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Waratah 'Fire 'n' Ice'

Commercial Cropping versus Bush Picking

"Australian flora could eventually sustain a diverse group of export industries with a collective value greater than the wheat industry" is a statement made by a CSIRO scientist at an international congress.

Australia-wide there are over 1,000 licenses issued each year for the legal bush picking/harvesting of flora in the wild. This contributes to the \$22 million in export revenue annually but also to the extinction of a range of flora and degradation of our land. Our policy is to encourage the commercial cropping of the Australian flora to the extent that it is more productive to harvest than to bush crop. The plants provide a greater yield of a superior quality over an extended reliable period to meet a growing more discerning market.

This stage has now been reached for *Blandfordia*, Christmas Bells, Waratah, *Banksia*, Kangaroo Paw and Geraldton Wax. Will the government authorities responsible for issuing licenses for bush picking of these plants for the 1997 harvest, please note. We are not taking the negative approach "do not issue bush picking licenses regardless of the export trade lost" but a positive, responsible proposal "for the species listed above, the commercial farming has reached the capacity to meet the demand in 1997 onwards".

Growing Proteaceae including Waratah

This issue commences a series on the reliable cultivation of all Proteaceae. While this issue concentrates first on Waratah, readers in other states should regard the recommendations as applying equally to *Banksia*, *Dryandra*, *Isopogon*, *Petrophile*, etc. Tropical Proteaceae will also be featured in an issue.

Now is the time to plant Waratah for flowers at the time of the Olympics

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COVER PLATE A Waratah for Year 2000, *Telopea speciosissima* 'Fire 'n' Ice', see page 303 for a description and how to grow this plant. Photograph from Yellow Rock Nursery.

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Gardening On The Wild Side

The New Australian Bush Garden

by Angus Stewart*

What is having an Australian native garden all about? To me it is about creating an Australian habitat in your backyard. It conjures up images of watching from your kitchen window as honeyeaters feed on your grevilleas or wattlebirds jealously protect their food source in the kangaroo paws around the side. It is about watching the eastern rosellas that nest in the big old blue gum and seeing their young ones learn to fly. It is all about establishing an island in your backyard that brings you a little bit of the bush through the flora and fauna.

Growing Australian plants is very rewarding because generally they are well able to tolerate a lack of both water and fertiliser although they will respond well when these are applied. Unlike the usual garden exotics Australian plants have not yet been improved to any great extent by means of selection of superior strains and by hybridisation to create totally new garden plants — cultivars — that are better suited to garden conditions. Better forms, bushier plants, longer flowering periods, better resistance to pests and disease, bigger flowers in a wider range of colours can all be achieved through the art and science of plant breeding.

Following is a short survey of what I consider the best cultivars currently available with references to descriptions in previous issues of *Australian Plants*. Some (marked*) not previously described, are described later in the article.

Kangaroo Paw *Anigozanthos* (It is not hard to pronounce, an-ig-o-ZANTH-os)

Tall forms 2 metres and over: *Anigozanthos* 'Bush Dawn' 17:28, *Anigozanthos* 'Bush Sunset' 16:66, *Anigozanthos* 'In The Pink'*.

Medium-sized cultivars, 1–2 m tall: *Anigozanthos* 'Bush Gold' 17:28, *Anigozanthos* 'Dwarf Delight' 12:317P 15:39, *Anigozanthos* 'Pink Joey' 16:176.

Dwarf cultivars, under one metre high: *Anigozanthos* 'Bob and Blanche's Wedding*', *Anigozanthos* 'Bush Ranger' 17:27, *Anigozanthos* 'Yellow Rock*', *Anigozanthos* 'Bush Twilight*', *Anigozanthos* 'Bush Heritage*.

Banksia Prostrate, dwarf and large cultivars

BANK-see-a

'Pygmy Possum' and 'Birthday Candles' have great potential, *Banksia spinulosa* 'Birthday Candles*', *Banksia spinulosa* 'Coastal Cushion*', *Banksia spinulosa* 'Stumpy Gold*', *Banksia paludosa* 'Greencape Dwarf*', *Banksia integrifolia* 'Australflora Roller Coaster' 17:54, *Banksia serrata* 'Australflora Pygmy Possum' 15:200 and *Banksia* 'Giant Candles' 15:200.

“Gardening on the Wild Side — The New Australian Bush Garden” by Angus Stewart.

This 200 page large book is the latest on the scene for wildflower gardening. As a lecturer in horticulture and years spent in the commercial development of exceptional cultivars now widely grown and appreciated, Angus Stewart has a lot to offer. The book is an odd collection of notes from an Australian plant lover and grower and his desire to see only the very best forms developed for horticulture shows through. A large part of his book is devoted to a range of cultivars he regards as most attractive with detailed advice on their cultivation. I have prevailed upon him to prepare this article with a brief mention only of cultivars not previously described in *Australian Plants*. This does not include *Brachyscome* or *Telopea* presented in separate articles, or *Grevillea*. The book is generally available for \$34.95 or by mail as indicated inside rear cover — Editor.



△ *Telopea speciosissima* 'Dreaming' (centre top) with its parents, a red form of waratah on the left and *Telopea* 'Wirrimbirra White' on the right. Photo by Brian Fitzpatrick, see page 306.

▽ *Telopea* 'Braidwood Brilliant', see page 307 for a description. Photo from Yellow Rock.



Telopea 'Braidwood Brilliant'



△ *Hardenbergia violacea* 'Mini-haha'
Photo by Angus Stewart, see page 295

▽ Minnie Daisy as flowering pot plant
Photo by J. Lidbetter, see page 297



Acacia The Wattles a-KAY-sha
Acacia baileyana prostrate, *Acacia baileyana* 'Purpurea' 11:69, *Acacia cardiophylla* 'Kuranga Gold Lace'. See page 323 for other *Acacia* cultivars.

Boronia bor-O-nee-a
An old favourite is the Sweet Scented Brown Boronia, *Boronia megastigma*, available in the trade under numerous cultivar names. The recent release *Boronia megastigma* 'Royale' could be worth a try.

Brachyscome brac-eez-CO-me
Featured in another article in this issue, pages 314–319.

Callistemon The Bottlebrushes cally-STEE-mon
Hardy, colourful and bird attractors. Previous issues have described these but two new releases may be of interest, *Callistemon* 'Rose Mist' and *Callistemon* 'Allyn Mist'. *Callistemon kenmorrisonii* is a newly described species.

Correa CORR-ee-a
Correa 'Dusky Bells' 15:228, *Correa* 'Marion's Marvel' 18:26 and *Correa reflexa* 'Fat Fred' 15:230 are among many attractive cultivars on the market.

Ceratopetalum N.S.W. Christmas Bush serra-to-PET-al-um
Ceratopetalum gummiferum 'Albery's Red' and *Ceratopetalum gummiferum* 'Magenta Star' 15:225, are superb selections, see page 332 for a photograph.

Chamelaucium Geraldton Wax cam-ee-LAW-she-um
Chamelaucium uncinatum 'Purple Pride' 17:374. For others refer to *Australian Plants*.

Crowea CROW-ee-a
Crowea exalata 'Southern Star', a selected good form. Others in *Australian Plants*.

Everlastings or Paper Daisies (*Heliochrysum*)
now **Bracteantha** brack-TEE-an-tha
Selected from *Bracteantha bracteata*, 'Dargan Hill Monarch' 17:338, 'White Monarch' 15:338, 'Cockatoo' 11:338, 'Diamond Head' 15:339, 'Gold'n'Bronze'.

From *Rhodanthe anthemoides* (*Helipterum*) now **Rhodanthe** ro-DANTH-ee
'Paper Cascade' 17:344, 356, 'Paper Star' 17:344.

Eriostemon The Wax Flowers erry-o-STEEM-on
Eriostemon myoporoides 'Perfusion', *Eriostemon verrucosus* 'Semmen's Double Wax Flower' 4:345, *Eriostemon buxifolius* 'Cascade'.

Grevillea gre-VILL-ee-a
A large range of beautiful plants described in previous *Australian Plants*.

Hardenbergia hard-en-BER-jee-a
Hardenbergia violacea 'Mini-haha', *H.* 'Pink Fizz' or *H.* 'Free'n'Easy'.

Leptospermum The Tea-trees lep-to-SPERM-um
Leptospermum polygalifolium (was previously *rotundifolia*) 'Lavender Queen', *Leptospermum polygalifolium* 'Julie Ann', *Leptospermum polygalifolium* (was *flavescens*) 'Cardwell' 8:130, *Leptospermum macrocarpum* 'Copper Sheen', *Leptospermum spectabile* 'Aphrodite'.

Pandorea Decorative climbing plants pan-DOR-ee-a
Pandorea jasminoides 'Lady Di', *Pandorea pandorana* 'Snow Bells', *Pandorea pandorana* 'Golden Showers' 15:364.

Scaevola The Fan Flowers

SEE-vo-la

Delightful spreading ground cover plants, featured in past *Australian Plants*, 'Mauve Clusters*', 'Pepite*', 'Fan Dancer*'. *

Telopea Waratahs

tel-O-pe-a

Telopea speciosissima 'Wirrimbirra White' 16:132, *Telopea speciosissima* 'Olympic Flame' or 'Sunburst*', *Telopea speciosissima* 'Sunflare*', *Telopea speciosissima* 'Fire and Brimstone' 14:252, *Telopea speciosissima* 'Light Shade of Pale' 14:252, *Telopea* 'Shady Lady*', *Telopea* 'Braidwood Brilliant*', *Telopea* 'Canberry Coronet*'. These and more are described on page 303.

Lilly Pillies *Syzygium* and related *Acmena*

siz-IDG-ee-um

Syzygium australe 'Blaze*'. Readers are invited to advise of various cultivars based upon *Syzygium* and *Acmena* and their horticultural features.

Wildflower cultivars not previously described

Acacia cardiophylla 'Kuranga Gold Lace'. A prostrate shrub no more than 20 cm high that can spread at least a metre wide. The leaves have a ferny, greenish grey appearance. It flowers in early spring with masses of golden-yellow globular flowers each to 1 cm across, at the end of the branches. A beautiful soft-looking plant that makes a wonderful ground cover.

Acacia floribunda 'Gippsland Gold' has weeping foliage and strongly variegated yellow-lime new growth which ages to lime green. The lemon rod flowers appear in spring. This hardy shrub reaches a height of 2–2.5 metres making an ideal feature plant in a hardy position with well drained soil, or as a screen plant.

Acmena smithii 'Hedgemaster' is the most compact of all the new lilly pillie cultivars released to date. It is a dense compact shrub (0.5–1 m tall by 0.5 m wide) that develops a bun shape. The small leaves (1.5–2 cm long by 0.5 cm wide) and short internodes give it a very bushy growth habit. As with most lilly pillies, it is very adaptable suited to full sun through to medium shade.

Anigozanthos 'Bob and Blanche's Wedding'. This big, bright, boofy-looking kangaroo paw cultivar can be highly recommended for its long-flowering habit and its intense almost iridescent, bright orange flowers. A hybrid between *A. flavidus* and *A. humilis* it has the hardiness of the former and the lower habit and bright flowers of the latter. It looks stunning as a potted plant or in the garden. The royalty from the sales of each plant goes to UNICEF.

Anigozanthos 'Yellow Rock'. This small yellow flowered kangaroo paw is also a hybrid between *A. flavidus* and *A. humilis* with some input from *Anigozanthos* 'Solace' (16:67, 68). Its long flowering habit and contrasting light colour makes it ideal for planting with other hybrids.

Anigozanthos 'Bush Twilight'. Another small plant (to 50 cm) with large yellow flowers that are heavily tinged with orange, produced almost non-stop through the year. This is one of the new generation of the 'Bush' series produced over many years by Biotech Plants. A proportion of each sale of plants in this series goes towards research by the Australian Flora Foundation.

Anigozanthos 'Bush Heritage'. Another small continuously flowering kangaroo paw by Biotech Plants from their range of decorative hardy plants, this one having deep burgundy flowers.

Anigozanthos 'In The Pink' is a selected form of *A. flavidus* from plants raised in California, USA. It is a robust, plant with leaves to one metre height and flowers to 2 m high. The small, hot pink flowers are produced in profusion in summer.



△ *Bracteantha bracteata* 'Gold 'n' Bronze', the latest selection from the Golden Everlasting, see page 302 for details. Photography by Rodger Elliott.

▽ *Scaevola* 'Light Fantastic', see page 298 for details. Photograph by Rodger Elliott.



Anigozanthos 'Pink Joey' was for many years, the only widely available Kangaroo paw cultivar. A selection from *Anigozanthos flavidus* it has proven quite hardy, some plants being many years old and growing quite thick. The clumps are readily divided for additional plants. The small bright pink flowers are displayed over a clump of leaves to 1 metre tall.

Anigozanthos 'Joey Paws' are now available in three colour forms, 'Joey Confettii' with yellow/orange flowers, 'Joey Lipstick' with purple flowers and 'Joey Fireworks' with orange flowers. The new forms all grow to 20–30 cm in height, selected for vigour, speed of growth, uniformity and profusion of flowers.

Banksia spinulosa 'Birthday Candles' is a compact dwarf shrub growing to 45 cm tall and up to 100 cm across, with fine, crowded foliage. It produces large quantities of gold flowers with dark red styles from early autumn through winter to spring. The credit for careful selection and production of this incredible plant goes to Bill Molyneux of Australfora. See the photograph opposite, spectacular!

Banksia spinulosa 'Coastal Cushion' is a spreading dwarf shrub to 50 cm tall and up to 2 m across, with narrow, linear leaves (3.5–5 cm long by 0.2–0.3 cm wide). The flowers are in well-displayed heads to 15 cm long and 6 cm in diameter, golden yellow with maroon styles. Flowering from late summer to the end of winter, each plant may bear up to 40 flower spikes at any one time. Hardy in well-drained soils and, as in nature, it will tolerate exposed coastal conditions.

Banksia spinulosa 'Honeypots' is a chance low-growing form of the species, about 60 cm high spreading to 120 cm wide. The honey coloured flowers appear freely across the bush from April to September.

Banksia spinulosa 'Stumpy Gold' is a robust spreading shrub to 40 cm tall and up to 1.2 m across, with narrow, linear leaves (4–7 cm long by 0.4–0.6 cm wide). The golden yellow and orange flower heads are well displayed, 15 cm long by 6 cm in diameter. It differs from 'Coastal Cushion' in its later flowering period and its lighter golden-coloured flowers.

Banksia paludosa 'Greencape Dwarf' is a low mounding shrub to 60 cm tall and up to 3 m across with obovate-shaped leaves (6–9 cm long by 2 cm wide) which are shiny green above and lighter green beneath. The large showy creamy yellow flowers are 13 cm long by 8 cm in diameter. Flowering is from mid-summer to the end of autumn. A hardy plant for a container, as a specimen plant for exposed coastal situations, even for embankment planting.

Boronia megastigma 'Royale', selected from the Sweet-scented Brown *Boronia* because of its abundance of fragrant flowers and its unique presentation, it looks like a topiary plant. Suited to small gardens and courtyards as a pot plant, it can be brought indoors while in flower, sharing its magnificent fragrance.

Boronia 'Southern Star' is a form of *Boronia pinnata*. The evergreen bush is small to medium growing (1.2 m high by 1 m wide) with masses of pink flowers requiring a protected position with fairly well-draining soil. Prune lightly after flowering to maintain a rounded bush and to promote flowering next season.

Bracteantha bracteata 'Spectrum' is a seedling selected for its attractive large paper daisy flowers to about 60 cm high from spring to summer. It is proposed for use in rockeries, borders or in tubs.

Bracteantha bracteata 'Gold 'n' Bronze', photograph opposite, see page 302.

Callistemon kenmorrisonii has crimson flowers with purple anthers, with some characteristics of both parents, *C. subulatus* and *C. citrinus*. It differs from *C. subulatus* in its large size, 1–3 m tall; larger wider and more irregularly arranged leaves 15–52 mm long, 3–6 mm wide, and with large fruit. It differs from *C. citrinus* in the less hairy rachis and smaller leaves.

Callistemon 'Rose Mist' is a selection from a cross between *Callistemon* 'Candy Pink' and *C. recurvus* (previously known as 'Tinaroo Falls'). It has a very dense, semi-weeping habit with fine foliage giving it a softer appearance than many of the broad leaved species. It can grow to 3–4 metres high by 2 m wide but as with most bottlebrushes it will benefit from pruning. The rose red-pink flowers appear in profusion in autumn with spot flowering throughout the year and another flush in spring. It prefers full sun and withstands moderate frosts. It is hardy, even in heavy clay soil. A pleasing feature is that it does not retain its old seed capsules.

Callistemon 'Allyn Mist' has similar parentage but its distinctive feature is that it develops into an extremely attractive dense columnar shrub to 3–4 m. From a distance the flowers have an orange hue enhanced by a mass of gold anthers.

Ceratopetalum gummiferum 'Albery's Red' is a compact form of the NSW Christmas Bush growing to 5 m tall if not pruned, with glossy green foliage. The form is selected for the brilliant red floral display on a compact bush ideal for picking of large stems for floral display. See photograph on page 332.

Crowea exalata 'Southern Star' is an exceptional selection from the wild of a dainty small plant. Trialed for four years, this small compact shrub to 0.7 m high and wide, bears a profusion of pink star-like flowers in autumn and winter. It has shown to be more disease resistant than other croweas and hardier in a moist, well drained soil. It will accept periods of inundation and will tolerate some shade but the attractive foliage colours better in strong sunlight.

Eriostemon buxifolius 'Cascade' is a prostrate plant ideal for ground cover and a feature in rockeries. In spring it is covered in masses of pink buds which open to reveal white star-shaped flowers.

Eriostemon myoporoides 'Profusion' is a dense small shrub about 1 m wide and high. The lance-shaped leaves are medium in the size range for this species and have a distinct apple-like fragrance when crushed. The flowers have a slightly pinkish tinge while in bud with white petals when fully open. The plant is literally smothered in flowers from late winter to early spring. On a gardener's scale of 1 to 10, this cultivar must rate a 10. It is virtually indestructible and puts on one of the best displays of flowering imaginable.

Eucalyptus 'Summer Beauty' is a hybrid cross of *Eucalyptus floiofolia* and *Eucalyptus ptychocarpa* and is the product of a long-term breeding programme by S. T. and N. V. Henry in Queensland. It produces large pink flowers in summer.

Eucalyptus 'Summer Red' has the same parentage but produces red flowers complemented by rich-red growth. Replacement of *Eucalyptus* by *Corymbia*?

Hardenbergia 'Bushy Blue' is a shrub with a naturally compact growth habit to 75 cm high. In late spring it is laden with showy violet pea flowers. Bred in California, it likes a sunny, well-drained position and can be used as a specimen plant, as a hedge, or in containers.

Hardenbergia violacea 'Mini-haha' is a small upright bushy shrub to a height of 15–30 cm by 30–50 cm wide. It has smallish, bright green leaves with reddish-bronze new growth and dark mauve flowers in profusion in spring. Adaptable to any soil type, it can be grown in full sun or light shade. Photograph, page 289.

Hardenbergia violacea 'Pink Fizz' is a climbing or trailing small shrub that will cover a sizeable area if allowed space. The beautiful pink flowers are its main attraction. It is adaptable to any soil type and can be grown in full sun or light shade and tolerates some frost.

Hardenbergia violacea 'Free 'n' Easy' is a climbing or trailing small shrub that will cover a sizeable area if allowed. The outstandingly beautiful flower colour distinguishes this cultivar, white with a hint of pink, in profusion in spring.

Leptospermum rotundifolium 'Lavender Queen' is a low-growing shrub to 1.5 m tall by 1–2 m wide. The aromatic leaves are small and round. The large flowers are up to 3 cm across, a pale pink tinged with lavender in spring. The very large, glossy seed capsules persist on the branches and are quite ornamental in their own right. A stunning plant when in flower, it adapts to most soil types and climatic conditions. It prefers full sun.

Leptospermum rotundifolium 'Julie Ann' is a prostrate, ground-covering shrub less than 30 cm tall and up to 2 m across. The foliage is similar to 'Lavender Queen' with pale mauve flowers to 2 cm across.

Leptospermum polygalifolium 'Cardwell' is a compact shrub 2–3 m tall by 2 m wide with weeping branches that give the plant a very graceful appearance. The deep green leaves are small and lance-shaped with a reddish tinge when young. The white flowers are 1–1.5 cm across and smother the branches from late spring into summer. An adaptable plant that will thrive from Melbourne to north Qld.

Leptospermum macrocarpum 'Copper Sheen' is a smallish, erect shrub to 2 m tall by 2 m wide. The dull green leaves are small and elliptic in shape with a reddish tinge when young. The flowers are up to 3 cm across with large, reddish sepals and yellowish petals. It adapts to most soil types and climatic conditions, preferring full sun.

Leptospermum spectabile 'Aphrodite' is a small to medium shrub with a very dense branching habit, giving it a tight bun-shaped appearance. The short, narrow elliptic leaves have withstood the rigours of the Canberra frost for a number of years. Flowers are up to 2 cm across, an interesting red-purple colour.

Pandorea jasminoides 'Lady Di' is a vigorous climber with bright green, glossy, pinnate leaves and bears masses of white, trumpet-shaped flowers right through the warmer months of the year. It is quite adaptable and one of the best Australian climbers.

Pandorea pandorana 'Snow Bells' is a very vigorous climber with glossy pinnate leaves producing clusters of creamy white flowers in early spring. Quite adaptable but prefers an enriched soil and full sun.

Prostanthera lasianthos 'Mint Ice' is a variegated mint bush with attractive contrasting foliage all year round. It grows to a pleasing shrub 2 m high if left unpruned or as a screening or accent plant. Flowers, white in summer.

Scaevola 'Mauve Clusters' is a spreading ground cover with small oval-shaped leaves that are slightly lobed. The dark mauve fan-shaped flowers are 1.5 cm across in profusion in spring the colours being the feature of the plant.

Scaevola 'Light Fantastic' is a spreading ground cover 30–50 cm tall that can spread up to 2 m diameter under good conditions. The small, spoon-shaped leaves are 6 cm long by 2 cm wide. The fan-shaped flowers to 2 cm across, are mauve-blue with a cream basal blotch, displayed throughout the year with peaks during spring and summer. A selection by Rodger and Gwen Elliot, the parents are thought to be *Scaevola albida* and *S. auriculata*. It does best in freely draining acidic soils with a sunny aspect, but will tolerate semi-shade. It is a plant for pot or hanging basket culture or as a rockery or border plant, photograph on page 292.

Scaevola 'Petite Cascade' is a compact, more upright less vigorous ground cover with small spoon-shaped leaves that are prominently lobed. The fan-shaped flowers are 1.5 cm across, a soft, light mauve to blue in colour.

Scaevola 'Fan dancer', a selection of *S. aemula*, has a compact growing habit to about one metre across with dense foliage of a lush green. A profusion of fan-shaped purple flowers are produced year round. It has good tolerance to high humidity, minor frost and salt preferring full sun to dappled shade. During the long hot summer months it requires an occasional deep watering. It is similar but more compact than *Scaevola*. 'Purple Fanfare'.

Syzygium australe 'Blaze' is a very compact shrub form of the species with smallish leaves 3 cm long by 1 cm wide that are densely clustered on the stem. The plant would make a wonderful hedge or border plant with its fabulously coloured new growth. ■

Wildflowers for Horticulture

Boosting the Cut-flower Export Industry*

by Ross Worrall

Australia's unique native flora is a vast natural resource. On the world cut flower market, there is growing demand for the unusual and distinctive shapes and colours of our native flowers and foliages, which generally have a long vase life. An export income of \$2 million in 1981 has grown to \$22 million in 1993. The demand for native fresh and dried flowers has similarly increased.

While the industry was originally based on bush harvested product, an increased demand for quality and quantity has seen increasing numbers of commercial plantations established. It has become clear that an industry based on cultivated plants is more sustainable and better able to compete on the world market. This trend also allows superior clones and new varieties to be produced. Native flower growing is attracting many newcomers to the commercial cut flower industry. The Rural Industry Research and Development Corporation (RIRDC)** is a major source of funding for native flower research projects. The Corporation recently hosted a nationwide series of workshops to foster the native flower industry. A report on a study in NSW is given opposite.

The Australian Flora Foundation, founded and partly funded by SGAP has taken an active role in the promotion of research in this area. ■

*"Development of Australian East Coast Species for Floriculture in both domestic and export markets" is available from NSW Agriculture for \$10.00. It is designed for commercial growers of cut flowers with special emphasis upon Christmas Bells, Waratah and NSW Christmas Bush.

**RIRDC native flower industry publications are available for a fee from RIRDC, PO Box 4776, Kingston, ACT 2604. They include "The Australian Wildflower Industry — a review", "The nature of demand curves for Australian flowers and foliage in key export markets" and "Commercial potential of NSW flora".

NSW Flora As Flowering Pot Plants

A study by
NSW Agriculture*

Following a survey of the flora of western NSW for species with potential for market development, eighty species were selected for further development and horticultural evaluation. The first selections will be of interest.

1. *Dodonaea viscosa* subsp. *spatulata* grows to 45–60 cm without pinching, in a 150 mm pot but needs some form of shaping, either physically or chemically. The insignificant flowers develop into very novel, round, prominent fruit ageing from green to a deep, bright red. These are displayed in the coloured form for a period of at least 8 weeks. The foliage is dark green 25 mm long by 6 mm wide.

2. *Goodenia willisiana* is a small compact herbaceous plant which can maintain continuous flowering throughout the year, bright yellow axillary flowers to 30 mm across each lasting for over two weeks. The foliage is an attractive green to blue-grey in colour. Photograph on page 312.

3. *Macgregoria racemigera* is a very showy compact plant up to 15 cm tall, with a blaze of flowers, white, tinged with a pink centre, 10–15 mm across**. Faintly perfumed the floral display is maintained for at least 2–3 months. Photo page 308.

4. *Minuria leptophylla*, Minnie Daisy, is a compact, floriferous herbaceous plant similar to *Brachyscome multifida* but more suited to hard pruning which will stimulate repeated flowering flushes. A pale mauve flowered form shows promise for pot culture. A double white is also being evaluated. Photo page 289.

5. *Prostanthera microphylla* is a small erect shrub to 1 m high. This form has a very compact habit, unusual pale green flowers and miniature dark green foliage.

6. *Goodenia robusta* is a very large flowered trailing *Goodenia* that is quite dramatic as a hanging basket specimen. The yellow flowers to 20 mm across combine well with the striking silver/grey hairy foliage.

7. *Goodenia glabra* is a prostrate weeping plant with large bright yellow flowers that contrast well with the dark green foliage, leaves to 25 cm long, woolly in basal rosettes. Flowers all year round, flushes in Spring to Summer. Photo page 304.

8. *Prostanthera aspalathoides* usually a stiff erect shrub to 1 m tall has a compact red flowering form that responds well to pruning. The fine, erect foliage offsets the bright red flowers.

9. *Scaevola humilis*. A selected white form is of particular interest because it provides a good display of white flowers for a large part of the year, with flushes in Spring–Summer. The foliage is a deep green in colour. Other forms with potential include an unusual pale pink form and a silver/blue foliaged form with vivid purple flowers and a relatively upright habit. Photograph on page 313.

10. *Brachyscome formosa* has a large bright pink flowered form that is much more spectacular than the *B. multifida*.

*The survey involved R. Worrall, J. Ledbetter and P. Milthorpe. It is available in published form as **Development of Australian native plants as flowering pot plants in domestic and export markets** from NSW Agriculture, Locked Bag 11, Windsor, NSW 2756 for \$10.00. It gives further details of these and other plants recommended for trial and production as commercial potted plants. It is styled to be of most benefit to a commercial grower contemplating venturing into this commercial activity.

**See the amazing photograph on page 308. It is not a bunch of cut flowers in a vase but a flowering pot plant 6 months from seed. As the first runners radiate out forming flowers on the ends, they were pruned back resulting in branching and the development of masses of terminal flowers that will last for months.

11. *Dodonaea truncatiales* is a very small shrub to 80 cm without pinching with novel, large propeller shaped fruit ageing from green to a bright pink prominent fruit which are displayed on the plant for a period of at least 8 weeks.

12. *Lasiopetalum behrii* is an unusual small shrub with long slender leaves and lots of large white to pink flowers. Attractive as a potted shrub, if elevated as, with most *Lasiopetalum* species, the flowers face downwards. Photo on page 312.

13. *Mimulus prostratus* is a slender prostrate herbaceous plant forming dense mats up to 60 cm across and 10 cm high. The white flowers appear in flushes throughout the year, more prominently in Spring.

14. *Phebalium bullatum* is often a shrub to 1 m but there are small forms with fine leaves and stunning yellow flowers suited for growing in small pots. It flowers over 6–8 weeks in late winter, early spring.

15. *Ptilotus exaltatus* is a strikingly unusual plant with distinctive large conical red/pink heads of flowers that have already attracted attention by overseas commercial interest. Selection of the best form is the key to local development.

16. *Ptilotus nobilis* is similar to *P. exaltatus* but lacks the beautiful red flowers. However, the dull grey/green flowers have a very attractive scent.

Preferred Potting Media — for pots 100 to 200 mm in size.

The mix: 25% European peatmoss, 25% Perlite (P500), 25% Composted Pinebark, 25% Coarse washed river sand.

Fertiliser per cubic metre of potting media: 4 kg Black No. 24 Nuticote 8–9 month N:P:K 16:44:8.3; 500 g Micromax (18 month release) with 500 g of IBDU; 500 g each of lime and dolomite to adjust pH to 6.0 ■

Supplementary notes on the plants recommended above

Editor

The following references by no means implicate the above authors.

1 and 11. Hop bushes, *Dodonaea*. All species are described and illustrated in *Australian Plants* volume 17, pages 189–233, together with details of cultivation.

2–6–7. *Goodenia*. Good references to this large group of plants in *Australian Plants* 5:247,328P; 6:147; 8:263; 9:250; 10:258,292; 11:301,360; 17:336P; 18:118,178.

3. Carpet-of-snow, *Macgregoria racemigera* is a very showy annual herb from arid and semi-arid regions across northern Australia from NSW and Queensland, through the Northern Territory to Western Australia. The small leaves 5–15 mm × 2 mm are on spreading and sometimes erect branches. The terminal flowers to 15 mm across are white with a pink throat, fragrant, profuse and massing to form a 'small carpet of snow' in the desert situation. It has exceptional potential for growing in containers and in rockeries. A sketch of the plant structure and flower details is in *Australian Plants* volume 13, page 215. See photograph on page 308.

4. Minnie Daisy, *Minuria*. 10 species occurring in Australia, in the daisy family Asteraceae. They are found in warm to hot arid areas often associated with saltbushes and mulga. All species are perennial herbs or dwarf shrubs and are exceptionally floriferous in suitable conditions. This makes them ideal for rockeries in harsh conditions or a container plant. See *Australian Plants* 6:137; 8:256P,261.

5–8. Mint Bushes, *Prostanthera*. A large genus of plants ideally suited for garden and container cultivation. *Australian Plants* 5:88,302,327; 6:141–171; 9:82; 10:296P,333; 11:272,304; 17:60.

9. Fan Flowers, *Scaevola*. A large group of mostly prostrate plants. Many forms have been selected for horticulture as on page 296. *Australian Plants* 5:91; 8:263; 9:182,259; 12:321; 13:70; 17:84,341; 18:112,118,172,186.

10. *Brachyscome* horticultural forms are described on page 317.

12. *Lasiopetalum* is a group of hardy plants, often not showy as their dainty flowers face the ground. Selected species and forms are used in horticulture.

13. Monkey-flower *Mimulus*, is a large group with only 4 species, all perennial herbs, found in Australia. The other species are, *Mimulus gracilis* with tubular blue, lilac or purple flowers with yellow blotches, *Mimulus repens*, the tubular flowers being white or yellow sometimes with red spots opening out to blue, purplish or pink lobes (*Australian Plants* 9:253,257; 10:259), and *Mimulus uvedaliae* with tubular flowers to 10 mm long, blue, purplish or lilac with a yellow tube.

14. *Pheballum* is a genus with a large number of very attractive plants for horticulture. *Australian Plants* (some colour) 5:88; 6:291; 8:250,288P; 11:304; 12:147; 15:47.

15-16. *Ptilotus* will be the subject of an article to be published shortly concerning the horticultural selection of several species. *Australian Plants* 5:249P; 18:144P. ■

The Survival of our Waratah is severely under threat

"It is unfortunate that indiscriminate bush picking continues. In one small property in the Appin area all the flowers had been picked with none left to produce seed. It is possible that this stand is decimated every year. This will lead to the loss of this population. Indiscriminate picking is repeated over much of the natural distribution with inevitable loss. The quality of bush-picked blooms is poor when compared with cultivated waratahs. If we wish to have an export industry for our native flora we should be concentrating on cultivation and breeding".

The above is a quote from an article by Cathy Offord, Horticultural Research Officer at Mt. Annan Botanic Garden, the native garden of the Royal Botanic Gardens, Sydney, and Lindsay Campbell, Associate Dean, Faculty of Agriculture, University of Sydney.

Responsible government? The Society has formally written to the responsible Minister requesting that the authorised bush picking of Waratah and Christmas Bells cease and government permission to harvest these species in the wild be not renewed as current licenses expire. It has been pointed out to the Minister that the commercial cut flower industry has reached the stage that the demand can be met. Commercial plantations of both these species produce blooms very much superior to the bush picked specimens. Not only is bush picking threatening the long term survival of these plants, it is undermining the export industry because of unreliable quality and acceptable blooms. — Editor

Expeditions in Western Australia

You are invited to join this expedition

A limited number of places are available on a 10-day camping trip with staff from Kings Park and Botanic Garden. This trip will be from 13th to 23rd of September, 1996. Areas visited will include Paynes Find, Meekatharra, Mt. Augustus and Shark Bay. The cost for the trip is \$1,075 per person. This rare opportunity will provide you the chance to assist on a collecting trip for seed to some of the more remote and spectacular areas of Western Australia. Seed will be used to improve botanical collections in the state's Botanic Garden. This opportunity is strictly limited. For further details contact Luke Sweedman, Seed Collector, Kings Park, West Perth, WA, Phone (09) 480 3625 or Fax (09) 322 5064.

New Plant Releases

from Koala Blooms Australia

In spring 1996 Koala Blooms Australia will release their first collection of plants in the **Koala Blooms Export Quality Range**.*

Koala Blooms is an Australian Company which has been undertaking the export of Australian plants since 1990. During researching of possible markets overseas Koala Blooms found that a number of Australian plants were being grown by Israel and European countries. Not only were nurseries and customers unaware that the plants originated in Australia, there was also, in nearly all cases, no financial benefit returned to Australia in the form of sales royalties to Australian breeders or originators and the horticultural industry.

It became very evident that we in Australia should seek to reverse this trend. For all Koala Blooms plants sold in Australia and overseas there is a royalty paid to the breeder or person who assigns the rights to Koala Blooms to market the plant for them. In the commercial horticultural world a larger royalty can be gained for unique plants which are able to be protected by breeding rights or plant patents.

As production of Koala Blooms plants has increased in U.S.A. it was realised that some of these plants could also be released simultaneously in Australia. In this spring there will be special release of 5 cultivars which have been propagated and grown by Koala Blooms licensed nurseries. Three are brachyscomes.

The stunning bright lolly-pink daisy flowers of *Brachyscome* 'Mardi Gras' can virtually cover the shortly-lobed deep green leaves from September to March and there will also be lighter flowering at other times. This compact, suckering cultivar rarely gets more than 20 cm tall and will spread 0.5–1 m across. It is thought to have *B. angustifolia* and *B. multifida* as parents. A sunny or semi-shaded site in well-drained acidic soils is best. Plants can be rejuvenated by shearing off the old foliage. It has been noted that some plants need plenty of iron, otherwise they can develop yellowish-green older leaves which usually indicates a lack of iron and/or magnesium. Application of iron chelates (EDTA) at 2–3 teaspoons per 10 litres of water, along with 1 teaspoon of Epsom Salts (magnesium sulphate) per 10 litres of water, usually remedies deficiencies.

In recent years there have been a couple of white-flowered selections of *Brachyscome multifida* offered by nurseries but they have not performed all that well in cultivation. This is no longer a problem as the new *Brachyscome* 'White Delight' is a vigorous spreading groundcover which is compact, producing masses of white daisy flowers of about 3 cm across over most of the year, with a peak blooming during late spring to autumn. Plants need freely draining acidic soils in a sunny or semi-shaded site. Plants can be clipped lightly at any time and flowering should begin again in 4–6 weeks time. Old plants can be rejuvenated by hard pruning or shearing in late autumn or early spring. Photograph page 308.

*If you would like more information regarding these plants and where they can be obtained, or if you have in your garden a new cultivar which you feel may be worthy of inclusion in the Koala Blooms Export Quality Range, you can write to Koala Blooms at 27 Wells Road, Mordialloc, Victoria, 3195.



Brachyscome 'Mardi Gras', plant and flowers, photography by Rodger Elliott.



For lovely pale mauve flowers it is difficult to surpass the display produced by *Brachyscome* 'Mauve Delight' during spring to autumn. See the photographs on page 316. This new introduction is thought to be a *Brachyscome multifida* × *B. angustifolia* hybrid. One of the highlights of this plant is that it develops as a compact groundcover of up to 20 cm tall and spreads 0.5–1 m across. A light shear or prune is beneficial if there is a decline in flowering as this promotes new growth and flowering should resume in 3–5 weeks.

These brachyscomes differ from others already being grown in flower-colour, vigour and growth habit. All are excellent for borders, rockeries and as container plants for patios, decks, window boxes etc. They are also suitable for hanging baskets. These selections are excellent for massed plantings and can be used formally or for informal displays as drifts of colour. They can be magnificent when planted to compliment each other. Brachyscomes are renowned for attracting butterflies and these new introductions are no exception. They tolerate light to moderate frosts but appreciate supplementary watering during extended dry periods.

Over the last 10 years there has been an increasing interest in growing *Scaevola*, a member of the *Goodenia* family and related to the brilliant *Dampiera*, *Goodenia* and *Lechenaultia* which are so popular with Australian gardeners. Some of these recent introductions are spectacular in flower but have been short-lived. *Scaevola albida* 'Karwarra Pink' (photo page 329) is a very reliable cultivar which originated at Karwarra Australian Plant Garden, at Kalorama in the Dandenong Ranges of Victoria. It is a clumping and suckering plant which produces its bright 2-toned pink fan flowers along slender stems from late spring to autumn. The floral display is at its best after Christmas which is when flowers are often at a minimum in gardens. It usually grows to about 30 cm tall and to about 1 m across. You can grow this lovely fan flower in gardens, rockeries and in containers such as planters and hanging baskets. Pruning of young flower-stems for posies and removing old flowering stems usually promotes production of further flowers. Heavy frosts can damage top growth but new sucker growth emerges when conditions are right. Royalties from the sale of this plant will help in the ongoing development of Karwarra Garden.

The final Koala Blooms introduction for 1996 is a dwarf everlasting, *Bracteantha bracteata* 'Gold 'n' Bronze', photograph on page 292, which has proved reliable and adaptable in trials over recent years. It has narrow, green, slightly hairy leaves and is a much-branched, moderately compact dwarf shrub of about 30 cm tall by 0.6–1 m across. The long-stemmed golden and bronze papery daisies of 3.5–4.5 cm across are displayed well above the foliage. The flower heads have many rows of tightly packed colourful bracts. Flowering is at a peak over the summer and autumn months. Plants can be used in gardens, rockeries and containers. They need good drainage, acidic soils and a sunny aspect to be at their best. Prune the flowers for use in fresh or dried arrangements. They are exquisite for long-lasting posies. It is best to choose recently opened flower heads if you wish to dry them. Removal of spent flower heads from the plants is beneficial also, as a means of regular pruning. As soon as plants show any sign of becoming sparse do not be afraid to prune them fairly hard, as this promotes good bushy growth. The parents of this excellent cultivar are thought to be *Bracteantha bracteata* 'Diamond Head' and *B. bracteata* 'Golden Bowerbird'.

Waratahs

The new breed to the year 2000

by Paul Nixon and W. H. Payne

Plant now to flower for the Sydney Olympics. The following are recommended:

Teloepa speciosissima* 'Fire 'n' Ice'

Photograph on page 285

Bred by Roy Rother, Emerald, Victoria, 'Fire 'n' Ice' is one of the most striking cultivars yet selected. It is a medium dense shrub 2.5 m × 1.5 m with dark green foliage and unusual contorted (sinuate) leaves. It has classic near perfect, deep red globular flower heads with broad triangular close cupped bracts extending to about three-quarters the height of the floral cone. An outstanding feature is the brilliant white stigmatic tips and outer rim of the floral tubes. This gives the impression that the flowers have just survived a snowstorm, hence the name 'Fire 'n' Ice'. It is a late season flowerer its dark green foliage and brilliant flowers making it highly desirable to decorate any garden or indoors as cut flowers.

Teloepa speciosissima* 'Songlines'

Photograph on page 305

Bred by Yellow Rock Nursery in a breeding programme to select waratahs for the Sydney Olympic Games for use in floral tributes and display, this magnificent plant is ideally suited for cut flower production. It is a compact shrub 2 m × 1.5 m with dark green foliage. The flowers are pink in bud and when freshly opened they mature to an unusual flame red. The flame red broadly triangular bracts are loosely cupped around the inflorescence. They are arranged in whorls of three and extend to about three-quarters the height of the floral cone. The flower cones are globular and medium sized each comprising about 180 florets or individual flowers. The flowers open mid-season which in Sydney is mid-September.

Teloepa speciosissima* 'Cardinal'

This incredible plant was discovered growing on the property of the late Miss Lucelle Pope at Werombi, NSW. The photograph in *Australian Plants*, vol. 14, page 248 shows this lady in front of her spectacular plant. Its potential was recognised by Paul Nixon who transplanted it to a north east facing bank of Hawkesbury sandstone. The original plant survived some 39 years producing masses of brilliant flowers, 100–120 blooms annually. It is a large robust shrub 3 m × 3 m with dark green foliage. The flowers are cardinal red, large and dome shaped with up to 210 florets. A typical waratah has from 140–160 florets. The bracts are in two whorls, dark red and of medium size, extending 2 cm beyond the flowers. Flowering is from mid to late September. The vase life is excellent.

Teloepa speciosissima* 'Fire and Brimstone'

Photograph on page 305

Discovered in the wild by Paul Nixon near Kangaloon, NSW, this outstanding plant was selected for cultivation because of its robust habit, vigorous growth and very large flowers. It grows to 2.2 m with a spread of 1 m. The flowers are cone shaped with up to 240 florets. The bracts are small to medium, triangular, in two whorls and clasping. Flower petals are light/medium red as are the styles with the stigmas tipped white. The leaves are very large, up to 440 mm, dark green with medium serrations. An attractive plant in cultivation, it is quite frost resistant, withstanding frosts to -12°C for short periods. Very suitable for cut flower production the vase life being outstanding.

*Plants produced by Yellow Rock Nursery, available through your local plant nursery.



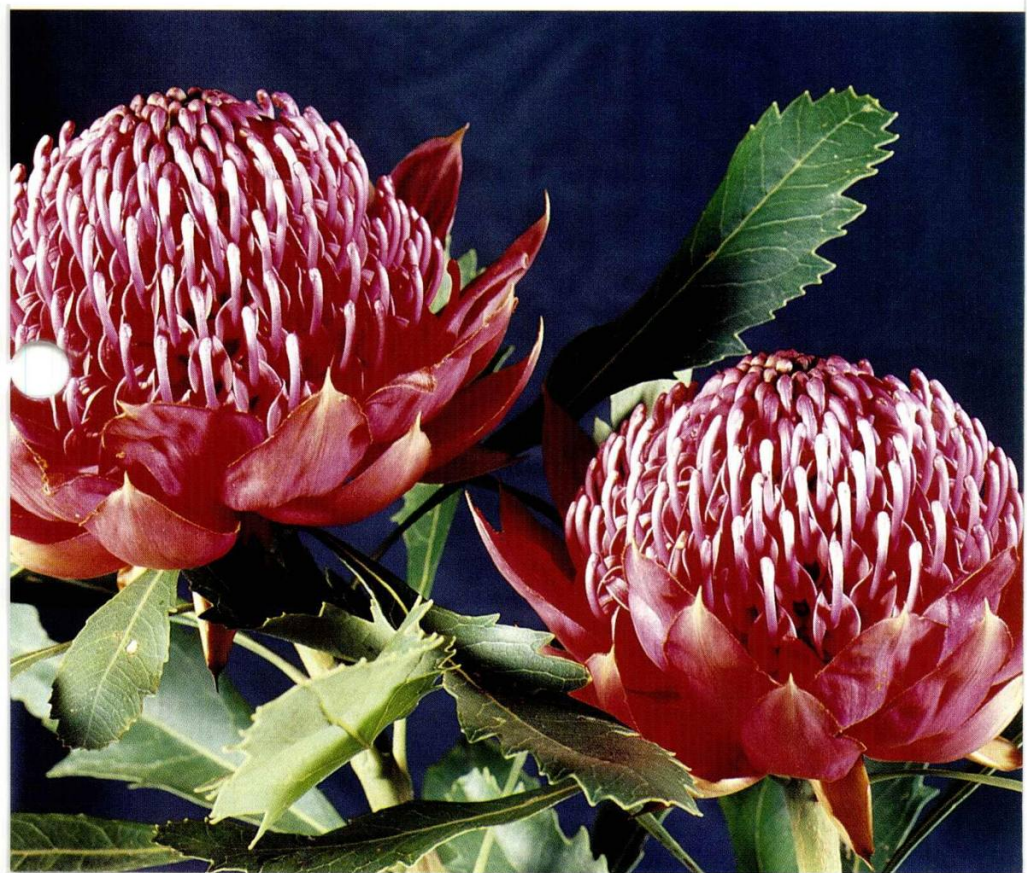
Goodenia glabra, as a flowering pot plant, see page 297, photo by J. Lidbetter.



△ *Telopea* 'Fire and Brimstone'

▽ *Telopea* 'Songlines'

See page 303 for description, page 310 for cultivation, photographs from Yellow Rock Nursery.



***Telopea speciosissima* 'Dreaming'**

Photograph on page 288

Bred in 1988 by Brian Fitzpatrick following earlier pioneering work by Russell Aroney and Keith Bottomley, 'Dreaming' is a hand pollinated hybrid resulting from a selected red form of the species shown on the left side of the photograph, chosen for its clarity of tone, and the white form known as 'Wirrimbirra White'. The result is elegant in form and luminous in colour as shown by the unique centre flower. The flower is ovoid and of medium size, with luminous pink florets and floral bracts. The styles emerge white with a cream base and turn pink when mature. The changing shades of colour from the time the white styles emerge from the vibrant pink flower head slowly maturing to an ovoid orb of pink, finally ageing to purple. A mid-season flowering variety, it has a similar growth habit to 'Wirrimbirra White'. As the name suggests, it is a celebration of the colours of the Dreamtime and the legends of the Waratah. Its release is planned for Spring 1997, 'The Year of The Dreaming'. Photograph on page 288.

***Telopea speciosissima* 'Canberry Coronet'**

Bred by Doug Verdon at Australian National Botanic Gardens, Canberra, the fine selection is an upright compact shrub, 3 m x 3 m with up to 100 terminal flower heads in mid-spring.

***Telopea speciosissima* 'Brimstone Blush'**

Found on the property of Mr. B. Richards, at Oakdale, NSW the plant was selected for its outstanding qualities for horticulture. It is a smaller shrub to one metre tall. The flower size is medium sized and globe shaped with a pink crown when mature. The 160 florets are surrounded by three whorls of medium sized dark red bracts. The styles have a light red base and get whiter towards the white stigmatic area, giving the flower head its pink appearance. The leaves are dark green with fine serrations. Flowers in October and remains attractive for weeks.

***Telopea speciosissima* 'Olympic Flame'**

Photograph on page 309

Bred from a single open pollinated seedling in a breeding programme in 1987 conducted by C. A. Offord, P. Nixon and P. B. Goodwin of University of Sydney, 'Olympic Flame' is a bush to four metres high with dark green leaves and bright red flowers. The Plant Breeders Rights application, together with 'Sunflare', description below, compares the plant with 'Fire and Brimstone' as follows:

	'Olympic Flame'	'Sunflare'	'Fire and Brimstone'	'Wirrimbirra White'
Flower Diameter				
outside bracts	146 mm	120 mm	150 mm	180 mm
without bracts	92 mm	85 mm	108 mm	95 mm
Flower Fresh Weight	57 g	81 g	107 g	71 g
Flower Colour	red	red	red	white/cream
Flower Vase Life	14 days	14 days	17 days	8 days

***Telopea speciosissima* 'Sunflare'**

Bred in 1981 from a similar programme but with more deeply lobed and serrate dark green leaves. 'Sunflare' has potential as a cut-flower.

[†]It seems likely that these plants will not reach the market because of the stringent conditions demanded by the owners. Meanwhile comparable cultivars are being developed in the trade.

***Telopea* 'Shady Lady'**

This waratah originated as several crosses between *Telopea speciosissima* and *Telopea oreades* and was brought to prominence by Protea Flora Nursery. It exhibits various forms, the leaf tends towards the plain leaf margin of *Telopea oreades* while the flower tends towards *T. speciosissima*. However, the bracts are not as showy and some droop while others are insignificant. An unusual feature is that some of the flowers in the head may mature from the centre out rather than the reverse as with other waratahs. This is an excellent garden shrub. It is not favoured for commercial cut flower growing as other forms of waratah are preferred in the trade.

***Telopea* 'Parry's Dream'**

It would be a tragedy not to mention 'Parry's Dream' a selection by Percy Parry, the leading supplier of waratahs as cut flowers 50 years ago. It is featured in full page colour photograph in *Australian Plants*, Volume 14, page 177. The splendour of this magnificent plant has not been lost and will be available through the trade in a year's time.

***Telopea* 'Braidwood Brilliant'**

Photograph on page 288

This attractive cross between *Telopea speciosissima* and *Telopea mongaensis* was made by Dr Robert Boden, when he worked with Canberra Parks Administration. Fine specimens may be seen in the rockery at the National Botanic Gardens, Canberra. The shrub tends towards *Telopea speciosissima* but with a relatively smaller flower while the small bracts favour *Telopea mongaensis*. Similarly, the dark green leaves do not exhibit very long petioles (stalks) and have some lobes rather than serrations. As with other crosses such as 'Canberry Coronet' and 'Corroboree' they appear to suffer from the heat in areas north of the habitat at Braidwood, NSW.

***Telopea* other cultivars**

Described and illustrated in colour in *Australian Plants*, volume 14, pages 237 to 259 are 'Shade of Pale' (to be available again next year) and 'Brimstone Blush'. Other commercial names of unknown value will no doubt appear on the market.

***Telopea* the natural species**

These are described in *Australian Plants* volume 14, page 250, together with sketches and flower details. Flora of Australia, volume 16 recently published, describes a new species.

Telopea aspera

This plant was so named for the rough or harsh texture of the leaves and appears to be an unusual form of *Telopea speciosissima*, differing in the leathery brownish leaves, may I quote, "ferruginous-hairy on the axes and especially the leaf under-surface". It grows in sandy soils over granite and is found only on the Gibraltar Range of northern NSW.

Waratah for Sydney 2000, especially bred for Olympic presentations



△ **Carpet-of-snow, *Macgregoria racemigera***

See page 297, photograph by J. Lidbetter

▽ ***Brachyscome* 'White Delight'**

See page 300, photograph by Rodger Elliott





Waratah 'Olympic Flame' with Flannel Flower, see page 306.

Waratah in cultivation

The best waratahs I have seen in cultivation are treated as an orchard plant, good specimen plants with fresh air circulation, room to grow and prosper and without root competition. There needs to be a change of attitude to the cultivation of Australia's wildflowers for good horticultural results. It is not true that they can be planted anywhere in sandy soil, even under large eucalypts, and left to survive as "nature intended". Take them out of the wild habitat where only the strongest survive in a good season and you have a plant that needs refuge in an artificial habitat that supplies all its needs. An orchard situation is well drained on a slope.

Mounding up soil to a height of 25 to 100 cm is an effective way of growing waratah where an area is not suitable. The mounds can be composed of crushed sandstone and sandy loam soil with 10% added organic matter such as leaf mulch has been found successful. Every time I have measured the pH of bush growing waratah the soil has been acidic with a pH of 5.2. I have grown them in more acidic conditions than this but rarely above 6.0. This presumably means an abundance of decaying leaf matter. When the value of proteoid roots are described in the next issue you will see that they abound in leaf mulch in the upper 5 cm of soil. However there are consistent reports of growing Waratah in heavy soils as on page 328 and experimental studies have shown that proteoid roots are not necessary where nutrients are supplied artificially.

Good drainage is essential. The mounding up of garden beds is essential but this is often not enough. Read how to do this correctly as described by John Hunt in *Australian Plants*, volume 18 page 101. The Parry family have grown waratah in an orchard for over 50 years and here, even in their natural Gosford sand area, they provided drainage pipes under the rows of vigorous waratah bushes. See how well they are growing at the National Botanic Gardens in Canberra at the entrance gate and in the rockery area. A feature of these areas is the lack of root competition from trees. If you supply ideal conditions for waratahs to grow the roots of nearby trees will soon invade and drain off nutrients and moisture.

Waratahs will not tolerate competition from eucalypts, acacias and banksias and should be grown apart from large vigorous shrubs. You may see them growing in the bush with other plants and trees but just what the soil contour is below ground that protects them from competition and provides adequate moisture and nutrients despite the competition, is not apparent from above ground.

For growers who want to get into the cut flower market, refer to the article by Ross Worrall in *Australian Plants*, volume 18, page 17. Now is the time to plant for rewarding flowering during the Olympics.

Having supplied this drainage and root area isolation the major problem is moisture. A continuously moist soil deep down is essential. How this is done effectively is not a simple matter. The regular use of a 'soak-it' hose may be easiest. If you use drippers then at least three are required about one metre from the trunk. It is noted that Mt Annan Botanic Garden have installed the newly available leaky pipe below a group of recently planted waratah.

Leaf mulch to maintain surface moisture and to suppress weeds appears desirable. In the next issue you will read more about the "proteoid" supplementary roots that assist nutrition of these plants and how they need a good depth of leaf litter to function well. All the best results I have seen have used materials such as pinebark, tree clipping mulch, in fact any mulch that is kept moist and open. I do not believe that copious amounts of leaf mulch from Banksia and other Proteaceae, even other waratah, is necessary. Supplying the "friendly fungus" for root growth or vigour is a myth. The proteoid roots form to assist in plant nutrition as required by the conditions. The plentiful supply of fertiliser applied correctly gets good results and the plant does not appear to feel the need to develop these supplementary root systems to aid its food supply.

Nutrients will need to be provided regularly if grown in poor soils. Prior to active growing periods in spring and autumn, a slow release fertiliser such as Osmocote or Nutricote or even Dynamic Lifter. The fertiliser should have a fairly high nitrogen content. Give your plants a good start by first growing them in a 10–15 litre pot for two years before planting. Feed them with a slow release fertiliser, about 1 gram per litre of growing medium, every three months. When you purchase a plant pot it on to a larger container using a commercial potting mix.

Care of your vigorously growing plant? After regular water and feeding, protection from wind comes next and if necessary, adequate staking. Pruning will limit wind damage and assist vigour and flower production. After flowering prune back most of the past season's growth. One commercial grower prunes all his bushes to waist high as it assists harvesting of blooms and they look prosperous.

Pests include rabbits, wallabies and cockatoos for some people but the major problem is a borer that attacks the newly forming flower buds. Abundant bird life should keep the borer in check. Failing this an insecticide may need to be used.

Cut flower? Preparation includes cutting off at least 2 cm of stem tip and then split the ends before putting them in a vase. This will dramatically revitalise a wilted flower. If one third of a teaspoon of salt is added to the water it will prevent disease in the vase. Fresh water from time to time and recutting of the stem will help to keep the flowers fresh for a long time.

Still cannot grow Waratah!

Editor contemplates our failure

I have collaborated with Paul Nixon who does grow waratah easily but I cannot grow them. There are a lot more like me so why? Everything seems in my favour with a garden on a Georges River (Sydney) sandstone ridge so where are we all going wrong. For me it is shallow soil over the usual poor subsoil or rock and trying to compete with trees that we love. The plants die of thirst and eucalypt root strangulation. For the thousands of others who have failed we need to review the whole problem.

Searching through the various reports of success I came across an article that is still being promoted as an excellent guide. It is by the late H. Brackpool and is in volume 1 of *Australian Plants* 35 years ago. It is repeated on page 328. To our shame, I do not think we have progressed since then at least to the shame of this periodical. In the next few issues I hope to review the problem and come up with practical answers. One answer to the problem is presented in the article on page 323 from specialists in this area over many years of careful study and development. They recommend planting straight away before the hot weather. This advice applies to their well prepared and nurtured, vigorously growing plants and may not apply to others available, especially those grown from seed from random stock.



△ *Goodenia willisiana*

See page 297 for description.

▽ *Lasiopetalum behrii*

See page 298 for description.

Photography by J. Lidbetter.





Scaevola humilis, see page 297 for a description.
Photography by J. Lidbetter.

Yellow-tongue daisy

by The Australian Daisy Study Group
from **Australian Brachyscomes***

Brachyscome chrysoglossa

An easily grown perennial with yellow ray florets with a rather untidy habit in cultivation. *chrysoglossa* — gold tongue, referring to the gold ray florets.

Distribution and habitat: NSW, Vic. (After revision this distribution may need to be extended.) Occurs in inland New South Wales and just over the border into Victoria. Grows on heavy grey or black clay in grasslands or on floodplains under scattered eucalypts.

Description: In cultivation a branching perennial with ascending stems. The basal stems are almost glabrous. **Leaves** are sessile, 1–6 cm × 1–10 mm, variable in shape; some with 3 blunt lobes at the apex, others wedge-shaped with 5–10 irregular teeth around the margin. The shorter leaves may be entire. A few glandular hairs are scattered over the surface and there are woolly hairs around the margin. Young growth is more hairy. The basal tuft of leaves is lost as the plant develops. **Flower heads** are 1.5–2 cm across on flower stems 12–18 cm long. These stems bear 2–4 leaves at the base and sparse glandular hairs which become more numerous just below the head. **Fruits** are brown, 2–2.5 mm × 1.5–2 mm. The body is obovate with scattered inrolled hairs over both faces. There is a smooth, slightly raised margin. The wing is irregularly lobed, edged with inrolled hairs, flat or curved inwards. The pappus is obvious with bristles of unequal length. In the wild plants are more upright than they are in cultivation.

Cultivation and uses: Yellow ray florets are rare in the genus *Brachyscome*, so this is a species which should be grown more often. It has a tough disposition, but is unfortunately somewhat untidy and sprawling in its habit. Although it disappears when the soil dries out it reappears when soil moisture is adequate. *B. chrysoglossa* grows well in sun or dappled shade, prefers moist soils and has a more upright habit if the soil is heavy. This species could be used in a rocky or massed in the garden, but is not neat enough for containers.

*Australian Brachyscomes

by The Australian Daisy Study Group

Recommendations for purchase of this exceptionally well produced book were inside the rear cover of the last two issues. Here one section is reproduced, with permission for editorial changes. The close study of this group of plants is reflected in the exceptionally accurate and minute detail recorded. Of particular value are the tables comparing the features of similar species such as *Brachyscome dentata* complex opposite. Many will be interested in the table "Comparison of Alpine Brachyscomes". For those interested, the book is superb value at \$29.95 plus postage and packing of \$8.40.

Editor's Note: I first requested permission from The Australian Daisy Study Group to reproduce the section of the book **Australian Brachyscomes** on the garden cultivars as produced here on page 317. I received the following comment in the letter of reply. "One of the objectives in publishing the book was to disseminate information on brachyscomes arising from our studies. Except for a couple of species which we were unable to collect our observations were based on material collected in the field over more than 7 years. Most of the species we then propagated from seed, only a few grown from cuttings where necessary. Observation of germination and cultivation requirements, assessment of the horticultural potential, as well as reference to herbarium material, was the basis for descriptions and illustrations in the book. The ease with which a number of *Brachyscome* species hybridised was a hindrance to the study of species over more than one generation. One positive aspect of this problem was that this propensity to hybridise enabled us to investigate relationships between species. We regard the segment on cultivated forms as an 'off-shoot' or minor aspect of our studies and therefore disappointed that you have chosen 'Cultivars' to represent our book. We suggest reproduction of *Brachyscome chrysoglossa* to more accurately illustrate the contents of the book".

Propagation: Seed germinates at a rate of 15–20% in 10–40 days. Seedlings need protection in cold, wet weather. It may be preferable to sow in early spring. Cuttings strike easily.

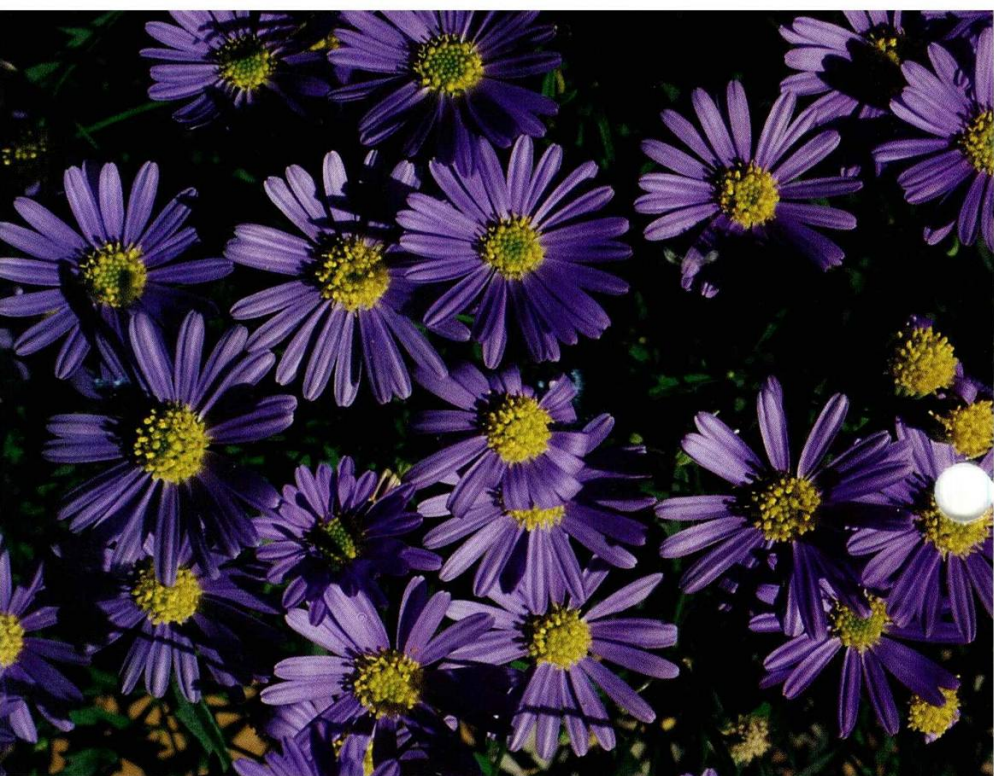
Similar species: *Brachyscome* aff. *curvicarpa* is the only other entity with yellow ray florets. There is very little difference between the two entities; *B.* aff. *curvicarpa* has more glandular hairs on stems and leaves and the fruits are strongly curved with infolded wings. *B. dentata* may open with pale yellow ray florets in some forms, but the florets then age to white. A further difference is that the body of the fruit is covered with long finger-like tubercles.

Special notes: *B. chrysoglossa* is included in the *B. dentata* complex and it has a chromosome number of $n = 4$ (Short, 1994). This taxon was considered by Davis (1948) to be a variety of *B. marginata* Benth. and she named it var. *chrysoglossa* (F. Muell.) Davis. She observed that the ray florets were “brilliantly orange-yellow”, but that it was otherwise identical with *B. marginata*. In fact, the fruits of this yellow-flowered entity differ from those of *B. dentata* (syn. *B. marginata*) in having inrolled hairs on the body rather than large, conspicuous tubercles, and a narrow, irregularly lobed or toothed wing. It is because of these differences that the taxon is thought to be worthy of specific rank and the name *B. chrysoglossa*, first reinstated in Ross (1990) and used by Watanabe and Short (1992), and has been accordingly adopted in this book.

It is difficult to delineate the two yellow-flowered brachyscomes, *B. chrysoglossa* and *B.* aff. *curvicarpa*. At the southern extremity of the range *B. chrysoglossa* is sparsely glandular-hairy and the fruits are mainly flat. At the northern extremity *B.* aff. *curvicarpa* is densely glandular-hairy and the fruits are strongly curved like those of *B. curvicarpa* (although they are brown rather than black). The wing margin is usually entire and somewhat thickened. Between the two extremities there appears to be a gradation of these characters.

Comparison of Species in the *Brachyscome dentata* Complex

Species	Distribution	Plant size	Flower head cm	Flower colour	Fruit mm	Fruit Features
<i>B. chrysoglossa</i>	NSW Vic.*	20–30 cm x 30–50 cm	1.5–2	yellow	2–2.5 x 1.5–2	brown fruit, hairs on body, irregularly lobed wing
<i>B. curvicarpa</i>	QLD, NSW	15–25 cm x 20–50 cm	2–2.5 cm	white, mauve	1.8–2 x 1.5–2	black fruit, hairs on body, wings folded inwards
<i>B.</i> aff. <i>curvicarpa</i>	QLD*	20–30 cm x 10–30 cm	1.5–2 cm	yellow	1.8–2 x 1.5–2	brown fruit, hairs on body, wings folded inwards
<i>B. dentata</i>	QLD, NSW, ACT, Vic, SA, NT	15–50 cm x 10–50 cm	2.5–3.5 cm	white, yellow fading to white	2.5–4 x 2–3	brown fruit, large finger-like tubercles on body, irregularly and deeply lobed wing
<i>B. papillosa</i>	NSW	30–40 cm x 30–50 cm	2–2.5 cm	white, mauve	2.5–3 x 2–3	brown fruit, large leaf-like tubercles on body, entire or undulating wing
<i>B. tetrapterocarpa</i>	QLD	20–35 cm x 20.3–5 cm	1.5–2.5 cm	white	2.5–3 x 2 mm	pale to dark brown fruit, four wings



Brachyscome 'Mauve Delight', plant and flowers, see page 302. Photo by Rodger Elliott.



Brachyscome Cultivars

by The Australian Daisy
Study Group*

Many *Brachyscome* cultivars are now available in nurseries. The profusion of flower heads allied with a long flowering period has stimulated great interest in these cultivars. Some have arisen as chance seedlings in gardens, some have been produced as attractive by-products in experimental hybridisations, and some have been bred in Australia and overseas for colour, flower size, habit and increased reliability. Purchase a plant of some of the following and grow on more for your garden. Cuttings strike easily over the warm months and are then ready to be planted out in autumn.

***Brachyscome* 'Blue Haze' PVR** (*B. angustifolia* × *B. multifida* 'Breakoday')
(The plant originated from a breeding programme in Australia)

Compact, low growing plant (15–20 cm × 35–50 cm) with blue-mauve flowers, 2.5–3.5 cm across, from spring to early winter. Foliage is intermediate between *B. angustifolia* and *B. multifida*. *B.* 'Blue Haze' is slower growing and not as vigorous as *B. multifida* and does not perform as well in gardens. Not suitable for subtropical conditions. Prefers a warm, sunny situation and does well in hanging baskets. 17:343 (A reference to volume 17, page 343 for more details).

***Brachyscome* 'Betty Campbell' *B. angustifolia* var. *heterophylla* × *B. formosa*)**
(The book is dedicated to Betty Campbell for her work with the group)

Handsome, low growing perennial (15–20 cm × 40–60 cm) which spreads by suckering. Pale pinkish mauve flower heads, 2.5–3 cm across, from spring to autumn. Foliage is intermediate between the two parents. Moist, well-drained conditions in sun or dappled shade are most suitable. May die back during long dry periods but shoots again when the soil is moist. An attractive plant for gardens, hanging baskets or containers. Arose from experimental hybridisations carried out by the Study Group.

***Brachyscome* 'Happy Face' PBR** (*B. formosa* × *B. segmentosa* seedling)
(The plant originated from a breeding programme in Australia)

Dense, compact plant (15–20 × 25–30 cm) with intense, purplish-pink flowers, 3.5–4.5 cm across, from spring to winter. Attractive, rich green foliage occasionally tinged purple due to anthocyanin, which is also present in its parent, *B. formosa*. May not be suitable for subtropical conditions. Prefers good drainage in well composted soil to which nutrients have been added. Plant in dappled shade in gardens or tubs.

***Brachyscome* 'Just Jayne' PVR** (*B. angustifolia* var. *heterophylla* × *B. multifida*)
(This plant arose as a chance seedling in a garden near Brisbane)

Compact perennial (15–20 cm × 30–50 cm) which spreads by suckering. The leaves are mid-green, deeply divided with narrow lobes. Flower-heads are white to very pale pink and are 2.5–3 cm across. 'Just Jayne' prefers moist, well-drained soil in sun or dappled shade. It is suitable for subtropical climates where the peak flowering period is autumn and an easterly aspect is preferred. This plant is prone to suffer from iron deficiency. Treat with iron chelates. It makes an attractive rockery plant or small ground cover.

*Australian *Brachyscomes* by The Australian Daisy Study Group. See footnote to page 314.

***Brachyscome* 'Lavender Mist' PBR** (described as a selection of *B. ascendens*)

(Royalties are donated to the Australian Network for Plant Conservation)

Dense ground-covering perennial (25–30 cm × 0.5–1 m) with erect and ascending stems. The leaves are deep green with toothed margins. Flower heads are 3–4 cm across, dark to mid-mauve, produced on long stems for most of the year. The heads remain open at night as they do in *B. ascendens*, the species from which this cultivar was derived. 'Lavender Mist' appears easy to grow in most climates, is suitable for sunny situations or dappled shade and is frost tolerant. Royalties for plants purchased have been donated to the Australian Network for Plant Conservation (ANPC) for research into endangered plants.

***Brachyscome* 'Lemon Drops' PVR** (*B. aff. curvicaarpa* × *B. multifida*)

(A compact white form was used in the Australian breeding programme)

A reasonably compact, low growing plant (15–20 cm × 40–50 cm) with lemon flowers, 2–2.5 cm across, from spring to early winter. Foliage is closer to that of *B. aff. curvicaarpa* than *B. multifida*. *B. 'Lemon Drops'* is fast growing and performs well in elevated inland climates. It may not be suitable for subtropical conditions. Plant in sunny, warm situations in gardens, tubs and hanging baskets. 17:343,353.

***Brachyscome* 'Lemon Twist' PBR**

(*B. aff. curvicaarpa* × *B. multifida* var. *dilatata*)

(This plant originated from a plant breeding programme in Australia)

Dense, low, compact plant (15 × 40–50 cm) with strong lemon-coloured flowers, spring to early winter. Foliage is intermediate between *B. aff. curvicaarpa* and *B. multifida* var. *dilatata*. Hardier than *B. 'Lemon Drops'* in cooler and warmer climates. Plant in sun to dappled shade in gardens, tubs and hanging baskets.

***Brachyscome* 'Maureen'** (*B. angustifolia* var. *heterophylla* × *B. formosa*)

(A mauve-pink plant of nursery origin was crossed with 'Pilliga Posy')

Charming perennial (15–20 cm × 30–60 cm) which spreads by suckering. Foliage is closer to *B. angustifolia* var. *heterophylla* than to *B. formosa* 'Pilliga Posy'. Vibrant pink flower heads, 2–3 cm across, appear from spring to autumn. This cultivar grows well in temperate and elevated inland climates but has not been trialed in subtropical areas. Best conditions for 'Maureen' are moist, well-drained soils in part sun or dappled shade. Arose from experimental hybridisation carried out by the Study Group to examine relationships between species and is named after the founder of the Australian Daisy Study Group.

***Brachyscome multifida* 'Amethyst'** is a fine foliated form with flower heads of amethyst-violet with lime-green centres, 1.5–2 cm across, on stems 10–12 cm long which are often dark red. Plants grow 10–30 cm × 20–60 cm and do not sucker. Stems tend to cascade making it an excellent choice for hanging baskets. Suitable for cool to subtropical climates. 17:347.

***Brachyscome multifida* 'Breakoday'** as described in *Australian Plants* Vol. 17:347. The deep mauve heads, 2–3 cm across, have lime-green centres when they first open, and are held above the foliage on stalks 6–10 cm long.

***Brachyscome multifida* 'Bright Eyes'** is a cushion, 10–15 cm high, prostrate and spreading. Small deep-mauve heads, 1–1.5 cm across are produced on leafy stems to 4 cm long throughout the year. It has been incorrectly called 'Blue Eyes'.

***Brachyscome multifida* 'Evan'** is a diminutive cushion form with deep mauve-purple heads, 1–1.5 cm across on stems 2–4 cm long. It is lovely in a small pot. Not suited frost prone areas. 17:54.

Brachyscome multifida 'Alba', *B. multifida* 'Minima', *B. multifida* 'Roulette' and *B. multifida* 'White Surprise', 15:193, have been registered with the ACRA.

***Brachyscome* 'Pink Happy Face'** PVR (*B. formosa* × *B. segmentosa* seedling)

Dense, compact plant (15–20 cm × 30–40 cm) with large, mauve-pink flowers, 3.5–5 cm across, from spring to early winter. Attractive, large, mid-green foliage is closer to that of its parent *B. formosa*. Prefers good drainage in well composted soil to which nutrients have been added. Plant in dappled shade in gardens or tubs. Plant originated from a breeding programme in Australia.

***Brachyscome* 'Pink Haze'** PVR (*B. multifida* var. *dilatata* × *B. multifida* (white))

Dense, low, compact plant (10–15 cm × 50–75 cm) with mauve-pink flowers in profusion from spring to early winter. Typical of *B. multifida* foliage. Much hardier than other pink-flowered *B. multifida* types. Performs well in subtropical and elevated inland regions. In subtropical districts it grows better in semi-shade than in full sun. Makes an excellent ground cover and is suitable for hanging baskets. Plant originated from a breeding programme in Australia. 17:343, 352.

***Brachyscome* 'Strawberry Mousse'** PVR (*B. angustifolia* × *B. formosa*)

Dense low growing perennial (10–15 cm × 0.6–1 m) with large, bright pink flower heads, 3–4 cm across, from spring to autumn. Spreads by suckering. Leaves are spoon-shaped with deeply lobed margins. It is recommended for temperate and inland climates, but it is not reliable in subtropical areas. *B. 'Strawberry Mousse'* grows well in full or part sun in well-drained soil, and tolerates moderate frosts. A good ground cover and attractive in containers and hanging baskets. Arose as a chance seedling in a nursery in Victoria. 17:347.

***Brachyscome* 'Sunburst'** PVR

Compact perennial (30–35 cm × 50–60 cm) with bright green lobed leaves closer to those of *B. segmentosa*. Yellow-brown buds open to yellow daisies, 2.5–3 cm across, which fade to cream. The effect of the three colours on the plants is most attractive. *B. 'Sunburst'* flowers throughout the year although most flowers are produced in the warmer months. Regular trimming maintains the compact habit. This cultivar grows well in subtropical and inland climates. It arose as a chance seedling in a study group member's garden in South Brisbane.

***Brachyscome* 'Toucan Tango'** PVR (*B. rigidula* × *B. multifida* seedling)

Neat dense perennial (10–15 cm × 15–20 cm) with violet-blue daisies, 2.5–3 cm across, which fade with age. It flowers from late winter to late autumn and is frost tolerant. In subtropical districts this cultivar grows well for some months but may succumb to fungal attack. Originated from bedding trials in Germany.

***Brachyscome* 'Valencia'** (*B. angustifolia* var. *heterophylla* and *B. segmentosa*)

Attractive perennial (20–30 cm × 40–80 cm) with large mauve-pink daisies, 2.5–5 cm across, from spring to autumn. *B. 'Valencia'* grows best in moist well-drained soil in full sun or dappled shade. Grown in shade it does not flower well. It has been trialed in most climates and seems to be reliable in all. It arose as a chance seedling in the garden of a study group member in Brisbane. 17:354.

Acacia

propagate vegetatively*

by Pauline Glocke and Margaret Sedgley**

The *Acacia* genus is large and diverse and species can be used in a range of situations and climatic conditions — from tropical to arid zones and from fertile to poor soils. Acacias are used as ornamental plants, cut flowers, cut foliage, for timber and in conservation programmes, and research is underway into acacias as indoor plants. *Acacia* characteristics sought by commercial growers include flower size, shape, colour, time of flowering, foliage colour and resistance or tolerance to frosts, drought, disease, insects and soil type. Horticultural forms of *Acacia* are listed on page 330.

Vegetative propagation allows the cloning of plants with desirable characteristics and ensures genetic purity is maintained. Clonal propagation is necessary in species that show high phenotypic variability when grown from seed, and in plants that have erratic seed set, providing a more uniform and reliable crop. Vegetative propagation is achieved by the induction of adventitious roots on stem cuttings using a plant growth regulating chemical, indole butyric acid (IBA).

Vegetative propagation through stem cuttings of Australian plants such as Geraldton Wax has improved their quality for the cut-flower trade, and this can be achieved for *Acacia* crops. Such propagation avoids the variation found with seed-grown plants, reduces the time taken to flower, and mother stocks can be improved with selection of the best phenotype. Techniques to aid propagation through stem cuttings include etiolation, girdling and the use of juvenile material.

Propagation by Etiolation

Etiolation is the growing of plants in the dark or heavy shade, which causes elongation of cells, reduced lignification and increased sensitivity to auxin treatment. The mechanism is poorly understood as the changes induced by etiolation are complex and involve meristem activity, plant growth regulating chemicals and cell differentiation. Etiolation of specific areas of a plant can be achieved by mounding earth around the base of the plant as in stool beds, or by covering the base with black polythene or hessian. Cuttings taken from below the ground level and the etiolated areas become the base of the cutting. A portion of a branch can be etiolated by applying bands opaque to light, such as electrical tape, below the growing tips. The banded area is softer due to less lignification, and generally yellow from the lack of light. The banded portion later becomes the base of the cutting.

A combination of heavy shade and banding can also be used. The plant is grown under heavy shade, then the shade is removed to allow photosynthesis and increased carbohydrate production. After shade removal the area of the branch that will be the base of the cutting is banded to maintain etiolation.

*Based upon an article by the authors in the December 1995 issue of Australian Horticulture.

** Pauline Glocke works under the supervision of Dr M. Sedgley at the University of Adelaide on the development of the Australian flora for horticulture. Our last issue reported upon their work in the development of *Acacia* species for potted plant sales. A future issue will describe their pioneering work in the development of *Banksia* for the cut flower export market.

Propagation by Girdling

Girdling is the removal of bark tissue to prevent downward transport of nutrients, hormones and other materials. It is a method of increasing nutrient supply to specific areas of the plant and has been used to increase the sugar content of ripening fruit, to accelerate the ripening process, to improve bud grafting of citrus and to improve rooting percentages of cuttings.

Juvenility and Propagation

Juvenility in plants is the period from germination to the induction of flowers. In phyllodinous *Acacia* species there is a very early vegetative transition phase as true leaves are lost and phyllodes become the dominant foliage within the first few weeks of growth. However, flowering generally does not occur until months or years later. In many species, juvenile material is more likely to root than mature tissue.

Little is known of the internal changes that result in mature tissue being harder to root, and the length of the juvenile period is influenced by environmental conditions, genetic factors and diseases such as viruses. Optimal conditions for fast growth reduce the period of juvenility and the ability to form adventitious roots while older tissue at the tips of the branches has less rooting ability.

Knowledge of the qualities of mature plants is generally required for the identification of suitable superior genotypes for commercial exploitation. Mature tissue is more difficult to root and juvenile material must therefore be obtained from mature plants. This can be achieved by several methods:

- cuttings can be taken from the lower parts of the crown where the tissue is juvenile;
- a plant that does not readily shoot from the base can be induced to do so by severe pruning and coppicing;
- grafting of mature scions onto juvenile rootstocks will rejuvenate the tissue in some plants and serial grafting, by regrafting the new growth, can progressively rejuvenate some species; and
- treatment with plant regulators to retard growth can maintain the juvenile phase longer.

Propagation experiments

The ornamental species selected were *Acacia baileyana*, *A. imbricata*, *A. glaucoptera*, *A. podalyriifolia*, *A. polybotrya*, and *A. vestita*. The six species offered a range of leaf and phyllode size, shape and colour and all are used in the nursery trade or as cut flowers or foliage.

Experiments were conducted to test the effects of IBA, etiolation, girdling and juvenile material on the ability of *Acacia* species to form adventitious roots from stem cuttings. Stem anatomy and changes during root development were also observed. The species were treated with IBA to aid root formation and the statistical package, Genstat, was used to randomise each design layout and to analyse the results.

Terminal semi-hardwood cuttings were taken in autumn, 1–2 cm of soft tip growth was removed and recut to 12 cm in length. Two thirds of the leaf area was removed by stripping the lower leaves or phyllodes up to 8 cm from the base and cutting the remaining leaves or phyllodes in half. The base of each cutting was dipped into a 1.25% solution of bleach then rinsed in water. The base of each cutting was then dipped for five seconds in 10,000 parts per million IBA, allowed to air dry for 30 seconds then placed 10 per 15 cm diameter pot in a mixture of sand, peat and perlite, 1:1:1. The cuttings were placed in a mist propagator with five seconds of misting every 60 minutes with the bottom heat at 25°C, and arranged in a randomised complete block design. The glass-house temperature was 25 to 28°C during the day and 12 to 15°C during the night. The cuttings were harvested after eight weeks and the root growth measured.

For *Acacia baileyana*, different plants or genotypes were used with varying results. Of the genotypes used, the best and the worst gave 80% and 20% rooting respectively. There appears to be an advantage gained by placing 10 cuttings per pot against individual cuttings in tubes. Crowding of cuttings may modify their immediate environment, maintaining high humidity and reducing water stress through transpiration. It is also possible that the accumulation of unknown chemicals leaking from the base may encourage callus development and rooting.

Table 1: Rooting success of Acacias treated with IBA.

Species	% success	etiolation	girdling	juvenility
<i>A. baileyana</i>	80	slight	no	not tried
<i>A. imbricata</i>	90	no	no	not tried
<i>A. glaucoptera</i>	24	no	no	yes
<i>A. podalyriifolia</i>	20	no	no	yes
<i>A. polybotrya</i>	40	no	no	not tried
<i>A. vestita</i>	0	no	no	not tried

Pre-treatment of etiolation and girdling did not significantly improve rooting of species studied, but there was a positive effect on juvenile tissue (see Table 1). The positive effect of IBA on the rooting of *Acacia* species varied with the time of the year, the pre-treatments given and the genotype. IBA can therefore improve the rooting of *Acacia* species but it is not the limiting factor. Anatomical observations showed the possibility that a ring of fibres below the stem surface may prevent the emergence of roots. This fibre layer was thickest in *A. vestita* which was the only species which formed no roots.

Microscopy also showed that blue staining phenolic deposits were present in many cells. This might result in phenolic inhibition and, together with adverse environmental conditions may have reduced success in the root shy species. Future work on the rooting of *Acacia* species is therefore warranted. This should include breeding and selection of acacias to develop superior forms.

Other *Acacia* cultivars, with reference to their descriptions in previous issues of *Australian Plants* are given on page 330.

How To Grow New Generation Waratahs

by Yellow Rock Nursery, the Waratah specialists

The first four waratahs released in the new generation, '**Fire 'n' Brimstone**', '**Cardinal**', '**Brimstone Blush**' and '**Wirrimbirra White**', are naturally occurring cultivars of the common NSW waratah, *Telopea speciosissima*. They are the result of many years of selection and trials by well-known specialist growers, Yellow Rock Nursery, and researcher Paul Nixon. The four waratahs have been selected for their vigour and reliability. This makes them easier to grow than ordinary seedling waratahs. We now add two forms of exceptional value especially for the cut flower trade, '**Fire 'n' Ice**' and '**Songlines**'.

They have also been selected for their beauty, each possessing a distinctive feature that makes it a cut above the ordinary, either the colour, the shape, the size of its flower or its exceptional vase life. Of special concern is the Olympic Year of 2000 where we need to display the very best to the world. Cut flower growers will need to plant this season for assured results in the year 2000.

Waratahs, beacons of the bush, are not difficult to grow but they do have specialised requirements. While success can not be guaranteed this new generation will make it more likely that **gardeners can succeed**. These waratahs will flower in the first or second season depending on when they are planted.

Planting. Spring and autumn are the best times to plant. Mid-summer planting should be avoided. Plant as soon as possible after purchase. Water plants an hour before planting. Remove plant carefully from the pot by tipping upside down avoiding root disturbance. Do not place the plant deeper than it was in the pot. Water in well. If using drip irrigation ensure drippers are placed initially, in the root ball area until roots are established in the new soil, 3-5 weeks in spring.

Position. Waratahs do best in temperate climates but they are very frost hardy. A north easterly aspect in full sun and protected from westerly winds is the ideal, but they will take dappled shade. Stake plants on exposed sites. Avoid planting within the drip line of eucalypts or other large trees.

Soil. Free draining soil, including sub-soil, is the key to successful cultivation. They grow naturally in sandy soil over 1.5 m deep. They can grow well in a wide range of soil types provided the soil is well drained. In the garden situation this is best achieved by growing them in raised beds or on mounds 25-100 cm high. The ideal is beds or mounds of crushed sandstone or coarse white sand or sandy loam mixed with 10% organic matter such as composted leaf litter. Mounds should be mulched with a thick layer of gum leaves or other organic material to give the plants a cool root run and retain moisture. Keep mulch clear of the stems.

Watering. Waratahs need regular and thorough watering particularly during hot, dry or windy conditions. Drip irrigation is particularly recommended.

Fertilising. Do not fertilise at planting. Once plants are established (after six months) fertilise after flowering and again in early autumn with an organic fertiliser low in phosphorous such as composted cow or horse manure. Alternatively, apply a low phosphorous slow release fertiliser such as Nutricote Fern and Palm formulae, particularly recommended or Nutricote or Osmocote for natives as an alternative. Avoid fertilising in summer, particularly in drought conditions, when they form proteoid roots to protect themselves from heat stress and for nutrition. Fertilisers inhibit the development of these roots.

Frog-scape Your Garden

by Kevin Casey* as interpreted by W. H. Payne

Providing a frog-friendly garden is an easy, fun and rewarding way to help restore depleted native frog populations. It can also provide an ecological balance to a wild life garden and contribute to the control of garden pests, nature's way. A network of suburban breeding sites can mean the difference between survival and disappearance for species at risk. Survival of species is in the hands of the individual who can tip the balance of the Earth's survival by very simple acts.

The Australian flora provides the background for survival for all Australian native creatures but it is the wild flora that is most under pressure. The book "Attracting Frogs To Your Garden" by Kevin Casey* suggests Australian plant **species that will attract and support a frog population** but the main emphasis is providing the conditions most favoured by frogs and this includes a small pond.

Instructions on **how to construct a small pond in your garden** make this appear very easy. Just a sheet of black flexible PVC liner, available very cheaply from your hardware store is the main ingredient. *Australian Plants*, volume 17, has issue 136 devoted entirely to aquatic plants and the construction and care of ponds. The issue gives considerably more detail on suitable plants for pond and bog situations than this book which has a more general appeal to plant those that grow naturally in your area. After providing a suitable environment you need only to wait and frogs will usually colonise your garden.

You could be impatient and stock your pond with a few tadpoles. The life cycle of the frog makes fascinating reading. The **care of tadpoles** appears the critical phase and the book can open a whole new world for young and old in the pleasure of observing, understanding and nurture of tadpoles.

Stories of the various frogs and the section on frog spotting reveals a whole new segment of nature for you to share. You can read it yourselves. I shall concentrate on the **impact of frogs on your life and your garden** here. One impact will be the frog calls for mating, a delight for some, an irritation for a few so be careful where you locate your pond. Another concern is the possible breeding of mosquitoes in your pond but the book advises how this can be eliminated. Of national concern is the cane toad but its removal and elimination is simple if people will just band together and take the simple steps as directed.

Insect control! Frogs need living, moving prey. Their capture is aided by the frog's tongue. This is attached toward the front of the mouth and is sticky at the end. When a frog gets close to the victim, the long tongue is flicked out in a blur of speed and the prey is caught on the end and pulled back into the

*"Attracting Frogs To Your Garden" by Kevin Casey is the basis of the above article. This small 130 page book makes fascinating reading for young and old. It is available from your bookseller for \$14.95 or from the publisher Kimberley Publications, PO Box 6095, Upper Mt. Gravatt, Qld. 4122 plus \$2 postage. The chapter headings give a good indication of what it contains — Where have all the frogs gone? — Our unique amphibians — Identifying your frogs — Life as predator and prey — The cane toad — Frog calls and mating — Doing the right thing for frogs — Raising tadpoles — The Backyard frog pond — Attracting other wildlife. — Editor.



Eastern Sedge or Dwarf Tree Frog *Litoria fallax*



Red-eyed Green Tree Frog *Litoria chloris*

mouth. Prey includes flies, beetles, crickets, ants, snails, slugs, mosquitoes, moths, grasshoppers, spiders, termites, cockroaches, centipedes and caterpillars. Bigger frogs may capture sizeable prey such as mice, bats, lizards and small snakes.

Nature at play. Frogs and tadpoles are not the only creatures to benefit from the creation of a healthy backyard pond. Native birds visit to splash about in the shallows but please no cats. Water gliders skate along the surface and oval-shaped whirligig beetles spin vigorously near the edges.

Toward the pond bottom a dragonfly nymph or "mud eye" may await approaching prey while caddis fly larvae cling to submerged leaves, caterpillar-like in their translucent silken cases. Other common pond residents include water-boatmen, back swimmers, water scorpions, may fly nymphs, water spiders and even tiny shrimps. Diving beetle fly around at night but spend their days chasing small prey through the pond, diving underwater while breathing air stored underneath their wing covers. Tiny water snails and microscopic organisms feed on decaying matter as part of nature's life cycle.

Once established, a garden frog pond is virtually maintenance-free aside from the occasional removal of excess plant growth just as your garden needs it.

Australian Frogs

A Field Guide To Australian Frogs* by J. Barker, G. C. Grigg and M. J. Tyler

While the above book "Attracting Frogs To Your Garden" is a delightful informative book to read should you decide to encourage frogs to your garden, the complete reference to the frogs of Australia is this field guide. For the frogs on the previous page the following descriptions are given. There are 15 species of Green Tree Frog in Australia, that have discs on the tips of their fingers and toes.

Eastern Dwarf Tree Frog *Litoria fallax* is one of the smallest of the green tree frogs and may be a uniform green, uniform brown or green with a pale brown back. The lower or ventral surface is white and glandular. There is always a white stripe from the angle of the jaw, below the eye, to the shoulder. The iris of the eye is golden and the interior and posterior surfaces of the thigh are orange. Webbing between the toes is well developed but the fingers have only a trace of webbing. It is a coastal species ranging from northern Queensland to central NSW. It is usually found in the vegetation bordering swamps, streams, ponds and farm dams, often in large numbers. The advertising call is a very high-pitched, upwards inflecting "wreek-pip-pip", the first component being drawn out, the latter part short and staccato.

Red-eyed Green Tree Frog *Litoria chloris* is a large frog to 65 mm long which spends much of its life high in the trees and is rarely seen except in heavy rain periods. The upper (dorsal) surface is green, the lower surface a vivid deep yellow, see page 325. The hands and feet have very large discs and well developed webs. It has a scattered distribution in coastal rainforest or wet sclerophyll forest from Proserpine, Queensland, to central NSW. The call consists of a series of long "moans" usually followed by a soft trill.

*A Field Guide To Australian Frogs is available for \$34.95 plus \$6.50 postage from Surrey Beatty & Sons, 43 Rickard Rd. Chipping Norton, NSW 2170.

Growing for the Cut Flower Trade

Getting started

by W. H. Payne

There is an opportunity for those with the necessary resources and determination to earn extra income from the production of cut flowers. I specifically said "extra income" as a venture to produce and market cut flowers in sufficient quantities to yield sufficient income for full time employment requires a lot of capital and very careful planning. However, it is an ideal opportunity as a cottage farming industry, extra cash income to supplement traditional income.

I am encouraging the cottage farming of Australian natives as the disastrous bush picking industry must cease if our native flora is to survive. I am not against the bush pickers as individuals. I am sure that if they could get wildflowers of an assured quality, even buying them in bulk from the farmer, they would be happier in their work. The growing of wildflowers could be rewarding in other ways.

As with any commercial venture, there are traps, initial investment, hard work and failures. I am not promoting a get rich quick scheme or even a very lucrative venture. The government department in each state has facilities for assistance to ventures into horticultural cropping. Unfortunately some are not very co-operative for small part time, amateur operations, perhaps because they have seen so many people fail. NSW Agriculture (write to Locked Bag 11, Windsor, NSW 2756) has a publication "Getting Started in Flowering Growing Kit" together with a small native flower package for \$20, post free. This covers all cut flower growing as well as natives with a list of nurseries that can supply small plants to get you started. While it lists the plants at present commercially grown, it does not advise how to grow the plants. As regards Australian natives, the sum total of knowledge on propagation and cultivation is found in issues of *Australian Plants*. There is no other hidden or magic way, in fact you will be almost pioneers in this area so please do not be led astray, the risks are considerable and the work is unceasing.

There are many success stories however mostly due to dogged determination and an understanding that they are indeed out on a limb. A group in northern NSW have pioneered the Christmas Bell (*Blandfordia*) cut flower trade to the extent that they have created an export market. Now to meet the market demand they need more growers to sustain commercial quantities. If you have property in the Port Macquarie, Lismore area and are prepared to invest in a large shade house there could be a short cut for you to get into the industry.

What To Grow?

First find out what will sell and how to get it to the market. The previous issue of *Australian Plants*, this issue and the next few issues will inform of suitable plants with a good market if you can get them to the buyer. The *Blandfordia* growers got together with a mutual help scheme and an association with commercial cut flower agents. The input from NSW Agriculture was significant, the sort of support you can expect from similar government agencies concerned with the promotion of Australia's export trade.

Why?

My involvement is purely selfish, to encourage the cultivation of Australian flora leading to a greater knowledge of how this can be done and its ultimate conservation in the wild. I went on a field trip of the Sub Tropical Farm Forestry Group and was impressed with the range, quality and size of the tree plantations on private properties. While the owners hoped to reap an ultimate reward when the trees are harvested, it was clear that an over-riding interest was in the ecology, the conservation of biodiversity as the egg-heads put it, and the thrill of seeing these interesting plants grow and prosper.

Now is the time to plant Waratah for flowering during the Olympics.

How I Grow Waratah

by H. Brackpool

The common belief that waratah will only grow in sandy soil is a fallacy. I have been growing healthy plants in heavy Eastwood (Sydney) soil for 20 years. Some are 2–3 metres high and producing abundant flowers. They are survivors in a grove of 20 plants following long periods of excessive rain. A friend who has grown them successfully over many years emphasised that at the base of every waratah plant is the early crown from which the new canes eventually sprout. This develops into something like half a coconut shell, convex side up, as the plant grows bigger. If this crown gets too much moisture it rots and the plant dies.

The replacement plants in my grove of 20 plants have each been planted in small mounds of 30 cm diameter and 12 cm high at the centre, sloping down to the level of the rest of the soil, just like an inverted basin. Surplus water will then drain away from the critical area where the plant enters the ground. In heavy soils too much water kills rather than too little.

The plants should not be put out in the open ground before May, preferably two years after the seeds were planted. This gives all winter for the roots to get used to their new positions and the plants are large enough and able to stand the summer sun. If in full sun they should be shaded for the first summer or two. One year old plants or plants put out in September/October will usually die. Another equally important point is not to water the young plants in hot weather, but mulch with dead foliage. If the weather is too hot and the plant is watered, the excess moisture goes to the leaves and the plant quickly wilts and dies, killed by the heat and mistaken kindness. It seems better to let nature look after them once they are planted out by not watering at all, and of course, a well-drained position in full sun or facing north is preferable. Following these rules the plants make good headway and very rarely die.

Editors Note: This is hopefully the first of notes I hope readers will send of their experiences. The observations above could be tempered by the reminder that Eastwood on the north side of Sydney, gets at least twice as much rain we get on the south side especially in dry periods. One wonders whether the no water advice will apply to drier areas at times of stress. It could indicate that water, if used, should be kept away from the area near the plant stem but rather deep down where the deeply exploring roots do expect to find some moisture.

Growing Waratah and Other Australian Proteaceae

This issue commences a series of articles on this impressive family of plants, *Banksia*, *Isopogon*, *Petrophile*, *Lambertia*, *Grevillea* and the amazing tropical species. We started with possibly the most difficult to grow, the Waratah. For 40 years I have heard the same story, grow them in a very well drained position, if necessary on a mounded garden. How many readers have succeeded in growing them even this way! Not me! Someone has failed and I suspect it is not the home gardener. We have tried following the experts advice and still failed repeatedly.

The advice in this issue is only just a start. Coming issues will have competent reports on the critical factors with the state-of-the-science reviews from the world's leading scientists and horticulturalists. Never before published in a form that you will understand, *Australian Plants* will maintain the standard for which it has become world famous. Hopefully, this will not be regarded as an ego trip, an attempt at excellence, but accepted for its real objective, a guide to more reliable cultivation of the Australian flora and its long term conservation. — Editor.



***Scaevola albida* 'Karawarra Pink'** as a potted plant see page 302.
Photography by Rodger Elliott.

Acacia horticultural cultivars

see page 320

Acacia acinacea 'Ruby Tips' 17:327
aculeatissima 'Prostrate' 16:159C see page 320
amblygona 'Australflora Winter Gold' 10:169D 15:195C 16:156C
baileyana 'Purpurea' 11:69, 363C 16:156C
boormanii 'Olympic Gold' PVR
cardiophylla 'Gold Lace', a trailing prostrate mutant form, PVR.
cognata 'Green Mist', a dwarf shrub with a pendulous habit, PVR
cultriformis 'Australflora Cascade' 12:322D 15:195CD, 196P 18:115CD ACRA
dealbata 'Kambah Carpet' 15:195C ACRA
fimbriata 'Dwarf'. A lower compact form of a beautiful wattle.
floribunda 'Gippsland Gold', variegated, weeping foliage, yellow new growth.
howittii 'Canberry Honey Bun', compact, 1.25×1.5 m, fragrant and pendulous.
iteaphylla 'Parson's Cascade' 15:197D ACRA
pravissima 'Golden Carpet' 10:170D, 371C 15:197DP 18:115
terminalis 'Tasmanian Pink' PVR

Wildflower Nurseries in Queensland

Fairhill Plants and Botanic Gardens — Huge range; rainforest plants, grafted grevilleas, rare plants, wildflowers, ferns, orchids, revegetation trees. Extensive display gardens. Open every day 8.30 a.m.–5.00 p.m.
Fairhill Native Plants, Fairhill Rd., Yandina, Qld 4561. Tel. (074) 46-7088.

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Western Australian Wildflower Society — P.O. Box 64, Nedlands 6009. A wide selection of Western Australian seeds is available at \$1.50 per packet, plus postage of 45¢ for a number of packets. Send for a catalogue for \$2.00 plus 80¢ postage. A huge range of seeds at a price you can afford expertly collected, labelled and packed. A book "Hints on Growing ..." 40 pages, \$3.80 posted.

Australian Proteaceae

A time for all readers to help

To adequately present this series I need your help!

1. Send slides of *Isopogon*, *Petrophile*, *Lambertia* and tropical species for evaluation and correct identification and get more over the coming season.
2. Send notes on your experiences in growing the above plants.
3. Purchase plants and plant them in your garden following advice given and report results in two years time.
4. Please do not leave this to someone else, we can all assist.

"Australian Plants", The Australian Flora Periodical

Past issues are available in volumes 4-10/11, each volume is bound and cased, beautifully presented with green vinyl covering and gold lettering for \$21.00, plus \$5.00 post. Volumes 16 and 17 will not be available bound. Volumes 12, 13, 14 and 15 are available only from The Editor, Australian Plants, 860 Henry Lawson Drive, Picnic Point 2213, for \$40 each plus \$6 postage.

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'Albery's Red' Christmas Bush of NSW.
See page 290.