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Gardening In The Tropics

This issue was going to be devoted to the use of Australian Plants in horticulture in the tropics with emphasis on cultivation in Cairns. Only some articles were available in time so there are articles in the rear of the issue of wider interest. This is possibly a good thing. A visit to the area and a study of the plants recommended by local horticulturalists indicates that there is a strong preference for Proteaceae (*Grevillea* etc., not really mentioned in this issue but the subject of our two previous issues and of the next one) and Myrtaceae, the bottlebrushes, tea trees and *Melaleuca*, with some interesting northern species.

What did impress me during my visit, and after studying the recommendations of the local growers, is that gardening is not so very different in Cairns from say Sydney, or the world. Good growing conditions, that could be likened to those recommended by the "old English gardener" are the key to success. These are friable, nutritious, well drained soils. Once you have gone to the trouble of adequate preparation of the garden beds, the only difference is the choice of plants to suit the environment above ground.

Gardeners in the tropics have their problems but they are not as unique as I first thought. The general standard of gardens in Cairns in the new areas is impressive. The overuse of lawn by migrants from greener pastures is understandable but the low maintenance gardens in other respects are functional and attractive. There is room for more professional landscaping and a wider range of plants for low maintenance and we hope to assist in this in our future issues. ■

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COVER PLATE

A bottlebrush flower attracts a Spiny-cheeked Honeyeater, *Acanthagenys rufogularis*.

Creating an attractive wildflower garden which inevitably leads to visits by nature's wild creatures, is the theme of this issue. The planting of red bottlebrush flowering plants has proved rewarding in all areas of Australia and the articles that follow recommend their use in tropical landscaping.

Reprinted by permission, from "Birds of Eucalypt Forests and Woodlands", see page 317.

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Landscaping A Tropical Garden

by Margaret Haupt



Landscaping a garden in Cairns requires consideration of various factors which may or may not be unique to Cairns. We have a climate which can be very dry for months and broken by a few days of very heavy rain. Plants to be grown need to be selected from those which tolerate high humidity, high rainfall for periods of time and then little moisture for long periods. Strong south-easterly winds during winter and lighter northerly breezes during summer are a feature of our climate.

Some soils such as the schists of the Bayven Heights area and the deep sands of the Holloways and Mackens Beach areas and parts of the city, tend to dry out very quickly and require watering during dry spells. Many suburban blocks have been pared down to sub-soil or are filled with poor soil. Water restrictions apply and allotted water is insufficient to maintain large areas of lawn in good condition throughout the year without attracting excess water charges.

I feel the most successful garden may be one in which areas of paving extend around the house and for outdoor living areas with small unpaved areas to allow for plantings of small shade trees, shrubs and prostrate plants to break heat reflected from paving. Areas of lawn could be kept to a minimum. The boundaries could be planted extensively with shrubs and small trees to provide privacy. Dense plantings could be used to break the strong south-easterly winds while thinner plantings of small trees such as *Eucalyptus ptychocarpa* would allow the northerly breezes through in the summer. Tall slender trees such as *Melaleuca leucadendron* are suitable for the western boundary and are tall enough to throw shade on the roof of a low set house in summer. Carefully placed plantings can provide the householder with privacy, shade, protection from strong winter winds with little need for maintenance and watering.

Planning Your Native Garden

Draw a plan of your house and land and draw in areas you wish to plant in trees and shrubs using the suggestions above. Small trees, shrubs and ground covers are best for front gardens. Large trees provide a background and are best behind the house. Height and width are perhaps the major factors in selecting shrubs for a site, plus personal preference, of course. A mixture of colours can be important, too. *Acacia* and *Grevillea* grow quickly and flower early but are sometimes short-lived. *Melaleuca* and *Callistemon* take longer to flower but are generally long lived.

The selection of plants is always difficult. It is easy to talk vaguely as above, all landscapers do it and it can be maddening for the home gardener. We of the Cairns Group of SGAP have prepared a number of articles for this issue. On page 295 I have an article "Plants From Cuttings" followed by "Planting and Maintaining A Garden In Cairns". Here I give a list of plants tried and proven in Cairns. These notes on landscaping continue on page 290.



WILDFLOWERS ON CAPE YORK





Wildflowers Grown In Tropical Gardens

Melaleuca nervosa (above)

Photography by W. H. Payne

This is a street tree in Cairns. The form above has this huge crop of red/pink bottlebrushes where as this species usually has cream/yellow brushes and grows to a large shrub or tree. The articles in this issue from horticulturalists recommend plants such as this for ornamental use as well as to attract birds. Other plants of similar habit with beautiful bottlebrushes, *Melaleuca* and *Callistemon* are listed on page 296. This plant could be a form of *M. viridifolia*.

Grevillea pteridifolia (opposite)

Photography by W. H. Payne

This prostrate plant is growing on the north side of coastal dunes at Cape Flattery, north of Cooktown. This prostrate form is an excellent ground cover plant for Cairns gardens. *Grevillea pteridifolia* is normally an upright plant found growing in the scrub almost the whole length of Queensland. Species of *Grevillea* are also listed on page 296 as most suitable for ornamental garden plants and for attracting birds to the garden.

A Garden is For Living

The benefits of massed border planting and using only a few well chosen lawn specimens allows for ease of mowing, more privacy and gives the added bonus of feed and shelter areas for the many species of birds which inhabit the Cairns area. *Callistemon* and *Grevillea* attract a wide range of honeyeaters while *Baeckea*, *Melaleuca* and *Leptospermum* attract insects which allow the insect eaters to feast in your garden.

A few taller trees such as *Eucalyptus intermedia* afford birds such as Kookaburras a lookout while they pause to rest. A 'White Cedar' will provide shade while attracting yellow fig birds to the fruit, and is a perfect nesting tree. When bare it becomes a social centre for a variety of birds inhabiting the area.

Eucalyptus ptychocarpa brings rainbow lorikeets while making a perfect nesting tree for willie wag-tails and peaceful doves. *Callistemon* 'Eureka' is a dense shrub with upright growth which makes nest building for honeyeaters and finches a breeze. Dense areas of shrubbery give birds protection while providing a training area for fledglings learning to fly. The mulch rotting down provides much insect life and you will find birds which feed on the forest floor rummaging around amongst the leaves — a lone Black Butcherbird, friar birds or Monarch flycatchers can be found in the lower storey. Kingfishers will also make regular calls and sit and dream on a comfortable branch while waiting for the next 'meal on wings'. Massed plantings of a variety of natives will provide a rich source of food for a wide variety of birds all year as well as shelter and raw materials for nest building. A study of a sunbird's nest reveals such treasures as bark from *Melaleuca*, leaves from *Callistemon*, pods from *Acacia* and even hair from your dog!

No Cairns garden is complete without a Cairns Birdwing or Blue Mountain butterfly flitting about. What joy one *Aristolochia tegala* can bring as butterflies, male and female, float about it and numbers of larva munch away. Big Greasys will also breed in profusion on this vine. Plant your vine adjacent to a larger tree or on a fence where the larva can pupate away from the vine. A *Euodia elleryana* will attract the Blue Mountain butterfly but must be planted in a damp spot as it loses lower branches and foliage in dry periods. Its flowers and seed are loved by a variety of birds and butterflies.

The local granite rocks are beautifully shaped and can provide a beautiful setting around a pool or on areas to be retained. Rocks with pockets of soil in between allow species requiring good drainage to flourish. A wide range of natives is now available to create a suburban forest which will provide a year-round parade of birds, butterflies and insects which will fascinate you and your children.

We feel that the bonus you get with a wildflower garden, the spectacle of nature's creatures living together, is so important Graham Bennett, a keen observer of nature's realm, continues this story in his words. ■

Wildlife in the Garden



by Graham Bennett

Cairns is very well endowed with native birds and butterflies so growing plants to attract them is very rewarding and adds a new dimension to your surrounds. Any garden will attract wildlife of some kind but we have the opportunity of using our own native plants to attract many species of birds, bees, butterflies, bugs and bats to make the garden more enjoyable.

A safe supply of water is necessary. There are many ways of doing this for birds. A shallow bird bath raised from the ground by about one metre is sufficient to protect against cat attack. Small containers can be left in trellises or trees; these must be left full and clean.

The next requirement is a safe shelter and to this end several types of plants should be grown: feeding plants, shelter plants, resting plants and nesting plants.

Feeding plants are most important. *Grevillea* (*G. banksii*, *G. pteridifolia*, *Grevillea* 'Robyn Gordon' and *Grevillea* 'Misty Pink'), *Callistemon*, *Eucalyptus* and *Melaleuca* are rich in nectar and if a variety are planted, there will be flowers all year. *Grevillea banksii* is an excellent starter as it flowers early, has a long flowering period and is tall enough to make most birds feel secure. These birds will soon get used to a sure meal and will then start finding other flowers to keep bringing them back. Certain insects will also be attracted to these flowers and will be relished by insect eating birds such as Willie Wagtails and Sunbirds. Fruit eating birds enjoy *Eugenia*, White Cedar (*Melia azederach*) and other fruiting rain-forest species, not forgetting palms. *Eucalyptus* are also attractive to nectar feeders. As well as nectar these supply fruits.

Shelter plants can be grown in groves and feeding plants make good shelter plants. The plants should be planted about one and a half metres apart. Good shelter plants are *Callistemon* (particularly *C. salignus* and *Callistemon* 'Eureka'), *Hakea*, *Buckinghamia* and *Melaleuca*. Look-out trees such as tall *Eucalyptus tessellaris*, *E. tereticornis* and *E. citriodora* are popular with birds passing by and may entice a strange bird or two to rest a while.

Most birds seem to prefer to nest in densely sheltered shrubbery. Finches love thick growing plants such as *Callistemon salignus*, *Macadamia* and other upright branching trees are also popular. Pee Wees are very fond of white cedar, *Peltophorum* and *Euodia*. They seem to prefer the more open situations offered.

One thing to remember is that we must regard all wildlife as desirable. It is no good getting rid of large birds which prey on smaller ones or birds which eat desirable insects, e.g. bees. Nature appears to be cruel if looked at individually but all species have to live together.

A host of butterflies will visit your flowering shrubs to feed and if your garden contains host plants, they will breed there. The Big Greasy, Cairns Birdwing and Red Bodied Swallowtail lay eggs on *Aristolochia* vines; Blue Mountain Butterfly lays on the *Euodia*; Tailed Emperor, Bright Cerullean favour *Brachychiton* spp.; Blue Argus Blue Banded Eggfly, Common Eggfly, all need a tiny plant — *Pseuderanthemum variable* for survival. *Passiflora aurantia* is host to The Cruiser and the Red Lacewing. The Common Oak Blue require *Terminalia muelleri*, *Hibiscus tiliaceus* and *Faradaya splendida*. The large Green Banded Blue lay their eggs on the young shoots of the *Alphitonia excelsa*. We have three



Leptospermum flavesces △

▽ *Leptospermum scoparium*



vines (*Aristolochia indica*) which attract dozens of Cairns Birdwings. The larvae really chomp into the leaves and wander off to pupate on nearby shrubs.

It is a danger to pupate on the host vine as one's leaf may be eaten or severed by other larvae. It is best to check the vine each day during breeding times to rescue any in danger. So try to plant the vine amongst other plants. Wasps do parasitise Blue Mountains and ants can be a pest of pupal and larval.

The most popular butterflies in this area are the Cairns Birdwing and Blue Mountain (Ulysses). If the garden has enough shelter it may attract possums or some of our other furry animals such as bandicoots. Some damage can be done to the foliage and flowers but if there is enough shelter for possums there is usually enough food available for the damage not to be noticeable.

When we get down to lizards, spiders and snakes, most people wonder if they may have overdone it or decide they really don't want wildlife in the garden at all. Lizards and spiders will be found in any garden but it is seldom that snakes are found. When they do appear they generally are harmless anyway and are best left alone. Frogs are the food source they usually are searching for.

Convinced? Now let us create a living garden

If starting with a weed infested unkempt area that has been a problem to maintain, refer to "Preparation of the Planting Area" below.

When laying out your garden a few things need to be considered. Nesting plants could be located in areas of the garden where there is little people traffic. Plant in groups. Plants which are in flower most of the year could be planted where you could get the most enjoyment from watching the birds which visit them. *Grevillea banksii*, *Grevillea pteridifolia*, *Grevillea* 'Sandra Gordon' are beaut where they can be seen through bedroom windows. *Euodia*, *Eucalyptus ptychocarpa*, *Eucalyptus miniata*, *Eucalyptus phoenicea* could be situated where they are visible from the living room so that the parade of honeyeaters, butterflies and lorikeets can be watched in comfort. I prefer to plant away from the walls of the house with paths and strips of grass between the house and the plantings allowing room to move around the house and birds feel more secure.

***Leptospermum flavescens* (opposite top)**

Photography by Lois Sourry

This beautiful freely flowering plant has many forms, a couple of which are recommended in the article here to decorate your tropical garden and to attract birds. The Grey-breasted Silvereye shown in the photograph on page 316 is nesting in a Teatree.

***Leptospermum scoparium* (opposite bottom)**

Photography by Bob Jessop

This photograph shows a typical *Leptospermum* flower with five petals attached to the outer ring of the receptacle which is also ringed with numerous stamens. Nature's creatures enjoying the nectar on the ends of the stamens, transfer pollen to the stigma which stands up in the centre of the receptacle, fertilising the ovaries contained below it and inside the woody receptacle. The petals and stamens drop off leaving behind this fruit capsule, the red capsule at the top of the photograph. When the seed is ripe this capsule is hard and grey. If you remove the old capsules further down the stem from this year's flowers, and place them in a paper bag which is then left on the inside windowsill of a sunny window, the seed capsule will split open, spilling out dozens of tiny seed. Sprinkle these on moist sand in a container, sprinkle sand on top and keep moist with the container say on the inside sill of the same sunny window, and you will get dozens of small plants. For more precise details of how to grow your own plants from seed, see previous issues of Australian Plants.

Leptospermum belongs to the plant family Myrtaceae, see page 304.

Most plants can be planted approximately 1.5 m apart to allow room for the plants to develop and yet provide a dense area for shelter. A few taller species could be the basis and shelter shrubs could be planted in-between. *Eucalyptus* allow shrubs to grow comfortably beneath them but it is best to plant them all together so they all have a good share of the light while they are growing. A suggested planting could consist of tall plants such as *Eucalyptus ptychocarpa*, *E. miniata*, *E. phoenicea*; under shrubs such as *Callistemon polandi*, *Baeckea* 'Clarence River', *Leptospermum* 'Cardwell'; and edging plants such as *Callistemon citrinus* prostrate, *C. citrinus* 'Alba', *Leptospermum flavescens* 'Pacific Beauty'. The whole planting area could be spread with thick newspaper and topped with bagasse or bark and edged with grass or paving. Ground covers such as Australian Daisy are useful to cover any bare areas. Line planting along fences could include *Callistemon* 'Kings Park', *Callistemon* 'Tinaroo', *Callistemon polandi*, *Callistemon salignus*, *Callistemon* 'Eureka', *Leptospermum petersonii*, *Leptospermum* 'Copper Glow', *Leptospermum* 'Lemon frost', *Melaleuca linariifolia* 'Snowstorm', *Melaleuca linariifolia*, *Melaleuca bracteata*, *Melaleuca bracteata* 'Revolution Green', *Melaleuca alternifolia*, *Grevillea* 'Misty Pink', *Eucalyptus peltata*, *Eucalyptus ptychocarpa*. Large trees such as *Euodia*, *Peltophorum* can be planted as specimen trees.

This is a small selection of plants which flourish in Cairns and are relished by the feathered population. N-Nectar, I-Insects, S-Shelter, F-Fruit.

<i>Baeckea</i> (all)	I	<i>Grevillea</i> (all)	N. S.	<i>Macadamia</i>	N. S.
<i>Banksia</i> (all)	N. S.	<i>Hakea</i> (all)	N. S.	<i>Melaleuca</i>	N. S. I.
<i>Buckinghamia</i>	N. S.	Black Bean	N. S.	<i>Passiflora</i>	N. I.
<i>Brachychiton</i>	N	<i>Westringia</i>	S	<i>Pandorea</i>	N. I. S.
<i>Schefflera</i>	N	<i>Euodia</i>	N. S.	Palms (Native)	S. N. I.
<i>Callistemon</i> (all)	N. S.	<i>Kunzea</i> (all)	N. S.	<i>Stenocarpus</i>	N. S.
<i>Elaeocarpus</i>	F	<i>Leptospermum</i>		<i>Tristania</i>	N. S.
<i>Eucalyptus</i>	N. S.	(all)	N. S. I.	<i>Xanthorrhoea</i>	N. I.
<i>Eugenia</i>	F. S.	<i>Lomandra</i>	N	<i>Xanthostemon</i>	N. S.

Preparation of The Planting Areas

In Cairns several approaches can be made to this problem.

If the area to be planted is flat you have no real problems. Firstly, mow the area to cut down all high grass and weeds. Don't use a grass catcher, just let the cuttings lay. Once this is done cover the area with old newspapers, used carpet, old hessian bags or any other product at hand that will break down. Cover this with grass clippings, bagasse, peanut shells, sawdust (not from processed timbers, these contain poisons), rice husks etc. to around 150 mm depth. Water and allow to settle for a week or two, after which planting can take place.

On sloping blocks and steep hill sides a brush cutter may have to be employed. If this is not practicable a fire break and burning or the use of knock down poison spray may be considered. The best way to approach large areas is to only prepare an area of a size that can be prepared in the above manner in a few days. You will also have something to see fairly quickly to keep you motivated.

The earth worms and grubs will soon break down the newspaper etc. which will, by now, have done the job of killing the weeds which were originally growing on the land. The top cover is to keep in moisture, stop erosion and prevent the weeds growing back before your selected plants can take over. You may wish to add a new cover yearly if you have a plentiful supply available. It will allow you to keep control with a minimum of effort. ■

Plants From Cuttings

*From the Wilds of
North Queensland*

by Margaret Haupt

Growing native plants from cuttings collected in the wilds of far North Queensland is quite a challenge. The main problem is that many areas are less accessible during "the wet" so much collecting is done during dry periods when sap flow may be at a minimum. The material is often dusty and one is attracted to plants which are in flower (this is not the ideal time to select propagation material). The material may have to be kept for days in an "Esky" or perhaps in just a plastic bag. Although the material may look sound on preparation for propagation, cuttings often turn black and defoliate shortly after being placed under mist.

More success may be achieved if the cuttings are taken from a young specimen rather than the mature flowering specimen. The material taken should be just hardened new growth. Wash the material as soon as possible before placing in a clean plastic bag. Chlorinated drinking water is better than surface water so perhaps a cupful of drinking water could be used as a final rinse to save cuttings from breaking down too soon. Cuttings can be folded in damp newspaper and then enclosed in a plastic bag. This may stay cooler than just a plastic bag if no refrigeration is available.

To prepare material for cutting up — Wash the material well in running water, dip into a 1:200 solution of Sodium Hypochlorite. Cut into cuttings and dip into hormone powder or solution. Apply fungicide such as Benlate every 14 days to protect against fungal disease. Cuttings taken from wild plants usually take longer and have fewer roots. Even if only one plant results from a batch of wild cuttings, success has been achieved as cuttings then taken from this plant when grown on will be much easier to strike.

Specialized equipment is needed to raise large quantities of natives from cuttings and this would be too expensive for the amateur enthusiast. However, a wooden box with a glass or plastic lid will suffice. The cuttings can be sprayed with a fine water spray once a day. Results can be achieved by placing a plastic bag or glass jar over a potful of cuttings.

The medium used in the pot into which the cuttings are placed depends on what is available but I have found that 1 peat to 4 perlite gives the best root system. Some use sand and peat but the roots tend to be fine and weak and the sand should be sterilized before using. Vermiculite tends to hold too much moisture. Osmocote mixed sparingly through the medium helps form a healthy, vigorous plant.

Cuttings From Plants In Cultivation

The material used is critical to the successful rooting of the cutting. It must be sufficiently hardened to resist wilting but not so old and woody as to resist rooting. They are better taken early in the morning from high on the bush. Results are better from a vigorous, well watered shrub or young plant. Keep fresh in a plastic bag in the bottom of the fridge if you can't use the material straight away. Cut the

stems 2" to 3" long, either tip or laterals with a heel. Trim the heel to remove any torn material. The tip cuttings should be cut below a leaf node. Use a new razor blade to make a clean cut without bruising. Remove leaves from one-third of cutting and trim any large soft leaves to half. The cuttings can be soaked in a solution of Captan and Maxicrop or Formula 20 until planted. When all cuttings have been prepared dip ends in hormone powder or solution, allow to dry slightly, make a hole in medium no deeper than a third of cutting, firm medium around cutting to prevent any air pockets. Water well with a solution of Captan and Maxicrop and repeat every 10 days.

If using a jar or plastic bag over cuttings, check every week. Remove any dead leaves, wipe out jar or shake out bag before replacing. New growth is an encouraging sign but doesn't always mean roots have formed. *Melaleuca*, *Westringia* and some *Grevillea* strike within two weeks but *Callistemon* can take months. Success isn't easy to achieve but by trial and error you will find a system which gives results. Start with easy types such as *Westringia* to develop your skill and move on to the more difficult species when you have achieved some success. Early autumn, spring and early summer are the best times to try.

Water rooted cuttings well before potting them up. The roots are very easily broken. Keep sheltered for a few days before placing in full sun. If some cuttings have a callus formed but roots have not appeared, cut some callus away and replant.

PLANTS TO DECORATE YOUR GARDEN

Margaret Haupt

Melaleuca 'Golden Gem'
Westringia fruticosa
Leptospermum flavescens
 'Pacific Beauty'
Leptospermum flavescens
 'Sugar Plum'
Melaleuca linariifolia
 'Snowstorm'
Grevillea 'Robyn Gordon'
Grevillea dryandrii
Baeckea sp. 'Clarence River'
Lomandra 'River Reed'
Leptospermum brachyandrum
 'N.T. Weeping Teatree'
Eucalyptus phoenicea
Eucalyptus ptychocarpa

Callistemon viminalis
Callistemon viminalis
 'Dawson River'
Callistemon viminalis
 'Hannah Ray'
Callistemon viminalis 'Prolific'
Callistemon 'Wildfire of
 Newcastle'
Grevillea banksii
Grevillea venusta
Grevillea 'Misty Pink'
Grevillea 'Pink Surprise'
Leptospermum brachyandrum
Leptospermum 'Copper Glow'
Leptospermum flavescens
Leptospermum 'Lemon Frost'
Leptospermum longifolia
Leptospermum petersonii
Leptospermum squarrosus
Melaleuca alternifolia
Melaleuca armillaris
Melaleuca bracteata
Melaleuca bracteata
 'Revolution Green'
Melaleuca bracteata
 'Revolution Gold'
Melaleuca linariifolia
 'Snow in Summer'

Melaleuca linariifolia
 'Snow Storm'
Melaleuca symphiocarpa

TALL SKINNIES FOR WESTERN SUN SCREENS

Callistemon viminalis
Eucalyptus peltata
Eucalyptus ptychocarpa
Leptospermum petersonii
Melaleuca leucadendron
Melaleuca linariifolia
Melaleuca 'Revolution Green'

SMALL SHADE TREES

Callistemon viminalis
Eucalyptus phoeniceus
Eucalyptus ptychocarpa
Melaleuca 'Revolution Green'
 (bottom branches pruned)
Melaleuca linariifolia
 (Aft branches pruned)
Melaleuca leucadendron
 (Planted in groups)

LAWN SPECIMENS

Pongamia pinnata
Syzygium species

SCREEN PLANTS

Baeckea sp. 'Clarence River'
Callistemon 'Candy Pink'
Callistemon 'Captain Cook'
Callistemon 'Endeavour'
Callistemon 'Eureka'
Callistemon 'King's Park
 Special'
Callistemon polandii
Callistemon salignus
Callistemon 'Tinaroo'

What do these plants look like. See past and future issues of Australian Plants for colour plates and descriptions.

Planting Procedure Is Important

by Margaret Haupt

Planting can be done at any time except December which is usually too hot and dry. Planting in a garden bed is the best way as it allows beds to be raised to provide better drainage. For a new garden bed, soil preparation is important as it saves problems for years ahead. The best way is to add soil to raise the level of the bed and blend it into the top layer of your natural soil. Sand can be added if this is tight, heavy soil and humus such as leaf mould and animal manure added to sandy areas. A good garden soil is the objective. Broadcast dolomite and fork in. Water well.

Place the plants where they are to grow, large shrubs to centre, smaller plants either side and prostrate and ground cover plants around the edges. These smaller plants can be added later when larger plants are established. Dig a hole larger than the plant container, fill with water and allow to drain away. Sprinkle a little Osmocote 18:2:6 in the hole.

Immerse each plant in a bucket of water until bubbles stop rising, remove and allow to drain. If the container is a plastic bag, slit bottom then slide out of bag. Place the plant in the hole so that soil level is slightly higher than the potting mix level. Firm the soil around and water well. Mulch well with gravel or bark to control weeds and loss of moisture. Take care to keep it away from trunk.

Where there is a severe weed problem mulch initially with newspaper and bagasse, later with lawn clippings and natural leaf litter. Keep the mulch about 10 cm away from the trunk or stem of the plants to control rotting or attack of the plant tissue where it enters the ground. This appears to be a critical area for plant survival. Over-planting can cause spindly growth so spacing should be kept to a minimum of 1.5-1.8 m. Very few natives grow and flower well as understorey plants unless especially chosen for shade so it is best to plant low growing plants such as *Leptospermum flavescens* 'Pacific Beauty' in areas around a pool or on the outskirts of massed plantings. A short grower between two large plants rarely succeeds.

Maintaining A Healthy Attractive Garden

WATERING — If plants are well mulched watering will only be necessary in dry spells. *Callistemon* and most *Melaleuca* which tolerate the wet very well do like to be watered during our long dry. *Grevillea*, *Eucalyptus* and *Banksia* like good drainage to withstand the wet and appear to survive quite well in the dry. One objective in having a native garden is to reduce the need for watering.

PRUNING — is best carried out by cutting off old flower heads while the plant is young. Do not prune more than a third of the bush off at one time and leave an interval of three weeks between prunings. Water well and fertilize lightly after pruning.

PEST CONTROL — should be carried out if shrubs are struggling. Scale and leaf-matting insects can be controlled with White Oil and Rogor. Disyston 5 granules sprinkled around affected plants is helpful. Use sprays as a last resort as birds and predators can be affected by some sprays. Never exceed strengths recommended by manufacturers.

FERTILIZER — should be used sparingly. A twice yearly light application of Sulphate of Ammonia well watered in is all most natives require. *Banksia*, *Grevillea* and *Hakea* should not be fertilized. ■

Palms for Containers

By David Jones*



Palms make excellent indoor plants and have been used in this way for over 100 years. The large, airy rooms and hallways of the stately homes of England have for long been graced by the drooping fronds of a *Kentia* or its relative.

Although palms as a group are generally considered suitable for indoor decoration and are often promoted as such, the vast majority of species do not respond favourably to indoor conditions. Practical experience shows that only a limited number of species succeed consistently well in enclosed situations. More species succeed indoors in tropical regions in the open, airy design of houses suitable for a warmer climate. Some modern houses are designed for a more open living style and provide excellent conditions for plants.

In general, palms that consistently grow well indoors are those that will tolerate fairly dark positions, a usually dry atmosphere and neglect. The best of these are the two species of *Howea* native to Lord Howe Island, which are generally sold as *Kentia* palms. When well cared for and in a position which suits them they are a magnificent addition to the indoor decor.

The next step is to select the plant. As with other plants a good palm should be a sturdy, healthy specimen in active growth. Look for a plant with healthy dark-green leaves. Avoid those with dull leaves that have a dry appearance as they have probably been neglected or held too long in the store or nursery. Plants with very lush, soft growth should be avoided as they may have just been taken out of a glasshouse.

Be especially wary of plants which have pests already established. A few holes in the leaves from caterpillars or grasshoppers is acceptable but colonies of scales, mealy bugs or spider mites can be expected to proliferate in the indoor environment. These pests are difficult to eradicate once established and it is better to start with clean stock. When checking for mealy bugs or scale look under the leaf sheaths, in the petiole grooves and so on.

Conditions

Light — Palms indoors prefer a position where they receive some light coming in through an archway, window, skylight or doorway. Direct sunlight for part of the day can be tolerated happily by palms provided that it is not long exposure to hot summer sun. Morning sun or sun filtered through shrubs and trees is ideal. Bright light through coloured or frosted glass provides an attractive background for a group of palms and can be quite suitable for their growth. Such glass, however, may transmit heat and the plants will require more frequent watering and attention to humidity than would be the case in other areas. Solar films applied to windows to reduce heat and glare are very detrimental to indoor palms.

* "Palms In Australia", a new book by David Jones. This article is reproduced from the book, by permission as an indication of the competence of this author as reviewed on page 303.

Humidity — Indoor atmospheres are generally of low humidity and tend to fluctuate considerably with changes in the outdoor environment as well as heating and air conditioning. Palms generally dislike low humidities although there is a considerable range of response within the group. Species that are intolerant of low and fluctuating humidities lose their lustre and appear dull and are often severely attacked by pests such as spider-mite and mealy bug.

The answer to low humidity is to change the atmosphere around the plants. This does not necessarily mean increased watering although the plants must not be allowed to dry out. Many an indoor palm has been killed by overwatering because its leaves seemingly advertised that it was dry. The dryness is, in fact, caused by the low humidity and cannot be compensated for by increased watering of the potting mixture. Increasing the humidity around the leaves is the most successful solution. This can be achieved by grouping indoor plants so that each contributes to the atmosphere around the other. For the same reason a number of plants in each pot is more successful than just one. Standing the pot in a large saucer of wet, evaporative material such as scoria is also a useful technique to increase the surrounding humidity, as is misting the plants at regular intervals with a fine spray.

Temperature — The majority of palms are tropical in origin and therefore dislike low temperatures, although some of the successful indoor species grow very well in temperate regions. Tropical palms in active growth may be damaged by temperatures around 14°C but if they are dormant or are growing slowly they can withstand somewhat lower temperatures. The length of time the plant is exposed to the low temperature also exerts a considerable influence. Low temperatures are not a problem in tropical regions, but in highland districts and temperate zones the winter temperature indoors can drop to a level which can cause damage to sensitive species.

Houses fitted with internal heating avoid the problem of cold damage to indoor palms but the resultant very dry atmospheres may cause excessive water loss. Indoor palms in winter grow slowly, not only because of lower temperatures but also through reduced light intensity and short daylight hours.

Care of Indoor Palms

Watering — Although watering indoor plants is basic common sense, for various reasons it creates more problems and frustrations than any other aspect of the plant's care. Healthy, actively growing plants need regular watering and the frequency depends upon the prevailing temperatures and humidity. In summer, plants can be safely watered daily whereas in winter their needs are much less. The same parameters as for indoor plants apply — vigorous-growing plants will need more water more frequently than those growing slowly or not at all. Plants will need watering more regularly in the summer than in the winter and plants growing in bright light will dry out more quickly than those in dim positions.

Other factors must also be considered such as the type of potting mix, the size of the pot and how full it is of roots, and the prevailing temperature and humidity. The potting mixture must drain well but should also retain sufficient water for the plant's growth. Heavy soils that become soggy when watered are useless for palms as they only lead to rotting of the roots and retardation or death of the plant.

Palms that are kept too dry lose the sheen on their leaves, generally look unhealthy and may even wilt. Palms that are too wet suffer damage to the tips of the leaflets which die and become brown. If they have suffered root damage such as rotting of the root tips, waterlogged palms may also wilt because the damaged roots are unable to extract water from the soil. Wilting in palms is not as prominent as in other groups of plants.

The ideal watering regime keeps the potting mixture sufficiently moist to keep adequate oxygen and water available to the roots for growth. Regular topping up can be quite satisfactory but at intervals the potting mixture should be thoroughly soaked so that water flows out the drainage holes. This ensures a thorough wetting of the root system and also leaches out salts which may have accumulated from the breakdown of the fertilisers. This leaching process should be performed out of doors or in a bath or sink.

In any group of indoor plants some specimens are going to require more regular watering than others. It is a temptation to water all of the plants at the same time but this should be avoided and individual needs catered for. For example, if all of the plants are watered each time the most vigorous plant dries out, then the least vigorous ones will receive too much.

Recuperation — Indoor palms, like any indoor plants, appreciate a 'freshen-up' at intervals. This can consist of a hosing down in the garden to wash the dust off the leaves and refreshen the plants generally. This simple act can also be important in reducing pest build-up and discouraging species such as mites which like dry conditions. It is also a good policy to put palms outside in rainy or drizzly weather but they must not be left out if the sun appears. Such sudden exposure can drastically burn plants that have been shielded from it.

Resting indoor palms by moving them to a shady position in the garden or bush house is very beneficial. Here they are well watered, repotted or fertilised if necessary and generally encouraged to recuperate and put on new growth. Once spelled, the plants can then be moved back indoors. With planning, a series of palms can be cycled in this way and those indoors can always be at their peak. Palms should be rested outside for two to three weeks after every two-month period indoors.

Fertilisers — Indoor palms benefit from the application of fertilisers but these should only be applied during the warm growing months of the year. Fertilisers applied during winter when growth is slow or sudden applications of quick-release fertilisers to starved or debilitated palms may be of no benefit and indeed may even cause severe burning. Fertilisers are best applied in small doses at regular intervals and the soil mixture should be watered thoroughly and regularly

Shown opposite are three of Queensland's native palms.

Hydiastele wendlandiana is the palm on the left next to the swimming pool. It occurs naturally from Tully to Cape York Peninsula and across to the Northern Territory. The distinguishing feature of this palm is shown, the leaflets irregularly spaced on the palm frond, the end or terminal ones being joined and fish-tail like. It may be confused with *Ptychosperma macarthurii* that has the same distribution and similar leaves but in this species the terminal leaves are narrow and separated.

Normanbya normanbyi is the palm on the right, adjacent to the swimming pool. This is a tall, slender feather-leaved palm with jagged tipped leaflets radiating out from the frond in all directions, arching like a fox's tail. The leaves are whitish underneath. It is found naturally only in coastal areas of north-eastern Queensland.

Wodyetia bifurcata as shown opposite (bottom) is from the wild in Cape York. Being only recently described, mature garden specimens are not available to photograph. It is very similar to *Normanbya normanbyi* with its arching fox-tail like fronds.



Hydriastele wendlandiana and *Normanbya normanbyi* △

▽ *Wodyetia bifurcata*



after their application. Quick-release fertilisers should never be applied to newly potted palms or to those where the root system has been damaged (for example by waterlogging), because the weakened or new roots can be readily burned.

A wide range of commercial products is available to fertilise indoor plants and most of these will be successful with palms. Fertilisers are usually incorporated in the potting mix to encourage initial growth and these may be supplemented with side dressings when it is felt that the growth is in need of a boost. Complete fertiliser mixtures are usually used in the potting mixes and these may be quick or slow releasing. Organic manures and fertilisers can be very beneficial but some such as blood and bone have the drawback of being smelly and attractive to dogs. Suitable potting mixtures including fertilisers are as follows:

Mix 1	Mix 2
5 shovels coarse sand	5 shovels coarse sand
4 shovels milled pine bark or peat moss	3 shovels peat moss
3 shovels friable loam	10 shovels milled pine bark
45 g Osmocote [®] (3-4 months formulation)	70 g Osmocote [®] (3-4 months formulation)
130 g Osmocote [®] (8-9 months formulation)	240 g Osmocote [®] (8-9 months formulation)
40 g Dolomite	60 g Dolomite
3 g Iron sulphate	5 g Magnesium sulphate
	45 g Iron sulphate
	40 g Trace element mix

Note that palms like well-rotted animal manures and these can be added to either mix.

Supplementary fertilising of palms can be carried out using slow-release fertilisers, plant pills, or liquid preparations. Liquid fertilisers are very beneficial and are usually safe except where the plant is suffering from overwatering. A useful, cheap, nitrogenous preparation can be made by dissolving 1½ teaspoons of urea or ammonium nitrate in a watering can of water. Commercial preparations have the amounts to be applied on the packet and these recommendations should be adhered to. Some nutrients can be applied through the leaves in a process known as foliar feeding. This is generally a much less satisfactory and more expensive way of boosting growth than root applications.

Pests — Pests are dealt with in detail in the book. Container-grown palms may be more susceptible to certain pests than are those palms grown in the garden. The three most serious pests of container-grown palms are mealy bugs, spider-mites and scale insects. Spider-mites revel in dry conditions and are mainly a pest of indoor palms. Their effects can be reduced by frequent misting or hosing. Mealy bugs and scale may be present on any palm but become very severe on those that are weakened or debilitated through neglect. Healthy plants resist pests far better than weakened ones.

PALMS AS OUTDOOR PLANTS

Palms make excellent container plants for outdoor decoration on areas such as terraces, patios, etc. Almost any palm will make a suitable container plant for a while but vigorous species soon outgrow their container and will need regular attention. Any of the small palms will make excellent container plants provided they can tolerate the climatic regime of the area.

Sun — Young palms need protection from direct, hot sun for the first two to three years of their life. The majority of plants will tolerate sun when their fronds are about 1 m high and this is the size to start off a palm in a container. Palms kept well watered will tolerate more sun than if allowed to dry out between waterings.

When a new palm is purchased it will need to be hardened off before being placed in full sun. Hardening consists of increasing the exposure to sun the plant receives each day while keeping it well watered.

Wind — Palms generally do not like wind and those in containers should not be placed in a windy or draughty position.

Frost — Frost is a major enemy of palms and only hardy species should be chosen for cold areas.

Watering — Container-grown palms must be regularly watered and at no stage allowed to dry out completely. Watering will vary with the climatic conditions prevailing. In summer a daily watering may be necessary whereas in winter once or twice a week may be sufficient. Windy weather dries plants out and extra watering may be needed. Heavy rain will water the plants but do not fall into the trap of thinking that light rain will do the same. Rain needs to be fairly heavy and persistent to penetrate the potting mix and many a plant has died because the owner thought that rain had watered the plant sufficiently.

In addition to normal waterings it is a good policy to thoroughly soak the plants every two weeks. This prevents dry spots developing in the potting mixture and also leaches out excess fertiliser salts. Hosing down the foliage is also useful because it reduces the build-up of dust and discourages pests.

Repotting — Repotting of container-grown plants is necessary to maintain their appearance and growth. The containers eventually become filled with roots and the potting mix exhausted. Such plants are referred to as being potbound and watering them can be difficult. Repotting will be necessary every one to two years. The plants can be put into a bigger container or the plant can be put back into the old one after removal of the old potting mixture and some of the root system. Repotting is best carried out in the spring or early summer. ■

Palms in Australia

by David Jones

A book of palms of the world as grown in Australia. There is a large section of the book, 60 pages, devoted to Australian palms and 100 pages on the most spectacular of the exotics of the world. A major feature is the section on the study of ferns and their cultivation. That portion devoted to pot culture is reproduced in this issue. It gives a good indication of the study David Jones has given his subject and the simple presentation that is reflected throughout the book. A book of 278 pages with over 200 colour plates, this book is good value at \$24.95 plus \$3.05 postage.

Myrtaceae

The Petalled Myrtles

Why have the botanists grouped such apparently different flowering plants, the bottlebrush, *Callistemon* on the cover, the Teatrees on page 292, the northern Teatree, *Neofabricia*, below, and the *Syzygium* opposite into the Myrtle family. To the home gardener, they are hardy rewarding plants. In an issue shortly we will present this exceptional family as a whole with a very simple description with sketches. The yellow flowered Teatree of Cape York, *Neofabricia*, is shown below. What a beauty for tropical gardens. — Editor.



Neofabricia (above)

Photography by W. H. Payne

The flowers are 3 cm across. A magnificent free flowering plant photographed on Cape York, it was 1.5 metres high. Who can report on its use in horticulture and who will help in a study group to select and develop the best reliable horticultural forms?

Syzygium luehmannii (opposite top)

Photography by Hugh Nicholson

Known as Riberry or small-leaved Lilly-pilly, this beautiful rainforest tree to 30 m may be found from Kempsey in NSW, to Cooktown in Queensland. As an ornamental feature plant it grows as a shrub 5 m to 10 m and is widely sought after in Horticulture. It makes a superb tub plant that can be brought inside for short periods while the leaves are at their brightest.

Syzygium moorei (opposite bottom)

Photography by Hugh Nicholson

Rose Apple or Coolamon was known to early settlers as the Watermelon tree for the colour of the flowers, borne completely inside the crown on every available branch. These colour plates were reproduced from "Australian Rainforest Plants", see page 317.



Potted Plants

by Gary Sankowsky of Zodiac Nursery

A number of nurseries have asked us about suitable fertilizer and potting mix for our plants. A lot of rubbish has been written about fertilizing "Native" plants. I have even seen it written that "Native plants should not be fertilized". Putting a plant in a pot without nutrients is a bit like putting a cow in a yard for six months without feed. In a pot the roots occupy only a fraction of the area that they would in a natural situation so unless nutrients are added the plants cannot grow at a normal rate.

The most convenient and efficient method of providing the N.P.K. nutrients is long life slow release fertilizer. If you live north of say Bundaberg, Qld., then there is only one worth using and that is NUTRICOTE. It requires a much higher temperature to release than OSMOCOTE and if the latter is used roots may be burnt by excess release in hot weather. Recent tests carried out at D.P.I. Mareeba confirm that Nutricote is by far the best for the tropics and that the powdered brands are completely useless, as they release all their nutrients in 2-3 weeks.

In our mix we use no soil. It is quite a cheap mix as we use the locally mined "peat". The one we use at present is "Tableland Peat", it bears no resemblance to peat moss but seems to do the job O.K. A much better one (more like peat moss) is "Tropical Peat", but this is also more expensive. Even the dearer one is still about 30% the price of imported peat.

Our mix is as follows: 50% peat + 50% sand (not too fine).

1 cubic yard.		or for 2 cubic feet.
4 kg	9-10 month Nutricote	300 gr.
6 kg	Dolomite	450 gr.
50 gr	Trace elements	4 gr.
10 gr	Iron chelates	1 gr.

The pH level is important as in a too acid mix the nutrients are not available to the plant. Dolomite is used to set the level. A pH tester is essential. The "C.S.I.R.O soil pH Testkit" is ideal and is readily available. If necessary add dolomite till it is about 6, then all you probably need to add is the low phosphorous Nutricote. The pH of the sand will vary and the amount of Dolomite must be adjusted to suit. This can change by as much as 50%.

This potting mix is also available for indoor potted plants kept to decorate the home or for the patio. Pot up in spring, top dress next spring and then repot the following year. For top dressing on existing potted plants use 9-10 month Nutricote at the following rate; — 1 heaped teaspoon for 150 mm pot, 1 level one for 125 mm and ½ for 100 mm pot.

Almost any rainforest tree, shrub or whatever, is suitable for use as a tub plant on a patio or bushhouse but not many have been tried completely indoors. The best way is to keep them in a bushhouse and bring them into the house for 1-2 weeks at a time. The thing to watch is change in light level; they should be kept under 80% shade so the shock is not too great. I have prepared an extensive list of suitable rainforest species that will be printed in an issue shortly. ■

Storckiiella

B. P. M. Hyland

Reprinted from Muellera 5(3): 215-217 (1983) where a new species of *Storckiiella* is formally described. A genus of 4 species, this is the only one occurring in Australia.



Storckiiella australiensis showing a, leaves and a head of flower half full size, as they would appear at the end of a branch; b, the flower bud showing imbricate sepals x 3; c, an open flower x 3 showing reflexed sepals (petals), erect stamens; d, (with a short filament and an anther dehiscing apically) and the gynoeceum (the female part of the flower comprising the style and stigma); f, a seed pod half full size and g, the seed at full size.

In a personal letter Bernie Hyland, author of the above report on Muellera advises: "*Storckiiella australiensis* grows in a restricted area of very wet lowland rainforests north of the Daintree River in northern Queensland. It grows to a large tree 30 m+ tall and attains a stem diameter of one metre or more. It is not conspicuous except when it flowers the crown is covered with yellow flowers".

I don't know if this species would be suitable for cultivation. The area where it occurs is a very wet one with an annual rainfall in excess of 3.8 metres. There would not be many areas in Australia with similar climatic conditions. ■

Trees of the *Cassia* Family

The *Cassia* family of plants, Caesalpiniaceae, includes a number of trees of considerable horticultural potential. See Australian Plants; Vol. 8 No. 68 for descriptions of these and all Australian *Cassia*. When grown in the open it will be a small tree covered in yellow flowers! Who will get us seed and who will grow it on and report? — Editor.





Sturt's Desert Pea

In the December, 1981, issue of "Australian Plants" you presented an article on *Clianthus formosus*. In your article you asked if the beautiful form variety, *marginatus*, had been lost forever. We are happy to be able to report that *Clianthus formosus* var. *marginatus* is still alive and well and during the 1985 flowering season, covered in many distinctive blooms.

We have discovered the form in a cultivated situation in a garden in the Murchison area of W.A. The lady who is growing this form of *Clianthus* very kindly showed us around her very lovely garden (a credit indeed to anyone living in such arid areas). She sows seed from her var. *marginatus* plants each year and so far the plant has flowered true to form for the past fifteen or more years.

Shown here are photographs of some of the many colour variations we found in our two week excursion through the Pilbarra from inland Newman — to Exmouth — on the west coast of W.A.

Rosalie, Ross and Leith Wilkinson with David Green — Perth, W.A.

Hanging Baskets

This is one of numerous leaflets available from:
The Black Hill Native Flora Park, P.O. Box 667, Adelaide, S.A.
Reproduced by request.

With the advent of smaller dwellings, whether it be flats, town houses or units, and the popularity of outdoor living areas such as patios, the space in which we might like to grow some of our plants is often limited. Very often we are looking at a blank wall, balcony or a fence of our neighbours. If you are in a situation of limited garden space, one alternative is the use of hanging baskets.

Baskets have been in use for many years although mainly exotic plants have been grown. With the trend in both this type of housing and the increasing interest in Australian plants, a large variety of native plants is becoming available in hanging baskets.

One disadvantage with baskets is their limited soil volume — this restricts the size of the plants that can be grown within a basket. Another disadvantage to some people is the quickness of the drying of the soil in a basket. However, the use of peat moss, vermiculite, perlite etc., will increase the moisture holding ability of the soil. The use of materials such as coconut fibre and sphagnum moss for lining baskets will also help to reduce water loss. With these precautions, this form of plant culture becomes a worthwhile alternative to pot or garden culture in limited areas.

Preparing The Basket Before Planting

Bracken fronds (*Pteridium esculentum*) used for lining hanging baskets will last for two years or more. Mature fronds are used with the fronds or sections of the fronds layered in the basket so as to form a fairly dense lining with special attention to the basket edge. Damp peat moss is then placed about 2-3 cm. deep over the whole basket interior (this holds moisture and prevents potting soil washing out).

A good quality potting soil to which is added 25% peat and/or 25% vermiculite etc. is then filled to the desired level (adding potting mix while placing peat moss is a helpful idea).

It is recommended that the potting soil is well firmed so to prevent washing when watered.

Care

During the warmer weather, or if you have baskets indoors, a daily watering check is advisable.

Australian plants, although tough in their natural habitat, can succumb very quickly when put in a situation where they are limited in root area and rely entirely on you to replenish their requirements.

Don't be caught in an air-conditioned room — pot cultured plants generally dry out quicker in these situations and so will your baskets. Like pots, they should be slightly moist at all times.

Once your plant is well established, a little feeding with a liquid fertiliser, say once every two months, or application of a slow release fertiliser once or twice a year is ample.

Watering

Water your basket until the excess water drips through the bottom, or you are satisfied that the soil is quite saturated — this is very important. If you should be absent for a few days, invert a bottle filled with water and allow it to drip slowly. Of course, kind neighbours are a better way. Care should be taken in the cooler times of the year as overwatering can be as harmful as too little.

Drip irrigation systems may also be used with hanging baskets.

Pruning

Prune after flowering. Usually the plants within baskets are the type that trail or twine around and very little pruning is needed.

Wildflowers That Have Been Grown In Baskets

Beautiful displays of hanging baskets can be maintained for two years or more by following careful cultivation requirements.

Grevillea obtusifolia, *G. gaudi-chaudi*, *G. thelemanniana* (prostrate forms), *Pultenaea pedunculata*, *Cissus antarctica*, *Astarte fascicularis* (prostrate), *Kennedia glabrata*, *Veronica distans*, *V. calycina*, *Scaevola aemula*, *Viola hederacea*, *Dampiera diversifolia*, *Correa reflexa* (prostrate), *Hemianthus pungens*, *Grevillea nudiflora*, *Asplenium flabellifolium*, *Pratia pedunculata*, *Darwinia homoranthoides*, *Brachycome multifida*, *Helichrysum apiculatum* (prostrate), *Hibbertia crenata*, *Leptospermum juniperinum* 'Horizontalis'. ■

East Coastal-2

Part 2 of a series by Brian Walters

Lechenaultia In Hanging Baskets

Have you ever wondered why the name *Lechenaultia* is spelt *Lechenaultia*? No? Well, I don't suppose it is a question of earth-shattering importance!

But give a thought to the 19th century botanist, Leschenault de la Tour, in whose honour this genus of most spectacular plants was named. If he were alive today he would be apoplectic!

Well, how would you feel if your name had been commemorated for posterity by being bestowed upon a genus of plants . . . and the person responsible spelled your name wrongly? I ask you!!

It seems that most botanists accept the name as originally published. So we are stuck with *Lechenaultia* not *Leschenaultia* (or is it the other way around . . . ?).

All of this brings me to *Lechenaultia formosa*, probably the most vividly spectacular of them all. It occurs in a bewildering variety of colours . . . reds, oranges, pinks and various combinations thereof. Most forms give 4 to 6 month's continuous flowering through winter and spring.

Lechenaultia formosa, like other members of the genus, is not regarded as a long lived garden subject in coastal NSW and Queensland. *Lechenaultia* (with three exceptions) occur naturally in south-western Australia and, like many plants from that area, they do not take kindly to the east coast's humid, wet





Living With Plants

Decorate your living area with attractive plants. The hanging baskets of two colour forms of *Lechenaultia formosa* were photographed hanging from the eaves of a verandah at the home of Brian Walters, at an outer western suburb of Sydney. In his article here he describes how you can grow these magnificent flowering plants. Previous issues have described plants for basket and container growing, one with a colour plate of a Sturt's Desert Pea, pictured on page 308 of this issue, in full flower.

The restful shade area above is at a home in a suburb of Cairns the two open sides looking out on a shady wildflower garden alive with birds and butterflies, and an inground pool. So they are not all natives in the hanging baskets. One reason is that people are not aware that our Australian plants are equally attractive and often more hardy. More of this in future issues. Send for your subscription to Australian Plants. Notes and photography by W. H. Payne.

Ferns. We are producing a book on these to grace your home. We need good colour slides. Who will take them for us?

summers. None the less, *Lechenaultia formosa* in any of its many forms is well worth growing because of the vivid splash of colour it provides.

Over the past seven or eight years I've been growing various forms in hanging baskets and have found this to be the most satisfactory method of cultivation. The accompanying photographs show some of the results achieved.

The baskets are the traditional, bark-lined, wire type filled with a potting mix which is basically a commercial sawdust/pine bark/sand blend (3 parts) mixed with one part of coarse river sand. I've also used the old faithful blend of 3 parts sand and 1 part peat moss quite successfully . . . the only problem with this is the weight (ideal if you're into body building but don't make the mistake of hanging the basket in an area where you're going to walk; they have a nasty habit of jumping out in front of you when you're not watching. Banging your head on one is not an experience you'll want to repeat!)

Like all container plants they will require fertilizing. I've always used 8/9 month Nutricote or Osmocote once or twice a year when I think of it . . . if this all sounds a bit "hit or miss" it's because it is!! Fortunately the plants don't seem to mind.

Anyway, the point is that the overlapping of the bark layers provides excellent drainage over a large area. The plants seem to respond to these conditions and, in my experience at least, are much healthier and more vigorous than similar plants grown in standard pots.

Lechenaultia are plants which prefer a lot of sun despite their soft, fragile appearance. They will not be happy in full shade but will accept half day sun quite successfully.

During summer the bark-lined baskets dry out quickly and will require daily watering but this can be reduced to a couple of times a week during the colder months.

How long will they last with this sort of treatment? Probably 3 to 4 years is about as much as you should expect. This is generally about the acceptable life of the bark lining anyway. Still, this is not bad for a plant which is basically there to provide colour. *Lechenaultia* are ridiculously easy to propagate from cuttings so replacement plants can always be available. Some forms sucker lightly and these shoots can also be potted up as replacements.

Give it a go! What have you got to lose?



Study Groups

Barbara Daly, Co-ordinator of Study Groups

Study Groups comprise any reader who wishes to learn more about a specific group of plants by growing them. The group operates by correspondence with a nominal annual fee, mostly \$4.00, to cover postage. Advice is given on the plants to grow, how to go about it and often, free seed. Our No. 104 issue contains a list of these groups and the following alterations should be made.

Australian Food Plants — Mr Rodney Barker, P.O. Box 62, Kangaroo Ground, Victoria 3097.

Rainforest Study Group — Ian Innes, P.O. Box E327, St. James, NSW 2000.

Australian Daisy Study Group — Mrs Maureen Schaumann, 88 Albany Drive, Mulgrave, Victoria 3170. Previously known as the Brachyscome/Helipterum Study Group, this is just a name change.

Melaleuca Study Group — Mr Allan Foster, 40 Fairfax Road, Warners Bay, NSW 2282.

Callistemon Study Group — A leader is required. Who will help out by offering? Replies to Barbara Daly, 8 Bussell Crescent, Cook, A.C.T. 2614.

Birds

And Their Help In Control of Woodland Dieback

by Hugh A. Ford, Dept. of Zoology, Univ. of New England, Armidale, NSW.



Eucalypt woodland differs from dry sclerophyll forest in having trees with rounded and deeper crowns and a more open, often broken, canopy. Generally the shrub layer is poorly developed, though herbs and especially grasses are abundant. Woodland occurs in an almost unbroken belt from northwestern Australia across the north, down the east coast and westwards to the Mount Lofty Ranges. There is a further belt in southwestern Australia. It is usually inland from forest, in lower rainfall, though in places woodland reaches the coast. This study (see "Birds of Eucalypt Forests and Woodlands" see next page) concentrates on eucalypt woodland around Armidale in the Northern Tablelands of New South Wales.

Only a small proportion of the eucalypt woodland remains in its original state. European settlers found an open woodland with an abundance of grass and rapidly started using it to rear cattle and sheep. The woodland was partly cleared to encourage grasses, but leaving trees for shelter and shade. This resulted in an attractive parkland, with denser timber on the hilltops. Towards the end of the last century trees started deteriorating and dying. Termed Eucalypt Dieback, it is not confined to the study area as the Southern Tablelands are badly affected as are eucalypt woodlands from southeastern Queensland around to South and Western Australia.

Causes being studied are subtle changes in climate, partial clearing of trees and trampling of the soil by stock, grazing, chemicals, exotic grasses and fungal disease. The most conspicuous cause of dieback, though, is defoliation by insects, specially Christmas beetles. However, a conference on eucalypt dieback considered that, although insects were often the immediate cause of tree deaths, the underlying cause of mortality was probably environmental stress.

One of several reasons why herbivorous insects could have increased is that their natural predators have been reduced in abundance so that they now have less impact on the insect population. Wasps and flies parasitize the insects and ants, robberflies, assassin bugs, lacewings and many others prey on them.

This study considers the role of birds in controlling herbivorous insects in eucalypt woodland. Here I describe the density and composition of the bird community in eucalypt woodland near Armidale and estimate the biomass of insects consumed annually by birds. I compare this estimate with a crude estimate of the annual production of insects as a guide to the likely effect of birds on herbivorous insects.

Of about 80 species breeding around Armidale, only eleven are summer visitors. Several breeding species, mostly honeyeaters and pardalotes, increase in winter. Honeyeaters, flycatchers and warblers make up most of the species, as well as most of the individuals.

Reprinted from "Birds of Eucalypt Forests and Woodlands: Ecology, Conservation, Management" and used here to illustrate the report on 'Eucalypt Dieback' above. The biggest enemy of nature is man and his work in destroying areas like those above is undoubtedly the cause of this alarming problem. However, man must live so it is up to us all to support studies such as those above and the sensible restoration and preservation of suitable areas — Editor, Australian Plants.



The word rainforest brings a mental image of cool shade beneath a thick canopy of leaves formed by many large trees. Just the atmosphere in a tropical garden on hot days. By the right selection of plants you can also provide a blend of attractive foliage, flowers, birds, butterflies, life.

For a detailed description of most of those plants that have been tried and proven you will need to refer to past issues of "Australian Plants". We do not have the space here, it would — has taken volumes. Some of these plants are in the book below.

Australian Rainforest Plants — In The Forest and In The Garden

Produced by Hugh and Nan Nicholson of the Terania Rainforest Nursery, Terania Creek Road, The Channon via Lismore 2480, and available from them for \$9.95 plus \$1.50 postage, or from your book-seller. This small 72-page book has 110 colour plates and provides not only a very good colour plate of the 97 species described but advice on where they may be found in the wild and how to grow them in your garden. What does show through is the love of the rainforest by Nan and Hugh, giving the reader the opportunity to see the plants as they found them after many years of rambling.

The remarkable bonus that comes with this well prepared book is the practical advice on cultivation of these little known plants from a competent horticulturist and nurseryman. An outstanding feature is the quality of the photography by Hugh and the excellent colour printing from them. We have reproduced two on page 305 and another on page 332.

Birds of Eucalypt Forests and Woodlands

This large book (384 pages 30 × 20 cm) publishes the reports presented to the 1982 conference of The Royal Australasian Ornithologists Union, the theme being the above heading and title of the book. There are 31 papers published, one of which is referred to above. It may be obtained by mail by sending \$54.00 (incl. postage) to Surrey Beatty & Sons Pty Ltd, 43 Rickard Road, Chipping Norton, NSW 2170.

The reports cover study sites representing most woodland areas of Australia from the South Alligator River, N.T.; Lockhart River in Cape York, Queensland; the east coastal woodland areas through Queensland, Victoria and around to South Australia, and to Tasmania; and the south-western area of Western Australia. Colour plates of these habitats are presented as has been done opposite for the Armidale area of the above report.

The range of birds studied in other papers on foraging and nesting habits is also quite wide from the parrots, to honeyeaters, to pardalotes, etc., many with colour plates as opposite.

This book contains scientific papers which are often heavy reading for the non-scientist. However, in this case, I had no trouble in following the details of the studies and I am sure all our readers will learn a lot of information on birds and their behaviour not normally available to the non-technical bird lover. What stands this book far above others reporting scientific papers, however, is the trouble they have gone to to present the papers in an easily read manner, to group the subject matter into "parts" and to have a specially written introductory article in front of each part describing for the layman the subject matter and what each scientist has attempted to achieve and how he has gone about it.

This book must represent a first in the method of presentation where authors and publisher have gone to such lengths and expense to produce a scientific book that encourages the non-qualified layman to understand and savour scientific research — and on a subject of special interest to most of us. On your behalf I extend special congratulations to the enlightened attitude of the scientists and the publisher and hope their efforts will receive your support and encouragement by purchasing a copy — \$54 (incl. postage) as mentioned above — Editor, Australian Plants.

The colour plates opposite have been reproduced from the book.

- Top: Stringy bark, *Eucalyptus caliginosa*, and Red Gum, *Eucalyptus blakelyi*, open forest near Armidale in the Eastwood State Forest on the Northern Tablelands of NSW. (H. Ford).
Second: The Red-brown Finch, *Emblema temporalis* (N. Chaffer).
Third: Grey-breasted Silvereye, *Zosterops lateralis* (M. Seyfart) nesting in a Teatree.
Bottom: Open-forest at Wollomombi Falls east of Armidale on the Northern Tablelands of NSW. Trees include: *Eucalyptus caliginosa*; *Eucalyptus conica* and *E. melliodora* (R. Noske).

Sandalwoods and Quandongs of Australia

by Alex S. George
Bureau of Flora and Fauna,
Canberra, A.C.T.

Sandalwoods and Quandongs belong to the genus *Santalum* of the family Santalaceae, a family of about 30 genera and 400 species in tropical and temperate regions of the world. All members of the family are hemiparasites, that is, they are parasitic on the roots of other plants, rarely on branches, but they also have photosynthesising leaves or stems. They are trees or shrubs with simple leaves. The flowers have only one whorl or ring of segments (tepals), three, four or five in number, and the same number of stamens. The ovary is inferior with 1-5 chambers and develops into an indehiscent fruit that usually has a fleshy outer layer.

In *Santalum* the leaves are opposite or sometimes in threes, the flowers are in panicles or racemes or umbels, there are four tepals and four stamens, and the fruit is spherical with a woody inner layer. Six of the 25 or so species of *Santalum* are found in Australia; of these five are confined to the continent and one is also found outside, from India to Hawaii. No species is known from Tasmania, although three other genera of the family are represented there.

Most widespread of the Australian species is the Northern Sandalwood or Plum Bush, *Santalum lanceolatum*. This shrub or small tree has pendulous or spreading branches and lanceolate or elliptic, flat dull green leaves. The flowers are in rather large panicles, cream or pale green, with tepals 3-5 mm long. There are knuckle-like lobes between the stamens. The fruit is up to 1 cm across with a purple, soft outer layer and a small smooth 'stone'. There is a large round apical scar where the tepals have fallen away. The species is common across the tropical and arid regions of Western Australia, the Northern Territory and Queensland and in northern South Australia. It is less common in inland New South Wales and is very rare in Victoria. Plants in northern Queensland often have thin leaves and smaller flowers and should be studied closely to determine if they are a variety or separate species.

The fleshy layer of the fruit is edible and rather sweet. Various parts of the plant have been used by Aborigines for medicinal purposes. The plant is also considered good fodder for stock.

Closely related to *Santalum lanceolatum* is *S. album* which in Australia occurs only in a few coastal areas of the Northern Territory. It has much broader leaves, smaller flowers and a dark red or black fruit. The species also occurs outside Australia, and in India is cultivated for sandalwood.

Another species related to *Santalum lanceolatum* is *S. obtusifolium* which, however, is easily recognised by its leaves. These have revolute (rolled under) margins — the only Australian species with this character — and are markedly discoloured, the lower surface being paler than the upper. The flowers are in small umbels of up to five flowers and the tepals are only 1.5-2 mm long. The fruit is 8-10 mm long with a dark purple fleshy outer layer. *Santalum obtusifolium*

grows on creek banks in forest, from the Macpherson Range in south-eastern Queensland through eastern New South Wales to far eastern Victoria. A decoction from the wood is said to have been used by Aborigines to treat constipation and pain.

The other three Australian species of *Santalum* have small flowers with tepals 1-2 mm long and no knuckle-like lobes between the stamens. The fruit is relatively large — about 15-25 mm diameter. Best known of these three is the Quandong, *Santalum acuminatum*, which is widespread in southern Australia except coastal regions of the south-east. It is a large shrub or small tree with a bushy crown and flat, pointed, yellowish-green leaves. The flowers are creamy green or dull orange, in panicles. The fruit has a fleshy outer layer that turns vivid shiny red (rarely yellow) when ripe, and the 'stone' is woody and very wrinkled. This stone is sometimes used for ornaments. The fleshy coat is edible and may be eaten raw or cooked, especially as a jam or pie filling. It tastes somewhat like quince when cooked. Research is under way in South Australia aimed at developing the Quandong as a commercial fruit. The oil-rich kernel and the leaves have been used for medicinal purposes by the Aborigines.

The Sandalwood, *Santalum spicatum*, is found in the drier parts of South Australia and southern Western Australia. It has blunt, grey-green leaves, reddish-green flowers and a firm outer layer to the fruit that turns brownish when ripe. The 'stone' is almost smooth. Although edible the outer layer is rather dry and tasteless. The plant was once extensively cut for commercial sandalwood and exported to Asia, but now only small quantities are harvested from the wild, under licence. Extracts from the bark and fruit have been used medicinally by Aborigines.

Closely related to the common Quandong is the Bitter Quandong, *Santalum murrayanum*. It, too, has a rough 'stone', but the outer layer is thin, greenish-brown or dull red when ripe, and does not separate easily from the stone. This outer layer is very bitter to the taste. The plant is a shrub or small tree and is often graceful with its pendulous branchlets. The leaves are distinctive, being often in threes, narrow and with a hooked point. Bitter Quandong occurs in inland areas of Western Australia, southern South Australia, western New South Wales and north-western Victoria. It was named after James Murray, a member of Howitt's expedition sent in 1861 to recover the bodies of the explorers Burke and Wills.

Santalums are not spectacular plants but for the native plant enthusiast they are an interesting addition to the garden, being of unusual form, different texture and colour of foliage and oddly-scented flowers. If fertilisation is achieved then the fruits add to the charm. As far as is known, parasitism by Santalums on surrounding plants does not unduly harm the hosts. ■

References on the classification, uses and cultivation of *Santalum*

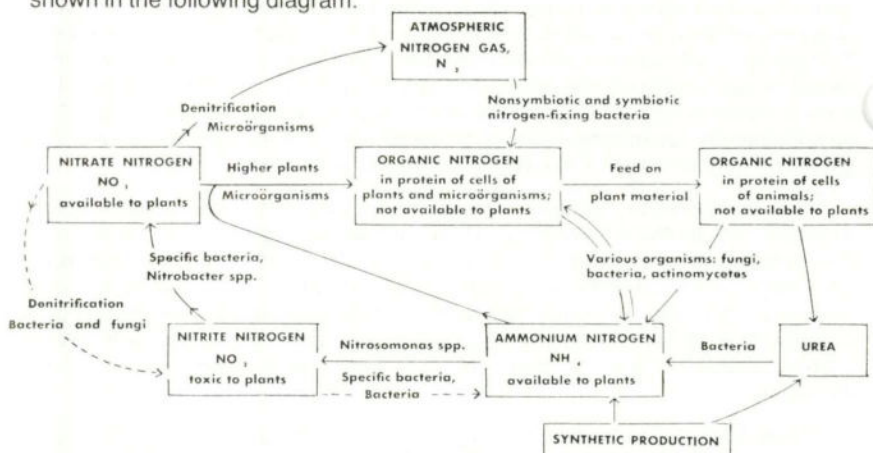
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TRANSFORMATION OF PLANT NUTRIENTS BY MICROÖRGANISMS — 3

by John Ferguson — Edited*

Nitrogen

The primary source of soil nitrogen is the atmosphere. The nitrogen in the air, however, is in the form of an inert gas which becomes available to green plants only as it is changed into combined forms. This may be achieved commercially by chemical processes which generally produces ammonium or cyanamidae. Nature's way is through the activities of certain microörganisms as shown in the following diagram.



Schematic representation of the most important nitrogen transformations in soils.

Atmospheric nitrogen is converted to organic nitrogen by nitrogen-fixing bacteria. Except in the case of plants in the legume family (in the plant family Leguminosae/Fabaceae) where this change is achieved symbiotically by bacteria in nodules formed on the roots as mentioned opposite, this first step in nature's process does not produce appreciable amounts of nitrogen directly available to plants, especially in soils with growing plants. It is taken up and stored in the protein of cells of plants and microörganisms and the action of different organisms is required to convert it to ammonium or nitrate nitrogen before plants can utilize it.

Ammonifiers and nitrifiers

Some organisms first carry the reactions from ammonium to nitrate, and then others convert from nitrite to nitrate nitrogen. Denitrification (reduction of

*Microörganisms In The Soil — Edited

This article by John Ferguson is reproduced, by permission, from "The U.C. System for Producing Healthy Container-Grown Plants", edited by Kenneth F. Baker, Manual 23 of the California Agricultural Experimental Station of the Division of Agricultural Sciences, University of California, Los Angeles, USA. It has been edited only slightly for Australian conditions by the Editor, Australian Plants, with sincere apologies for any errors or unintended change of emphasis.

This is a series selected to give us a better understanding of below ground conditions, Editor.

nitrate to nitrite and then to gaseous nitrogen) can be performed by many organisms, but it is not important where soil is well aerated.

The steps from ammonium to nitrate are performed by specific, non-spore-forming bacteria. These bacteria are among the most sensitive of soil organisms and soil treatment readily withstood by the ammonifying organisms may cause injury or death to the nitrifying bacteria. Ammonium is produced under a much broader range of conditions than is nitrate. Conditions and treatments which inhibit the nitrifiers often have little effect on ammonium production. For example, highly acid media inhibit nitrification much more than ammonium formation.

It has been shown that in a growing medium at pH 3.9 the total ammonium and nitrate nitrogen was 251 ppm, of which only 28 ppm was in the nitrate form. However, at pH 5.9, with a total of 505 ppm, 350 ppm appeared in the nitrate form. Thus the medium at pH 5.9 had about twice as much total available nitrogen but nearly fourteen times as much in the nitrate form as in the medium at pH 3.9.

Low temperatures also reduce nitrification much more than ammonification. Under most environments some organisms included in the ammonifying population, can grow at temperatures that inhibit the specific bacteria concerned with nitrification. In normal, untreated field soil the bulk of nitrogen available to the plant appears in the nitrate form. Ammonium formation usually becomes a factor only after some type of soil treatment. ■

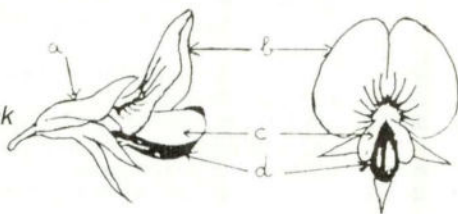
Diversity Of Plant Life

In nature's domain, there is a wide diversity of plant life above ground and of creature life below ground. A garden needs a range of plants that often assist one another and one group of plants that should be included are the legumes, including the pea-flowered plants. It has been shown above that bacteria, living on and with the plant roots, form root nodules and convert atmospheric nitrogen to nitrogen food for the plant. The use of legumes to enrich the soil in agriculture is a practice that has been in use for many years. — Editor's Note.

Bush Peas

The Genus *Pultenaea* —

Part 5 by C. E. & D. T. Woolcock



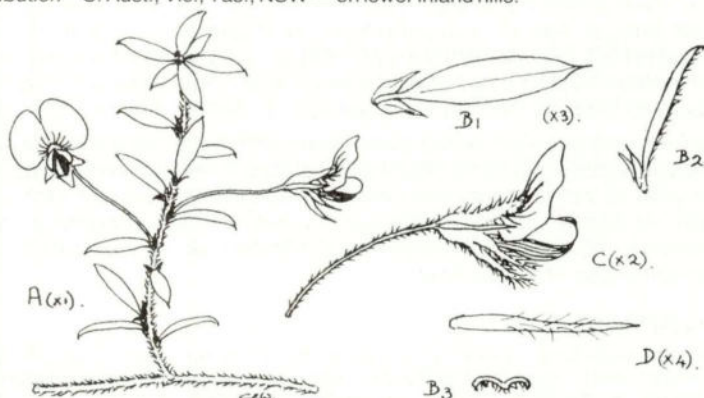
a — the calyx cupping the flower
b — large petal — the standard
c — two petals — covering keels
d — two petals — boat shaped keel

Pea flowered plants are a vital and picturesque part of the Australian scene. There are so many of them it is at first confusing. For those wishing to learn more we suggest that you read "The Pea flowered Plants of Australia" in No. 86 issue of Australian Plants.

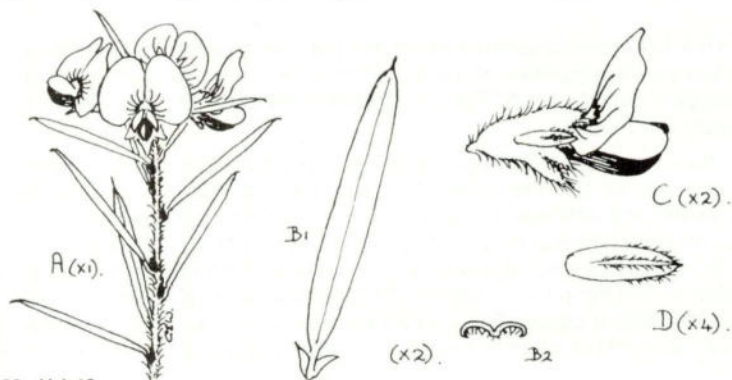
We have presented those pea flowered plants that are called *Pultenaea* in a series of articles commencing in No. 95 issue and this, Part 5, presents some very interesting and beautiful plants. If you find a pea flowered plant that is a shrub and has flowers similar to that above, it could be a *Pultenaea*. As a matter of interest, gently open the keel and check the stamens inside. The following species are in Group IV, i.e. leaves elliptical/oblong and alternate along the stem — see the colour plates. The species described, in this group, do not have the leaves incurved but flat or recurved i.e. the leaf edges may curve under slightly.

Pultenaea pedunculata* Hook.*Matted Bush-pea**

- Habit** Prostrate or densely matted shrub, pubescent stems which are sometimes rooting. (A). See page 328 for a colour photograph.
- Leaves** Elliptical with mucro, almost flat with slightly recurved margins, 5-12 mm long $\times$ 2-3 mm wide, appressed hairs on undersurface, petiole c. 1 mm long, stipules 2-3 mm long and prominent. (B, B₂, B₃).
- Flowers** Usually solitary, axillary, on pubescent peduncles to 20 mm long. Calyx hairy with filiform lobes longer than the tube. (C).
- Bracteoles** Linear, longer than the calyx tube, glabrous or a few scattered hairs. (D).
- Flowering** Spring — September/October.
- Distribution** S. Aust., Vic., Tas., NSW — on lower inland hills.

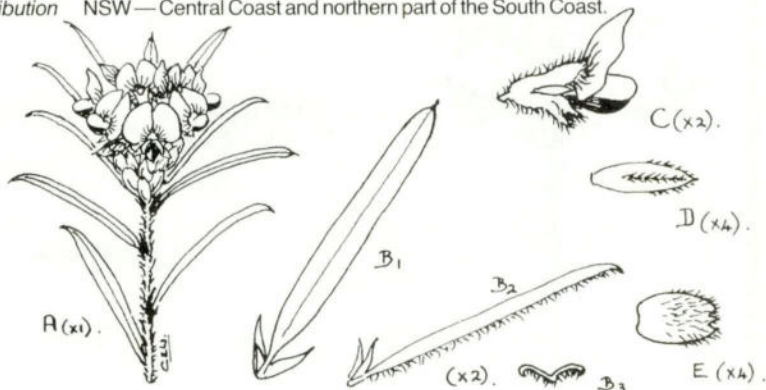
***Pultenaea benthamii* F. Muell.****Bentham's Bush-pea**

- Habit** Erect graceful shrub 2-3 m high. Stems pubescent. (A).
- Leaves** Broad-linear, c. 25 mm long $\times$ 3 mm wide, flat with recurved margins and pungent apex, upper surface glabrous, lower with somewhat appressed hairs, prominent midrib. Petioles short and stipules small, 1.5-2 mm long (B₁, B₂).
- Flowers** Sessile in small terminal heads, flowers often large and showy. Calyx silky villous with short lobes. (C).
- Bracteoles** Linear, brown, attached halfway up tube and exceeding the length of the tube, mainly glabrous but a few scattered hairs on midrib and margins. (D).
- Flowering** Spring — October/November.
- Distribution** Vic. — Grampians and East Gippsland, NSW — south parts of Central Coast.



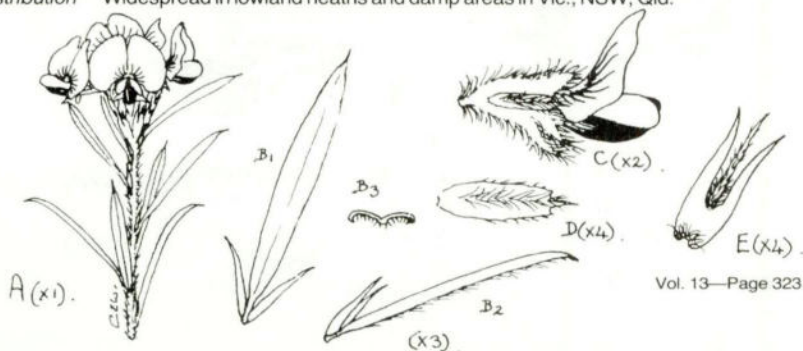
Pultenaea rosmarinifolia* Lindl.*Rosemary Bush-pea**

- Habit** Small rather straggling shrub, sometimes with branches to 2 m high. (A).
Leaves Variable, linear, elliptical to oblanceolate, lower leaves broader than the upper, distant, flat or convex with recurved margins, mainly glabrous above, the lower surface pubescent with prominent midrib, apex obtuse with recurved mucro. Leaf usually 20-40 mm long; stipules 2-6 mm long. ($B_1 B_2 B_3$).
Flowers Dense terminal heads with many flowers, subsessile. Floral bracts imbricate, shortly hairy, forming a prominent cup enclosing the floral head (E). Calyx silky hairy. Keel dark red. (C).
Bracteoles Scarious, lanceolate with hairy keel and margins, attached towards the centre of the tube and slightly exceeding the tube. (D).
Flowering September-October.
Distribution NSW — Central Coast and northern part of the South Coast.

***Pultenaea paleacea* Willd.****Chaffy Bush-pea**

(This species has several sub-species or varieties.)

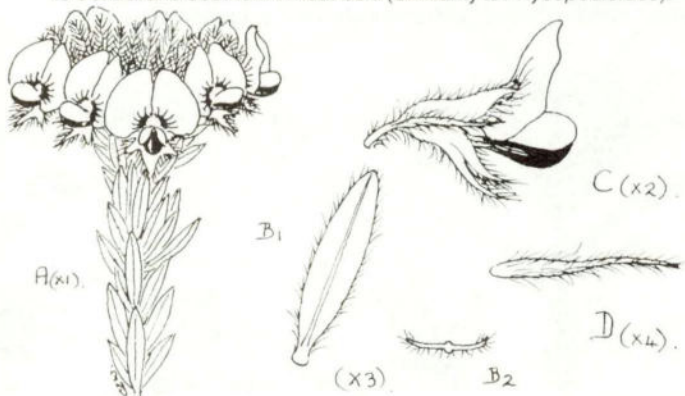
- Habit** Slender straggling shrub — sometimes to 1 m high but often less. Young stems with appressed hairs becoming glabrous with age. Stems sometimes prostrate.
Leaves Linear to narrowly elliptical or oblanceolate, flat with recurved margins and mucronate tip, 7-20 mm long $\times$ 1-3 mm wide, glabrous on upper surface, appressed hairs undersurface and prominent midvein. Stipules c. 5 mm long, lanceolate. ($B_1 B_2 B_3$).
Flowers Sessile, clustered near ends of branchlets. Calyx, lobes particularly, pubescent and enclosed by imbricate, pale brown, papery bracts, which are glabrous. Lower calyx lobes acute or acuminate and shorter than the tube. Keel dark red. (C).
Bracteoles Oblong to oblanceolate, brown and papery, pubescent on midrib, longer than calyx tube, variously attached from base to mid-point of calyx tube. (D).
Flowering August to November.
Distribution Widespread in lowland heaths and damp areas in Vic., NSW, Qld.



***Pultenaea dasyphylla* (Turcz.) G. Keighery**

Photograph opposite, top

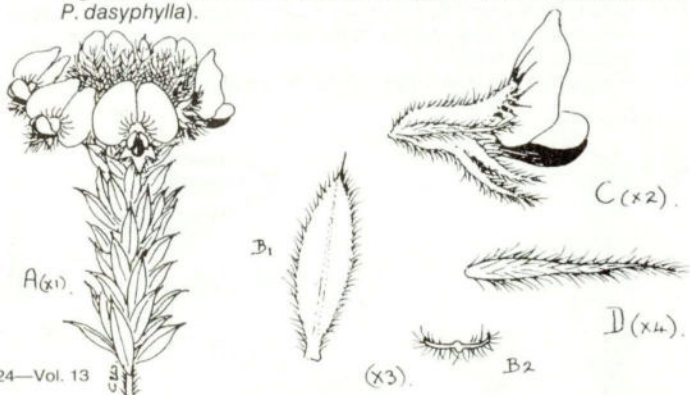
- Habit** Prostrate shrub to about 1 m diam; tomentose. (A).
Leaves Elliptical, flat or very slightly incurved, c. 10 mm long $\times$ 3 mm wide, without mucro, slightly/moderately hairy on lower surface, scattered hairs only on upper surface. Stipules absent. (B_1 , B_2).
Flowers Large terminal heads of large flowers on peduncles c. 3 mm long. Calyx tube and lobes acuminate, hairy; floral bracts also hairy giving heads a dense mop-like appearance. Keel dark red. (C).
Bracteoles Lanceolate, villous, as long as calyx tube and lobes.
Flowering September-October.
Distribution Lower rainfall sand heaths in WA from north of Geraldton (e.g. Kalbarri area) to Central and Southern Wheat-belt. (Similarity to *P. lycopodioides*).



***Pultenaea lycopodioides* (S. Moore) C. A. Gardner**

Photograph opposite, bottom

- Habit** Erect, multistemmed, tomentose shrub to 1 m high (A).
Leaves Elliptical, flat or slightly incurved, appressed on branches, villous on both surfaces, usually c. 8 mm long $\times$ 3 mm wide, mucronate. Stipules absent. (B_1 , B_2).
Flowers Distinct heads with large flowers. Calyces, bracts and bracteoles all very tomentose, giving the heads a feathery appearance. Calyx lobes very acuminate and hairy. Flowers subsessile. Keel dark red. (C).
Bracteoles Linear, villous, as long as calyx tube and lobes. (D).
Flowering August-September.
Distribution W.A. sand heaths in lower rainfall areas, east of the Central Darling Range e.g. between Southern Cross and Coolgardie. (Similarity in appearance with *P. dasyphylla*).





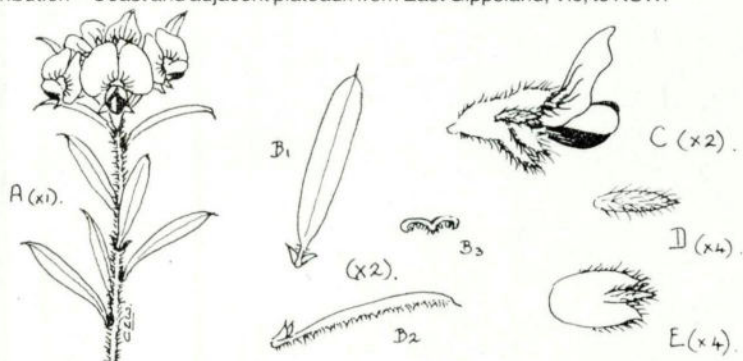
Pultenaea dasyphylla △

▽ *Pultenaea lycopodioides*

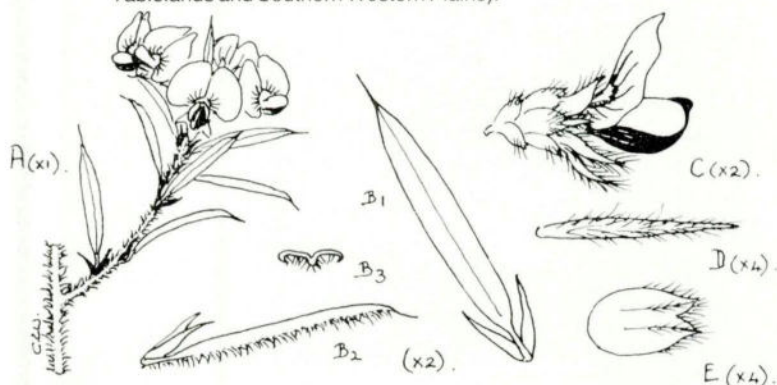


Pultenaea linophylla* Schrad.*Halo Bush-pea**

- Habit** Erect straggling shrub to 1 m high, sometimes semi-procumbent. (A).
Leaves Oblong to linear-cuneate, not crowded, flat with margins recurved, sometimes emarginate, minute recurved mucro, 10-25 mm long, under-surface pubescent. Stipules small. (B_1 , B_2 , B_3).
Flowers Sessile terminal heads. Floral bracts hairy, partly enclosing the silky-hairy calyx. (E). Calyx lobes acute, not longer than the tube, more hairy than the base of the tube. (C). Colour photograph on page 328.
Bracteoles Simple, linear, small, villous, attached halfway up tube. (D).
Flowering Spring — September/October.
Distribution Coast and adjacent plateaux from East Gippsland, Vic, to NSW.

***Pultenaea polifolia* A. Cunn.****Dusky Bush-pea**

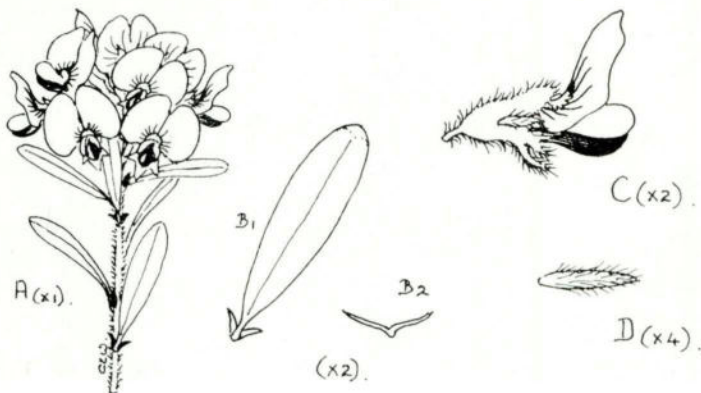
- Habit** Weak shrub to 1 m high, spreading or ascending branches, branchlets hairy. Plant has more villous appearance than *P. paleacea*. (A).
Leaves Linear to narrow-elliptical, variable in length, 10-40 mm long, silky hairy on undersurface, leaf-tips acute with a weak recurved mucro. (B_1 , B_2 , B_3). Stipules subulate, 2-6 mm long.
Flowers Terminal heads enclosed in dense brown hairy bracts (E) sessile. Calyx villous with acuminate lobes, lower ones longer than the tube. Keel dark red. (C).
Bracteoles Linear, villous, as long as calyx and attached at its base. (D).
Flowering Spring — September/October.
Distribution Uncommon species in Vic. (scattered in N.E.); NSW — widespread in heath and dry sclerophyll forests (Central Coast, North, Central and Southern Tablelands and Southern Western Plains).



***Pultenaea platyphylla* N.A. Wakef.**

Flat-leaf Bush-pea

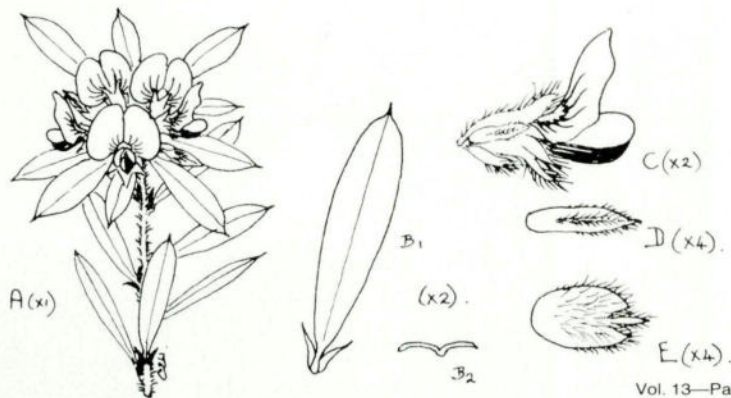
- Habit** Erect angular shrub to 2 m high. Branchlets minutely hairy. (A).
Leaves Oblong-elliptical to narrowly cuneate, slightly incurved to flat, glabrous, with prominent midrib on undersurface, 10-20 mm long $\times$ 3-6 mm wide, obtuse sometimes indented apex. Short petioles and minute stipules. (B, B₂).
Flowers Dense, showy terminal heads with short peduncle about 1-2 mm long. Calyx and peduncle silky villous. Lobes acuminate, no longer than the tube. (C).
Bracteoles Linear-lanceolate, villous, attached about mid-point calyx tube and about as long as calyx lobes. (D).
Flowering Spring — September/October.
Distribution Vic. — hillside plant of Central and N.E.; also NSW — Temora District.



***Pultenaea myrtilloides* A. Cunn.**

Myrtle Bush-pea

- Habit** Erect or decumbent shrub to c. 1 m high. Pubescent stems. (A).
Leaves Oblanceolate to elliptical, wider near apex, flat with a soft mucro, 12-25 mm long $\times$ 3-5 mm wide. Hairy on undersurface (B, B₂). Stipules, 2-3 mm long, are longer than the petioles. Colour photograph on page 327.
Flowers Sessile in dense terminal heads, with numerous ciliate floral bracts (E). Calyx villous, more so the lobes which are acuminate. Keel red. (C).
Bracteoles Linear-elliptical to obovate, pubescent on midrib and margins, almost equal in length to tube and attached near base of tube. (D).
Flowering Late Winter-Spring.
Distribution Heaths and sclerophyll forests in damp areas near coast — NSW to S.E. Qld.





Pultenaea pedunculata △

▽ *Pultenaea linophylla*





Pultenaea myrtilloides (above)

Photography by Colin Woolcock

An erect shrub to one metre, northern NSW to S.E. Queensland.

Pultenaea pedunculata (opposite, top)

Photography by Colin Woolcock

The photograph does not get this message across, but this species is a prostrate densely matted shrub, ideal for use as a ground cover plant. In spring it simply covers itself with these small yellow pea flowers — what a beauty.

Pultenaea linophylla (opposite, bottom)

Photography by Colin Woolcock

An erect shrub to one metre, it may be found on the coast and adjacent plateaux from East Gippsland, Vic., through to the north coast of NSW.

Australian Plants — Australia's Wildflower Periodical

This periodical is produced on a non-profit-making basis for the enjoyment of all. The quality of presentation is, as you see, exceptionally high. This applies also to the colour printing and readers are requested to check their colour printing carefully. If it is not excellent, then return the offending page only and your copy will be replaced. Please make allowance, in a few plates, for the amateur photography we must rely on. We choose the best available and our photographers are really doing a great job.

If you have photographs of succulent Australian plants, Australian *Hoya*, Australian ferns or Australian orchids, may I see them. Who will make a special effort to do this for us over the coming flowering season.

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Snow Wood

Pararchidendron pruinosum

Formerly known as *Abarema sapindoides*, this lovely tree is sometimes given the unflattering name of Stinkwood due to the strong but not unpleasant smell given off when it is cut. Far more noticeable are the pom-pom flowers in spring which change from white to deep yellow with age. The orange seed pods which follow are tightly twisted with shiny hard black seeds inside. Often seen growing on rainforest edges where it forms a dense bank of foliage, it occurs naturally from the Illawarra region in NSW to the Atherton Tableland in north Queensland.

In the garden, its graceful appearance and light green lacy leaves make it an excellent 5 m to 8 m plant for shrubberies. Although tolerant of cool conditions and able to grow in southern Australia, it is sensitive to heavy frost. When protected from wind, it is hardy in full sun and will develop very thick foliage. Specimens can be kept in tubs for some time and used indoors for short periods.