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# Managing Natural Resources

*Managing Natural Resources in Rural Australia for a Sustainable Future*, is a publication by the federal government seeking to develop a national policy. Australian's concerned about the very survival of our continent because of its current mismanagement will applaud this initiative. One could be cynical and note that an election is pending and no doubt this is an influencing factor. However, it is a commendable move and a valuable step towards our survival.

**Nobody in authority cares about the future of Australia** was a leading statement in our last issue. Does it still apply? It certainly does, see page 317.

## CONTENTS OF THIS ISSUE

The presentation has changed as readers are missing vital information of interest.

### GROWING AUSTRALIA'S WILDFLOWERS

- Our garden**, number 33 in this series ..... Graeme and Lorna Mee 283  
 Gardening in dry rangelands and hot areas ..... W. H. Payne 289  
**Grevillea study group**, cultivation and research ..... W. H. Payne 322  
 Other articles indexed that include cultivation are *Eremophila* page 303;  
*Senna* 289; *Sturts Desert Pea* 324; *Western Billy-Buttons* 323.  
**Sturts Desert Pea** *Wildampia formosus* ..... E. B. Smith and P. and K. O'Neill 324

### WILDFLOWERS DESCRIBED FOR BEGINNERS

- Senna**, (previously known as *Cassia*) the genus part 2 ..... B. R. Randell 290  
**Australian rushes** ..... K. A. Meney, John S. Pate *et al.* 313  
**Eucalyptus**, restored in one genus, *Eucalyptus* .....  
 ..... M. I. H. Brooker and W. H. Payne 319  
**Western Billy-Buttons**, *Pycnosorus* ..... Judy Barker 323

### PROPAGATION OF WILDFLOWERS

- Senna** used to rehabilitate dry areas ..... Lynn Boladeras 289  
**Eremophila**, seed germination ..... Paul Rezl 307  
 Other articles indexed that include propagation; *Rushes* 313.

### COMMERCIAL DEVELOPMENT OF AUSTRALIA'S FLORA

- Eremophila** as cut flowers ..... Jan Hall 303  
**Eremophila** in floriculture ..... Jocelyn Linder 306  
**Thryptomene ericaea** 'Centenary Sunburst' ..... John Scarvelis 311  
 Other articles indexed that include commercial development, Australian  
*Rushes* 313; *Western Billy-Buttons* 323.

### CONSERVATION ISSUES

- Conservation of Australia's natural resources** ..... W. H. Payne 317  
 Australian Flora Botanic Gardens, Cranbourne Australian Garden ..... 318  
**Native bees as pollinators** ..... S. Trueman and H. Wallace 320  
 Other articles indexed that concern conservation, *Rushes* 313; *Senna* 289.

**COVER PLATE.** Wildflower garden in dry area — *Grevillea petrophilioides* with its spikes of red cone-like flowers on long stalks and *Xanthorrhoea australis* with its white "pokers" of flowers. A mulch of gravel is being invaded by a green carpet of prostrate *Eremophila* which will soon cover itself in yellow flowers. The garden is that of Philip Vaughan, Pomonal, Victoria, an area of extremes that can get dry and hot. As described on page 289, a wide range of plants can be grown in the driest areas using a trickle watering system. Photograph by Neil Marriott

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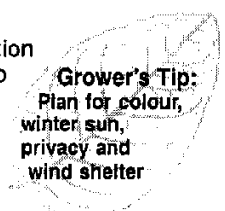
# Our garden

Number 33 in our garden series\* \_\_\_\_\_ by Graeme and Lorna Mee

In 1988 we purchased 2.2 hectares (5 acres) of land on a newly established rural subdivision 12 kilometres north-west of Raymond Terrace, near Newcastle, NSW. The land had been grazing land with the four acres closest to the road being grassland, the section at the back comprised of large *Eucalyptus pilularis* (blackbutt), *Eucalyptus tereticornis* and *Allocasuarina torulosa*. A gully ran across the centre of the block. Our goal was to establish a garden which blended with the local landscape, as well as developing a number of habitats, e.g., heath, wetland, forest, rainforest.

Close to the road in the centre of the block stood a spotted gum, *Eucalyptus maculata*. With the aim of establishing trees endemic to the local area we collected a number of seedlings that were beginning to grow in the gravel at the edge of the recently established roads in the subdivision. These seedlings were grown on in pots and then replanted thickly (approximately fifty trees) across the front of the block to create a natural forest. Most of these trees turned out to be *Eucalyptus paniculata* and the rest were *Eucalyptus maculata*. This area also contains three large *Acacia decurrens* and three *Acacia prominens* which flower heavily in winter and add colour to the garden as well as providing shelter from the strong westerly winds that blow through the Hunter Valley.

Near the driveway in front of the house was a lower section of ground with heavy clay soil. *Melaleuca ericifolia* began to regrow and sucker in this area, so we planted it with large shrubs that can tolerate heavy conditions, *Melaleuca quinquenervia*, *Melaleuca leucadendra*, *Callistemon salignus* and *Banksia* 'Giant Candles'. Six *Banksia robur* add interest with their large, leathery leaves and beautiful flowers.



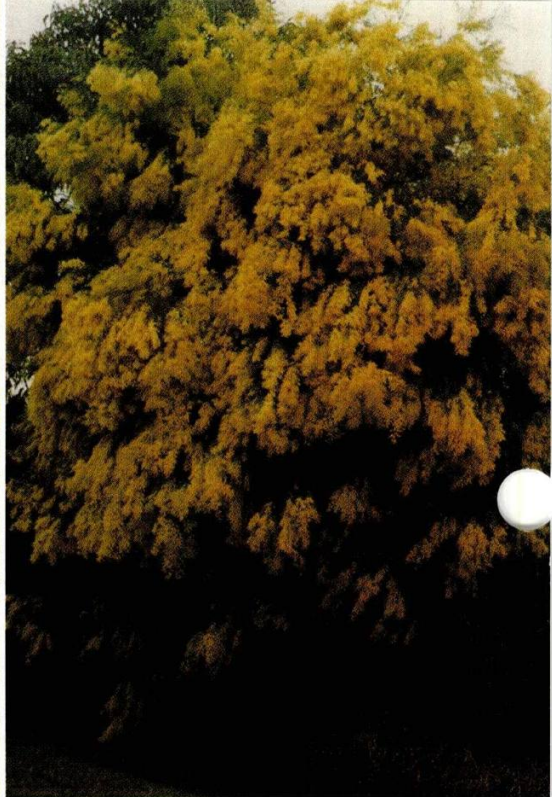
**Grower's Tip:**  
Plan for colour,  
winter sun,  
privacy and  
wind shelter

We built the house to face north on the block to enable the winter sun to warm the house during winter. Our aim near the house was to establish garden beds of shrubs, so we wouldn't block out the winter sun, while at the same time being able to appreciate the beauty and colour of the *Grevillea*, *Banksia*, *Acacia* and *Callistemon*. It provides shelter from the wind this area and privacy. The initial planting was done in a large circle in front of the house on the northern side leaving a grassed area in the middle for our children to play in, e.g., the cricket or football field. The circular shelter belt was planted with *Banksia ericifolia*, *Banksia* 'Giant Candles', *B. oblongifolia*, *B. serrata*, *Grevillea longifolia*, *G. triloba*, *G. banksii*, *Grevillea* 'Honey Gem', *G. 'Moonlight'*, *G. 'Pink Surprise'*, *G. 'Coastal Glow'*, *Callistemon 'Harkness'*, *C. salignus*, *C. 'Kings Park'*, *C. 'Endeavour'*, *C. pinifolius*, *Acacia fimbriata*, *A. iteaphylla*, *A. longifolia*, *Leptospermum* species, *Melaleuca quinquenervia*, *M. hypericifolia* and *Kunzea ambigua*. As I grow most of my own plants from seed or cuttings we were able to plant this area thickly with a number of plants of the same species growing together to create a natural effect.

\*Our Garden Series appears in many past issues as an indication to what will grow in various areas. What others have achieved has proven of very wide interest. I need more of these reports, take some photographs of sections of your garden and send them to me. These photographs are from prints produced by an average camera by a home photographer.



△ **Cabbage Tree Palm**  
with *Eucalyptus longifolia*



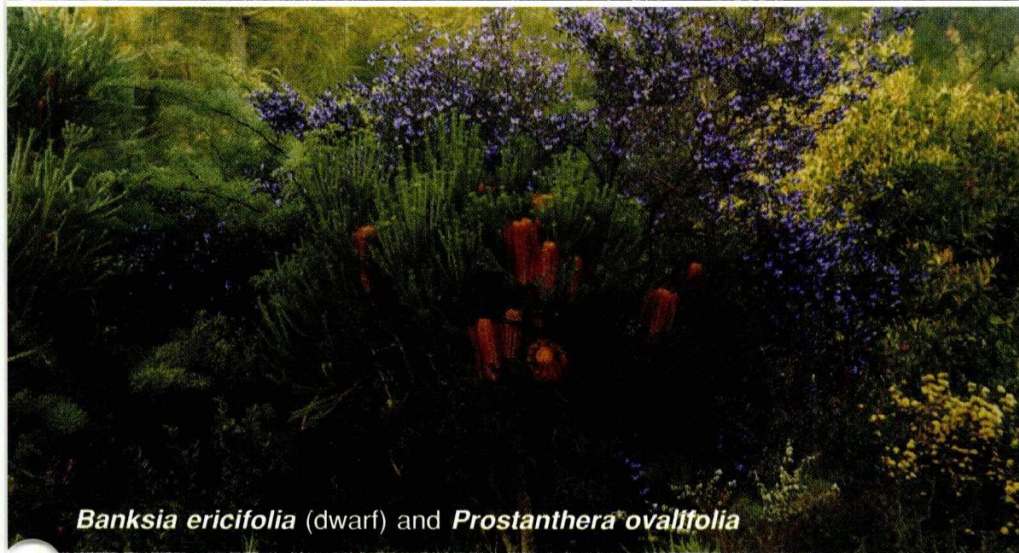
△ ***Acacia fimbriata***  
Photographs by G. Mee

▽ ***Anigozanthos* 'Big Red'** as a garden border





*Leptospermum 'Cardwell'* and *Hakea purpurea* (red)



*Banksia ericifolia* (dwarf) and *Prostanthera ovalifolia*



Maturing rainforest, *Macadamia*  
with *Eucalyptus microcorys* and *E. grandis*

Each year I develop a new garden bed for plants I have grown during the year. These beds are on each side of the house, with three large beds facing the road on the western side. This region of the block mainly contains a heavy clay soil so these gardens are on raised beds to provide good drainage. I have obtained the soil for these beds by digging it out of the natural gully that runs across the block and wheel-barrowing the soil to the garden bed. A bonus is that I now have an extra dam in the gully area, with the exercise involved improving my fitness.

The three large beds across the western side of the house facing the road have been planted to provide colour with smaller shrubs and annuals such as *Helipterum*, *Anigozanthos*, *Thryptomene saxicola*, *Micromyrtus ciliata*, *Grevillea* 'Robyn Gordon' in the front, through to *Grevillea* 'Moonlight', *G.* 'Honey Gem', *G.* 'Majestic', *G.* 'Orange Marmalade', *Banksia* 'Giant Candles', *B. serrata* and *B. integrifolia* at the back. *Anigozanthos* have been planted thickly in clumps with large red, yellow and orange hybrid species proving very hardy and providing a very colourful display in spring. The *Grevillea*, *Banksia*, *Anigozanthos*, *Helipterum* etc. also provide Loma with plenty of cut flowers.

The block slopes down to the gully on the eastern side of the house creating a raised bank which provides excellent conditions for *Prostanthera* species with *P. ovalifolia*, *P. rotundifolia*, *P. incisa*, *P. scutellarioides* all appreciating the good drainage, shelter and eastern sun and giving colour to the bank in spring.

**Grower's Tip:**  
Take advantage  
of sloping ground  
for raised beds

Our goal was to grow a rainforest around the gully area and the initial plantings consisted of *Eucalyptus grandis*, *E. microcorys* (Tallow wood), *Syncarpia glomulifera* (Turpentine), *Lophostemon confertus* (Brush Box), *Acacia meianoxylon* (Tasmanian Blackwood) and *Casuarina cunninghamiana* to provide shelter and structure. Among these trees raised garden beds consisting of rainforest species have been established. Initially this area struggled due to the lack of protection from the westerlies and a series of drought years. However, the shelter trees e.g., *Eucalyptus grandis* and *Casuarina* have grown quickly. Rainforest species such as *Elaeocarpus reticulatus*, *E. grandis*, *Acmena smithii*, *Syzygium luehmmanii*, *Waterhousia floribunda*, *Toona australis*, *Jagera pseudorhus*, *Dysoxylum fraserianum* (Rosewood), *Macadamia tetraphylla* (Macadamia Nut), *Stenocarpus sinuatus*, *S. salignus*, *Cupaniopsis anacardioides* (Tuckeroo), *Cryptocarya rigida*, *Pittosporum undulatum*, *Hymenosporum* have begun to put on good growth. This area has also been underplanted with species such as Native Ginger and *Citriobatus*. In summer this area provides shade and shelter and a cool contrast to other areas of the garden.

The area between the rainforest and the large trees at the back of the block was not mown so it could regenerate naturally. Very quickly a large area of *Melaleuca ericifolia* suckers grew creating a dense thicket. The soil in this area is heavy, poorly drained clay. Adjacent to this area *Melaleuca nodosa* grew back quickly. Behind this area a long thick narrow section of *Leptospermum* grew. Then there was a grassland area which has gradually been colonized by *Allocasuarina torulosa* and *Eucalyptus tereticornis*. Many native grasses have regenerated here and among the blackbutts at the back of the block. However with the wallaby grass, *Dianella* and *Lomandra* has also come weeds such as whisky grass, fireweed and verbena. A walk through this area can reveal large areas of ground orchids in spring as well as *Thysanotus* and *Hibbertia*.

The natural forest area at the back of the block consisting of *Eucalyptus pilularis*, *E. tereticornis* and *Allocasuarina torulosa* has also been colonized by new plants often brought in by birds, e.g., *Alphitonia excelsa* and *Clerodendrum*.

As one of our goals is conservation we don't water any part of the garden once plants are established. Planting is carried out in the autumn so plants are well established before summer. Major plantings contain mainly east coast species which grow well in our environment.

Another goal in establishing different habitats in the garden was to attract native fauna to our garden. In the early years we regularly saw grey kangaroos, however with neighbours on all sides, fences and dogs no kangaroos were sighted for a few years. To our joy this year two young pretty faced wallabies have taken up residence. Many frogs have found suitable habitats in the dams, fernery and gardens. Large Green tree frogs are regularly found on the house verandah at night. In the fernery and vegetable patch large numbers of small green tree frogs abound. At least three other species of frog have been seen including a small round frog that burrows in piles of potting sand.

The birds bring real life to our garden. A family of blue wrens work their way around the garden, sheltering in the thickly planted shrubbery. Eastern spinebills, yellow faced honeyeaters, striped honeyeaters, bluefaced honeyeaters, red wattle birds and friar birds are attracted to the nectar of the Grevilleas and Banksias. The tiny little scarlet honeyeater loves the bottlebrush. Large yellow-tailed black cockatoos fly in with their loud call and strip the banksias of their seed pods eating them like cobs of corn. In winter the *Eucalyptus tereticornis* flower heavily attracting noisy flocks of rainbow lorikeets which also visit the grevilleas and banksias. Eastern rosellas are also regular visitors.

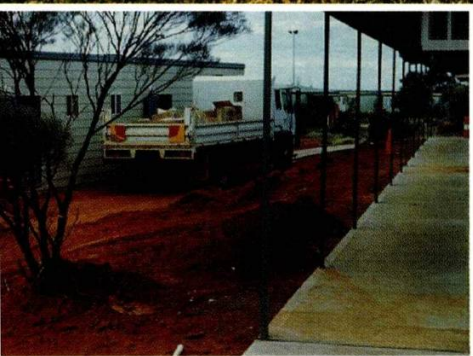
A walk in the rainforest brings the sound of grey fantails, thornbills, golden whistler, pardalotes and rose robin regularly feeding. A flock of these small birds will generally work their way through the whole garden wherever they can find shelter. The rainforest is also regularly visited by King parrots and Bower birds. Among the large trees at the back one often hears butcher birds, choughs and apostle birds. A few sightings have been made of the glossy black cockatoo feeding on *Allocasuarina torulosa* seed.

Water birds are attracted to the dams on our block and on neighbouring properties. We regularly see birds such as white faced heron, little cormorant, ibis, egret, black duck, wood duck, plovers and spoonbills. Great satisfaction comes when one sees a pair of purple swamphens working their way through the garden each day with little chicks running along on long thin legs or a wood duck heading for the dam with twelve little ducklings following behind.

So despite the weeds, the plants that have not survived, the trees that have blown over in the wind and the hares that are enjoying the conditions, great satisfaction comes from a garden that is growing, developing and maturing as conditions change, at the same time as retaining many local species. ■

**Wildlife native plants study group** comprises readers anxious to bring wildlife back into their gardens. You can learn how to do this by contacting the leader of the study group, Christine Jones by mail, care of your state secretary as listed inside our rear cover.

**Study Groups?** This is typical of the service to members on a wide range of plants. See page 322 for our Grevillea Study Group. All enquiries are through the state secretaries. Editor.



△ **Senna** on Barrenidgee Station in arid range-lands, 70 km SE of Wiluna, WA.

◁ **Before planting**

▽ **After planting**, there are surprises as to what grows with a drip watering system: The red flowered shrubs in background are *Hakea francisiana* and *Callistemon* 'Harkness' with *Grevillea thelemanniana* (yet to flower), *Melaleuca* 'Golden Gem' (lime green) and *Eremophila glabra* (grey foliage yet to flower).



# *Senna used to rehabilitate dry areas*

by Lynn Boladeras

*Senna* are ideal for site rehabilitation in the WA goldfields areas. Where they are growing they self-sow and germinate, especially where the ground has been disturbed. Plants for other areas are grown, the results below being typical.

The seed is sown in a mixture of equal parts of cocopeat, perlite and spinifex sand, the very red stuff, not creek sand. The *Senna ft helmsii* seed was not given any prior treatment while those of *Senna ft sturtii* were soaked in hot water and left for 24 hours, then sprayed with smoked water before covering with a fine layer of creek sand. Old seed given this extra treatment did not germinate. As the seed gets older it dries out and needs more aggressive action to stir it to action. The mechanism for survival in the "desert" is for hard coated seed to lie dormant for years and a favourable season. For best results use fresh seed.

The seed is planted in small tubes held in a propagation shed with 80% white shade cloth on the roof and sides. As the temperatures in the area are usually 45° with hot winds, December to March, they get sprinkler/mist spray for 5 minutes, 4 times a day. When removed to the "standing area" they are under 40% white shade cloth, open to the east side only. Watering is for 10 minutes, twice a day. When transplanted to larger pots they are fertilized with a weak fish emulsion.

|                              | <i>Senna ft helmsii</i> | <i>Senna ft sturtii</i> |
|------------------------------|-------------------------|-------------------------|
| Seed sown                    | 27-2-99                 | 11-12-99                |
| Germination occurred         | 3-3-99                  | 4- 1-00                 |
| Transplanted to larger pots  | 26-3-99                 | 7- 1-00                 |
| Put into the "standing area" | 30-3-99                 | 7- 1-00                 |
| Planted out                  | 4-1-00                  | 28- 3-00                |

I use and know *Senna ft helmsii* as the crinkly-edged greyish leaf plant opposite.

*Senna ft sturtii* has flatter leaves, green to greyish, no serrations.

*Senna phyllodinea*, taller shrub with curved, banana shaped leaves.

## *Gardening in dry rangelands and hot areas*

A summary by W. H. Payne

The problems are debilitating but the reward for a satisfying living environment is great. There are even opportunities for a commercial crop taking advantage of the heat and the dry environment. It comes down to selection of suitable plants and their culture. We have accumulated a vast amount of information from experienced growers in these areas, the following references being taken from our last volume, volume 19. It is now available, fully bound, as a beautiful book, a marvellous present, see inside our rear cover.

**Water, quality and quantity.** A drip system is necessary. The experience of Brian Powell who established station gardens on near desert and rangelands properties using underground water of poor quality is detailed in volume 19:243. Your conditions may not be as severe but water availability is always a problem. Prepare and contour for the best result, volume 20, page 98.

**Frost** can be serious and the experience of others is important.

**Plant selection** is critical. This issue presents dry, hot area plants acclimatized to rigorous conditions, *Senna* and *Eremophila* plants opposite are surprising (see also 19:263, 271 and 274).

**Plants for commercial cropping** in volume 19 include Bushfood from rangelands 276, *Dodonaea* 257, Quandong 249, *Eucalyptus* 248, Sturt's Desert Pea 261, Riceflower 304, Tea-tree oil 324 and Corkwood for medicine 325.

# Australian Senna

Continued from page 248 in our previous issue \_\_\_\_\_ by B. R. Randell

*Senna* with flat pods splitting along both sides, flowers with 10 anthers.

## PART E

**Shrubs with dull seeds; leaflets 1–3 pairs; inflorescences along the stems; pods curved. Good species.** Restricted to far northern WA and NT.

### *Senna curvistyla*, figure 7E.

Spreading shrublet to 30 cm tall. Leaves 2–3 cm long, leaflets elliptic, 2–3 pairs, the largest 0.5–1.5 cm long; glands stalked; petals 4 mm long. On deep red desert sand, northern Western Australia and Northern Territory. This small plant has tiny flowers. The root is much thickened just below ground level, perhaps as an adaptation to quick recovery after fire or drought, so it should transplant well.

### *Senna cladophylla*, figure 7D.

Spreading shrublet to 30 cm tall. Leaves 3–5 cm long, leaflets broad elliptic, 2–3 pairs, the largest 1.2–1.5 cm long; glands stalked; stipules cordate; petals 6–8 mm long. In moist rocky soil, far northern WA and NT. Not often seen, but immediately recognizable, because of its large persistent heart-shaped stipules.

### *Senna goniodes*, figure 7C.

Erect shrub to 1 metre tall. Leaves 3–6 cm long, leaflets elliptic, 2–3 pairs, the largest 2–4 cm long; glands not stalked; petals 4–10 mm long. Along coastal watercourses in far northern areas of Western Australia. In 1837 Alan Cunningham also collected this on several offshore islands.

### *Senna oligoclada*, figure 7A.

Shrub to 3 metres tall. Otherwise, as for *Senna goniodes* but petioles longer (8–15 mm long, not 4–10 mm long as in *S. goniodes*); and more flowers in the inflorescence (3–5, not 2–3 as in *S. goniodes*). Sandy watercourses away from the coast, in far northern Western Australia.

### *Senna leptoclada*, figure 7B.

Shrub to 3 metres tall, erect, sometimes pendulous. Otherwise, as for *S. oligoclada* but whole plant hairless (both *Senna goniodes* and *S. oligoclada* have erect hairs on all parts); and with longer petals 11–14 mm long. Shrub on limestone soils, Arnhemland, Northern Territory.

### *Senna procumbens*, figure 7G.

Prostrate undershrub. Leaves 5–8 cm long, leaflets lanceolate, 2–3 pairs, largest 4–5 cm long; leaf glands replaced by hairs; stipules narrow; petals 11–13 mm long. Inland Northern Territory. Grows in swamps or open forest, among tall grass. It may regenerate from a persistent woody rootstock after drought or fire.

### *Senna heptanthera*, figure 7F.

Creeping perennial, barely woody. Leaves to 6 cm long, leaflets ovate, 1–2 pairs, the largest 2–5 cm long; 1 gland not stalked; stipules narrow; petals 10 mm long; only 7 fertile anthers. Arnhemland, Northern Territory. This species was lost to science for about 100 years, and is still very poorly collected. It is the only species of this Australian group to regularly have only 7 anthers. It is also unusual in being more like a herb than a woody shrub.

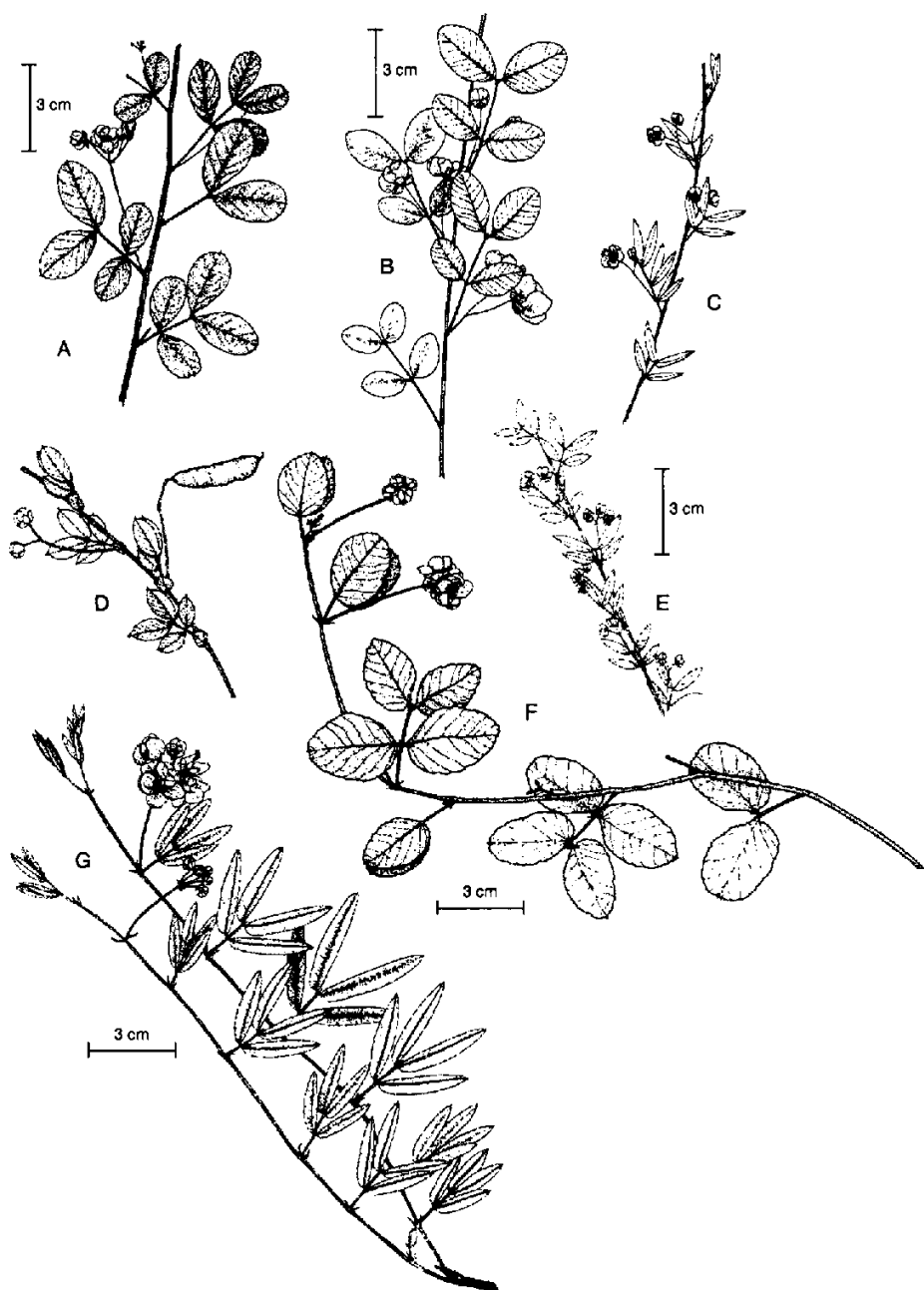


Figure 7. A *Senna oligoclada* B *Senna leptoclada* C *Senna goniodes* D *Senna cladophylla* E *Senna curvistylia* F *Senna heptanthera* G *Senna procumbens*.

## PART F

**Shrubs with dull seeds; inflorescences terminal; pods straight.** These are good morphological species, and generally do not occur in mixed (hybrid) populations. Usually restricted distributions in Western Australia.

### ***Senna ferraria*, figure 8A.**

Tall shrub. Leaves 6–8 cm long, leaflets obovate, 2–4 pairs, the largest 20–50 mm long, 1–1.5 cm broad; glands sessile. Petals c. 15 mm long; hairy outside. Pilbara region of Western Australia. This has sometimes been confused with *Senna* ft *oligophylla*, but has larger flowers with hairy petals. It also has very robust leaf petioles. David Symon named it from the locality of the first collection, near the iron-ore deposits ["ferrous" means iron].

### ***Senna charlesiana*, figure 8B.**

Erect shrub to 2 metres tall. Leaves 4–10 cm long, leaflets terete, 0–2 pairs, 0.5–2 cm long; glands sessile. Petals 12 mm long, hairy outside. South of the Pilbara of Western Australia. When there are no leaflets, the "leaves" are soft needle-shaped petioles [up to 10 cm long] just like those of many wattles. Superficially it resembles *Senna* ft *filifolia*, but has longer petioles and larger hairy petals.

### ***Senna phylodinea***

Erect shrub 2–3 metres tall. Leaves 1.5–6 cm long, leaflets laterally compressed, 0(–1) pairs, to 0.8 cm long. Petiole laterally compressed, silvery grey, 1.5–5 cm long. Petals c. 7 mm long, hairless. Western New South Wales, eastern South Australia, south-western Queensland. When there are no leaflets, the "leaves" are tough sickle-shaped petioles, again resembling those of many wattles. David Symon believes this is a good species, I included it in *Senna* ft *petiolaris*.

### ***Senna circinnata*, figure 8C.**

Shrub or small tree to 2 metres tall. Leaves 3–6 cm long, leaflets obovate, 1–3 pairs in seedlings, 0 at maturity. Petiole terete, grey-green, 1.5–5 cm long. Petals c. 7 cm long, hairless. Pod coiled like a snail shell. Inland plains of New South Wales, and south-western Queensland. When there are no leaflets, the "leaves" are firm needle-shaped petioles [up to 6 cm long], just like those of many wattles. Superficially it resembles *Senna* ft *filifolia*, but has pods which are coiled through one or two circles.

### ***Senna symonii*, figure 8D.**

Shrub reaching about 1 metre. Leaves 2–3 cm long, leaflets obovate, 2–3 pairs, the longest 0.8–2 cm long, 0.5–0.7 cm broad, glaucous. Petiole terete, 0.3–0.8 cm long. Petals c. 8 mm long, hairless. Western Australia north of the Pilbara.

### ***Senna stricta*, figure 8E.**

Erect shrub to 2 m. Leaves 2.5–4 cm long, leaflets linear, 2–5 pairs, the longest 1–2.5 cm long, 0.1–0.2 cm wide, reddish glaucous. Petiole terete 0.6–1.5 cm long. Petals c. 9 mm long, hairless. Pilbara region of Western Australia.

### ***Senna glaucifolia*, figure 8F.**

As for *S. stricta*, but leaves longer (3–6 cm long), leaflets wider (0.3–0.8 cm wide, elliptic), less often reddish. Petiole terete, 1–1.5 cm long. Pilbara region of WA eastward to the border of Northern Territory. Vegetatively the last three species (*Senna symonii*, *S. stricta* and *S. glaucifolia*, which are not always easy to separate from each other) resemble some plants of *Senna* ft *coriacea*, but are not known to occur in hybrid swarms, where *Senna* ft *coriacea* is always found.

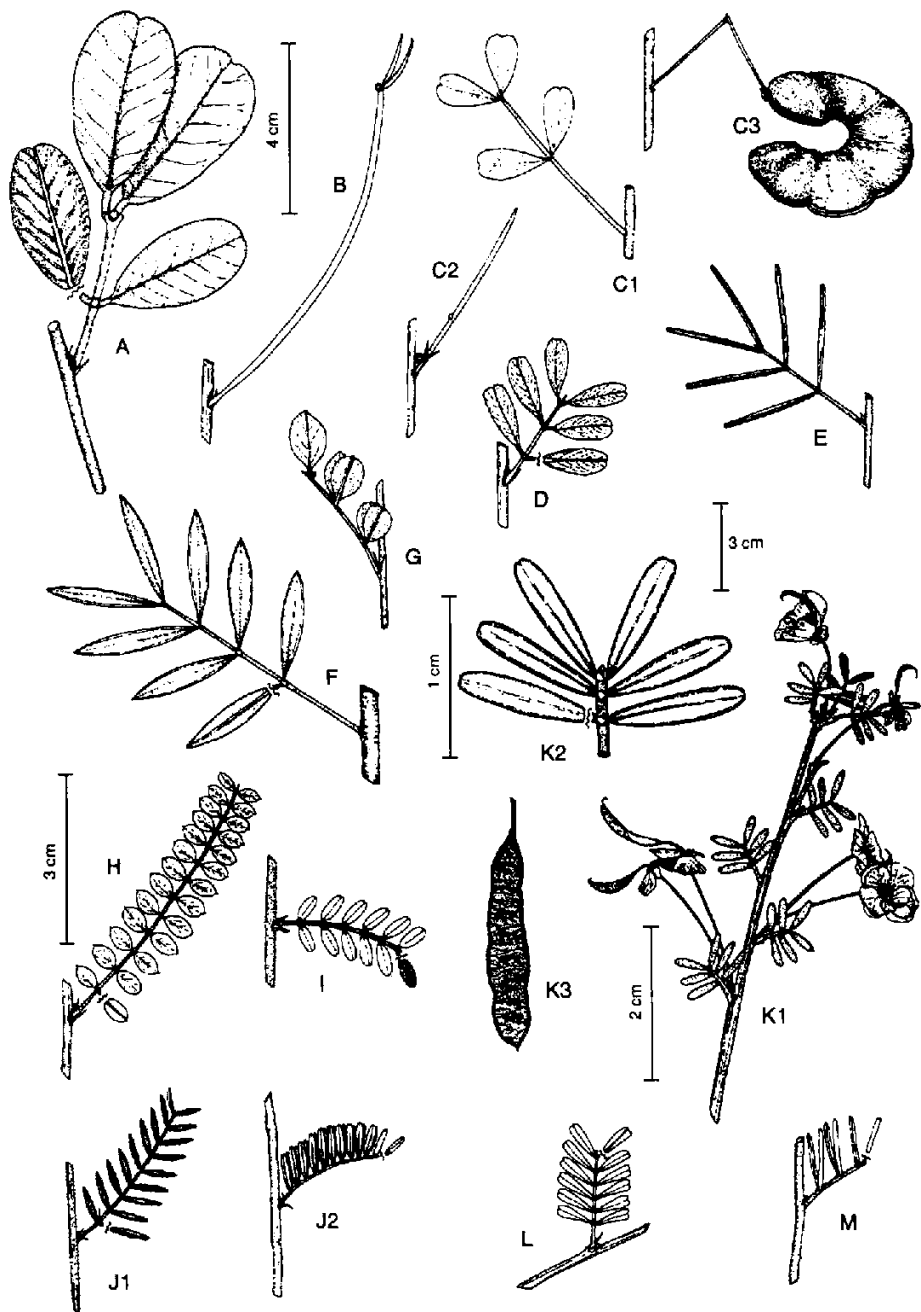


Figure 8. *Senna*, shrubs with dull seeds, inflorescences terminal, pods straight. Descriptions opposite; unless otherwise indicated the scale bar 3 cm applies to all figures.

***Senna hamersleyensis*, figure 8G.**

Sprawling shrublet to 30 cm tall. Leaves 2–3 cm long, leaflets obovate, 2–4 pairs, the largest 0.5–1.2 cm long, 0.5–1.2 cm wide, hairy. Petiole angular, 0.3–1.2 cm long. Petals c. 10 mm long, hairless. Pilbara Region of Western Australia. The pods are carried on very long stalks [4–9 cm long], longer than the leaves. This makes it easy to recognize. It is known from only a small number of collections, and should be cultivated to ensure its survival.

***Senna flexuosa*, figure 8H.**

Shrub to 2 metres tall, erect or spreading. Leaves 3–5 cm long, leaflets ovate, 10–13 pairs, the largest 0.4–1 cm long, 0.2–0.4 cm wide, sparsely hairy. Petiole terete 0.6–0.8 cm long. Petals c. 8 mm long, hairless. South of the Pilbara region, Western Australia. Known from only a very small geographic area, and probably under some threat of extinction. It is easily recognized by its long flexible leaves [often 5 cm long], and its many leaflets.

***Senna cuthbertsonii*, figure 8I.**

Sprawling shrublet to 30 cm tall. Leaves 4–5 cm long, leaflets obovate, 5–9 pairs, the largest 0.6–1 cm long, 0.3–0.6 cm wide, densely hairy underneath. Petiole terete 0.6–0.8 cm long. Petals c. 8 mm long, hairless. Northern Pilbara, Western Australia. Known from only a very small geographic area on the Upper Ashburton River, and probably under some threat of extinction. It is easily recognized by its leaflets which are usually quite hairless on top.

***Senna stowardii*, figure 8J.**

Erect shrub sometimes reaching 2 metres tall. Leaves 2–3 cm long, leaflets elliptic, 5–14 pairs, the largest 0.4–1 cm long, 0.1–0.4 cm wide, sparsely hairy, glaucous. Petiole terete 0.1–0.4 cm long. Petals 5 mm long. Goldfields of WA.

***Senna cardiosperma*, figure 8K, photograph on page 308.**

As for *Senna stowardii* but leaves shorter (0.5–1 cm long), and leaflets fewer (2–4 pairs, the largest 0.8–1.5 cm long, 0.1–0.3 cm wide, shown enlarged in detail K2, elliptic, sparsely hairy). Petiole c. 0.2 cm long. Petals c. 6 mm long, hairless. The pod is shown in detail K3. Goldfields area of Western Australia. *Senna stowardii* and *S. cardiosperma* are sometimes hard to separate, but *S. cardiosperma* has fewer flowers per peduncle (2–4, compared with 3–5 in *S. stowardii*). Both may also be confused with *Senna. cf. coriacea*.

***Senna pilocarlina*, figure 8L.**

Spreading shrublet to 50 cm tall. Leaves 1–2.5 cm long, leaflets spatulate, 5–6 pairs, the largest 0.8–1.2 cm long, 0.1–0.3 cm wide, hairy. Petiole 0.2–0.3 cm long. Petals c. 6 mm long, hairless. Northern Pilbara of Western Australia. Known from a very restricted area on the Ashburton River headwaters, and from a very few collections. Should be cultivated to ensure its survival. With its spatulate leaflets, and long fruit stalks (2.5–3.5 cm long) it is easily recognized.

***Senna manicula*, figure 8M.**

Erect shrub reaching 1 metre tall. Leaves 1–1.5 cm long, leaflets terete, 3–4 pairs, the largest 0.6–1 cm long, 0.1 cm diameter, hairy. Petiole 0.1–0.3 cm long. Petals c. 6 mm long, hairless. Goldfields area of Western Australia. When I first saw these shrubs from a distance, I did not recognize them as sennas. The shrubs were compact and dense, and the leaves deep green. Before I examined the leaves and flowers, I thought they might be related to an *Eremophila*.

## PART G

**Shrubs very variable, often intergrading between forms** i.e., not good morphological species. Very wide distributions through Central Australia, often in mixed (hybrid) populations. Seeds often producing more than one seedling.

When you are trying to link some of these difficult plants with their names, please spare a thought for the problems faced by the botanists who provided those names. We humans have minds that look for patterns in nature, and we have grown to expect that nature has allotted a distinct category [or shoebox] for every living thing, distinct from the shoebox of every other living thing. And we expect the botanist/taxonomist, to find that shoebox, if they look hard enough.

But, as we get to know plants better, it is becoming very obvious that nature has *not* created all plants so that they can be slotted into separate shoeboxes, distinct from each other. Plants like these sennas have broken down the sides of the shoeboxes, and the distinctions between the boxes are now very blurred, if not totally obliterated. Trying to put these sennas into shoeboxes is an impossible task. But because our current system of naming plants is based on this idea, we must make the best approximation to it that we can. That is what the current scheme requires. We won't do better until we forget the idea of shoeboxes and find another naming pattern that is closer to the sennas' natural behaviour.

In selecting the names to give the form taxa *ft*, we always chose the tag which has been used for many years by botanists and gardeners alike. So there are no new combinations of words to learn. We hope that these new names will make it easier to understand the behaviour of plants in this group, and to grow and enjoy them even more than you have done in the past.

***Senna* ft [form taxon] *chatelainiana***, Figure 9D, photograph on page 309.

Erect shrub to 4 m tall. Leaves 4–6 cm long, leaflets elliptic, 3–6 pairs, 0.6–2.5 cm long, stalked glands 1–4. Petiole 1–2.5 cm long. Petals 11–19 mm long, hairy outside. Pilbara region of Western Australia. To be identified as *Senna* *ft chatelainiana*, plants *must* have narrow stipules, and stalked glands; but *must not* be sticky or covered with white powder. Vegetatively *ft chatelainiana* resembles *S. stricta*, but differs in larger hairy petals. There are plants intermediate between *Senna* *ft chatelainiana* and *ft glutinosa*; *ft pruinosa*; and *ft luerssenii*.

***Senna* ft *pruinosa***, figure 9C.

Erect or straggling shrub to 2 metres tall. Leaves 5–10 cm long, leaflets elliptic, 3–5 pairs, 1–2 cm long, persistent stipules broadly falcate, glands stalkless. Leaves white pruinose. Petiole 1–1.5 cm long. Petals c. 12 mm long, sometimes hairy. Northern Pilbara of WA, through southern NT, to far western Qld and NSW. To be identified as *Senna* *ft pruinosa*, plants *must* be white and powdery (pruinose), with broad persistent stipules, flat glands, and leaflets longer than their distance apart on the midrib. There are many plants which are intermediate between *ft pruinosa* and *ft chatelainiana*; *ft luerssenii*; and *ft glutinosa*.

***Senna* ft *glutinosa***, figure 9A.

Erect or straggling shrub. Leaves 3–5 cm long, leaflets elliptic, 4–6 pairs, 1–2.5 cm long, glands flat; petiole 1–1.5 cm long. Leaves sticky. Petals c. 14 mm long, hairy outside. Northern Pilbara of Western Australia, eastward into central Northern Territory, and far north-west of South Australia. To be identified as *Senna* *ft glutinosa*, plants *must* have narrow stipules, flat glands, no white surface powder but be sticky. There are many plants which are intermediate between *ft glutinosa* and *ft chatelainiana*; *ft luerssenii*; and *ft pruinosa*.

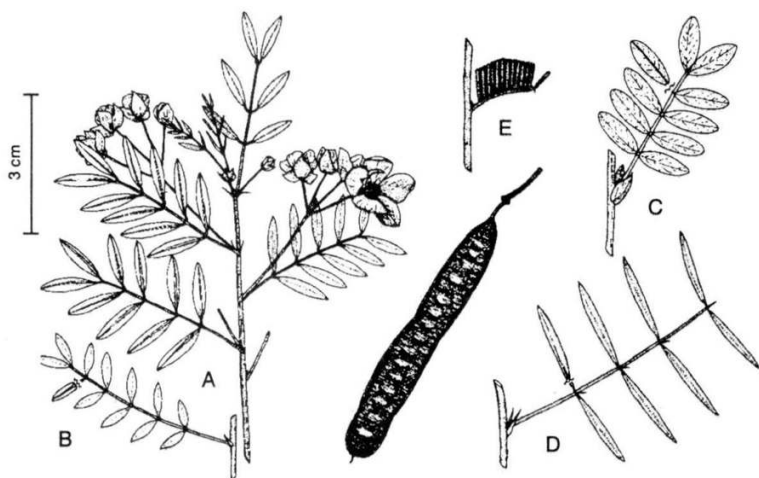


Figure 9. **A** *ft glutinosa*, **B** *ft luerssenii*, **C** *ft pruinosa*, **D** *ft chatelainiana*, **E** *ft microphylla*.

***Senna ft luerssenii*, figure 9B.**

Erect shrub to 2 metres tall. Leaves 4–8 cm long. Leaflets elliptic, 4–7 pairs, 0.8–1.8 cm long; stipules sometimes broad and  $\pm$  persistent; glands sometimes stalked. Leaves sometimes pruinose or sticky. Petiole c. 1.5 cm long. Petals 7–15 mm long, rarely hairy. Northern Pilbara of Western Australia, extending north-east to near Northern Territory border. This extremely variable taxon is a “dumping ground” for all the plants which cannot be placed in the previous three. Individuals always show some of the characters of each of *ft chatelainiana*, *ft pruinosa*, and *ft glutinosa*. For example, plants may have narrow stipules, but be pruinose or have stalked glands, as well as being sticky. The plants named *ft luerssenii* are probably always hybrids, the four taxa are hard to separate.

***Senna ft microphylla*, figure 9E.**

Erect shrub to 2 m tall. Leaves 2–3 cm long, leaflets terete, 8–10 pairs, 0.8–1.2 cm long, woolly hairy. Petals 4–8 mm long. Scattered through southern NT and northern SA. Its looks like a very short-leaflet form of *Senna ft artemisioides*, and has smaller flowers as well. There are many plants which are intermediate between *ft microphylla* and *ft artemisioides*; *ft coriacea*; and *ft gawlerensis*.

***Senna ft artemisioides*, figure 10A.**

Erect shrub to 3 m tall. Leaves 3–6 cm long, leaflets terete, 3–8 pairs, 1.5–2.5 cm long; hairy (10 **Ac** top of leaflet, **Ad** leaf lower surface). Petals 7–10 mm long. Pod, detail 10 **Ab**. Widespread through southern WA, NT, and Queensland, throughout South Australia, and western plains of New South Wales. Very variable. There are many plants which are intermediate between *ft artemisioides* and many taxa, including *ft microphylla*; *ft sturtii*; *ft helmsii*; *ft oligophylla*; *ft quadrifolia*; *ft glutinosa*; *ft filifolia*; *ft petiolaris*; *ft coriacea*; and *ft gawlerensis*.

**In my garden**, this is very long-lived (more than 30 years) despite the branch tips being frosted every year. It spreads by suckering from the roots, and also germinates many seedlings beneath the parent plant, now 2 metres tall. The seedlings quickly develop very long tap roots (more than 10 cm long) when there are only 3 or 4 leaves visible, and are difficult to transplant successfully.

▷ *Senna* ft *luerssenii*,  
see opposite



▽ *Senna* ft *helmsii*,  
see page 302



***Senna* ft *coriacea*, figure 10D.**

Shrub or small tree to 3 metres tall. Leaves 1–5 cm long, leaflets linear to elliptic to obovate, 1–6 pairs, 0.7–3 cm long, hairless or only slightly hairy, often glaucous. Petals 5–8 mm long. Far south-eastern WA, throughout SA, far south of NT, south-west and southern Qld, western plains of NSW, and north-west of Victoria.

This is a very variable taxon, and is another "dumping ground" for plants which do not "fit" within any other. Its leaflets are too long to fit into *ft gawlerensis*, too wide to fit into *ft filifolia*, too short to fit into *ft zygophylla*, without the compressed petiole of *ft petiolaris*, too narrow to fit into *ft oligophylla*, without the folded leaflets of *ft alicia*, and without enough hairs to fit into *ft sturtii* or *ft quadrifolia*. Many plants are intermediate between *ft coriacea* and all these taxa.

Some plants which occur in mixed populations in the far north of SA are very difficult to name, as each shows some characters of all of the three taxa, *ft coriacea*, *ft oligophylla*, and *ft alicia*. Some plants from the Pilbara and Goldfields of WA, which belong to *S. symonii*, *S. stricta*, *S. glaucifolia*, *S. stowardii* or *S. cardiosperma* [which do not occur in hybrid swarms] resemble plants from SA and Vic. found in hybrid swarms, and placed in *S. ft coriacea*.

***Senna* ft *gawlerensis*, figure 10J.**

Shrub or small tree to 2 metres tall. Leaves 2–3 cm long, leaflets obovate, 5–10 pairs, 0.3–0.6 cm long, sparsely hairy. Petals c. 5 mm long. Flinders and Gawler ranges of South Australia. In the Gawler Ranges of South Australia, this form appears as a small neat tree, with the axis of the leaf curving backwards. There are many plants which are intermediate between *ft gawlerensis* and *ft coriacea*; *ft artemisioides*; *ft filifolia*; and *ft petiolaris*.

***Senna* ft *filifolia*, figure 10 E, photograph on page 309.**

Erect shrub to 3 metres tall. Leaves 2–5 cm long, leaflets terete, 1–4 pairs, 2–4 cm long, almost hairless. Petals 4–10 mm long. Very widespread, from southern Pilbara of WA, through SA, southern NT, south west Qld, western plains of NSW and north-west of Victoria. This is a very variable taxon. If there are more than 4 leaflet pairs, or conspicuous hairs, plants should be referred to *ft artemisioides*; if the petiole is laterally compressed, to *ft petiolaris*; and if the leaflets are flat but tightly inrolled, to *ft coriacea*. Many plants are intermediate between *ft filifolia* and other taxa, including *ft alicia*; *ft artemisioides*; *ft coriacea*; *ft gawlerensis*; *ft glutinosa*; *ft helmsii*; *ft oligophylla*; *ft petiolaris*; and *ft sturtii*.

***Senna* ft *petiolaris*, figure 10I.**

Erect shrub to 3 metres tall. Leaves 2–7 cm long, leaflets laterally compressed or elliptic, 0–3 pairs, 1–2.5 cm long; petiole laterally compressed 2–8 mm wide; usually hairless. Petals 7–10 mm long. As for *ft filifolia*, very widespread, from southern Pilbara of WA, throughout SA, southern NT, south-west Qld, western plains of NSW, and north-west of Vic. Very variable with plants are intermediate between *ft petiolaris* and many taxa, including *ft alicia*; *ft artemisioides*; *ft coriacea*; *ft gawlerensis*; *ft glutinosa*; *ft helmsii*; *ft oligophylla*; *ft filifolia*; and *ft sturtii*. I use a very strict definition for the taxon, insisting that ANY plant with a laterally compressed petiole, however narrow, belongs here. But there are some plants where the width of the petiole varies from leaf to leaf, and in some leaves, the compression is almost absent. So there will always be confusion.

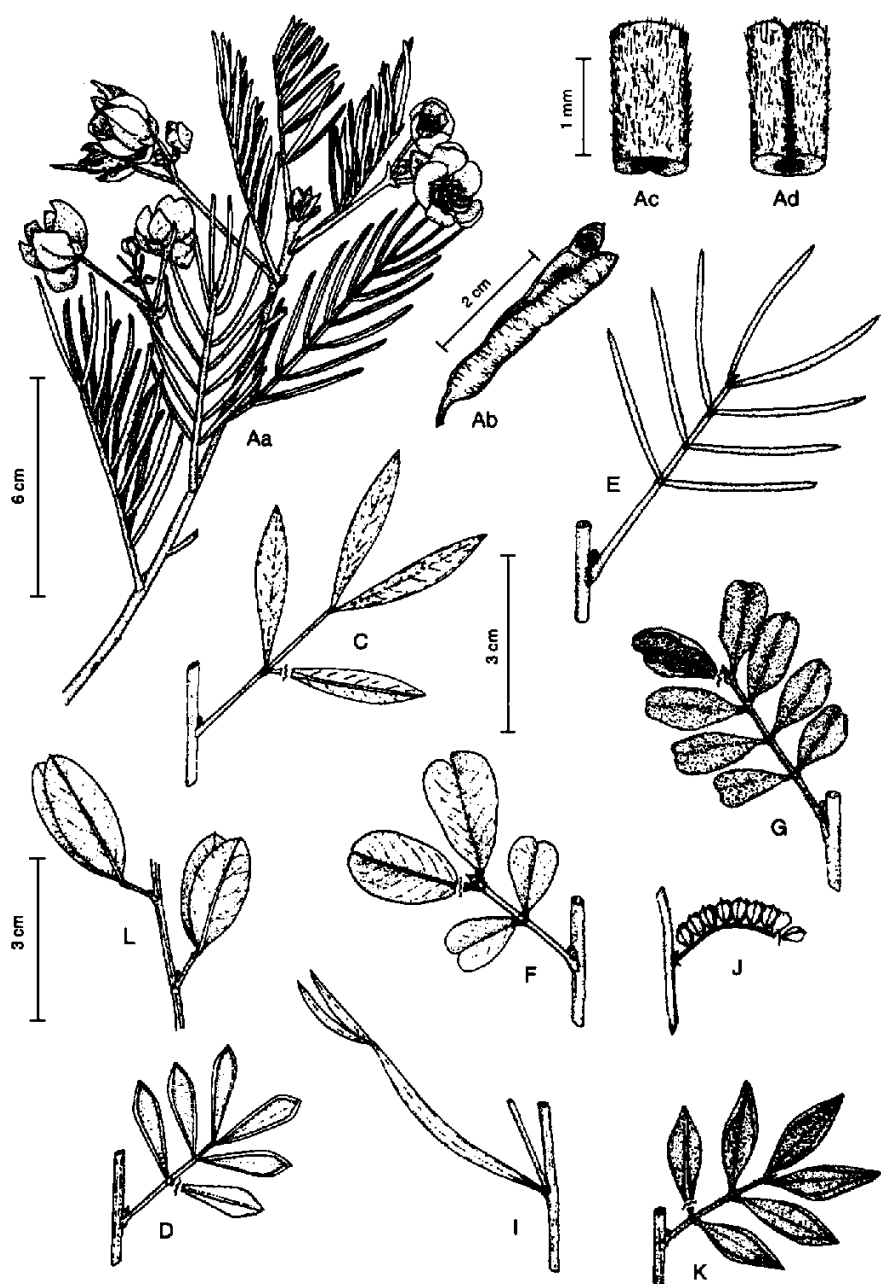


Figure 10. Shrubs with variable appearance, often grading between forms. Descriptions opposite; figures D-K are to the 3 cm bar scale.



△ *Senna* ft *sturtii* see page 302

▽ *Senna* ft *pruinosa* see page 295





△ *Senna venusta*, and ▽ *Senna notabilis* These plants were described on page 244 of our last issue, species with flat papery pods and cone-like flower heads.



***Senna* ft *sturtii***, figure 10K, photograph on page 300 by David Hockings.

Erect shrub to 2 metres tall. Leaves 2–4 cm long, leaflets elliptic, 2–8 pairs, 1.5–2.5 cm long; hairy. Petals 7–10 mm long. As for 'ft *artemisioides*', very widespread through southern WA, NT and Qld, throughout SA, and western plains of NSW. Extremely variable in the length and breadth of the leaflets, as well as in the density of the hairs. Its leaflets are too broad to fit in ft *artemisioides*, too narrow to fit in ft *helmsii*, or too hairy to fit in ft *coriacea*. Many plants are intermediate between ft *sturtii* including ft *artemisioides*; ft *helmsii*; ft *oligophylla*; ft *quadrifolia*; ft *glutinosa*; ft *filifolia*; ft *petiolaris*; and ft *coriacea*.

***Senna* ft *quadrifolia***, figure 10C.

Erect shrub to 3 metres tall. Leaves c. 4 cm long, leaflets elliptic, 2–3 pairs, 2–5 cm long, hairy. Petals 8–10 mm long. Scattered through south-western Qld, southern NT, and northern SA. To identify this form, look for a longer petiole, 15–25 mm long, as well as the 2–3 pairs of longer leaflets. Many plants are intermediate between ft *quadrifolia* and ft *alicia*; ft *filifolia*; and ft *sturtii*. Vegetatively it resembles ft *zygophylla* but it has very few hairs on the leaves.

***Senna* ft *helmsii***, figure 10G, photograph on page 297.

Erect shrub to 2 metres tall. Leaves 2.5–5 cm long, leaflets obovate, 2–4 pairs, 1–2.5 cm long, recurved at margins, woolly hairy. Petals 8–12 mm long. Extends from Pilbara in WA through southern NT, south-western Qld, north-western NSW, and most of inland SA. A very variable form. It is obviously related to ft *sturtii*, but has wider hairier leaves. Plants with fewer hairs resemble ft *oligophylla*, especially those forms with silky hairs. Many plants are intermediate between ft *helmsii* and ft *quadrifolia*; ft *filifolia*; and ft *alicia*.

***Senna* ft *oligophylla***, figure 10F.

Erect or spreading shrub to 2 metres tall. Leaves 2–5 cm long, leaflets ovate, 2–3 pairs, 1–4 cm long, silky golden hairy or hairless. Petals 8–10 mm long. As for ft *helmsii*, extends from Pilbara in WA through southern NT, south-western Qld, north-western NSW, and most of inland SA. A very variable form, including some plants from WA with golden silky hairs, which David Symon named as the variety *sericea*. There are many plants intermediate between ft *oligophylla* and many taxa, including ft *sturtii*; ft *quadrifolia*; ft *filifolia*; and ft *alicia*.

***Senna* ft *alicia***, figure 10L.

Erect shrub to 2 metres tall. Leaves 1–3 cm long, leaflets elliptic, 1–3 pairs, 1.5–3 cm long, sparsely hairy or hairless, glaucous. Petals 8–10 mm long. South Western Qld, south-eastern NT, and north-eastern SA. I gave this its name because it is the form found most commonly around Alice Springs. It has the distinctive habit of carrying the leaflets with the inner faces of a leaflet pair close together, and almost vertical. There are many plants which are intermediate between ft *alicia* and ft *coriacea*; ft *oligophylla*; and ft *quadrifolia*.

***Senna* ft *zygophylla***, photograph on page 308.

Erect shrub or small tree, to 3 metres tall. Leaves 0.8–3 cm long, leaflets elliptic; 1–2 pairs, 1.8–4 cm long, usually hairless. Petals 6–9 mm long. Western plains of NSW, extending into southern Qld. This is restricted to NSW and Queensland, where it replaces ft *coriacea*. However, its leaflets are usually significantly longer and more glaucous than in ft *coriacea*. Many plants are intermediate between ft *zygophylla* and ft *coriacea*; ft *petiolaris*; ft *quadrifolia*; and ft *sturtii*. ■

# *Eremophila* as cut flowers

by Jan Hall, Yarrowonga, Victoria

A well organized cut flower producer could have a year long range of *Eremophila* using drip watering and a regular fertilizer programme. This does not happen in my garden as drought, cold, wet periods, competition and severe frosts all take their toll. A nice, sandy loam would help too.

My experience is limited to using those we grow here. This is quite a range of *Eremophila* because they do tend to survive the long dry periods, plus our degraded clay soil. However, many are spoiled or killed by serious frosts as occurred in 1987 and 1998 but average frosts do not worry them. Enjoy the flowers and foliage.

**Grower's Tip:**  
Plants for dry  
and hot with  
clay soil

**For foliage** — The following can grow to 2 m high and wide and do not mind being raided for large armfuls of foliage. It keeps them compact and bushy.

*Eremophila glabra* 'Murchison Magic,' good foliage even without its red flowers that are displayed well by the silver leaf. Photos volume 8:248 and 12:8.

*Eremophila glabra*, 'Silver leaf' the silvery leaves have undulating edges.

*Eremophila subfloccosa*

*Eremophila nivea*\*, heavenly wisps of grey light foliage that do not need the soft purple flowers to look good. Photograph in our volume 12, page 241.

*Eremophila compacta*, usually grown for its unique pink bell flowers (for the genus) but the foliage is very attractive. Photograph in volume 12, page 37.

## **For flowers I use:**

*Eremophila neglecta*\*, mauve flowers enhanced by a colourful long lasting calyx.

*Eremophila oppositifolia*\*, the mauve flowers enhanced by a long-lasting calyx.

*Eremophila bignoniifolia*, and hybrids, the large white flowers hold well but the stems may be untidy.

*Eremophila divaricata*, the flowers also hold well but stems may be untidy.

*Eremophila psilocalyx*\*, produces multiple stems.

*Eremophila dempsteri*\*, has a bonus as flowering is followed by a period where the fluffy seeds are quite showy.

*Eremophila youngii* produces good long stems of greyish leaves topped by red flowers. They are abundant in winter for me here and are unaffected by frost.

## **Others used casually in bunches and could be developed as cut flowers are:**

*Eremophila maculata* has several forms, the cultivar 'Winter Gold', the variety *brevifolia*, and an upright form with red-spotted flower. Photo in volume 15:161.

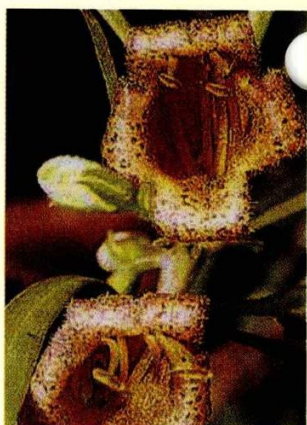
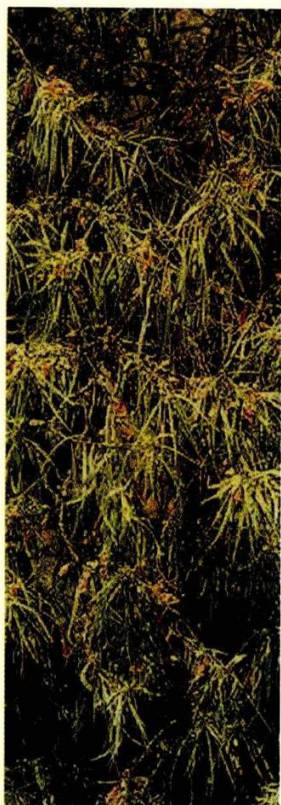
*Eremophila oppositifolia* suffers from cold and frost here, but plants sheltered in an open igloo produce lovely stems, both the deep pink and the purple form.

*Eremophila racemosa*; and *Eremophila calorhabdos*. Photo volume 12, page 44.

*Eremophila hygrophana*. Photograph in volume 19, page 264.

## **The commercial development of Australia's wildflowers.**

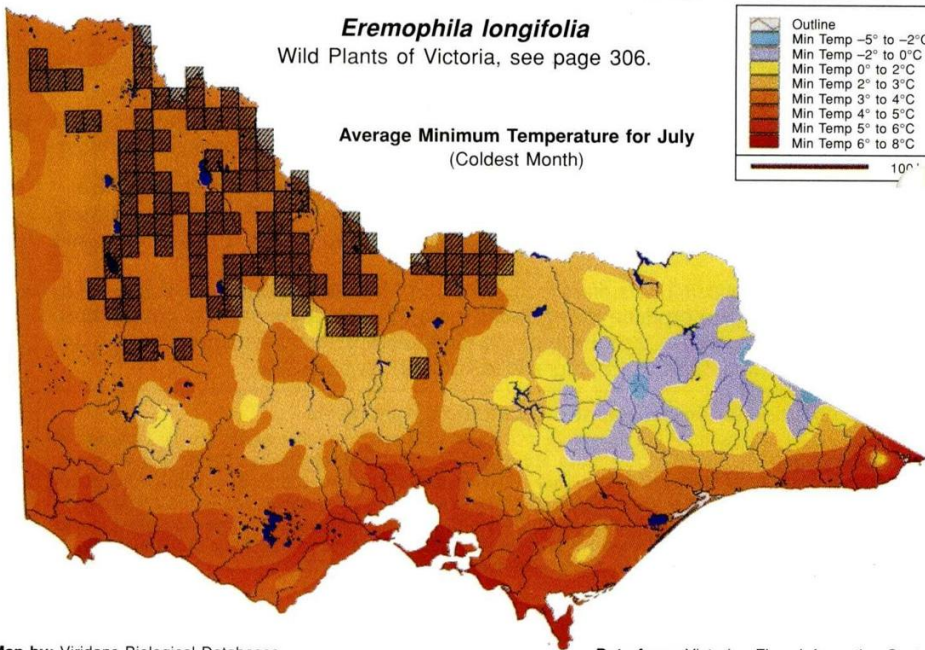
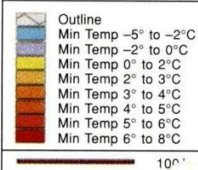
Most issues of *Australian Plants* feature articles on wildflowers that have potential for commercial development. The plants in this issue are suited for areas outside the temperate areas usually use for commercial wildflower farms. They could represent an alternative crop for areas not suitable for serial cropping or as a reserve cash crop. These articles are presented also with a conservation aspect as an alternative for bush picking. They provide tips on propagation and cultivation of use in general horticulture. As a commercial crop they develop the very best forms of a species, of a consistent quality and are more in demand than bush-picked flowers.



### *Eremophila longifolia*

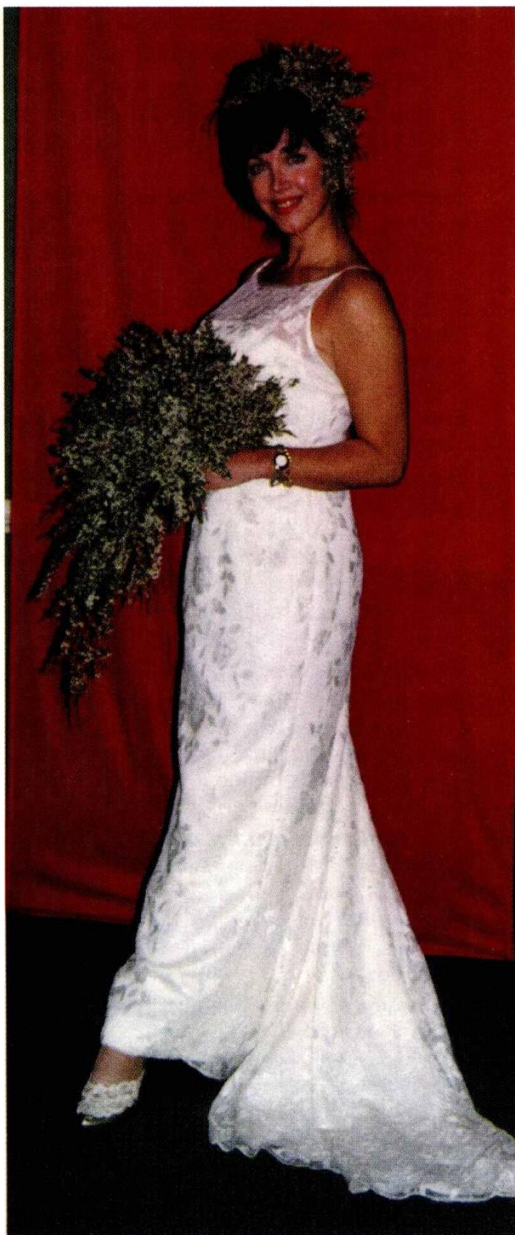
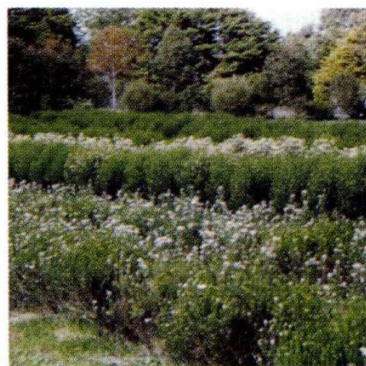
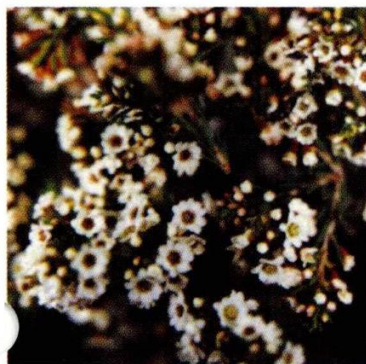
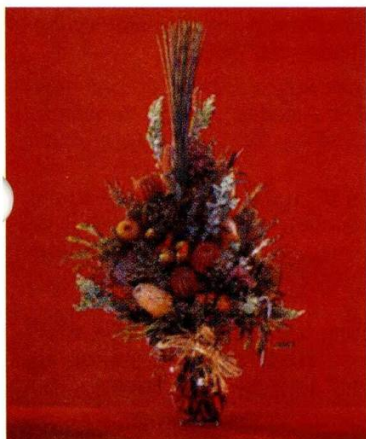
Wild Plants of Victoria, see page 306.

Average Minimum Temperature for July  
(Coldest Month)



# *Thryptomene ericaea* 'Centenary Starburst'

Top left: Floral arrangement; Centre left: The flower;  
Lower left: A plantation; Right: Bouquets of *Thryptomene*



# *Eremophila in floraculture*

by Jocelyn Linder — Ouyen, Victoria

For a long time I have used *eremophilas* in Floral Art Work. I have belonged to the Pinnaroo [SA] Floral Art Group for a number of years and have shown at the Pinnaroo Show for many years. I have also used them in fresh baskets of flowers which can be allowed to dry out and still look attractive and also in hall and church arrangements. Many *eremophilas* have good potential for the cut flower trade, especially the ones that have interesting calyces.

These observations have from my own experience and those of members of the Floral Art Group, including one who has a successful florist business. There are many *eremophilas* that could be used as cut flowers, these are just a few.

***Eremophila interstans*** has great potential as a filler plant in both the flower and calyx stage. I have often said this has similar uses and potential to *Thryptomene* species. It has long stems and is easy to work with; I have seen it used in table arrangements for a wedding and have often used it in the calyx stage for basket arrangements.

***Eremophila oppositifolia***, in any of its colours, also has great potential; especially because it flowers when there is a shortage of other flowers. Its attractive calyx persists and increases its length of time as a cut flower.

***Eremophila youngii*** and ***Eremophila pantonii*** are both useful because of their foliage and stem length.

***Eremophila viscida***, especially the pink form, has considerable potential because of its fresh foliage colour and also attractive calyx.

***Eremophila nivea*** and ***Eremophila pterocarpa*** are very useful as foliage plants, for both fresh work and arrangements that can be allowed to dry. I have treated both of these plants with glycerin successfully; I feel that *Eremophila nivea* is not really suitable, when in full flower, for the flower trade as the flowers do not keep well and they drop. Its potential is in its foliage.

a ***Eremophila virens*** has not been used much, but I can see potential for its large foliage from a large leafy bush.

***Eremophila miniata*** is one of my favourites because of its colour and large calyx, its uses could be many in the floral industry. I have used it for shoulder sprays and baskets and it would be useful in bridal work. Many comment that it is like a small orchid. 12:73P.

***Eremophila maculata*** with its many forms have restricted use because of stem length, but have a definite place in shorter bunches; flowers picked at an early stage last well.

***Eremophila laanii*** could be useful, though I find it hard to find suitable branches. White flowers, like grey foliage, are often sought after in bunches of cut flowers.

***Eremophila saligna***, with its fresh foliage and white flowers could find a place in the filler market.

**\*Wild Plants of Victoria:** 4,500 plant species are described with 2,500 full colour photographs such as that of *Eremophila longifolia* on page 304. It is a compact disc is surely a must for residents in Victoria, especially those in country areas, or those who stroll in the wild. 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.

# Eremophila seed germination

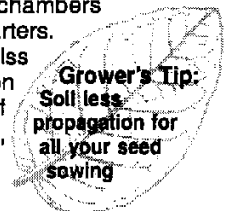
by Paul Rezl

Eighteen species of *Eremophila* (listed in the table on page 310), were trialed, 11 collected from a property near Mullewa, Western Australia, the other seven species from a commercial seed service, the age of the fruits unknown.

*Eremophila* fruits exhibit a remarkable diversity, not only in the shape and size ranging from as little as 2 mm in *E. densifolia*, to 15 mm in *E. maculata*, but also in the internal structure. Some fruits are corky inside and the seed is quite loose but in many species the inside is more or less woody. For germination to take place the seed needs to be released, a laborious process, as follows:

*Eremophila racemosa* is a species with a very restricted occurrence in nature but which is reasonably well established in cultivation. Fruits consist of four chambers and these contain up to 12 seeds according to Richmond and Osborne (*Australian Plants* No. 134) but in practice I have never found more than six fully developed seeds per fruit. Seeds are elongated, approximately 2–6 mm long. They are covered with a thin skin-like testa. To release the seeds from fruits it is necessary to open each of the four seed chambers and that means basically splitting the fruits in halves and quarters.

I use a board made of soft wood, a light hammer and a Swiss army knife (or similar). Fruits are placed in small dents on the board for better stability and, while holding the edge of a knife somewhere close to the central seam of the fruits, they are split longitudinally, the force differing with species.



**Grower's Tip:**  
Soilless propagation for all your seed sowing

## Seed Sowing

A soil less propagating mixture was used for sowing based on Lignocel (milled coconut shells which are compressed into brick-like blocks) and perlite in the rate of 3:1. I use this universally for all sowings. It is similar to peat/perlite mix but it has better water holding capacity and the structure is more open, doesn't compact easily and unlike peat, absorbs water readily even when dry. As a result, young seedlings root very well. When preparing the propagating mixture a Lignocel block is water saturated by adding 5 litres of water to the compressed block. 0.05% Polyversum™ was used in order to inoculate the substrate.

I do not sterilize the mix; but treated it with fungicide. Polyversum, was used. It is a new generation biofungicide that works on the wide spectrum of soil-borne diseases. The active agent is the fungus *Pythium oligandrum* which is naturally present in small quantities in the soil. This "friendly fungus" lives in symbiosis with the root system of the plants. The product is non-chemical and remarkable for its long storage capacity of 10 years (provided it is kept dry).

Seeds were treated with Polyversum prior to sowing and sown immediately in small containers only lightly covered. Containers were watered by soaking in 0.05% Polyversum and placed in the propagating box with the temperature regime of 25°C during the day and 5°C at night to simulate the oscillating temperatures inland where most *eremophilas* grow. As I do not have a growth room or a thermostat, the box was placed in a refrigerator every night and removed in the morning for the period of first two weeks from the date of sowing. The propagating box was then left on 25°C permanently.

This article is reproduced from the newsletter of the *Eremophila* Study Group.



*Senna ft zygophylla*, see page 302



*Senna cordosperma*, see page 294



*Senna* ft. *chatelainiana* see page 295



*Senna* ft. *filifolia*, see page 298

## Germination of *Eremophila* seed, results and observations

| Species                                    | Seeds per fruit | No. of fruit used | No. of seed used | First seedling days | No. of seeds germinated |
|--------------------------------------------|-----------------|-------------------|------------------|---------------------|-------------------------|
| <i>E. clarkei</i>                          | 1-3             | 12                | 8                | 8                   | 2                       |
| <i>E. compacta</i>                         | 1-2             | 12                | 13               | 5                   | 9                       |
| <i>E. cuneifolia</i>                       | 2-6             | 10                | 14               | 17                  | 1                       |
| <i>E. densifolia</i>                       | 2-4             | 20                | 5                | 0                   | 0                       |
| <i>E. divaricata</i>                       | 0-2             | 10                | 4                | 0                   | 0                       |
| <i>E. eriocalyx</i>                        | 1-4             | 14                | 17               | 6                   | 5                       |
| <i>E. forrestii</i>                        | 1               | 11                | 9                | 6                   | 5                       |
| <i>E. fraseri</i> subsp.<br><i>galeata</i> | 1-2             | 6                 | 6                | 21                  | 2                       |
| <i>E. laanii</i>                           | 3-5             | 5                 | 4                | 7                   | 3                       |
| <i>E. longifolia</i>                       | 1               | 10                | 2                | 7                   | 2                       |
| <i>E. mackinlayi</i>                       | 0-1             | 12                | 1                | 10                  | 1                       |
| <i>E. maculata</i>                         | 4               | 3                 | 7                | 27                  | 2                       |
| <i>E. oldfieldii</i>                       | 0-1             | 15                | 1                | 14                  | 1                       |
| <i>E. platycalyx</i>                       | 4-6             | 16                | 14               | 9                   | 6                       |
| <i>E. racemosa</i>                         | 2               | 2                 | 5                | 0                   | 0                       |
| <i>E. serrulata</i>                        | 1               | 5                 | 6                | 9                   | 1                       |
| <i>E. spectabilis</i>                      | 2-4             | 4                 | 5                | 11                  | 1                       |
| <i>E. "spuria"</i>                         | 1-5             | 11                | 11               | 7                   | 5                       |

Of the 132 seeds sown, 49 (37%) germinated. All species from Mullewa germinated with a germination rate (48%). Germination was rapid, most occurring in the second and third week from the date of sowing. With two seeds of *Eremophila maculata* which refused to germinate in spite of all efforts, the testa was carefully peeled off. Both seeds germinated immediately.

Pots with seedlings were placed under fluorescent lights with a 14 hour day/10 hour night cycle. They were growing vigorously as expected and quickly showed some signs of nutrient deficiency as the propagating mixture is very low in nutrients. When regular doses of complete fertilizer were given, the seedlings responded immediately by strong healthy growth. At this stage two applications of 0.05% *Polyversum* were applied to the seedlings while watering.

Seven seedlings were lost before the first repotting, possibly due to an airborne fungal infection, drying out or natural weakness. First repotting was done approximately one month from the date of sowing and most of the seedlings had 2-4 pairs of leaves. The potting mix was based on loam/peat 1:1 which I am using for all of my plants. I have noticed a very healthy, well developed root system in all seedlings. There were no losses after the first repotting and all of the plants (42) are healthy and growing well at the time of writing.

**Germination delay mechanisms** are the impervious woody fruit, temperature (oscillating temperatures promote germination) and the presence of inhibitor in the seed testa. However, many species will germinate under the constant temperature, while most will germinate without the removal of testa. Contrary to what has been previously published, fresh seeds germinate better than old.

**Treatment of seed, soil and seedlings** with *Polyversum* proved beneficial and root systems on the first repotting were well developed. Plants appear to be very compact with short internodes and many side shoots. *Polyversum* seems to stimulate the growth through the root tissue and is **recommend for all propagation** testing with many **other Australian native plants**.

# *Thryptomene ericaea* 'Centenary Starburst'

by John Scarvelis, Primary Industries and Resources SA (PIRSA),  
Revegetative Centre, Box 752, Murray Bridge, 5253

**Kangaroo Island Thryptomene.** *Thryptomene ericaea* is a plant that is endemic to South Australia. It occurs naturally on Kangaroo Island and, to a much lesser extent, on Eyre Peninsula. It is a dominant feature of the understory in eucalyptus mallee vegetation where its masses of small white flowers burst onto the landscape in spring. A clonal selection 'Centenary Starburst' has been nominated to represent South Australia in the Centenary Floral Emblem for 2001.

Its cousin, the **Gramplains Thryptomene**, *Thryptomene calycina*, is well known in the cut flower markets, and is a valuable export product to overseas markets, including the USA. However, 'Centenary Starburst' will grow on a wider selection of soil types, including those moderately alkaline, and it extends the flowering season for marketing of *Thryptomene*.

*Thryptomene ericaea* 'Centenary Starburst' is propagated from established carefully selected mother stock. Plantation growing provides a uniform product and improves efficiency of harvest. While it is commercially marketed as a "filler" flower, 'Centenary Starburst' is also being promoted as a floral gem in its own right such as the wedding bouquet and head piece shown on page 305. With it is a floral arrangement, a plantation and the flower.

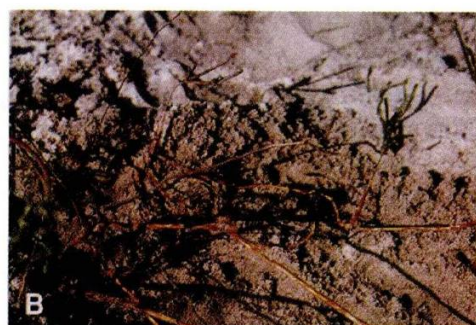
In landscaping, 'Centenary Starburst' can be used as a specimen shrub, for massed planting, or in a small garden, even as a flowering potted plant in a courtyard, balcony or entrance. Even when it is not in flower, the delicate and graceful new growth is very pleasing to the eye, an absolute "show-stopper".

**Australian flora as a resource.** An agreement with the Minister for Primary Industries and Resources SA, and 'Botanigan', an Israeli nursery group, created a joint venture to develop export pathways for Australian plants to Israel, European and other markets, trading as *State Flora Australia*. The project is raising the public profile of the Australian floral resource, supporting its commercial use and, at the same time, ensuring its sustainability. The business of *State Flora Australia* includes the supply, under contract, of superior selected plant material with **associated royalties**.

## **Thryptomene as a commercial cutflower crop**

There are 35 species of *Thryptomene* native to Australia but it is *Thryptomene calycina*, the Gramplains Thryptomene that has proven such a valuable crop. It is marketed widely as Victorian Laceflower and is in demand on the world horticultural scene as a filler flower. Its horticultural cultivars, 'Cascading Lace', 'Coral Lace', 'Ivory Lace', 'Talbot Star' and 'Winter Lace', are described and illustrated in full colour in *Australian Plants* volume 17, pages 166–171. The article also describes success with grafting using *Thryptomene saxicola* as a root stock because of problems with root rot from *Phytophthora cinnamomi*.

The search for alternative, free flowering hardy forms has led to the development of 'Centenary Sunburst'. There are many more species awaiting trial, *Thryptomene maisonvii* shown in colour on page 328.



# Australian rushes

by K. A. Meney, John S. Pate, *et al.*\*

The recent awareness of the floristic potential and functional importance of the family Restionaceae in Australia, has resulted in interest in its propagation biology. *Baloskion tetraphyllum* from eastern Australia, has been grown successfully in cultivation for some years. The mining industry has found that restiads are notoriously difficult to rehabilitate. The horticultural industry is keen to develop species of restiads for the export trade, principally for use of "foliage" as dried and dyed filler to larger flowers such as banksias.

The novel nature and wide variety of forms of Restionaceae result in many species having potential as "foliage", pot specimens or attractive garden plants for dry or damp situations. At least eight species of restiads are currently harvested Australia-wide from natural populations or from semi-managed sites for use within the floricultural industry. For most species, whole culms are harvested just prior to anthesis and then dried and dyed for export.

Their commercial is because their "graminoid" appearance can provide strong contrasts to traditional garden plant forms and they have been found to be long lived and to flourish in a wide variety of soil types and climatic conditions. Furthermore, the inflorescences of many of the species are aesthetically pleasing, particularly the bronze-coloured spikelets of *Meeboldina scariosa* and the bright yellow inflorescences of *Anarthria scabra*.

Restiads have potential for use as biological barriers to the spread of *Phytophthora cinnamomi* fungus to susceptible plants. One study has shown that *Banksia* seedlings in a container with the restiad *Chordifex amblycoleus* were not infected but containers of seedlings without a retard barrier were readily infected with the destructive disease.

Many of the most common restiads in urban and rural bushland habitats are strongly rhizomatous and play an important role in soil binding and forming dense herbaceous layers which limit opportunities for invasion of alien weedy species. Providing that such habitats do not become too nutrient-enriched and, as a result, the competitive ability of restiads reduced, certain species have great potential as pioneer stabilizers and ground covers for rehabilitation after mining.

**Colour plate opposite.** A, a clone of *Alexgeorgea subterranea* colonizing bare sand; B, partly excavated clone of *A. subterranea* showing the rhizome network; C and D, species used in the horticultural industry, C, *Anarthria scabra*, the female on the left, the male on the right; D, *Baloskion tetraphyllum*, described on page 316. E and F, Propagation methods; E, smoke germination of *Loxocarya 'gigas'* (control on left); F, tissue-cultured *Lepidobolus chaeocephalus* (male) translocated to a post-mined habitat.

**\*Australian Rushes, biology, identification and conservation of Restionaceae and allied families**, Edited by Kathy A. Meney and John S. Pate, published by University of WA Press, University of WA, Nedlands, WA, 6907, for \$95.00. This large book of 486 pages is the only authoritative reference to Australian Rushes. The introductory chapters describe how the various genera/species have developed, grow, etc. For each species there is a full page sketch opposite a simple but complete description. Portion of two of these sketches are reproduced on the next pages. A valuable scientific work that can be easily read by all.

**Common species suitable for ground stabilization** would include *Desmocladus flexuosus*, a widespread inhabitant of coastal limestone communities, kwongan and woodland habitats. This and *Alexgeorgea* species are capable of forming enormous, dense clones with a potential spread of the order of 20–80 cm each year. Similar common widely-spreading species include *Loxocarya cinerea*, *Desmocladus asper* and *Hypolaena fastigiata*.

**Soil erosion prevention** requires species that do not engage in rapid lateral extension of rhizomes but have strongly sand-binding roots such as *Lyginia* spp., *Lyginia 'excelsa'*, *Loxocarya 'gigas'*, *L. magna*, *Chordifex 'sinuosus'*, and *Hopkinsia* spp.

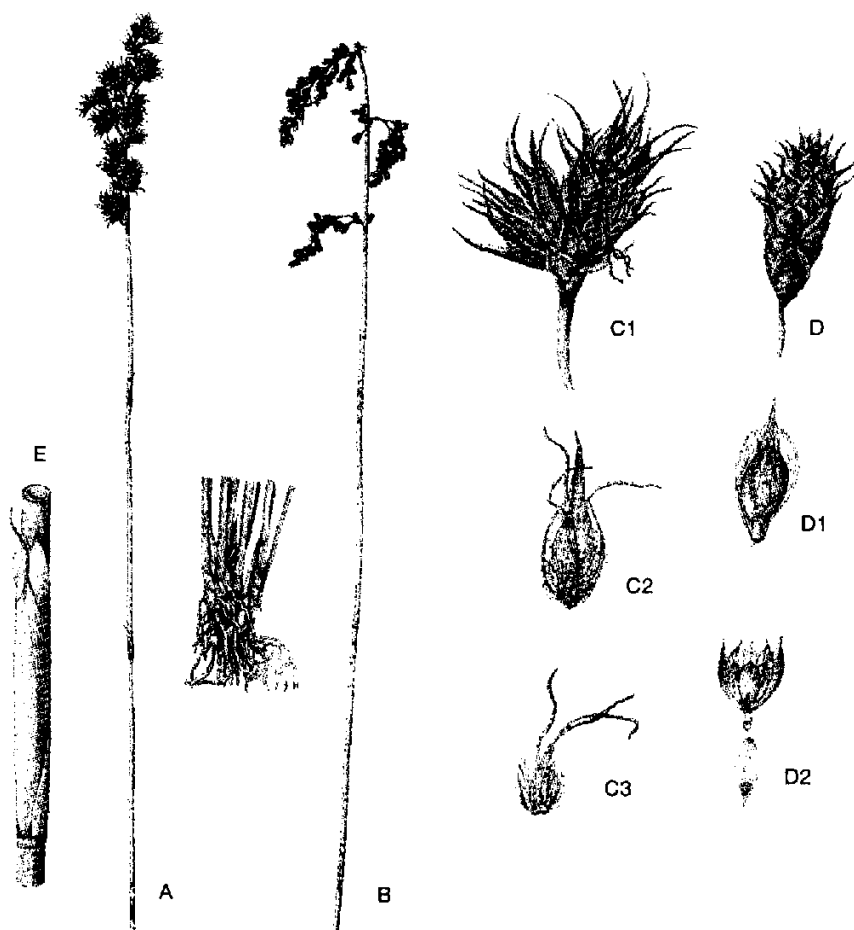
**Species for emergency grazing.** While some are rejected by grazing animals many are regularly grazed in the wild by kangaroos. Owing to the highly fibrous nature and low levels of nutrient elements, they are unlikely to offer substantial nutritional benefit to graziers in comparison with traditional feed plants. However in marginal country, not only would they provide emergency sustenance, but they **would bind and hold the soil during dry periods**. Some species can provide rare compounds, one a sulphur, containing amino compound that confers immunity against grazing. These species would be left to bind the soil in a heavy grazing situation, preserving the ground for grazed species to recover.

**Propagation** has not been simple, given (i) the generally very low seed set of species, (ii) the relatively short-lived nature of their seeds and (iii) the presence of highly specific germination requirements which are often closely linked to fire or disturbance. The rhizomes of Restionaceae are not important centres of nutrient storage or energy, but rather act as conduits for transport of water and solutes to culms and reproductive structures and to support perennating buds. Many species are unlikely to contain sufficient resources to enable successful vegetative multiplication, and, in others propagation is possible only if timed seasonally to ensure new root development and maintenance of culm integrity.

The most successful propagation method is by micropropagation with extracted seed embryos as starting material. Seeds of some species have shown promising germination responses to applications of aerosol or liquid smoke. Although tissue culture is by far the best method for mass propagation of most species of Restionaceae, this is clearly a difficult or impossible approach if a species typically sets little or no seed. In these instances, vegetative propagation may turn out to be the only feasible method.

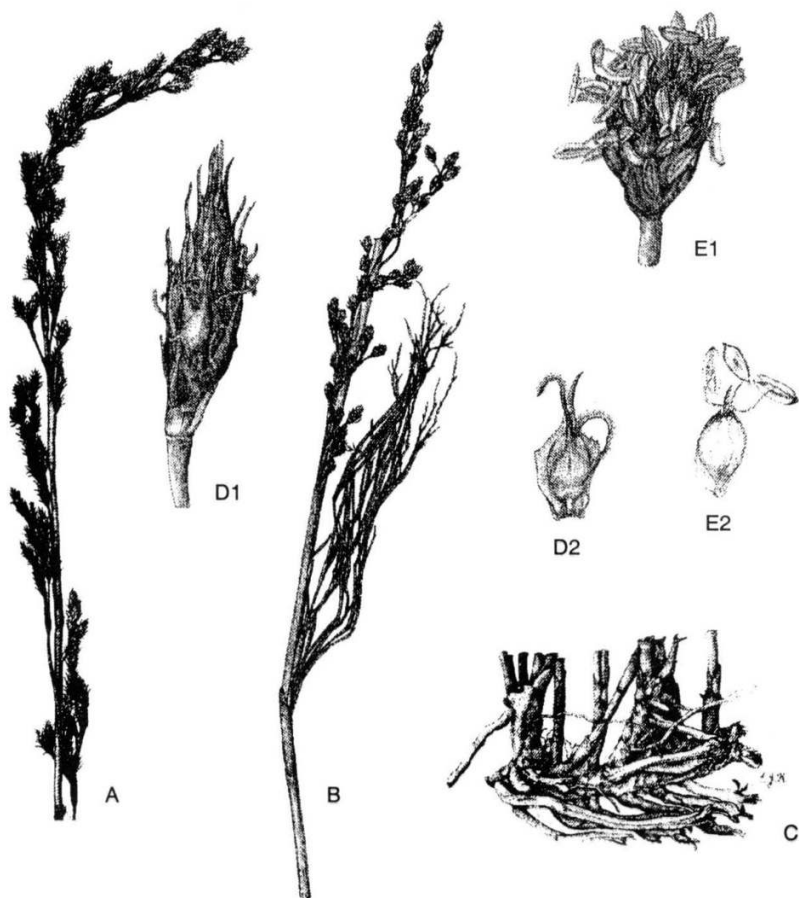
The optimal method for propagation of strongly clonal species such as *Alexgeorgea* spp., *Desmocladus asper*, *D. flexuosus*, and *Hypolaena* spp., is to divide plants during autumn and mid-winter. Indeed, almost complete failure can be expected when propagation is attempted at other times. Each "division" should retain at least three years' worth of growth, since the transplant relies on older structures as its main initial supply of the starch and/or sugars needed to resprout effectively. Culms should be trimmed to about 2 cm and divisions planted directly in the habitat or into a low nutrient-based potting mixture. It is imperative that plants be kept moist following transplanting and they are likely to require adequate watering or irrigation throughout their first summer in the field.

**Commercial exploitation.** In Western Australia, *Leptocarpus*, *Meeboldina*, *Chaetanthes* and *Melanostachya* are the most extensively harvested genera, with culms of *Chaetanthes aristatus*, *Meeboldina cana*, *Leptocarpus tenax*, *Melanostachya ustulata* and *Loxocarya striata* picked from natural populations.



*Meeboldina scariosa*, **Velvet Rush**. The female culm, detail A, has heads of numerous spikelets, C1 with showy brown acuminate bracts with translucent margins that bleach with age, each spikelet as in C2. The male culm, Detail B, has a nodding head of numerous spikelets, detail D, each as in D2. The anthers remain almost completely within the bracts when pollen dehiscence occurs. Widely divergent tepals and glumes in the nodding inflorescence aid pollen dispersal. Culm sheath E is a dull grey-brown to black 10–20 mm long.

*Meeboldina scariosa*, **Velvet Rush**, is widespread in WA from Gingin inland to Northam and along the south coast to Cape Riche in sand, usually over peat in seasonally inundated swamps and heaths. It is the most sought after of the seven species currently harvested. Culms of female plants of this seeder species are cut at ground level. This frequently results in death of the plant since remaining culms and rhizomes do not contain sufficient reserves for recovery. As a result, many populations have become threatened over the period 1980–1993 during which bush picking increased 15-fold. The situation deteriorated to the extent that agencies involved in nature conservation prohibited all harvesting on government land. Diminishing supply of this species has therefore become acute and propagation is now being undertaken.



*Baloskion tetraphyllum*, the female culm, detail D1, shows the head with emerging stigmas, each female flower as in D2. Somewhat unique to the genus with reproductive parts in 3 or multiples of 3; this genus has only two stigmas and ovaries. The male culm, detail B (with a growth of arching fine green branchlets in this case) has heads of 15–200 male flowers, detail E1, each flower as in E2. In this case there are three anthers, dorsifixed (attached at the midpoint to the filament). The culm sheath is appressed, red-brown, 15–30 mm long; lamina absent. Sheaths on upper main culms and sterile branches have a prominent apical tuft of white hairs. Spikelets and fruits are numerous, globose in male, ovate in female with 15–200 spikelets per culm; male 4–7 mm long; female 8–10 mm long. The fruit a capsule.

*Baloskion tetraphyllum* of the east coast from Qld to Tas. and SA are dioecious, plants forming tall elegant clumps with erect main culms and arching, fine, green branchlets. Horizontally creeping rhizomes, C, are buried up to 2 cm deep, up to 10 mm in diameter, covered with dense grey hairs and light brown scales. The culms are hollow, light green, 50–160 cm long, tall, erect, 1.5–5.0 mm diameter; all culms fertile and most bearing fine whorls of axillary sterile branches. Sterile, finely-branched, dark green culms also present, especially in young plants may shoot from a fertile culm as in detail B, or arise separately from the rhizome.

# *Conservation of Australia, our very survival*

Editor

*Managing Natural Resources in Rural Australia for a Sustainable Future* is just one major step towards the prevention of the Australian continent becoming a dust bowl in the future. This proposal by the federal government is addressed to the rural community, and producers of goods based upon land use. In essence it is saying "clean up your act or eventually go broke taking the rest of Australia with you". It proposes that the rural community divides themselves up into large areas of common use (mainly water catchment areas) and self regulate to maximize the use of natural resources in a sustainable way. It naturally includes good management practices such as tree planting, regeneration of corridors of land not suitable for production, water use, crop selection etc., and is a scheme to be highly recommended.

But, there is no sign of national initiatives by the federal government to set overall objectives for land use and rehabilitation. The present commitment is restricted, token and political. They continue to ignore conservation of our native flora and its dependent creatures. There is no evidence that this is a priority for our nation's leaders. It is time to advance from a well prepared resource of labour based upon the Landcare movement and others such as "Greening Australia" and the vast amount of knowledge based upon recent scientific research, innumerable conferences and published papers, to national action.

## **The scientific approach, a great tourist trap as well**

Conservation of the Australian flora, its dependent wild creatures, the very diversity of life, including the human race, is dependent upon the scientific management of our natural resources. In the future the only way this naturally interdependent diversity of life can continue to exist is in large, well managed natural areas. As existing areas are being progressively reduced or depleted by adjacent development it will be necessary to relocate plants and creatures to the designated areas with adequate management practices to prevent degradation.

### **Australian Flora Botanic Gardens**

The Australian Flora Botanic Gardens scheme is the creation of managed research gardens in a range of climatic and regional areas. Each is to plant and support as wide a range of the Australian flora as possible such that the entire sensitive flora is represented in at least two such centres. If the plant is lost at one centre it can be reestablished from other centres. There they will be studied to develop the most effective propagation and cultivation practices necessary to reestablish them into natural areas. Based upon these studies suitable management practices will be evolved for the natural areas.

**Australian Flora Botanic Gardens** will be a major tourist attraction. The sites are adjacent to large towns where their economy is based upon tourism. A number of such cities/towns have nominated to maintain these gardens because of the income to be earned from tourism and a number have been established. Major gardens have been established, the National Botanic Garden, Canberra, at Kings Park, Perth, Mount Annan at Sydney and, hopefully see below, Cranbourne near Melbourne. Regional gardens are established at Port Augusta, Batemans Bay, Wollongong, Newcastle, Gladstone, Rockhampton and Alice Springs. Other commenced are at Albany, Devonport, Maroochydore and Malanda.

## *Cranbourne Australian garden*

An incredible concept that all Australia will be proud of. We have many beautiful Australian Flora Botanic Gardens in strategic areas around Australia. Each is unique and a valuable showcase to the Australian flora. Cranbourne promises to be the most spectacular.

Located on the fringe of Melbourne's metropolitan growth corridor it will be a clever blend of natural and contrived landscapes in a vast area, a new concept for botanic gardens worldwide. The spectacle for tourism will be unsurpassed with a subterranean walk to see life below ground, a dramatic simulated bushfire experience, vistas of waterways with living rock gardens, dynamic landscapes of fresh plant communities, a spectacular sand garden, a marsh garden, walks through various eucalypt forests, etc. There will also be a vast natural bush area, scrubby, untidy but nature's playground for all types of creatures and birds.

The research proposed will include a study of propagation and cultivation techniques and the horticultural potential of Australian Plants; the management of native plants and animals so critical to the survival of us all; this will include the reconstruction of plant communities and revegetation of sites.

The fate of this exceptional national project lies in the hands of a few influential Australian leaders! The Australian Plant Society may take some credit for the concept because of the work over many years by members in Melbourne. The early plantings, by the Dryandra Study Group and other groups, look magnificent, a recreated Western Australian landscape with some eastern Proteaceae. No doubt this area was shown to people of influence as an indication of what can be done. Well done Victoria. Editor.

**The World Conservation Monitoring Unit (WCMU)** based in Cambridge, United Kingdom, is a joint venture between the World Conservation Union, The United Nations Environment Program and the World wide Fund For Nature. It has published The Red List, a list of plants under threat in the wild in the world. A significant proportion of these are Australian flora. There are 2,245 Australian plant species listed by WCMU as in danger of extinction. There is little doubt that, if we do not take positive steps to safeguard the part of the world we are entrusted with, that this will be 20,000 species in the very near future.

One conclusion reached at an international congress was "that conservation of species is becoming increasingly difficult in natural reserves. It will be necessary to integrate ex-situ and in-situ methods. The ex-situ sites such as managed botanic gardens would enable the re-introduction of plants into their wild habitats in order to restore depleted or extinct populations with careful monitoring of the process". We possess the skills, enthusiasm and knowledge to cultivate and conserve these plants but, just as importantly, we need to have the will.

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### **Birds Becoming Extinct**

Harry F. Recher, Prof. Environmental Management, Edith Cowan University, Joondalup, WA.

I predict that Australia will lose half of its terrestrial bird species in the next century. To prevent this disaster adoption of a management plan for ecological sustainability is urgently required. This involves restoration of native vegetation, the creation of a comprehensive, adequate and representative reserve system across the continent fully linked by wildlife corridors. Immediate action would be to reduce grazing pressure, remove inappropriate fire regimes, control feral and native animals, improve water quality and restore environmental water flows.

# *Eucalyptus, all restored*

Research by M. I. H. Brooker, CSIRO Plant Industry as published in  
Australian Systematic Botany 13, 2000

Summary of by W. H. Payne\*

All trees that look like a *Eucalyptus*, the "gum trees" characteristic of the Australian landscape are now probably *Eucalyptus* species. This includes those transferred to a new genus *Corymbia* a few years ago and the *Angophora* species. A new scientific study has grouped the 720+ species into seven subgenera that more closely associates similar species, now all to be known as *Eucalyptus*.

Species previously known as *Angophora* are now *Eucalyptus* species in the subgenus *Angophora* generally taking up the second [species] name used when in *Angophora* with a few exceptions, one of these being the biggest disaster of the whole regrouping. The much loved *Angophora costata* becomes *Eucalyptus apocynifolia* [a-poc-IN-i-fo-ly-a] and its two subspecies are now full species *Eucalyptus curyphylla* and *E. leiocarpa*. *Angophora bakeri* becomes *Eucalyptus angustata* with its two subspecies now *Eucalyptus crassifolia* and *E. palustris*; *Angophora floribunda* is now *Eucalyptus florida* and *Angophora melanoxylon* is *Eucalyptus melana*.

All species previously transferred to *Corymbia* now have their old name restored and 12 new species described as *Corymbia* are transferred to *Eucalyptus* with an appropriate generic name change. They are bloodwoods all in the subgenus *Corymbia* except for the 'ghost gums' now rightly in a subgenus *Blakeila* on their own. It will please many that the world famous 'ghost gums' of central Australia has retained its old name *Eucalyptus papuana*.

## **You may use *Corymbia* if you wish**

The botanical scientists often disagree as has occurred in this case. They live with this by agreeing to disagree and it is common for different Botanic Gardens/Herbaria, to have differing views on the correct name for a species. Fortunately they eventually come to a consensus eventually. As it concerns *Eucalyptus*, there will be deep divisions in the scientific world for many years. The "establishment" is closing ranks behind the *Corymbia* and others as separate genera within the eucalypt complex. Recent research based upon minute differences is quoted.

My view is that this research supports the case for one genus *Eucalyptus* with numerous subgenera. In the view of Ian Brooker, there could be as many as seven subgenera. The botanists have been coy about how many more genera they will propose once we have swallowed *Corymbia*.

**Readers are at liberty to accept the name they prefer** and in each case they will be scientifically correct. Rather than refer to this large group of look-alike trees using a multiplicity of names, it is proposed to use *Eucalyptus* here.

\*Editor's note: Marion Blackwell, that world renown botanist/conservationist of Western Australia, was the first to courageously go into print [*Australian Plants* volume 19 page 186] and protest about the transfer of the bloodwoods and ghost gums from *Eucalyptus* to the new genus *Corymbia*. Her sentiments reflected the general public reaction to this change which has now been shown, on scientific grounds alone, to be inappropriate. The derision shown to her by some members of the botanical community was quite unjustified.

It is appropriate to acknowledge the courage of Ian Brooker in publishing this study despite severe pressure from some for him not to do so. We are also grateful to Alex George for his very thorough study of the manuscript before publication to ascertain that it is scientifically correct based on a thorough, lifetime study of a very complex group of plants. Editor.

# Native bees disperse seeds

by Stephen Trueman and Helen Wallace\*

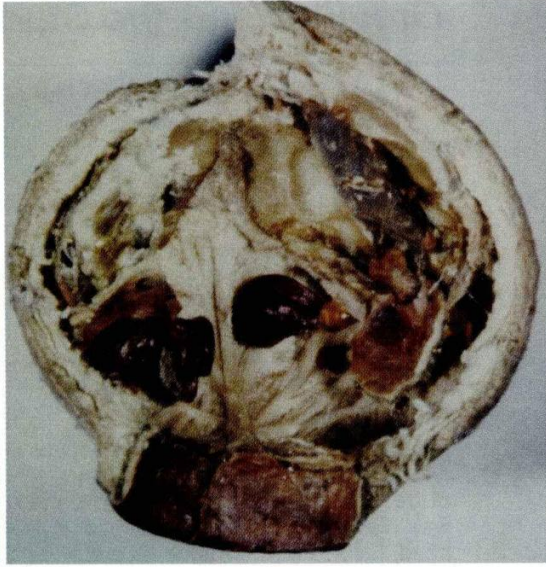
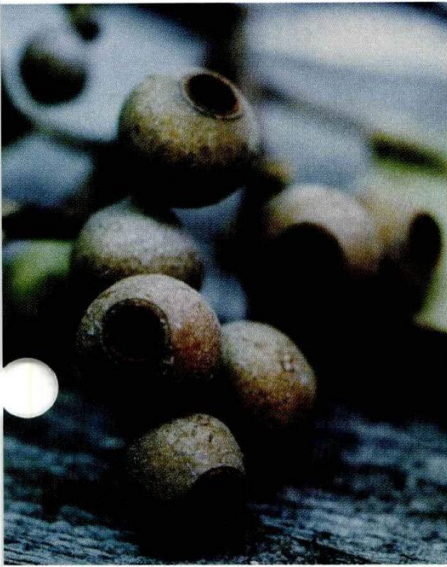
How many of us have done the right thing by planting native species, only to find later that we have planted an environmental weed? The issue of garden escapees becoming environmental weeds was raised in the September 1999 issue, and one of the plants mentioned was the Cadaghi, *Eucalyptus torelliana* (formerly *Corymbia torelliana*). This popular shade tree grows naturally between Cairns and Townsville, but its control has been recommended further down the east coast since it invades bushland and may compete with locally native trees. We have found that one of the invasion methods of *Eucalyptus torelliana* is unique, and we thought it a fitting time to share our discovery with other readers.

Unlike many *Eucalyptus* species, *E. torelliana* does not have winged seeds. Its seeds are dispersed by some native stingless bees (especially *Trigona carbonaria*) which visit a wide range of plants, and are well known as pollinators of *Macadamia*. These small black bees build nests in hollows such as tree trunks or artificial boxes (hives). The nest has many small chambers containing honey, pollen and brood (young bees). Unlike the European honeybee, stingless bees use plant resins to construct their nests. In summer, *Trigona* bees forage voraciously to extract droplets of resin from open *Eucalyptus torelliana* capsules to construct the outer walls of the nest. Some seeds do not fall out of the capsules when they open, and these seeds often stick to the resin droplets collected by the bees. When bees leave the capsules, they try to scrape off the seed onto a fruit or leaf. If the seed still sticks, they then have to transport it back to the nest. Occasionally they manage to dislodge the seed at the nest entrance, but usually carry it and resin straight into the nest. Some seeds remain stuck in resin and become part of the resin walls of the nest. Other seeds are cleaned of resin and discarded by bees that fly away from the nest and dump the seed.

The discarded seeds are still fully viable, and they germinate and establish in abundance around native bee nests. Disturbed sites such as road cuttings and land-fills are particularly favourable locations for *Eucalyptus torelliana* invasion, and the parent trees do not even have to be within sight. We know that stingless bees can transport the seeds at least 300 metres, but it is almost certainly true that many seeds are transported much further. On the east coast, stingless bee nests are much more common than many people realize. However *Eucalyptus torelliana* trees might pose a problem for stingless bees in tropical regions, as there are some reports that the resin melts in very hot weather and blocks hive entrances.

The main problem with *Eucalyptus torelliana* trees is their invasiveness in sites where they do not occur naturally and where they threaten to displace locally native plants. If you're surrounded by housing, without a patch of bushland for kilometres, there is probably little need to worry about the invasive potential of your big old *E. torelliana* tree. But if your big old tree adjoins bushland, and its seedlings are appearing over the back fence, now might be a good time to replace the tree and remove its seedlings.

\*Dr Stephen Trueman, Department of Botany, University of Queensland 4072; and Dr Helen Wallace, University of the Sunshine Coast, Maroochydore DC 4558.



Above left: Fruits of *Eucalyptus torelliana*.

Above right: Inside the fruit; a golden resin droplet that is collected by *Trigona* bees. Several red-brown seeds are visible.

Below left: Inside a *Trigona* hive; the spiral brood in the centre and numerous bright yellow pollen pots.

Below right: *Trigona* bee with a *Eucalyptus* seed stuck in resin to its hind leg. Photography by Jeff Willmer.



# Grevillea and the Study Group

W. H. Payne

I got it wrong and apologize to Peter Olde and his remarkable study group. In our December 1999, issue 161, I published a photograph of *Grevillea thyrsoidea* labelled 'Giant Form' and suggested that this is an example of an outstanding plant that deserves a cultivar name. I am advised that it already has a name *Grevillea thyrsoidea* subspecies *thyrsoidea*. The intention was to encourage growers, particularly study group members, to bring to notice any form of a species with special horticultural merit. This is the only way we can make progress in the horticultural development of our flora and its conservation. Readers are urged to let study group leaders know of any form of a species that is exceptional such as hardier in cultivation, larger flowers, better colours, etc. By giving it a cultivar name attached to the species name 'Hardy' or 'Woorah' (where it was originally found) we can purchase a plant confident of its performance.

For example, Judy Barker describes Drumsticks or a Western Billy-Buttons, *Pycnosorus globosus*, an excellent plant for flower arrangements either dried or fresh with a long vase life and perfect for commercial cultivation. If a form was discovered that had exceptional features such as a much larger flower head, it could be registered as a cultivar such as *Pycnosorus globosus* 'Jumbo' or 'Jumbo Drumstick'. Submitted by the Study Group this would be registered, without charge, as a cultivar under the international Code of Nomenclature for Cultivated Plants by the **Australian Cultivar Registration Authority**. Simply send the application for registration to ACRA, National Botanic Gardens, Canberra. We should be doing more of this, why not share your treasure.

**Registration as a cultivar** does not confer ownership of the plant just the registered name. Anyone can grow this special form and market it. We are not locking up our floral treasures and demanding royalties, we are sharing a beautiful plant with the world. Of course, to maintain its characters it would be necessary to propagate vegetatively by cuttings, division or micro-culture.

**Registration under Plant Breeders Rights** is a different matter as it confers rights to the owner who would demand royalties. The responsible authority is now taking a tougher attitude to plants for registration. You cannot take a plant from the bush and register it as yours, you have to prove that you have spent some years developing it as a different plant. You cannot claim a plant with Plant Breeders Rights if it has already been registered as a cultivar as above. In fact, registering a choice plant as a cultivar prevents such exploitation.

**The Grevillea Study Group** is an example of a very well run group of enthusiasts under the guidance of its leader Peter Olde. There are sub-groups, in Queensland guided by Merv Hodge and in Victoria by Neil Marriott. The group (somewhat similar to other Study Groups) is to be highly commended for:

1. Having regular meetings in the outer areas of Sydney, Brisbane and Melbourne.
2. Conducting field rambles in the wild to study *Grevillea*.
3. Producing an excellent newsletter on propagation and cultivation.
4. Maintaining seed banks and facilitating the exchange of cuttings and plants.
5. An annual plant sales and display at Mount Annan Botanic Garden, Sydney.
6. The introduction of many very special species and forms to cultivation.
7. The promotion of research into the cultivation of *Grevillea*.
  - (a) by their own growing trials and grafting studies.
  - (b) the funding of research through the Australian Flora Foundation.
8. The publication of three volumes on *Grevillea*, the *Grevillea Book 1, 2 and 3*, see page 327 for details.

## Western Billy-Buttons or Drumsticks, *Pycnosorus*

by Judy Barker, Australian Daisy Study Group

All six species of *Pycnosorus* (pick-no-SORE-us) have yellow compound heads of small partial heads densely packed on a common receptacle. Each partial head contains 3–8 bisexual florets. The compound heads are almost globose to ellipsoid in shape and are held singly at the tips of relatively long stiff stems. *Pycnosorus* species are annual or perennial herbs with taproots. The species in the flower arrangement on page 325 is *Pycnosorus globosus*.

Three of the species were included in the genus *Craspedia*, the Alpine Billy-Buttons, until 1992 when a revision created two distinct genera. They reinstated the genus *Pycnosorus* to include *Pycnosorus chrysanthus*, *P. globosus* and *P. pleiocephalus* and described three new species, *P. eremaeus*, *P. melleus*, and *P. thompsonianus*. The genus name is derived from the Greek *pyknos* — dense, and *soros* — heap, referring to the dense arrangement of florets in the compound heads. *Pycnosorus* is mainly distinguished from *Craspedia* by having stalkless partial heads, and pappus bristles and bracts are yellow. By contrast, the partial heads of *Craspedia* are stalked, and the pappus bristles and bracts are white (although the bracts may be tinged brown).

*Pycnosorus globosus*, Drumsticks, sends up flowering stems to 1 m or more, and the heads may be up to 35 mm in diameter. Silvery stems and leaves make this a most attractive plant in moist garden conditions. Excellent germination is achieved in 5–15 days, and seed has been sown successfully in summer, autumn or spring. Division is another means of propagation. The species occurs in Queensland, NSW, Victoria and SA. It grows on heavy soils subject to inundation, often along roadsides.

*Pycnosorus thompsonianus* has smaller flower heads in cultivation (15–20 mm across) and flowering stems shorter (35–65 cm). This is an appealing perennial, more delicate of habit than Drumsticks. Seed germinates reasonably well in 7–20 days and does not appear to be fussy about when it is sown. When a number of seedlings are grown in close proximity this amenable plant will self-sow. It occurs on the western and far western plains of NSW and south-western Queensland, usually growing on floodplains.

*Pycnosorus chrysanthus*, Golden Billy-Buttons, is a pleasing tufted perennial with globose flower-heads 10–13 mm in diameter. It may grow quite dense from 25–50 cm high and of a similar width. Seed germinates in 5–20 days but, in the experience of Study Group members, percentage germination is not as good as that of the above two species. It is possible that the seed sown was not as viable as it should have been, but this species strikes readily from cuttings. Some forms are more attractive as garden plants than others.

*Pycnosorus pleiocephalus*, Soft Billy-Buttons, is an annual herb growing to about 30 cm high. The flower-head is globose or ovoid, and a small secondary head is often produced just below the main head. It is not as easy to germinate. The seed may need an after-ripening period of one or two years storage at room temperature and perhaps some form of treatment. It occurs in the warmer areas of all the states with the exception of Tasmania and grows in sandy soils.

*Pycnosorus eremaeus* which occurs in Queensland, SA and the NT, and *Pycnosorus melleus* which grows only in a small area on the Qld-SA border, have not been grown by the Study Group.

In most situations perennial species of *Pycnosorus* flower from spring to summer, but may produce another flush of smaller heads in autumn. They are suitable for open situations in full or part sun but require some moisture in hot weather. They do not last much longer than two years.

The heads of most *Pycnosorus* species dry beautifully. The stems should be picked just before the partial heads begin to open and while the intricate pattern is apparent on the surface. These heads will last for years if they are hung upside down in a cool place for 3–4 weeks or until the stems have dried. If they become dusty over a long period they may be rejuvenated by washing under running water. Although Drumsticks are usually harvested from the wild, they have been grown as a cut flower crop along the central coast of New South Wales.

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## *We grow Sturts Pea* \_\_\_\_\_ by Paul and Kath O'Neill, Waratah, Victoria

We grow Sturts Desert Pea *Willdampia formosa*\*, in a pot under the eaves of the house as shown opposite. They are very sensitive to rain and need to be undercover in a sunny position. We used a normal potting mix with river pebbles and sea shells for a mulch.

## *I grow Sturts Pea* \_\_\_\_\_ by E. B. Smith, Kardinga, WA

My experience in growing Sturts Pea has been similar to that described by Gwen Oxnam in No. 140 issue of *Australian Plants*. I also bought self-watering pots and at last had success. I bought seedlings about 8–10 cm high in foam styrene seed trays, from a plant nursery. They were transplanted into the self-watering pots. I did not fill the bottom reservoir with soil as Gwen did but keep them regularly topped with water. Twelve seedlings survived to flowering, three of them growing on and flowering several times.

Self-watering pots are available in sizes of 14 cm to 40 cm in diameter. The size that suited me best being the 20 cm. The bottom compartment or water reservoir is detachable. The slotted tray, integral with the upper container, has a central well which is filled with potting mix and projecting down into the water. This allows the soil above to be kept moist. There is at least one other brand of similar but heavier construction but the base is not detachable.

\**Willdampia formosa*? As noted on page 319 there is often disagreement between botanical scientists on the accepted name of a plant. For many years Sturts Desert Pea was known as *Clianthus formosus*, *Clianthus* also including a similar plant (in general appearance of the flower) from New Zealand. Our Desert Pea grafts onto the New Zealand plant as if it was a twin brother and the grafted plants you purchase are a product of this union. A botanist chose to lump it into the genus *Swainsona* because of some floral characters, but it looks very different to the untrained eye. A highly respected botanist, Alex George, has recognized this very marked difference and placed it in a separate genus as above. I understand that some botanists disagree with this action. As noted on page 319, this is accepted practice, you can choose which correctly published scientific name you consider appropriate. I consider Alex George acted wisely. Editor.



- △ A floral arrangement featuring Billy-Buttons, described opposite, Waratah and *Banksia hookeriana* with Geraldton Wax and a Princess Protea. The latter is a native of South Africa, a floral beauty though not an Australian native.

I have asked for photographs and I am grateful to Paul and Kath for responding.

- ▽ **Sturts Desert Pea** growing in a pot on a window sill as described opposite.



## **Cultivated Plants of the World** \_\_\_\_\_ by Don Ellison, publ. by New Holland

The title implies that it would be impossible to do justice to the subject, yet 4,250 plants are illustrated in full colour! Books on the world scene, especially garden plants are usually compiled overseas and Australian flora is only briefly mentioned but in this large 600 page book there are a large number of Australian derived plants illustrated. The list of contributors of photographs covers from Broome, right around Australia and back to Darwin. Most botanic gardens and many leading nurseries have been involved with a foreword by Ross McKinnon, Curator, Brisbane Botanic Gardens. It is a credit to Don Ellison, so what is the downside? If you want a book full of colour photographs presented such that you identify a plant by its flowers alone, there is no downside; it is exceptional value at \$59.95. Apart from the excellent pictures of 4,250 plants that have found favour the world over but especially in Australia, there is very little additional information except for the botanical name, the common name, its origin and a couple of lines of text referring to the reason the plant is grown worldwide in show gardens.

**Winning the War on Weeds.** — This excellent reference to the common garden weeds and methods of control is available at booksellers for \$26.45. The weeds are well illustrated for ready identification and sketches show how most can be eradicated by hand. As a last resort the correct herbicide is given for decisive control.

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**The Grevillea Book**, volumes 1, 2 and 3 by Peter Olde and Neil Marriott, is the complete reference to all species of *Grevillea*. The society ensured that they were published to a very high standard with at least one large colour photograph of each of the 340+ species with easily read description of each species and details of its occurrence and cultivation. They are available from Australian Plant Society, P.O. Box 744, Blacktown, NSW 2148 at \$39.95, and as an introductory offer they will be post free for orders received within Australia in 2000; overseas add \$A10.

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**Editorial Material:** Editor, Australian Plants, 860 Henry Lawson Dr., Picnic Point 2213. Enquiries by mail only. Email address: [austplantsed@nectar.com.au](mailto:austplantsed@nectar.com.au). Fax only by appointment on (02) 9773 9866.

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*Thryptomene molesoneuvii*, see page 311

