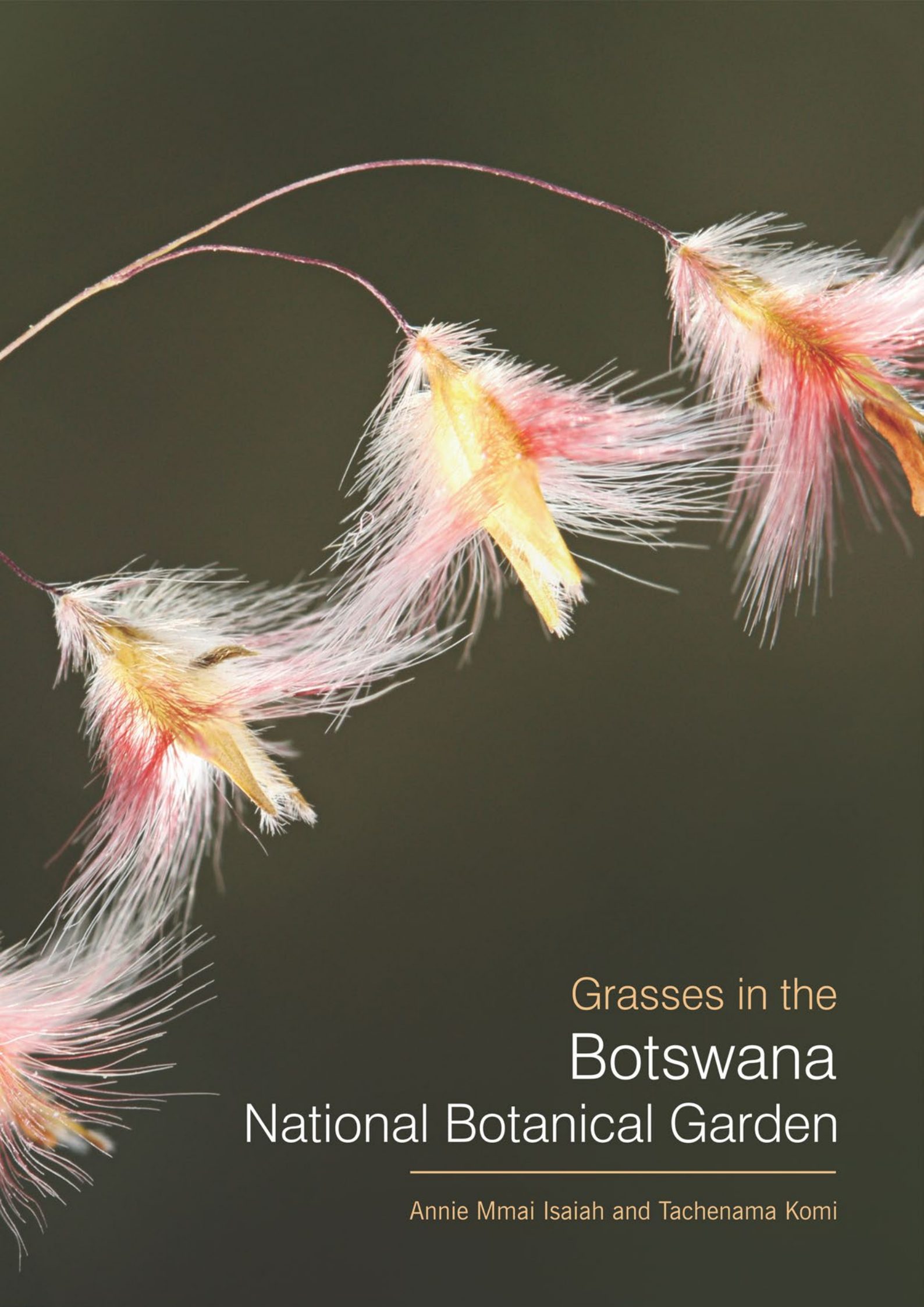

Grasses in the Botswana National Botanical Garden

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Melinis repens (Photograph: M. Koekemoer, SANBI).

Introduction

This booklet contains 33 grass species that were collected in the Botswana National Botanical Garden, Gaborone. The collection of plants was carried out from January to March 2012. The specimens were identified, mounted, labelled and filed in the National Herbarium, GAB.

The Botswana National Botanical Garden is a unit under the Natural History Division in the Department of National Museum and Monuments. The other units are Herbarium, Geology and Zoology. The garden started operating in 1968. It covers an area of 9 ha and is located along Okwa Road in Gaborone Village, opposite Gaborone Sports Club at Plot Number 17991. The role of the botanical garden is to maintain documented collections of living plants, especially indigenous species, for the purpose of research, conservation, display and education. This is done by collecting and growing wild indigenous plant species. The garden offers a repository for threatened species, particularly plants that are endangered, endemic or rare and thereby operates as an ex situ living plant conservation facility. Furthermore, the garden facilitates involvement in biological diversity conservation of various disciplines including botany, horticulture, species recovery programmes and environmental education/awareness.

The Botswana National Botanical Garden also aims to increase awareness of, and implement international agreements that are geared towards, sustainable use of plant resources, such as the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) and the Convention on Biological Diversity (CBD).

Background information

The objective of the study was to identify and compile an inventory of all the grass species occurring in the Botswana National Botanical Garden where the project was conducted.

Grasses belong to the family Poaceae. Like other angiosperms, typical grass plants have three organs: roots, stems and leaves. Grass roots are fibrous with few modifications. Depending on the soil type, they usually penetrate less than 2 metres into the ground. Grass stems fall into three general categories, namely aerial culms, underground rhizomes and stolons that lie on the surface. Grass leaves consist of three parts, namely the sheath which envelops the culm, the blade, which extends from it, and the collar and ligule located at the junction of sheath and blade. The blade and sheath are the main sites for photosynthesis (Gibbs Russell et al. 1990).

The inflorescence is the reproductive structure found at the tip of the culm that bears spikelets. Gibbs Russell et al. (1990) define a spike as a single unbranched central axis with the spikelets sessile upon it, whereas a structure is spike-like when main branches are borne on a central axis. A raceme is an unbranched central axis bearing spikelets. A panicle is an inflorescence in which the main axis bears branched secondary axes with pedicellate spikelets. A spikelet is the basic unit of a grass inflorescence and consists of a two basal glumes and florets on a rachilla above. A floret is the individual unit of a spikelet and consists of a lemma and palea, which conceal reproductive organs. In many grasses the spikelets on inflorescences vary with age, this is particularly noticeable on panicles. One should always endeavour to identify grasses during the flowering stage when reproductive features are visible. After seed dispersal the inflorescence dies off (Van Oudtshoorn 2009).

Humans and animals depend on grasses for survival. According to Van Oudtshoorn (1992) the grass family is the most important plant family for man's persistence and economic development. This is not only because of the indirectly derived products such as meat, butter, wool and leather, but some of the most important foods such as maize, rice, wheat, sorghum and sugar are grasses.

A few examples of the uses of grasses include thatching, basketry, hats, traditional brooms, provision of forage, sports turf, green manure, fuel, mulching, recycling of nutrients, oxygen release and soil conservation.

Purpose of the survey

The National Botanical Garden receives local and international visitors. Most visitors come to appreciate the indigenous plants that have been conserved there, while others conduct research in the garden. To date, no research has been conducted to identify the National Botanical Garden's naturally occurring

herbs, grasses and trees. This booklet is a first step to collate and distribute data on the grass species of the garden.

Significance of the study

The findings of this study will serve as a record of all the grasses that occur in the Botswana National Botanical Garden and the results may be used in literature reviews by researchers or anyone who has an interest in studying the family Poaceae. The study further aimed to identify invasive alien grass species so that they could be targeted for elimination; none were identified. This survey of the grass species is the starting point for the documentation of all other naturally occurring indigenous plants in the National Botanical Garden.

Cynodon dactylon (Photograph: M. Koekemoer, SANBI).

List of species

Aristida adscensionis L.

Annual three-awn

Local name: Seloka
Habitat: Occurs in poorly drained, disturbed soils along roadsides and on bare patches in natural grazing land.
Selected features: Sparsely tufted annual grass with few leaves. Culms usually branched, culm nodes and parts of inflorescence usually purple. Leaves flat, upper surfaces covered with sparse coarse hairs, fewer hairs on lower surface. Inflorescence a single, fine arching contracted panicle of three-awned spikelets, up to ±300 mm long.
Frequency: Few
Date collected: 2/2/2012

Aristida congesta Roem. & Schult. subsp. ***barbicollis*** (Trin. & Rupr.) De Winter

Spreading three-awn

Local name: Seloka
Habitat: Occurs in seasonally waterlogged areas, roadsides and in disturbed places.
Selected features: Sparsely tufted grass. Leaves straw-coloured, curled and rolled when dry; long white hairs present at junction of leaf blade and sheath. Inflorescence an open panicle with spikelets concentrated at ends of branches; awns twisted.
Date collected: 2/2/2012

Bothriochloa insculpta (A.Rich.) A.Camus

Pinhole grass

Habitat: In coarse, textured soils with poor drainage.
Selected features: Culms up to 1 m tall, ring of white hairs present around nodes. Ligule a papery membrane with hairy margin. Inflorescence of spike-like racemes arranged semi-digitally on primary rachis.
Frequency: Few
Date collected: 27/2/2012

Brachiaria deflexa (Schumach.) C.E.Hubb. ex Robyns

False signal grass; false panicum

Habitat: Grows in shade in National Botanical Garden; in clayey-loam soil with good drainage.
Selected features: Tufted grass, 0.25 m tall. Leaf with relatively short, wide, open blade; covered with velvety hairs. Spikelets are arranged in pairs.
Frequency: Few
Date collected: 31/1/2012

Brachiaria nigropedata (Ficalho & Hiern) Stapf

Black-footed grass

Local name: Motenene
Habitat: Rocky or stony, sandy, poorly drained soils.
Selected features: Tufted grass with leaves mostly concentrated around base of plant; rhizomes short. Culm nodes covered with short, white hairs. Leaves curl when dry, covered with velvety hairs. Inflorescence branches arranged at more or less regular intervals up central axis, two rows of spikelets on lower side (Heath & Heath 2009). Spikelets covered with soft hairs; short stalks at base of mature spikelets purple to black.
Date collected: 2/2/2012

Cenchrus ciliaris L.

Foxtail buffalo grass

Local name: Mosekangwetsi
Habitat: In National Botanical Garden in sandy loam soil.
Selected features: Tufted perennial grass, sometimes with decumbent culms that root at nodes; nodes swollen. Leaf blades flat, usually hairless; often hairy near ligule; long, tapering leaf points. Inflorescence a purple, bristly, false spike. Spikelets falls off at maturity (Roberts & Fourie 1975).
Date collected: 31/1/2012

Chloris virgata Sw.

Feather-top chloris

Local name: Tshitlangwetsi
Habitat: In National Botanical Garden in sandy loam soil with good drainage.
Selected features: Grass 0.2 m tall, rooting from lower nodes; base of the plant often fan-shaped. Leaf sheathes compressed. Inflorescence digitate with feathery racemes arranged in whorls at apices of culms.
Frequency: Few
Date collected: 31/1/2012

Cynodon dactylon (L.) Pers.

Couch grass

Local name: Motlho
Habitat: In National Botanical Garden in loam soil with good drainage.
Selected features: Short, mat-forming grass, spreads with stolons and rhizomes. Leaves point upwards. Inflorescence digitate.
Frequency: Frequent
Date collected: 27/1/2012

Dactyloctenium aegyptium (L.) Willd.

Common crowfoot

Local name: Dingofo
Habitat: In National Botanical Garden in sandy loam soil with good drainage.
Selected features: Tufted, mat-forming annual. Culms tufted, geniculately ascending, rooting at nodes. Leaves with hairy margins and prominent midribs. Inflorescence thick, digitate racemes (Gibbs Russell et al. 1990).
Frequency: Few
Date collected: 31/1/2012

Digitaria eriantha Steud.

Common finger grass

Habitat: In National Botanical Garden on flat land, in sandy loam soil with good drainage.
Selected features: Tufted, with compact stolons. Inflorescence of 3–15 racemes, arranged digitately to subdigitately in one or two whorls at tips of the culms.
Frequency: Abundant
Date collected: 31/1/2012

Digitaria velutina (Forssk.) P.Beauv.

Long-plumed finger grass

Habitat: In National Botanical Garden in sandy loam soil.
Selected features: Tufted grass with knee-like bent nodes. Culms branched. Leaf sheath compressed, hairy. Inflorescence semi-digitate.
Frequency: Few
Date collected: 31/1/2012

Echinochloa holubii (Stapf) Stapf

Kalahari water grass

Habitat: In stony or rocky soils; also in poorly drained, seasonally waterlogged soils.
Selected features: Tufted grass in damp soil. Leaves few. Inflorescence a number of short, thick purple racemes, borne pressed against central inflorescence axis.
Date collected: 2/2/2012

Echinochloa stagnina (Retz.) P.Beauv.

Long-awned water grass

Habitat: In National Botanical Garden in pond/swampy area; wet, clayey soil with smaller air spaces to allow movement of water.

Selected features: To 1 m tall. Culms pithy, rooting at bent nodes. Leaves slightly folded at midrib, occasional indistinct purple blotched stripes (Heath & Heath 2009); ligule a fringe of hairs, often absent in lower leaves. Inflorescence open with long, clearly secund racemes along central axis. Spikelets narrowly ovate, rigid hairs on nerves; awns up to 20 mm long (Field 1976).

Frequency: Common

Date collected: 27/3/2012

Enneapogon cenchroides (Licht. ex Roem. & Schult.) C.E.Hubb.

Nine-awned grass

Local name: Molekangwetsi
Habitat: Associated with *Acacia tortilis* (Forssk.) Hayne and *Melia azedarach* L., herbs and other grasses in National Botanical Garden; in well-drained, grey sandy loam soil.
Selected features: To 1 m tall. Inflorescence contracted or open panicle. Spikelets with lemmas typically bearing nine hairy awns.
Frequency: Few
Date collected: 27/1/2012

Eragrostis biflora Hack. ex Schinz

Shade grass

Habitat: In National Botanical Garden under trees, a shade-loving grass; in well-drained, grey, sandy loam soil.

Selected features: Leaf sheathes keeled, glabrous; ligule a ring of hairs. Inflorescence a delicate much-branched panicle up to 350 mm long, pedicels long, slender. Spikelets green to purple; 1 or 2 florets (Van Oudtshoorn 2009).

Frequency: Common

Date collected: 27/3/2012

Eragrostis cilianensis (All.) Vignolo ex Janch.

Stink love grass

Habitat: In National Botanical Garden in sandy loam soil.
Selected features: Tufted grass with knee-like bent nodes; strongly scented when crushed. Culms branch from lower nodes. Inflorescence a grey, open panicle, branches rather short. Spikelets grey-green.
Frequency: Common
Date collected: 31/1/2012

Eragrostis lehmanniana Nees

Lehmann's love grass

Local name: Rathathe
Habitat: Along roadsides; in clayey loam soil.
Selected features: Tufted grass. Culms branched, nodes bent knee-like, rooting from lower nodes. Leaves stiff, straight, partially rolled; lower leaf sheaths yellow. Inflorescence with lowest branches borne in pairs or singly, not whorled (Roberts & Fourie 1975).
Frequency: Few
Date collected: 17/2/2012

Eragrostis racemosa (Thunb.) Steud.

Narrow heart love grass

Local name: Rathathe
Habitat: In National Botanical Garden in stony or rocky, poorly drained soil.
Selected features: Culms erect, sturdy. Leaves mostly concentrated around base; older leaves curling, red-brown. Spikelets olive green.
Frequency: Few
Date collected: 2/2/2011

Eragrostis rigidior Pilg.

(Broad) curly leaf

Habitat: In National Botanical Garden along roadsides; in sandy loam soil.
Selected features: Culms with purple nodes, lower nodes bent knee-like. Leaves dry light brown, flat, hairless, ribbon-like, curling at maturity. Inflorescence a fine open panicle, lowest branches arranged in whorls, bases of branches with rings of hairs. Spikelets small, grey-green (Roberts & Fourie 1975).
Frequency: Abundant
Date collected: 31/1/2012

Eragrostis rotifer Rendle

Pearly love grass

Habitat: In stony or rocky, seasonal waterlogged, poorly drained soil.
Selected features: Tufted grass. Culms fairly erect. Leaf sheaths usually rolled in. Inflorescence big, open panicles, lowest branches arranged in whorls.
Date collected: 2/2/2012

Eragrostis superba Peyr.

Saw-tooth love grass

Local name: Mogamapodi
Habitat: Grows in disturbed soils, bare patches in veld, along roadsides, termites mounds; in sandy, loam and gravelly soil.
Selected features: Tufted grass with hard culms, up to 1 m high. Leaves with distinct, hairy collars below ciliate ligules, lower nodes often bent knee-like. Inflorescence a subcontracted panicle with central axis and several side branches. Spikelets straw-coloured, large, oval, prominently flattened, edges typically serrated (Field 1976; Van Oudtshoorn 2009).
Frequency: Few
Date collected: 19/3/2012

Eragrostis trichophora Coss. & Durieu

Hairy love grass

Habitat: Associated with *Acacia tortilis* (Forssk.) Hayne and *Melia azedarach* L., herbs and grasses in the National Botanical Garden; in grey sandy loam soil with good drainage.

Selected features: Up to 0.4 m tall, culms branched with purple nodes. Inflorescence a delicate open panicle; lowest branches whorled.

Frequency: Common

Date collected: 27/1/2012

Heteropogon contortus (L.) Roem. & Schult.

Spear grass

Local name: Seloka
Habitat: Along roadsides.
Selected features: Tufted perennial, often with branching culms. Leaves folded at midrib; usually blunt-tipped; sheaths compressed. Inflorescence a single raceme; awns long, brown, velvety, intertwined, curling when dry and clustering together (Van Oudtshoorn 2009).
Frequency: Common
Date collected: 31/1/2012

Melinis repens (Willd.) Zizka

Natal red top

Local name: Sanyane
Habitat: Along roadsides in National Botanical Garden; in sandy loam soil with good drainage.
Selected features: Perennial up to 0.5 m tall. Culms and lower parts of leaves covered with long, straggly hairs (Heath & Heath 2009). Leaves with prominent midrib, flat or rolled. Inflorescence an open panicle. Spikelets covered with reddish to pink hairs which become lighter as plant matures.
Frequency: Common
Date collected: 31/1/2012

Microchloa caffra Nees

Pincushion grass

Habitat: In poorly drained, stony or rocky soil.
Selected features: Basal sheaths break up into fine fibres when old. Inflorescence a single unilateral spike, initially straight, becoming curved.
Date collected: 2/2/2011

Panicum coloratum L.

Small buffalo grass

Local name: Puka
Habitat: Found in disturbed areas where water usually collects in loam soil with good drainage.
Selected features: Up to 1 m tall with short rhizomes. Culm nodes bent knee-like, usually purple. Inflorescence an open panicle with lowest branches solitary.
Frequency: Common
Date collected: 27/2/2012

Panicum maximum Jacq.

Guinea grass

Local name: Mhaha
Habitat: In National Botanical Garden in grey, sandy loam soil with good drainage.
Selected features: Up to 1 m tall. Culms and sheaths hairy. Leaves broad; midribs prominent, white. Inflorescence an open panicle, lower branches arranged in whorls (Heath & Heath 2009).
Frequency: Abundant
Date collected: 27/1/2012

Schmidtia pappophoroides Steud.

Sand quick

Local name: Molalaphage
Habitat: In National Botanical Garden in clay loam soil.
Selected features: Grey-blue, decumbent perennial, up to 0.5 m tall. Culm bases swollen; stolons on lower nodes. Leaves blue to grey-green. Inflorescence a grey-green, softly bristly, spike-like panicle. Spikelets with lemmas with 5 awns.
Frequency: Few
Date collected: 31/1/2012

Sporobolus festivus Hochst. ex A.Rich.

Red dropseed

Habitat: Usually found in shallow, sandy soils among granite rocks, also in poorly drained, damp soils.

Selected features: Densely tufted grass. Basal leaf sheaths break up into fibres. Inflorescence a fine, multi-branched, open panicle. Spikelets with shades of red.

Frequency: Common

Date collected: 2/2/2012

Tragus berteronianus Schult.

Carrot-seed grass

Local name: Mogamapodi
Habitat: In disturbed places in the National Botanical Garden; in sandy soils with good drainage.
Selected features: Culms flushed red below; nodes dark red. Leaf sheaths rolled. Inflorescence a long dense spike. Spikelets densely arranged around rachis, 2–3 mm long, covered with hooked spines, dropping easily when mature, often sticking to clothes (Heath & Heath 2009).
Frequency: Common
Date collected: 31/1/2012

Tricholaena monachne (Trin.) Stapf & C.E.Hubb.

Blue-seed grass

Local name: Mofala
Habitat: Around dried pond in coarsely textured soil with poor drainage.
Selected features: Tufted perennial. Culms tend to bend at nodes; nodes green. Leaves blue-green. Inflorescence a multi-branched open panicle. Spikelets hairless, with purple-blue tint (Heath & Heath 2009).
Frequency: Not common
Date collected: 27/2/2012

Urochloa mosambicensis (Hack.) Dandy

Bushveld signal grass

Habitat: In National Botanical Garden in grey sandy loam soil with good drainage.
Selected features: Tufted, hairy grass with stolons; up to 1 m tall. Culms nodes hairy. Leaves usually wavy and hairy especially along margins. Inflorescences semi-digitately arranged around central axis (Van Oudtshoorn 2009).
Frequency: Common
Date collected: 27/3/2012

Urochloa oligotricha (Fig. & De Not.) Henrard

Perennial signal grass

Habitat: Along roadsides in clayey loam soil with good drainage.
Selected features: Basal sheaths densely hairy, old sheaths break into fibres. Inflorescence with up to 20 unilateral racemes, usually in groups of 2–4 up a short central axis.
Date collected: 31/1/2012

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Tragus berteronianus (Photograph: M. Koekemoer, SANBI).

Thirty-three grass species found to occur in the Botswana National Botanical Garden during a three-month long survey in the summer of 2012 are presented in this guide. Each species is illustrated by a photograph of a herbarium specimen, supplemented by some short notes on its morphology, its habitat and the frequency with which the species occur in the garden. The species are arranged alphabetically according to scientific names, and English and Tswana common names are also provided. All specimens illustrated in this guide are available in the National Herbarium of Botswana (GAB) in Gaborone.

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