



Australian Plants

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Listen our land is crying

Nobody in authority cares about the future of Australia

A continent degraded to the extent that the Australian prosperity, our quality of life is threatened. If action is not taken now we will irrevocably bankrupt the continent for which we are responsible. The facts are detailed in the new book by Mary White for all to see that this statement is scientifically correct and, alas the proof is evident. (see review of *Listen our land is crying* on page 266.)

**NOBODY
IN AUTHORITY
CARES ABOUT
THE FUTURE OF
AUSTRALIA**

**I AM A
NOBODY
AND I AM ONE WHO
CARES ABOUT
THE FUTURE OF
AUSTRALIA**

Strong challenging words. It is time for action, who is concerned enough to wear these **lapel badges as a form of protest** on specified occasions. Who will offer to organize a national campaign, get sponsors to make the badge, etc?

It is not right to **blame the farming/grazing community** that has clothed and fed us and provided the basis for our present prosperity, see page 267.

It is not right to **blame the mining and forestry industries**, they have paid our debts and maintained our prosperity, a cornerstone of living standard, page 267.

It is not fair to **blame our politicians** as they are unaware of the pending disaster. They are treated like "mushrooms" and believe their own propaganda, page 267.

If authority deigns to reply to this they will regurgitate their own propaganda but the true slant on this is summarized on our page 268, it is leading to disaster!

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COVER PLATE, *Olearia picridifolia* is a rounded bush, outstanding in early spring when large panicles of mauve daisies rise well above the narrow, greyish foliage. **A hardy plant for alkaline conditions**; pruning maintains shape and improves flowering. Photograph by Ivan Holliday. Reports are required on your experiences with all *Olearia* species.

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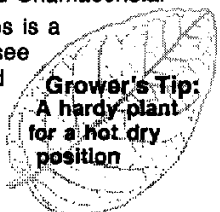
Australian 'Cassia'

an introduction by W. H. Payne

Cassia are very showy long flowering plants and every garden and landscape should have them dotted about. For most areas of Australia, Desert Senna, *Senna* form taxon *artemisioides* in its many forms, is easy to propagate and grow. Forming rounded bushes that can be contained to a metre high and wide, they commence flowering in late summer and are an orb of golden yellow colour through to early next summer. They like the sun and exposed conditions and survive with very limited water. Now *Senna* not *Cassia*, therein hangs a tale.

There are two *Cassia* species native to Australia both from the tropical north. They are described and illustrated by Barbara Randell on page 241. Forming graceful trees with masses of pendulous flowers, they need tropical and sub-tropical conditions to flourish and provide shade and colour. The rest, previously known as Australian *Cassia* are now in two genera, *Senna* and *Chamaecrista*.

The historical development of the arid-zone *Senna* species is a typical Australian saga. The sclerophyllous* (a daunting word see below for its meaning) habit of much of Australia's flora typified by our eucalypts, resulted from periods of aridity over many years. The flora evolved from the closed forests of the cretaceous Gondwanaland period. Periods of harsh climate opened up areas of land and sclerophyllous forms of plants evolved in areas of poorer soils often deficient in phosphorous.



Grower's Tip:
A hardy plant
for a hot dry
position

Relic populations were then isolated during periods of intense aridity and new plants evolved to survive these conditions. These plants expanded in less arid periods and in the case of *Senna*, hybridization took place a number of times during the last million years. This saga is the background for the development of Australian desert *Cassia/Senna*, as described by Barbara Randell on page 246.

Propagation and cultivation

This is a group of plants for the beginner. There are some species that have proven very hardy and extremely floriferous. For the temperate areas, grow the species in Part D on page 247 as well as the magnificent *Senna* form taxon *artemisioides*. This is the plant I grow in abundance in Sydney as mentioned above. As described on page 246, there are many forms of this variable plant due to the harsh arid conditions in which it evolved. One form is in colour on page 237, I grow the narrower leaf desert form in my hard dry spots. For the dry interior the many species of *Senna* should be used, they are survivors.

Senna are also easy to raise from seed which is readily available, anyone can do it, a marvellous activity for children. So they lose a few, there is plenty of seed easily grown. The seed has a hard coating for survival in the desert awaiting rain. Place the seed in a cup and pour on boiling water, leave to soak for a week; then sow the seed in coarse sand; put a piece of glass over the container and put it out in the sun. Keep the seed moist by standing the container in shallow water, permanently or once a day. The only trouble I have is from damping off, the small seedlings collapsing. Be sure to remove the glass lid as soon as they start to come up, give them plenty of sun and fresh air and you will have more plants than you know what to do with.

* Sclerophyllous. I have skipped over this word in real ignorance of its meaning regarding it as another device to mystify our flora. Pronounced (scler-O-phyll-ous) it means hard leaved, leaves coriaceous and evergreen. A feature of much of our Australian flora, tough to survive.

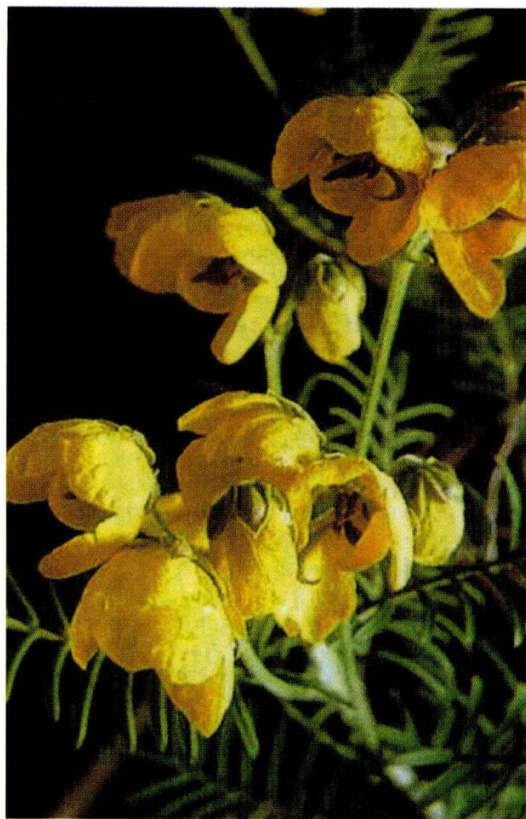
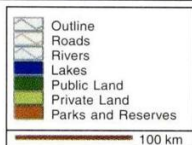
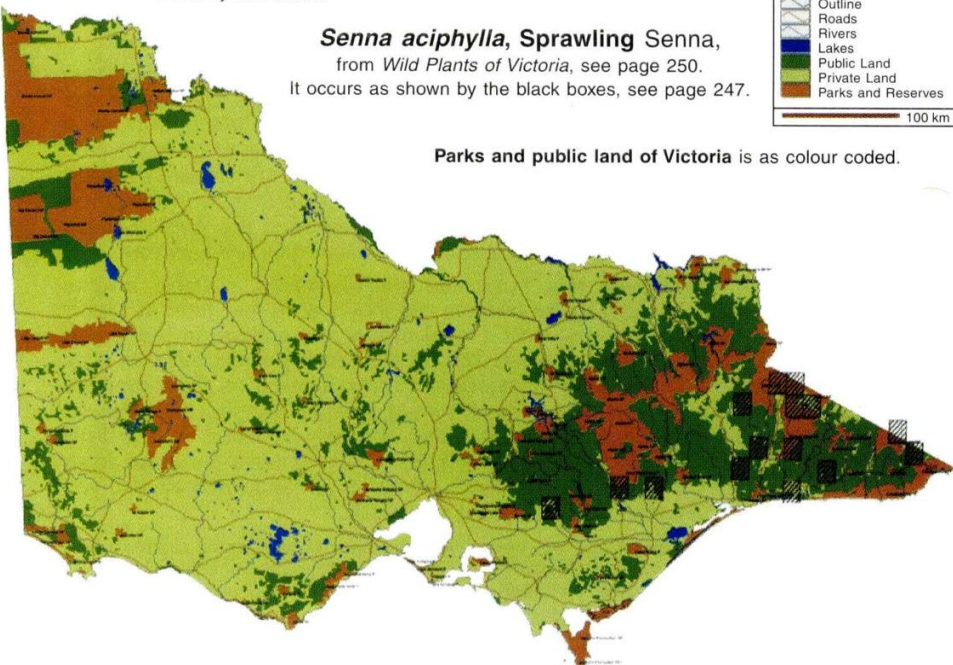


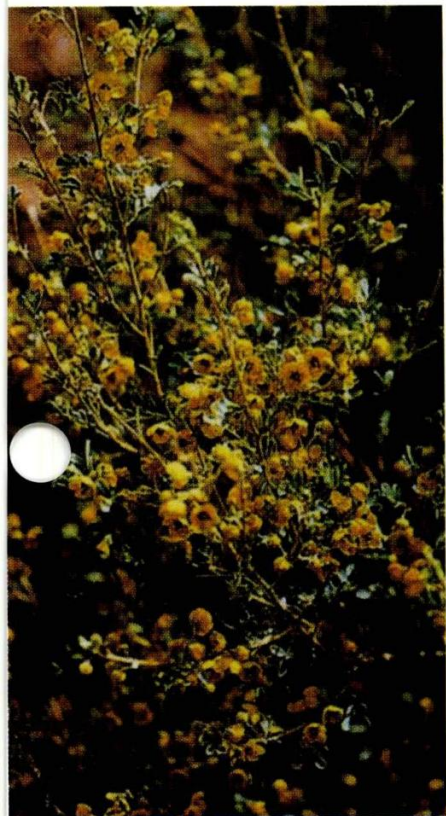
Photo by John Eichler

***Senna aciphylla*, Sprawling Senna,**
from *Wild Plants of Victoria*, see page 250.
It occurs as shown by the black boxes, see page 247.



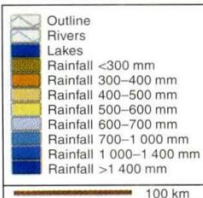
Parks and public land of Victoria is as colour coded.



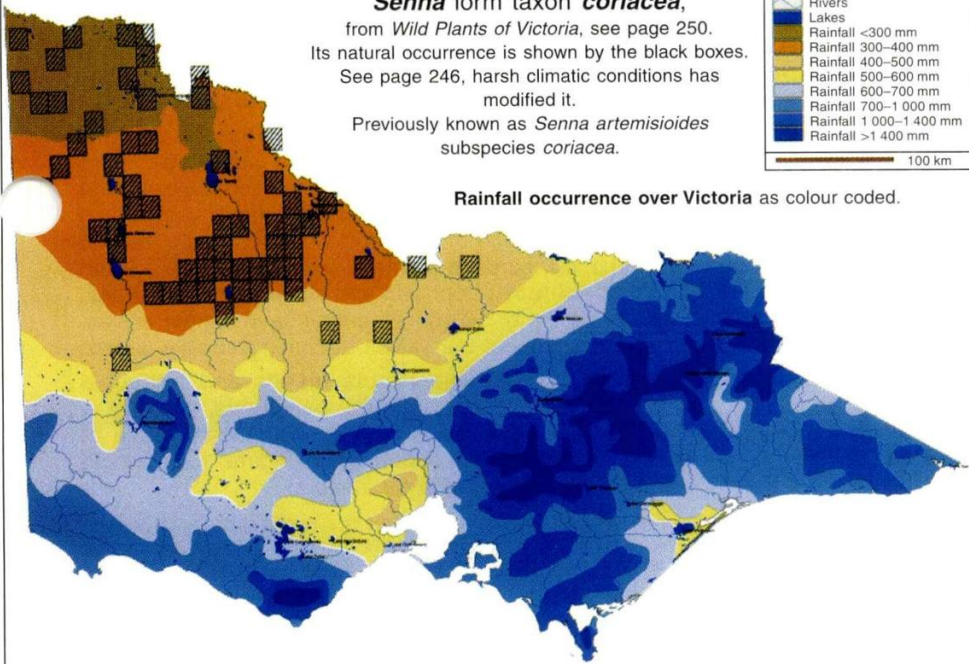


***Senna* form taxon *coriacea*,**
from *Wild Plants of Victoria*, see page 250.
Its natural occurrence is shown by the black boxes.
See page 246, harsh climatic conditions has
modified it.

Previously known as *Senna artemisioides*
subspecies *coriacea*.



Rainfall occurrence over Victoria as colour coded.



Cassia and Senna

A review of the groups of plants formerly known as *Cassia*

by B. R. Randell*

When I last wrote about this group of plants for *Australian Plants* (in 1976), all of the species I described were listed as belonging to *Cassia*. Since then, there has been a great deal of scientific work done on several Continents, and it is now generally agreed that three genera should be recognized within the original group.

There are complex technical reasons for the separation, but for the Australian species, the pods provide enough information to justify it. *Cassia* species have long, cylindrical, woody pods which do not open. *Chamaecrista* species have flat papery pods which split open as they dry out, flinging out the seeds, while the valves become spirally coiled. *Senna* species have papery pods which split open as they dry out, but they do not eject their seeds, and the valves remain uncoiled.

Botanists never take lightly the decision to change the name of a species. It is only done when the benefits of the change outweigh any drawbacks. In this case, I am convinced that the benefits, highlighting the differences between the groups now recognized as genera, are greater than the problem of learning new names.

Australia now has two true *Cassia* species, small trees which live on the edges of rainforests in Queensland and northern New South Wales. They all have long woody cylindrical pods like those of the introduced species *Cassia fistula* 'Golden Shower'. They are described and illustrated on page 240.

Australia also has twelve native tropical species which now become *Chamaecrista*. These have flat papery pods which split open as they dry out. The pods split suddenly and recoil violently, flinging out the seeds, while the valves become spirally coiled. *Chamaecrista* species are usually low herbs, and in Australia are restricted to tropical areas in the NT and Queensland.

Most of the Australian plants previously known as Cassias are now included in *Senna*. The *Flora of Australia* recognizes 62 plants. Of these 46 are given full species names and 16 are regarded as probable natural hybrid crosses or variants of older species. As such they have been given a species name but with an appendage of X or "form Taxon". These include the showy shrubs cultivated in our gardens (some of which come from South America), and the many hardy shrubs of our arid and semi-arid inland areas. These have pods which may be flat or cylindrical, but all have papery valves. They open slowly, not violently, without the valves becoming spirally coiled.

The leaves are pinnately divided with minute glands and without a terminal leaflet. Leaflets in several species are deciduous, leaving a functional phyllode or leaf stalk. Small black glands occur at the base of the petiole (g) in Figure 1I, or along the midrib as in Figure 1J. It would appear that these glands provide a secretion for insects.

***Australian Cassias.** This article is based upon the many years of scientific study by Dr Barbara Randell and earlier work by Mr D. E. Symon, as published in the "Journal of the Adelaide Botanic Gardens" in 1989. The sketches by Beth Chandler are reproduced from this published work. See also *Flora of Australia*, Volume 12.

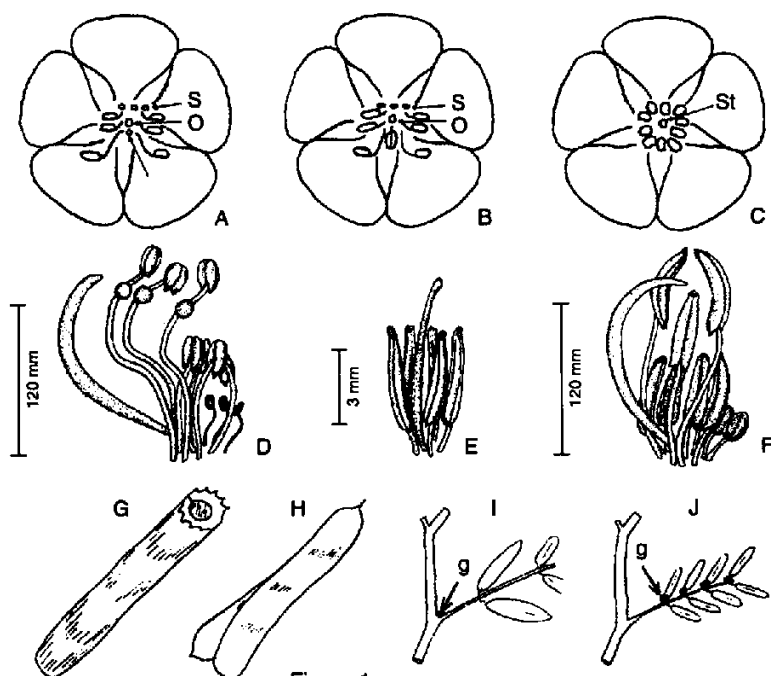


Figure 1

The flowers of *Cassia*, *Senna* and *Chamaecrista* with five separate petals, almost always yellow. In Figure 1, the central part of the flower comprises the stamens, some with fertile anthers (a) to deliver pollen; sterile stamens (s) called staminodes and the central style (st) which receives pollen delivering it to the ovary (o). In Figures 1D, 1E and 1F the petals are removed to show the stamens, staminodes, (collectively, the androecium), and central style.

In all three genera the fruit is a pod but in Australian species, that of *Cassia* is woody and does not break open Figure 1G, while that of *Senna* is papery and does break open, Figure 1H. But there are significant differences between the arrangements of their anthers.

***Cassia* flower** (Figure 1A and 1D) has 10 anthers; the three at the back (furthest from the ovary) are small and sterile, then comes four fertile anthers on short stalks, then two fertile anthers on long S-curved stalks (filaments), stalks 12–15 mm long, and between them another sometimes sterile one.

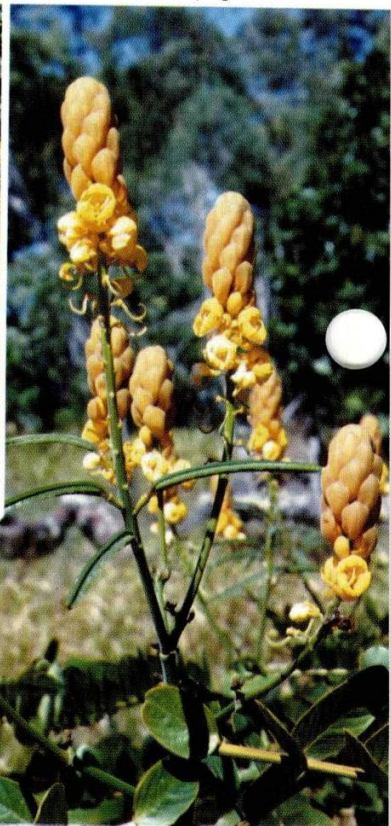
***Chamaecrista* flower** (Figure 1E) has either 5 or 10 fertile anthers, all on short filaments, in a single ring, typically 3 mm long as shown.

***Senna* flower** has several possible patterns. The Australian group has 10 fertile anthers all on short filaments, in a single ring as in Figure 1C. Another possible arrangement resembles the *Cassia*, with 3 sterile anthers at the back, then 4 fertile anthers on short stalks, then 2 fertile anthers on long filaments (C-curved, 8–15 mm long), while the last anther between them may be fertile (Figure 1B and 1F) or sterile. The style is long and curved, usually green.



△ *Cassia brewsteri*, photograph by John Story, who has others, Editor.

▽ *Senna magnifolia*, one of the species with cone-like flowers, see page 244.

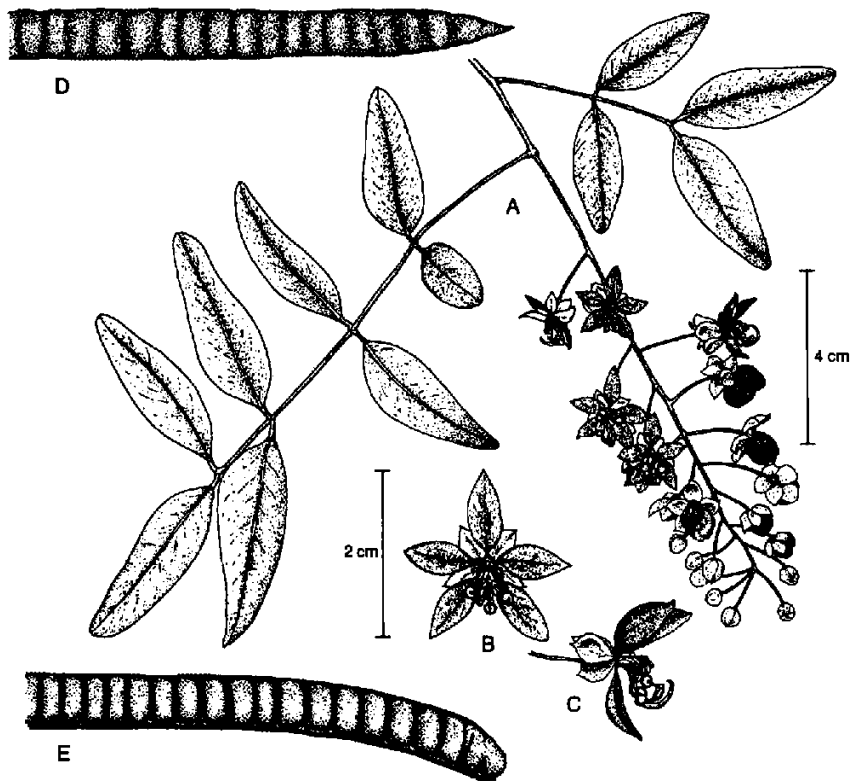


Part A — CASSIA

TREES with S-curved longest anthers, and woody cylindrical pods;
leaves without glands.

Cassia queenslandica

Flower petals 5–20 mm long, yellow; filaments of longest anthers with a swelling at midpoint. Flowers 50–80 per inflorescence. Leaflets 4–8 cm long. Rainforest tree of far northern Queensland. The only distinguishing character from *Cassia brewsteri* given in *Flora of Australia* was that *Cassia queenslandica* has more numerous and larger flowers in the racemes.



Cassia brewsteri, Figure 2 A, flowering branchlet; B and C the flower; D the pod. *Cassia queenslandica*, Figure 2E, a seed pod.

Cassia brewsteri

The type variety *brewsteri* has flower petals 5–15 mm long, often red; anther filaments with swelling. Inflorescence with 10–50 flowers. Leaflets c. 4.5 cm long, often reddish or with few hairs persisting below. Pod ± compressed, distinctly transversely ribbed. It occurs in open forest and rainforest margins in eastern and southern Queensland.

Cassia brewsteri* variety *marksiana has petals that are never reddish; leaflets without hairs beneath; and pods without hairs but with slight transverse ribs. It occurs in southern Queensland and northern New South Wales, in the Macpherson Ranges and adjacent Tweed River Scrubs.

Cassia brewsteri* variety *tomentella has petals that are never reddish; leaflets finely tomentose below; and pod $\pm$ cylindrical, (with very slight transverse ribs) with persistent dense minute hairs. Southern Queensland, west of Rockhampton south to near Boonah.

The last two varieties are sometimes listed as species but there are many individuals with mixed characteristics where the distributions of the three varieties overlap. The introduced **Cassia fistula* has larger flowers with petals 20–30 mm long; filaments of longest stamens without a swelling at the mid-point; and flowers 20–75 per inflorescence. Its leaflets are 5–9 cm long. It is a tree native of Indian subcontinent, widely planted and naturalized north of Brisbane.

PART B — *SENNA* sect CHAMAEFISTULA*

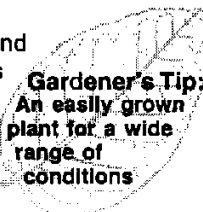
Shrubs with C-curved longest anthers; cylindrical pithy papery pods; leaf glands at base of petiole or between the leaflets.

Senna clavigera

Shrub to 1.5 m tall, leaf gland at base of petiole, erect and club-shaped; leaflets 4–7 pairs, the largest 1–2 cm wide; pods 4–5 cm long. Wet sclerophyll forests of Queensland and New South Wales.

Senna barclayana

Shrub to 1.5 m tall, leaf gland at base of petiole, broad and flat; leaflets 6–10 pairs, the largest 0.4–0.9 cm broad; pods 3–5 cm long. Open forests in eastern northern New South Wales, and southern Queensland. In my garden, this is a straggly shrub, which responds well to annual heavy pruning. It flowers and seeds prolifically. Ants are attracted to the glands on the leaves.



Gardener's Tip:
An easily grown
plant for a wide
range of
conditions

Senna planitilicola

Shrub to 2.5 m tall, leaf gland at base of petiole, broad and flat; leaflets 5–7 pairs, the largest 1.5–2.5 cm broad; pods 7.6–9.5 cm long. Widespread over subtropical Inland areas.

**Senna*, the genus is presented in parts grouping species with a common feature:

Part C, shrubs with flat papery pods; 7 fertile anthers, some larger; usually without leaf glands.

Part D, shrubs with shiny seeds of east coastal and tropical distribution, see page 247.

Part E, shrubs with dull seeds; leaflets in 1–3 pairs; inflorescences along the stems; pods curved.

Part F, shrubs with dull seeds; inflorescences terminal; pods straight. Parts E, F and G, next issue.

Part G, shrubs very variable in appearance, often intergrading between forms.

There are 4 weedy species in this group. **Senna occidentalis* and **Senna hirsuta* have glands at the base of the petiole, but pods 10–20 cm long. **Senna obtusifolia* and **Senna tora* have glands between the leaflets, but their seeds have smooth patches on each side. *Senna obtusifolia* was declared a noxious weed in Queensland in 1981.

Another 4 species with cylindrical pods are garden ornamentals, all have leaf glands between the leaflets. **Senna multiglandulosa* (formerly *Cassia tomentosa*) has hairy leaflets; **Senna* $\times$ *floribunda* has pointed leaflets; **Senna pendula* var. *glabrata* has broad leaflets; and **Senna corymbosa* has narrow leaflets.

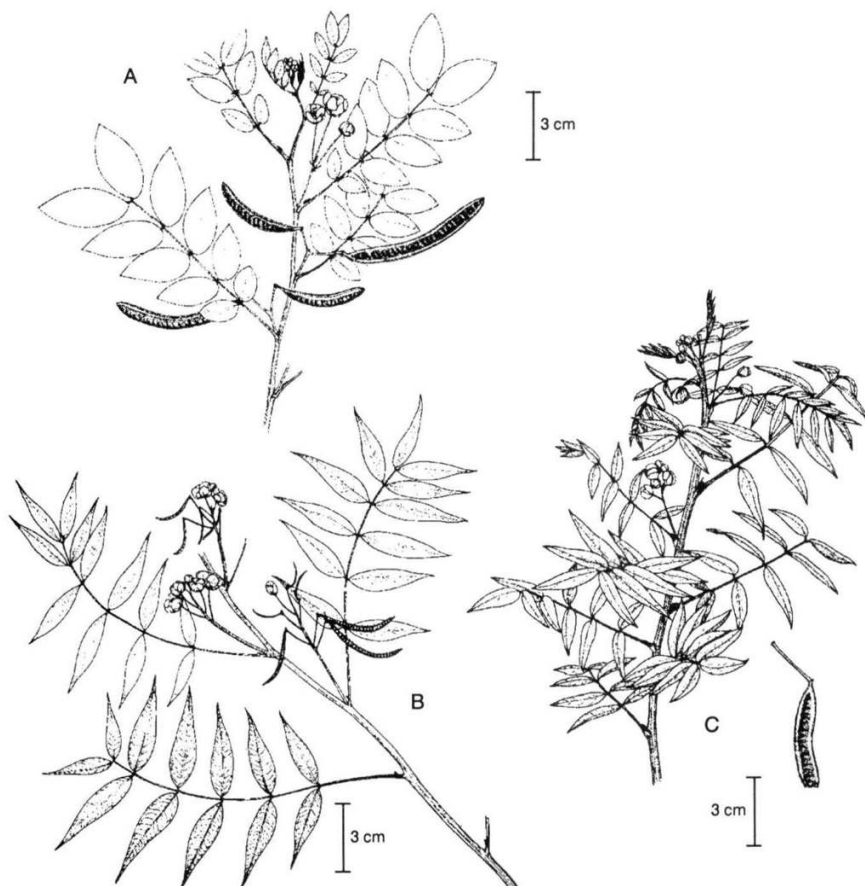


Figure 3A, *Senna planitiicola*; branch with flowers and fruit.
 3B, *Senna clavigera*; a branch with flower and fruit.
 3C, *Senna barclayana*; flowering branch.

PART C — *SENNA* sect *SENNA*

Shrubs with flat papery pods; 7 fertile anthers, some larger than others; usually without leaf glands, some with cone-like flowerheads.*

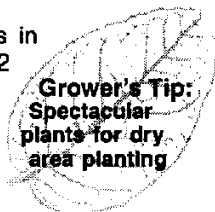
Senna pleurocarpa, photograph on page 249.

Spreading shrub to 1 m tall without hairs. The type variety *pleurocarpa* has flowers crowded into cone-like inflorescence; bracts yellow or green, oval; leaflets 5–7 pairs, the largest 3–6 cm long, without obvious hairs. Widespread through central Western Australia, southern Northern Territory, far-western Queensland, and far-western New South Wales.

The variety *angustifolia*, from the southern half of WA has long-pointed bracts; and var. *longifolia* from central western Qld, has 10–12 pairs of leaflets.

Senna notabilis

Hairy annual of perennial shrub to 1.5 m tall; with flowers in cone like inflorescences; bracts green, hairy; leaflets 6–12 pairs, the largest 1.5–3 cm long, hairy. Pods 2–4 cm long, golden brown, darker over seeds. Widespread through northern WA, throughout NT, and western areas of Qld and NSW. This is usually known as the cockroach bush, because of the appearance of the pods.



Grower's Tip:
Spectacular
plants for dry
area planting

Senna venusta

Hairy shrub to 2 m tall with flowers in cone-like inflorescences; bracts yellow, hairless; leaflets 6–15 pairs, the largest 3–8 cm long, hairy. Pods 4–8 cm long, golden brown. Northern half of Western Australia, throughout Northern Territory, barely reaching western Queensland.

Senna magnifolia

Straggling shrub to 1.5 m tall, mostly without hairs. Flowers are in cone-like inflorescences; bracts yellow-brown, hairless; leaflets 4–6 pairs, the largest 5–8 cm long, hairless. Pods 8–10 cm long, dark brown. Restricted to isolated areas in northern WA and western Qld, not recorded for NT. *S. magnifolia* takes its name from the large leaflets, photograph page 240.

There are two weedy species in this group with cone-like inflorescences, **Senna didymobotrya* from Northern Africa with dark brown or black bracts; and **Senna alata* from South America, distinguished by its winged pods.

Senna timorensis

This shrub lacks the erect cone-like inflorescences of the above species. Its taxonomic links are not clear but this is where it has been placed in the past. The flowers are in open heads; leaflets 15–18 pairs, 0.5–0.7 cm apart, the largest 3–5 cm long, sparsely hairy. Pods 7–9 cm long. Shrub to 2 m tall. Sparsely distributed through northern areas of WA, NT and western Qld. Also in Indonesia. At first glance, this resembles members of the *Psilorhagma* group, but it does not have 10 anthers typical of that group.

The introduced **Senna siamea* is related to *Senna timorensis*, and is grown in gardens in NT and Qld It is a small tree, sometimes reaching to 30 m tall.

*The first four species are notable for the way their cone-like flower heads sit above the bush, see photograph on page 249, and are followed by fruits, seed pods with seed that rattle in the wind, earning the common name of **rattle pods**. Editor.

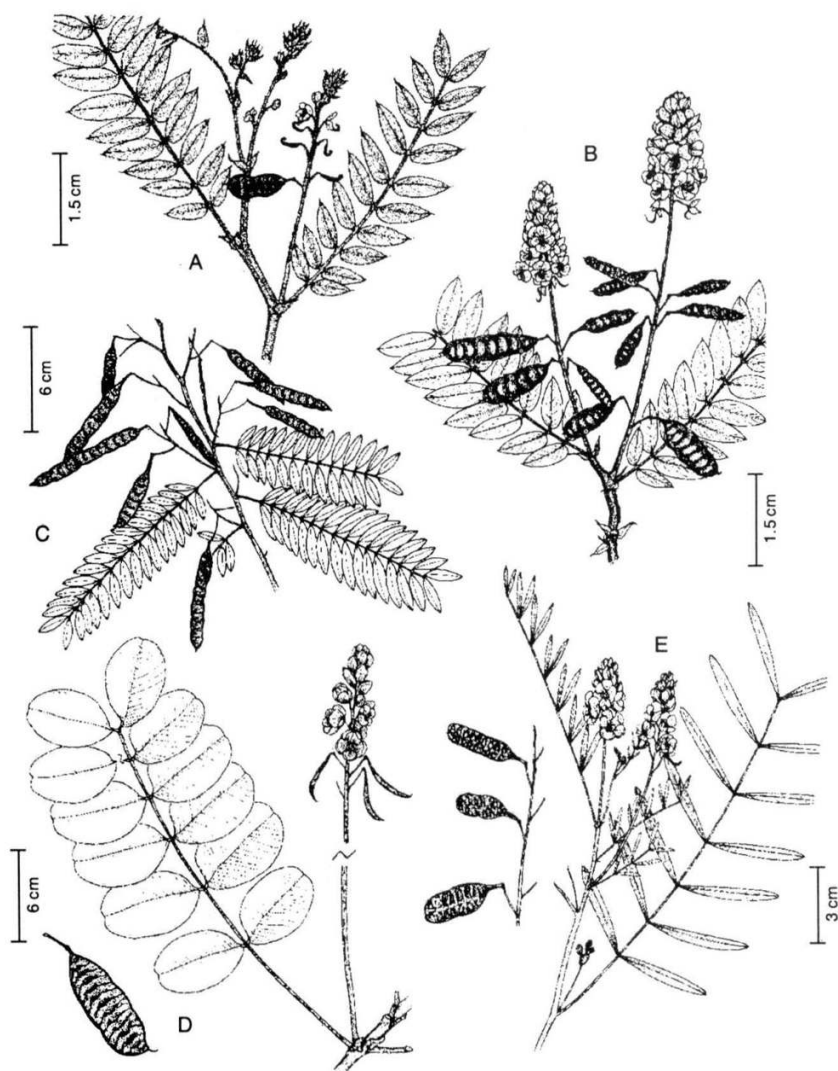


Figure 4A, *Senna notabilis*, a flowering branchlet with flowers and fruit. Note scale bars.

4B, *Senna venusta*, a flowering branchlet with a typical cone-shaped flower head.

4C, *Senna timorensis*, a branchlet with fruit, note the scale bar, $\times 4$ of those above.

4D, *Senna magnifolia*, a flowering node, note the scale, it is also $\times 4$ of the top two species.

4E, *Senna pleurocarpa*, a flowering branchlet, the scale is only $\times 2$ of the top two species.

**AUSTRALIAN ARID-ZONE GROUP* *SENNA* sect. *PSILORHEGMA*:
Shrubs with flat papery pods; usually with 10 fertile anthers, all short;
glands between leaflets.**

During the years 1965–1999, we have been developing an ever deeper understanding of this group of plants, which are unique in Australia, and virtually worldwide, because of the complexities of their breeding patterns. Many of them have doubled the number of their chromosomes, hybridize with many of their neighbours, and have acquired the ability to produce multiple seedlings identical with the hybrid plants. It is these abilities that have caused so much variation that it is impossible to use the usual methods to provide them with names.

I have made several attempts to provide useful names, and each attempt is an improvement on the last. The approach used in the Flora of Australia treatment, which I developed in co-operation with Dr Bryan Barlow, is the best to date. But it is not perfect, and no doubt will also be improved in the future.

In the current scheme, we use 28 species names (and one variety). These refer to taxa which obey all the “rules” we expect of traditional species — they do not appear to hybridize with others, and are quite uniform in appearance, so that they are easy to recognize. Most of these species occur in quite restricted areas of the far northern areas of Western Australia and the Northern Territory, or along the wetter eastern coasts of Queensland, New South Wales and Victoria. A few occur in the southern wheat-belt and goldfields areas of Western Australia.

The remaining 16 taxa are widespread through arid areas of central Australia, and are those in which hybridization is so common. They are not species, as they are very variable in their appearance from place to place, and are almost always collected from very complex populations in which we can recognize several of the 16, as well as many intermediates.

We wished to provide names for these, but they are **not** species, sub-species or varieties, in the sense that these names have been used in the past. Instead, we adopted the designation “form taxon” [“ft” for abbreviation].

All gardeners have become familiar with the concept of cultivar names [“cv” for abbreviation] — they indicate plants with a recognizable, consistent appearance, and are usually of garden origin. So using a name with the “cv” designation allows clear communication between gardeners. In the same way, “form taxon” names enable us to communicate better.

When we use the name *Senna* ft *artemisioides* we refer to the taxon which has leaflets in 3–8 pairs, 1.5–2.5 cm long; more or less terete, and hairy; even though we all know that in the field or garden, the appearance of this taxon is highly variable, with different numbers of leaflets, different leaflet lengths, and different degrees of hairiness. We also know that it is probably always involved in hybridization with the *Senna* plants growing nearby.

So using this name *Senna* ft *artemisioides*, summarizes a great deal of information, and allows better communication between botanists; between botanists and gardeners; and between gardeners.

The arid zone of species, parts E, F and G are in a future issue, forward comments on cultivation. Part E, shrubs with dull seeds; leaflets in 1–3 pairs; inflorescences along the stems; pods curved. Part F, shrubs with dull seeds; inflorescences terminal; pods straight. Parts E, F and G, next issue. Part G, shrubs very variable in appearance, often intergrading between forms.

PART D

Shrubs with SHINY SEEDS; East coastal and tropical distribution.

Senna coroniloides, Figure 5A.

A straggling shrub to 3 m tall. Leaves 5–9 cm long, leaflets elliptic, 9–12 pairs, the largest 1–2 cm long, flat; petioles 5–10 mm long; one stalked gland between lowest leaflets. Fruit stalks 1–3 cm long. Dry sclerophyll forests, of south-eastern Qld and northern NSW. Often grows in brigalow scrubs.

Senna aciphylla, Figure 5B, photograph on page 236.

Spreading shrub to 3 m tall. Leaves 5–9 cm long; leaflets 5–12 pairs, the largest 2–4.5 cm long, edges often recurved; petioles 2–5 mm long; stalked glands between all leaflet pairs. Fruit stalks 2–5 cm long. Wet or dry sclerophyll scrubs from southern Qld to Vic. The recurved edges of the leaflets are usually distinctive.

Grower's Tip:
The easiest
Senna to grow,
prune it hard

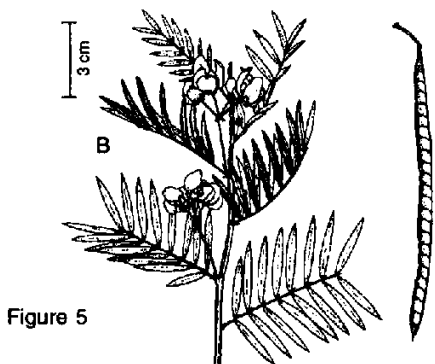
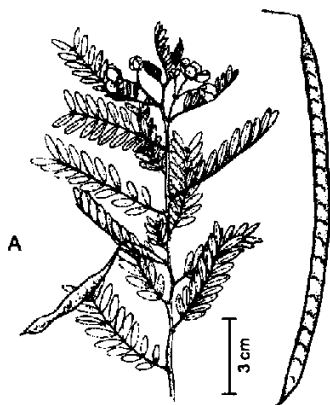


Figure 5

Senna odorata, Figure 6A.

Shrub to 3 m tall, straggling in poor light. Leaves 8–15 cm long, leaflets elliptic, 8–13 pairs, the largest 1–3 cm long, usually flat; petioles 6–15 mm long; stalked glands between all leaflet pairs. Fruit Ab with stalks 3–9 cm long. Anthers Ac. Wetter eastern forests of NSW. This was once called *Cassia australis*, but that name cannot be used in Australian *Senna*. It has already been used for a South American species — “australis” means “south”.

Senna acclins, Figure 6C.

Erect shrub to 3 m. Leaves to 15 cm long, leaflets elliptic, 5–7 pairs, the largest to 5 cm long; petioles 2–4 cm long; stalked glands 1–2 between lowest leaflet pairs. Fruit stalks 2–4 cm long. Rainforest margins in southern Qld and NSW. Lost to science for almost 100 years, its survival is threatened due to rainforest clearance. It should be cultivated, to ensure it survives.

Senna surattensis. The type variety *surattensis* is a shrub or small tree, in good conditions reaching 10 m, though usually shorter. Leaves 5–20 cm long, leaflets 6–10 pairs, the largest 2–5 cm long, sometimes hairy; petioles 3–4 cm long; stalked glands 1–5 between lowest leaflet pairs; petals 1.5–2.5 cm long.

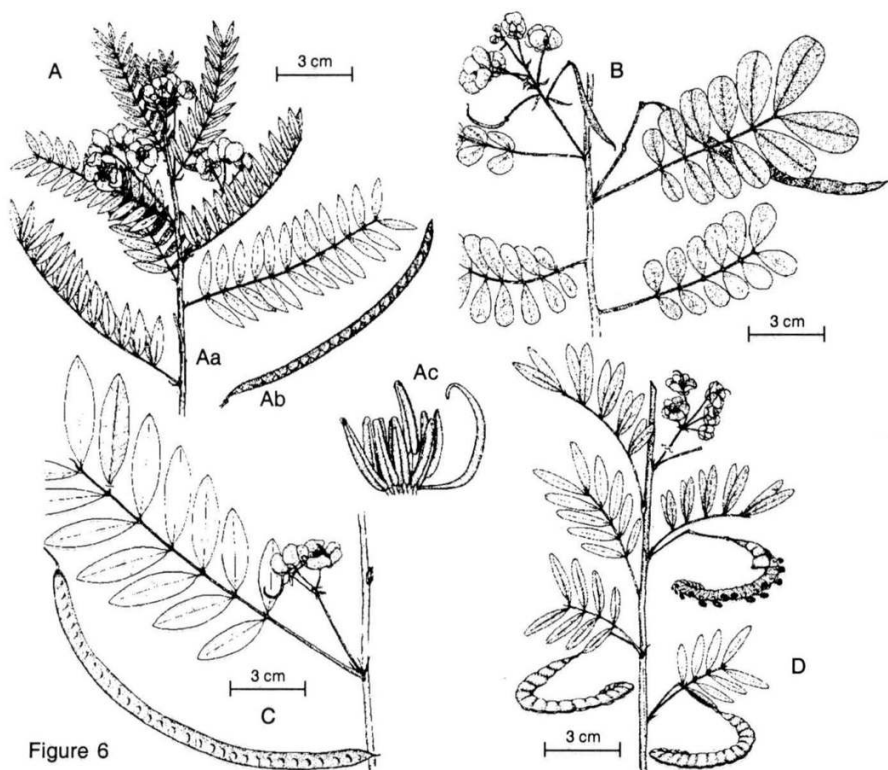


Figure 6

The type variety *surattensis* occurs in closed forests of far Northern Territory, and coastal Queensland. It also grows in Indonesia and SE Asia, where it is often cultivated for medicinal purposes, the leaves providing a poultice for skin complaints. Similar in appearance to *Senna gaudichaudii*, but with larger leaves.

The variety *sulfurea* differs with leaflets in 4–7 pairs, the largest 4–10 cm long, often golden pubescent; petioles 2–6.5 cm long; petals 1–3 cm long. Tropical forests in far northern WA, NT and coastal Qld. It also grows in Indonesia and SE Asia, where it is often cultivated for medicinal purposes.

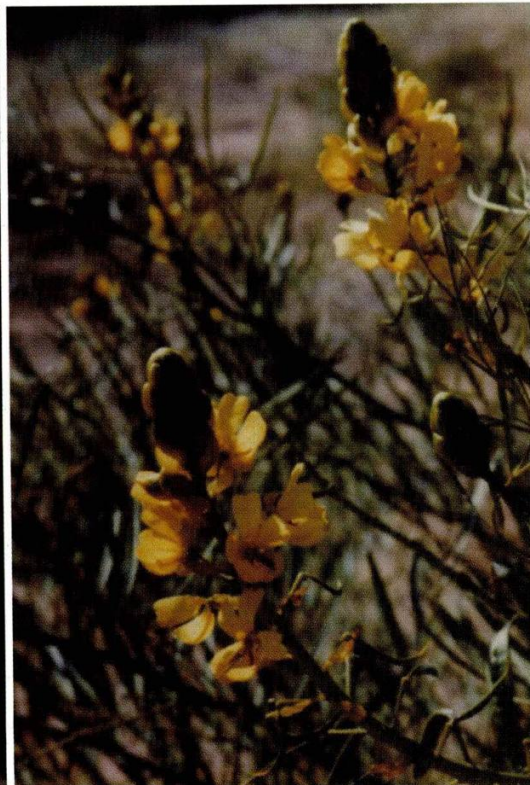
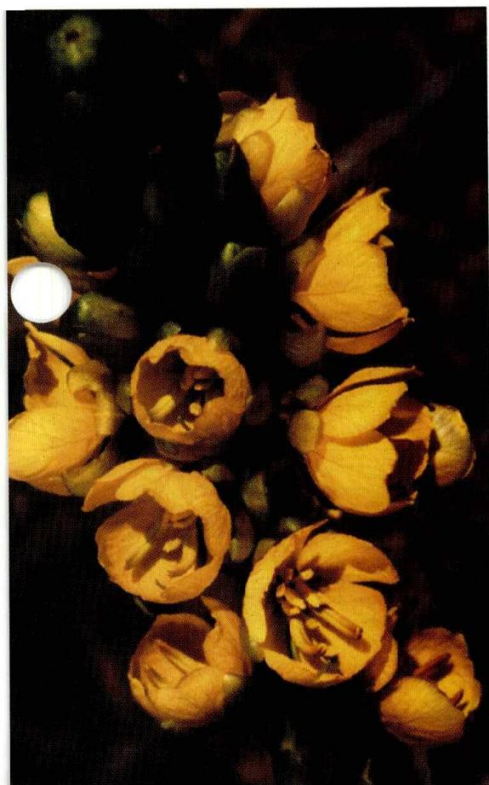
Senna gaudichaudii (formerly *Cassia surattensis* ssp. *retusa*), Figure 6B. Shrubs or small trees to several metres tall. Leaves 5–10 cm long, leaflets 2–6 pairs, the largest 2–6 cm long, usually golden pubescent; petioles 1–3 cm long; stalked glands 1–5 between lowest leaflet pairs; petals 1–1.5 cm long. Rainforests of coastal Qld, south of Rockhampton, Pacific Islands east to Hawaii. The name was given to a plant first collected in Hawaii in 1832.

Senna costata, Figure 6D. Shrub or small tree to 2 m tall. Leaves 4–6 cm long, leaflets 4–6 pairs, the largest 2–4 cm long; usually with stiff hairs; petioles more than 15 mm long; stalked glands 1–3 between lowest leaflet pairs; petals 0.7–1 cm long. Pod curved through half-circle; after it opens the seeds dangle from strong seed-stalks. Scattered in grassy woodlands across inland WA, NT and Qld. The unusual seed pods would make it an interesting garden subject.



△ *Cassia odorata* bush and flowers. See page 235 and 247.

▽ The cone-like flower heads of *Senna pleurocarpa* (photograph by Eddy Wajon).
Description page 244.



Wild plants of Victoria

from Viridans*

All the information residents and visitors of Victoria will need about the whole of the flora of Victoria is now available for easy access in your home. It is on a compact disc for your computer or television screen. The descriptions are simple, two being reproduced below, together with the colour pictures and locality map reproduced on pages 236 and 237.

Sprawling Cassia, *Senna aciphylla*, (photograph on page 236 and description on page 247) sprawls over the ground or through other shrubs where it may reach 2 m tall. The dull green pinnate foliage has leaves divided into 8 to 12 opposite pairs, linear to narrowly elliptic leaflets, as shown in the photograph, each up to 25 x 4 mm, dull green, sometimes sparsely hairy. The yellow flowers are to 25 mm across, with 5, rounded petals and 10 brown stamens. It flowers in two month periods, Jan. Feb. Sep. Oct. Nov. Dec. The fruit is a pod to 8 cm x 6 mm, containing brown, hard seeds.

Desert Cassia, Broad-leaf, *Senna (artemisioides)* form taxon *coriacea*, (photograph on page 237) is a shrub to 3 m tall, with fine, grey-green foliage and large yellow flowers. The pinnate leaves are divided into 2 to 6 opposite pairs of oblanceolate leaflets, as shown in the photograph, each up to 30 x 6 mm, dull green-green, sometimes sparsely hairy. The yellow flowers are to 2 cm across, with 5 rounded petals and 10 brown stamens. The fruit is a pod to 19 cm x 15 mm, containing dark brown, hard seeds. It is a butterfly food plant, for caterpillars of Small Grass Yellow and Icilius Blue.

***Wild Plants of Victoria**; 4 500 plant species are described as above, with 2 500 full colour photographs that will fill your screen. There is information that will assist you to find a specific plant in the wild or to warn you of all the species in a specific area. Alternatively, you can name a plant you came across in your rambles in any part of Victoria.

The compact disc is surely a must for residents in Victoria, especially those in country areas, or those who stroll in the wild. This is especially so for those with children, what fun they will have learning about the plants they see, using an activity, the computer, that has taken a significant interest in their lives. If they have not already become proficient, this is an ideal way for them to learn. What a game, bring home a few specimens then find their name.

Tourists will find this compact disc especially valuable; going to the area, check the plants they will see, make notes, then go and ramble and find the plants. Available from Viridans, 614 Hawthorn Road, Brighton East, Victoria 3187, for \$90, phone 03 9596 8553.

Study groups — The Australian flora is so large, members have found it convenient to concentrate on certain aspects such as Garden design or Container plants, *Acacia*, *Banksia*, *Boronia* and allied plants, *Brachychiton* and allies, *Callistemon*, *Melaleuca* and allied plants, *Correa*, the 'daisy' plants, *Dryandra*, *Epacris*, *Eremophila*, *Eucalyptus*, ferns, food plants, grass and sedges, *Grevillea*, *Hakea*, orchids, palms and cycads, *Prostanthera* and allies, *Ptilotus*, rainforest, *Rhamnaceae*, *Verticordia*, wallum and coastal heath, and wildlife with native plants.

They operate mostly by correspondence although many get together when they can to discuss achievements and problems. Their newsletters, exchange of ideas, plants and seed are convenient for many, especially country dwellers. For more information contact the secretary of the society in your state as listed inside our rear cover.

Australian ferns

Growing them successfully _____ by Calder H. Chaffey*

Introduction by Editor

"Reproduced here are some of the 239 photographs from *Australian Ferns, Growing them successfully* and descriptions of the ferns illustrated. This shows the practical importance of this book to all those keen to grow or study ferns. There is a paragraph with a botanical description but do not be daunted by its apparent technical nature, the book describes and illustrates, by sketches, the terms used; with a little patience, you too can become an expert".

"Typical of the practical approach in this book easily followed instructions on how you can grow your own ferns from spore taken without difficulty from the back of the fern fronds. The method uses facilities readily available in the home. It can be great fun."

Australian ferns, growing them successfully

Histiopteris incisa 'Bats Wing Fern' is an attractive light green to blue-green, soft fern with a lot of variation. In cool climates it is deciduous and in warmer parts may shed its fronds in a cool winter. It has a height of 1-3 m, and wide spreading. A terrestrial fern with a thick, long rhizome covered by glossy hairs, photo page 253.



Grower's Tip:
You can now
grow beautiful
ferns to
decorate
your home

Growing at home — An easy fern to grow. It is not fussy about soil and seems to be able to grow almost anywhere. The best specimens grow in filtered sunlight but it also succeeds in full sunlight or shade. In full sunlight the fronds do not grow so high but in shade they become very tall. It enlarges rapidly in a spreading colony and is therefore most suited to garden cultivation. It may, however, be successfully grown in a large container if the spreading rhizome is kept trimmed. As a thick groundcover it is a most useful fern. Choose a moist area with room to spread. Provided a little water is available it is also useful for those difficult places in the garden where cultivation of other species is unsuccessful. Beware of its spreading nature because it can easily become a weed where it is not wanted. This certainly applies in the fern house. Also the spores are very viable and it will self-sow around the garden. Outside it can be grown with ease throughout the east coast and ranges and along the moister parts of the west coast. This is also a suitable fern for the inland where it may be grown in most places if kept moist and given appropriate shelter for the climate.

There is also a section on growing zones (with maps) or areas where it is recommended for cultivation. Australia is divided into 19 growing zones so that wherever you live, there is practical advice based on reports by experienced growers in your area.

Australian Ferns, Growing them successfully by Calder H. Chaffey, published by Kangaroo Press in association with the Australian Plant Society, available at your bookseller for \$64.95.

This is the book that fern growers and lovers have been waiting for, a book that is an exceptionally well prepared guide to the growing and identification of ferns. With a major input from the Fern Study Group of the Australian Plant Society, the basic facts and practical advice is based upon many years of experience from competent growers from all regions of Australia.

Chapters include What is a fern, Fern habitats, Growing Requirements, Fertilizers, Growing media, Growing Ferns in Containers, Their culture, Places to grow ferns, Growing ferns in difficult climates, Simple propagation, Pests and diseases, and the hundreds of species most widely grown and will succeed for you if you follow the simple advice given.



Huperzia plicatifolia Common Tassel Fern

Cultivation of Tassel



Huperzia prolifera, Square Tassel Fern

Fern on page 254



Humata repens, Dwarf Hare's-foot Fern,
description and cultivation, page 254.



Histiopteris incisa, Bats Wing Fern,
cultivation on page 251.

***Histiopteris incisa*, Bats Wing Fern**, photo page 253, has stripes, spaced along the rhizome, are brown in colour and hairy at the bases. Fronds are up to 4 m in length. Laminae, to 0.9 m in width, are divided three times and broadly triangular-shaped. Secondary pinnae are opposite, mostly triangular-shaped and lobed. The lowest pair of lobes is shorter and "stipule-like" and, at the rachis junction, gives the appearance of a bat's wings. It is from this that the common name is derived. Veins fork several times and some anastomose. Sori are elongated along the pinnae margins, which are recurved to form a false indusium. Moist sheltered rainforests and wet eucalypt forests, in large colonies, often in gullies and along creek banks, and in cleared areas. The only Australian species in, Qld, NSW, Vic., Tas., SA, NT, LHI, NI, NZ, pantropic and south temperate.

***Humata repens*, Dwarf Hare's-foot Fern**, photo page 253, grows to a height to 20 cm, spreading. An epiphytic or lithophytic fern with a slender, long-creeping rhizome densely clothed with brown peltate scales. Stripes, 1–7 cm in length, are articulated to the rhizome and spaced. Laminae, 1–10 cm in length, 1.5–6 cm in width, are divided twice, leathery, thick, dark green, narrowly-triangular-shaped and dimorphic. Veins are free and branched. Fertile pinnules are similar to the sterile pinnules but have sori on the ends of veins very close to the margins. Each vein has a lateral branch ending in a marginal tooth. Indusia are pocket-shaped and round or kidney-shaped. A fern of the rainforest on tree trunks, logs, rocks and occasionally mossy damp soil, usually in wet places near creeks, it occurs in Queensland south to Mackay, New Guinea, SE Asia, Japan.

Growing Dwarf Hare's-foot Fern at home. This is a slow-growing fern, a little difficult to establish, but once growing, a hardy survivor. In a warm humid climate it may be grown outside on moist mossy rocks or as an epiphyte on moist logs and tree trunks. South from Brisbane it is best grown in a fern house. In a cold climate, a glasshouse may be necessary and some heating may be needed. In these situations it makes an excellent basket fern. Plant in an epiphyte mixture. It may also be grown as an epiphyte on a slab of tree fern trunk. Keep in a humid warm situation and water well and regularly. Fertilize with organic or soluble fertilizer sprays or add slow release fertilizer to the growing medium.

***Huperzia phlegmaria*, Coarse or Common Tassel Fern**, photo page 252, is an epiphytic primitive fern ally with roots in a basal tuft; pendent to 90 cm spreading. Stems are 50–90 cm in length, branched more than once and pendent. They bear sterile and fertile leaves in separate zones. Sterile leaves are small or scale-like, leathery, stiff, 6–20 mm in length, 2–6 mm in width. They are ovate-shaped, dark green and arranged in spirals. Fertile leaves bear sporangia. They are crowded, 1–2 mm in length, ovate-shaped, in branches on the distant ends of the stems and up to 20 cm in length. The transition from the sterile to fertile zone is sudden. There is one vein in each leaf. In rainforests as epiphytes on trees or on rocks in NE Qld coast to tablelands, Polynesia, Malesia, SE Asia, Africa.

Growing Common Tassel Fern at home. This very hardy species is probably the easiest tassel fern to grow. In the tropics it may be grown outside as an epiphyte on trees or among rocks in a rockery. Being very frost and cold sensitive, in cooler localities it must be grown in a warm sheltered place such as a fern house or glasshouse which may need some heating. It makes a great show in a hanging basket. Some growers as far south as southern New South Wales have success by hanging baskets near a north-facing brick wall, sheltered by 40 per cent shade-cloth. The bricks absorb heat from the sun and radiate enough heat at night to ensure survival.

Growing tassel ferns. Bright light, ideally filtered sunlight, is very important. In a fern house or glasshouse the best position is near the roof where the light is strongest. The lack of humidity here is not so important as with other species of tassel ferns as *H. phlegmaria* will tolerate slightly drier conditions. However, they do best in an atmosphere of high humidity with plenty of circulating air but away from draughts and wind. The growing medium needs to be free draining, coarse and well aerated. It should not contain soil or fine material which may carry infection, interfere with aeration or become soggy. It should be remembered that such material, if used in potting mix, although satisfactory at first, may eventually break down and clog the medium. A good growing mixture for growing *H. phlegmaria* in baskets is shredded tree fern fibre 1 part, aged pine bark nuggets (2–4 cm) — 2 parts and charcoal chunks (2 cm) — 1 part. Use this medium, or a similar one, if planting *H. phlegmaria* in rockeries or hollows in trees. Some growers plant this fern in chunks of *Platyserium* fibre or use small pieces as a potting mix in baskets. This method is very satisfactory but watch out for fibre breakdown, when the fibre becomes very soggy and will kill the fern. Also beware of overwatering as *Platyserium* fibre holds a large amount of moisture and may interfere with aeration.

Water frequently, especially in summer and in the tropics, to maintain a high humidity. In cold areas allow to dry slightly in the winter. Fertilize with weak soluble fertilizer every two weeks. In cold areas ease off fertilization in the winter. Soluble organic fertilizers, such as seaweed or fish emulsion, watered in or as a foliar spray, are most beneficial. Nuggets of aged hard animal manures placed on the surface may also be used. By modifying the conditions it may be grown in most coastal parts of the mainland.

Propagation is by division of rhizomes, which must be in large clumps. Layering the fertile ends of the stems is also a good method. To do this fill a tray with the potting mixture given above and peg down the fertile end of a stem while still attached to the fern. Lightly cover with the same mixture and keep moist. When roots develop, separate the young fernlets and pot up.

***Huperzia prolifera*, Square Tassel Fern**, (*pro* *liff* *er* a. From Latin *prolifer-proli*, "offspring", fer, "bearing", i.e., bearing offsets.) photograph page 252, is pendent to 40 cm, spreading, which develops into a colony. An epiphytic fern ally with roots in a basal tuft. Stems are pendent, 15–40 cm in length, and branched more than once. Sterile leaves are thin, scale-like, leathery and stiff. They are 4–10 cm in length, 2–4 mm in width, overlapping, narrowly-ovate-shaped and green. Fertile leaves are crowded, 3–4 mm in length, 2 mm in width, ovate-shaped, in branches on the distal one-third of the stems. These bear sporangia. The stems of the fertile part are square-shaped in cross section. The transition from the sterile to fertile zone is gradual. There is only one vein in each leaf. It occurs in rainforests to high altitudes, epiphytic on trees in NE Qld, Melanesia.

Growing Square Tassel Fern at home. Cultivation and propagation as for *H. phlegmaria* but it will grow in a slightly cooler climate and in more shade. Although it is a very easy tassel fern to grow it is very slow. It may be grown on the coast in the east, south and south-west of the mainland.

***Huperzia squarrosa* Water or Rock Tassel Fern**, photo page 256, is pendent to 70 cm, spreading. An epiphytic or lithophytic primitive fern ally with roots in a basal tuft. Stems are similar, 25–70 cm in length, branched more than once and erect to pendent. Sterile leaves are tiny, crowded, leathery and stiff. They are 10–20 mm in length, 1–2 mm in width, narrowly-ovate-shaped and yellowish-green.



△ *Huperzia squarrosa*, **Water or Rock Tassel Fern** described on page 255.

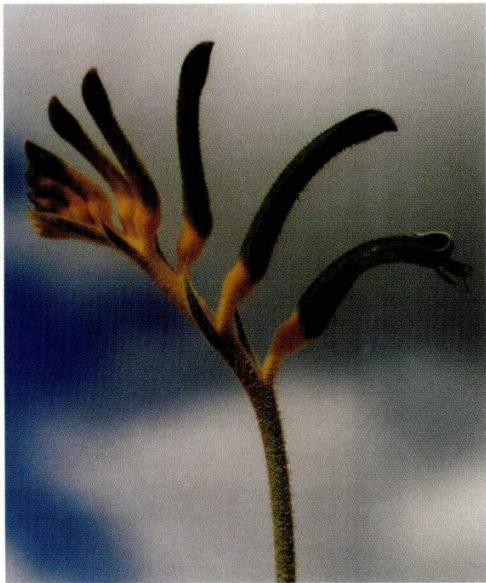
The cultivation of Tassel Ferns at home is described on page 254.

▽ *Hypolepis glandulifera*, **Downy Ground Fern**, has leaves covered with hairs on both surfaces and are sticky to touch when young. Easily grown, very vigorous.





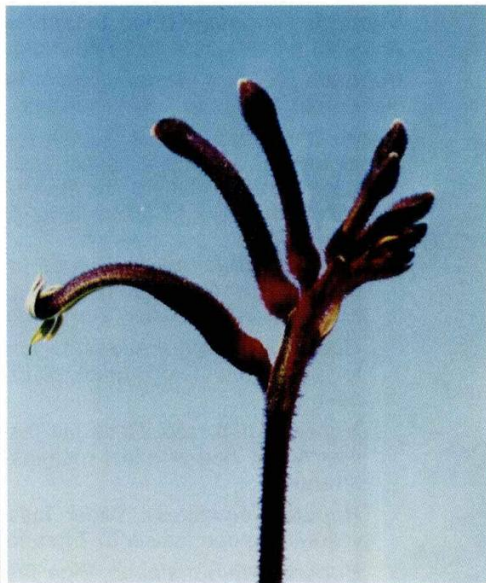
1. *Anigozanthos manglesii*
'The Golden Touch'



3. *Anigozanthos manglesii*
'Green-and-gold'



2. *Anigozanthos manglesii*
'Imperial Red'



4. *Anigozanthos manglesii*
'Bleeding Heart'

1. **The Golden Touch:** a pure gold variant of *Anigozanthos manglesii*; a recessive and true-breeding colour. For discussion, see page 270.
2. **Imperial Red:** a vibrant true-breeding colour; blends exceptionally well with a gold variant in a mixed planting or floral arrangement.
3. **Green-and-gold** version 2; floral Australians in the making.
4. **Bleeding Heart:** a red-and-purple variant differing from the common red-and-emerald of *Anigozanthos manglesii*, with a recessive pH-controlling gene.

The fertile leaves of **Water or Rock Tassel Fern** are crowded, 4–7 mm in length, 2 mm in width and ovate-shaped. They bear sporangia and are on the distal part of the stems which are 10–30 cm in length, unbranched or branched once. The transition from the sterile to fertile zone is gradual but occasionally the fertile tip produces a sterile zone again and a further fertile region. There is one vein in each leaf. It occurs in rainforests as epiphytes on trees or on rocks and moist rock walls, in NE Qld, Polynesia, SE Asia, Africa.

Growing Water or Rock Tassel Fern at home. Cultivate as for *H. phlegmaria* but needs a lot of warmth, light and humidity. It is a very easy tassel fern to grow. As it forms a large clump it makes a most spectacular basket specimen. It needs ventilation and protection from cold to which it is very sensitive. It may be grown in most coastal regions of the mainland.

More Tassel Ferns

Flora of Australia*

All 12 species of *Huperzia* are described with the line drawing opposite.

***Huperzia australiana*, Fir Clubmoss**, detail O (opposite), is a ground growing Clubmoss with branches erect or decumbent to 40 cm long.

Huperzia serrata is a similar plant but with pale to dark green leaves, the margins prominently toothed.

***Huperzia varia*, Long Clubmoss**, detail D–F, has larger leaves to 18 mm long spirally arranged.

***Huperzia carinata*, Keeled Tassel Fern**, is an epiphytic plant with thick mid to yellowish green leaves to 2 mm wide, strongly keeled 30–45° to the axis.

***Huperzia prolifera*, Square Tassel Fern** is similar in appearance but with thin deep green leaves to 4 mm wide and not strongly keeled.

Huperzia marsupiliformis, (detail A–C) is in a group of Tassel Ferns where the sporophylls are distinctly shorter than the leaves, the pale green to yellowish green leaves as in detail B, the sporophyll pointed as in detail C. The pendulous, tufted branches are to 60 cm long. Other epiphytic tassel ferns in this group are:

***Huperzia phlegmaria*, Coarse or Common Tassel Fern**, Detail K, the stiff deep green leaf to 20 mm long, detail L, densely spirally arranged, the transition from the sterile to the sporogenous zone abrupt.

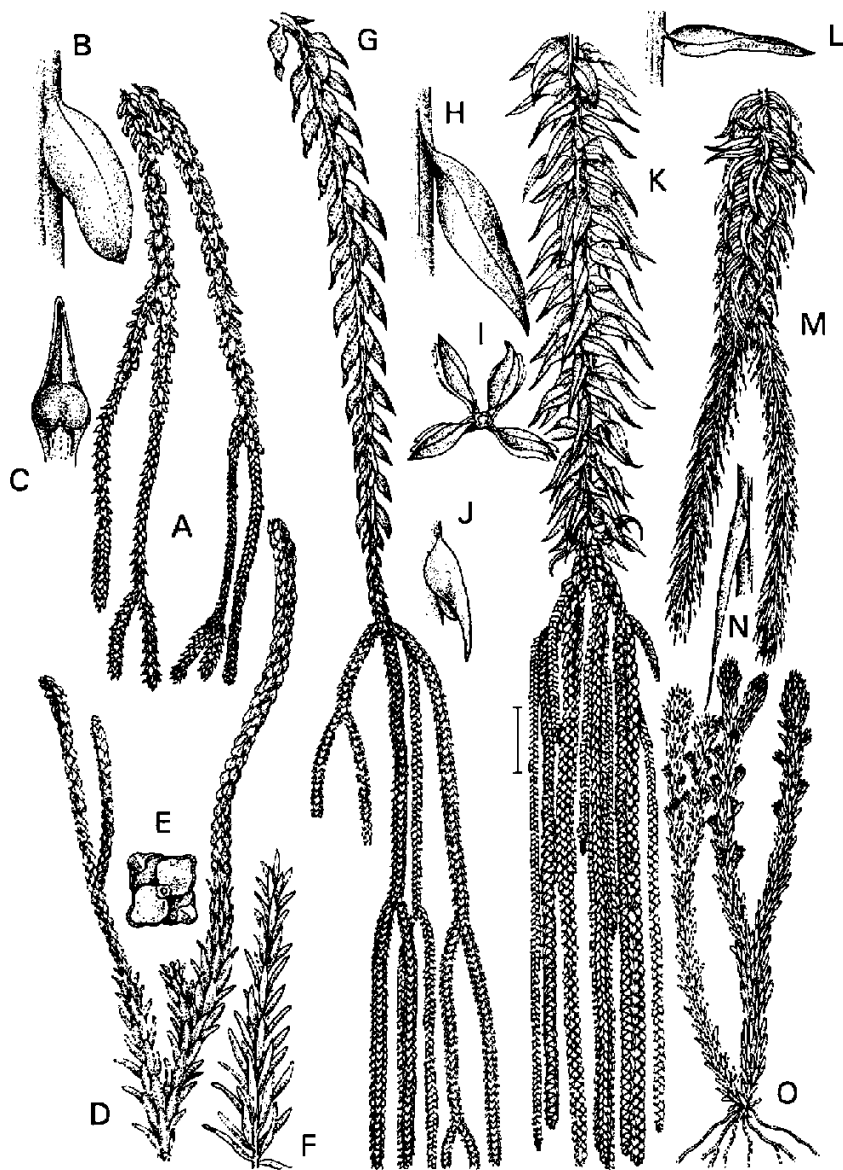
***Huperzia phlegmarioides*, Layered Tassel Fern**, detail G, the bright green to yellow-green leaf H arranged in characteristic fashion as in I, a sporophyll as in J.

***Huperzia filiformis*, Rat's Tail Tassel Fern** has thick dark green leaves less than 5 mm long with leaf margins prominently toothed and densely spirally arranged.

***Huperzia squarrosa*, Water Tassel Fern**, detail M, the thin pale green to yellowish green leaves to 7 mm long as in L, are arranged in 4 rows.

***Huperzia dalhousieana*, Blue Tassel Fern**, has glaucous, rich bluish green leaves to 25 mm long in whorls of 3, crowded, spreading and angled 45° to the axis.

**Flora of Australia* — Volume 48, Ferns, Gymnosperms and Allied Groups; a vast volume of 766 pages describing 582 species found in Australia. It is available for \$59.95 from CSIRO Publishing P.O. Box 1139 (150 Oxford Street), Collingwood, Victoria 3066. Phone (03) 9662 7666 for details or Email: sales@publishing.CSIRO.au. This is a scientific book; the plants are described in technical botanical terms. However those keen to know more about ferns can readily translate the language for their own use as I have done for the Tassel Ferns. A feature of the book is the clear sketches, the one opposite by G. R. M. Dashorst.



Huperzia marsupliiformis, A Tassel Fern where the sporophylls are distinctly shorter than the leaves, B, the sporophyll pointed as in detail C.

Huperzia varia, Long Clubmoss, D-F, has large leaves spirally arranged.

Huperzia phlegmarioides, Layered Tassel Fern, G, leaf H and I, a sporophyll J.

Huperzia phlegmaria, Coarse or Common Tassel Fern, K, stiff leaf L.

Huperzia squarrosa, Water Tassel Fern, M, leaves in 4 rows, sporophyll, N.

Huperzia australiana, Fir Clubmoss, detail O, a ground growing Clubmoss.



Splendid Everlasting, *Rhodanthe chlorocephala* ssp. *splendida*



Pom Pom Everlasting, *Cephalopterum drummondii*



△ **Silky Halgania**, *Halgania sericiflora*

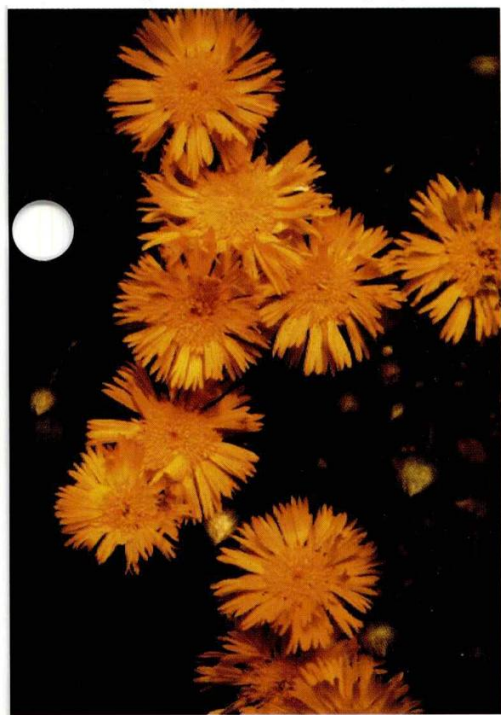
Photographs here and opposite by Eddy Wajon from *Wildflowers of Kalbarri and Goldfields.*

▽ **Bright Podolepis**, *Podolepis canescens*



△ **Felty Bellflower**, *Bonamia rosea*

▽ **Wiry Everlasting**, *Schoenia filifolia*



Wildflowers of Kalbarri and Goldfields of Western Australia

see the photographs on pages 260, 261 and 280

by Eddy Wajon*

Podolepis canescens, **Bright Podolepis**, is a slender plant 5–80 cm tall; round yellow flowers 2–4 cm across; spear-shaped leaves 5–8 cm long × 5–10 mm wide. Flowering August to December it is a very common plant in woodlands or plains of all of Western Australia except north of Exmouth.

Schoenia filifolia, **Wiry Everlasting**, is a slender plant 10–50 cm tall; shiny yellow flowers 10–20 mm across; thin, wiry leaves 5–20 mm long × 1 mm wide. Flowering August to November it is common on plains in sand or clay, Carnarvon to Geraldton, Brookton, Kalbarri, Leonora and Meekatharra.

Halganis sericiflora, **Silky Halganis**, is a shrub 1–2 m tall; purple to blue flowers 1.5 cm across with yellow centres and silky grey in bud; silky, toothed oval leaves 1–4 cm long × 2–8 mm wide. Flowering July to November, it is not common in woodland and heath in sand or gravel, Murchison-Kalbarri, Eneabba-Morawa.

Bonamia rosea, **Felty Bellflower**, is a slender plant 0.1–1 m tall; white pink or yellow (rare) flowers 1–2 cm across; silky hairy oval leaves 10–15 mm long × 5–8 mm wide. Flowering July to September, it is not common in woodland in sand, clay or stony soil, Port Hedland to Carnarvon, Geraldton, Southern Cross and Giles.

Cephalopterum drummondii, **Pompom Everlasting**, is a slender plant 5–50 cm tall; yellow, white or greenish globular flowers 5 cm across; spoon-shaped leaves 5 cm long × 1 cm wide, mostly at the base of the plant. Flowering July to October, it is very common in woodland or plains, Exmouth to Geraldton, Moora, Norseman, Eucla and Wiluna.

Rhodanthe chlorocephala, **Splendid Everlasting**, is a slender plant 10–60 cm tall; white globular flowers 6 cm across; straight leaves 1–3 cm long × 2 mm wide. Flowering from July to October, it is very common in woodland and plains in sand, clay or loam, Carnarvon to Mullewa, Koorda, Kalbarri and Wiluna.

Keraudrenia integrifolia, **Common Firebush**, is a shrub 0.5–4 m tall; hairy purple to lilac flowers 20–30 mm across; straight, oblong leaves 2–3 cm long × 1 cm wide. Flowering in February to December, it is very common in woodland and heath, Port Hedland to Carnarvon, York, Esperance and Giles.

Pityrodia terminalis, **Native Foxglove**, is a shrub 0.5–1 m tall; pink to red (in the north) or white (in the south) tubular flowers 2 cm long in a cluster 10–30 cm long at the end of branches; woolly, oval leaves 1–3 cm long × 0.5 cm wide. Flowering August to November it is common in heath in sand or gravel, Billabong to Katanning, Esperance, Kalbarri and Murchison.

**Colour Guide to Spring Wildflowers of Western Australia, Part 1, Kalbarri and the Goldfields*, by Eddy Wajon. This book is available from Wajon Publishing Company, 16 Eckersley Heights, Winthrop, WA 6150, phone 08 9310 2936, for \$19.95 plus \$2.50 postage. Additional parts are planned each year, Part II, Perth and the Southwest, in July 2000. This is the ideal reference for travellers in the west, keen to see and identify the vast array of wildflowers. For each of the 220 species described as above, there is a beautiful colour photograph. The plants are presented in groups of similarly coloured flowers, red, pink and mauve, orange and brown, yellow, white, green and black and blue and purple flowers. See a flowering plant in the wild, look at photographs of plants with a similar coloured flower and stop when you get to the plant in front of you. A quick easy check of the plants in this way adds fun and purpose to your trip through the wonderland of flowers in season in Western Australia.

More Wildflowers — easy to grow?

notes by W. H. Payne

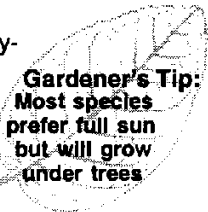
Let us take another look at the wildflowers on the previous pages. Many of these can be cultivated readily.

Halganina. The 16 species of *Halganina* are described in volume 18, page 156, with colour photographs of two species. "Most species require a warm, very well drained site, preferably in full sun, although they will grow happily under trees in inland areas. Many favour alkaline soils, and I have excellent results by adding garden lime to the soil for a spread of 1–2 metres.

Halganina sericiflora, **Silky Halganina** is a delightful low grey-green shrub with masses of terminal flowers in spring.

Halganina andromedifolia 'Lavender Halganina', is a most spectacular small to medium shrub. To achieve best results plant it in a hot well drained position on a mound of rubble.

Halganina cyanea 'Rough Halganina', is a widespread plant, common in cultivation. All are garden gems. A number of species grow in alkaline soil when over limestone.



Gardener's Tip:
Most species
prefer full sun
but will grow
under trees

Keraudrenia integrifolia, **Common Firebush** has been a feature plant in my garden for years now. There are 13 species all with showy flowers to 3 cm across, all blue or with shades of red to pale purple. Properly pinch pruned they can form compact bushes (I am told) covered with bright flowers. I let mine get leggy and it grew through a *Hakea purpurea* bush. Now my *Hakea* has a hat of purple flowers over it for long periods of the year. If you can get a plant of *Keraudrenia*, any species, plant it and enjoy. It will grow readily from cuttings.

Bonamia rosea, **Felty Bell flower**; this photograph prompted me to check my books. It belongs to the plant family Convolvulaceae, which are usually floppy or trailing plants. There are two erect species that display the flowers well, this one and *Bonamia erecta* found in the desert regions of NT, WA and SA. This plant could prove to be a horticultural gem especially for containers. If someone can obtain plants of the white, pink and yellow forms they could be very valuable.

Pityrodia, **Native Foxgloves**, another plant gem from dry situations that has considerable potential for horticulture. Reports are needed from readers on their experiences in growing these plants. They have great potential as a potted flowering plant as well as in rockeries.

The everlasting daisies

see also volume 17, page 346

In our last issue we showed a mass planting of these at Mt. Annan Botanic Garden. The white flowers are species of *Rhodanthe*, the yellows *Podolepis* and others such as *Cephalopterum*, *Schoenia* and *Waitzia*, and the pinks are forms of *Rhodanthe*. The photographs on page 261 show flower heads of some of these. They are all easy to grow as bedding and border plants if you wish to go the trouble of getting a bright display of annuals. All you need is seed, which is widely available. To get the display at Mt. Annan, they direct seeded in May and protected them from birds and animals until flowering in September. I planted mine later in the year. I have tried various methods all very productive. I use a shallow pot with the same mix I used for cuttings, one third peat, one third perlite, one third coarse washed river sand. Sow the seed by sprinkling on top and then a light sprinkle of the propagating mix. The container was placed on the shelf next to my cuttings, being taken out, when I think of it, to sit in direct sun sometimes during the day. The results were good. The seedlings are easily eased out by a pull on the two new leaves with a nudge from below with a narrow stick. Grow on as for any other garden annual.

Figure 2
Thelymitra antennifera



Figure 3
Thelymitra circumsepta

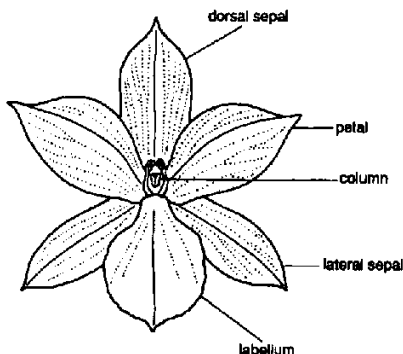
See page 277 for close-up
colour photos of twelve
species of *Thelymitra*.

Sun orchids, *Thelymitra*

by David Jones et al.*

Thelymitra are known as **Sun Orchids** because the flowers of most species open only in warm to hot weather, on bright sunny days. There are 70 species mostly occurring in Australia. They are terrestrial orchids that die back after flowering to fleshy subterranean tubers.

Orchid flowers contain an outer ring (whorl) of three sepals and an inner whorl of three petals, perched on top of a slender to swollen ovary. The front or median petal is often greatly modified and is known as the lip or labellum. With *Thelymitra*, the labellum is generally similar in shape and size to the petals. The column, the central fleshy organ in the centre of the flower, is the key organ for identification and Figure 4 shows a number in colour. It comprises the style and the staminal filaments unequally arranged. A feature is the two projecting arms flanking the anther, many adorned with a brush-like cluster of hairs.



See photograph of Figure 4 on page 277.

Thelymitra antennifera, **Rabbit-ears**, photograph Figure 2, is found in coastal heathland on poorly to moderately drained peaty and sandy soils, on the east and north coasts of Tas., Vic. and WA. Leaves are linear, 6–12 cm x 2.5–3 mm, terete, dark green, reddish at the base. The scape may be 10–25 cm tall, of 1–4 fragrant pale to bright yellow flowers 25–35 mm; the external surfaces have a reddish brown band that sometimes stains the inner surface reddish. The column Figure 4 is 5–6 mm long, with ear-like arms held high, dark brown and notched as in Figure 2.

Thelymitra circumsepta, **Naked Sunorchid**, photograph Figure 3, is widespread but localized in Tasmania from coastal lowland to 700 m altitude inland, favouring colder and wetter areas at higher altitudes. It is found also in NSW, Vic. and NZ. The lanceolate leaf is 15–30 cm x 15–25 mm thick, leathery, channelled, ribbed, dark green, basal brownish.

**The Orchids of Tasmania* by David Jones, Hans Wapstra, Peter Tonelli and Stephen Harris. Published by Melbourne University Press, P.O. Box 278, Carlton South, Victoria 3053, tel. 03 9347 3455, the book is available for \$79.95. This could be described as the perfectly presented book. The 195 Tasmanian species are simply but clearly described (the descriptions above are a summary) each with a beautiful colour photograph (two are reproduced here) a location map, habitat, etc. The excellence of this work is a testament to the competence of the authors:

David Jones, research scientist at the Australian National Botanic Gardens and author of many books on orchids, ferns, cycads, etc.

Hans Wapstra, is recognized as Tasmania's leading orchid specialist, a biologist with the Tasmanian Department of Primary Industries, Water and Environment.

Peter Tonelli, naturalist and photographer superb.

Stephen Harris, senior botanist with Tasmanian Dept. Primary Ind., Water and Environment.

Les Rubenack for the spectacular photographs of *Thelymitra* columns, Figure 2.

The flower head of **Naked Sunorchid** may be 15–70 cm tall with 3–20 flowers, 20–30 mm across, pale blue to dark blue, purple or pinkish, but sometimes with the sepals lighter coloured. The column in Figure 2 is 3–5 mm long, erect, the post-anther lobe very short, not hooded, irregularly toothed, usually yellowish, flanked by two much longer obliquely erect yellowish auxiliary lobes, the column arms erect with a dense tuft of yellowish hairs.

Listen our land is crying

by Mary E. White

Published by Kangaroo Press, available at your book seller for \$69.95.

This book provides interesting reading for all Australians. If you have children the book is a must as a reference for school projects. While the presentation is based upon scientific fact, diagrams, graphs, maps and tables of data, the wording is simple and makes interesting reading. The many colour photographs are impressive, but what makes it a book for people of all ages is the many inserts of short stories, factual but interesting and readily understood by the young with a short span of concentration. The chapters say it all:

Water, land and life; the world's primary resources of water and soil, finite and degraded. **Australia's climate, global and local;** global warming, the facts and the El Niño phenomenon.

Australia's geological history; how the past helps to explain today's problems.

Biodiversity; the multitude of living organisms which form the web of life, can we recover?

Soil, a non-renewable resource in serious trouble. Are we committed to a desert continent?

Salt and salination of soil and water; a creeping disaster that could devour the land.

The Murray-Darling Basin and river system; Australia's breadbasket in serious trouble.

The Riverine Plain of the Murray Basin in NSW; irrigated agriculture, we need it but!

Australia's Grasslands; our grazing land is close to extinction, decline to desert!

The National Drylands Salinity Program a study of five focal catchments of specific areas.

Feral animals and plants out of control causing devastation.

The Tropical north; a vast resource needing informed sympathetic management.

The Arid Rangelands; vast areas of our inland, productive or desert, the crossroads.

Mining and the environment; mining, the most environmentally conscious of all land users.

Forests and wilderness; destroying old growth forests to replace it with plantation is criminal vandalism. Plantations should be established in already degraded agricultural land.

Coastal and marine environments, the eastern green crescent; destruction and rehabilitation.

Epilogue; Gala, The living earth and greed of man; environmental health versus short term gain for a few.

This book is the current one in a series of fascinating scientific studies of the early evolution of the Australian continent. The earlier ones are listed below. The latest in the series "*Listen our land is crying*" is not a historical book but a warning of pending disaster if our politicians do not change their priorities. Hopefully all Australians will read it; I wonder if our politicians will read it or will their minds continue to treat them as mushrooms.

The Greening of Gondwana by Mary E. White examines the birth of our continent and the changes as life evolves. The first book by Mary White, available for \$59.95.

After the Greening, the browning of Australia by Mary E White, traces the evolution of the driest vegetated continent by rifting and drifting from the green and forested, well-watered Gondwana. Her second book available for \$59.95.

Listen our land is crying

but who will listen _____

by W. H. Payne*

A continent degraded to the extent that the Australian prosperity, our quality of life is threatened. If action is not taken now we will irrevocably bankrupt the continent for which we are responsible. It is not right to **blame the farming/grazing community** that has clothed and fed us and provided the basis for our present prosperity. There has been a rude awakening for them as their land progressively becomes unproductive, the new generation has been alerted.

It is not right to **blame the mining and forestry industries**, they have paid our debts and maintained our prosperity. They are the very cornerstone of our standard of living and are keen to modify their practices for sustainable growth.

It is not fair to **blame our politicians** as they are quite unaware of the pending disaster. They are treated like "mushrooms" and believe their own propaganda at election times where glossy reports appear to indicate positive action.

The scientific community know what is necessary but they have had to confine their activities to the limits of the "political" budget eked out to them. This society made a prodigious effort to encourage the people responsible for the Year 2001 celebrations of 100 years of federal government, to at least formulate a management plan for our continent based upon the recommendations the scientists can make. We did not take the "greenie" approach of "do not do this or that because", but a positive approach that showed vast economic advantages in the correct management of our natural resources, sustainable and wealth productive. However, the approach by the management for the 2001 Federation celebrations is for vast expenditure on the restoration of old buildings, new buildings in Canberra and fireworks and local parties for the peasants.

There can be no excuse any longer

"This continent is heading for a major collapse of its natural resources" is a direct quote from *"Listen our land is crying, Australia's Environmental Problems and Solutions"* by Mary White. It was reasonable that the government should claim that they were acting in the country's best interests when they took away aboriginal children, or sent our young men to Vietnam, but our country's leader, John Howard, will have no excuse for neglecting to head off the disaster facing the nation. The scientific facts are all graphically illustrated in "Listen our land is crying". It is difficult to pin down who is to blame for the farce being promoted for the year 2001 but the chairman, Dick Smith, and the chief executive, Tony Eggleton, have the leadership responsibility. Mary White is not as forthright in her book but her frustration shows in every page. Her approach is to calmly define and illustrate the facts in an objective scientific way in the hope of avoiding the hysteria if the public understood the disaster confronting us. We put our case to the Centenary of Federation Committee in this reasoned and logical way, without result. Please excuse the editor but the stakes are very high, the very future of Australia and its quality of life.

*The challenging remarks above are all to be blamed on the Editor. That incredible lady Mary White has been quite constrained in her comments, preferring to keep to the facts in the hope that someone in authority will at last take notice of the disaster confronting us. Her book is revealing, incredibly provoking in her determined way, read about it.

Australia neglected by our leaders

Editor *et al.*

The environment has come and gone as an issue in recent years. While it is an issue that regularly scores well in polls designed to identify the public's perception of matters for concern, it is not high on any political agendas. Most government backed programs . . . are very small relative to the problems.

David Cocks, CSIRO Wildlife & Ecology Division fellow, in *Australian Landcare**

Disaster looms for Australia

by Alex Campbell, chairman, of the Land and Water Resources Research and Development Corporation (LWRRDC) provided this advice in the September 1999 issue of *Australian Landcare** as summarized by the Editor.

"Salinity is a disaster that will touch every Australian's hip pocket. It is potentially the biggest environmental problem facing Australia. Dryland salinity costs Australians more than \$270 million a year in environmental degradation, degraded water supplies, lost agricultural production and damage to infrastructure like roads, buildings and recreational facilities.

Up to 15 million hectares of land could go saline within 50 years. For too long, urban Australia has seen this as only an agricultural problem. It is now a major issue for those living in urban areas, and for the wider environment. Conservative estimates indicate damage to urban infrastructure in Australia amounts to about \$100 million a year. For the city of Wagga Wagga in NSW, urban salinity is costing \$3.2 million a year — or potentially \$95 million over the next 30 years, if no new action is taken.

It is estimated that at least 80 other country towns are suffering from damage to the foundations of buildings and infrastructure due to rising saline water tables. Damage has been noticed at the edges of larger cities, like Sydney. With costs of up to \$1 million a kilometre to repair highways affected by salinity. A 1997 investigation of roads in Western Australia found that 230 km were already affected by salinity and waterlogging in that state alone.

Research indicates that salinity could spread and affect six times the area of land that is currently affected within the next 20 to 50 years. This means a third of our productive landscapes would be affected in the lifetimes of our children".

The Murray Darling Basin Commission reports "that currently, of the 5.1 million tonnes of salt now mobilized annually, 2 million tons enters streams and is carried by the Murray to the sea with 3.1 million tonnes deposited within the landscape, in the Murray basin alone. These figures are rising and within the next 100 years 5 million tonnes will be deposited annually".

Editor. The continent is drowning under a relentless release of salt. Planting trees is a short term remedy, temporarily holding back the flood. Water is a valuable resource becoming increasingly critical for world survival. We need not waste it, but remove the salt as a lucrative by-product to survival. Research into cheap methods of salt removal to acceptable levels is a national priority.

Infernal ferals: a national blight

by Peter O'Brien

Executive Director of the Bureau of Rural Sciences, Agriculture, Fisheries and Forestry, Australia as published in *Australian Landcare*, and summarized by the Editor.

Every year in Australia hundreds of thousands of foxes, rabbits, goats, pigs, cats and rats are trapped, poisoned, shot or otherwise destroyed. They are killed because of the agricultural losses and environmental harm they cause.

**Australian Landcare*, a quarterly journal for the environment, landcare, greening of Australia, bushcare and regeneration, sustainable farm management, etc., is available for an annual subscription of \$25, phone 1800 035 351. The December 1999 issue focuses on Achievements and Challenges and the work of thousands of dedicated, concerned Australians.

Over the past century, knowledge about pest animals and techniques for controlling them has greatly improved, but the general approach has changed little. The hope has been that with lots of effort pests can be all but eliminated. Yet, they continue to thrive. Clearly it is time to review the past, and to plan pest-animal management that is smarter and more successful.

Living soil crusts crucial in pastoral zone

by Dr David Eldridge
Research Scientist, NSW Land and Water Conservation in *Australian Landcare*, summarized by Editor.

Overgrazing in arid pastoral zones could literally be costing the earth. The living organisms that make up soil crusts in fragile semi-arid rangelands are smaller than the head of the match but they play a crucial part in soil health and productivity. These organisms add nutrients like phosphorus, nitrogen and carbon to the soil and some also secrete substances which bind soil particles together. By increasing soil stability, these crusts reduce wind and water erosion".

The small organisms that grow on soils include plants such as lichens, mosses, liverworts, fungi, bacteria and algae. The uneven soils surface created by the crusts trap water and seeds. This, combined with the greater soil fertility, creates the ideal environment for seed germination and seedling growth. During droughts, soil crusts are often the only form of soil protection. Since soil crusts give us an insight into how healthy the land is, they are an essential part of sustainable land management. Once crusts are gone, it can take more than 50 years to get them back. Nature's way to survive drought being frustrated.

It is not all gloom and disaster

Editor

The above facts on the disaster facing Australia are just a few of the areas needing a national emergency effort, that was submitted to the government for adoption as planned objectives for the future salvation of Australia as a worthy objective for the anniversary celebrations for 100 years of federal government. We were ignored. We made the point that there are thousands of concerned Australians already active in this area with very limited funds and their honorary labour, who would form the nucleus for a planned, national emergency effort.

Landcare: There are now 4 500 landcare groups with more than a third of all farmers involved. The effort is not working to a national plan for lasting improvement and is seriously under-managed and funded.

Greening Australia, a competent, dedicated team fostering tree planting, farm forestry and remnant bush regeneration. They are able to adequately organize only a few of the schemes requested of them.

Bushcare Network, the promotion of sustainable vegetation management with 120 support officers for a nation-wide network of community groups engaged in bushcare and regeneration. There are many local action groups in this network.

Wildlife corridors, ribbons of green across the country, is the objective of many regional groups and concerned land owners who are dedicating some of their own land for this purpose. Government provides fencing but exploits the propaganda.

Government words but only political action

At election time and other opportunities for deceiving the public, the work of the above groups is presented as government initiatives and areas of major funding. There is no shortage of committees, seminars and words, but there is no commitment to face the disaster facing our continent, ***Listen our land is crying.***

Kangaroo Paws

Not Your Average Kangaroo Paw. II.* Uncommon Mangles'

by Beng Tan, Curtin University of Technology, Perth

Vibrancy of flower colour and unique floral shape are undoubtedly the greatest horticultural attributes of Mangles' Kangaroo Paw (*Anigozanthos manglesii*). This WA wildflower has justifiably earned its place as the State's floral icon. Displays of vivid "red-and-green", a sight to behold for visitors; poetic, like Wordsworth's daffodils, they too can dance and prance in the breeze.

In collaboration with a seedling nursery, the author recently undertook a breeding program to develop "uncommon" colour variants of Mangles' kangaroo paw. These are to be raised from seedlings and must breed true for a specific flower colour. The first pre-requisite is fulfilled by the species' natural fecundity but the second requirement entails research and keen observation.

The species is highly heterozygous, and this necessitated much re-selection cum progeny testing to achieve fidelity for a specific flower colour or combination. Self-pollination is not an option to achieve true-to-type breeding behaviour because it will result in near to complete sterility. Varietal stability and seed production depend on hybridization between related plants possessing similar flower colour(s) and plant characteristics. See photographs on page 257.

Four broad cohorts of colour variants can be recognized:

- Yellow (in grades, ranging from pale lime to rich gold)
- Red-and-green (from red-and-lime green to red-and-bluegreen)
- Red-and-burgundy (from all-red and red-and-rose to red-and-purple)
- Green-and-gold (from yellow-and-pale green to bronze-and-dark green)

The ubiquitous and genetically dominant flower colour of the species is red-and-green, but this can vary from red-and-lime to red-and-bluegreen. Odd individuals displaying a different flower colour may occur but infrequently in natural populations. One such variant is the recessive yellow form, a natural sport that has lost its ability to produce red flower pigments (anthocyanins). The red-and-green and the red-and purple cohorts appear to be two parallel series with "equivalents" in each cohort. The difference between two "equivalents" e.g., red-and-bluegreen and red-and-purple is the presence of a recessive gene controlling hair cell sap pH or acidity in the red-and-purple form. With this underlying genetic control, hybridization between two heterozygous red-and-green individuals will produce red-and-purple variants in 25% of the progeny. Further, the latter group will breed true.

The green-and-gold form, which is developed exclusively by breeding, appears to be a genetic contradiction. The absence of colour pigments in ovary hair cells, while present in the continuum of perianth hairs, can only be explained by genetic suppression of anthocyanin synthesis in the ovary hair cells but not in contiguous ones covering the perianth. *Continued page 278*

*In a previous issue of *Australian Plants* (19: 267-270, 1998), two chimeral "sports" of red and yellow kangaroo paws (*A. rufus* and *pulcherrimus*), which display green:yellow stripe leaf variegation or split flower colours were described. The harlequin-like trait in the latter sport is inherently unstable and, after several flowering seasons, the original mutation quite predictably gave rise to both individual red and yellow flower stems within the same clump (see Plate 5 in the referred article). Leaf variegation, on the other hand, is stable but a variegated-leaf sport is generally less amenable to tissue culture propagation.

Eucalyptus foliage

Cut stems, pruning and postharvest; leaf wax structure

by Michelle G. Wirthensohn and Margaret Sedgley*

Most *Eucalyptus* species go through a change of leaf form from glaucous, often rounded, juvenile leaves to glossy, lanceolate-shaped adult leaves, sometimes via an intermediate phase. The juvenile leaves are valued for their ornamental worth, see photographs on page 276. The stems are used as a filler for flower arrangements worldwide. Plants must be pruned regularly to avoid the adult transition and to promote growth of coppice shoots with juvenile leaves. Once the stems have reached a marketable length (>40 cm) they are harvested as soon as the tips have hardened off, and do not wilt after picking.

Coppicing is a form of management in which trees are cut back regularly to encourage growth of shoots from the base of the trunk. Coppice stems initially grow faster than uncut or seedling trees because they have the advantage of an existing root system. *Eucalyptus* coppice shoots can sprout from the cut surface of the trunk, the whole length of the trunk or at the base or lignotuber. Lignotubers are partly subterranean organs which produce new leafy shoots if the aerial part of the tree is removed or destroyed.

Little research has been conducted on *Eucalyptus* foliage, its production or postharvest handling. *Eucalyptus* foliage has been cultivated in the United States for some years, and workers in Italy showed that *E. cinerea*, *E. ovata* syn. *sturtiana*, *E. parvula* syn. *parvifolia*, *E. gunnii* and *E. globulus* spp. *maidenii* gave the best quality foliage for their environment. At present the worldwide industry is based on relatively few species, with *E. gunnii* the most widely cultivated. The efficiency with which postharvest storage and handling are carried out is very important. Sucrose concentrations that are too high can damage *Eucalyptus* foliage, causing browning of leaf margins. An important part of postharvest handling is correct storage and transportation conditions, because foliage must often travel to distant markets with the risk of quality loss.

Epicuticular wax is present on adult and juvenile leaves of *Eucalyptus* species. It has been shown in the literature that species studied have tube-shaped wax. This causes light to scatter which gives the glaucous appearance of a white or grey-green "bloom". This wax bloom and the attractive juvenile leaf shape of some species, makes eucalypt foliage a popular product in the expanding native floriculture industry. Tube wax is very easily removed from the leaf thereby downgrading the quality of the product. Wax structure on specific organs of individual species is generally constant, but there is variation in deposits, particularly in the size and distribution of the particles during the growth of many plant tissues.

Epicuticular wax was studied on juvenile *Eucalyptus* leaves from eighteen species during leaf development from first separation of the leaf blades to full leaf expansion (day 30).

*Michelle G. Wirthensohn and Margaret Sedgley, Department of Horticulture, Viticulture and Oenology, Waite Campus, University of Adelaide, PMB 1 Glen Osmond, SA 5064.

Epicuticular wax was studied on the base and tip areas of unfolding leaves. All species had tube wax on juvenile leaves but there were differences between the species, in the length and conformation of tubes and percentage surface area covered by wax. The longest tubes were 12.1 mm and the shortest were 2.1 mm. Wax tube diameter range was 0.23–0.42 mm. The most surface area covered by wax was 81% and the least was 29%. All species belonging to the section *Maidenaria*, series *Viminalis* had tubes arranged in fan-shaped clusters. Tube length was greatest in day 30 leaves, but tube diameter was narrower than day 0 leaves. There were significant differences in wax structure between the base and tip of day 0 leaves of ten species, and tubes were observed crystallizing from structureless wax deposits at the base area only.

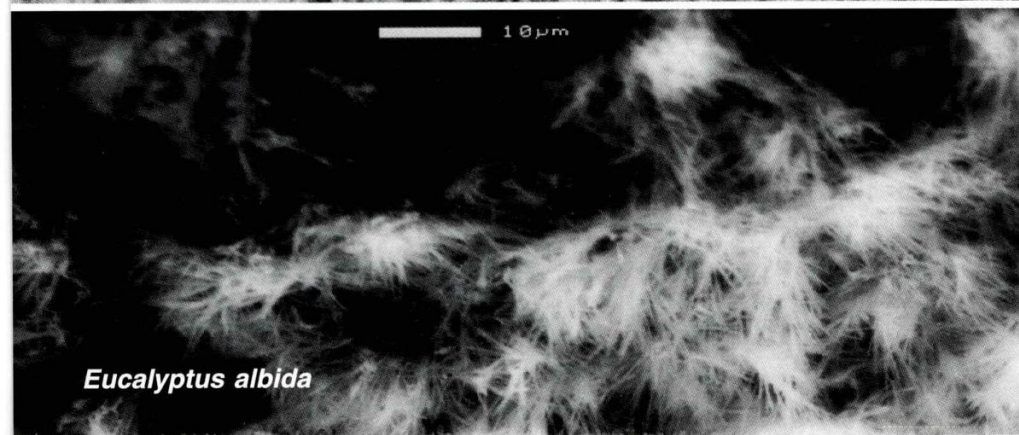
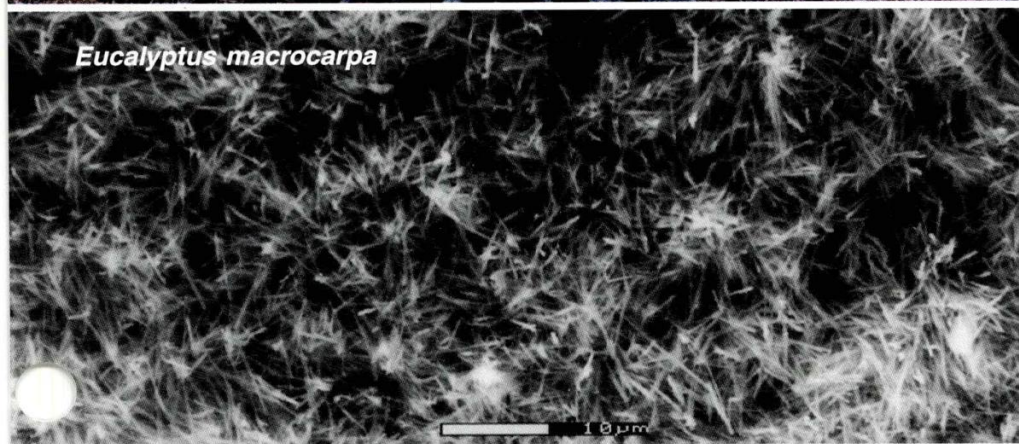
Regeneration of wax was investigated following removal from day 16 and day 30 leaves of *E. brachyphylla*, *E. cordata* and *E. kruseana*. For each leaf age, four leaves per species were sampled at 0, 1, 3, 9 and 15 days after wax removal. The three species, *E. brachyphylla*, *E. cordata* and *E. kruseana* showed significant wax regeneration following removal. The investigated species differ in the period of time when the longest and the widest wax tubes can be observed. All three species, for both leaf ages, regenerated wax tubes of similar diameter to the controls. There was also regeneration of wax to similar percentage of surface area covered in all three species.

Cut flower production study

This work examines 17 species for stem production including aesthetic and growth rate attributes (Table 1). There is also very little information on pruning techniques for cut foliage of eucalypts. This paper reports the results firstly, of pruning on 17 species of *Eucalyptus*, and the effect of time of pruning on regrowth of *E. gunnii*. Secondly, we conducted our study to find the most appropriate postharvest solutions for a range of species and hybrids, and thirdly, we investigate the structure of epicuticular wax as the leaf develops in 18 species of *Eucalyptus* and the regeneration of leaf wax after wax removal. The species were chosen because of their potential or current use as commercial cut foliage. Study uses an Environmental Scanning Electron Microscope (ESEM).

Pruning experiment Species of *Eucalyptus* L'Hér. were subjected to trials to investigate their suitability for floriculture and the effect of pruning for cut foliage production. Pruning was carried out at 19 months of age in April 1995 on all species except *E. gunnii* to 0.5 m or 1.0 m above ground level, with a control group which were not pruned. There were up to 10 trees per treatment per species. One hundred *E. gunnii* trees were pruned at 19, 22 and 25 months in April, July and October 1995 to three heights above ground level, 0.1, 0.5 or 1.0 m. Lateral stems on all species were pruned flush with the trunk except for July and October pruned *E. gunnii* trees where up to 12 laterals were left intact. Measurements were made at 3, 6, 9 and 12 months after pruning of the total number of new lateral stems ≥ 10 cm and stems were harvested when the majority were of marketable length (>40 cm) and the tips had hardened. Measurements were made of the total number of harvested stems, the total weight of stems, and the number of stems 0–39 cm, 40–49 cm, 50–59 cm and ≥ 60 cm.

Plates opposite. Figure 1 (top): *Eucalyptus albidia* 6 months after pruning to 0.1 m. Figure 2: Microscopic view of the tubes of wax on the surface of a *Eucalyptus macrocarpa* leaf. The tubes diffract the light to give the grey bloom to the leaf. Figure 3: Microscopic view of the tube on a juvenile leaf of *Eucalyptus albidia*.



After pruning at 19 months of age, the interaction of species $\times$ pruning height was significant for tree height, increase in height after pruning, trunk diameter and lignotuber diameter. There were significant differences between species, in the lengths of stems, total number of stems and total weight of stems at 12 months after pruning, but there was no significant difference between pruning heights. The majority of stems produced by *E. cordata*, *E. kruseana*, *E. delegatensis* and *E. crucis* were <40 cm in length, whereas the most stems of ≥ 60 cm length were produced by *E. globulus*. *Eucalyptus globulus* produced the highest total number of stems, with the highest proportion of ≥ 60 cm stems produced by *E. pulverulenta*, *E. pruinosa* and *E. albens*. For *E. gunnii* pruning to 1.0 m at 25 months produced most stems at 6 months after pruning.

Postharvest experiment

Postharvest trials were conducted to assess the vase life of cut stems, and the effect of pulsing and simulated transportation on vase life. *Eucalyptus globulus* plants were located on a grower's property at Inman Valley. *Eucalyptus cinerea* and *E. albidia* stems were harvested from the Waite Agricultural Research Institute Arboretum. Stems of *E. sideroxylon*, *E. platypus*, *E. spathulata*, *E. cladocalyx* $\times$ *E. platypus*, *E. spathulata* $\times$ *E. platypus*, and *E. spathulata* $\times$ *E. sargentii* were collected from plantations at Murray Bridge. The hybrids were the result of a crossing program conducted at the Waite Campus.

Holding solutions containing 1% or 2% sucrose significantly increased vase life of *E. globulus* and *E. cinerea* over the control, but pulsing *E. cinerea* in 1%, 5% or 10% sucrose for 2 hours at 24°C or 24 hours at 3°C had no effect. In simulated transport trials, stems of *E. sideroxylon*, *E. spathulata*, *E. platypus*, *E. cladocalyx* $\times$ *E. platypus*, *E. spathulata* $\times$ *E. platypus* and *E. spathulata* $\times$ *E. sargentii* were placed into pulsing solutions of 0, 1% or 5% sucrose with bactericide. Pulsing was conducted for 18 h at 3°C. A 5% sucrose pulse significantly increased the vase life of the hybrid *E. spathulata* $\times$ *E. platypus*.

Vase life of *E. albidia* stems was not improved over the control after pulsing with 1% to 10% sucrose at 3°C or 24°C before 1 week of dry storage at 3°C. Control stems lasted up to 18 days and treated stems up to 16 days. The longer cooler pulse was significantly better than the short warm pulse. The warm (24°C) pulse with sucrose was deleterious relative to the control, with vase life reaching only 3 days.

Conclusions

Our work has shown that a greater number of shoots regenerate from *E. gunnii* when pruned in spring than when pruned in winter or autumn. The best species from this study for cut foliage are *E. globulus*, *E. bridgesiana*, and *E. cinerea*. The first two species need to be pruned regularly to maintain juvenility and promote regrowth, while *E. cinerea* needs be pruned only to retain a manageable size. A 2% sucrose holding solution extended vase life of *E. globulus* and *E. cinerea*. There was no advantage of sucrose pulsing to extend vase life, or to improve vase life following dry storage, except for *E. spathulata* $\times$ *E. platypus*.

The vase life superiority of the *E. spathulata* $\times$ *E. platypus* hybrid over both parental species following dry storage suggests that introduction of vase life and storage longevity into a *Eucalyptus* selection program may lead to rapid improvements in cut stem quality. The three species with the most surface area covered by wax, *E. albidia*, *E. macrocarpa* and *E. tetragona* have the most glaucous juvenile leaves of the 18 species studied, and *E. albidia*.

Table 1. Juvenile morphological characteristics of 17 species.

Species	Juvenile leaf colour ^a	Juvenile leaf shape	Months to leaf phase change (%) ^b	Months to first flowering (%) ^b
Subgenus <i>Eudesmia</i>				
Section <i>Quadria</i>				
Series <i>Heteroptera</i>				
<i>E. tetragona</i>	189A, 188A	oblong-elliptic	17 (100)	41 (7)
Subgenus <i>Monocalyptus</i>				
Section <i>Renantheria</i>				
Series <i>Eucalyptus</i>				
<i>E. delegatensis</i>	189A, 147A	ovate-orbicular	17 (100)	—
Subgenus <i>Symphyomyrtus</i>				
Section <i>Bisectaria</i>				
Series <i>Kruseanae</i>				
<i>E. kruseana</i>	188A, 189A	orbicular	—	30 (79)
<i>E. brachyphylla</i>	147A, 148A	ovate	—	17 (14)
Series <i>Subulatae</i>				
<i>E. socialis</i>	191A, 189A	elliptic-lanceolate	—	32 (35)
<i>E. gillii</i>	189A, 191A	cordate	—	32 (47)
Series <i>Curviptera</i>				
<i>E. orbifolia</i>	189A, 191A	orbicular	—	33 (36)
<i>E. crucis</i>	188A, 189B	orbicular	—	25 (14)
<i>E. macrocarpa</i>	188A, 191A	broad ovate/elliptic-ovate	17 (100)	—
Section <i>Maidenaria</i>				
Series <i>Viminatae</i>				
<i>E. bridgesiana</i>	189A, 191A	orbicular-cordate	23 (100)	—
<i>E. globulus</i>	188A, 189A	ovate-elliptic	23 (100)	—
<i>E. gunnii</i>	189A, 191A	orbicular-ovate	28 (100)	—
<i>E. cordata</i>	188A, 189B	cordate	—	—
<i>E. pulverulenta</i>	188A, 189A	orbicular	—	32 (5)
<i>E. cinerea</i>	188A	orbicular	—	—
Section <i>Adnataria</i>				
Series <i>Striolatae</i>				
<i>E. pruinosa</i>	189A, 191A	ovate	11 (100)	32 (25)
Series <i>Moluccanae</i>				
<i>E. albens</i>	189A, 191A	ovate-orbicular	14 (100)	—

^a Most common colour shown first (>40% of leaves and trees). Colour codes from RHS Colour Charts; '—' did not occur during 41 month observation period.

^b Percentage of trees where this occurred.

These show the greatest potential for use in the cut foliage industry because of the white "bloom" and the small, sessile, ovate-cordate shaped leaves. The other two species have larger leaves and are less attractive for foliage, but have potential for use as foliage with fruit or flowers. *Eucalyptus cordata* regenerated longer wax tubes than the control but the density of wax did not reach control amounts, whereas *E. brachyphylla* regenerated wax beyond control amounts for both measurements, a positive feature for the floriculture industry.



Figure 4. Juvenile shoot tips of *Eucalyptus* species in this study.

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Figure 4. ***Thelymitra orchid columns*** *Orchids of Tasmania**, see page 265

A feature used in the identification of Sun Orchids is the column in the centre of the flower. Enjoy the photographic excellence of Les Rubenack.

**The Orchids of Tasmania* by David Jones, Hans Wapstra, Peter Tonelli and Stephen Harris. Published by Melbourne University Press, P.O. Box 278, Carlton South, Victoria 3053, tel. 03 9347 3455, the book is available for \$79.95. This could be described as the perfectly presented book. The 195 Tasmanian species are simply but clearly described (the descriptions on page 265 a summary only) each with a beautiful colour photograph and for *Thelymitra*, these exceptional photographs of the flower columns as well as a location map, habitat, etc.

Not Your Average Kangaroo Paw, development of the green n' gold.

Continued from page 270

In developing the green-and-gold form, where genetic suppression of anthocyanin is incomplete ("leaky") the manifestation is a peachy ovary. There are several variations of the 'green-and-gold' theme in this cohort; compare, for example, "version 2" seen in Plate 3, page 257, with an earlier version shown in Plate 7 in the first article. From the author's perspective, the ultimate 'green-and-gold' Mangles combines a pure gold ovary with a blue-green perianth. When an archetypal 'green-and-gold' Mangles is finally developed for horticulture, it will be a prized cultivable Australian — a flower icon worthy of any future *la République Australienne*.

Colour photographs on page 257.

Australian Plants for newcomers. It is very difficult to present such a vast subject as the Australian flora without using botanical names. We try to use common names where possible. Hopefully newcomers will not be deterred by what, at first appears a technical publication. There are sections for all tastes and that is why so much is crammed into the space available, so choose those articles that interest you.

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Apology — This is necessary over the delay in producing the bound volumes of *Australian Plants*. I have been frustrated by experts for six years now. The bound volumes will be available for dispatch in 2 weeks time, volumes 16, 17, 18 and 19. They are a very good reference.

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Native Foxglove, *Pityrodia terminalis*



Common Fire Bush, *Keraudrenia integrifolia*