 24 (Spies et al. 1992; Visser & Spies 1994a).

*Flowering*: October to January. *Ecology*: Restricted to montane habitats; on sandy oligotropic soils derived from quartzite; in damp areas such as seeps, cool south-facing ledges and in disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. WC.

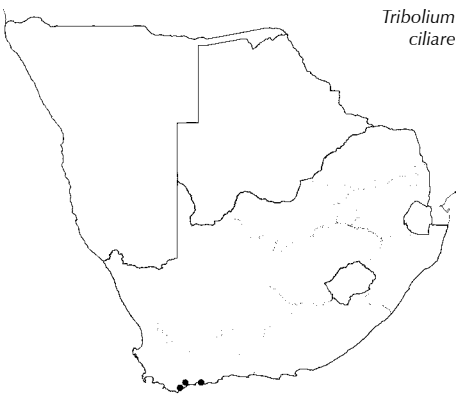
Anatomy vouchers: *Ellis 2238, 4688* & *5553*.
Voucher: *Ellis 2855*.


*Tribolium brachystachyum*

**Tribolium ciliare** (Stapf) Renvoize, in *Kew Bulletin* 40: 799 (1985). Type: Western Cape, *Thunberg 2348* (UPS, holo.).

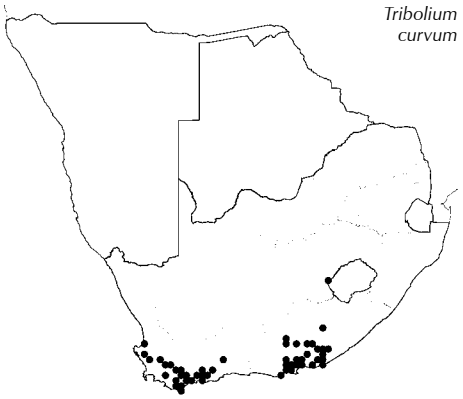
*Plagiochloa ciliaris* (Stapf) Adamson & Sprague, in *Journal of South African Botany* 7: 91 (1941).

Weakly tufted annual to 100 mm high; stolons absent. Leaf blade to 20 × to 1 mm; glabrous or sparsely hairy, hairs tubercle-based. Inflorescence a terminal, contracted, cylindrical panicle, 5–12 mm long, partly enclosed in uppermost leaf sheath; a dehiscence node absent below flag-leaf. Spikelet 2–3 × to 1 mm, not distichous; florets 2; glumes as long as spikelet or slightly shorter, acute, 5-nerved, hairs tubercle-based, tapering apically; lemma acute, awnless, back and keel glabrous, margins hairy, hairs acute, 0.3–0.5 mm long; palea acute, hairy between keels, marginal long hairs absent; anthers 0.5–0.6 mm long. Chromosome number: 2x = 12 (Spies et al. 1992; Visser & Spies 1994b).


*Tribolium ciliare*

*Flowering*: September to October. *Ecology*: On Bredasdorp limestone outcrops; disturbed areas with well-drained soils that are dry in summer. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic (on Bredasdorp limestone). WC.

Anatomy voucher: *Ellis 5453*.
Voucher: *Davidse 33525*.


*Tribolium curvum*

**Tribolium curvum** (Nees) Verboom & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 306–364 (2010). Type: South Africa, Eastern Cape, Uitenhage District, Swartkopsrivier, *Ecklon 4529b* (lecto.).

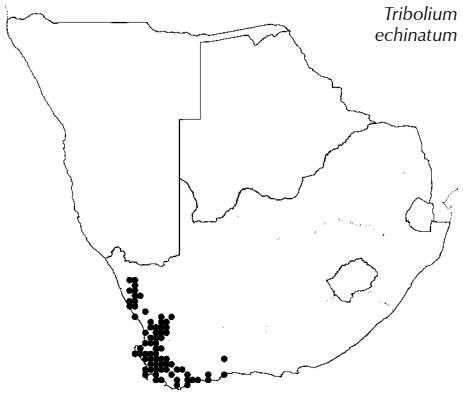
*Danthonia curva* Nees, in *Florae Africanae australioris*: 328 (1841).

*Karroochloa curva* (Nees) Conert & Türpe, in *Senckenbergiana Biologica* 50: 295 (1969).

Tufted, perennial to 400 mm high; stoloniferous. Leaf blade to 250 × to 2 mm, flat or folded, blade and sheath usually glabrous, if pubescent then never hispid. Inflorescence 15–50 mm long. Spikelet 5–6 × ± 1.5 mm, 3–6-flowered; glumes 3.5–6.0 mm long; lemma 2.5–3.5 mm long (including lobes), densely hairy with long hairs all over, except lobes glabrous, margins fringed; deeply lobed, lobes narrow, acute to acuminate, awned; central awn 4.0–5.5 mm long, column (twisted) and bristle present; palea 2.2–2.5 mm long, glabrous or rarely pubescent between keels; callus semi-circular, short, 0.2 mm long; anthers 1.5–1.8 mm long.

*Flowering*: October to May. *Ecology*: In damp or shady habitats. *Frequency in southern Africa*: Common. *Distribution*: Endemic. FS?, WC, EC. *Economics*: Natural pasture.

Illustration: Chippindall: 243, fig. 214 (1955); Conert & Türpe: 296, fig. 2–8, spikelet parts only (1969).
Anatomy vouchers: *Ellis 1208, 2522, 2560, 2561* & *Van Breda 1757*.
Voucher: *Du Toit 1999*.


*Tribolium echinatum*

**Tribolium echinatum** (Thunb.) Renvoize, in *Kew Bulletin* 40: 798 (1985). Type: South Africa, *Thunberg 1711, 1712* (UPS, ?holo.).

*Lasiochloa echinata* (Thunb.) Adamson, in *Journal of South African Botany* 8: 272 (1942).

Prostrate or tufted annual to 300 mm high; stolons absent. Leaf blade 20–150 × 1–5 mm, expanded, usually sparsely to densely hairy, hairs simple or tubercle-based, rarely glabrous. Inflorescence a terminal contracted panicle, ovate or cylindrical, 10–50 mm long, partly enclosed in uppermost leaf; a dehiscence node absent below flag-leaf. Spikelet 3.5–5.0 × 1.0–1.5 mm; florets (2–)3(–4), not distichous; glumes 3.5–5.0 mm long, longer than spikelet, acuminate to long-acuminate, 5-nerved, scaberulous; hairs long, glassy, tubercle-based, tapering apically; upper glume awn usually 0.5–1.4 mm long; lemma 2.8–4.0 mm long, long-acuminate, awnless; lower margins hairy; hairs 0.3–1.2 mm long, acute; palea acute or bi-lobed, glabrous or hairy between keels and margins long hairy; anthers 0.8–2.0 mm long. Chromosome number: 2x = 12 (Spies et al. 1992; Visser & Spies 1994b).

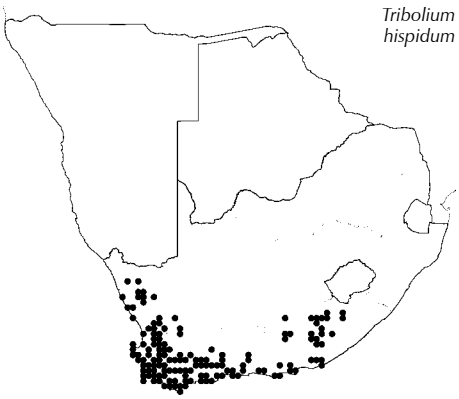
*Flowering*: August to November. *Ecology*: On well-drained soils derived from sandstones, shales, granites, dolerite and recent sands; common and widespread over a large range of habitats and veg-

etation types; common in disturbed areas such as roadsides. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. Introduced to Australia. NC, WC.

Anatomy vouchers: *Ellis 700, 1179, 1676, 1726, 2197* & *2436*.
Voucher: *Davidse 33250*.

**Tribolium hispidum** (Thunb.) Desv., in *Opuscules sur les sciences physiques et naturelles*: 64 (1831). Type: South Africa, *Thunberg 2354*.

*Lasiochloa longifolia* (Schrad.) Kunth, in *Rèvision des graminées* 2: 557, t. 193 (1832).


*Tribolium hispidum*

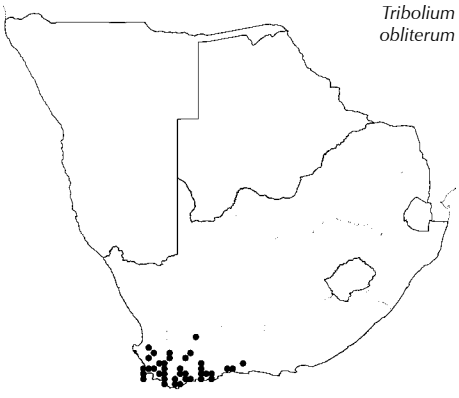
Tufted perennial to 400 mm high; stolons absent. Leaf blade to 250 × 0.5–4.0 mm, usually glabrous on limestone and hairy elsewhere, hairs tubercle-based; sheath mouth with bristles. Inflorescence a sparse contracted panicle, 10–50(–70) mm long, ovate or linear; a dehiscence node absent below flag-leaf. Spikelet 3–5 × to 1.5 mm; florets 2–3(–4), not distichous; glumes usually longer than spikelet, acute to shortly acuminate, awned, scaberulous, tubercle-based hairs 1.0–1.5 mm long; lemma acuminate, awnless, keels glabrous, sub-marginal hairs in tufts, hairs acute 0.3–0.5 mm long, rarely hairs sparsely scattered; palea acute, hairy between keels, sometimes margins with long hairs; anthers 1.5–2.0 mm long. Chromosome number: 2x = 12, 24, 36 (Spies et al. 1992; Visser & Spies 1994b).

*Flowering*: August to February. *Ecology*: A variable widespread, common species found in a wide range of altitude and vegetation types with the matching soil types such as fynbos on oligotropic soils derived from sandstone, renosterveld on heavier soils derived from shales and granites, valley bushveld on shale soils in the east and grasslands in the eastern Karoo mountains. *Frequency in southern Africa*: Widespread and locally common. *Distribution*: Endemic. NC, WC, EC.

Illustration: Chippindall: 115, fig. 85 (1955).
Anatomy vouchers: *Ellis 627, 642, 674, 694, 695, 1153, 1175, 1259, 1283, 1638, 1665, 2330, 2336, 2501, 2510, 2525, 2559* & *2615*.
Voucher: *Smook 3633*.

**Tribolium obliterum** (Hemsl.) Renvoize, in *Kew Bulletin* 40: 798 (1985). Type: St. Helena, *Burchell 59* (K, holo.).

*Plagiochloa oblitera* (Hemsl.) Adamson & Sprague, in *Journal of South African Botany* 7: 91 (1941).

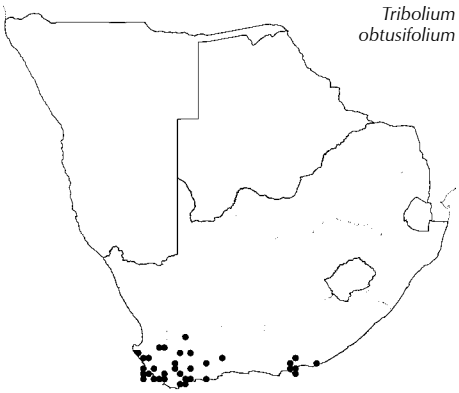

*Tribolium obliterum*

Prostrate or erect, tufted perennial 100–350 mm high; stolons present or absent. Leaf blade to 180 × 0.5–1.0 mm, glabrous; sheath mouth with a ring of bristles. Inflorescence a terminal, contracted, sparse panicle, 10–50 mm long, obovate or cylindrical, often partly enclosed in uppermost sheath; a dehiscence node absent below flag-leaf. Spikelet 3.5–5.0 × to 2 mm; florets 5–10, not distichous; glumes shorter than spikelet, acute, glabrous, scabrid; lemma acute to acuminate, awned, awn up to 0.3 mm long; glabrous on back and keel, hairy on margins; hairs slender, acute; palea truncate, glabrous between keels, margin long hair tufts present or absent; anthers 0.3–0.5 mm long.

[Closely related to *T. obtusifolium* with possible hybrids reported.]

*Flowering*: September to December. *Ecology*: In well-drained habitats on gravelly soils often derived from silcretes; disturbed areas such as cultivated fields and roadsides. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. Introduced in Australia, St Helena and Ascension Islands. NC, WC.

Anatomy vouchers: *Ellis 685, 1262, 1637, 1659, 2239, 2475, 2519* & *2521*.
Voucher: *Davidse 33840*.


*Tribolium obtusifolium*

**Tribolium obtusifolium** (Nees) Renvoize, in *Kew Bulletin* 40: 799 (1985). Type: South Africa, Eastern Cape, 'Locis aridis agrorum ad flumen Zwartkoprivier, alt. I., et in calcareis ad Zautpanskop iuxta eundem fluvium', December, *Drège s.n.* (B, holo.; PRE, fg.).

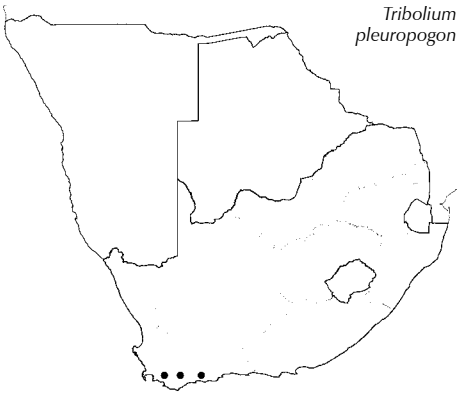
*Lasiochloa obtusifolia* Nees, in *Florae Africanae australioris* III: 430 (1841).

Tufted to spreading perennial to 300 mm high; stolons present or absent. Leaf blade 10–300 × 0.2–1.2 mm, glabrous, expanded or rolled; ring of bristles at sheath mouth. Inflorescence a terminal, contracted panicle, 10–60 mm long, ovate, obovate or cylindrical; a dehiscence node absent below flag-leaf. Spikelet 3.0–5.2 × 1.5–2.0 mm; florets 3–6, not distichous; glumes 3–5 mm long, usually ± as long as spikelet, acute, glabrous, scaberulous, long tubercle-based hairs present or absent; lemma 2.9–4.5 mm long, acute to acuminate, awnless, glabrous or scabrid at least at apex, sub-marginal tufts of acute, 0.2–0.5 mm long hairs present, rarely hairs on keels or scattered on back; palea obtuse, glabrous between keels, sometimes margins with long hairs; anthers 0.8–2.0 mm long.

[Morphologically variable; closely related to *T. obliterum*.]

*Flowering*: September to February. *Ecology*: Rare but with a wide distribution and habitat range. Seasonally waterlogged coastal sands and limestone; not in sandstone-derived soils or well-drained habitats; wet habitats such as near fountains or seepages. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. NC, WC, EC.

Anatomy vouchers: *Ellis 641, 1277, 2520, 2532, 2568, 5841* & *Davidse 33973*.
Voucher: *Duthie 1761a*.


*Tribolium pleuropogon*

**Tribolium pleuropogon** (Stapf) Verboom & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 306–364 (2010). Type: South Africa, Western Cape, in moist places near Riversdale, 130 m, *Schlechter 1759* (K, holo; GRA, iso.).

*Schismus pleuropogon* Stapf, in *Kew Bulletin of Miscellaneous Information* 9: 234 (1916).

Perennial 120–250 mm high; stolons present. Leaf blade 30–80 × to 1.5 mm, involute. Inflorescence 15–80 mm long. Spikelet 5–7 × to 2 mm, ovate; 5–7-flowered; lemma glabrous except lower $^1/_3$ of margin fringed with hairs, lobes acute, narrow; central awn 1.0–1.5 mm long, straight, twisted column absent, robust; palea glabrous between keels; anther 0.6–0.8 mm long,

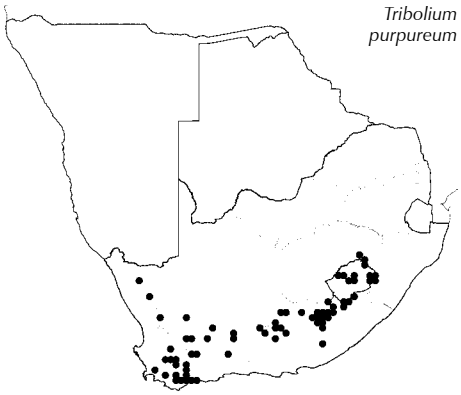
*Flowering*: November. *Ecology*: Moist areas. *Frequency in southern Africa*: Rare. *Distribution*: Endemic. WC.

Illustration: Conert & Türpe: 65, fig. 17 (1974).
Voucher: *Linder 5895*.

**Tribolium purpureum** (L.f.) Verboom & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 306–364 (2010). Type: South Africa?, *Thunberg* (UPS 2620, holo.).

*Danthonia purpurea* (Thunb.) P.Beauv. ex Roem. & Schult., in *Systema vegetabilium* 2: 690 (1817).

*Karroochloa purpurea* (L.f.) Conert & Türpe, in *Senckenbergiana Biologica* 50: 303 (1969).


*Tribolium purpureum*

Tufted perennial to 220 mm high forming small cushions; shortly rhizomatous; sparsely hispid. Leaf blade to 40 × to 1 mm, blade rolled, falcate, hispid (long stiff white hairs). Inflorescence 10–20 mm long. Spikelet 5–7 × to 4 mm, 3–6-flowered; glumes 4–7 mm long, often tinged with dark purple around keels; lemma 3.0–3.5 mm long (including lobes); long hairs (1.8–2.2 mm long) in tufts, glabrous between tufts; deeply lobed, lobes rounded to acute, awnless, glabrous except margins and apex shortly hairy; central awn 3–4 mm long, geniculate, awn with column (twisted) and bristle; palea 2.8–3.2 mm long, sparsely hairy between margins and keels, keels densely shortly hairy almost to apex, sometimes only on one side; anthers 1.8–2.2 mm long.

[Similar to *T. tenellum*, an annual with shorter lemma hairs (0.5–1.2 mm long).]

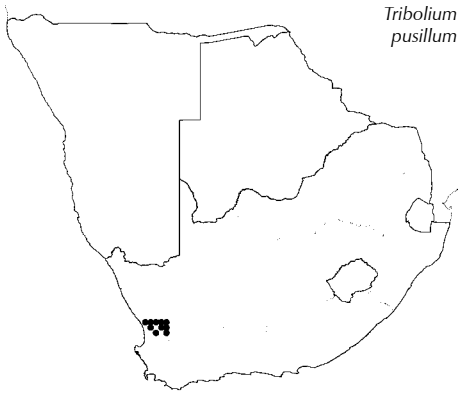
*Flowering*: July to May. *Ecology*: In mountainous areas, in short grasslands and roadsides. *Frequency in southern Africa*: Common. *Distribution*: Endemic. L, FS, KZN, NC, WC, EC. *Economics*: Natural pasture for sheep.

Illustration: Chippindall: 244, fig. 215 (1955); Conert & Türpe: 304, fig. 24–30, spikelet parts only (1969).
Anatomy vouchers: *Ellis 1677, 2472, 2575, 2597, 5703, 5733* & *5976*.
Voucher: *Barker 33*.

**Tribolium pusillum** (Nees) H.P.Linder & Davidse, in *Botanische Jahrbücher* 119: 495 (1997). Type: South Africa, Western Cape, ad Ebenezer in collibus siccus arenosis, alt. infra 400′, *Drège s.n.* (B, holo.).

*Urochlaena pusilla* Nees, in *Florae Africanae australioris* III: 438 (1841).

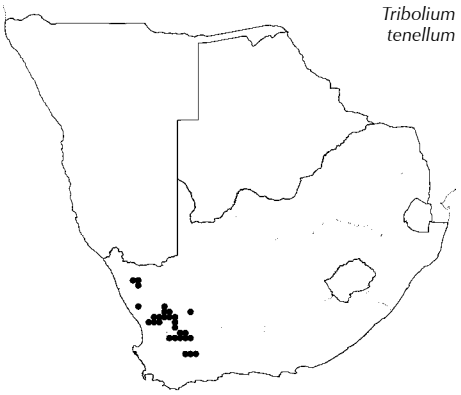
*Urochlaena major* Rendle, in *Journal of Botany* 37: 382 (1899). Type: South Africa, Western Cape, Klaver, 1400′, 27 August 1986, *Schlechter 8699* (BM, holo.; PRE, iso.).


*Tribolium pusillum*

Ascending or erect annual 80–250 mm high; stolons absent. Leaf blade 20–70 × 1–2 mm, expanded, sparsely hairy, hairs fine, tubercle-based. Inflorescence capitate, 10–15 mm long, ovate, base enclosed in an enlarged flag-leaf with a dehiscence node below, dehiscing as a unit. Spikelet 5–6 mm long; florets 2–6; glumes as long as spikelet, acuminate, awn longer than glume body, up to 5 mm long, long bristly tubercle-based hairs present; lemma 3.5–4.0 mm long, long-acuminate, awned, awn 2.5–6.5 mm long and without twisted column, back with club-shaped hairs basally; palea truncate, glabrous between and on keels, margins with long hairs; anthers 1.7 mm long. Chromosome number: 2x = 12 (Spies & Du Plessis 1988).

*Flowering*: August to September and sometimes into October. *Ecology*: Dry sandy areas and usually on clayey soils derived from grey Karoo shales; alongside roads. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. NC, WC.

Illustration: Linder & Davidse: 496 (1997).
Anatomy vouchers: *Ellis 1724, 2449, 4629, 5346* & *5347*.
Voucher: *Linder 5440, 5761*.


*Tribolium tenellum*

**Tribolium tenellum** (Nees) Verboom & H.P.Linder, in *Annals of the Missouri Botanical Garden* 97: 306–364 (2010). Type: South Africa, Northern Cape, 'Inter Buffelrivier (Koussie) flumen et Zilverfontein in elice ab aquis relicta inter praerupta montium', *Drège s.n.* (B, holo.).

*Danthonia tenella* Nees, in *Florae Africanae australioris*: 324 (1841).

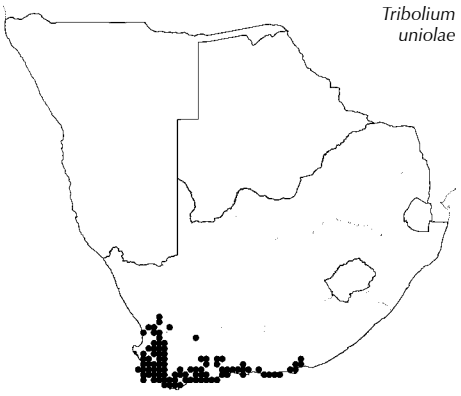
*Karroochloa tenella* (Nees) Conert & Türpe, in *Senckenbergiana Biologica* 50: 299 (1969).

Tufted annual 40–150(–250) mm high; sparsely hispid. Leaf blade 5–15 × to 0.8 mm, rolled, falcate; blade and sheath usually sparsely hispid. Inflorescence 5–20 mm long. Spikelet 4–7 × to 2 mm, 3–5-flowered; glumes 4–7 mm long, sometimes tinged with purple at apex; lemma 1.8–2.5 mm long (including lobes), hairs 0.5–1.2 mm long, in numerous tufts in a row across middle of back below awn insertion, around base and near margins; lobes broad, truncate, awnless, glabrous; central awn 2.8–4.0 mm long, geniculate, with column (twisted) and bristle; palea 1.8–2.4 mm long, glabrous, keels long hairy from middle for short distance to well below apex; anthers 1.4–1.8 mm long.

[Similar to *T. purpureum*, a rhizomatous perennial that has longer lemma hairs (1.8–2.2 mm long).]

*Flowering*: June to October. *Ecology*: Sandy soils; in disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Endemic. NC, WC.

Illustration: Conert & Türpe: 308, fig. 36–41, spikelet parts only (1969).
Anatomy vouchers: *Ellis 2420, 2434, 2435* & *2462*.
Voucher: *Davidse 33381*.


*Tribolium uniolae*

**Tribolium uniolae** (L.f.) Renvoize, in *Kew Bulletin* 40: 797 (1985). Type: Cape Province, *Sparrman s.n.* (LINN 91–22).

*Plagiochloa alternans* (Nees) Adamson & Sprague, in *Journal of South African Botany* 7: 91 (1941). Type: South Africa, Western Cape, Du Toit's Kloof, as catarracea in solo humoso, alt. 2000', fruit matures in Feb., *Drège s.n.*

*Plagiochloa uniolae* (L. f.) Adamson & Sprague, in *Journal of South African Botany* 7: 90 (1941).

*T. alternans* (Nees) Renvoize, in *Kew Bulletin* 40: 178 (1985).

*T. amplexum* Renvoize, in *Kew Bulletin* 40: 797 (1985). Type: South Africa, Western Cape, Franschhoek Pass summit parking area, 2400', 8 Oct. 1973, *Boucher 2287* (K, holo.; PRE, iso.).

Tufted perennial 100–700 mm high; occasionally rhizomatous; stolons absent. Leaf blade 50–300 × to 0.5–5.0 mm, rolled or expanded, sickle-shaped towards apex, stiff, glabrous to hairy, hairs simple. Inflorescence terminal, 8–70 mm long, spike-like, linear, contracted, distichous or with a few basal branches, usually secund, partly enclosed or exserted from uppermost leaf; a dehiscence node absent below flag-leaf. Spikelet to 4–10 × to 4 mm; florets 5–9; glumes shorter than spikelet, acute to acuminate, glabrous or sparsely hairy with tubercle-based hairs; lemma 4–6 mm long, obtuse to acute, glabrous or hairy, lower ¼–½ of back evenly hairy, hairs club-shaped, awnless; palea acute, glabrous or hairy between keels, tufts of long marginal hairs present or absent; anthers 1.6–3.1 mm long.

[A variable species.]

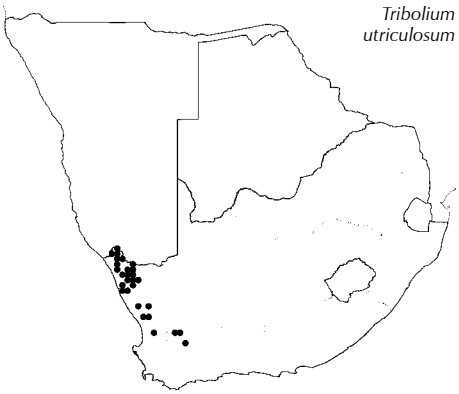
*Flowering*: September to December. *Ecology*: Found on well-drained soils derived from granite, sandstone, shales or limestone; in a num-

ber of vegetation types; from sea level to 1 000 m; disturbed areas such as roadsides and fields. It appears to be stimulated by fire and may be very common after scrub-fires. *Frequency in southern Africa*: Locally common. *Distribution*: Introduced in Australia. Endemic. NC, WC, EC. *Economics*: The inflorescence, which is sometimes very attractive, is used for flower arrangements. It is a potential pasture grass.

Illustration: Chippindall: 114, fig. 84 (inflorescence only) (1955).
Anatomy vouchers: *Ellis 613, 616, 705, 1178, 1193, 1206, 1257, 1279, 1289, 2211, 2212, 2214, 2222, 2237, 2299, 2319, 2566 & 4677.*
Voucher: *Davidse 34149, Hanekom 2638, Oliver 4682.*

**Tribolium utriculosum** (Nees) Renvoize, in *Kew Bulletin* 40: 798 (1985). Type?

*Lasiochloa utriculosa* Nees, in *Florae Africanae australioris* III: 436 (1841). Type: South Africa, Northern Cape, Little Namaqualand near Noagas, alt. 2000′, *Drège s.n.* (B, holo.; PRE, fg.).


*Tribolium utriculosum*

Tufted annual to 90 mm high; stolons absent. Leaf blade 10–100 × to 2.5 mm, expanded, sparsely to densely hairy, hairs tubercle-based; bristles around sheath mouth. Inflorescence a contracted 10–20 mm long panicle, usually partly enclosed in uppermost leaf; a dehiscence node absent below flag-leaf. Spikelet 2–5 × to 2 mm; florets 3–6; glumes 4.5–5.0 mm long, longer than spikelet, acuminate to long-acuminate, apex reflexed, glabrous to scabrid, long inflated tubercle-based hairs present; lemma 3.3 mm long, acute, awnless; club-shaped hairs, 0.2–0.4 mm long on margins; back with acute, scattered hairs; palea acute, hairy between keels, margins with tufts of long hairs; anthers 1.0–1.5 mm long. Chromosome number: 2x = 12 (Visser & Spies 1994b).

*Flowering*: August to October. *Ecology*: Sandy alluvial soils, soils derived from granites; disturbed areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic to Namaqualand largely between Nuwerus and Orange River but with a single record from Roggeveld Mts in east. NC, WC.

Illustration: Chippindall: 116, fig. 86 (1955).
Anatomy vouchers: *Ellis 1734, 2155, 2430 & 5083.*
Voucher: *Thompson & Le Roux 99.*

## **Tricholaena** Schrad. ex Schult.

Schultes: 8, 163 (1824); Stapf: 441 (1899); Chippindall: 434 (1955); Anderson: 103 (1961); Launert: 206 (1970a); Clayton & Renvoize: 502 (1982); Clayton & Renvoize: 295 (1986); Zizka: 36 (1988); Zizka: 113 (1989); Gibbs Russell et al.: 341 (1990); Watson & Dallwitz: 960 (1994).

Perennial or rarely annual, tufted; culm usually branched from lower nodes, often geniculate. **Leaf blade** expanded or frequently involute; *ligule* a narrow, fringed membrane or a fringe of hairs. **Inflorescence** a panicle, open, diffuse, usually much divided; *spikelets* pedicelled. **Spikelet** symmetrically oblong in profile, laterally compressed; *glumes* unequal, very dissimilar, with a distinct, elongated internode between glumes, awnless, rarely minutely mucronate; lower glume usually a minute, ovate scale, rarely well developed, 0–1-nerved; upper glume as long as spikelet, narrower than lower lemma, usually slightly notched at apex, 3–5-nerved. **Florets** 2; *lower floret* male;

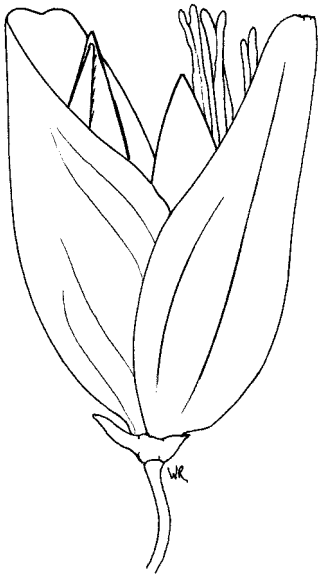


Figure 547.—*Tricholaena monachne* spikelet (2.5 × 1.4 mm). Artist: W. Roux.




Figure 548.—*Tricholaena monachne*. A, plant; B, ligule. Artist: C. Smith.

lemma similar to upper glume but wider and slightly longer, finely 3–7-nerved; *upper floret* bisexual; *lemma* firmer than glumes, smaller than lower lemma, dorsally compressed, glabrous, smooth, glossy, brittle, white, readily deciduous, margins flat and partly clasping palea (paspalum-type), awnless; *palea* ± equal to lemma, hyaline, 2-nerved. **Lodicules** 2. **Stamens** 3. **Ovary** ellipsoid; styles free or connate at base, plumose above. **Caryopsis** ovoid to elliptic-oblong; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines uneven. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 9$ (polyploidy).



Figure 549.—*Tricholaena monachne* spikelet (2–3 mm). Photographer: M. Koekemoer.

**Species** 4, mainly Africa, also the Canaries, Mediterranean and Madagascar; 2 in southern Africa, widespread, not recorded from Lesotho, Western and Eastern Cape.

Species treatment by A.C. Mashau.

**Quick guide to easily confused taxa:**

1. Spikelet laterally compressed . . . . . **Tricholaena monachne**
   Spikelet dorsiventrally compressed . . . . . 2
2. Spikelet supported on a bead-like swelling; lower glume scale-like, broadly ovate . . . . . **Eriochloa meyeriana**
   Spikelet not supported on a bead-like swelling; lower glume nearly as long as spikelet . . . . . **Panicum natalense**

**Key to species:**

1. Culm lower internodes glabrous and smooth; spikelet glabrous, very rarely hairy; lower glume usually reduced to a minute scale up to 0.1 mm long; leaves sometimes hairy . . . . . **T. monachne**
   Culm lower internodes adpressed hairy and/or with prickles; spikelet hairy; lower glume a minute scale (0.1 mm) or up to 3 mm long; leaf adaxial surface hairy . . . . . 2
2. Lower glume (0.8)1.0–3.0 mm long; spikelet hairs (0.8)1.0–3.0 mm long . . . . . **T. capensis** subsp. **capensis**
   Lower glume a scale 0.1–0.4(–2.0) mm long; spikelet hairs 0.1–0.3(–0.5) mm long . . . . . **T. capensis** subsp. **arenaria**

**Tricholaena capensis** (Licht. ex Roem. & Schult.) Nees subsp. **arenaria** (Nees) Zizka, in *Bibliotheca Botanica* 138: 49 (1988). Type: South Africa. Northern Cape, Klein-Namaland, sand hills between Lekkersing and Kaus, *Drège 2568* (B, lecto.).

*T. arenaria* Nees, in *Delectus Seminum in Horto Botanico vratrislaviensi collectorum* 1835 (1836).

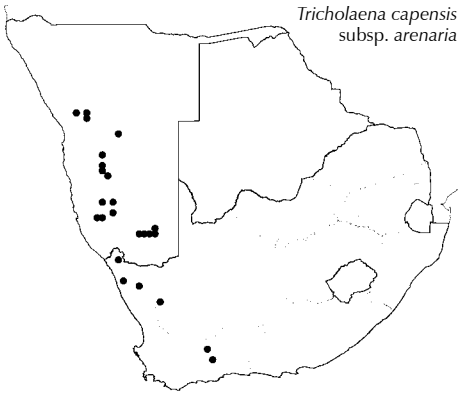
*T. arenaria* Nees var. *glauca* (Hack.) Stapf, in *Flora capensis* 7: 446 (1899). Type: Namibia, Great Namaqualand, between Ausis and Khuias, *Schenck 80* (PRE, isosyn.).

Tufted perennial 200–600 mm high; lower part of culm adpressed hairy and/or with prickles. Leaf blade 30–70 × 2.0–3.5 mm, ad-

pressed hairy and/or with prickles. Spikelet 2–3 × 1 mm, hairy; glumes unequal; lower glume nearly always a scale 0.1–0.4(–2.0) mm long; upper glume and lower lemma covered with hairs 0.1–0.3(–0.5) mm long, sparingly hairy with short hairs on the back and long hairs towards the margins; anther 1.5–2.0 mm long.

*Flowering*: January to April. *Ecology*: Sandy, dry areas. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NC, ?WC. [Actual distribution in South Africa is in question as the identifications of all the specimens could not be verified, since PRE specimens were not seen.]

Anatomy vouchers: *Ellis 4741 & 5067*.
Vouchers: *Giess 10250*, *Smook 12160*.

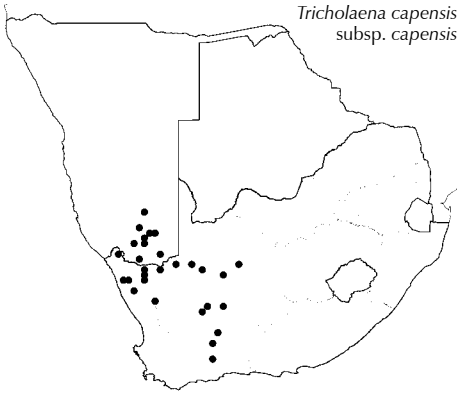

*Tricholaena capensis* subsp. *arenaria*

**Tricholaena capensis** (Licht. ex Roem. & Schult.) Nees subsp. **capensis**, in *Bibliotheca Botanica* 138: 48 (1988). Type: South Africa. Northern Cape, Jan Bloms Fontein, *Lichtenstein 45* (B, lecto.).

Tufted perennial 200–600 mm high; lower part of culm adpressed hairy and/or with prickles. Leaf blade 30–70 × 2.0–3.5 mm, adpressed hairy and/or with prickles. Spikelet 2–3 × 1 mm, grey, wholly or flushed strongly with purple or purplish-brown, hairy; glumes unequal; lower glume (0.8)1.0–3.0 mm long, up to half as long as spikelet; glumes and lower lemma covered with dense hairs (0.8)1.0–3.0 mm long; anther 1.5–2.0 mm long.

*Flowering*: January to June. *Ecology*: Sandy, dry soil. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. N, NC, WC.

Anatomy voucher: *Ellis 5401*.
Voucher: *Davidse 6209*.


*Tricholaena capensis* subsp. *capensis*

**Tricholaena monachne** (Trin.) Stapf & C.E.Hubb., in *Flora tropical Africa* 9: 909 (1930). Type: Réunion.

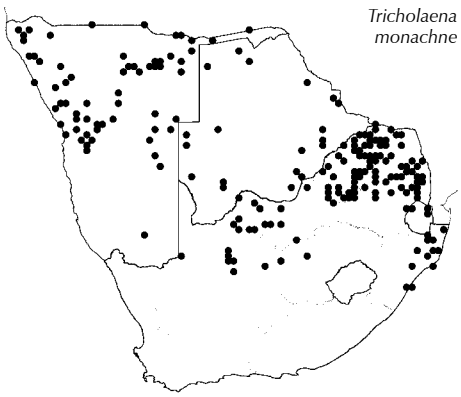
*T. monachne* (Trin.) Stapf & C.E.Hubb. var. *annua* J.G.Anderson, in *Kirkia* 1: 103 (1961). Type: Namibia, between Swakop and Usakos, *De Winter 3205* (PRE, holo.).

Blue-seed grass, blousaadgras

Perennial or annual, 200–1 000 mm high; an annual form occurs in Namibia that is less than 300 mm high and has a softer appearance than the hardy, wiry, drought resistant perennial form; culm glabrous. Leaf blade 30–70 × 2.0–3.5 mm, sometimes hairy. Spikelet 2–3 × 1 mm, green, often flushed or almost entirely purple, usually glabrous, very rarely hairy; glumes unequal; lower glume nearly always reduced to a minute scale up to 0.1 mm long; anther 1.5–2.0 mm long.

[The spikelets in this species are usually glabrous, but individuals with hairy spikelets can be separated from *T. capensis*, which has hairy culms.]

*Flowering*: November to March. *Ecology*: Most soils, favouring sandy soil; sweet and mixed bushveld and open grassland; often disturbed places. *Frequency in southern Africa*: Common. *Distribution*: Northwards to tropical Africa to Madagascar and Mascarene Is. N, B, S,


*Tricholaena monachne*

LIM, NW, G, M, FS, KZN, NC. *Economics*: Although it has a low leaf production it is an important grazing grass in arid areas; an indicator of disturbed places; ruderal weed; used in flower arrangements.

Illustration: Zizka: 114 (1989).
Anatomy vouchers: *Gibbs Russell & Smook 5181*; *Ellis 2055, 4331, 4722, 4721 & 4769*.
Voucher: *Smook 4234*.

## **Trichoneura** Andersson

Andersson: 148 (1855); Stapf: 649 (1900); Chippindall: 128 (1955); Launert: 209 (1970a); Phillips: 296 (1974); Clayton & Renvoize: 214 (1986); Gibbs Russell et al.: 342 (1990); Watson & Dallwitz: 962 (1994); Cope: 43 (1999); Fish: 237 (2009).

Annual or perennial, tufted. **Leaf blade** linear, usually expanded, pointed; *ligule* an unfringed membrane, truncate. **Inflorescence** open or contracted, composed of a number of racemes scattered along a central axis; racemes often stiff and straight, sometimes spreading; *spikelets* solitary, subsessile, biseriate, overlapping or distant. **Spikelet** laterally compressed, wedge-shaped, disarticulating above glumes and between florets; *glumes* ± equal, equal to longer than spikelet, similar, membranous, very narrow, 1-nerved, tapering to a mucro or awn; lower glume longer than lowest lemma. **Florets** 3–many, *lower florets* bisexual; *upper floret* reduced; *lemma* similar in texture to glumes, membranous, rounded on back, 3-nerved, hairy, conspicuously hairy along lateral nerves, incised, bluntly 2-lobed, awned from sinus; *awn* fine, bristle-like, shorter than body of lemma, straight; *palea* ± equalling lemma, often pilose between keels. **Lodicules** 2, fleshy, glabrous. **Stamens** 3. **Ovary** obovoid, glabrous; styles distinct, plumose above. **Caryopsis** narrow, dorsally flattened. **Photosynthetic pathway**: $C_4$; XyMS+. PCR cell chloroplasts centripetal. **Cytology**: $x = 10$.



Figure 550.—*Trichoneura grandiglumis* spikelet (15.0 × 6.1 mm). Artist: W. Roux.



Figure 551.—*Trichoneura grandiglumis* spikelet (5–14 mm). Photographer: M. Koekemoer.

**Species** 7, Africa, Arabia, USA (Texas) and Galápagos Islands; ± 2 in southern Africa, widespread, not in Western Cape.

Species treatment by M.T. Nembudani and L. Fish.

### Quick guide to easily confused genera:

Lemma apex entire . . . . . **Pogonarthria**
Lemma apex lobed . . . . . **Trichoneura**

### Key to species:

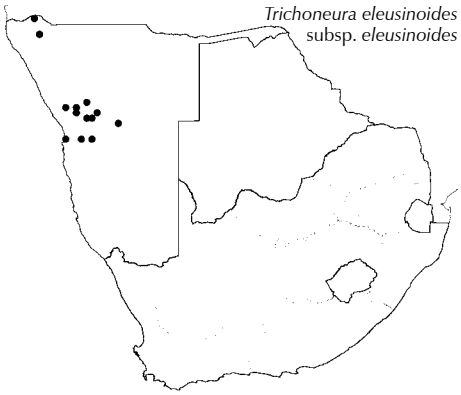
1. Perennial; inflorescence broadly pyramidal, 70–320 mm long, racemes stiff and straight, usually longer than ½ the central axis, often spreading horizontally; spikelets ± their length apart . . . . . **T. grandiglumis**
   Annual; inflorescence broadly lanceolate, 40–190 mm long, somewhat contracted, racemes firm, not stiff, often slightly curved, shorter than ½ the central axis, never spreading horizontally; spikelets crowded . . . . . 2
2. Spikelet 3.0–4.5 mm; anther 0.3–0.5 mm long; caryopsis 1.4–1.6 mm long, elliptic; from Namibia . . . . . **T. eleusinoides** subsp. **eleusinoides**
   Spikelet 5.5–8.0 mm long; anther 0.6–1.0 mm long; caryopsis 2.0–2.5 mm long, oblong; from northern Limpopo . . . . . **T. eleusinoides** subsp. **limpopoensis**




Figure 552.—*Trichoneura eleusinoides* subsp. *limpopoensis*. A, plant; B, spikelet; C, lemma. Artist: G. Condy.




Figure 553.—*Trichoneura grandiglumis*. A, plant; B, ligule. Artist: C.D. Bartman.

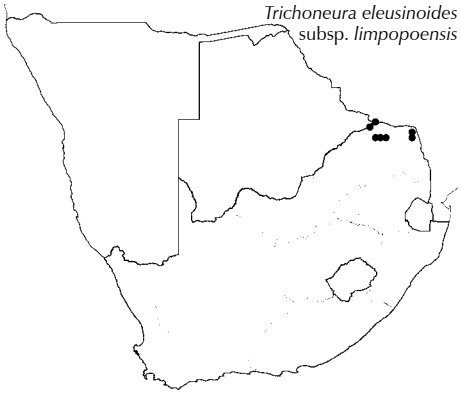



**Trichoneura eleusinoides** (Rendle) Ekman subsp. **eleusinoides**, in *Arkiv för Botanik* 11: 13 (1912). Type: Angola, ?*Welwitsch* ?*7460, ?7482* & ?*2303* (syntypes).

Tufted annual 90–350 mm high; leaves cauline; culms decumbent or ascending. Leaf blade 20–45 × 2–3 mm; sheaths with long, slender bulbous-based hairs. Inflorescence up to 90 × 50 mm, contracted; racemes up to 30 mm, stiff, not spreading more than 45 degrees from axis; spikelets crowded. Spikelet 3.0–4.5 mm long; glumes 3–5 mm long (including awn), ± equal or upper slightly longer, as long as to slightly shorter than spikelet; awn up to 1 mm long; lemma 1.5–2.8 mm × 0.6–0.7 mm (excluding awn); awn 0.8–1.2 mm long; palea papillose, hairy; anther 0.3–0.5 mm long; caryopsis 1.4–1.6 × 0.4 mm, elliptic.

*Flowering*: January to May. *Ecology*: Rocky outcrops and granite mountain slopes. *Frequency in southern Africa*: Infrequent to locally common. *Distribution*: Angola. N.

Anatomy voucher: *Ellis 4738*.
Voucher: *Dinter 7053*.




**Trichoneura eleusinoides** (Rendle) Ekman subsp. **limpopoensis** Fish, in *Bothalia* 39: 237 (2009). Type: South Africa, Limpopo, Masekwa Poort, *Ellis 1945* (PRE, holo.).

Tufted annual, possibly biennial, 300–700 mm high; leaves mostly cauline; culms slender, erect, sometimes geniculate; nodes dark. Leaf blades up to 150 × 2.0–6.5 mm, lanceolate, acute, flat, glabrous or with sparsely scattered, long, thin, bulbous-based hairs; margins scabrid; sheaths with long, slender, bulbous-based hairs, bases often red. Inflorescence 60–200 mm long; racemes 10–20, up to 60 mm long, becoming shorter towards apex, ascending, not spreading more than 45° from central axis; spikelets crowded, less than own length apart. Spikelet 5.5–7.5(–8.0) mm long (including awn); glumes 5–8 mm long (including awn), unequal, slightly shorter to as long as, or sometimes longer than spikelet, awn up to 1 mm long; lemma 2.8–3.0 × 0.8–1.0 mm, apex membranous; lateral nerves densely long-hairy, middle of back hairy from base to ¾ up; awn 0.8–1.2 mm long, shorter than body of lemma; palea as long as lemma, apex emarginate, capitate, hairy, upper margins and apex minutely hairy; anthers 0.6–1.0 mm long; caryopsis 2.0–2.5 × 0.5 mm, oblong.

[In the past these specimens were identified as *T. schlechteri* Ekman, a coastal grassland plant known only from Mozambique that has a glabrous palea. In Gibbs Russell et al.: 344 (1990) this species was referred to as *Trichoneura* sp. = *Codd 5325*.]

*Flowering*: January to May (occasionally November). *Frequency in southern Africa*: Infrequent to locally common. *Ecology*: Sandy to sandy loam soils often derived from quartzite; on rock slabs, in rocky depression or ledges and crevices on rocky or stony slopes or moist soils on banks of rivers or streams. *Distribution*: Endemic. Possibly in Zimbabwe, northern Limpopo. LIM

Anatomy vouchers: *Ellis 1938, 1945, 1946* & *1948*.
Voucher: *Codd 5325, Mothogoane 316*.

**Trichoneura grandiglumis** (Nees) Ekman, in *Arkiv för Botanik* 11 (9): 15 (1912). Types: South Africa, Eastern Cape, between Witberge Mts. and Kraai R., *Drège*; between Brockpoort and Leeuwenfontein, *Drège* (syntypes).

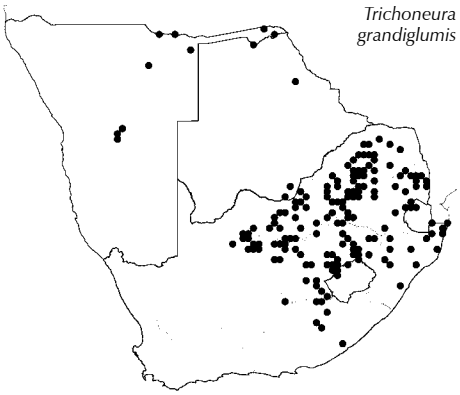
ROLLING GRASS, WAAIGRAS

Tufted perennial 220–630 mm high; culms slender, erect or ascending; leaves mostly basal. Leaf blade 30–200 × 3–7 mm. Inflorescence 70–320 mm long, broadly pyramidal; racemes usually longer than ½ the central axis, stiff, straight, often spreading horizontally; spikelets ± their length apart. Spikelet 5–14 mm long, often purplish; glumes 5–14 mm long (including awn), awn up to 2 mm long; lemma 3.5–8.5 mm long; anther 0.7–0.8 mm long; caryopsis 1.5–2.5 mm long, oblong.

[The length of the glumes and spikelets vary considerably. Previously two varieties, var. *grandiglumis* and var. *minor*, were distinguished on spikelet length (5.3–14.0 mm and 5.3–8.2 mm respectively), and ratio of awns to floret (longer than and shorter than the floret respectively). No clear separation of specimens is given by these two characters and pending further investigation, these varieties are not upheld here.]

*Flowering*: November to April. *Ecology*: On sandy soils; on hillsides, open floodplains and in bushveld, sometimes in disturbed areas. *Frequency in southern Africa*: Common. *Distribution*: Africa south of the Congo Basin; N, B, S, L, LIM, NW, G, M, FS, KZN, NC, EC.

Illustration: Cope: tab. 20 (1999).
Anatomy vouchers: *Loxton & Ellis 953*; *977, Ellis 101, 513, 1795* & *4071*.
Voucher: *Huntley 967, Strey R.S.B. 53*.




## **Trichopteryx** Nees

Nees ab Esenbeck: 449 (1836) as *Trichopteria*; Nees ab Esenbeck: 339 (1841); Stapf: 449 (1899); Chippindall: 287 (1955); Conert: 238 (1957); Phipps: 119 (1964); Clayton: 409 (1974); Clayton & Renvoize: 319 (1986); Clayton: 213 (1989); Gibbs Russell et al.: 344 (1990); Watson & Dallwitz: 963 (1994).



Figure 554.—*Trichopteryx dregeana* spikelet (4–7 mm). Photographer: M. Koekemoer.

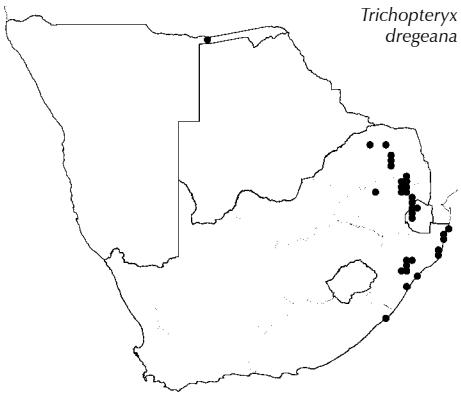
Annual or perennial; erect or trailing; culm often wiry. **Leaf blade** linear-lanceolate, expanded, crinkled on one margin, reflexed; *ligule* a fringe of hairs. **Inflorescence** a panicle, usually fairly dense, pedicels commonly setose; *spikelets* solitary or in pairs. **Spikelet** brown, laterally to not noticeably compressed, disarticulating above glumes and between florets; *glumes* unequal, similar, narrowly ovate, membranous, ± persistent, 3-nerved; lower glume half as long as spikelet; upper glume as long as spikelet. **Florets** 2; *lower floret* male or sterile; lemma 3-nerved, not keeled, awnless; *upper floret* bisexual; *lemma* similar to firmer in texture than glumes, membra-



Figure 555.—*Trichopteryx dregeana*. Artist: F. Lauth.




Figure 556.—*Trichopteryx dregeana*. A, spikelet (9.0 × 2.4 mm); B, lemma (8.0 × 0.6 mm). Artist: S.B. Chiliza.




nous to thinly coriaceous, 5–7-nerved, incised, 2-lobed; lobes finely awned; hairy, a conspicuous tuft of white hairs present below each lobe; awned, from sinus between lobes; *awn* geniculate, longer than body of lemma; *callus* short, semi-circular, hairy; *palea* finely nerved, 2-keeled, keels not winged. **Lodicules** 2, narrowly cuneate. **Stamens** 2. **Ovary** glabrous; styles free, plumose above. **Caryopsis** lanceolate, longitudinally grooved, glabrous; hilum long, linear; embryo large. **Photosynthetic pathway**: $C_4$. Organisation of PCR tissue when unconventional arundinella-type. XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 12$.

**Species** 5, Africa and Madagascar; 1 in southern Africa: *Trichopteryx dregeana* Nees, Namibia, Swaziland, Limpopo, Mpumalanga, KwaZulu-Natal and Eastern Cape.

Species treatment by M.J. Moeaha.

**Trichopteryx dregeana** Nees, in Lindley, in *A natural system of botany* 2: 449 (1836). Type: South Africa, locality unknown, *Drège 4268*.

VLEIGRAS

Tufted perennial up to 900 mm high; grows in a tangled mass. Leaf blade to 500 × 4 mm, spreading and reflexed, light green. Inflorescence open, up to 140 mm long; pedicels minutely scabrid; spikelets with a whorl of hairs at the base. Spikelet 4–7 mm long; glumes and lower lemma bright brown, apices transparent; upper lemma with two conspicuous lateral tufts of white hairs; lobe awns 2–3 mm long; central awn slender, 4–7 mm long, lower part bent and twisted, upper hair-like; anthers 0.6–1.4 mm long.

[Habit similar to *Eragrostis volkensii*, which can be distinguished vegetatively by the blades being blue-green, wider (up to 8 mm) and stiff.]

*Flowering*: December to May. *Ecology*: Vleis and wet places, shady crevices among rocks on hillsides. *Frequency in southern Africa*: Locally common. *Distribution*: Zambia, Zimbabwe, Malawi, DRC and Angola; also Madagascar. N, S, LIM, M, KZN, EC.

Anatomy vouchers: *Ellis 454, 1543, 3457, 3374, 4469* & *4494*.
Voucher: *Kluge 1694*.

## **Tripogon** Roem. & Schult.

Roemer & Schultes: 34 (1817); Chippindall: 122 (1955); Pilger: 38 (1956); Launert: 210 (1970a); Phillips & Launert: 301 (1971); Phillips: 288 (1974); Clayton & Renvoize: 211 (1986); Gibbs Russell et al.: 345 (1990); Watson & Dallwitz: 973 (1994); Cope: 29 (1999).

Perennial, slender, densely tufted, up to 220 mm high; sheaths persistent at base, sometimes becoming fibrous. **Leaf blade** narrowly linear; *ligule* a narrow, fringed membrane or a fringe of hairs. **Inflorescence** a solitary, terminal, sub-secund spike-like raceme; *spikelets* usually adpressed to rachis, alternating in 2 rows along slender tri-

angular rachis; glumes dorsiventral to rachis. **Spikelet** linear-elliptic, laterally compressed, disarticulating above glumes and between florets; *glumes* unequal, shorter than spikelet, membranous, keeled, 1-nerved or rarely upper glume 3-nerved; lower glume often asymmetrical. **Florets** 5–10, all bisexual except terminal floret reduced; *lemma* membranous, glabrous, dorsally rounded or obtusely keeled, 1–3-nerved, rarely with 1–2 additional faint nerves, emarginate to 2-lobed, central nerve terminating in a mucro or slender *awn*, rarely lateral lobes mucronate; *callus* short, villous; *palea* shorter than lemma, 2-keeled, keels usually winged, hyaline. **Lodicules** 2, truncate. **Stamens** 2 or 3. **Ovary** glabrous; styles plumose. **Caryopsis** narrow, subterete, obtusely trigonous in cross section; hilum short; pericarp fused; embryo large or small. **Photosynthetic pathway**: $C_4$; XyMS+. PCR sheath outlines even. PCR sheath extensions present. Maximum number of extension cell 1. PCR cell chloroplasts centripetal. **Cytology**: $x = 10$.



Figure 557.—*Tripogon minimus* spikelet (2.6–8.0 mm). Photographer: M. Koekemoer.

**Species** ± 30, tropical Africa and India, Australia; 1 in southern Africa: *Tripogon minimus* (A.Rich.) Hochst. ex Steud., Namibia, Botswana, Swaziland, Limpopo, North West, Mpumalanga, Gauteng, KwaZulu-Natal.

Species treatment by A.C. Mashau.

**Tripogon minimus** (A.Rich.) Hochst. ex Steud., in *Synopsis plantarum glumacearum* 1: 301 (1854). Type: Ethiopia, Tiger, near Djeladjeranne in mountains towards River Tacazze, *Schimper 1652* (P, holo.).

Tufted perennial, 80–220 mm high; old basal sheaths divide into coarse fibres. Leaf blade 10–90 × 0.5 mm, filiform; ligule a fringed membrane. Inflorescence slender, erect, 20–80 mm long, secund; spikelets borne alternately along rachis. Spikelet 2.6–8.0 mm long, 5–10-flowered; lower glume 1-nerved; lemma apex emarginate, mucronate or shortly awned; anther 0.9–1.5 mm long.

*Flowering*: December to May. *Ecology*: Mostly in shallow soils; on rocky outcrops but also in waterlogged sand and seasonal pans. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards and throughout tropical Africa and Congo River basin; also Madagascar. N, B, S, LIM, NW, G, M, KZN.

Illustration: Cope: 30, tab. 13 (1999).
Anatomy voucher: *Ellis 3328*.
Voucher: *Killick & Leistner 3371*.

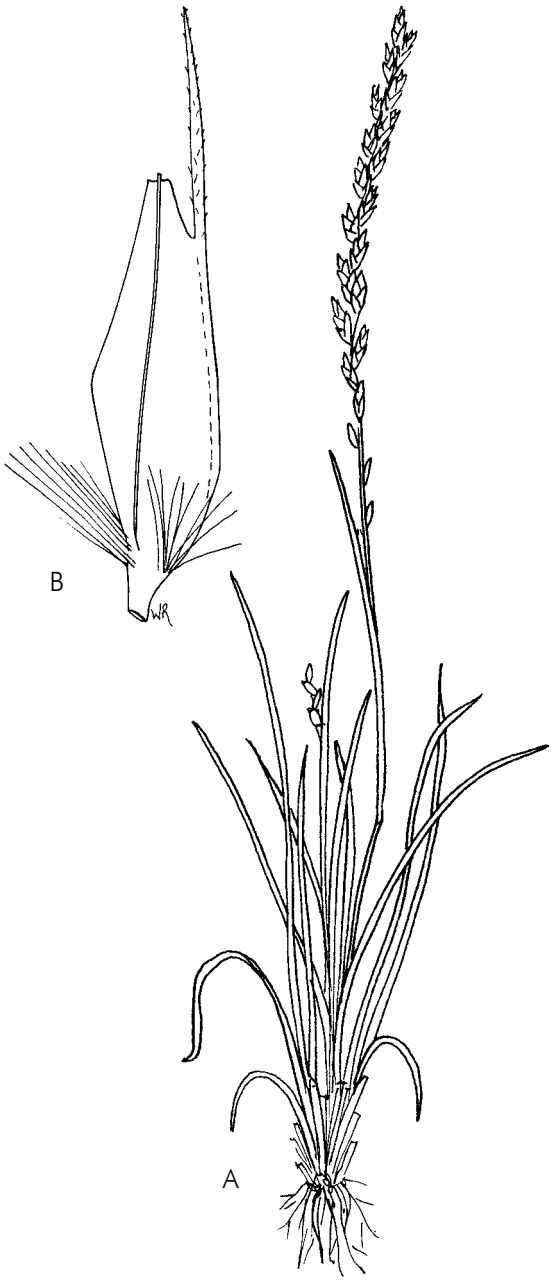
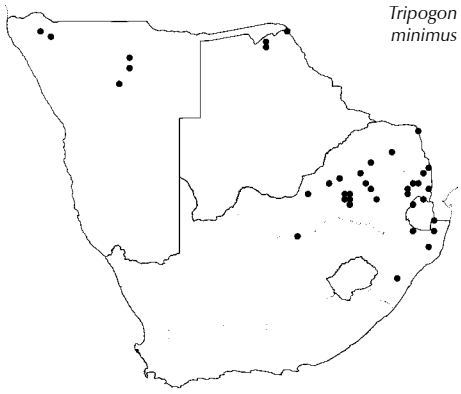



Figure 558.—*Tripogon minimus*. A, plant; B, lemma (2.5 × 0.5 mm). Artists: A, H.W. du Toit; B, W. Roux.



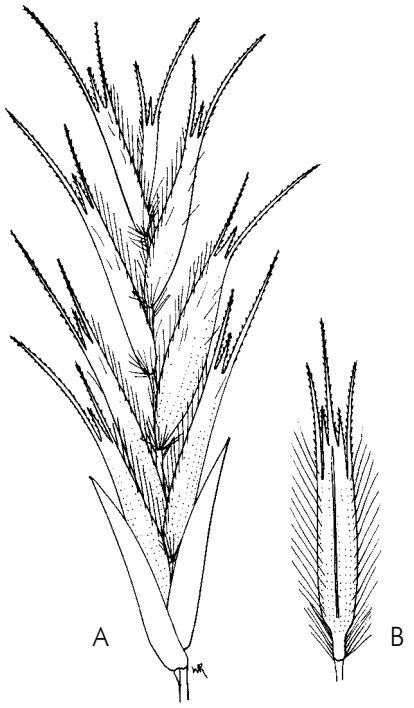



Figure 559.—*Triraphis andropogonoides*. A, spikelet (12 × 2 mm); B, lemma (5.7 × 0.7 mm). Artist: W. Roux.




Figure 560.—*Triraphis andropogonoides*. Artist: C. Letty.

## **Triraphis** R.Br.

Brown: 185 (1810); Stapf: 650 (1900); Chippindall: 124 (1955); Pilger: 46 (1956); Clayton: 128 (1970); Launert: 210 (1970a); Clayton & Renvoize: 205 (1986); Gibbs Russell et al.: 345 (1990); Watson & Dallwitz: 976 (1994); Cope: 20 (1999).



Figure 561.—*Triraphis andropogonoides* spikelet (6–10 mm). Photographer: M. Koekemoer.

Annual or perennial; tufted; rhizomatous. **Leaf blade** narrow, expanded or rolled; *ligule* a fringed membrane or a fringe of hairs. **Inflorescence** an open or contracted panicle, rarely spike-like. **Spikelet** laterally compressed; disarticulating above glumes and between florets; *glumes* ± equal or unequal, shorter than spikelet, narrowly lanceolate, 1-nerved, mostly 2-lobed, awned. **Florets** 3–24, bisexual; *uppermost florets* reduced; *lemma* scarious or membranous, keeled, 3-nerved, long-hairy on lateral nerves or all nerves, deeply 3-lobed, 3-awned as each lobe is awned, lateral awns shorter than central awn; *awns* slender, straight; *callus* hairy; *palea* shorter than lemma, hyaline. **Lodicules** 2, minute, delicate, glabrous. **Stamens** 3. **Ovary** glabrous; styles plumose. **Caryopsis** linear, trigonous; hilum short; pericarp fused; embryo large, waisted. **Photosynthetic pathway**: $C_4$; NAD-ME; XyMS+. PCR sheath outlines uneven, extensions present. Maximum number of extension cells 3. Cell chloroplasts ovoid with well-developed grana; centrifugal/peripheral. **Cytology**: $x = 10$.

**Species** 7, Africa and Arabian Peninsula, 1 in Australia; 5 in southern Africa, widespread.

Species treatment by M.J. Moeaha and L. Fish.

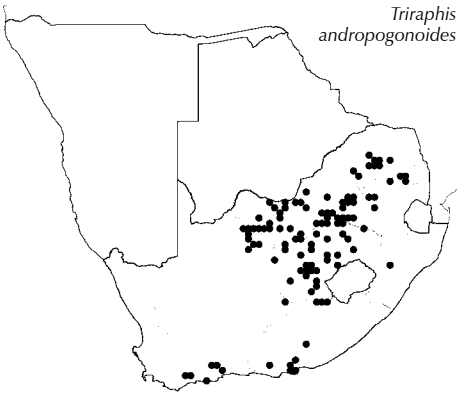
**Key to species:**

1. Annual . . . . . 2
   Perennial . . . . . 3
2. Spikelet 2–4 mm long (excluding awns); anthers 0.2–0.4 mm; inflorescence 10–30 mm long; culm internodes glabrous . . . . . **T. pumilio**
   Spikelet 6–10 mm long (excluding awns); anthers 1.2–2.0 mm; inflorescence longer than 30 mm long; culm internodes hairy . . . . . **T. purpurea**
3(1). Culms profusely branched, woody, yellow; inflorescence 25–90(–190) mm long; mature plant usually yellowish, especially the leaf sheaths, rarely leaves flushed purple or red . . . . **T. ramosissima**
   Culms unbranched, not woody, usually flushed reddish to purple; inflorescence 120–400 mm long; plant reddish, basal culms and leaf sheaths dark brown to reddish . . . . . 4
4. Lemma central awn 1.0–2.5 mm long, shorter than lemma body; rhizomes long and very well developed . . . **T. andropogonoides**
   Lemma central awn 5–7 mm long, longer than lemma body; rhizomes short . . . . . **T. schinzii**

**Triraphis andropogonoides** (Steud.) E.Phillips, in *An Introduction to the study of the South African Grasses*: 89, 90, 219 (1931). Type: South Africa, Eastern Cape (syntypes).

*Triraphis rehmannii* Hack., in *Bulletin de l'Herbier Boissier* 3: 388 (1895). Type: South Africa, Free State, Draaifontein, *Rehmann 3622*; Bloemfontein, *Rehmann 3933*.

Broom needle grass, besemgras, perdegras

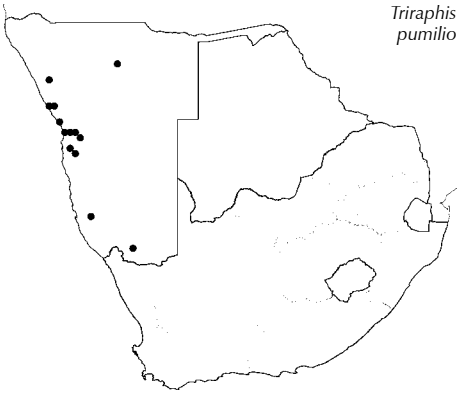

*Triraphis andropogonoides*

Erect perennial 380–1 220 mm high; long creeping rhizome present; rootstock very well developed; tillers very loosely grouped; base dark brown to reddish; culm internodes glabrous, smooth. Leaf blade 200–400 × 2–6 mm glabrous or rarely pilose, sheath glabrous or with long white hairs; ligule a fringe of long hairs up to 2.3 mm long. Inflorescence 120–300 mm long, ± dense, branches stiff. Spikelet 5–10(–15) mm long (excluding awns), 5–15-flowered; glumes 2.0–4.5 mm long; lemma 2.6–5.0 mm long (excluding awns), central awn 1.0–2.5 mm long, shorter than lemma; anthers 1.2–2.3 mm long.

*Flowering*: October to May. *Ecology*: Well-drained soil on rocky slopes or in deep sand; in open grassland. *Frequency in southern Africa*: Common. *Distribution*: Endemic. LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Unpalatable grass that seldom occurs in abundance in the veld; used to make hand brooms.

Anatomy vouchers: *Smook & Gibbs Russell 2192*; *Ellis 1600, 2038, 2039* & *2040*.
Voucher: *Van der Schijff 5321*.

**Triraphis pumilio** R.Br., in Denham & Clapperton, in *Narrative of the travels and discoveries in northern and central Africa. Botanical appendix*: 245 (1826). Type: Africa, location not cited, *Dr Oudney*.


*Triraphis pumilio*

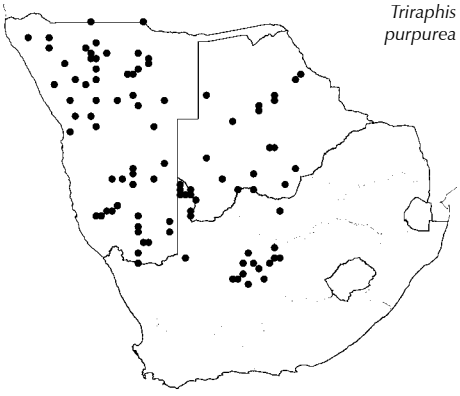
Tufted annual 40–220 mm high; culm internodes not long hairy. Leaf blade 50–120 × 2 mm, glabrous except for long hairs near base; sheath hairy with long white bulbous-based hairs; ligule a fringed membrane. Inflorescence 10–30 mm long, dense, green to purplish. Spikelet 2–4 mm long (excluding awns); 3–11-flowered; glumes 2.0–2.5 mm long, shortly awned (± 1 mm long) or mucronate; lemma 3-nerved, central awn 1.8–2.4 mm long, about as long as the lemma; anthers 0.2–0.4 mm long.

*Flowering*: January to May. *Ecology*: In sand; riverbeds or moist depressions. *Frequency in southern Africa*: Locally common. *Distribution*: Northern Africa through Mauritania to Arabia. N.

Illustration: Chippindall: 127, fig. 99 (1955).
Anatomy voucher: *Ellis 4767*.
Voucher: *Oliver & Muller 6661*.

**Triraphis purpurea** Hack., in *Verhandlungen des Botanischen Vereins für die Provinz Brandenburg* 30: 146 (1888). Type: Namibia, Cubub bei Aus in Gross-Namaland, *Pohle*.

*T. fleckii* Hack., in *Bulletin de l'Herbier Boissier* 4: 23 (1896). Type: Namibia, Rehoboth, *Fleck 292a*.


*Triraphis purpurea*

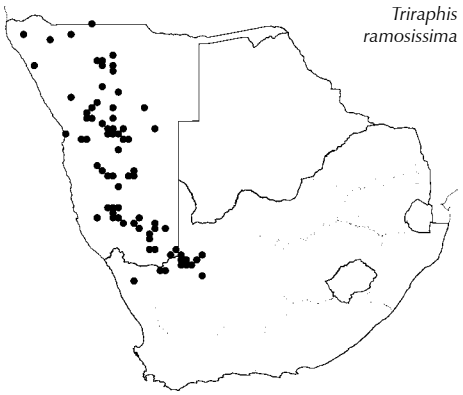
Red honey grass, annual needle grass

Tufted annual 90–770 mm high; culm internodes hairy with long bulbous-based hairs, densely hairy near the nodes. Leaf blade 35–60

× 1–2 mm; glabrous or with long hairs near the base; sheath densely hairy; ligule a fringed membrane. Inflorescence ± open but dense, longer than 30 mm long, purple. Spikelet 6–10 mm long (excluding awns); 5–11(–24)-flowered; glumes 1.8–3.5 mm long, lobed, shortly awned; lemma 3.2–3.5 mm long (excluding awns), central awn 2.0–3.5 mm long, shorter than to as long as body of lemma; anthers 1.2–2.0 mm long.

*Flowering*: January to June. *Ecology*: On red sand or rocky calcareous soils; often in moist patches or in shade. *Frequency in southern Africa*: Common. *Distribution*: Angola. N, B, NW, NC.

Illustration: Müller: 297 (2007).
Anatomy vouchers: *Ellis 4728* & *Gibbs Russell & Smook 5213*.
Voucher: *Van Vuuren & Giess 1095*.


*Triraphis ramosissima*

**Triraphis ramosissima** Hack., in *Verhandlungen des Botanischen Vereins für die Provinz Brandenburg* 30: 237 (1888). Type: Namibia, Zwischen Ausis und Kuias in Gross-Namaland, *Schenck 83* (PRE, iso.).

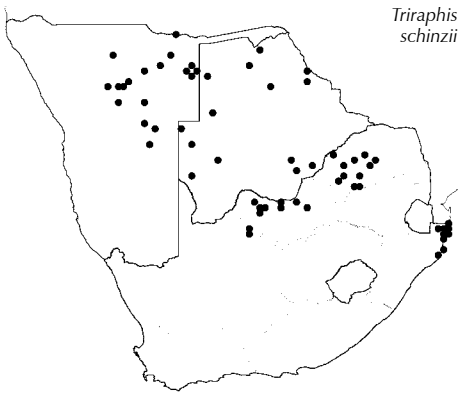
*T. elliottii* Rendle, in *The Journal of Botany, British and foreign (London)* 29: 73 (1891). Type: South Africa, Northern Cape, O'kiep, *Scully*.

BRANCHED NEEDLE GRASS, BERGGRAS

Bushy, tufted, perennial 250–810 mm high; rhizomatous; culm profusely branching from a short distance above the base, yellow, woody, internodes glabrous, smooth. Leaf blade 60–120 × 1 mm, glabrous; sheath glabrous; ligule a very short fringe of hairs. Inflorescence 25–90(–190) mm long, mostly dense, contracted. Spikelet 4–15 mm long (excluding awns); 4–19-flowered; glumes 2.2–3.5 mm long (including awns), awns 0.3–0.5 mm long; lemma body 3.0–3.2 mm long, central awn 3.0–3.5 mm long, about as long as to longer than lemma; anthers 1.2–1.8 mm long.

*Flowering*: February to June. *Ecology*: Often in sand or calcareous soils; rocky hill slopes, on floodplains or in dry watercourses. *Frequency in southern Africa*: Common. *Distribution*: Endemic. N, NC.

Illustrations: Chippindall: 125, fig. 97 (1955); Müller: 299 (2007).
Anatomy vouchers: *Gibbs Russell & Smook 5170, 5265*; *Ellis 4343, 4363, 4723* & *5260*.
Voucher: *De Winter 2618*.


*Triraphis schinzii*

**Triraphis schinzii** Hack., in *Verhandlungen des Botanischen Vereins für die Provinz Brandenburg* 30: 147 (1888). Type: Namibia, Amboland, Omatope, *Schinz 627* (B, holo.).

*T. schlechteri* Pilg. ex Stent, in *Bothalia* 1: 294 (1921). Type: Mozambique, Maputo [Lourenço Marques], *Schlecter 11664* (K, holo.).

SANDVELD BROOM GRASS

Erect, tufted, perennial 700–1 400 mm high; rhizome short; base pale or dark brown to reddish; culms unbranched, internodes glabrous and smooth. Leaf blade 250–500 × 2–5 mm, glabrous or base hairy; sheaths glabrous or hairy; ligule a fringe of long, up to 1 mm, hairs. Inflorescence 200–400 mm long, open, branches usually lax. Spikelet 6–11 mm long (excluding awns), glumes 2.8–4.5 mm long, lobed; lemma 4.0–5.2 mm long (excluding awns), central awn 5–7 mm long, longer than lemma; anthers 0.8–1.2 mm long.

*Flowering*: November to April. *Ecology*: Sandy grassland or bushveld; deep sand on dunes or river banks and on forest margins. *Frequency in southern Africa*: Common. *Distribution*: Zimbabwe, Zambia, Mozambique and Tanzania. N, B, LIM, NW, G, KZN.

Illustrations: Müller: 301 (2007); Cope: 22, tab. 10 (1999).
Anatomy vouchers: *Gibbs Russell & Smook 5395*; *Ellis 3414, 3569* & *4049*.
Voucher: *Story 6398*.

## **Tristachya** Nees

Nees ab Esenbeck: 458 (1829); Stapf: 452 (1899); Chippindall: 275 (1955); Conert: 296 (1957); Phipps: 105, 109 (1964); Launert: 213 (1970a); Clayton: 421 (1974); Chippindall & Crook (1976); Clayton & Renvoize: 318 (1986); Clayton: 204 (1989); Gibbs Russell et al.: 347 (1990); Watson & Dallwitz: 980 (1994); Lebrun & Stork: 289 (1995).



Figure 562.—*Tristachya leucothrix* spikelet triad (24–45 mm). Photographer: M. Koekemoer.

Perennial, tufted. **Leaf blade** expanded or rolled; *ligule* a fringe of hairs. **Inflorescence** an open or contracted panicle or raceme; spikelets usually in triads, rarely in pairs, pedicels of triads entirely or partly fused, thus mimicking a single spikelet, rarely pedicels free, then pedicels slender, often of different lengths, longest pedicel much longer than shortest pedicel. **Spikelet** laterally to not noticeably compressed, disarticulating above glumes; *glumes* unequal, lanceolate, ± persistent, chartaceous or subcoriaceous, 3–5-nerved, glabrous or hairy, hairs usually tubercle-based; upper glume usually as long as spikelet. **Florets** 2; *lower floret* male; lemma membranous, 3–7-nerved, glabrous or hairy, awnless; palea well developed; *upper floret* bisexual; *lemma* convolute, similar to firmer in texture to glumes, usually cartilaginous, 5–9-nerved, glabrous or hairy, hairs not in tufts, incised, 2-lobed, lobes awnless or awned; central awn from between lobes, *awn* geniculate and twisted, usually longer than body of lemma; *callus* conical, pungent, pubescent; *palea* membranous, 2-keeled, hyaline, keels thickened but not winged. **Lodicules** 2, cuneate, very fleshy. **Stamens** 3. **Ovary** obovoid to oblong, glabrous or apex hairy; styles plumose. **Caryopsis** longitudinally grooved; hilum long-linear; embryo large. **Photosynthetic pathway**: $C_4$; XyMS-. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 10, 12$ (polyploidy).

**Species** ± 22, tropical and southern Africa, Madagascar, tropical America; 6 in southern Africa; widespread.

Species treatment by A.C. Mashau.

### Quick guide to easily confused taxa:

1. Upper lemma lobes awned; lower glume ovate . . . . . **Loudetia pedicellata**
   Upper lemma lobes awnless; lower glume ovate-elliptic or acute to acuminate . . . . . 2




Figure 563.—*Tristachya biseriata*. A, spikelet triad (55.0 × 7.8 mm); B, upper floret (60 × 1 mm). Artist: S.B. Chiliza.



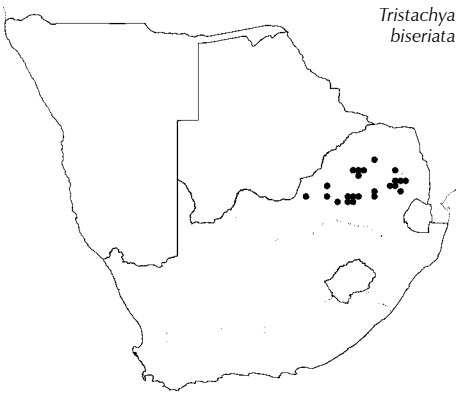

Figure 564.—*Tristachya leucothrix*. A, plant; B, lemma and callus. Artist: F. Lauth.

2. Spikelets not in dense triads; lower glume acute to acuminate; glumes twice as long as spikelet . . . . . **Loudetia glabrata** **(West Africa)
Spikelets in dense triads, pedicels unequal; lower glume ovate-elliptic; glumes $^1/_3$–$^2/_3$ as long as spikelet . . . . . 3
3. Lemma central awn 15–35 mm long; culm base partly swollen; spikelet 10–20 mm long (excluding awn) . . . . . **Tristachya lualabaensis**
Lemma central awn 40–120 mm long; culm base markedly bulbous; spikelet 25–35 mm long (excluding awn) . . . . . **Tristachya superba**

[The following specimens from Namibia: Katima Mulilo (1724AD), *Ellis 344*; Kabe floodplains (1724DA), *Brown s.n.* were wrongly identified as *Loudetiopsis glabrata* (K.Schum.) Conert (now *Loudetia glabrata* (K.Schum) Conert) a species from West Africa. These specimens have been re-identified as *T. lualabaensis*.]

**Key to species:**

1. Pedicels free . . . . . 2
Pedicels connate . . . . . 3
2. Lemma central awn 40–120 mm long; culm base markedly bulbous; spikelet 25–35 mm long (excluding awn) . . . . . **T. superba**
Lemma central awn 15–35 mm long; culm base partly swollen; spikelet 10–20 mm long (excluding awn) . . . . . **T. lualabaensis**
3(1). Culm robust, 2–3-noded, 600–2 000 mm long; inflorescence with 8–70 triads, narrowly ovate; lower glume finely acute to setaceously acuminate . . . . . **T. nodiglumis**
Culm slender, 1 rarely 2-noded, 150–900 mm long; inflorescence with 1–10 triads, narrowly lanceolate; lower glume acute to acuminate . . . . . 4
4. Tubercle-based hairs common on glumes and lower lemma; upper lemma lobe awnless, acuminate to 3–5 mm long . . . **T. leucothrix**
Tubercle-based hairs on glumes only or absent; upper lemma lobe acuminate or awned, awn 3–20 mm long . . . . . 5
5. Upper lemma lobe awnless, acuminate to 3–5 mm long; tubercle-based hairs absent on glumes and lower lemma. . . . . **T. leucothrix**
Upper lemma lobe awn 5–20 mm long; tubercle-based hairs usually absent or on glumes only . . . . . 6
6. Upper lemma lobe awn 5–12 mm long; tubercle-based hairs only along margins of lower glume; glumes lanceolate; lower glume ± as long as spikelet . . . . . **T. biseriata**
Upper lemma lobe awn 10–20 mm long; tubercle-based hairs usually absent on glumes and lower lemma; lower glume acute; upper glume very narrowly lanceolate; lower glume $^1/_2$–$^3/_4$ mm long . . . . . **T. rehmannii**



*Tristachya biseriata*

**Tristachya biseriata** Stapf, in *Kew Bulletin of Miscellaneous Information*: 295 (1897). Type: Lesotho, Leribe, *Rev. J. Buchanan 220*.

Tufted perennial 300–900 mm high; basal sheaths densely white hairy. Leaf blade 300–400 × up to 2 mm, filiform, wiry, usually rolled, curved. Inflorescence with 2–10 triads, nodding; pedicels connate. Spikelet 20–25 mm long (excluding awn); glumes lanceolate; acuminate; lower glume ± as long as spikelet, with tubercle-based hairs along margins; upper lemma pubescent, lobe awn 5–12 mm long, central awn 30–50 mm long; anther 4–6 mm long.

*Flowering*: October to March. *Ecology*: Shallow stony soils; on hillsides and rocky outcrops. *Frequency in southern Africa*: Locally common. *Distribution*: Endemic. LIM, NW, G, M.

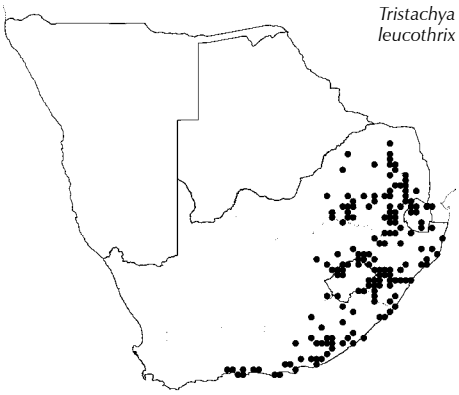
Illustration: Chippindall: 277, fig. 248 (1955).
Anatomy vouchers: *Ellis 1242, 1243, 1333, 2843, 2847 & 2849*.
Voucher: *Smook 4853*.

**Tristachya leucothrix** Trin. ex Nees, in *Agrostologia brasiliensis*: 460 (1829). Type: South Africa, *Zeyher*.

*Apochaete hispida* (L.f.) J.B.Phipps, in *Kirkia* 4: 105 (1964).

*T. hispida* (L.f.) K.Schum., in *Die Pflanzenwelt Ost-Afrikas und der Nachbargebiete* C: 109 (1895).

TRIDENT GRASS, ROOISAADGRAS


*Tristachya leucothrix*

Tufted perennial 150–900 mm high; basal leaf sheaths silky pubescent to fulvously tomentose or covered with dense brown hairs; culm slender, 1 rarely 2-noded. Leaf blade 50–400 × 2–6 mm. Inflorescence of 1–7 triads, nodding; pedicels connate. Spikelet 24–45 mm long (excluding awn), narrowly lanceolate; glumes with many tubercle-based hairs, rarely hairs absent; lower glume $^3/_4$ as long as spikelet, narrowly lanceolate, acuminate; upper glume almost as long as spikelet, very narrowly lanceolate; lower lemma with many tubercle-based hairs, rarely hairs absent; upper lemma glabrous or rarely obscurely hairy near apex, lobes awnless, acuminate to 3–5 mm long, central awn 50–100 mm long; anther 5–6 mm long.

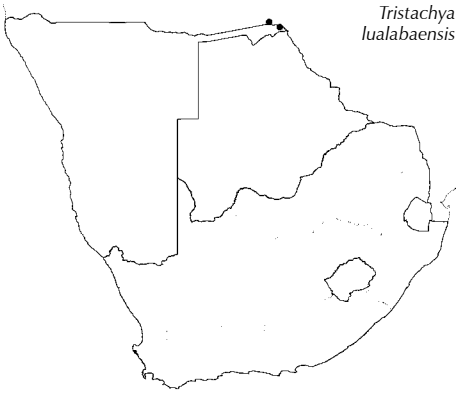
[Specimens without tubercle-based hairs on glumes and lemmas are found in the Eastern Cape.—(3129 BC): Port St. Johns, Ntsubane, *R.G. Strey 8998*; Ntsubane Forestry Station: near Fraser fall, *F. Venter & P. Vorster 44*.—(3129BD): Mkambati Nat. Reserve, *C. Shackleton 41*; main camp at Msikaba River mouth, *L. Smook 5481*. Specimens with filiform leaves have been found in the Wakkerstroom area. More specimens and research are needed to establish whether these belong to a new species/taxon or if it is due to variation within the species.]

*Flowering*: October to March. *Ecology*: Marshy grassland, mountain sourveld and on hillsides. *Frequency in southern Africa*: Locally dominant in highland sourveld. *Distribution*: Northwards to DRC. S, L, LIM, NW, G, M, FS, KZN, WC, EC. *Economics*: Natural pasture for sheep; has a reasonable leaf production and is well grazed early in the season, but later the leaves become too hard and unpalatable.

Anatomy vouchers: *Ellis 1430, 1483, 1834* & *2821*.
Voucher: *Smook 1699*.

**Tristachya lualabaensis** (De Wild.) J.B.Phipps, in *Kirkia* 4: 104 (1964). Type: DRC, Katanga, Lualaba, *Homblé 941* & *997* (syntypes).

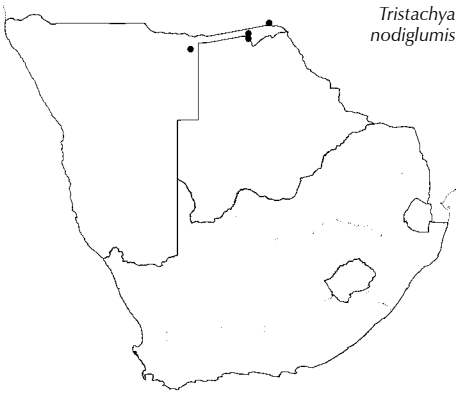
*T. hitchcockii* (C.E.Hubb.) Conert, in *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 77: 301 (1957). Type: Zimbabwe, Victoria Falls, *Hitchcock 24299* (K, holo.).


*Tristachya lualabaensis*

Tufted perennial 700–1 400 mm high; culm base partly swollen, not bulbous. Leaf blade 60–300 × 2–6 mm. Inflorescence linear, loosely contracted; spikelets in triads, rarely in pairs, pedicels free and unequal, 5 mm and 10 mm long respectively. Spikelet 10–20 mm long (excluding awn); glumes and lower lemma glabrous (without tubercle-based hairs); lower glume $^1/_2$–$^2/_3$ as long as spikelet, ovate-elliptic; upper glume as long as spikelet, lanceolate; upper lemma hairy, lobes awnless, acuminate to 2–5 mm long; central awn 15–35 mm long; anther 3.5–7.0 mm long.

*Flowering*: January to March. *Ecology*: Alluvial soils subject to flooding. *Frequency in southern Africa*: Locally common in river floodplains. *Distribution*: Zambia, Zimbabwe, DRC and Tanzania. N.

Anatomy vouchers: *Ellis 344* & *3734*.
Voucher: *Curson 669*.


*Tristachya nodiglumis*

**Tristachya nodiglumis** K.Schum., in *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 24: 334 (1897). Type: Angola, Malange [Malandsche], *Mechow 462*.

*T. eylesii* Stent & J.M.Rattray, in *Proceedings of the Rhodesian Scientific Association* 32: 41 (1933). Type: Zimbabwe, Chinmora Reserve, *Eyles 3403A* (SRGH, holo.).

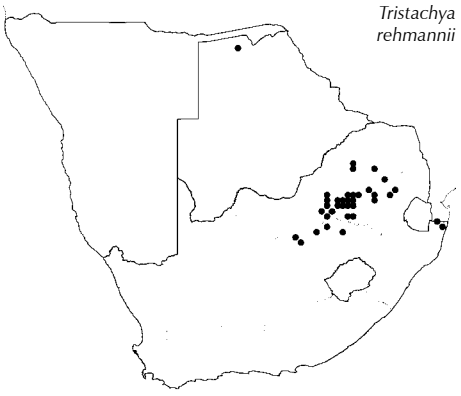
*T. longispiculata* C.E.Hubb., in *Kew Bulletin* 1934: 263 (1934). Type: Angola, Benguella, *Gossweiler 2772*.

Tufted robust perennial 600–2 000 mm high; culm robust, 2–3-noded; basal sheaths silky villous. Leaf blade 150–600 × 3–13 mm. Inflorescence narrowly ovate with 8–70 triads, nodding, pedicels connate. Spikelet 18–30 mm long (excluding awn); lower glume $^1/_2$–$^4/_5$ as long as spikelet, narrowly lanceolate, finely acute to setaceously acuminate, glabrous or with tubercle-based hairs; upper glume as long as spikelet, very narrowly lanceolate; upper lemma hairy, lobe awn 10–20 mm long; central awn 30–60 mm long; anther 6.5 mm long.

[A variable species that intergrades with *T. rehmannii*, which occasionally has tubercled hairs; intermediate specimens are difficult to identify.]

*Flowering*: December to March. *Ecology*: On sandy soils; floodplain grassland. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to DRC and Tanzania, also Angola. N, B.

Illustration: Clayton et al.: 427, fig. 115 (1974).
Anatomy voucher: *Ellis 315*.
Voucher: *Smith 2230*.


*Tristachya rehmannii*

**Tristachya rehmannii** Hack., in *Bulletin de l'Herbier Boissier* 3: 384 (1895). Type: South Africa, Limpopo Province, Streydpoort [Strydpoort], *Rehmann 5383* (W, holo.).

*Dolichochaete rehmannii* (Hack.) J.B.Phipps, in *Kirkia* 4: 110 (1964).

Broom trident grass, besemgras

Closely tufted perennial 200–900 mm high; basal sheaths silky villous; culm slender, 1-noded. Leaf blade to 200 × 1–3 mm, curling when old. Inflorescence narrowly lanceolate with 1–6(–8) triads, nodding, pedicels connate. Spikelet 20–30 mm long (excluding awn); glumes and lower lemma glabrous or with occasional tubercle-based hairs; lower glume $^1/_2$–$^3/_4$ as long as spikelet, narrowly lanceolate, acute; upper glume as long as spikelet, very narrowly lanceolate; upper lemma pubescent, lobe awn 10–20 mm long, central awn 50–100 mm long; anther 4.5–7.5 mm long.

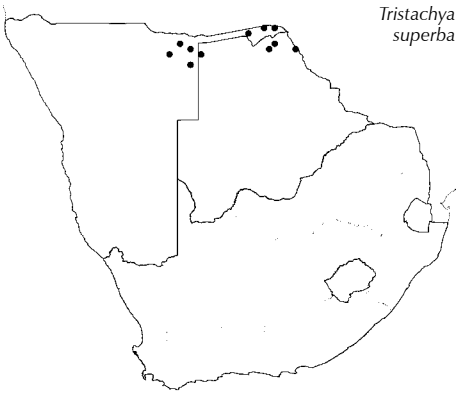
*Flowering*: November to March. *Ecology*: Shallow stony soils. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to DRC and Tanzania, also Angola. B, LIM, NW, G, M, FS, KZN. *Economics*: Used for brooms.

Illustration: Chippindall: 279, fig. 250 (1955).
Anatomy vouchers: *Ellis 725, 753, 1331* & *1803*.
Voucher: *Liebenberg 8574*.

**Tristachya superba** (De Not.) Schweinf. & Asch., in *Beitrag zur Flora aethiopiens*: 302 (1867). Type: Sudan. *Figari* (FI, holo.).

*Loudetia superba* De Not., in *Index Seminum horti botanici r archigymnasii Genuensis*: 24 (1852) & *Annales des Sciences naturelles*, sér. 3,19: 369 (1852).

Giant trident grass


*Tristachya superba*

Tufted perennial 1 200–2 700 mm high; culm base hard and bulbous. Leaf blade to 600 × 8–20 mm. Inflorescence linear, contracted; spikelets in triads, rarely in pairs, pedicels free and unequal, 2–7 mm and 10–25 mm long respectively. Spikelet 25–35 mm long (excluding awn); glumes and lower lemma glabrous (without tubercle-based hairs); lower glume $^1/_3$–$^1/_2$ as long as spikelet, ovate-elliptic; upper glume as long as spikelet, lanceolate; upper lemma sparsely hairy, lobes awnless, acuminate to 3–5 mm long, central awn 40–120 mm long; anther 7.5–9.0 mm long.

*Flowering*: February to August. *Ecology*: Granite sandveld and Kalahari sands. *Frequency in southern Africa*: Locally common in sandy areas, widespread. *Distribution*: Tropical Africa. N, B. *Economics*: Culms used as drinking straws by San people; roots eaten by warthogs.

Illustration: Chippindall & Crook: fig. 726 (1976).
Anatomy voucher: *Ellis 3707*.
Voucher: *Ellis 2747*.

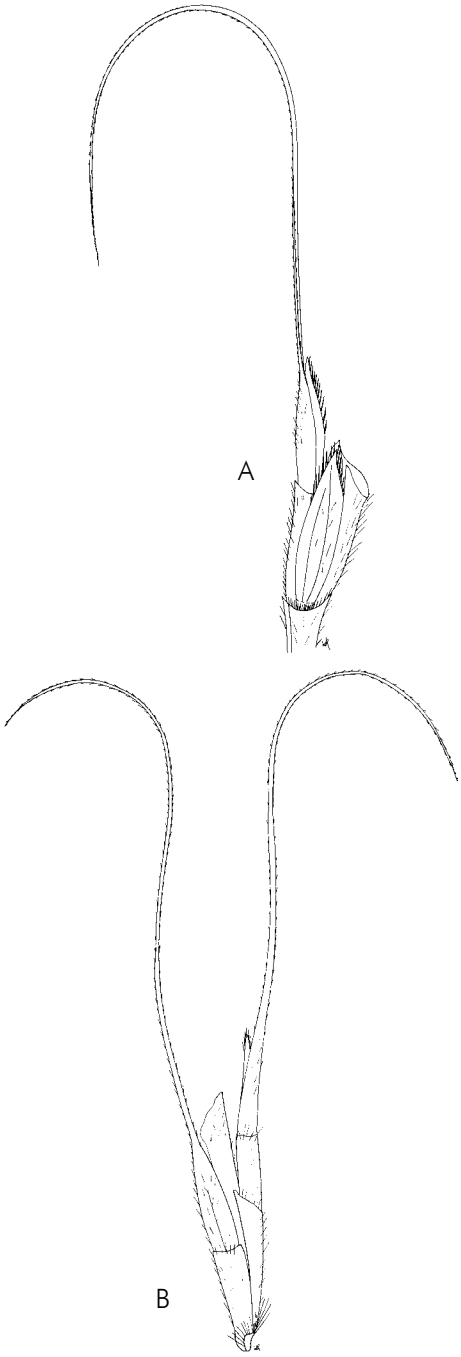



Figure 565.—*Urelytrum agropyroides*. A, awnless sessile and awned pedicelled spikelet pair (65.0 × 3.4 mm); B, raceme portion showing awned pedicelled spikelet (63.0 × 4.4 mm). Artist: W. Roux.

## **Urelytrum** Hack.

Hackel: 25 (1887); Stapf: 330 (1898); Chippindall: 516 (1955); Clayton & Renvoize: 832 (1982); Clayton & Renvoize: 361 (1986); Gibbs Russell et al.: 349 (1990); Watson & Dallwitz: 988 (1994); Cope: 153 (2002).



Figure 566.—*Urelytrum agropyroides* spikelet pair (7–8 mm). Photographer: M. Koekemoer.

Perennial, rarely annual, erect, tufted. **Leaf blade** linear, flat or rolled, glabrous or loosely hairy, glaucous; auricles from leaf sheaths present; *ligule* an unfringed membrane, almost hyaline. **Inflorescence** of 1, rarely 2, racemes, solitary or subdigitate, terminal, cylindrical or slightly flattened, hairy or glabrous, spike-like, rigid, elongated, disarticulating easily and obliquely; internodes stout, clavate, apex crateriform with a lobed scarious rim; pedicels free of rachis, racemes obliquely jointed; *spikelets* in pairs, in long–short combinations: one sessile, the other pedicelled. **Sessile spikelet** dorsiventrally compressed, elliptic, falling with glumes, internode and pedicel; *glumes* ± equal, dissimilar, awnless; lower glume coriaceous, hairy or glabrous, flattened on the back, 2-keeled towards the apex, wingless; upper glume membranous, boat-shaped, keeled. **Florets** 2; *lower floret* male; lemma hyaline, 2-nerved, awnless; palea present; *upper floret* bisexual; *lemma* less firm than glumes, hyaline, entire, delicately hairy, awnless; *callus* oblique, broadly obtuse to cuneate, hairy, inserted into top of the internode; *palea* almost equalling lemma. **Lodicules** 2, fleshy, cuneate, glabrous. **Stamens** 3. **Ovary** narrowly oblong, terete at middle, glabrous; styles linear, plumose. **Caryopsis** small, about 3–4 mm long, ellipsoid; hilum short; embryo large. **Pedicelled spikelet** with lower glume awned or rarely awnless; awn to 120 mm long, scabrid, curved or straight; florets 2, both male, rarely one bisexual or sterile and reduced to glumes. **Photosynthetic pathway**: $C_4$; XyMS-. **Cytology**: $x = 10$.

**Species** 7, tropical Africa; 2 in southern Africa; northern Namibia, North West, Gauteng, Limpopo, Mpumalanga, Free State, KwaZulu-Natal; Eastern Cape and Northern Cape.

Species treatment by M.T. Nembudani.

### Quick guide to easily confused genera/taxa:

**A**

Sessile spikelet callus oblique; pedicelled spikelet lower glume awn 5–120 mm long, rarely awnless . . . . . **Urelytrum**
Sessile spikelet callus horizontal with a central peg; pedicelled spikelet lower glume usually awnless or sometimes with an awn up to 5 mm long . . . . . **Rhytachne**

**B**

1. Culm nodes with ring of white adpressed hairs . . . . . **Trachypogon spicatus**
Culm nodes without ring of white hairs . . . . . 2




Figure 567.—*Urelytrum agropyroides*. A, plant; B, ligule; C, part of inflorescence. Artist: J.P.H. Acocks.

2. Inflorescence with scabrid awns throughout its length; pedicelled spikelet awned; ligule an unfringed membrane; tastes bitter . . . . . **Urelytrum agropyroides**
Inflorescence with velvety hairy awns in upper half only; pedicelled spikelet awnless; ligule a fringed membrane; lacks bitter taste . . . . . **Heteropogon**

## Key to species:

Pedicelled spikelet awn 30–120 mm long, rarely less; ligule 2–6 mm long, prominent; inflorescence scabrid to densely hairy . . . . . **U. agropyroides**
Pedicelled spikelet awn not more than 20 mm long or absent; ligule 0.3–1.3 mm long, not prominent; inflorescence scaberulous and glabrous . . . . . **U. henrardii**

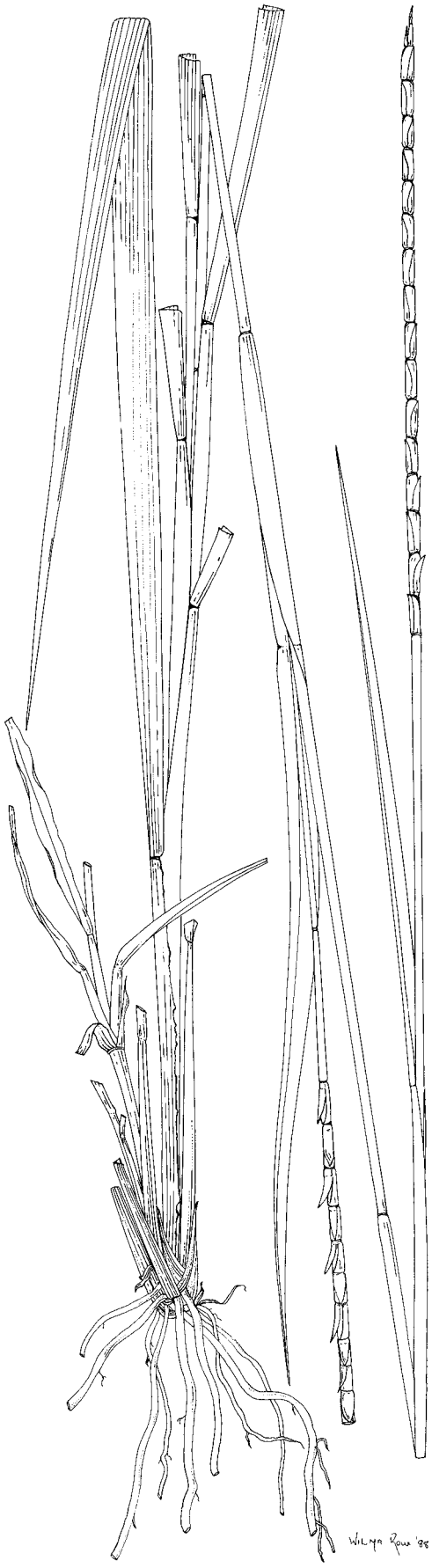
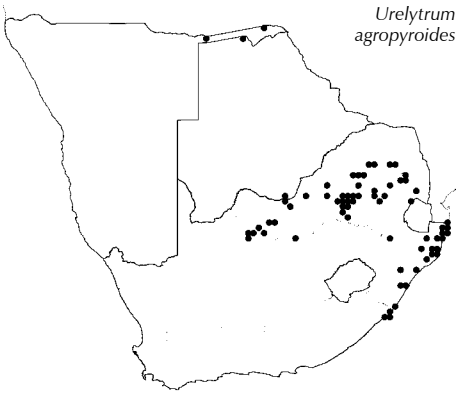



Figure 568.—*Urelytrum henrardii*. Artist: W. Roux.


*Urelytrum agropyroides*

**Urelytrum agropyroides** (Hack.) Hack., in DC., *Mongraphiae Phanerogamarum Prodromi nunc Continuatio, nunc Revisio* 6: 272 (1889). Type: Angola, Lobango, *Newton* (COI, holo.).

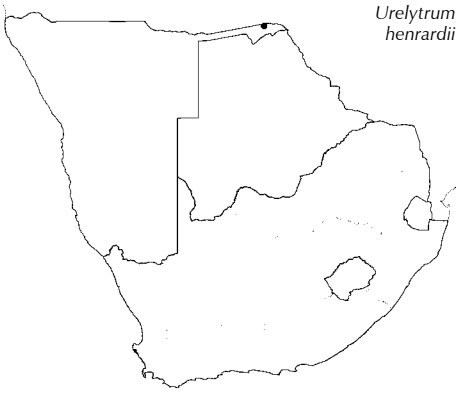
*U. squarrosum* Hack. in DC., in *Mongraphiae Phanerogamarum Prodromi nunc Continuatio, nunc Revisio* 6: 272 (1889). Type: South Africa, KwaZulu-Natal, Durban, *Guienzius* (W, holo.).

CENTIPEDE GRASS, QUININE GRASS, KINAGRAS, VARKSTERTGRAS

Coarse, hard, tufted perennial 600–1 600 mm high; bitter tasting (hence quinine grass). Leaf blade to 400 × 1–6 mm wide; rolled when young and then later again when old; ligule prominent, 2–6 mm long. Inflorescence 80–300 mm long, raceme solitary, sometimes 2–3, scabrid to densely hairy. Sessile spikelet 7–8 mm long, awnless; callus oblique; anther 4.0–4.5 mm long. Pedicellate spikelet smaller; lower glume awn 30–120 mm long, rough, curved, flattened on the lower part and characteristically curled at maturity so that the inflorescence resembles bones of a fish.

*Flowering*: October to June. *Ecology*: Open grassland and stony hillsides. *Frequency in southern Africa*: Common. *Distribution*: Northwards to Tanzania, also Ghana and Madagascar. N, B, LIM, NW, G, M, FS, KZN, EC.

Illustration: Chippindall: pl. 26 (1955).
Anatomy vouchers: *Ellis 145, 374, 425, 1226, 1779 & 4069*.
Voucher: *De Winter & Marais 4819*.


*Urelytrum henrardii*

**Urelytrum henrardii** Chippind., in *Blumea*, Supplement 3: 25 (1946). Type: Zambia, Munshiwemba, *Stohr 759* (PRE, holo.).

Tufted perennial, culms to 1 000 m high. Leaf sheath to 400 × 3–4 mm; usually pilose or pubescent above, ligule a short membrane, 0.3–1.3 mm long, truncate. Inflorescence a solitary raceme 150–300 mm long; rachis internode and pedicel scaberulous and glabrous. Sessile spikelet narrowly oblong-lanceolate; lower glume 6.5–8.5 mm long, glabrous below, spinulose above and on keels, subacute; anther 3.3–3.7 mm long, brown. Pedicelled spikelet 2–3 mm long; awn to 20 mm long, straight, often awnless.

*Flowering*: January. *Ecology*: On sandy soils; open woodland and savanna; on dry open hillsides and on river terraces. *Distribution*: Zambia. N.

Voucher: *Killick & Leistner 3287*.

## **Urochloa** P.Beauv.

Palisot de Beauvois: 52 (1812); Stapf: 384 (1898); Stapf: 586 (1920); Chippindall: 380 (1955); Chippindall & Crook: 234 (1976); Burt et al.: 343 (1980); Clayton & Renvoize: 600 (1982); Clayton & Renvoize: 284 (1986); Webster: 228 (1987); Clayton: 79 (1989); Gibbs Russell et al.: 350 (1990); Watson & Dallwitz: 991 (1994).

Annual or perennial; tufted or decumbent; sometimes stoloniferous. **Leaf blade** expanded; *ligule* a fringed membrane to a fringe of hairs. **Inflorescence** of 2–many or solitary, 1-sided racemes, scattered alternately on a central axis; rachis 3-angled or flat; *spikelets*



Figure 569.—*Urochloa mosambicensis*. Spikelet (3–5 mm). Photographer: M. Koekemoer.

solitary or paired, more rarely in clusters of 3 or 4; pedicels often reduced to disc-tipped stumps; lower glume turned away from rachis (abaxial). **Spikelet** dorsiventrally compressed, plano-convex, ovate or lanceolate, falling entire at maturity; *glumes* unequal, dissimilar, awnless; lower glume usually shorter than spikelet, 3–5-nerved; upper glume as long as spikelet, 5–11-nerved. **Florets** 2; *lower floret* male or sterile; lemma 5–7-nerved, resembling upper glume, awnless; palea almost as long as lemma or reduced, 2-keeled; *upper floret* bisexual; *lemma* shorter than spikelet, firmer than glumes, indurated, entire, rounded at apex, margins inrolled and clasping only edges of palea, granulose to rugose, faintly 5–7-nerved, mucronate or awned; *awn* scabrid, straight, shorter than spikelet; *palea* obtuse, almost as long as and same texture as lemma, 2-keeled. **Lodicules** 2, small, cuneate. **Stamens** 3. **Ovary** glabrous; styles plumose. **Caryopsis** broadly ellipsoid to subrotund, dorsiventrally compressed; hilum short; embryo large. **Photosynthetic pathway**: $C_4$. The anatomical organisation conventional. Biochemical type PCK (4 species); XyMS+. PCR cell chloroplasts centrifugal/peripheral. **Cytology**: $x = 7, 9, 15$ (polyploidy).

**Species** ± 12; 6 in southern Africa, widespread.

Species treatment by A.C. Mashau.

**Quick guide to easily confused genera:**

1. Spikelet with a bead-like swelling at the base . . . . . **Eriochloa**
   Spikelet passing smoothly into pedicel without a bead-like swelling, sometimes with a cylindrical stipe . . . . . 2
2. Lower glume turned away from rachis . . . . . **Urochloa**
   Lower glume adjacent to rachis . . . . . **Brachiaria**

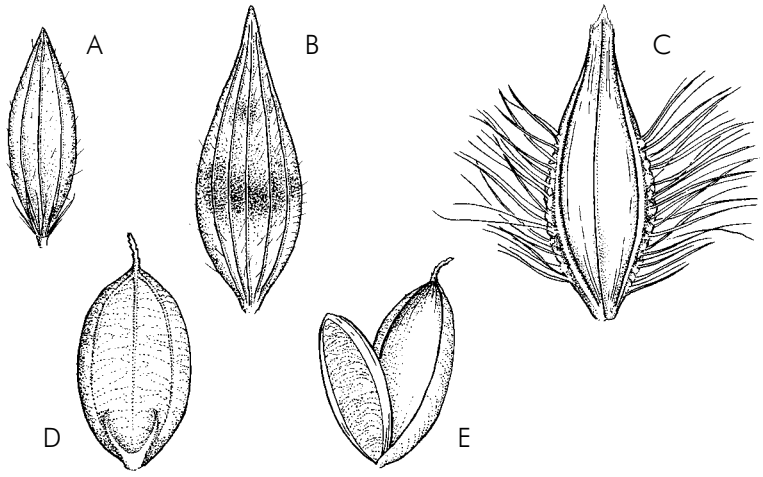



Figure 570.—*Urochloa brachyura* spikelet parts. A, lower glume; B, upper glume; C, lower lemma; D, upper lemma; E, upper floret (opened). Artist: C. Smith.




Figure 571.—*Urochloa brachyura*. A, plant; B, ligule. Artist: C. Smith.

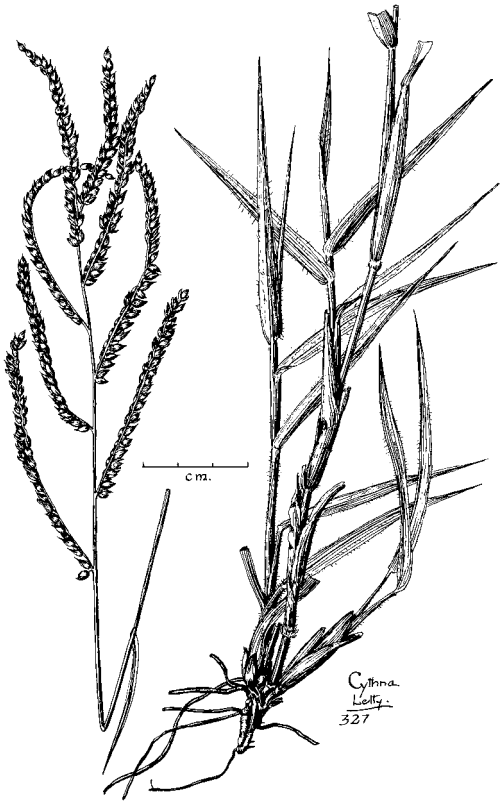
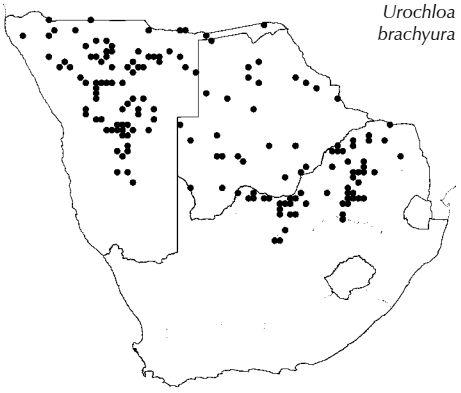
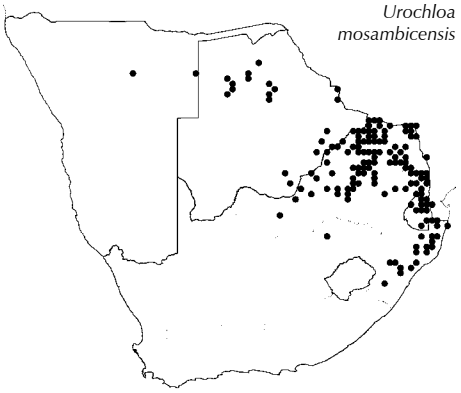



Figure 572.—*Urochloa mosambicensis*. Artist: C. Letty.



*Urochloa brachyura*



*Urochloa mosambicensis*

**Key to species:**

1. Lower glume $^1/_3$–$^1/_2$ (rarely more) as long as spikelet; upper glume 9-nerved, cross-veins often present; plant annual . . . **U. panicoides**
   Lower glume $^2/_3$ to as long as spikelet; upper glume 5–8-nerved, without cross-veins; plant annual or perennial . . . . . 2
2. Lower glume 3-nerved; spikelet ovate to broadly lanceolate . . . . 3
   Lower glume 5-nerved; spikelet narrowly ovate to lanceolate . . . 5
3. Annual; basal sheaths glabrous to loosely pubescent . . . . . **U. trichopus**
   Perennial; basal sheaths glabrous to densely hairy . . . . . 4
4. Upper lemma awn well developed, 0.5–1.2 mm long; spikelets neatly arranged in two rows on rachis; lower glume with 1–3 stiff hairs on the back; plant 200–1 500 mm high. . . **U. mosambicensis**
   Upper lemma awn reduced, less than 0.5 mm long; spikelets usually untidily arranged on rachis; lower glume without stiff hairs on the back; plant to 300 mm high . . . . . **U. stolonifera**

5(2). Perennial; basal sheaths densely hairy, old sheaths usually splitting into fibres . . . . . **U. oligotricha**
   Annual; basal sheaths loosely pubescent, rarely splitting into fibres . . . . . **U. brachyura**

**Urochloa brachyura** (Hack.) Stapf, in *Flora tropical Africa* 9: 592 (1920). Type: Namibia, Olukonda, *Schinz 638*.

Coarsely tufted annual 200–1 200 mm high; basal sheaths loosely pubescent, rarely splitting into fibres; culm erect or geniculately ascending. Leaf blade 30–300 × 3–16 mm. Inflorescence of (2)5–6(–10) racemes 10–60 mm long. Spikelet 3.5–6.0 mm long, lanceolate to narrowly ovate; lower glume $^2/_3$ as long as spikelet, 5-nerved, without stiff hairs on the back, apex narrowly rounded; upper glume 7-nerved, without cross-veins, glabrous or pubescent; lower lemma sometimes with a fringe of stiff hairs near the margins; upper lemma shortly awned, awn ± 1 mm long; anther 1.3–2.0 mm long.

[Close to the annual *U. trichopus*, which has lower glume 3-nerved, stiff hairs on the back, and the perennial *U. oligotricha* with the lower glume 5-nerved.]

*Flowering*: October to April. *Ecology*: Usually on black turf and clayey soils; in woodlands or grassveld, often in shade. *Frequency in southern Africa*: Common. *Distribution*: Angola, Zimbabwe to East Africa and Ethiopia. N, B, LIM, NW, G, FS, NC.

Anatomy vouchers: *Gibbs Russell & Smook 5151, 5210*; *Ellis 199, 407* & *2026*.
Voucher: *Tinley 1308*.

**Urochloa mosambicensis** (Hack.) Dandy, in *Journal of Botany, British and foreign*. London 69: 54 (1931). Type: Mozambique, *De Carvalho*.

*U. pullulans* Stapf, in *Flora tropical Africa* 9: 590 (1920).

*U. rhodesiensis* Stent, in *Proceedings of the Rhodesian Scientific Association* 32: 26 (1933). Type: Zimbabwe, *Rattray 500*; Harare, *Stent 3669, 5547* (syntypes).

Bushveld signal grass

Tufted perennial 200–1 500 mm high; stoloniferous, sometimes rooting and branching from lower nodes; basal sheaths glabrous to densely hairy, usually not splitting into fibres. Leaf blade 20–300 × 3–20 mm. Inflorescence of (2)3–15 racemes, 20–80 mm long. Spikelet 3–5 mm long, ovate; lower glume $^2/_3$–$^5/_6$ as long as spikelet, 3-nerved, 1–3 stiff

hairs on the back, apex broadly rounded; upper glume 5-nerved, usually without cross-veins, glabrous or pubescent; lower lemma with or without a fringe of stiff hairs near the margins; upper lemma awn well developed, 0.5–1.2 mm long; anther 1–2 mm long.

[Close to *U. stolonifera*, a smaller plant with spikelets untidily arranged and upper lemma very shortly awned; and *U. trichopus* an annual with slightly shorter, thicker and hairy racemes; similar to *U. oligotricha*, which is a denser, tufted grass with longer leaves and 5-nerved lower glume.]

*Flowering*: October to May. *Ecology*: On a variety of soil types; usually in sheltered disturbed places. *Frequency in southern Africa*: Common. *Distribution*: Northwards to East Africa. Introduced to Australia. N, B, S, LIM, NW, G, M, FS, KZN. *Economics*: Palatable grass of average leaf production; introduced as a forage crop in tropical countries; a good indicator of disturbed places.

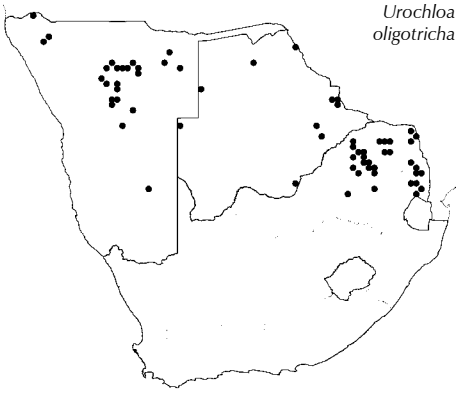
Anatomy vouchers: *Ellis 503, 1916, 3478* & *4523*.
Voucher: *Smook 5389*.

**Urochloa oligotricha** (Fig. & De Not.) Henrard, in *Blumea* 4: 502 (1941). Type: Nubia, *Figari*.

*U. bolbodes* (Steud.) Stapf, in *Flora tropical Africa* 9: 593 (1920). Type: Ethiopia, *Schimper 2021*.

Perennial signal grass

Perennial 600–1 000 mm high; rhizome stout, sometimes shortly creeping; basal sheaths very densely silky hairy, old sheaths splitting into fibres. Leaf blade 50–100 × 6–12 mm. Inflorescence of 5–20 racemes, 30–100 mm long. Spikelet 3–5 mm long, lanceolate to narrowly ovate; lower glume 5-nerved, without stiff hairs on the back, apex narrowly rounded or truncate; upper glume 7–8-nerved, without cross-veins, glabrous to pubescent; lower lemma sometimes with a fringe of stiff hairs near the margins; upper lemma awn 0.3–0.5 mm long; anther 1.2–2.0 mm long.


*Urochloa oligotricha*

[Distinguished from *U. mosambicensis* and *U. stolonifera* by the 5-nerved lower glume, lanceolate spikelet and fibrous old leaf sheath, however, intermediates with *U. mosambicensis* are present; closely resembles the annual *U. brachyura*.]

*Flowering*: December to May. *Ecology*: On clay or loam; often in wet areas; wooded grassland, roadsides and old farmland. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to Ethiopia. Introduced to Australia. N, B, LIM, G, M. *Economics*: A valuable, palatable grazing grass that produces a high leaf yield; sometimes cultivated; weed in disturbed areas.

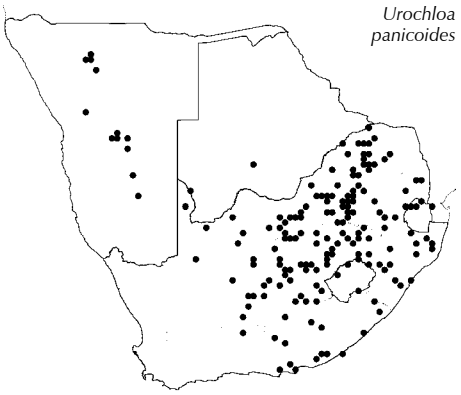
Anatomy voucher: *Ellis 1556*.
Voucher: *Giess 7784*.

**Urochloa panicoides** P.Beauv., in *Essai d'une nouvelle Agrostographie*: 53, fig. 11/1 (1812). Type: Mauritius, *De Jussieu*.

*U. ruschii* Pilg, in *Notizblatt des Botanischen Gartens und Museums zu Berlin Dahlem* 15: 449 (1941). Type: Namibia, Farm Lichtenstein bei Windhoek, *Rusch*.

Garden urochloa

Tufted erect or prostrate annual 100–900 mm high; often spreading cartwheel-like; basal sheaths glabrous to densely hairy, rarely split-

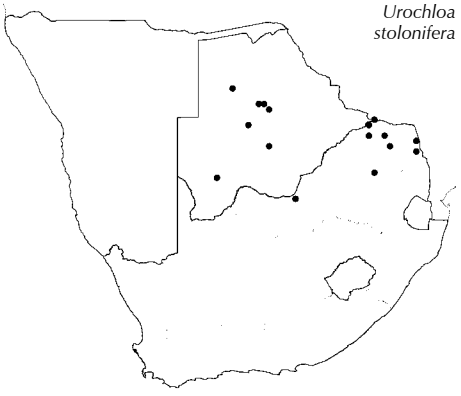

*Urochloa panicoides*

ting into fibres. Leaf blade 20–250 × 5–18 mm. Inflorescence of 2–7(–10) racemes, 10–90 mm long. Spikelet (2.5–)3.5–4.5(–5.5) mm long, elliptic; lower glume less than $^1/_2$ as long as spikelet (rarely longer), without stiff hairs on the back, apex broadly rounded or truncate; upper glume 9-nerved, cross-veins often present, glabrous or pubescent; lower lemma sometimes with a fringe of stiff hairs near the margins; upper lemma rugulose, awn 0.3–1.0 mm long; anther 0.9–2.0 mm long.

[Easily distinguished from other annual *Urochloa* species by its usually shorter lower glume.]

*Flowering*: October to May. *Ecology*: Prefers clay soils; grows in damp areas but even on hard bare ground; in disturbed or overgrazed places, gardens and cultivated land. *Frequency in southern Africa*: Common. *Distribution*: Northwards in Africa to Sudan, also Yemen and India. Introduced to Australia. N, B, S, L, LIM, NW, G, M, FS, KZN, NC, WC, EC. *Economics*: Palatable as a grazing grass, but with a very low leaf production; widespread weed in gardens and cultivated lands.

Illustration: Chippindall: 384, fig. 328 (1955).
Anatomy vouchers: *Ellis 132, 747, 765 & 1781*.
Vouchers*: Smook 4619, Smook & Gibbs Russell 2486*.


*Urochloa stolonifera*

**Urochloa stolonifera** (Gooss.) Chippind., in Meredith, *Grass & Pastures of South Africa*: 381 (1955). Type: South Africa. Northern Cape, Gordonia District; along the Molopo River, *Pole Evans and Pentz* in Nat Herb. Pretoria, *8327*; *Goossens 608* (syntypes).

Tufted perennial 100–300 mm high; with almost woody rhizomatous rootstock or stoloniferous; basal sheaths glabrous to densely hairy, rarely splitting into fibres; basal culm nodes swollen. Leaf blade 40–130 × 2–9 mm. Inflorescence of 2–6 racemes 10–40 mm long; spikelets untidily arranged on rachis. Spikelet 2.5–3.0 mm long, broadly lanceolate; lower glume almost $^3/_4$ as long as spikelet, 3-nerved, without stiff hairs on the back, apex truncate; upper glume 5-nerved, without cross-veins, pubescent to densely hairy; lower lemma with stiff bristles sometimes mixed with short, soft hairs near the margins; upper lemma awn reduced to less than 0.5 mm long; anther 1.0–2.1 mm long.

[Close to *U. mosambicensis*, which is a larger plant with spikelets neatly arranged in two rows and a longer awn on the upper lemma.]

*Flowering*: December to April. *Ecology*: On sandy or calcareous soils; near rivers or pans, often in disturbed places. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic. B, LIM, NW.

Illustration: Chippindall: 382, fig. 326 (1955).
Voucher*: Zwanziger 520*.

**Urochloa trichopus** (Hochst.) Stapf, in *Flora tropical Africa* 9: 589 (1920). Type: Sudan, Kordofan, *Kotschy 74*.

*U. engleri* Pilg., in *Notizblatt des Botanischen Gartens und Museums zu Berlin Dahlem* 15: 450 (1941). Type: Namibia, Tsumeb, *Engler 6406*.

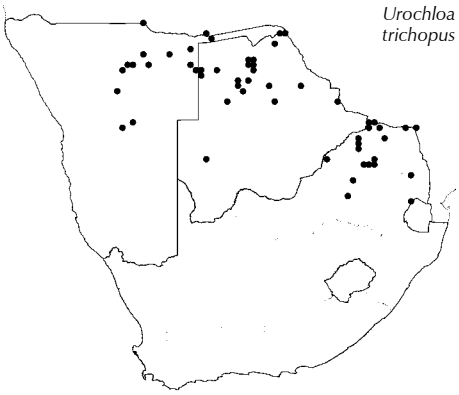
Coarsely tufted annual 200–1 700 mm high; basal sheaths glabrous to loosely pubescent, rarely splitting into fibres. Leaf blade 50–300 × 5–20 mm. Inflorescence of 3–20 racemes, 10–140 mm long.

Spikelet 2.5–5.5 mm long, ovate; lower glume $^{2}/_{3}$ as long as spikelet, 3-nerved, middle nerve with a tuft of 1–5 stiff hairs always present on the back and a $^{1}/_{3}$ from apex, apex broadly rounded or truncate; upper glume 5-nerved, without cross-veins, glabrous or pubescent; lower lemma nearly always with a fringe of stiff hairs near the margins; upper lemma granulose to rugulose, awn 0.5–1.0 mm long; anther 1.5–2.1 mm long.

[Close to the annual *U. brachyura*, which has the lower glume 5-nerved and lacks stiff hairs on the back and the perennial *U. mosambicensis*.]

*Flowering*: December to April. *Ecology*: Usually on sandy soils; in wooded grassland or on floodplains and river banks, often in cultivated lands. *Frequency in southern Africa*: Locally common. *Distribution*: Northwards to tropical Africa but mainly in the east; and Yemen. N, B, LIM, G, M.

Illustration: Clayton: 83, tab. 20 (1989).
Voucher: *De Winter & Wiss 4163*.



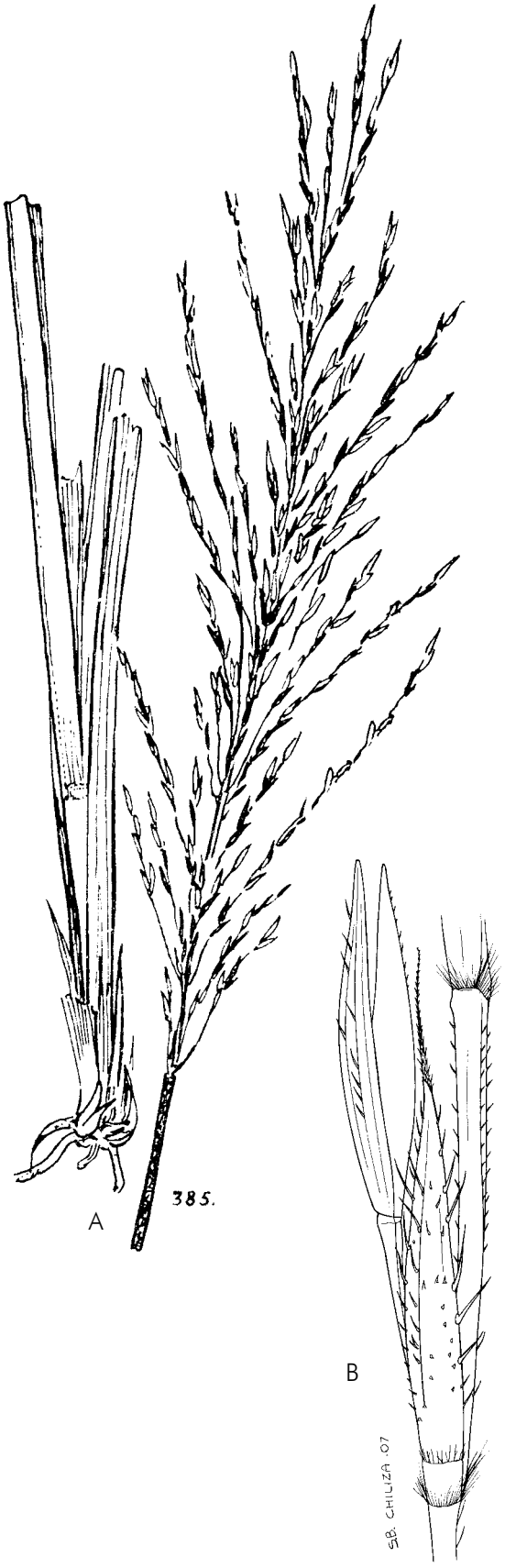



Figure 573.—*Vetiveria nigritana*. A, plant; B, sessile and pedicelled spikelet pair with stout linear internodes and pedicels (10.0 × 1.3 mm). Artists: A, unknown; B, S.B. Chiliza.

## **Vetiveria** Bory

Bory: 43 (1822); Stapf: 156 (1917); Chippindall: 469 (1955); Clayton & Renvoize: 739 (1982); Clayton & Renvoize: 342 (1986); Gibbs Russell et al.: 352 (1990); Watson & Dallwitz: 997 (1994); Veldkamp: 526 (1999); Setshogo: 34 (2002) under *Chrysopogon* Trin.



Figure 574.—*Vetiveria nigritana* spikelet pair (5.5–7.0 mm). Photographer: M. Koekemoer.

Perennial, tufted, coarse; with stout rhizomes; roots often aromatic. **Leaf blade** linear; sheaths glabrous, compressed, keeled, especially in lower part; *ligule* a fringed membrane to a fringe of short hairs. **Inflorescence** panicle-like, of many, slender racemes, arranged in whorls along a central axis; racemes fragile, internodes and pedicels linear, disarticulating transversely; *spikelets* paired, in long–short combinations: one sessile, the other pedicelled. **Sessile spikelet** laterally compressed, falling with glumes, joint and pedicel; *glumes* ± equal, dissimilar, shortly awned, (at least one of them); lower glume rounded on back, 5-nerved, armed with short tubercle-based spines; upper glume 3-nerved. **Florets** 2; *lower floret* sterile, reduced to a lemma, awnless; *upper floret* bisexual; *lemma* less firm than glumes, hyaline, not keeled, glabrous, incised, 2-lobed, awned from sinus; *awn* straight or curved, glabrous, often inconspicuous; *callus* rounded, fitting in slightly hollowed apex of internode, hairy with short hairs; *palea* minute, hyaline, nerveless. **Lodicules** 2, fleshy, glabrous. **Stamens** 3. **Ovary** glabrous. **Caryopsis** oblong; hilum short; embryo large. **Pedicelled spikelet** usually smaller than sessile spikelet, male or sterile; lemma awnless. **Photosynthetic pathway**: $C_4$; XyMS-. PCR sheath outline even. PCR cell chloroplasts with reduced grana; centrifugal/peripheral. **Cytology**: $x = 5$, 10 (polyploidy).

**Species** 10, tropical Africa, Asia and Australia; 1 in southern Africa: *Vetiveria nigritana* (Benth.) Stapf, northern Namibia and northern Botswana.

Species treatment by A.C. Mashau.

### Quick guide to easily confused taxa:

Raceme with several to many spikelet pairs; inflorescence lanceolate; internode linear; sessile spikelet lower glume spinulose on back; callus rounded . . . . . **Vetiveria nigritana**
Raceme reduced to a triad of 1 sessile and 2 pedicelled spikelets; inflorescence ovate; internode filiform; sessile spikelet lower glume often with spines on margins; callus pungent . . . . . **Chrysopogon serrulatus**

**Vetiveria nigritana** (Benth.) Stapf, in *Flora tropical Africa*. 9: 157 (1917). Type: Nigeria, Nun R., *Vogel* (K, holo.).

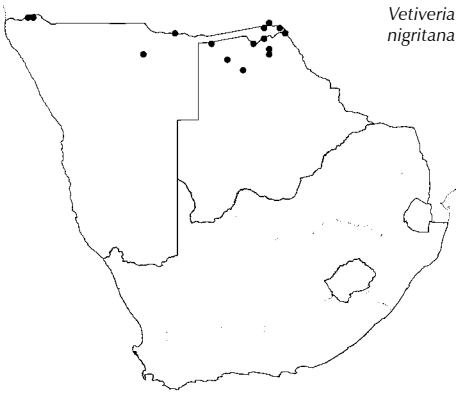
Alternate name: *Chrysopogon nigritanus* (Benth.) Veldk., in *Austrobaleya* 5: 526 (1999).

Tufted perennial to 3 000 mm high. Leaf blade to 90 × to 7 mm, margins cutting; ligule a fringe of hairs. Inflorescence 160–410 mm

long, lanceolate, consisting of many, slender racemes, arranged in whorls along a central axis; internode linear; often purple. Sessile spikelet 5.5–7.0 mm long; glumes dark purple, apices rounded; lower glume spinulose on the back; upper glume spinulose along the keel, sometimes drawn out into a short awn; upper lemma awned from sinus; awn 1–4(–9) mm long, straight or curved, column glabrous, bristle minutely scabrid; anther 2.6–3.2 mm long. Pedicellate spikelet slightly shorter than sessile spikelet; glumes less spinulose; sterile.

*Flowering*: July to June. *Ecology*: Often on black turf soil; in wet places. *Frequency in southern Africa*: Infrequent. *Distribution*: Northwards to tropical Africa. N, B. [There are specimens cultivated in KwaZulu-Natal at PRE]. *Economics*: Good soil binder; roots varyingly aromatic, probably according to edaphic conditions; young shoots eaten by cattle; old culms used for thatching as it is said to repel termites.

Illustration: Setshogo: 37, tab. 14 (2002).
Anatomy vouchers: *Ellis 342, 1771 & 3697.*
Voucher: *De Winter & Wiss 4125*.




## **Vossia** Wall. & Griff.

Wallich & Griffith: 572 (1836) name conserved, not of Adanson (1763); Stapf: 51 (1917); Clayton & Renvoize: 831 (1982); Clayton & Renvoize: 363 (1986); Gibbs Russell et al.: 353 (1990); Watson & Dallwitz: 1001 (1994); Cope: 164 (2002).

Perennial; submerged or floating; rooting from submerged nodes. **Culms** terete, glabrous, spongy. **Leaf blade** linear, broad, flat, tapering to a fine apex, glaucous; *ligule* a fringed membrane. **Inflores-**

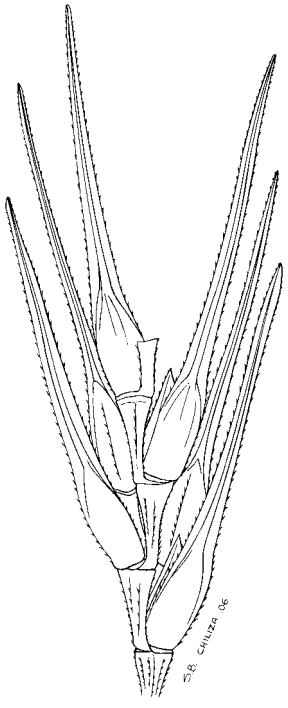



Figure 575.—*Vossia cuspidata* sessile and pedicellate spikelet pairs; internodes stout and thickened (55 × 14 mm). Artist: S.B. Chiliza.



Figure 576.—*Vossia cuspidata* spikelet pair (20–40 mm). Photographer: M. Koekemoer.

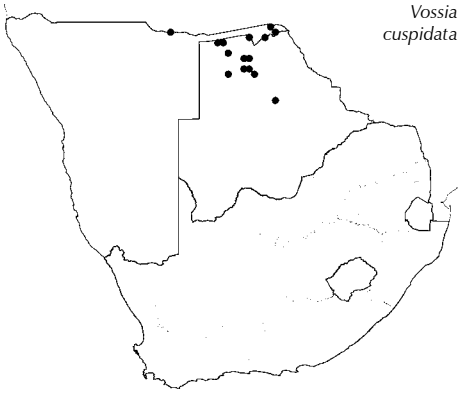


Figure 579.—*Vossia cuspidata* specimen.

**cence** of 1–many, pale green or straw-coloured racemes; digitate to subdigitate on a short axis; racemes erect, flattened, rigid or slightly nodding, stout; internodes and pedicels stout, thickened, disarticulating transversely at joints but rachis not very fragile; pedicels free; *spikelets* paired, in long–short combinations: one sessile, the other pedicelled. **Sessile spikelet** dorsiventrally compressed, flat or slightly rounded across back, falling with glumes; *glumes* unequal (if awn is taken into consideration), dissimilar; lower glume flat on back, 2-keeled, scabrid on keels, narrowly winged above, drawn out into a long, flattened, awn-like tail; upper glume boat-shaped. **Florets** 2; *lower floret* male; lemma hyaline, 2-nerved, awnless; palea present, hyaline; *upper floret* bisexual; *lemma* less firm than glumes, hyaline, entire, awnless; *callus* truncate; *palea* 2-nerved. **Lodicules** 2, large, fleshy, broadly cuneate, glabrous. **Stamens** 3. **Ovary** glabrous; style branches 2, plumose. **Pedicelled spikelet** similar to but smaller than sessile spikelet; bisexual or male only. **Photosynthetic pathway**: $C_4$; XyMS-. **Cytology**: $x = 10$.

**Species** 1, tropical Africa and India; *Vossia cuspidata* (Roxb.) Griff., in southern Africa, Namibia (Caprivi) and northern Botswana.

Species treatment by M.J. Moeaha.


*Vossia cuspidata*

**Vossia cuspidata** (Roxb.) Griff., in *Icones et Notulae Plantarum Asiaticarum* pl. 153, t. 3: 12 (1851). Type: Bangladesh.

HIPPO GRASS

Hydrophytic perennial; either rooted in water or forming floating mats up to 7 000 mm long, leaves cauline; culms nodes with fibrous roots, submerged or up to 2 000 mm long out of water. Leaf blade 300–1 000 × 6–18 mm. Inflorescence 120–300 mm long; racemes 2–5. Sessile spikelet 20–40 mm long; lower glume yellowish with a long flattened green, awn-like tail, anthers 4.0–4.7 mm long. Pedicellate spikelet a little smaller, 25–30 mm long.

*Flowering*: August to May. *Ecology*: In permanent rivers and lakes. *Frequency in southern Africa*: Rare, but locally dominant. *Distribution*: Throughout tropical Africa up to Nile Delta and in India. N, B. *Economics*: Sometimes regarded as a weed as it can block up waterways.

Anatomy vouchers: *Edwards 4384, Ellis 3704 & 3708*.
Voucher: *Gibbs Russell 2807*.

## *Vulpia C.C.Gmel.

Gmelin: 8 (1805); Stapf: 723 (1900); Chippindall: 59 (1955); Hubbard: 63 (1970); Stace & Cotton: 154 (1980); Bor: 1732 (1985); Clayton & Renvoize: 96 (1986); Gibbs Russell et al.: 354 (1990); Watson & Dallwitz: 1003 (1994); Sell & Murrell: 152 (1996).

Annual, tufted or culm solitary. **Leaf blade** linear, flat or rolled; sheaths rather loose, smooth and glabrous; *ligule* an unfringed membrane. **Inflorescence** a panicle, spike-like or open, rarely a raceme; *spikelets* pedicelled, ± secund. **Spikelet** laterally compressed, usually disarticulating above glumes; *glumes* unequal, usually shorter than the spikelet, dissimilar, rounded on the back, awnless or awned; lower glume sometimes minute, 0–1-nerved; upper glume 1–3-nerved,

acute to acuminate. **Florets** 2–many, bisexual, sometimes upper ones reduced to a lemma; *lemma* tapered, 3–5-nerved, entire, awned; *awn* median, apical, straight, more than half as long as to longer than body of the lemma; *callus* short, glabrous; *palea* 2-keeled, hyaline. **Lodicules** 2, unequally lobed. **Stamens** 1 or 2, rarely 3. **Ovary** glabrous or minutely hairy at apex. **Caryopsis** linear or ellipsoid; hilum long-linear; embryo small. **Photosynthetic pathway**: $C_3$; XyMS+. **Cytology**: $x = 7$ (polyploidy).



Figure 580.—*Vulpia myuros* spikelet (6–10 mm). Photographer: M. Koekemoer.

**Species** ± 23, temperate regions, mostly Mediterranean; 4 naturalised in southern Africa, Lesotho, Mpumalanga, Free State, KwaZulu-Natal, Northern, Western and Eastern Cape.

Species treatment by A.C. Mashau.




Figure 581.—*Vulpia myuros*. A, plant; B, spikelet. Artist: B. Connell.

**Key to species:**

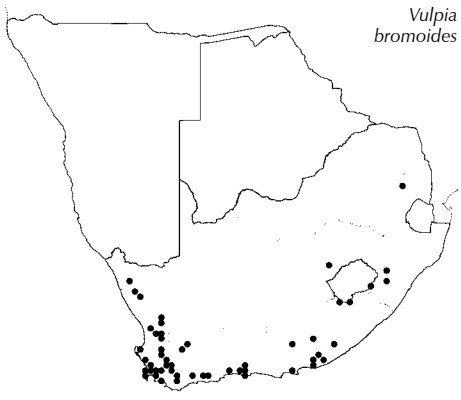
1. Upper glume 12–16 mm long (excluding awn), awn 10–20 mm long; callus pointed . . . . . ***V. fasciculata**
   Upper glume, 3–10 mm long (excluding awn), acute or very shortly awned, awn to 2 mm long; callus rounded . . . . . 2
2. Inflorescence partially enclosed in uppermost leaf sheaths; lower glume often scale-like or to nearly $^1/_2$ as long as upper glume . . . . . ***V. myuros**
   Inflorescence well exserted from leaf sheaths; lower glume $^1/_4$–$^3/_4$ as long as upper glume . . . . . 3
3. Lower glume $^1/_2$–$^3/_4$ as long as upper glume; spikelets usually secund and often almost perpendicular to central axis . . . . . ***V. bromoides**
   Lower glume $^1/_4$–$^1/_2$ as long as upper glume; spikelets mostly adpressed to central axis . . . . . ***V. muralis**

***Vulpia bromoides** (L.) Gray, in *A natural arrangement of British Plants* 2: 124 (1821). Type: Europe.

Squirreltail fescue

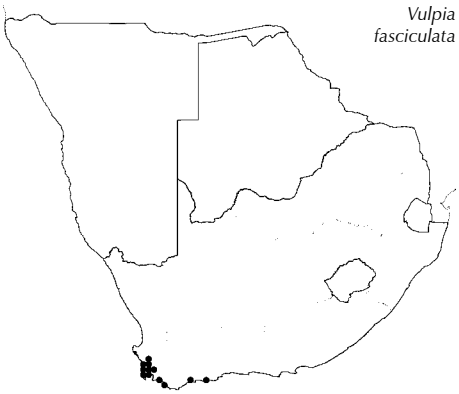
Loosely tufted annual 50–600 mm high; culm solitary or numerous. Leaf blade 100–200 × 0.5–3.0 mm. Inflorescence 20–120 × 15 mm, well exserted from the uppermost leaf sheath; usually secund, spikelets often almost perpendicular to the central axis. Spikelet 7–14 × 2.1–3.5 mm (excluding awns), green or purple, 3–10 flowered; lower glume $^1/_2$–$^3/_4$ as long as upper glume, linear-lanceolate; upper glume 3–10 mm long, acute or shortly awned, subulate-lanceolate, 3-nerved; lemma scabrid, tipped with a scaberulous awn up to 12 mm long; callus rounded; anther 0.3–0.6 mm long.

[There are many overlapping characters between this species and *V. muralis* and *V. myuros*, but *V. bromoides* can be distinguished by its longer lower glume and spikelets that are often almost perpendicular to the central axis.]



*Flowering*: August to January. *Ecology*: In weedy and disturbed rocky places such as roadsides and along streams. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from Europe. Worldwide. M, FS, KZN, NC, WC, EC.

Illustration: Chippindall: 60, fig. 31 (1955); Clayton et al.: 65, fig. 22 (1970).
Anatomy voucher: *Smook 3675*.
Voucher: *Smook 3675*.


*Vulpia fasciculata*

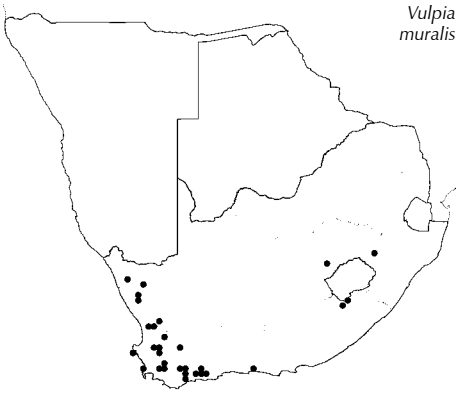
***Vulpia fasciculata** (Forssk.) Samp., in *Lista das Espécies representadas no Herbário portugués* 24 (1913). Type: Egypt.

Loosely tufted annual 100–450 mm high, culm solitary. Leaf blade 30–250 × 2–5 mm. Inflorescence partially exserted from the uppermost leaf sheath. Spikelet 10–20 × 2.8–4.0 mm (excluding awns); glumes unequal, lower glume 0.5–2.0 mm long; upper glume 12–16 mm long, awn 10–20 mm long; lemma glabrous or minutely scabrid with V-shaped cross-sectional configuration, awn 15–20 mm long; callus pointed; anther 0.8–2.0 mm long.

[The long-awn on upper glume uniquely distinguishes this species from other *Vulpia* species in southern African. *V. fasciculata* is closely related to *V. membranacea* (L.) Dumort., from western Germany, northern Greece, southern Macedonia, Israel, Balearic and Canary Islands, which differs in having anthers 0.6–0.9 mm long and ± U-shaped cross-sectional lemma configuration.]

*Flowering*: October to November. *Ecology*: In weedy and disturbed places such as gardens and roadsides, also in coastal dunes with other alien plants. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from the coastal areas of southern and western Europe. WC.

Anatomy vouchers: *Smook 3612, 3764* & *3765*.
Voucher: *Smook 3714*.


*Vulpia muralis*

***Vulpia muralis** (Kunth) Nees, in *Linnaea* 19(6): 694 (1847). Type: Ecuador.

Loosely tufted annual 60–700 mm high; culm solitary. Leaf blade 1–3 mm. Inflorescence 20–160 mm long, well exserted from the uppermost leaf sheath; spikelets usually adpressed to central axis. Spikelet 5–10 × 1.5–2.7 mm (excluding awns); lower glume $^1/_4$–$^1/_2$ as long as upper; upper glume 3–10 mm long, acute; lemma finely 5-veined, awn 5–12 mm long; callus rounded; anther 0.3–0.7 mm long.

[Distinguished only by the key characters from *V. bromoides* and *V. myuros*, with which it shares many overlapping characters.]

*Flowering*: September to December. *Ecology*: On calcareous or limestone soils, generally in dry habitats; in disturbed areas such as road verges. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from southern Europe. FS, NC, WC, EC.

Anatomy vouchers: *Smook 3625, 3751, 3654A* & *3763A*.
Voucher: *Smook 3693*.

*__Vulpia myuros__ (L.) C.C.Gmel., in *Flora badensis, alastica et confinium Regionum cis-et transrhenana, Plantes a Lacu bodamico usque ad Confluentem Mosellae et Rheni sponte nascentes exhibens* 2: 8 (1806). Type: Europe.

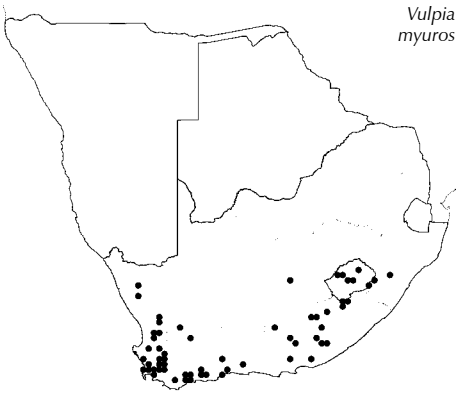
RAT'S-TAIL FESCUE, LANGBAARD-SWENKGRAS

Tufted annual 50–700 mm high; culms usually densely fascicled. Leaf blade 20–150 × 0.5–3.0 mm. Inflorescence 50–120 mm long, partially enclosed in uppermost leaf sheath; spikelets usually adpressed to the central axis. Spikelet 6–10 × 1.5–2.5 mm (excluding awns), green or purplish, 3–7-flowered; lower glume 0.5–2.0 mm long, usually scale-like, but can be to nearly $^1/_2$ as long as upper glume; upper glume 3–6 mm long, acute, 1–3-nerved; lemma scabrid, awn up to 15 mm long, scaberulous; callus rounded; anther 0.3–1.0 mm long.

[Distinguished from *V. bromoides* and *V. muralis* only by the key characters.]

*Flowering*: September to November. *Ecology*: Disturbed places in wet or damp areas but extending also to the more arid regions. *Frequency in southern Africa*: Locally common. *Distribution*: Naturalised from western, central and southern Europe. Introduced worldwide in temperate regions. L, FS, KZN, NC, WC, EC.

Anatomy vouchers: *Smook 3669, 3749*; *Ellis 1160 & 2247*.
Voucher: *Acocks 16522*.



*Vulpia myuros*

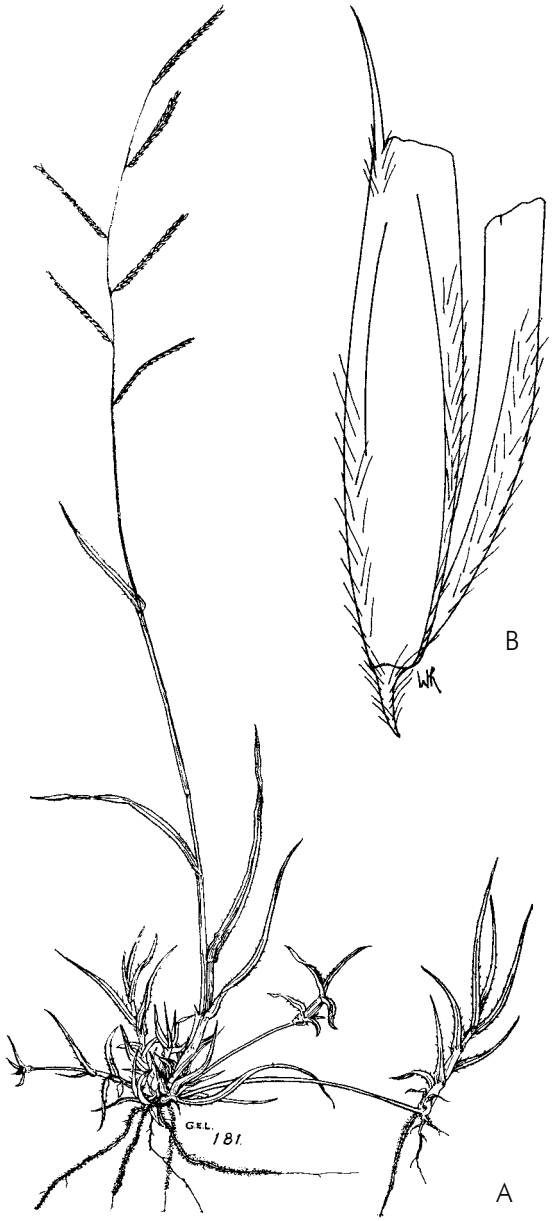
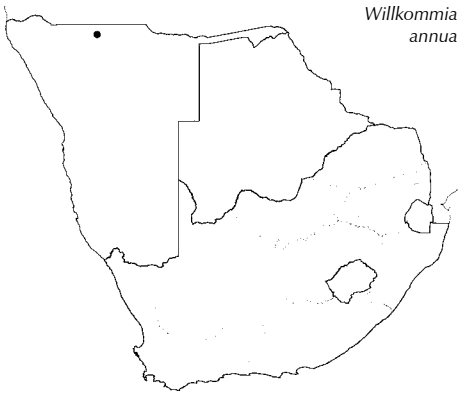



Figure 580.—*Willkommia sarmentosa*. A, plant; B, floret showing awned lemma and awnless palea (4.2 × 1.1 mm). Artists: A, G.E. Lawrence; B, W. Roux.



*Willkommia annua*

## **Willkommia** Hack.

Hackel: 145 (1888); Hackel: 810 (1896); Chippindall: 204 (1955); Launert: 49 (1970a) under *Craspedorhachis* Benth.; Clayton & Renvoize: 239 (1986); Gibbs Russell et al.: 355 (1990); Watson & Dallwitz: 1007 (1994); Cope: 219 (1999).



Figure 581.—*Willkommia annua* spikelet (4–5 mm). Photographer: M. Koekemoer.

Annual or perennial, sometimes a short-lived biennial; tufted; stoloniferous; mat-forming. **Leaf blade** linear, margins usually thickened; *ligule* a fringe of hairs. **Inflorescence** spike-like, main branches widely scattered or closely arranged along a central axis; *spikelets* shortly pedicelled. **Spikelet** dorsiventrally compressed, back rounded, disarticulating above glumes, a distinct elongated internode present between and above glumes; *glumes* very unequal, slightly longer than spikelet, membranous, obtuse to acute, glabrous or long-hairy on nerves, awnless; lower glume nerveless; upper glume 1-nerved. **Floret** 1, bisexual; *lemma* less firm to similar in texture to glumes, thinly membranous, broadly rounded, entire, acute to obtuse, 3-nerved, hairy, awned; *awn* minute, straight; *callus* pungent; *palea* glabrous or silky-hairy. **Lodicules** 2, fleshy, glabrous. **Stamens** 3. **Ovary** glabrous. **Caryopsis** ellipsoid; hilum short; embryo large. **Photosynthetic pathway**: $C_4$; XyMS+.

**Species** 4, southern tropical Africa and Texas, USA; 3 in southern Africa, mainly northern Namibia and Botswana.

The genus is in need of revision.

Species treatment by M.T. Nembudani.

### Quick guide to easily confused genera:

Glumes ± equal; upper glume flat-backed; 2-keeled; lemma up to $^1/_2$ as long as upper glume . . . . . **Craspedorhachis**
Glumes unequal; upper glume rounded on back, keelless; lemma nearly to as long as upper glume . . . . . **Willkommia**

### Key to species:

1. Racemes several, closely arranged on the central axis; spikelet elliptic, 2.5–3.0 mm long . . . . . **W. newtonii**
   Racemes few (occasionally several), distant from one another on the central axis; spikelet narrowly elliptic, 4–5 mm long . . . . . 2
2. Annual . . . . . **W. annua**
   Perennial . . . . . **W. sarmentosa**

**Willkommia annua** Hack., in *Verhandlungen des Botanischen Vereins der Provinz Brandenburg* 30: 146 (1888). Type: Namibia, in Gesellschaft mit *W. sarmentosa* bei Olukonda gefunden, *Schinz s.n.*

Tufted annual to 600 mm high. Leaf blade to 30 × 1.5–2.5 mm, margins thickened, with rigid hairs far apart. Inflorescence with few

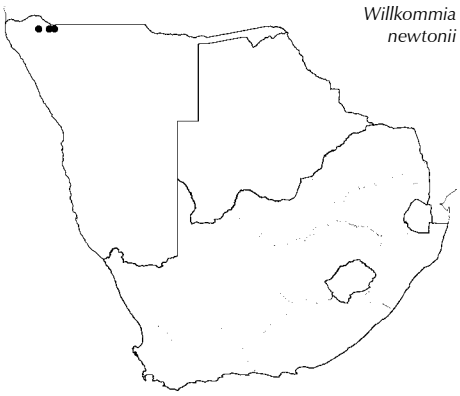
racemes, well apart from each other on the central axis. Spikelet 4–5 mm long, narrowly elliptic, green; upper glume scaberulous, especially at the apex; anther 1.3–1.5 mm long.

[Barely distinguishable from the perennial *W. sarmentosa*.]

*Flowering*: January. *Ecology*: Moist, sandy, often halophytic soils. *Frequency in southern Africa*: Infrequent. *Distribution*: Endemic, but possibly in Angola. N.

Voucher: *Barnard 16495*.

**Willkommia newtonii** Hack., in *Bulletin de l'Herbier Boissier* 4: 810 (1896). Type: Angola, Benguela, Biballa, ad radicem montis Serra de Chella, *Newton 5*.


*Willkommia newtonii*

Tufted perennial or sub-perennial to 500 mm high; geniculate at base; stoloniferous. Leaf blade to 20 × 3.0–3.5 mm, margins pectinate, hairs long and close together. Inflorescence with several racemes closely associated on the central axis, which is then not easily visible between each raceme. Spikelet 2.5–3.0 mm long, elliptic, sometimes flushed purple; upper glume occasionally hairy, long hairs present on the central nerve, if these are absent then there are large prickles near the apex.

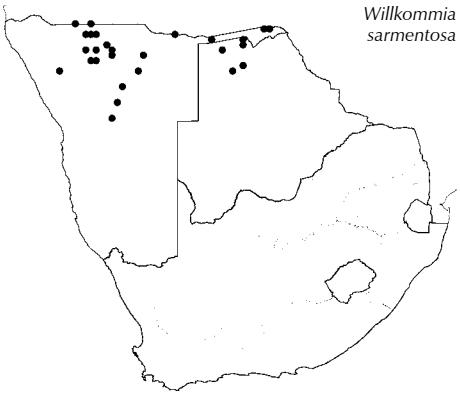
[Barely distinguishable from *W. sarmentosa*, which has fewer racemes arranged well apart on the central axis and spikelet narrowly elliptic. Intermediates have been found between these two species.]

*Flowering*: March to April. *Ecology*: Sandy soils; in clearings between tall trees. *Frequency in southern Africa*: Rare. Infrequent. *Distribution*: Angola. N.

Voucher: *Giess 9305*.

**Willkommia sarmentosa** Hack., in *Verhandlungen des Botanischen Vereins der Provinz Brandenburg* 30: 145 (1888). Type: Namibia, Olukonda, Ondonga Stamm (Amboland), *Schinz 625*.

*Craspedorhachis sarmentosa* (Hack.) Pilg., in *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeograhie* 74: 27 (1947).


*Willkommia sarmentosa*

Tufted perennial to 800 mm high; stoloniferous; mat-forming. Leaf blade to 110 × 5 mm, usually glaucous, margins thickened and with long cilia that are far apart or only occasionally present. Inflorescence usually with only a few racemes distant from each other on the central axis. Spikelet 4–5 × 0.5–0.9 mm, narrowly elliptic, green; upper glume scaberulous with minute prickles especially near apex; anther 1.5–3.1 mm long.

[*W. annua* is annual, but *W. newtonii* is barely distinguishable from *W. sarmentosa* and intermediates have been found.]

*Flowering*: November to March, and July. *Ecology*: Moist sandy, often halophytic soils; along edges of pans and marshes, or seasonally waterlogged areas. *Frequency in southern Africa*: Locally common. *Distribution*: Zimbabwe, Zambia. N, B.

Illustration: Cope: 220, tab. 64 (1999).
Anatomy vouchers: *Ellis 5267, Smook 5114 & 5141*.
Voucher: *Giess & Müller 13952*.

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# GLOSSARY

**abaxial**: the side of a structure (e.g. leaf lamina or spikelet) facing away from the main or central axis, and is normally the lower surface of a leaf (opposite *adaxial*).

**achene**: dry, indehiscent fruit with a single seed free from the pericarp; true achenes do not occur in Poaceae (*Sporobolus*).

**acuminate**: tapering gradually to a point, with sides of the apex ± pinched in or concave.

**acute**: tapering to a point, with the sides of the apex straight or somewhat convex.

**adaxial**: the side of a structure (e.g. leaf lamina or spikelet) facing the main or central axis, normally the upper surface of a leaf (opposite *abaxial*).

**adherent**: union of parts usually separate.

**adjacent**: lying near or joining.

**adnate**: structure attached or joined to another of a different kind.

**adpressed**: lying close and flat against a structure but not united with it; often used when describing hairs (*Leptochoa fusca*, hairs on lemma).

**aerial**: part of plant above surface of ground or water.

**amplexicaul**: stem-clasping; base of the leaf blade embracing or clasping the stem (*Alloteropsis cimicina*).

**aneuploidy**: a condition where there are no chromosomes.

**annual**: completing the life cycle in a year, usually passing the unfavourable season as a seed (see *biennial*, *perennial*).

**annular**: ring-like or arranged in a circle; often glands forming a ring (glands on the pedicel: *Eragrostis patintipilosa, Eragrostis moggii*).

**anther**: part of the stamen that contains the pollen.

**anthesis**: the period during which the flower is open and pollination takes place.

**antrorse**: pointing upwards (opposite *retrorse*).

**apical**: at or towards the apex.

**apiculate**: ending abruptly with a small sharp point.

**appendage**: small protrusion or extension attached to main structure (appendage at apex of upper raceme base *Hyparrhenia newtonii*; ear-like on lemma *Ehrharta calycina*).

**aristate**: with a fine awn or bristle at the apex.

**aromatic**: with a smell, especially a spicy or pleasant smell.

**attenuate**: narrowed or tapering.

**articulate**: a joint between parts that usually separates cleanly at maturity.

**articulation**: a joint where a clean breakage usually occurs, a strong colour difference or whitish line may be the only indication of an articulation (in *Stipagrostis* and *Aristida* it occurs between the base of the column and the apex of the lemma [*Aristida pilgeri*]; near the middle of the lemma [*Stipagrostis ciliata* var. *capensis*]; and between the awns and the apex of the column [*Aristida congesta*]).

**ascending**: curved upwards and approaching erect.

**auricle**: appendage or ear-like outgrowths usually at the junction of the leaf blade and sheath (*Oryza longistaminata*, *Hordeum murinum*).

**awn**: a rigid appendage attached to the apex, back or base of structures such as glumes, lemmas or paleas. Awns may consist of a twisted/coiled column and a flat, straight part sometimes referred to as the bristle or limb.

**axil**: the angle between the main/central axis and lateral/secondary branches of an inflorescence.

**axis**: a generalised term for the main stem of the plant, of an inflorescence or of the inflorescence parts such as the racemes or spikelets.

**barbed**: with sharp, rigid backward-pointing hooks or spines.

**barbellate**: with small, sharp backward-facing spines or hooks (ovary in *Lamarckia aurea*).

**basal**: at or near the base (opposite *apical*).

**basal sheath**: leaf sheath found at the base of the plant.

**beak**: a narrow, usually apical projection.
- a slight narrowing of the lemma below the awn, as distinct from the longer column (in *Aristida*).
- upper glume and lower lemma narrows into an elongated beak (*Melinus repens* subsp. *grandiflora*).

**bearded**: with long or stiff hairs (peduncle apex *Chrysopogon serrulatus*; culm nodes *Sorghum versicolor*).

**bi**-: two or twice.

**bidentate**: with two teeth.

**biennial**: living two years, setting seed and dying in the second year.

**bifid**: divided, usually deeply, into two lobes at the apex (lemma in *Styppeiochloa gynoglossa*).

**bilobed/2-lobed**: see *bifid*.

**binate/2-nate**: in twos, in pairs, term often used when referring to the grouping of spikelets on the rachis (*Digitaria gazensis*).

**biseriate**: lying side-by-side on one side of the rachis.

**bisexual**: having functional stamens and ovary in the same spikelet or floret.

**blade (or lamina)**: the part of the leaf excluding the leaf sheath.

**bract**: a leaf-like structure that differs from foliage leaves e.g. spathes, glumes, lemmas and paleas.

**bristle**:

- a stiff hair.
- limb or upper part of some awns.

**bristly**: bearing bristles.

**bulbous**: swollen at the base like a bulb or corm.

**bulbous-based**: swollen and bulbous at the base, usually said of some hairs or basal leaf sheaths.

**burr**: a prickly structure with spiny bracts or bristles enclosing one or more spikelets (*Cenchrus insertus*).

**$C_3$**: photosynthesis in which atmospheric carbon is first fixed in three-carbon chains. It is indicated anatomically by the separation of chlorenchymatous cells from the nearest PCR cells by two to many chlorenchymatous cells.

**$C_4$**: photosynthesis in which atmospheric carbon is first fixed in four-carbon chains. It is indicated anatomically by the separation of chlorenchymatous cells from the nearest PCR cells by no more than one chlorenchymatous cell.

**caespitose**: growing in dense tufts.

**callus**: a hard projection found at the base of any structure of the spikelet that probably plays a role in seed dispersal; found at the base of a floret, a lemma (*Loudetia* spp.), a spikelet (*Heteropogon contortus*), or inflorescence segment.

**candelabrum**: resembles a large, branched candlestick or holder of lights.

**capillary**: very fine and hair-like.

**capitate**: a globular structure or head-like cluster(s); like a pin-head.

**capitellate**: diminutive of capitate.

**carina**: keel e.g. of the glume.

**carinate**: keeled.

**cartilaginous**: tough, elastic but not bony.

**caryopsis**: the fruit/grain or 'seed' of grasses, in which the seed coat (testa), is adnate to the pericarp.

**cataphyll**: scale-like leaves on rhizomes, stolons or at plant base (*Digitaria seriata*).

**cauda**: tail-like appendage (on lemma *Leersia tisserantii*).

**caudate**: with a long tail-like apex or appendage.

**cauline**: most leaves are borne along the culm rather than clumped at the base (*Eragrostis volkensii, Trichopteryx dregeana*).

**chartaceous**: stiff papery in texture, usually not green.

**ciliate**: fringed with stiff spreading hairs (*Eragrostis lappula*, *Eragrostis viscosa*, palea).

**ciliolate**: fringed with minute stiff hairs.

**clavate**: club-shaped, or slender then gradually thickened towards the apex, (hairs on inflorescence branches, *Panicum deustum*; inflorescence internode, *Rhytachne* spp.).

**clavellate**: slightly clavate.

**cleistogamous**: with florets not opening for pollination, therefore obligatory self-fertilising.

**cleistogene**: a floret that does not open for pollination.

**club-shaped**: see *clavate*.

**coalescent**: union by growth.

**collar**:

- the lower (abaxial) surface of the leaf blade/sheath junction.
- structure resembling collar of shirt e.g. glume.

**colliculate**: surface covered with little round bumps or elevations.

**column**:

- usually applied to the often twisted or coiled lower part of an awn (*Hyparrhenia* spp.).
- a straight structure between the apex of the lemma and the branching point of the awns (in *Aristida* and *Stipagrostis*).

**complex leafy false panicle**: an inflorescence of which the culm is profusely branched, each branch terminating in a basic unit of a raceme, raceme pair or cluster of racemes and these are separated from each other by modified leaves or spathes and spatheoles. Found in many Andropogoneae genera (*Hyparrhenia*, *Cymbopogon*).

**compressed**: flattened, most often used in terms of the spikelet or parts thereof, and the plant base (see *laterally, dorsally* and *dorsiventrally compressed*).

**concave**: curving inwards (opposite *convex*).

**conical**: cone-shaped.

**connate**: fused; joined, usually referring to similar structures joined together.

**contracted**: not spreading, inflorescences that are dense or narrow as branches do not spread away from the central axis.

**convex**: curving outwards or rounded (opposite *concave*).

**convolute**: rolled from one side with one margin inside and one outside, usually referring to a leaf blade.

**cordate**: heart-shaped, with rounded lobes (a solid shape), usually referring to the base of a structure

such as a leaf blade (*Diheteropogon amplectens*, *Panicum parvifolium*).

**coriaceous**: leathery in texture.

**corrugated**: wrinkled.

**crateriform**: cup or crater-shape (a solid shape).

**crest**: a ridge or surface projection (on glume and lemma, *Acroceras macrum*).

**crispate**: curled.

**cross-venation**: small strands of vascular tissue or nerves/veins joining the main nerves at various points.

**crown**: a solid cylinder formed by the fusion of the lemma as in *Nassella*.

**crustaceous**: texture thin and brittle, like a shell.

**cuff**: part of a shirt nearest to the hand, therefore like a cuff (lower glume, *Digitaria argyrotricha*).

**culm**: the stem of a grass plant.

**cuneate**: wedge-shaped, triangular; widest near the apex and tapering to a narrow base (a solid shape), (callus of sessile spikelet, *Hyparrhenia dichroa*).

**cupule**: cup.

**cuspidate**: ending in an abrupt firm point.

**deciduous**: falling off naturally at a particular stage of growth (opposite *persistent*).

**decumbent**: growing horizontally at the base then curving upwards.

**deflexed**: bent backwards or downwards but not to 180° (see *reflexed*).

**dentate**: coarsely toothed, with teeth perpendicular to the margins.

**denticulate**: minutely toothed, referring to margins.

**dichotomous**: with equally forked paired branches.

**digitate**: branching from a common point like the fingers of a hand, usually referring to an inflorescence type in which a number of racemes arise from a common point (*Digitaria milanjiana*).

**dioecious**: a species with separate male and female plants (see *monoecious*).

**disarticulate, disarticulating**: separating or breaking at distinct joints or articulations.

**distichous**: two-ranked, regularly arranged one above another in two opposite sides of the axis (leaves up the culm).

**divaricate**: spreading widely.

**dorsal**: back or the side turned away from the axis or outer surface of a structure.

**dorsally compressed**: flattened so that back and front are brought close together, or flattened from the back (spikelets, *Sacciolepis africana*, *Eriochloa fatmensis*).

**dorsiventrally compressed**: structures flattened on the dorsal (abaxial) and ventral (adaxial) sides.

**downy**: covered with short, soft hairs.

**effuse**: spreading.

**eglandular**: without glands.

**elliptic/ellipsoid**: rounded and broadest at the middle and gradually narrowed to both ends (a flat or outline shape).

**emarginate**: with a shallow notch at apex (lemma in *Eustachys paspaloides*).

**embryo**: the young plant inside the seed.

**endemic**: a species found in a particular area and which occurs **naturally** nowhere else in the world (compare *indigenous*, *naturalised*).

**entire**: with a continuous margin or apex not indented in any way.

**epidermis**: outermost layer of cells on an organ e.g. leaf blade.

**erect**: growing straight up or upright.

**exserted**: protruding or projecting from a containing structure (opposite *included*).

**extravaginal**: branching in which the young shoot breaks through the leaf sheath (see *intravaginal*).

**falcate**: sickle-shaped (a solid shape).

**false leafy pani**cle: see *complex leafy false panicle*.

**falsely petiolate**: see *pseudopetiolate*.

**fascicle**: a fairly tight cluster or bundle arising ± from the same point.

**fibrous**: composed of or resembling fibres.

**filiform**: thread-like, cylindrical and very slender.

**fimbriate**: margins fringed with long slender processes.

**flabellate**: arranged like the segments of an open fan, often used to describe the arrangement of basal leaf sheaths (*Eustachys paspaloides*).

**flaccid**: limp.

**fragile**: easily broken, especially along a line of abscission.

**flag-leaf**: the first leaf below the inflorescence that sometimes differs from other leaves (e.g. swollen) and sometimes partially encloses the inflorescence.

**flexuous**:

- not ridged.
- zigzag or wavy.

**floret**: an individual grass flower in the spikelet, usually consisting of lodicules, stamens, the ovary and stigma enveloped by the lemma and palea.

**free**: separate, a structure not united to any other structures except at point of origin.

**fruit**: the ripe ovary with its adnate parts, containing the seed. In most grasses it is difficult to distinguish the fruit (caryopsis) from the seed.

**fulvous**: reddish-brown or orange in colour.

**fusiform**: spindle-shaped; slender but broadest at the middle and tapering to both ends (a solid shape).

**geniculate**: bent abruptly like a knee; often used to describe the growth form of culms (*Leptochloa uniflora*) or awns (*Schizachyrium sanguineum*).

**geophytic**: plants that grow with the growing point below the soil surface, often with bulb- or corm-like structures.

**gibbous**: swollen on one side (upper glume in *Sacciolepis*).

**glabrescent**: only slightly hairy or becoming glabrous.

**glabrous**: without hairs, but not necessarily smooth (opposite *hairy*, *pubescent*).

**gland**: a secretory structure that can be raised, depressed or flat and of different shapes e.g. dot or linear.

**glandular**: with glands (opposite *eglandular*).

**glaucous**: bluish-green or bluish-white in colour, often due to a waxy bloom.

**globose**: round, spherical like a ball (a solid shape) (caryopsis of *Eragrostis cilianensis*).

**glomerate**: compactly clustered.

**glomerules**: small compact clusters (*Elytrophorous globularis*, spikelet clusters).

**glossy**: shiny (upper lemma of *Panicum fluviicola*).

**glume**: one of a pair or empty 'bracts' at the base of the spikelet. There are usually two, but sometimes one is reduced (*Eriochloa meyeriana*) or absent and this is usually the lower/or inferior glume (*Digitaria ternata*, *Eriochloa fatmensis*).

**grain**: the caryopsis or naked fruit of a grass.

**granular**: with a bumpy surface.

**granulose**: a slightly bumpy surface, fine and sand-like.

**habit**: the growth form of a plant.

**habitat**: the environment a plant lives in.

**herbaceous**: plant or structure that is not woody (texture of lemma in *Monolytrum luederitzianum*) (opposite *woody*).

**heterogamous**: of different sexes, e.g. with sterile and fertile spikelets (see *homogamous*).

**heteromorphic**: of more than one kind and different in appearance, e.g. paired sessile and pedicellate spikelets that differ in appearance.

**hilum**: the scar on the caryopsis marking the site of attachment of the pericarp and seed coat. It is on the opposite side of the embryo.

**hispid**: hairy with bristly, straight, erect, stiff hairs.

**homogamous pairs**: alike or the same; usually applied to spikelets of a pair that are of the same sexuality (the sterile spikelet pairs often found at the base of the lower raceme of the raceme pairs in *Hyparrhenia* spp.).

**hooked**: abruptly curved at the apex.

**hyaline**: thin and translucent/transparent or colourless.

**hydrophyte, hydrophytic**: growing in or partly submerged in water.

**hygroscopic**: able to twist and untwist with the addition or removal of water.

**hygrophyte, hygrophytic**: needing a large amount of water for growth.

**imbricate**: margins or edges overlapping.

**incised**: cut or deeply toothed.

**included**: enclosed, not protruding or exserted from containing structure (opposite *exserted*).

**indigenous**: a species native to a particular area, but not restricted to that area (see *endemic*, *naturalised*).

**indurate/indurated**: hardened and tough (upper floret, *Echinochloa*).

**inflated**: enlarged.

**inflexed**: bent inwards (palea in *Eriochloa meyeriana*; lemma in *Kaokochloa nigrirostris*).

**inflorescence**: the spikelet-bearing system of branches.

**inserted**: attached or included.

**inter**-: between.

**intercostal**: surface or space between nerves (basal sheaths, *Festuca caprina*).

**internode**:

- that part of the culm between the nodes.
- part of rachis of a raceme between spikelet pairs as in the Andropogoneae (*Schizachyrium brevifolium*).
- part of rachilla between florets.
- glumes can be separated by a short internode (*Bracharia humidicola*).

**interrupted**: not continuous, usually applied to dense inflorescences with occasional gaps.

**interspaces**: refers to spaces between nerves (lemma, *Digitaria* spp.) (see *intercostal*).

**intravaginal**: branching in which the young shoot emerges between the culm and the sheath mouth.

**invader**: usually a non-indigenous species that aggressively replaces the natural vegetation of the area.

**involucre**: a series of bracts or bract-like structures below a spikelet or spikelet cluster (bristles or sterile spikelets forming a ring or whorl around a spikelet or cluster of spikelets in *Pennisetum*, *Cenchrus*, *Themeda triandra*).

**involute**: rolled from both margins towards the middle; margins rolled inside but not overlapping.

**keel**:
- longitudinal ridge like the keel of a boat.
- a sharp fold or ridge on a compressed leaf sheath or blade, glume, lemma or palea.
- keel sometimes winged, e.g. the flat expansion of the keel(s) of the glume (*Vossia cuspidata*), lemma (*Cynodon hirsutus*) or palea (*Eragrostis superba*).

**Kranz anatomy**: leaf blade anatomical organisation usually associated with $C_4$ photosynthesis; consisting of a vascular bundle sheath with thicker walls than, and chloroplasts that are ultra-structurally different from, those in the surrounding radiate mesophyll.

**lacerate**: torn at the edges or irregularly cleft (lemma, *Deschampsia*).

**laciniate**: cut into narrow slender lobes.

**lamina/leaf blade**: part of leaf between apex and leaf sheath.

**lanate**: woolly or with matted hair as in sheep's wool.

**lanceolate**: lance-shaped; widest below the middle and gradually narrowed apically, approximately three times longer than wide (a flat or outline shape).

**lateral**: relating to the side (spikelets in triad, one central and 2 laterals as in *Hordeum*).

**laterally compressed**: flattened and bringing the sides together (spikelet, *Triraphis schinzii*).

**lax**: loose, soft or diffuse, often used to describe the form of an inflorescence.

**lemma**: the lower of two 'bracts' enclosing the grass flower or floret.

**ligule**: a membrane or line of hairs found on the adaxial or inner leaf surface at the junction of the leaf blade and sheath.

**limb** or **bristle**: part of the awn above the column (*Corynephorus fasciculatus*).

**linear**: long and narrow, with parallel sides, usually more than ten times longer than wide (a flat or outline shape).

**lobe**: a segment or division e.g. segments of a lemma that is divided at the apex.

**lodicules**: delicate scales at the base of the stamens and the pistil in the grass flower or floret that become turgid at anthesis, thus opening the lemma and the palea.

**long and short spikelet pair**: a pair, usually consisting of a sessile and a pedicellate spikelet, often differing from one another (sessile spikelet bisexual, pedicellate spikelet male or sterile as in *Andropogon*). A term mainly used in the tribe Andropogoneae.

**male floret**: floret with functional stamens but can have non-functional female parts. Position of such a floret(s) in a spikelet is variable.

**matt**: a surface with a dull finish, not shiny.

**membranous**: thin and semi-transparent but not dry.

**meristematic**: area of growth.

**midrib**: main or central nerve/vein of a leaf blade, glume, lemma or palea.

**misapplied name**: misidentified would probably be a better name; sometimes a specimen(s) is identified as a specific species, and the usage of this name could carry on for years, later it is discovered that the specimens actually belong to another, usually very similar or related taxon, e.g. *Eragrostis atrovirens*, which does not have a rhizome, was used for southern African specimens that do have rhizomes, the correct name for these specimens is *E. inamoena*.

**monoecious**: plant bearing separate male and female flowers on the same individual (see *dioecious*).

**mucro**: a short terminal usually soft point or projection excurrent from the midrib or central nerve.

**mucronate**: with a mucro or mucros.

**muricate**: rough, with short hard tubercles or pointed protuberances.

**muriculate**: diminutive of above (*Poa pratensis*, lemma).

**muticous**: pointless, blunt, without a mucro or awn.

**naturalised**: a non-indigenous species that forms self-sustaining populations under local conditions and that is capable of expanding its range.

**nerves** or **veins**: strands of vascular tissue found on the leaf lamina, glumes, lemmas and paleas.

**node**: the point where the leaf sheath is joined to the culm or where branches arise.

**nodding**: bent over and hanging down.

**non-Kranz anatomy**: leaf blade anatomy indicative of $C_3$ photosynthesis.

**oblanceolate**: opposite of lanceolate with the widest part near the apex.

**oblate**: transversely broadly elliptic.

**oblique**: with unequal sides.

**oblong**: with parallel sides and is longer than wide (a flat or outline shape).

**obovate**: rounded, broadest above the middle and narrower towards the base (a flat or outline shape).

**obtuse**: blunt or rounded at the apex (a flat or outline shape).

**opaque**: not transparent.

**ovary**: the female part of the flower or floret enclosing the ovule that develops into the seed.

**ovate**: broadest below the middle and narrower towards the apex (a flat or outline shape).

**palea**: the upper of two 'bracts' enclosing the floret.

**pallid**: pale in colour.

**panicle**: an inflorescence in which the primary axis bears branched secondary axes and pedicellate spikelets.

**papilla**: minute pimple-like projections or globular warts.

**papillate/papillose**: covered with papillae (on the palea *Alloteropsis papillosa*; on the adaxial surface of the leaf lamina in *Panicum triconode*).

**pappus**: a ring of soft spreading hairs at the apex of the lemma.

**PCA tissue**: in plants with $C_4$ photosynthesis, specialised mesophyll tissue where primary carbon assimilation from the atmospheric $CO_2$ takes place.

**PCK**: a biochemical variant of $C_4$ photosynthesis in which aspartate compounds are formed.

**PCR tissue**: in plants with $C_4$ photosynthesis, specialised cells, often but not always sheathing the vascular bundles, where secondary carbon reduction takes place.

**pectinate**: lobed like the teeth of a comb (lower glume in *Panicum ecklonii*) or margins with long rigid hairs (leaf blade of *Sporobolus pectinatus*).

**pedicel**: stalk, not branch or branchlet, supporting a single spikelet.

**pedicellate**: with a pedicel; also refers to the spikelet on a pedicel in the long–short spikelet pair of the tribe Andropogoneae.

**pendulous**: hanging downwards.

**peduncle**: mainly used here for the stalk below the raceme pair in *Hyparrhenia*.

**peg**: knob at base of callus that slots into the internode (*Rhytachne rottboellioides*).

**perennial**: a plant that lives for more than two years (see *annual*, *biennial*).

**pericarp**: the outer layer of the fruit/seed or grain; formed originally from the ovary wall, usually fused to the seed coat in grasses, but free or loose in some genera (*Sporobolus*).

**persistent**: remaining attached for a long time, usually after the other parts have been shed.

**pilose**: with very long, soft, rather straight hairs, which are separate but not sparse.

**plano-convex**: flat on one side and convex on the other side (*Urochloa* spikelet).

**plicate**: folded or pleated lengthwise (leaf lamina particularly of young leaves in *Setaria megaphylla*, *Setaria homonyma*).

**plumose**: like a feather with soft 'hairs' or an axis bearing fine hairs (inflorescence of *Phragmites* or awns *Stipagrostis*).

**polymorphic**: variable; said of plants that have several forms.

**polyploidy**: with more than two sets of chromosomes.

**prickle**: spine-like outgrowth of epidermis, found on many parts of grass plants, for example leaf margins.

**procumbent**: spreading along the ground but not rooting at the nodes.

**profile**: side view.

**proliferous**: inflorescence with plantlets and not flowers and fruits (see *viviparous*).

**prophyll**: a scale-like modified leaf with two keels, but no blade and sheath found at the base of the plant.

**prop roots**: (see *stilt roots*).

**prostrate**: lying closely along the surface of the ground.

**pseudo**-: false.

**pseudopetiolate**: resembling a petiole, grass leaves do not have petioles, but sometimes the base of the blade is narrowed at the junction between the blade and the sheath so as to resemble a petiole (*Setaria petiolata*, *Olyra latifolia*).

**puberulous**: covered with minute hairs.

**pubescent**: a generalised term for hairy, lacking definition of the type of hairs (opposite *glabrous*).

**pulvinus**: cushion-shaped swelling in the axils of inflorescence branches (*Sporobolus subtilis*).

**punctate**: covered with small dots or depressions and usually refers to a type of gland (*Eragrostis desolata*).

**punctiform**: a small, ± circular dot.

**pungent**: sharp pointed (callus of *Aristida stipitata*, *Heteropogon contortus*).

**raceme**: an unbranched inflorescence axis with pedicellate spikelets, the inflorescence can have a single main axis, or be a complex such as digitate which is made up of a number of racemes arranged digitately (*Digitaria milanjiana*), or paired (*Digitaria longiflora*, *Hyparrhenia*), or scattered up along main axis (*Brachiaria serrata*).

**raceme base**: the short stalk between the point of origin and the spikelets in *Hyparrhenia* and related genera.

**rachilla (rhachilla)**: axis on which florets are borne in a spikelet.

**rachilla extension**: in some spikelets, part of the rachilla extends in the spikelet but does not end in a floret; often appearing as a hard projection at base of the floret below (*Sporobolus subtilis*).

**rachis (rhachis)**: axis of a spike or raceme.

**reduced**: under-developed and usually small or missing. In grasses it is often the lower glume or palea that is reduced (lower palea in *Panicum subalbidum*).

**reflexed**: bent downwards or backwards to about 180° (see *deflexed*).

**retrorse**: pointing downwards or backwards, often referring to prickles or small projections (awns with minute hairs or prickles, *Setaria verticillata*).

**rhizome**: underground stem with scale leaves (*Cynodon dactylon*, *Arundinella nepalensis*).

**rhizomatous**: with a rhizome.

**rib, ribbed**: with prominent nerve(s) or vein(s) (lower glume of pedicellate spikelet as in *Andropogon gayanus*).

**rooting at nodes**: occurs when a mat-forming grass plant spreads by means of culms lying on the ground and roots developing at the nodes but, unlike in the case of stolons, plants do not develop at these points (*Digitaria sanguinalis*, *Hemarthria altissima*).

**rotund**: with a shape between orbicular and broadly elliptic.

**rudimentary**: poorly developed and not functional, referring to minute or imperfectly developed structures such as florets in a spikelet (*Festuca abyssinica, Enteropogon macrostachyus*).

**rufous**: rusty or brownish-red.

**rugose**: with a wrinkled or ridged surface (upper lemma in *Setaria homonyma*, *Panicum maximum*).

**rugulose**: with tiny irregular wrinkles or ridges (upper lemma of *Urochloa mosambicensis*).

**saccate** (see *gibbous*): bag or sac-shaped (upper glume, *Sacciolepis*).

**sagittate**: arrow-shaped, with down-pointing acute lobes like the head of an arrow at the base (base of leaf lamina, *Setaria sagittifolia*).

**scaberulous**: slightly or minutely rough or scabrous to the touch.

**scabrid, scabrous**: rough to the touch usually due to teeth, prickles or harsh hairs.

**scale**: a small or reduced structure such as a glume, lemma or palea or a miniature leaf without a blade.

**scarious**: thin, dry and shrivelled, not green.

**sclerophyllous**: with hard stiff leaves.

**scrambling**: climbing by sprawling over other plants or fences.

**setae**: bristle-like, said of awn, hair or particular gland type.

**secondary**: subordinate, not primary, referring to branches that arise from the primary or main branch of an inflorescence.

**secund**: one-sided, or arranged on one side (*Microchloa kunthii*, *Enteropogon macrostachyus,* inflorescence with spikelets borne on one side).

**serrated**: margin saw-toothed (*Eragrostis nindensis*, spikelet outline).

**sessile**: without a stalk or pedicel, directly attached to axis or inflorescence branch, usually referring to the state of a spikelet on the inflorescence axis.

**setaceous**: tubular, cylindrical shaped like a bristle but not necessarily rigid.

**sheath**: basal part of the leaf below the lamina, usually wrapped around the culm.

**shrub**: woody plant branching abundantly from base.

**sickle**: a tool with a curved blade used for cutting corn, therefore a structure shaped like this (inflorescence *Elionurus muticus*).

**sinuous**: wavy (inflorescence, *Agrostis lachnantha*).

**sinus**:

- notch in margin or depression.
- angle between lobes (upper lemma, *Trichopteryx dregeana*).

**smooth**: surface without lumps, wrinkles or any roughness.

**solitary**: borne singly, often used to describe the spikelet arrangement on inflorescence branches (see *binate* or *ternate*).

**spathe**: leaf-like bracts or modified leaves subtending and partially enclosing divisions in an inflorescence. Commonly used in Andropogoneae (*Cymbopogon*).

**spatheoles**: a secondary spathe within the compound inflorescence in the Andropogoneae.

**spherical**: shaped like a sphere, a round solid object.

**spicate**: spike-like i.e. resembles a spike.

**spiciform**: like a spike.

**spike**: an inflorescence in which a single axis bears sessile spikelets.

**spikelet**: a typical spikelet consists of the axis or rachilla with its two glumes at the base and one or more florets borne alternately up the rachilla.

**spike-like inflorescence**: resembles a spike, but the spikelets have pedicels (*Imperata cylindrica* has a panicle with much reduced branches and pedicels).

**spinulose**: with small spines.

**stamen**: male or pollen-bearing part of the floret consisting of a basal filament and a terminal anther.

**sterile**: without functional male or female parts.

**stigma**: part of the pistil that receives the pollen.

**stilt roots (or prop roots)**: supporting roots arising above the ground from the lower nodes (*Hyparrhenia rudis*, *Rottboellia cochinchinensis*).

**stipe**: stalk-like supporting structure usually associated with the spikelet (below the glumes in *Brachiaria nigropedata*).

**stipitate**: with a stipe.

**stolon**: a stem that creeps above the ground, roots and gives rise to a new plant.

**stoloniferous**: with a stolon.

**striate**: with fine, longitudinal, parallel lines, grooves or ridges (caryopsis of *Eleusine indica*).

**style**: the structure between the ovary and the stigma.

**sub-**: slightly, somewhat less, almost or below.

**subcorymbose**: branches and pedicels come from different points but all reach ± the same point; inflorescence almost forming a corymb.

**subdigitate**: almost digitate, referring to an inflorescence (*Digitaria brazzae*).

**superfluous name**: a name applied to a taxon for which another name or epithet was already available. In case of *Hainardia*, it has been known as *Monerma*, which is actually a superfluous name for *Lepturus*, another taxon (see misapplied name).

**tardily**: slow to happen or reluctant.

**tawny**: a dull brownish-yellow or brownish-orange.

**taxon** (pl. taxa): signifies any taxonomic group irrespective of its classification level.

**terete**: slender and ± circular in cross section (leaf blade, *Miscanthus junceus*).

**ternate (also 3-nate)**: arranged in threes, often used for spikelet arrangement on the rachis (*Digitaria*).

**tessellate**: surface with criss-crossed nerves forming square or oblong depressions or patterns (leaf blade of *Thamnocalamus tesselatus*).

**tiller**: leafy shoot of a grass, usually lateral and basal.

**tomentose**: hairy with somewhat matted, curly woolly hairs adpressed to the surface.

**translucent**: allowing light to pass through but not transparent.

**transverse**: across.

**triad**: three adjacent structures forming a group e.g. three spikelets borne together (spikelets of *Tristachya leucotrix*).

**trigonous**: three-angled, triangular in cross section.

**triquetrous**: 3-sided, with sides concave (a solid shape) or triangular in cross section.

**truncate**: as though cut off straight at the end, very blunt. Mainly used to describe the apex of the glumes, lemmas and paleas.

**tubercle**: a small ± spherical or elliptic swelling.

**tubercle-based hair**: hair with a small ± spherical or elliptic swelling at the base.

**tuberculate**: a surface covered in minute tubercles.

**tufted/tufts**: in a close cluster.

- describes the base of the plant with the leaves all closely clustered.
- describes the hair clusters on parts of the spikelet (upper lemma of *Danthoniopsis dinteri*, *Danthoniopsis petiolata*).

**turgid**: swollen (mature lemma of *Lolium temulentum*).

**tussock**: a dense tuft.

**undulate**: wavy e.g. margins going up and down.

**unisexual**: bearing only male or only female reproductive organs (*Olyra latifolia* has male-only and female-only spikelets on the same inflorescence).

**veins** (alternate for *nerves*): strands of vascular tissue.

**venation**: pattern made by the nerves/veins and usually refers to the number of nerves.

**ventral**: term for the front, adaxial or inner surface of an organ.

**verrulose**: covered with wart-like structures (upper lemma and palea of *Panicum natalense*).

**vestigial**: imperfectly developed.

**villous**: hairy with moderately erect, dense, long, soft often curly hairs.

**viscid**: sticky (below culm nodes in *Eragrostis viscosa*).

**viviparous**: young plantlets being produced within the parental inflorescence (*Poa bulbosa* subsp. *vivipara*).

**wedge-shaped**: a structure thick at one end and tapered to a thin edge on the other.

**weeds**: plants growing where it is not wanted.

**whorl/whorled**: a ring of bracts, spikelets or branches arising at the same place or node e.g. an inflorescence with several branches arising at the same place or a single node (*Sporobolus ioclados*, *Eragrostis rotifer*).

**wing/winged**: a thin projection or margin or extension of the margin of a structure (rhachis of *Digitaria argyrotricha, Digitaria longiflora*; upper half of lower glume, *Cymbopogon nardus*; palea, *Eragrostis superba*).

**woody**: hard and wood-like.

**woolly**: hairy with dense, long, soft, entangled, shaggy or curly hairs not adpressed to the surface (basal leaf sheaths in *Eragrostis sclerantha*).

**XyMS+**: a code that signifies the presence of mestome sheath cells between large metaxylem elements and the PCR sheath cells in primary vascular bundles.

**XyMS-**: a code that signifies the absence of mestome sheath cells between large metaxylem elements and the PCR sheath cells in primary vascular bundles.

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Grasses are very important features of the landscape and occur to a greater or lesser extent in all of the vegetation types of southern Africa. The importance of good grazing grasses for both wild and domesticated animals is well known. Some species are indicators of good or bad veld management and are useful to farmers and conservators. Crop farmers have to deal with undesirable grasses in their fields and the custodians of our indigenous vegetation need to correctly identify any alien invaders.

This identification guide relies primarily on the use of keys and descriptive information to aid the user in identifying a grass species. It contains some of the best information needed to identify southern African grasses. Keys to grass genera and species are provided, and in some instances also keys to easily confused taxa. For each species, a combination of useful characters is provided, and where applicable, line drawings of the spikelet or parts thereof accompany the identification keys. Species descriptions and distribution maps are hugely important and add to the identification of grasses.

One or more line drawings or a scanned herbarium specimen of one or more representative species accompany the description of each genus known to occur in southern Africa. Anatomy vouchers and voucher specimens are listed for each species discussed.

Note: many of the characters used for the proper identification of grasses are microscopic and requires the use of a good lens.

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