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Cultivation of Australia's Flora

The frugal use of water is becoming increasingly important and this issue indicates that you can grow most wildflowers with little water, applied correctly. What is more the drip system recommended here suits lazy gardeners like myself, it can even be done automatically while I am away. It is just a matter of choosing what plants suit your area best; not what you found would grow in the past. This is a whole new ball game, extend your range of plants immensely.

A quick glance at this issue would seem to indicate that it is only for people resident in the dry interior and even more specifically, for commercial growers. This is very definitely incorrect. It certainly favours people resident in dry areas. The advice is not confined to people in the north or the dry areas, as much of it was culled from experienced gardeners in the temperate areas of South Australia. It covers all Australia though I will reassure Tasmanian readers that there is a special issue in preparation for them. It is not confined to commercial growers either, the home gardener can learn a lot from the people that have to grow plants for a living, very dependent on quality and presentation. After all is this not what we want in our gardens and in the vase to decorate our living areas. These are the flowers grown to decorate the homes in Japan, why not yours?

The thrust here is certainly to benefit ourselves, and it is the best way to eliminate "bush picking" and the devastation it is causing in our wild places. This is a part of our "the bigger picture", a more prosperous Australia in the future, a land that is sympathetically nurtured for all creatures to live in harmony.

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COVER PLATE. *Eucalyptus phoenicea* is a small tree to 12 m with yellow-brown flakey or fibrous bark producing brilliant orange flowers. Its natural distribution is the Kimberleys and the top end of Northern Territory with an isolated widespread occurrence west of Cooktown, Queensland. It grows well in Townsville and has been used as a street tree.

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Gardening the outback

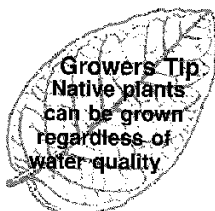
How to achieve water efficiency

by Brian Powell, Quorn, South Australia

Regardless of ground water quality in Australia's outback, native plants can be grown to decorate the landscape and the homestead. At my Quorn home site the ground water has over 4 000 parts per million of total dissolved salts. On many outback homesteads the ground water is not as bad as this and they were having trouble growing plants. At hundreds of sites in arid areas of South Australia right up to the border and beyond, my methods have shown that it is possible to grow a wide range of plants.

My involvement beyond the boundaries of my own garden started some years ago. I was talking on the School Of The Air on the Flying Doctor Network advising on the growing of quandongs. A lady listener turned the conversation around with the query "but how can I grow native plants?". This led to many responses from outback residents who obviously had tried and failed. The programme went so long overtime that I invited listeners wanting more precise information to send me their names and addresses.

For two years, at my own expense, I visited arid area stations, listened to their problems and, after much hard work, produced exceptional results. My fame spread and Malcolm Campbell, then manager of Greening Australia, came to see me to recruit my services as a Pastoral Services Extension Manager. It became obvious that to provide an adequate service, it would require expenditure in excess of his budget at the time. The result has been that the service supplied a suitable vehicle with a commitment to meet the expenditure necessary to run and service this vehicle and I would supply my services free of charge. Since this time I have visited over 100 outback homesteads and communities north to the South Australian border.



The Whyalla Revegetation Group has supplied many thousands of plants over the years all at no cost. This has enabled me to deliver them and plant them on the properties, all without cost to the residents. Their obligation was only to supply the trickle water system, which I installed.

One problem was to convince the homesteaders that they could grow plants in their conditions. Many had purchased plants and did their best with nurturing them only to see them die. Many had used a drip watering system but these were poorly constructed and the drippers used were of the wrong type.

The photographs on the next page show the home of Savina and Ian Williams on Arkaringa Station in the Simpson Desert. Previous residents had tried very hard to establish a few trees. A year after I planted out an area using my system its success is obvious. Another photograph shows an area just planted out at Tregar North Station, Stuart's Creek, north west of Maree. Decorative trees are mostly planted but understory is also important. The range of plants can be extended, see plants growing in my arid area garden, page 247. My method? (see page 246).



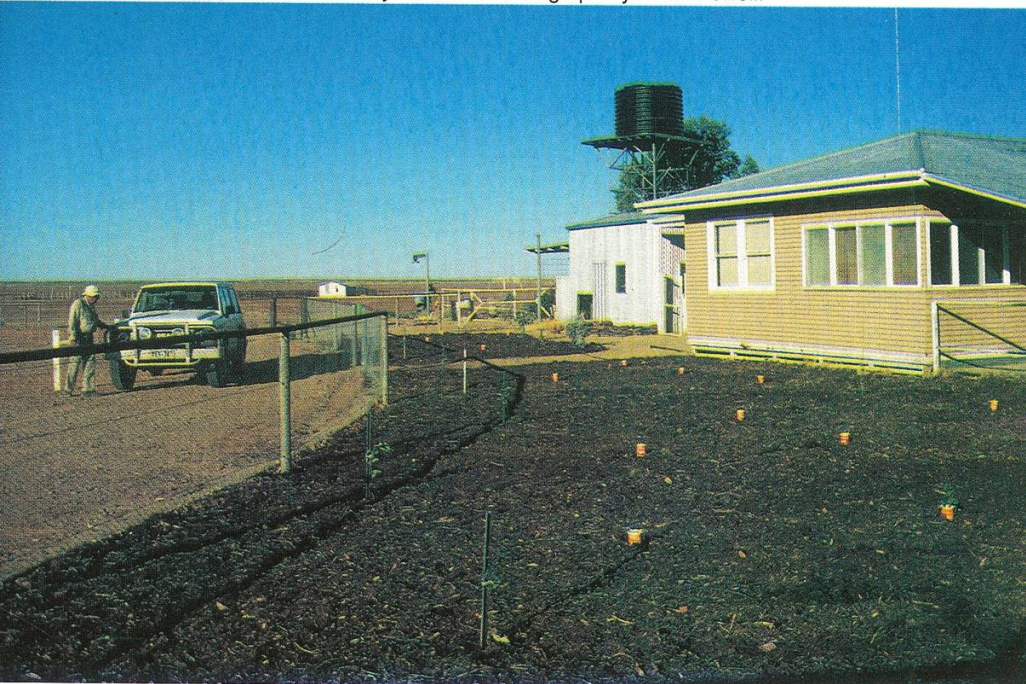
Arkaringa Homestead in the Simpson Desert. Above, the homesteaders had tried very hard over many years to establish some tree growth and shade and this is the best they could achieve. **Below, the same homestead two years after** Brian Powell installed a suitable drip system and planted the trees and shrubs provided without cost by the Whyalla Revegetation Group. Photos, Brian Powell.





△ **Brian Powell's garden at Quorn** wholly sustained by very saline water. A prostrate form of *Acacia acinacea* (yellow, this plant was previously known as *Acacia rotundifolia*) is adjacent to *Eremophila maculata* a shrub that was covered with red flowers a short while before and the green carpet formed by *Eremophila biserrata* which often has many yellow flowers sprinkled in the green ground cover. Photograph, W. H. Payne.

▽ **Stuart Creek Homestead** in the Maree area just after planting, installation of the trickle water system and heavily mulched. Photograph by Brian Powell.

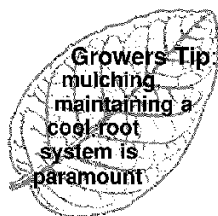


Dry area gardening, Brian Powell's way

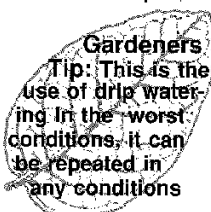
1. Use only young plants growing vigorously in tubes, the younger and fresher the better. Use plants normally found in arid areas such as mallee eucalyptus, wattles (*Acacia*), emu bush (*Eremophila*), salt bush etc.
2. Rip the soil quite deeply if possible and if not possible dig it over deeply. Rake over to a level.
3. Then install the watering dripper system. This usually is a 13 mm ($\frac{1}{2}$ inch) black plastic pipe laid over the area from the water supply tap and returning to the same tap. It may be 300 metres long with drippers mounted every two metres along its length (wider spacing if the plants are to have a wider spacing). One end is attached to the supply tap through a filter. The other end is a straight through tap used to flush the system. This is left open when first turning on the water supply tap flushing out what water may have been left in the main pipe from the previous watering. Run through about one gallon of water. Do not use micro tubing between the main pipe and the drippers, as these cannot be flushed properly.
4. Turn on the dripper system the day before planting. When you come to plant, the soil will be moist and easier to work.
5. For each plant, adjacent to each dripper, dig a hole 30 cm diameter and 40 cm deep. This soil will be mostly replaced when placing the plant, leaving the plant in a small depression. The dripper may then be adjusted to be 7–10 cm away for small plants. It should be moved back 30–60 cm from the plant during winter as the plant grows.
6. On planting, sprinkle the surface of the soil around the dripper with a level teaspoon of fertilizer. I use a Complete Mineral Mixture which has medium phosphorus and adequate trace elements. To this is added some Osmocote for native plants. This slow release fertilizer can be used annually.
7. After planting, mulch with a few layers of newspaper to one metre diameter and distribute on this a liberal layer of leaf mulch taken from under other trees, flood debris, etc.

Important features of this system:—

- a. Mulching. Retention of water and maintaining a cool root system is paramount. Without mulching, plant roots, even to a depth of 20 cm can suffer temperatures of 50°C, destroying them by "cooking". On windy sites it may be necessary to have a final layer of stones to hold the mulch in place. On one site, old vehicle tyres were used initially, but these were removed later as they are unsightly.
- b. Heat does not kill plants, keep up moisture levels at the root system to balance the rate of evaporation from the plant leaves and they will prosper in the heat.
- c. The type of dripper is critical. Any dripper with a needle and seat is a failure with salt water. Turbo key or button drippers are essential. I use *Neta* firm button drippers that are still giving good service after 22 years. We have about 13 000 drippers in current use.



- d. Water supply. Some use gravity feed from a raised tank or dam, but a pressure of at least 20 lbs per square inch is needed. It is more usual to use a small 500/800 gallons per hour pressure pump. A major problem was created by using water from uncovered tanks. The algae formed in these tanks due to sunlight on the water, is a major cause of blockages. With a covered tank it is necessary to clean the filters only annually. Use a 2-4 litre per hour dripper for heavy soils and a faster one 4-6 even 8 litre/hr drippers for sand soils. Use the drippers each day for 4 hours for new plantings, reducing this to once a week where the plants have adequate mulching.
- e. Saline/salt build up. It has been claimed that the continued use of a saline water supply will result in salt build up in the surface soil. This is quite possible with a surface sprinkler watering system where evaporation holds back the salt. With a dripper system the salt is washed down through the soil regardless of soil type. One dripper results in a pyramid of moist soil that is 2 metres in diameter at a depth of two metres below the dripper. This takes the moisture down and the plant roots with it, to cool moist soil and the salt dissipates. There is a garden in the outback producing exceptional vegetables in a deep sandy loam. The water supply has 6 000 parts per million of total dissolved salts. One quarter of the garden is in production each year. There has been no saline build up in the soil. ■



A garden in the hot and dry

Our Garden No. 29

by Fay and Brian Powell

In 1975 a section of our property at Quorn in South Australia was established as a native garden, using many of the arid land plants. The plants currently number in excess of 12 000, all watered by drip irrigation on water that is 4 000 parts per million of total dissolved salts. Over the years we developed a successful system using this saline ground water and this has been used in hundreds of homesteads over the dry arid areas of South Australia.

The garden is now used as a display garden known as **Endilloe Arid Land Gardens** with a Greening Australia visitors centre and facilities for tour buses. It includes experimental areas for cut flower production, see page 248, and an area for endangered plants.

The plants grown now are from all parts of Australia and include many species in the following plant genera, *Acacia*, *Atriplex*, *Banksia*, *Bursaria*, *Callistemon*, *Callitris*, *Calothamnus*, *Correa*, *Cassinia*, *Casuarina*, *Dodonaea*, *Dryandra*, *Eremophila*, *Eucalyptus*, *Goodenia*, *Grevillea*, *Hakea*, *Hibiscus*, *Maireana*, *Melaleuca*, *Petalostylis*, *Pittosporum*, *Rhagodia*, *Santalum*, *Senna*, *Sollya*, *Westringia*.

On display is the worlds first experimental Quandong orchard and other crops included exotic fruits (citrus, grapes, apples, peaches, figs, olives) and nuts (almonds, pistachio). ■

The Our Garden Series. Readers are invited to send notes and photographs of their garden. The series has been popular as it gives an indication of what will grow in various areas. Editor.



△ Cut flower plantation at Quorn, *Maireana sedifolia*, Blue Bush, (see page 258) and the photograph as a cut flower on page 288, in front of a *Eucalyptus gillii* crop.

▽ *Correa pulchella* yes, growing at Quorn in the hot and dry, fed by saline water.



Pioneering Quandong as a fruit

Santalum acuminatum

by Brian and Faye Powell, Quorn, South Australia

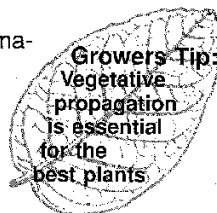
One of the things we wanted to do on retirement was to domesticate quandongs as an orchard crop. At that time little was known of their germination or their parasitic root habit. Enquiries stimulated the CSIRO, Division of Horticulture, to assist interested growers in the establishment of a series of experimental orchards. The first at Quorn, planted in 1974, was established primarily, from seed collected in the southern Flinders Ranges.

Genetic variation in the trees resulted in a collection of more than 360 different types which varied in their ability to thrive, the mature tree height and form, leaf shape and colour, years to first fruiting and in the number of fruit per tree. For ten years, we kept records of tree growth etc., and counted the fruit from each tree, sending the CSIRO ten pieces of fruit from each tree. Some trees started producing 2 000 fruit each season. It was a monumental task!

After 22 years of careful selection, we have now produced several trees of commercial quality, the first released on the market being known as Powells No. 1. The estimated yield, based on the best trees at Quorn, planted at 200 trees per hectare, is 5 tonnes per hectare of dried fruit. At a conservative value of \$60 a kilogram, this has the potential to gross \$15 000 a hectare. At sites where quandongs were grown under irrigation, with planting densities of 800 trees per hectare, the trees yielded 4 kg of dried fruit per tree.

To encourage the industry, Brian assisted in the formation of the Australian Quandong Industry Association* and was the first president in 1993-1994.

Grafting is the only reliable way currently available of reproducing superior plants. They can produce fruit two years after planting, coming into full production in their third or fourth year.



Quandongs can be grown successfully without a host for the first year but from then a relationship with a host plant is crucial. When a quandong root comes into contact with the root of another plant, it produces a pad-like growth which adheres to the root of the host. This allows root tissues to invade the roots of the host. It is not fully understood what the quandong gets from the host, possibly inorganic salts (N, P, K). Kikuyu grass has been used as a host in the past but it poses management problems under irrigated conditions. A native creeper which favours the same climatic conditions and appears to be a good host, is *Myoporum parvifolium*. It forms a dense ground cover and has the additional advantages of conserving soil moisture. ■

*Australian Quandong Industry Association would be the premier organization for quandong growers and can be contacted at P.O. Box 236, Upper Sturt, SA 5156. Members freely exchange experiences collaborate in marketing, and enjoy the regular journal, "Acuminatum" that presents information on new developments, management practices, and production problems.

Sandalwoods and Quandongs by Alex George, in Australian Plants Volume 13, page 318 describes the six species of *Santalum* found in Australia. Plum Bush, *Santalum lanceolatum* also has a small fruit to 1 cm across which is edible and rather sweet, it has cream flowers in large heads. *Santalum spicatum* is still harvested in small quantities as sandalwood.

Commercial Cropping in the Dry Interior

An overview by W. H. Payne

With three quarters of our continent regarded as arid or dry zone we have a responsibility to manage it correctly. It is extremely fragile and will readily disintegrate to dust. Even more alarmingly is the rapidity that it is expanding, covering what was once regarded as productive land. If our present land practices continue it will all be desolate from the Darling River west to the Indian Ocean.

Our vast areas can be productive and still be conserved, even improved, as a viable ecological system with the correct management. These management practices are well understood and our scientists know the answers but will anyone in a responsible position listen before the dust gets in their throat

We have plants that have evolved and survived the rigours of our interior. Some provided food for the aboriginal people. Much of the soil is not sand but a rich loam and this is why it so easily goes to dust and blows away. It only needs water to be productive. We have this huge reservoir of water under the ground that has been very wastefully discharged for many years. In this issue Brian Powell describes how this water can be used frugally to produce plants that have evolved to withstand the hot dry interior.

What to grow? Brian Powell has shown that a wide range of plants will grow, many of them native to areas that are not harsh and arid. The book "Economic Native Trees and Shrubs for South Australia" by Neville Bonney, see opposite, is an excellent reference to what will grow. Other states have research stations that are devoted to commercial cropping and advice is freely given. In this issue also, see page 276, is a report on "Feasibility of a sustainable Bush Food Industry in Western Queensland". This examines the development of commercial cropping in the Rangelands, another word for arid marginal land that has been exploited as grazing land for many years, two thirds of our continent.

For commercial **planting, cultivation** cropping and market preparation readers are referred to the above mentioned publications, exceptional value and extremely well produced. Growers in inland areas should refer to the article by Brian Powell on page 243. Most bushes are severely pruned by harvesting the flower stems but further pruning after flowering to round off the bush and encourage new growth will probably be necessary. This will reduce the bushes to one third of a metre high and the bushes could be almost two metres high before harvest. This requires spacing between plants of two metres, more for large bushes. Adjacent rows would be the same distance apart with a wider spacing between each pair of rows for machinery access. A trickle watering system is essential with more frequent watering in dry periods or in hot weather, especially when buds begin to form. A light dressing of a slow release fertilizer is required when new growth starts. Pest control will vary with the crop but vigilance is most important. The agricultural service in each state will give advice on these and any other problems associated with producing a healthy, well presented crop.

Commercial crops based upon Australia's flora

Based upon information in recent publications for Western Queensland and South Australia and a workshop on the feasibility of commercial cropping in the inland areas of NSW, the following notes have been compiled. They have been expanded to include home or homestead horticulture as the practices defined will assure success at the home garden level as well. The notes will be in a number of sections over the next few issues as they are quite comprehensive, this first one dealing only with the production of cut flowers and foliage for the local and overseas market.

Marketing and the market price are quoted for those items which concern us most and for which the least information is available. Prices, if quoted, are based on recent farm gate returns and actual market experience. Naturally they depend upon demand and how well the product is presented. It will be noted that a large proportion of the plants described below are known as "filler plants", that is they are used to "fill" around specimen flowers to show them to advantage. It follows that the price for filler plants is substantially less than for the feature flowers. However filler plant bushes are more productive and require less specialized production and care, usually.

Growers Tip:
Being able to get a product to market when other crops are not available can bring good prices.

Growing cut flowers and foliage for profit

Proteaceae, that wonderful family of plants that includes *Banksia* and the very similar *Dryandra*, *Isopogon* and the similar *Petrophile*, *Grevillea* and the similar *Hakea*, and *Telopea*, the Waratah. All species have been described in previous issues but they are of such importance as commercial cut flowers, they will be presented again in a separate section in this series. Most cannot be considered suitable for the hot arid interior though they are quite successful in the Riverina areas of South Australia and New South Wales.

Eucalyptus are widely planted for various reasons and will be presented in a separate section in a future issue. They are planted to produce foliage, a very lucrative crop as filler, the buds and fruits have a good market as they add interest to an arrangement, and for timber; flowers are of lesser importance but the right sort command a steady demand for use as shown in the photograph on our rear cover. ■

Economic Native Trees and Shrubs for South Australia by Neville Bonney and published by Greening Australia (SA) Inc. and available from them at State Tree Centre, Brookway Drive, Campbelltown, SA, 5074 for \$35 plus \$5 postage.

Australian native trees and shrubs grown in gardens or plantations for economic return is the subject matter of this exceptionally well produced book. The 178 large pages have one species per page each with a colour photograph, description, soil requirements, its use in commerce, the economics of production and management practices for commercial exploitation. I have only dealt above with plants for the cut flower/foliage trade but this book covers a whole range of economic uses of plants and trees in other ways such as farm and timber production. Growers in South Australia are fortunate in that each soil/climate region that will support the many species recommended, is defined for that state. However, the book has a much wider appeal and would be of interest to possible growers from all over Australia.

Plants for **commercial cropping of the berries and fruits** are an ongoing series and the Quandong is a feature of this issue.

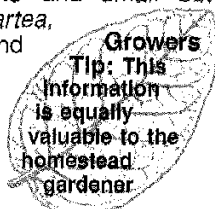
Plants for **foliage cropping for oils and medicinal substances** are already being exploited, the industry being worth millions of dollars of export earnings. These will be described in a separate section in this series.

The **horticultural potential** of these plants in general landscaping and the home garden is readily appreciated. They present themselves well, they are hardy and reliable and decorate the living areas either on the bush or in the vase.

Cut flowers and foliage to decorate our living spaces

The plants are presented in alphabetical order of botanical name. Marketing of plants based upon the Australian flora presents a problem, our flora is so vast and diverse the consumer cannot be expected to request certain flowers by name. Even when common names are applied they are still numerous and misleading. It would seem appropriate that, for marketing purposes, the vast range be presented in groups of similar plants related to their use by the consumer.

Myrtle filler plants. A large number of the plants described here are in the plant family Myrtaceae, a group of plants that are predominant in the Australian landscape. Because of this they can be easier to grow, hardier and more rewarding. These plants fall into two groups, those with the familiar ti-tree five petalled flower, usually white and small but produced in abundance. This group includes *Agonis*, *Astartea*, *Baeckea*, *Hypocalymma*, *Leptospermum*, *Micromyrtus* and *Thryptomene*, mostly filler flowers. They all grown in a similar conditions and being similar, compete with each other in the market. One reason such a number of similar plants are grown is to get a greater spread over the year. Those available when other flowers are out of season will command a better price.



Bottlebrush feature plants. The second group in the plant family Myrtaceae has a massed head of flowers "without" petals the prominent flower parts being the masses of styles grouped to form a bottlebrush or pom-pom flower head. Only two are included below, *Beaufortia* and *Regelia*, others being featured in our last issue. This latter group, because of the larger colourful flower heads are feature flowers. However, their lasting qualities have yet to be developed to assure a viable export crop.

Agonis juniperina Juniper Myrtle, will mature to a small tree 5-7 metres in height but commercial cropping and hard pruning keeps it to a manageable height and produces good stem length. It is the first of the *Agonis* to flower, in early winter and this tends to boost its selling price to \$3-4 a bunch. The small, long lasting, white flowers along the stem are attractive and the foliage may be sold latter, or even dried.

***Agonis* a-GO-niss**, are in the plant family Myrtaceae and are closely related to *Leptospermum*, the ti-trees, having similar five petalled, usually white flowers. There are eleven species, all limited in their natural occurrence to southwestern Western Australia. As with most Myrtaceae, they are hardy plants once established, withstanding periods of dryness. Most of the 11 species have potential as decorative plants or for the production of flowers and foliage others already in commercial use as **myrtle filler flowers**, are:

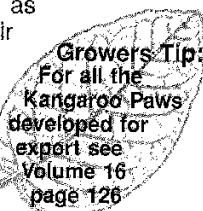
Agonis flexuosa Willow Myrtle or Willow Peppermint, will develop to a small tree to 15 m high if allowed to. It is a widely cultivated ornamental species in both temperate and tropical areas as a feature plant, as windbreaks and for erosion control. The usually white flowers with brown centres are densely clustered along the stem on short branchlets. It is so much in demand in the trade for horticulture that selected forms have been registered as cultivars some with Plant Breeders Rights, and include *Agonis flexuosa* 'Belbra Gold', 'Denmark Delight', 'Fairy Foliage', 'Peppermint Cream', 'Royal Flush', 'Southern Wonder' and 'Variegata', most described in *Australian Plants*, Volume 15, page 198.

Agonis linearifolia Rose Myrtle or Ti-tree, is similar but does not grow such a large bush. The long lasting white flowers in groups along the stem are attractive and are produced later in the season, spring to early summer. After 3-5 years mature bushes of *Agonis* produce up to 10 bunches of flowers each season from bushes planted in rows at 2 m intervals.

Agonis parviceps White Myrtle or Ti-tree, is the most popular in the cut flower trade possibly because of the regular foliage that is often dyed in various colours. It is a dense small shrub, 1-3 m in height. The small, long lasting white flowers are produced profusely in late Winter to Spring.

Anigozanthos Kangaroo Paws. There is a vast market as a cut flower, based upon their unusual appeal and their period of flowering. It is also essential to get access to this market and to keep up with the best forms, see page 267.

Astartea fascicularis, is a small dense foliaged shrub that can grow to 2 m. It is a hardy adaptable shrub producing long stems of small white flowers used as myrtle filler flowers.



Astartea (as-tar-TEE-a), is also in the plant family Myrtaceae with five species. Four are restricted to Western Australia, *Astartea ambigua*, *A. clavifolia*, *A. fascicularis* and *A. heteranthera*. Possibly of special interest to dry area and northern growers, *Astartea intratropica* is widespread in sandstone outcrops in the Northern Territory not far from Darwin. All are similar to *Astartea fascicularis* above.

Astartea 'Winter Pink' is a small delicate but dense shrub to less than a metre tall, a hybrid between *Astartea clavifolia* and *Baeckea astarteoides*. It arose in cultivation and was selected at Zanthorrea Nursery, WA. The leaves are 4 mm long, whorled around the stem. The flowers are 20 mm across and deep pink in colour appearing from April to October.

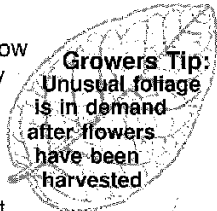
Baeckea behrii Broom Baeckea or Broombush, is a slender small shrub to almost a metre high. As the common name implies, its slender stems are readily grouped like a broom, a feature often sought as a filler plant. The small five petalled flowers are usually white but often pink, borne singly up the stem, all features sought after for flower arrangements. This plant is found in the drier areas on claypans and sandhills. It is widely grown in inland areas and is very drought resistant. Trickle watering produces long attractive stems.

Baeckea (BECK-ee-a) is a large group of similar plants. At least 70 species are found across Australia in a wide range of climatic conditions. Many of these are used as myrtle filler plants and selection of good forms has only just begun. *Baeckea linifolia*, Weeping Baeckea and *Baeckea crenatifolia*, Fern-leaf Baeckea, are cultivated commercially as **myrtle filler flowers** for features indicated by their common names. Northern species are *Baeckea camphorata*, Camphor Baeckea and *B. stenophylla* found up to central Queensland where it is commonly cultivated, *Baeckea diosmifolia*, Fringed Baeckea, *B. imbricata*, *B. jucunda* and *Ochrosperma*. *Baeckea linearis* from southern Queensland and *Baeckea polystemonea* from Central Australia, possibly with the largest flowers.

Baeckea virgata Tall or Twiggy Baeckea deserves special mention as it is an extremely variable plant with prostrate compact forms, a silvery grey leafed form as well as forms with long and shorter leaves. Horticultural forms are marketed as 'Howies Feathertips', a dense shrub with a weeping habit of its fine foliage growing to 1 m high, 'Wirreanda White Cascade' a low spreading shrub with pendulous branches, the new growth an attractive coppery colour, and 'Howies Sweet Midget', a small compact form that will enhance any rockery.

Banksia (Bank-SEE-a) as feature flowers. Banksias have found a special place in the cut flower market and the demand appears to be growing. Purists find the practice of dying flower heads various violent colours rather repugnant but the commercial grower must laugh all the way to the bank. There will be a special presentation on the commercial cultivation in a future issue, but meanwhile refer to the development of hybrids on page 350 of Volume 18, *Australian Plants*.

Beaufortia decussata Cross-leaved Beaufortia, can grow to 2 m. as a dense shrub. Features of this plant already in commercial cultivation are the deep red bottlebrush flower heads, 20 x 4 cm and the unusual foliage that is in demand without the flowers; the 1 cm long oval leaves are attached directly to the stem along its length. The flowering time is summer giving a market edge when other natives are in short supply. They sell for \$2-3 upwards per bunch of 10-15 stems. Page 212 of our last issue has a colour photograph.



Growers Tip:
Unusual foliage
is in demand
after flowers
have been
harvested

Beaufortia (bo-FOR-she-a), is a group of 18 species, most with brightly coloured globular flower heads that would be in demand, and most have foliage similar to the species above. Many have not been easy to grow but the use of trickle watering should solve this problem. It is not easy to recommend the most attractive. I have seen outstanding plants of *Beaufortia schaueri* with delicate violet flower heads and *B. purpurea* has very eye-catching bright orange flower heads, well presented on the ends of the stems.

Beaufortia sparsa Swamp Bottlebrush, can be a shrub to 2-3 m tall but responds well to severe pruning to promote long straight stems. It has similar features to *B. decussata* but the bottlebrush flower heads are a bright reddish orange and stand out as a feature flower. The colour photograph of a flower arrangement on page 188 of Volume 17 shows them to perfection with *Banksia ericifolia* flowers.

Boronia (bor-O-nee-a) cannot be considered a candidate for hot arid area growing. There is an established market and commercial planting is presented fully in Volume 19, page 57 of *Australian Plants*. They have horticultural appeal.

Despite this comment you will note that Brian Powell has grown the related Correa in Quorn quite successfully, see page 248, this is a whole new ball game.

Bracteantha bracteata Golden Everlastings (bract-ee-ANTH-a), is widely known and grown for its large golden flower heads that seem to retain their vibrant colour for years after picking. There are 20 registered cultivars and each year seems to see another one. All these are described in our previous issues with many colour plates. Try a range of these choosing those that do best in your conditions and produce the best flower heads on a suitable stem. For horticulture, the trend is towards forms that are compact and form low mounds of leaves. Flowering in summer months is prodigious and they will keep producing new flower heads if the old flower heads are pinched off. Once you have made your choice of what to grow you can produce new plants from cuttings very quickly and easily. Cut off a leafy stem near the base, remove flowers and buds, pinch off all but the top few leaves, cut the base freshly and thrust it in hormone powder or gel (even this is not essential) and place them in a pot of sand and peat mix to half their length, put the pot in dappled shade and keep it moist; in only a few weeks you can plant out all your new plants.

Caustis blakei Koala Fern and **Caustis dioica** Chinese Puzzle (c-AUST-iss), are commonly known as rushes. They are perennial herbs growing in moist depressions from a subterranean rhizome. The florists appear to love them because of their unusual contorted, flimsy appearance, providing a perfect filler. There are 10 species widely distributed so one from your own area may suit nicely. They do not produce a lot of stems in the wild unless during a wet warm period so do not pick from the wild. Suitable conditions with trickle watering will produce a crop.

Ceratopetalum (serra-to-PET-al-um), NSW Christmas Bush or Festival Bush, was featured in our No. 152 issue of Volume 19, *Australian Plants*.

Chamelaucium, Wax Flower (cam-ee-LAW-she-um), is one of the world's best sellers, especially on the export market. There are over 40 registered cultivar forms indicating the degree of competition for a product in such demand. Most are forms of *Chamelaucium uncinatum* Geraldton Wax but the popularity of this plant has sparked interest in others of the 21 species especially *C. axillare* Esperance Wax a smaller but very ornamental plant with its white wax flowers in compact clusters, *C. ciliatum* Stirling Wax its white flowers aging to red, *C. floriferum* Walpole Wax a compact showy small plant and *C. megalopetalum* Large Waxflower with the largest flowers but not as well displayed as others. Inevitably, more recent introductions include hybrids of these such as 'Esperance Pearl' and 'Esperance Velvet' seeking to blend the larger flowered *C. megalopetalum* with the favourite *C. uncinatum*. A more recent promotion is to be of 'Jasper', a hybrid with a *Verticordia* flower.

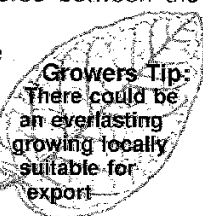
Growers
Tip: The market
is well served
so use good
forms especially
before or after
the WA crop
hits market

Dodonaea Hop Bush (do-do-NEE-a), are grown as a foliage filler plant but have the greatest potential because of their coloured fruits. Volume 17 had a whole issue, No. 137, pages 189–233, devoted to descriptions and sketches of all the 69 species with colour photographs of 26 of them and details of cultivation. They are widespread in Australia many from dry areas of the country. *Dodonaea lobulata* and *D. viscosa* have already been marketed. It is too early to assess vase life and market potential. See photographs opposite of *D. subglandulifera* as a crop.

Eremophila Emu Bush (er-e-MOFF-il-a), the subject of this issue with special reference to cut flower production on page 271.

Hypocalymma (hy-po-cal-IMM-a), are small shrubs producing long stems with attractive flowers clustered along them. There are 13 species, all with horticultural merit, but only three are produced as **myrtle filler flowers**. All respond well to heavy pruning, producing long saleable stems. Only 3–5 bunches per year can be expected from each plant, with a return of \$3–4 per bunch *Hypocalymma robustum*, 'Swan River Myrtle' has abundant rich pink flowers. It is often difficult in cultivation but the provision of trickie watering may solve this. *H. angustifolium* White Myrtle is much more reliable. While it is white early it ages to pink along the stem giving a two toned appeal. *H. xanthopetalum* has attractive rounded, stem-clasping foliage often in demand and forms have bright yellow flowers clustered between the leaves along the stem.

Ixodia (ix-O-dee-a) South Australian Daisy, is one of the Daisy/Everlasting filler group, produced to fill a demand for white filler flowers that are very long lasting. Daisy, because they are in the "daisy" plant family and "everlasting" because they seem fresh for so long. They are in a group where the tiny individual flowers do not appear to have petals but are grouped to form a tight "woolly" head of flower. There are two species, both from South Australia. *Ixodia achillaeoides* is an erect shrub growing to 1.5 m tall when in full flower with long stems produced by cropping. It is one of the few white-flowered "daisies" that remain white when dried, creating a significant market. It grows in the coastal areas and on Kangaroo Island. *Ixodia flindersia* is confined to the Flinders Ranges and a selected form may be more suited to the dry interior.



Leucophyta brownii Cushion Bush (loo-co-FY-ta), is a compact shrub usually to less than a metre high. Normally, it is intricately branched and attention is needed to induce long stems by growing it between taller foliage. The scale-like leaves hug the wiry white branches and are themselves covered with fine white hairs. The general appearance is a silvery grey compact shrub, and stems displayed in a flower arrangement produce an ethereal, pleasing complement to the flowers featured. As fresh foliage it has a long vase life and it is also sold dried. Bunches can be picked off bushes after 12 months but its life span is 3–5 years. The plant is a valuable feature in any low landscape or rockery with its contrasting, compact, silvery grey foliage, see the photograph on page 260. It will withstand exposed conditions even salt-laden coastal winds, forming small round balls of grey. The flowers are a pale yellow ball to one centimetre across but are not showy. The plant is very easy to grow from cuttings and should be in many places in everyone's garden. For commercial production, summer drip irrigation and light applications of slow release fertilizer will produce vigorous growth.



Dodonaea subglandulifera is classified as an endangered species here in South Australia. I found a small patch of 20 plants growing amongst black oak, in shallow red clay soil over sheet limestone. Here at Waikerie, in the SA riverland, the seed capsules commence colouring in late July, attaining full size and an intense red colour in late August to early September, fading to pinkish brown in mid to late October. Bushes grow to 2 m high by 3 m wide and completely cover themselves with the brilliant red seed capsule. Tom Loffler.



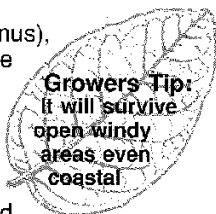
Maireana Bluebushes (mair-ee-AH-na), are often regarded as salt-bushes because of the succulently fleshy leaves and because they occur on flood plains of the arid interior. There are 57 species, a wide range of plants to choose from.

Maireana sedifolia Pearl Bluebush, grows to a small plant of one metre high, the whole presenting a bluish grey appearance. The fleshy, one centimetre leaves and branches are covered with fine pale bluish-grey woolly hairs. The selection and development of good forms is desirable for crop production. Drip irrigation is necessary to promote stem length in conjunction with pruning of side growth.

Maireana erioclada Rosy Bluebush, is a dwarf shrub with white woolly-hairy young growth. The flowers are not showy but the "petals" greatly expand in fruit to 1 cm across and are covered with soft woolly hairs that are rose coloured on good forms. This feature of displaying coloured fruits is pronounced in a number of species and combined with the succulent silvery grey foliage, many could be selected for marketing. See the photograph of a flower arrangement on page 288.

Micromyrtus (my-cro-MERT-us), may be regarded as **myrtle filler flowers**, being similar to others in this group with small petalled flowers along the stem of small leaves. There are 22 species many from semi-arid areas. They are usually small plants with arching branches. *Micromyrtus ciliata* has received the most attention with garden cultivars being promoted. For the cut flower trade it may stand out from the other **myrtle filler flowers** because of the pink buds before the usually white flowers open and pink flowered forms have been recorded.

Ozothamnus turbinatus Coast Everlasting (o-zo-THAM-nus), can grow to a tall shrub 3–4 m tall. The young foliage of leaves and stems of a greyish to grey-green, produced after pollarding of old plants, is attractive for use as fresh foliage or dried foliage. It produces terminal clusters of yellowish-white flowers that, in season, are attractive and of value in arrangements. It is a long-lived plant producing for up to 20 years. Drip irrigation and light applications of slow release fertilizers will promote good stem length.



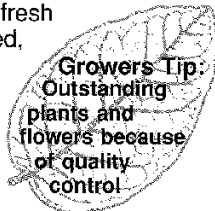
Ozothamnus belong in the Daisy/Everlasting group, with flowers that do not seem to be daisies at first glance. The flowers are long lasting. They were previously classified, botanically, as *Helichrysum* which includes the well known golden everlastings, and this no doubt has caused the problem with common names. There are 49 species in the group, very widespread around Australia. Most are "ticky-looking" bushes that you might pull out when they come up in the garden. The flowers are usually in terminal heads and, I think, not particularly attractive on such a leggy bush. However, there are good forms in each species and left until they flower one never ceases to be amazed at how well they look. By pollarding, cutting back severely to promote new growth with long stems has become the basis of a specialized cut flower industry. There is an interesting story associated with the commercial development of the following species and it indicates that there may be a treasure in your own locality. Species that have performed well in one area could be a disaster in your area. Look for good forms in your area and try these. In Australian Plants, Volume 12, page 158, there are five species described for Tasmania, all with special promise for horticulture. Why not try them with the treatment recommended here and fill your vase.

Ozothamnus diosmifolius can be a shrub to 2 m tall, the numerous green leaves sheathing the stem. The attractive feature is the white or pink flowers held in clusters at the end of the branchlets. The stems are sold as fresh or dried buds, flowers or foliage. The plant will be productive for 5–10 years though heavy cropping does shorten its life. Our next issue will present an amazing report by Ester and Graham Cook on their experiences in growing this plant commercially

Regelia velutina *Regelia* (re-GEEL-ee-a), let us use the botanical name as the common name, a plant in the **myrtle filler group**, or is this selling it short? It is a shrub that can grow to 2.5 m tall. The attractive feature is the grey-green foliage presented, stem clasping along stiff branches. I find the bright red flowers particularly attractive and worthy as feature flowers. There is an urgent need to develop a form that flowers abundantly on the ends of good length stems. It is a particularly attractive plant in the garden, especially in the cooler moister areas but, like all *Myrtaceae*, will perform well in good conditions. It is already selling for Christmas flower decorations and foliage, cultivated with drip watering.

Swainsona formosa *Sturts Desert Pea* (swain-SO-na), needs no introduction and its cultivation in the home has received much attention in past issues. I dreamt of its adoption as the national flower to commemorate the celebrations of 100 years of federal government in the year 2001*. What we could achieve by 2001 is flowering plants in hanging baskets. In the photograph on page 261 you will see some being commercially produced. As a cut flower *Sturts Desert Pea* appears improbable. It is all a matter of developing plants to meet market requirements. A commercial company based in Kimba, South Australia, see the photograph on page 261, is supplying an increasing demand. Their flowers and plants are outstanding because of their careful selection and quality control.

Stenanthemum scortechinii, 'Corroboree Flower' (sten-ANTH-e-mum), has been marketed as 'Snowballs' and 'Cotton Bush', names used widely for other plants and not a true representation of this plant. It is a woody perennial shrub to 1.5 m high. The branches bear a heavy crop of woolly, almost globular flowerheads that are almost white, hence the common names. The flowers are sold as fillers as fresh natural or fresh dyed from June to October. They are widely used as dried, usually dyed flowers. *Australian Plants*, Volume 19, page 40, details management practices from planting to the market. A cultivar, 'White Mischief' has been registered for landscaping use, making an attractive easy-care hedge or feature plant, differing in its more arching to prostrate habit.



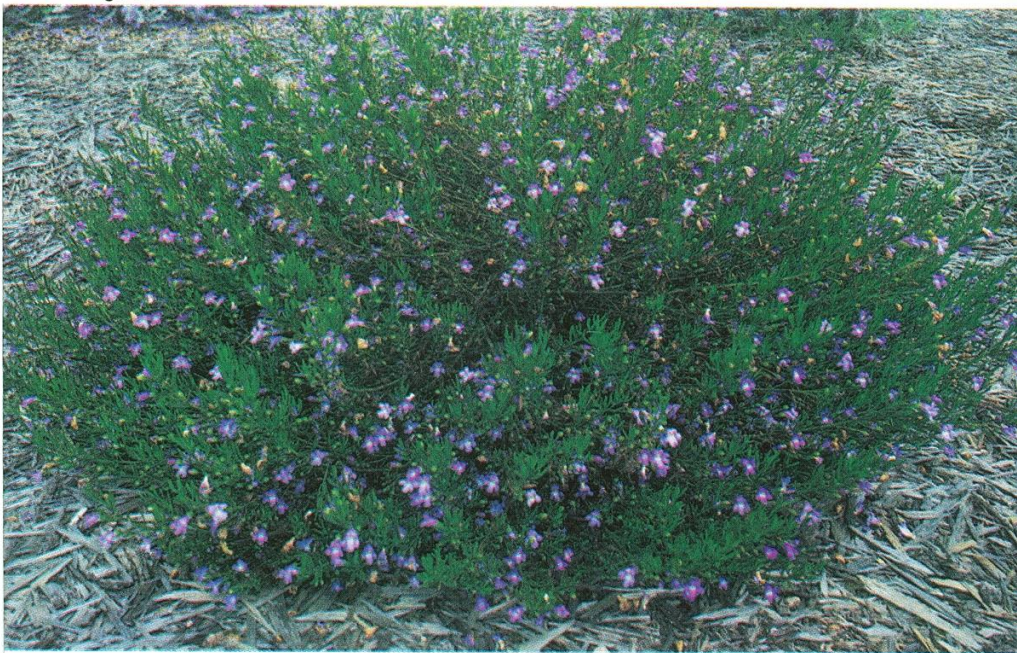
Growers Tip:
Outstanding
plants and
flowers because
of quality
control.

***Editors note.** *Sturts Desert Pea* was to be available, in full flower in a small pot, mass produced, to decorate the home. Not an improbable dream, science and the work of many practical botanists, especially the work of Dr Greg Kirby of Adelaide University, could have achieved this incredible production. Unfortunately, despite my personal pleas to the committee responsible for promotion of the celebrations in 2001, time will not now allow the essential development programme. The same comment applies to many other candidates for adoption in the time of national fervour. Hopefully some responsible person will take note of this comment before it is not too late for the industry to respond with the increasingly limited range of plants available. I will send a copy of this to the chairperson of the responsible committee but going on past experiences over the last five years I will not even receive a practical acknowledgment. There is so much that can be achieved with this plant with coordinated research and development and we will no doubt leave it to a foreign country to reap the rewards of research our scientists now know and are keen to proceed with. Pardon me if my frustration is showing, there must be someone responsible and truly Australian in government.



△ **The garden of Peter Bailey.** In the foreground is Cushion Bush *Leucophyta brownii*, see page 256 for its use as a cut flower for flower arrangements and as a feature flower in rockeries. Behind it is a native conifer, *Callitris preissii* that has been cut back from 6 m to 2 m high and lightly pruned to retain this height. I need reports of other readers who are using native conifers in the landscape. Beside it is the reliable *Grevillea* 'Robyn Gordon' in flower and behind it is Ivory Curl Flower *Buckinghamia celsissima* finally resting after flowering for over twelve months. Peter's garden was featured in our last issue as Our Garden No. 28 on page 230.

▽ ***Eremophila drummondii***, see page 279, photographed at Port Augusta Arid Zone garden.





Sturts Pea being grown at Kimba South Australia for the cut flower market and the flowering plant market throughout Australia. The lower photograph shows an area where flowering hanging baskets are prepared for sale, see page 259. Photographs by W. H. Payne.



Thryptomene calycina Grampians *Thryptomene* (thrip-TOM-e-nee), is a shrub that could grow to 2 m tall. It is another in the **myrtle filler group** with masses of small white flowers, but with selected forms with pink flowers. Careful selection and development in Victoria (to the extent that it is often called 'Victorian Lace Flower') has led to the production, for the cut flower trade, of a number of registered cultivars, 'Black Range Pink', 'Cascading Pink', 'Coral Lace', 'Ivory Lace', 'Sunset Lace', 'Talbot Lace', 'Winter Lace', and 'Winter Snow'. These have been described and illustrated with colour photographs, in our Volume 17, page 166, and indicate the value of the market for this plant.

Thryptomene (Thrip-TOM-e-nee), is a group of 18 species, all very similar and of considerable horticultural appeal. There could be selected forms more suited for your area. *Thryptomene saxicola* has been cultivated for many years and a selected form 'Paynes Hybrid' has been cultivated and sold as cut flower.

Thryptomene ericaea Kangaroo Island *Thryptomene*, is a similar plant but flowers later and so commands a market niche. It is producing flowers early or late in an already established market that returns good dividends. ■

Cut flower production trials

Plants Suitable for Cultivation in Inland NSW,* a report by W. H. Payne

At a conference, "Cut Flower Production for Inland NSW"* plants suggested for commercial production of cut flowers in inland NSW included most of the plants recommended above. There was special emphasis on their export market potential. The emphasis of all papers presented was that farmers considering diversifying to this crop should examine all the relevant aspects, including budgetary planning and marketing, and as a final preparation, they should create trial plantings. Selection of clones especially developed for commercial production and suitable for the area is important but the probability that there are suitable, untried forms growing locally* in the wild should also be considered.

For those contemplating growing for cut flower production, first set up a trial plot. The best position for a trial plot is where you intend to grow the plants on the farm. This will provide a close indication of how the plants will go in full production. If the trial plot is near the house and the production area is down the back or on the hill, the conditions may vary between the two areas, and the plants may grow differently.

The most basic trial plot should contain a number of varieties and cultivars so that you can compare growth rates and flowering times. For each variety, plant a minimum of 5 plants in at least 3 locations. These different locations may look the same but can vary without being obvious. You may then decide upon only 2–5 types of plants, then your trial plot could contain 20 plants of each type in 5 locations. This will allow you to get a better picture as well as marketable quantities of flowers. ■

*Cut Flower Production for Inland NSW, was the theme of a conference and workshop held at Wagga Wagga, NSW, in July, 1997. This report is based upon an address given by Tony Slater, Victoria Agriculture and Jonathon Ledbetter and Ross Worral of NSW Agriculture.

Emu Bush

How to grow and conserve *Eremophila*

by Colin Jennings*

Eremophila have been used in Aboriginal tribal life in ceremonial rites, and extracts and decoctions of plant parts have been used as liniments, medicines and antiseptics. The resinous exudates from some species are used as sealants and adhesives. Modern man has yet to fully research their wonderful commercial properties but most people who have seen these beautiful plants in full bloom marvel at their delicate, desert borne, beauty.

Eremophila are concentrated in the semi-arid and arid regions of Australia. They are locally dominant in many areas, often growing in impoverished sites; in general they are tolerant of harsh conditions, including drought, fire, frost, flooding and grazing, the name Poverty Bush being aptly applied. They have also been referred to as Emu Bush, Fuchsia Bush, Tar or Turpentine Bush. We prefer *Eremophila* pronounced, er-e-MOFF-il-a, as a common name.

Eremophila are diverse in their habit, ranging from prostrate ground covers, like *Eremophila serpens* and *E. biserrata*, to shrubs, both small, e.g., *Eremophila glabra*, *E. maculata*, *E. nivea* etc., to large bushes such as *Eremophila psilocalyx*, *E. gibsonii* and *E. duttonii*. There are several tree species including *Eremophila mitchellii*, *E. longifolia* and *E. bignoniiflora*. Flower colour is across the spectrum.

Like myself many people would like to grow them in the garden and become part of the Australian domestic landscape. How? This periodical, in past issues, has presented these plants extensively and illustrated in full colour many species mentioned here. Issue 93, Volume 12, is wholly devoted to **Wildflower Gardens in Dry Areas** and features *Eremophila*, **Their cultivation and care**. Issue 103, Volume 13 is devoted to **Gardening in the Centre** and features *Eremophila* in colour. Issue 120, Volume 15 specialises in a proven method of **Cultivation in a suburban garden** in Sydney.

Eremophilas for the garden** is a small book produced by the SA Region as a guide to those species most rewarding in cultivation. A survey by the Group revealed that there are now 165 species being grown by members, some tenuously so, but others are growing extremely well and are now fully established as plants with horticultural merit. Many species gazetted as rare or threatened are well known as garden plants, *Eremophila nivea*, *E. racemosa* and *E. denticulata*. ■

*Colin Jennings is leader of the *Eremophila* Study Group, a group of enthusiastic growers of *Eremophila*, who maintain contact by mail with a regular newsletter, exchange experiences and cuttings and seed, seeking to develop the best horticultural forms and to facilitate the conservation of the genus. Contact the Study Group through your state secretary.

*****Eremophilas for the garden*** is the title of a small book produced by the society as a guide to those species most rewarding in cultivation. It is a joint effort by Ivan Holliday, Colin Jennings and Mick Freeborn and may be obtained from Colin, 4 Kinnaird Cres., Highbury, SA 5089, for \$10.50 posted. It is excellent value as on each page, there is a coloured photograph of one of 69 species illustrated with a description of the plant, its distribution and cultivation notes.



Eremophila hygraphana, flowers and plant photographed at Port Augusta Arid Zone Botanic Garden by W. H. Payne. This recently opened wild garden is a revelation to visit, with plants of the dry interior of Australia presented for the tourist to see in comfort.





Eremophila platythamnus, plant and flowers, photographed at Port Augusta Arid Zone Botanic Garden by W. H. Payne. See pages 263 and 279 for a guide to these incredible desert plants for garden use.



The cultivation of *Eremophila* is most successful in the drier areas of Australia. They have in the main, proven to be adaptable to a range of soil types provided that drainage is very good and that light conditions are adequate; most require full sun site in the more temperate climates. More *Eremophila* have been killed through overwatering than through any other cause. They respond to fertilizers provided they are not applied too heavily and too often.

Some species have proven to be short lived, but these often propagate readily from cuttings. Others, once established, are reliable on their own roots and long lived. Plants grafted onto *Myoporum* stock in garden situations do well, the grafted plants appearing to be the better option in the wetter locations. Pot plant culture is suited to many of the species of smaller growth habit.

Whilst it is dangerous to generalize, most *Eremophila* are relatively pest free, aphids and mealy bug are the most commonly met. These can be controlled by predators, the preferred option, or by applying "soft" insecticides. Borers, particularly the larvae of the Cossinae family, do attack roots and stems of some *Myoporum* species and this may prove to be a problem for grafted plants.

Dr Guy Richmond researched the potential for a range of species to be used in the revegetation of minesites, Australian Plants, Volume 17, page 70. He commented:

"The future potential of this genus is significant since it offers a wide range of uses in rangeland and minesite rehabilitation programmes, horticulture, medicinal and phytochemical industries."

Eremophila have long been recognized as fodder plants in the pastoral areas; *Eremophila maculata*, *E. latrobei*, *E. forrestii*, *E. longifolia* *E. oldfieldii* and *E. scoparia* are grazed, particularly as seedlings or when in the flush of new growth.

Recent research on the medical properties of *Eremophila* includes the cardioactive effects of extracts from *E. alternifolia*. Aborigines used it as a decoction for headaches, fevers, inducing sleep and general well-being.

***Eremophila* from seed?** The legendary information about the seeds having to pass through the gut of an emu, is without proof. Members have reported on their success and failures with the frustrating challenge to grow plants from seed. There is no consistency of procedure or results but there are reports of success with seed extracted from the fruits for such species as *Eremophila compacta*, *E. ericalyx* and *E. platycalyx*.

Cuttings may be taken at most times of the year, but spring through summer is best, especially when new growths have started to mature. In autumn into winter, bottom heat is generally required. Some strike easily without hormone treatment, others respond best with such treatment.

Grafting has been a very valuable process. Much material collected in the field does not strike readily. Grafting onto *Myoporum* stock has been the only way in which many "new" species have been able to be introduced into cultivation. This has also been employed to produce plants for more temperate conditions.

The future of this genus as a garden plant is very sound. We hope to preserve the threatened wild populations and, through ethical collecting, grow these species in collections of those who care for the genus, and then to revegetation schemes. ■

Kangaroo Paws

Not your average kangaroo paw

Beng Tan, Curtin University of Technology, Perth

Serendipity should not come as a total surprise in plant breeding. The unusual and unexpected can crop up — literally — in the breeder's plots. "Sport" or spontaneous mutation, a random event in nature, is one source of novelty, while an unusual genetic combination may constitute a new creation. Examples:

'Harlequin' Kangaroo Paw (*Anigozanthos rufus* × *A. pulcherrimus* F₂ plant)

The original flower stem and perianth color of this F₂ plant is bright red orange. An anthocyanin-suppressing mutation in a shoot apex has resulted in the formation of a so-called mericlinal chimera, comprising a patch of mutant cells in the outermost cell layer and two inner layers of normal cells. After conversion to a flower stem, non-mutant cells in the chimeral shoot apex will produce both a yellow (flavonol) and red (anthocyanin) flower pigments while cells in the mutant sector can synthesise only yellow flower pigments. The overall effect of differential pigmentation is unique: a stem and individual floret can have split colours, i.e., red on one side and yellow on the other. Depending on the distribution of the mutant tissue in the shoot apex, whole branches or branchlets within a branched flower stem (inflorescence) can consist entirely of either red or yellow florets, or a split of both (see Plates 3 and 4).

Mericlinal chimeras are not stable. Whilst the mutant cells may not be lost they may be diverted to form new apexes during ensuing cycles of vegetative growth. Flower stems initiated from these will have entirely yellow branches and florets but these all-yellow stems will form within clusters of red orange flower stems (see Plate 5 showing all-yellow flower stems emerging from the original 'Harlequin' plant; the genetically unstable mericlinal chimera that was responsible for splitting of flower colour in the previous flowering season has given way to a stable periclinal chimera, the origin of all-yellow flower stems).

The emergence of an all-yellow mutant from a robust orange form provides an opportunity to clone and test the generally-held notion that yellow strains of most ornamentals are weaker than their strongly pigmented counterparts. It is believed that the leaf tissues in richly pigmented varieties are protected against UV damage by leaf anthocyanins and other flavonoid compounds, but these are absent or present at very low levels in yellow forms.

Variegated leaf mutant (*Anigozanthos pulcherrimus* × *A. rufus* F₂ plant)

This plant has leaf variegation manifested as parallel green and cream leaf stripes. Leaf variegation is a chlorophyll mutation which has given rise to a "periclinal chimera" at a shoot apex. Flower pigmentation is unaffected by the pigmentation and the inflorescence is typically *Anigozanthos pulcherrimus*, that is, one characterized by a rust coloured stem with yellow florets. There is a similar leaf mutant of a red-flowered variant of *A. flavidus*; the clone is being marketed under the proprietary trade name of *Anigozanthos* 'Flashpoint'.

Chlorophyll mutants are generally weak and slower growing owing to their reduced photosynthetic capacity. Shoots and plants with variegated leaves are relatively stable and can be cloned to initiate a distinct variety.

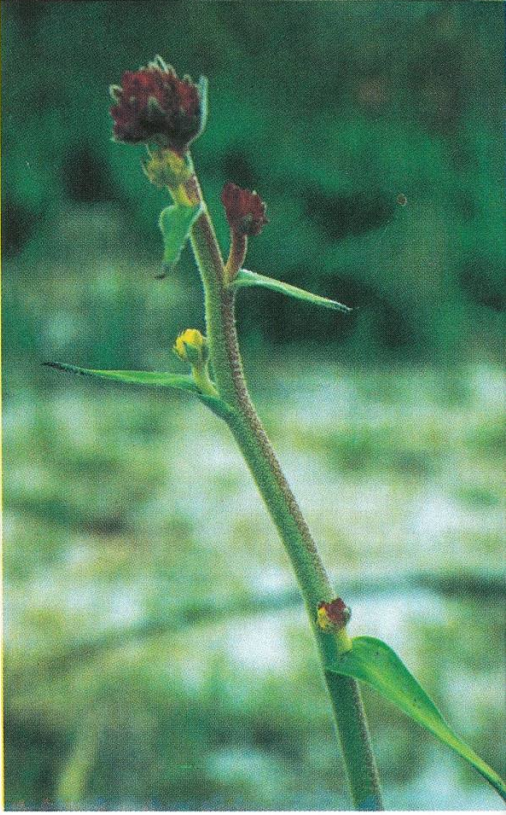


△ Plate 1. Kangaroo paw breeding plots at Curtin University.



△ Plate 2. 'Harlequin' kangaroo paw with split coloured flower stem.

▽ Plate 3. 'Harlequin' inflorescence: branchlets with red, yellow, or split colours.



▽ Plate 4. Closeup of split red and yellow perianth lobes of the flower.





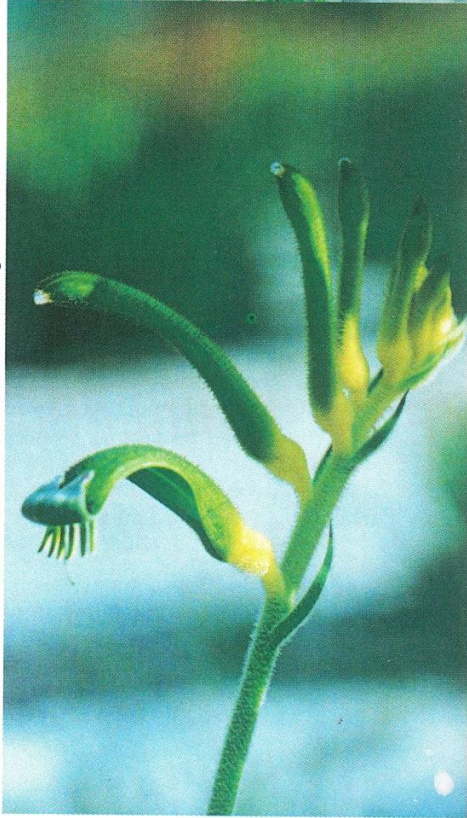
△ Plate 5. All-yellow flower stems emerging from the original 'Harlequin' plant.

▽ Plate 7. Yellow-and-green Mangles' Kangaroo Paw, further crosses with siblings of similar phenotype to test for seed fertility and whether the colour combination will breed true in the next generation.



△ Plate 6. Genetic stability of leaf variegation is evident from the emergence of new variegated shoots from the plant base.

▽ Plate 8. Mangles' Kangaroo Paw in patriotic colours, in contrast to the common red-and-green form.



Mangles' Kangaroo Paw in Australian colours (*Anigozanthos manglesii*)

The red-and-green Mangles' Kangaroo Paw is undoubtedly the most recognizable floral icon of Western Australia before and after its adoption as the State's floral emblem in 1960. Colour variants are known but these are neither as common or as popular as the common red-and-green form.

With the approach of Sydney 2000 Olympics, it may be timely to create a truly Australian Kangaroo Paw, that is, one with gold and green colours. The concept is surprisingly simple: combine the felted yellow stem and ovary of a pure gold variant with the green perianth of the common red-and-green form.

But the blueprint is flawed with a paradox. In the red-and-green form, the suite of pigments in red hair cells felting the stem and ovary tissues (indumentum) are exactly the same as those present in the green perianth hair cells. The visual difference between red and green coloration emanates from their difference in cell sap pH; in this case, red anthocyanins at above pH 5.2 appear green but red below this pH threshold. A gold variant has no anthocyanins but a rich yellow undercoat (flavonol pigments) which is also present in non-yellow flowers of all kangaroo paw species, including the Black Kangaroo Paw *Macropidia fuliginosa*. Since hair cells develop from a common epidermal tissue (L1 histogen), a yellow and green combination should not be possible in biological and chemical terms.

But such exceptional plants have been found in complex crosses, starting with both nominated parental forms. A plausible explanation for a break in the anthocyanin nexus assumes that anthocyanin synthesis in stem and ovary hair cells is selectively and genetically suppressed, leaving only the yellow undercoat. This is not a far-fetched conjecture. Consider, for example, the differential pigmentation in the Yellow Kangaroo Paw *Anigozanthos pulcherrimus*, where the stem is consistently red or rusty but the florets are bright yellow. In its close relative, the Red Kangaroo Paw *Anigozanthos rufus*, the whole inflorescence is uniformly red. Analysis has shown that the pigments in the red stem of *A. pulcherrimus* are the same as those in the stem and florets of *A. rufus*. This suggests that synthesis of red anthocyanins in floret tissues is suppressed in *A. pulcherrimus* but not in *A. rufus*.

Securing a few plants with patriotic gold-and-green colours is one thing but reproducing such plants in commercial numbers is another. An obvious option is cloning by tissue culture but it will not be a cost-effective strategy. Propagation from seed is a much cheaper option, as Mangles' Kangaroo Paw is a natural seeder, but overall success will depend on whether this particular colour combination is true breeding and, secondly, whether fecundity is significantly reduced by some degree of inbreeding. The latter is inevitable as sibling plants will be involved in seed production. With sexual propagules, there will be opportunities to reselect for other plant characters such as flower stem length, leaf erectness, and other desirable horticultural attributes.

Comments

Whilst traditional plant breeding is a game of numbers, solely to improve the odds of securing those improbable genetic recombinants, one should not discount the blessings of "Lady Luck". Though not by design or part of some lofty blueprint, mutants and unusual variants are legitimate outcomes of chance events. They represent missed opportunities if entirely ignored. ■

Eremophila as cut flowers

by T. G. Loffler, Waikerie, South Australia

Eremophila have potential as a commercial cut flower, both as a bunch filler and a feature flower. However, more selection and development of good forms is necessary. The foliage of many is unique, the flowers attractive and with a range of colours and after flower drop an attractive calyx persists thus extending the period for their suitability as use in cut flowers. While being less impressive in flower on the bush, the range of species with broom type foliage are ideal as filler foliage plants, hardy and long lasting.

The exceptional splendour of *Eremophila nivea* is now well known, but it has problems in cultivation in some locations. I have hybrid crosses of this plant under trial. Although they do not have the silver/grey foliage, a *nivea*/drummondii form is probably as spectacular in flower.

Eremophila oppositifolia fills a market niche because of its late winter flowering. Flower colour shades vary from white, cream to yellow, pink to red, blue/mauve to purple. Some selected forms of *Eremophila* that show promise as cut flowers are *Eremophila alternifolia*, *E. calorhabdos*, *E. drummondii*, *E. gibsonii*, *E. maculata*, *E. nivea*, *E. psilocalyx*, *E. purpurascens*, *E. racemosa*, *E. santalina*, *E. viscida*. These may also serve as filler foliage plants but the those especially suitable are *Eremophila dempsteri*, *E. dichroantha*, and *E. interstans*. ■

Do our own research

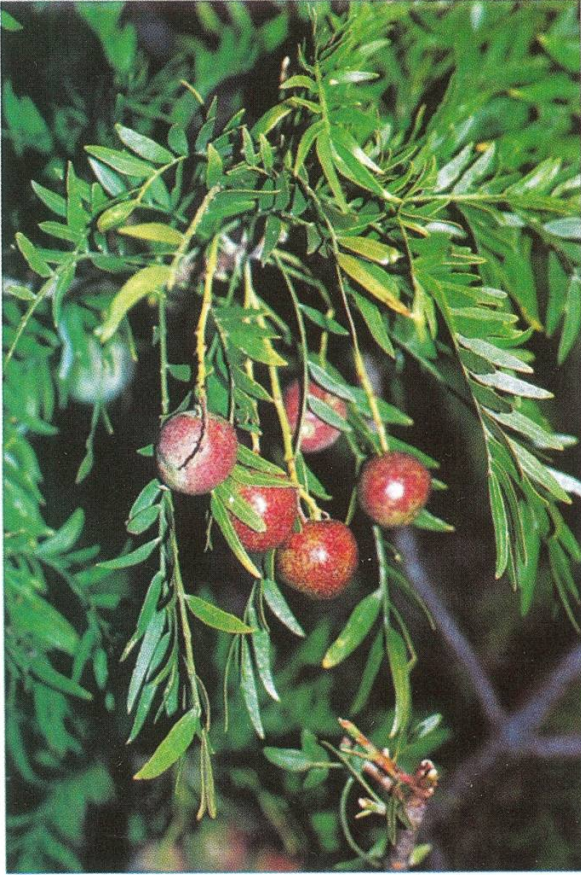
The DOOR Manual for Plant Nurseries* reviewed by editor

Research in horticulture is finding new ways of doing things. Public sector institutions have traditionally carried out this work but they have increasingly had to rely upon the support from the grower for field data. *Do Our Own Research* reverses this trend and the grower carries out the research, growing, recording, observing, all under the guidance of trained professionals.

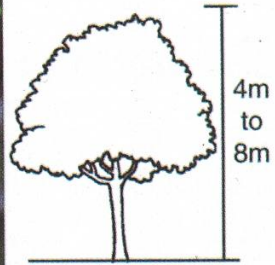
The DOOR Manual is directed specifically to the commercial nurseryman in the plant production area where large numbers of similar plants are produced in conditions that favour controls and mass testing. The procedures developed are based on a specific defined objective, the control of batches and associated variables, all carefully recorded and analyzed to yield a result. These procedures can be widely applied to all plant production systems, and to field production of a product such as flowers and fruits.

The scientific community is still directly involved on a defined basis and training and accreditation is necessary. Their laboratory now becomes large areas of production and the technicians, the growers. Many problems will yield positive results in this way but a number will need further experimentation under better controlled conditions. The difference from present practice is that problems needing solution are more precisely defined facilitating a quicker and more practical solution. The DOOR Manual is a valuable step forward in horticultural development and Queensland is to be complemented upon their initiative. ■

*Published by the Department of Primary Industries, State of Queensland, and available from them, P.O. Box 327, Cleveland, Queensland, 4163, phone (07) 38213784. It was financially supported by Horticultural Research and Development Corporation.



Flowers		Fruit	
	Spring		
	Summer		
	Autumn		
	Winter		



Owenia acidula

Family: Meliaceae
Common Name:
 Emu Apple

Look For:

A small tree with a single trunk and a dense, rounded canopy. Often found in dense clumps where numerous suckers have developed around a parent plant. Leaves are pinnate, dark green and dense, the flowers tiny, green and insignificant. Fruits are plum-like in appearance but contain a large, hard and woody nut containing 2 or 3 seeds.

Emu Apple

Owenia acidula

book review by W. H. Payne

On the opposite page I have reproduced a complete page of *Plants of the Dry Tropics**. What an incredible production this small 192 page book is! I chose the Emu Apple *Owenia acidula*, as it is pertinent to our presentation on edible fruits in this issue. Wild fruits such as these are the basis for our succulent table fruits. The flesh is edible but not plentiful around the large hard woody nut. Who knows what could be produced by selection, hybridisation and development, see page 276.

Each page of this book is devoted to a species widely distributed in the dry tropics, presented in this colourful fashion. Other pages are even better with a picture of the plant in the wild, another of the flower and another of the fruit or seed, the perfect presentation. ■

**Field Guide to Plants of the Dry Tropics*, compiled by Keith Townsend for Society for Growing Australian Plants, Townsville Branch Inc., and available from Keith, P.O. Box 363, Aitkenvale, Qld., 4814, for \$28 posted.

Conservation and the Society at work and play. This is typical of the exceptional work done by SGAP groups throughout Australia and a credit to those involved. The society is also heavily involved in Landcare and I quote from the foreword in the book: "Townsville/Thuringowa Landcare Association is pleased to be able to sponsor this superb field guide. SGAP have an important role in the conservation of our native flora. Their role extends to landcare and all land and water managers ... with closer ties between Landcare and SGAP in the future." There has been comment that the society has "lost the plot" with its concern over conservation. This is very far from accurate. The society continues to give a major emphasis to the cultivation of the Australian flora both to develop forms that will be suitable for horticulture and to decorate our landscapes, and to provide practical knowledge for the conservation of the flora in the wild. Society members are encouraged to be fully involved in complementary organizations directly concerned with conservation matters.

Trees by the million

This is the title of the regular publication by Greening Australia (NSW). No doubt other states have a similar publication; perhaps readers in other states could send me an old copy for study. Join Greening Australia for only \$20 annually (\$10 for low income) by sending the subscription to P.O. Box 9868, Sydney, 2001. For members in other states use this address and they will pass it on.

Greening Australia is one of the major success stories of our times. Their officers are very competent and dedicated and the organization represents the growing nucleus of experienced honorary workers performing vital work in rehabilitating our continent. The full time officers now appear to be through the Natural Heritage Trust, a better environment for Australia in the 21st century. With **Landcare**, this represents a vast workforce of experienced dedicated people to form the nucleus of national effort by all Australians for prosperity in the future based upon a healthy environment and managed national resources.

There is one danger, that the enthusiasts believe their own propaganda. We may be planting thousands of trees, even millions of trees but how many are coming to maturity and how many are dying due to development or disease and how many are deliberately destroyed by clearing. Despite what may be a confidence trick in the negotiations pertaining to planet warming, we may only be holding our own. There is a lot more to be done. Involve the Australian people, especially the young in national involvement for the year 2001. Editor. ■

Favourite *Eremophila*

My Garden. 3B*

by Noel Gane, Sydney

My experience in the cultivation of *Eremophila* as the main feature of my suburban garden goes back 20 years and I have never tired of them. They suit my situation on a flat level site that gets oppressively hot in summer and is mostly fully exposed to the sun the year around. The garden was started when SGAP started, 40 years ago. I met some incredible people in the East Hills Group including Bill Payne, Norman Denovan, (the local nurseryman), Viv Hopkins, Jack Hayward, Eric Packer and Lyle Pearce among many other "nuts". At first I tried a variety of natives and early on settled on *Melaleuca* being on a level block of clay soil with a minimum of drainage; we even went under in a flood twice. It was a great day when I got the *Eremophila* bug.

First it must be known that I try to grow *Eremophila* that that reach a maximum height of 2 m due to the smallness of my home site in a south western suburb of Sydney. Apart from the home, garage and driveway, all available space is taken to growing, essentially *Eremophila*. The land faces west and is almost flat but all gardens have been raised approximately 40 cm by the addition of compost and loads of stable manure. In my part of Sydney the weather can get very warm in summer, up to 35°C, plus. There is an occasional frost in winter. The soil, when tested, registered pH 6.5.

Growers
Tip: "Loads of
stable manure"!
on desert plants?
but not on
phosphorous
sensitive
plants

When planting out now-a-days, I make the planting hole slightly larger than the normal procedure. The soil removed is then mixed with crushed stable manure plus a small quantity of *Patons Native Plant Food* and a little blood and bone and this is replaced back around the new addition and watered thoroughly.

None of the plants have ever been sprayed with an insecticide, herbicide or pesticide. The only fertilizers used are Blood and Bone, *Patons Native Plant Food* and liquid *Aquasol*, that is apart from copious quantities of horse manure, fresh from the stables near the Bankstown Paceway.

The larger species Once you start collecting different species it is surprising just how many can be grown in a small area. Some I have grown with good success but after a couple of years I replaced them with smaller species.

Eremophila bignoniiflora × *E. polyclada*, reached over 2 m in under 18 months. It is a nice flower, white with purple spotted interior.

Eremophila denticulata, after 12 months got to over 2 m high, a very open bush it had to be replaced.

Eremophila fraseri, made a nice shrub with a spread to almost 2 m with red flowers and lasted three years.

Eremophila glabra, has many forms and all do well. I am very impressed with the variety *carnosa*, a very small tight shrub that flowers well.

Eremophila loanii, both white and red flowered forms, grew and spread quickly so a lot of pruning is necessary.

Eremophila maculata, the red, yellow mauve, pink and cream flowered forms, all grew well. I have kept a red form from Nyngan, NSW, growing for over 35 years.

*As My Garden — 3, Noel's garden was described in *Australian Plants*, Volume 15, page 156, together with details of cultivation and colour photographs.

Eremophila neglecta, lasted about 4 years, had red flowers, with no growing problems.

Eremophila paisleyi, grew easily and very well, accepted any conditions, producing white flowers.

Eremophila santalina and *E. saligna* grew quickly and produced white flowers.

Eremophila verticillata, causes me lots of problems, they grow and flower well followed by the call to green pastures.

Eremophila viscida, both white and pink flowering forms, need a lot of water and have a lot of unsightly dieback.

The smaller species. There are quite a lot of *Eremophila* that grow to a height of 1–1.5 m that would be suitable for many gardens. The growth height of the following plants is how high they grew in my garden:

Eremophila alternifolia, is very adaptable, mainly red flowered and in three forms. The variety *latifolia* has yellow to white flowers, growing to 0.75 m high.

Eremophila drummondii, has been grown in three forms, all doing well.

Eremophila linsmithii, has blue flowers on an attractive bush to 0.75 m.

Eremophila mackinlayi, is a very open plant to 0.25 m producing blue flowers.

Eremophila maculata variety *brevifolia*, has three different forms, all with nice mid-red flowers. It grows quickly. A grafted plant spread to almost 2 m in a very short time. It has been crossed with *E. duttoni* producing a nice small shrub to 0.5 m. The flowers are red and yellow. It comes readily from cuttings. *Eremophila maculata* 'Winter Glory' is a nice little compact, yellow flowered shrub to 0.75 m.

Eremophila oppositifolia, will reach 1.5 m, is hardy, producing greyish foliage and red or pink flowers.

Eremophila psilocalyx, has nice foliage and attractive blue flowers. It grows to 1.25 m receiving early morning sun until midday.

Eremophila pterocarpa, has good grey foliage to 1.25 m, producing pink flowers. It is very adaptable.

Eremophila racemosa, is a very nice shrub, a favourite with many gardeners. It grows to 1.5 m with nice pink flowers. It will spread to 1 m.

Eremophila youngii, with its grey foliage and pink flowers is a very durable shrub that will grow in any position to 1.5 m. The variety *lepidota* has nice grey foliage to 1 m high, producing light mauve flowers

Grafted plants. With the advent of grafting becoming popular there is now a selection of nice grey foliage species available. The following are doing well:

Eremophila bowmanii, *E. compacta*, *E. hillii* (red), *E. gilesii*, *E. glabra* (Murchison River), *E. iatrobei*, *E. macdonnellii*, *E. maitlandii* and *E. rotundifolia*.

Other grafted plants are *E. abetina* var *ciliata*, *E. clarkii* (Gocondiwindi and prostrate) and *E. georgei* (pink and blue).

Eremophila nivea, the species that every gardener wishes to grow because of its lovely grey foliage and soft mauve flowers. It is obtainable on its own roots and grafted but, over the years, I have discovered they both only last about the same time.

If you have never used stable manure on your *Eremophila*, try some, I am sure you will be well rewarded. ■

The Your Garden Series. Readers, please send notes on your garden together with photographs taken this season. Many readers must enjoy this series as a number queried "where was the Mills Garden No. 26." I am sorry for this omission, it is in Melbourne, Victoria.

Bush food potential

A pre-feasibility study for Australia's rangelands

A review* by W. H. Payne

A small bush food industry exists in Western Queensland based upon harvesting from naturally occurring plants. The study is confined to the "rangelands" of Queensland. This is part of the dry country that comprises 75% of our continent and includes arid and semi arid areas with low and erratic rainfall. The rangelands are used or abused for grazing. Erratic beef and wool prices as well as drought have created problems for the grazing industry and they are seeking supplementary income.

While the study deals with plantation establishment, because of the considerable risky investment involved, the thrust is towards wild harvest, another environmental, man-made disaster in the making. The existing small bush food industry is already making an impact on the survival of species in some areas and the advent of government subsidised devastation of the already critically dry country could be catastrophic.

There is an excellent aspect to the report if government has vision for future prosperity. There is little doubt that unless we modify our management of the vast dry interior of our continent, it will all go to desert that will expand by the wind to overlay our good productive land. The rangelands, the dry interior can be productive, contributing to our national prosperity with careful land uses. The report defines species that prefer to grow under these conditions and that produce foods, crudely called bush foods. Rather than destroy some areas by grazing, why not produce foods from Australian plants?

Plantation establishment, growing wild plants from the interior as a crop? how pedestrian and "European". Planting the best forms of selected wild species in suitable areas creating a more natural ecosystem is, however, quite feasible. Referring to page 243 of this issue it will be noted how a wide range of Australian natives may be established in the harsh conditions using the available saline water sparingly. Food from the desert can become a reality so let us look at the plants recommended in the study. Seven Key Regional Species (KRS, see table next page and descriptions that follow) were selected for western Queensland from the large number with bush food potential.

The plantation production system selected (according to the study) is based on low volume production, with plants interplanted in guilds of suitable mixes in a riverland community. Based on species suitable for the arid zone of far western NSW, a 20 ha plantation would provide an internal rate of return just under 9%. If established in 1997, the plantation would make an operating surplus in 2002 and employ a manager and 4 full time equivalent staff. A 20 ha plantation could have an operating surplus of \$42 500 in the year 2010.

*The review is based upon information contained in a research paper by the Rural Industries Research and Development Corporation, Paper No.97/37, "Feasibility of a sustainable Bush food industry in Western Queensland" by D. G. Phelps, Queensland Department of Primary Industries, January, 1997, supplement by other published information available, see pages 249, 250, 262, 273 and 282. Copies of this research paper may be obtained by sending \$15 to RIRDC, AMA House, P.O. Box 4776, Kingston, ACT, 2600.

Key Regional Species	Density	Estimated	Yield	Farm Gate Value	Gross Return	Operating Costs	Return After Operating Costs
	Plants/ha	kg/plant	kg/ha	\$/kg	\$/ha	\$/ha	\$/ha
Gundabluey	625	1.5	937.5	5.00	4 687.50	3 700.00	987.50
Desert Lime	625	2	1 250	6.50	8 125.00	4 375.00	3 750.00
Bush Tomato	3 300	0.5	1 650	8.00 ^a	13 200.00	5 000.00	8 200.00
Native Thyme	5 000	0.2	1 000	55.00	55 000.00	22 500.00	32 500.00
Kurrajong	275	2.0	550	15.00	8 250.00	3 325.00	4 925.00
Wild Orange	625	2	1 250	5.50	6 875.00	4 300.00	2 575.00
Quandong	833	1	833	20.00 ^a	16 660.00	3 700.00	12 960.00

Operating costs excluding harvesting and sorting (including amortised costs of plant and equipment), have been estimated at \$2 500/ha. Harvesting costs have been estimated at \$1 200/ha for Gundabluey, \$1 800/ha for Desert Lime, \$2 500/ha for Bush Tomato, \$200 000/ha for Native Thyme, \$825/ha for Kurrajong, \$1 800/ha for Wild Orange and \$1 200/ha for Quandong. The annualized costs of establishment that include land value and costs of irrigation, have not been included as they will vary from those for far western NSW.

Other species with potential

The study acknowledges the success in other areas of Australia with the following species: (see Australian Plants Volume 19, No. 151, for further details)

Bush Tomato *Solanum centrale*, Illawarra Plum *Podocarpus elatus*, Kakadu Plum *Terminalia latipes* was *T. ferdinandiana*, Lemon Aspen *Acronychia acidula*, Lemon Myrtle *Backhousia citriodora*, Mountain Pepper *Tasmannia lanceolata*, Muntries *Kunzea parvifolia* and Ribery *Syzygium acuminatum*.

Emu Apple *Owenia acidula*, is a beautiful tree to 10 m high, from the drier parts of Queensland, with a short trunk and dense rounded canopy, photograph on page 272. The fruit is 4 cm in diameter, the hard flesh covering a fairly large seed. A cottage industry (Jill's Emu Apple Jam) produces a jam for tourist outlets.

Native Pear or Bush Banana *Marsdenia australis**, is a slender climber growing in sandy soils among mulga and cypress pine. The long narrow thickish leaves, 5–10 cm × 0.2–0.4 cm are a dull green. The small bell-shaped flowers are a greenish yellow to cream. The fruit is pear shaped 6–10 cm × 2–2.5 cm, softly hairy with a reddish blush. They were eaten raw or roasted by aborigines. It was known as *Leichhardtia australis*. See *Australian Plants*, Volume 19, page 181.

*There are 79 species of *Marsdenia* in Australia and the fruit of a few others has been eaten. The closely related *Brachystelma* has one species native to Australia, *B. glabritiflorum*. It is a perennial herb with a single tuber that may be eaten raw or after cooking.

Kurrajongs and bottletrees. There are a number of different bottletrees and kurrajongs, *Brachychiton* species, throughout western Queensland, all having distinctive "boat"-shaped pods with yellow-brown seeds. The seeds are coated with white, itchy, hairs. Many towns, such as Roma, have plantings of bottletrees. In the bush food industry, the seed is roasted and ground for use as a coffee substitute or a flavoured flour in biscuits and cakes. Aborigines used to roast the entire pods, eating the seeds as a flour or paste and the itchy hairs as a type of sherbert. Sorted bottletree seed is being bought for \$12 to \$15/kg at the farm gate. Trees with large pods, such as kurrajongs (*Brachychiton populneus* and *B. australis*), have the most potential as the seed is more easily removed.

Gundabluuey *Acacia victoriae*. There are two major types of Gundabluuey throughout Queensland. The first (*Acacia victoriae*) is common throughout most of Queensland. It has relatively dense blue-green foliage and can be found growing from as far south and east as Birdsville, Cunnamulla and Condamine, and far north as Normanton. The second type (*Acacia victoriae* subsp. *arida*) is more common in drier western areas such as the Simpson Desert, Boulia and Poeppel's Corner. Both types of Gundabluuey have prickles along their branches and can be found in a range of soils, including clays and loamy sands. Gundabluuey, wattleseed, is harvested extensively in other areas of Australia such as the Flinders Ranges of South Australia. The bush food industry uses 7.5 to 10 tonnes being used annually. The seed is roasted, then ground, for use as a coffee substitute or as a flavoured flour in cakes and biscuits. For further detail see Volume 19, page 91.

Desert Lime *Eremocitrus glauca*. Desert lime (or lime bush) is a true citrus, with blue-grey leaves and prickles along the branches. It is usually found growing on clay or heavy clay soils, often as clumps of short bushes (2–3 m in height). They are occasionally found as single large trees to 5–6 m in height. Older trees have a weeping appearance and few, or no, prickles. Limes are common in the southern and western Darling Downs, especially in brigalow, or cleared brigalow, country. Limes also grow further west, e.g., in the Longreach, Blackall and Tambo districts where they are often found along creek lines and on slightly scalded country. The fruit can be picked when still green, and has a pleasantly refreshing and tangy taste. Desert lime fruit is extremely popular and becoming very well known within the bush food industry, with 3–4 tonnes currently being used per annum. The fruit is used in a variety of sauces and jams, (such as Red Ochre Wild Chilli Marmalade) and within restaurants. The plant has been investigated as a source of drought hardy rootstock for citrus trees.

Wild Oranges *Capparis* spp. There are a number of species of Wild Orange throughout western Queensland, *Capparis lasiantha*, *Capparis mitchellii*, *Capparis spinosa*, *Capparis umbonata* and *Capparis velutina*. Despite their common name, none are members of the citrus family but are in fact closely related to capers. Most look similar and have very attractive and showy white flowers with numerous stamens. The green coloured fruit is borne on a curved branch or peduncle. Fruit is usually green even when ripe, but sometimes turns purple or brown when ripe. The fruit has yellow flesh and numerous black seeds. The flesh is flavoursome when ripe, but the seeds are hot and peppery and the skin very bitter. Wild oranges grow in a variety of soils, including sands and clays. They are found growing from Dalby and Warwick, through Blackall and Jericho up to Hughenden and the Gulf. See *Australian Plants* Volume 19, page 133.

Native Thyme *Ocimum tenuiflorum*. Thyme is very aromatic, releasing a strong smell if disturbed in the paddock. It is a short shrub to knee height growing in a variety of soils from clays to sand in gidgee country around Blackall and Longreach and also Cloncurry and toward the gulf. It produces small purple flowers (which look similar to the white flower of domestic basil) following summer rains. The leaves also grow quickly in response to rain. During drought, thyme plants have few leaves with only dried branches and some seed heads remaining. Native Thyme is used as a herb to flavour breads and pastas and is to be promoted with other native herbs in supermarkets. Sorted and dried thyme leaf is currently being bought for \$55/kg at the farm gate.

Bush Cucumber *Cucumis melo* is an annual trailer or climber, widespread along stream banks and flood plains in inland areas. Growing rapidly after rains, the vines wither and die when it is dry leaving the ground strewn with fruit. It was an important food for the Aborigines and early white settlers. The rind is bitter but the fruit refreshing and sweet when ripe. It may be 2–5 cm across.

Ruby Saltbush *Enchylaena tomentosa* is a dwarf-spreading shrub, the tubular succulent leaves being an attractive bluish-green to 2 cm long. The fruit is a berry that changes colour from yellow to dark red as they mature. They are only 0.5 cm diameter but often in abundance. It is widespread in arid zones in sandy soil but seen also in coastal areas in a variety of soils some of which may be saline. ■

Bushtucker in Central Australia

Grow your own* by G. Griffin

In Central Australia, plants provided the bulk of the food for Aborigines. Of the 200 species used I have selected fifteen species as being both suitable for cultivation as garden specimens and quantities of edible items.

Yulka *Cyperus bulbosus*, is a sedge to 40 cm high with flat semi-erect leaves. The small tuber may be eaten raw or lightly roasted.

Pencil Yam *Vigna lanceolata*, is a trailing perennial herb with tri-foliolate leaves and yellow flowers on erect stalks. The long tap root can be eaten raw or lightly roasted. The fruit pods can become buried and appear as small white bulbs; they are also edible.

Ipomea *Ipomea costata*, is a low shrub or creeper with thick leaves. The tubers can be 20 cm in diameter and should be baked in an oven.

Conkerberry *Carissa lanceolata*, is a spreading shrub to 2 m high. The fleshy berries (fruits to 1 cm diameter) are edible and can be dried and subsequently reconstructed with water.

Bush Bean *Rhyncharrhena linearis*, is a slender vine with an edible green fruit that resembles and tastes like a bean, the commonly used vegetable. The leaves and flowers are also edible.

Other crops that occur in the centre and are mentioned in the article above are *Acacia*, *Capparis mitchellii* and *C. spinosa*, *Cucumis melo*, *Enchylaena tomentosa*, *Ficus platypoda*, *Leichhardtia australis*, *Santalum acuminatum* and *Santalum lanceolatum*. ■

*Bushtucker, Grow Your Own, Australian Plants, Volume 18, page 127, illustrated in colour.

An Exquisite Eye

Australian Flora and Fauna, drawings of Ferdinand Bauer

A review by W. H. Payne

A book published to accompany an exhibition at the Museum of Sydney, December, 1997 to April, 1998. The book is available for \$45 at booksellers or as indicated inside our rear cover, by mail. It shows on each right hand page, one of 64 Bauer original illustrations lent by the British Museum. The book stands alone as a beautiful record of the work of this gifted natural scientist. But it is much more than that. It is a record of the voyages of Matthew Flinders, Robert Brown and Ferdinand Bauer around Australia. Opposite each colour plate are extracts from the journals with recorded notes by Matthew Flinders, Robert Brown, George Caley and Peter Good on the day each plant was collected.

Brunonia australis, one of the plants illustrated and reproduced opposite.

Brunonia — named after Robert Brown (by latinising his name) — *australis* (southern). When first found by Robert Brown, he proposed to name the plant 'Alstonia' but later used that name for another plant. James Edward Smith took up the name *Brunonia*.

Pincushion, so named because of the shape of the flower head, is now considered to be the only species in the genus. It is restricted to Australia, widespread south of the 17th parallel. The plant has been widely grown in gardens. It is a variable species, especially in the hairiness of its parts and the size of the flower head.

The plant is especially suited for the development of exceptional forms for sale as a potted flowering plant. ■

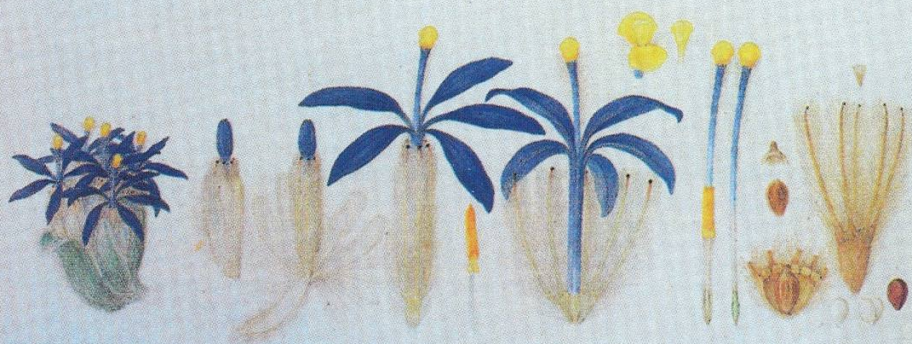
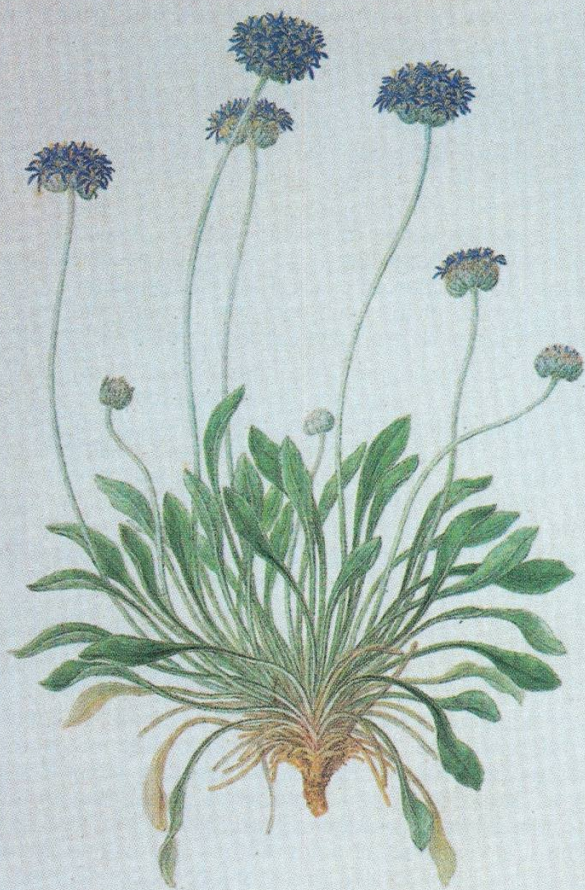
Brunonia

from Peg McAllister, Melbourne

This is a dainty little plant. It dies down each year and sprouts again from a tuber, lasting many years. I grow it as a tub plant with a trigger plant *Stylidium graminifolia*, to warn me that the pot is not empty; one of these and two *Brunonia* look good in a small container. The seed germinates readily but it is the second year before it flowers for me. Old plants can be cut back for better flowering.

There has been speculation that it is a candidate for the flowering potted plant market. This implies the selection of a good form but those I have seen in the goldfields, around Melbourne and in Western Australia have been remarkably constant, the size of plant and flower varying only according to the conditions. There is some colour variation from a delicate mauve to one population we saw in Western Australia that was a vivid ink blue.

It is amazing what competent plant technicians can do. If a good colour form can be produced on shorter stems in a compact clump, the plant would almost rival *Dampiera wellsi* and indeed be a very commercial prospect. See "The potted flower market" on page 286. ■



Native fruits — Aboriginal food

A book by Louis Glowinski, review by W. H. Payne*

Aboriginal diets on our enormous island continent differed widely from place to place. They consumed everything marginally edible. Especially impressive was their mastery of the arts of preparation of the many foods that were toxic or inedible in their raw state. A very large number of the roots and nuts considered as staples required processing in a series of steps, pounding into powder, leaching in running water for variable times, cooking in special ways to remove pungent tastes or, in extreme cases, powerful purgatives and poisons.

As there is a current series on edible plants in *Australian Plants* I shall describe just a few that have not as yet been mentioned. Some of these may be developed to commercial crops. They have evolved over many years to survive in the rigours of this vast continent of ours and could serve the basis for a crop in areas where imported food crops will not prosper.

Ground Berries *Acrotriche* are epacrids, prostrate to small branched shrubs, the small tubular flowers rich in nectar, producing a small globular fruit (drupe). *Acrotriche aggregata* is a low-growing shrub with pale green spear-shaped leaves. The paler green flowers have white tips and produce a 1 cm oval cherry-red fruit that is crisp, tart but pleasant. *Acrotriche depressa* Wiry Ground Berry, has tiny leaves. The globular fruits to 1 cm long are borne heavily and are edible. *Acrotriche serrulata* is known as Honey Pots as sweet nectar can be sucked from the flowers but there is no report on the edibility of the small green fruits.

Apple Midyim or Midgen Berry *Austromyrtus dulcis* is a small, ground hugging shrub of delicate, beautiful almost silky appearance. The leaves are tiny and narrow with a pronounced apricot-red tinge when young. The white fluffy flowers, a mass of stamens like many of its family the Myrtaceae, are produced freely in its second summer and accentuate the soft feel of the bush. The fruit, produced late autumn, is a tiny berry, 0.5–1 cm in diameter, white with tiny purple speckles, rather like a tiny bird's egg. The fruit is eaten whole, the pure white pulp being soft, sweet and pleasant but rather bland. The seed is hard but tiny and can be swallowed whole. The shrub is pretty at all times and a very useful ground cover; a useful and charming plant for the gourmet-landscaper. If dried they make acceptable raisins. They make a jam, enjoyed by early settlers. *Austromyrtus tenuifolia*, also produces an edible fruit used for jam making.

Billardiera Berries also known as Apple Berries, are small shrubs but more usually shrubby climbers, all producing a berry like fruit, some of which are edible. *Billardiera scandens* is a delicate vine with yellow pendulous bell-shaped flowers. The yellowish-green fruits are 2–3 cm hanging cylinders, brownish when ripe. The pulp is soft and edible, with a stewed apple taste.

*"The Complete Book of Fruit Growing in Australia by Louis Glowinski." (Available from your bookseller for \$39.95). A book written for the backyard orchardist. More than 200 fruits, nuts and berries, all of which can be grown in temperate or subtropical Australia, are described with details of their cultivation requirements. There is a chapter, Australian Native Fruits, which includes those described in our previous issues. I have taken the opportunity to refer to the book, and describe the fruits that are not widely known and commercially grown but could find a niche in a specialist market when properly developed.

Billardiera longiflora has tubular, bright greenish yellow flowers to 3 cm long, tinged with purple. The bright shiny purple (rarely white or reddish) berries are 2 cm x 1 cm with a "pleasant pulp". *Billardiera cymosa* has reddish berries to 2 cm long and was used as a food; the flesh has an aniseed taste.

Pigface *Carpobrotus*, are succulents native to dry sandy areas, especially on coastal sand dunes where they are often the first plant to succeed, binding the shifting sands and creating around them conditions suitable for grasses. The flowers are large and purple, as are the fleshy fruits. The fruits are eaten when soft or even when wrinkled and over-ripe. Their taste is sweet and rich, juicy and slightly aromatic or even salty, very acceptable to modern palates. Aborigines cooked and ate the leaves as well. *Carpobrotus glaucescens* Coastal Noon Flower, is found in NSW and Queensland and the smaller plant, *C. rossii* Karkalla, is found on southern coasts while *C. virescens* is from WA.

Mountain Berry *Cyathodes*. Seven species of the Epacridaceae group of small shrubs occur in Tasmania, all with masses of small white bell shaped flowers followed by a fleshy fruit (drupe) or berry. *Cyathodes parvifolia* produces masses of red berries (rarely white) 0.8 cm in diameter. Unfortunately they have a large stone and only a little of the pleasantly flavoured fruit.

Waxberry *Gaultheria* in Australia comprise three species, two confined to Tasmania. They are small upright shrubs, lovely to look at with particularly attractive dark glossy foliage tinged with red due to red hairs. Add in white berries and you have a splendid picture. Unfortunately white or pink berries are insipid or slightly bitter to taste, but they look good. *Gaultheria appressa* is a lustrous-foliaged undershrub of moist sub-alpine and mountain forests of NSW and Victoria. *Gaultheria hispida*, Snowberry, widespread in high altitude wet forests of Tasmania as is *Gaultheria depressa*, Alpine Waxberry.

Beard Heath Berries *Leucopogon* (Native Currents), are usually small shrubs with small white flowers notable for their dainty fringes. The tiny white fruits are sweet and juicy with a touch of acid. *Leucopogon parviflorus* has a lemon flavour and were known as Native Currants by early settlers. Other species used by aborigines were *L. leptospermoides*, *L. lanceolatus* and *L. montanus*.

Peach Heath *Lissanthe strigosa*, is a small shrub with small white or pink flowers producing tiny white fruits of an excellent honey flavour.

Cockspur Thorn *Maclura cochinchinensis*, is a subtropical spiny shrub, a relative of the mulberry and of similar habit. The white flowers are followed by a 2.5 cm apricot coloured fruit, sweet, juicy and one of the better wild fruits.

Native Elderberry *Sambucus*, are widely distributed understory shrubs. Both have white flowers followed by yellow fruit in the case of *Sambucus australasica* and white fruit for *Sambucus gaudichaudiana*. The 0.5 cm berries are juicy, slightly sour and pleasant.

Native Grape *Tetragium nitens*, is a rainforest climber producing the best of the many fruits referred to as native grapes. It is in the grape family Vitaceae. The fruit is a black globular berry 0.8 cm in diameter and tastes much like the domestic grape. ■

Propagation of The Waratah

by Paul Nixon, reviewed by W. H. Payne

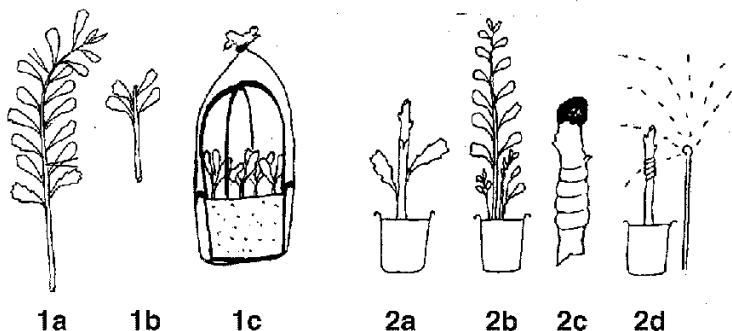
While Waratah can be readily propagated by seed, the propagation of the very best forms is only possible by vegetative means.

Propagation by cuttings as presented in *The Waratah*.*

Figure 1a. Take a cutting of wood from the last 12 months growth, remove the new soft tip growth and cut into 10–15 cm lengths.

Figure 1b. Remove two thirds of the bottom leaves and treat the base with growth hormone powder containing 2 000 p.p.m. of Indole-Butyric Acid (IBA).

Figure 1c. Place the cuttings in a pot of free draining clean medium such as a clean washed sand; put in one third of the stem and firm the cuttings in. If mist is not available, water the pot and place it in a clear plastic bag and tie.



Propagation by grafting as presented in *The Waratah*.*

Figure 2a. Use a 1–2 year old plant that is growing vigorously as the stock or root section of the grafted plant. Remove the top growth to a point where the stem matches the stem width of stem of the plant (scion) about to be attached. This should preferably be 20 cm above the soil level. Single stemmed 18 month old seedlings are ideal. The scion is a section of a stem of the desired plant form cut so that two "buds" (points where leaves have been removed) are available for growth.

Figure 2b. Cut a neat 'V' shape into the top of the stock plant, then cut a pointed wedge on the base of the scion; join them so the scion matches the stock and tie with plastic tape of the budding type.

Figure 2c. Paint the exposed top of the scion with grafting wax to prevent drying out. Leave the tape on until new growth occurs, at least 4 weeks.

Figure 2d. Keep it in a humid situation. The stock will probably throw up new growth and this needs to be remove regularly. ■

**The Waratah* by Paul Nixon has been revised and reprinted. All the species and their carefully bred commercial forms are described and illustrated in colour. The section on cultivation will be of special interest, the result of many years of field study and research. The book is available from your bookseller or by mail as indicated inside our rear cover for \$14.95



Goodia, the hardy Pea-flower

Photograph by Darrell Kraehenbuehl

by W. H. Payne

I find the most reliable pea-flowered plant is *Goodia lotifolia*. Thirty years ago I planted a few and I have had self-sown plants ever since. My wife is not as fond of it as she feels that it could become a weed but over 30 years it has failed to become rampant or to escape into adjacent bush areas. It is a small shrub usually to 30 cm high, rarely more, with light green leaves as shown in the sketch. My flowers are yellow, not as conspicuous as those in the photograph, but a good size to 2 cm across. As it is a member of Fabaceae I kid myself it is assisting other plants by fixing nitrogen. I have never had this satisfactorily explained to me. There is no doubt that nitrogen nodules form on the roots but just how this services other plants in the soil is not clear. Who can help me?

Muelleria 10 of 1997 from the Royal Botanic Gardens, Melbourne, recognizes two species. The distinction seems to be based upon the seed aril, the white piece attaching the seed to the seed pod. *Goodia medicaginea* appears to be very similar in all other respects, is it worth separating out. Possibly a reader can obtain some seed for me to try and see if it looks a different plant. ■

The potted flower market

The demand for a flowering plant in a small pot is increasing. The market over the next few years could be exceptional; in fact the right sort of well produced plant could yield excellent returns. Are any commercial plant producers interested enough to contact me? On page 259 I mention that it was hoped to produce a Sturt's Pea in flower in a small pot for short time indoor decoration. *Brunonia*, and *Dampiera*, as mentioned on page 280 are just one of many exceptional plants that could be developed for this lucrative market. Readers, do you know of any suitable plants, you could share in this promotion? Unfortunately, I have failed to interest a sponsor but have approached the Chairperson responsible for the Centenary of Federal Government celebrations of 2001, to promote a special plant or plants for the occasion. The opportunity over the next few years to promote Australia's plants is exceptional. The industry needs encouragement to do their best and a Flower of the Year project is proposed. Hopefully I can get someone to listen! Editor.

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Flower arrangement by Fay Powell using the grey foliage of *Pearl Bluebush* *Maireana sedifolia*, see page 256, and flowers and foliage of *Eucalyptus erythrocorys*, a decorative small tree grown for its foliage, bright red buds as shown, and fruits as well as flowers.