

Australian Plants



Registered by Australia Post
Publication No. MCG 1592

December 1991

Vol. 15 No. 122

\$2.40

The use of Australian wildflowers in horticulture and to decorate the home has shifted to the northern areas of Australia? Most certainly this issue and the next one are especially presented for those in northern areas but keen gardeners in the south are finding that many of the spectacular plants of the north are of value if a suitable site is selected. I would particularly request readers south of Brisbane who have grown the plants featured in this issue, to please advise the editor.

Rainforest — There has been an upsurge in the interest in rainforest over recent years. Southerners particularly have suddenly realised that many of the hardy spectacular trees used in landscaping and street planting have been found in rainforests. As specimen trees away from the competition for a place in the upper sun canopy, they grow much smaller and more compact. As indoor plants, they have special value. Many unique plants are presented in this and the following issues. If you have grown them as indoor or pot plants, please advise the editor.

Gardening in the tropical areas — The recent issues would appear to have been directed at beginner gardeners in the southern, more temperate areas of Australia. The suggestions made apply equally to gardeners throughout Australia. Provide good garden soil conditions with drainage to 30 cm or more, a surface mulch to maintain moisture and cool surface root conditions and some moisture during protracted dry spells and you will grow most wildflowers. The less perfect these conditions the more you tend to the hardy plants such as bottlebrush, featured in recent issues, and palms. —Editor.

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COVER PLATE — *Archontophoenix alexandrae* behind *Livistona cf. australis* — Photography by Tony Rodd. This photograph was taken on the Eungella Range, Queensland.

AUSTRALIAN PLANTS No. 129 issue of Volume 16, comprising issues 125-132. International Series Index ISSN 0005-0008. A National publication in 10,000 copies. Published by The Society for Growing Australian Plants NSW Ltd. For details see last page.

Available to members or by subscription of \$15.00, including postage to your address. Send to Australian Plants, P.O. Box 410, Padstow, NSW 2211.

Publication date of previous issue. No. 128 was 28th August, 1991.

Tropical Gardening

Part 1 of a series
by Peter Ball

It has been many years since the book *North Australian Plants* was published. Since then, the top-end plants have appeared in the gardens of north Australia and have performed extremely well. Gardening in north Australia is tropical gardening. Tropical gardening lends itself to many styles. There are three styles commonly in use:

Traditional — Lawn and shrubs combined in a formal layout. This uses tropical plants or tropical adapted plants. Regular, with almost mathematical appearance, the maintenance is high.

Forest — Many different formats can be used depending on the density of planting. Shade trees and palms are the mainstays, with the western side usually very dense shade trees. Many have bird baths and a shade house for delicate plants. Fruit trees and natives are a popular mix. Fern areas occupy the ground under shady spots. Lawn areas are at a minimum, and the maintenance is low.

Palm — Palm gardens are a new style that is still evolving. The current trend is to plant large numbers of palms at very close spacing. This gives a beautiful visual effect. It is popular with pool owners. Fern gardens may be planted among the palms after shade develops. Maintenance is low.

The aim of the series is to present enough information to enable gardeners to create a beautiful all native plant garden. Many of the plants of north Australia are lush, green and compare very favourably with many popular exotics. Often they are close relatives to popular exotic plants, particularly plants from India and Asia. It is now possible to create native gardens that are as pleasing in appearance as the exotic gardens we have become used to.

Tropical gardening uses different methods to temperate climate gardening. Many areas are monsoonal. Heavy rain falls only in mid to late summer. The build up to the rains is an intensely hot period with very little rain. The dry season can be up to nine months long with very little rain during that time. All these difficult seasons promote an interest in automatic watering systems with efficient sprinklers that can cover large areas in a short time. Many northern towns find that the home gardens are the largest water users during the dry times and a garden that will minimise water use is most desirable. Drip systems do not seem to be effective in maturing gardens. The plants soon outgrow the area that can be kept damp by the drippers. If you want a watering system try a sprinkler system first.

Years of burning and leaching monsoon rains have left very poor soil over much of the north. In some cases the soil becomes extremely hard when dry. Plants grow with difficulty unless heavily mulched and water use becomes excessive. The provision of mulching hay is a well established industry in the north. Many suppliers deliver to the gardeners who start each wet season by mulching their yards with the hay. After a few years of mulching in this way, the soil changes to loose friable loam and the plants respond with green new growth and pleasing form.



Ptychosperma bleeseri



Hydriastele wendlandii



Livistona humilis △

Photography by P. Ball

▽ *Carpentaria acuminata*



White ants, the wood eating termites, are a problem that is being overcome by the use of a bait that is applied in paste form to the ant infested area. Fruit trees can be treated and the fruit remains edible. It seems that the white ant problem is at last being overcome. Many native plants are white ant resistant. They possess chemicals that repel the ants. The termites will only eat them under starvation situations. Some of these plants are: Ironwoods, *Erythrophleum* — Cypress Pine, *Cupressus* — *Casuarina* — *Melaleuca*, Paperbark and *Ficus*, Figs. Many palms will resist white ant attack or the termites are forced to tunnel very close to the surface of the trunk due to excessive moisture contained in the inner trunk. The termites can be easily discovered and fixed with little effort. Try these plant species as main garden trees for longer life.

Many smaller shrubs such as *Dracaena*, *Cordyline*, *Tacca*, *Crinum* and the smaller *Grevillea* are termite resistant. Try these species as smaller plants in your garden. Green ants are still a problem awaiting a cure. Most gardeners ignore the ants until the numbers balance against the available food supply. Green ants attack leaf eating insects to protect their host tree from being defoliated and are actually useful. Birds, bees and butterflies are a delight in the garden and these are attracted in greater numbers by our native plants. Native plants are host to the food chain insects that form the diet of the native birds. Native fruits particularly form a large part of the diet of such birds as the Torres Strait Pigeon. Combining a native garden with a bird bath produces an attractive environment for birds and they will sing all day for you.

Starting a New Garden?

A popular and useful start-off method for new gardens is to plant quick growing *Acacia* such as the black and silver wattles. These plants are quick growing and produce shade, mulch and flowers within one year. The slower growing shade trees, ferns, palms and annuals are then planted under these short-lived trees which are pruned as required and finally removed to make way for the selected and now established trees growing under them. Many native shade trees are able to grow through overhanging foliage and some prefer to do this rather than start off in the full sun.

The final result of your efforts should be a green and shady garden filled with flowers, birds and butterflies providing a cool haven from the tropical sun and a source of intense satisfaction at providing a pleasant landscape compatible with the environment.

A suggested garden layout for an elevated house is shown opposite. The next issue will provide a layout for a house at ground level. This issue describes the palms of the top-end and next issue will be continuing the series of describing all our top-end wildflowers.

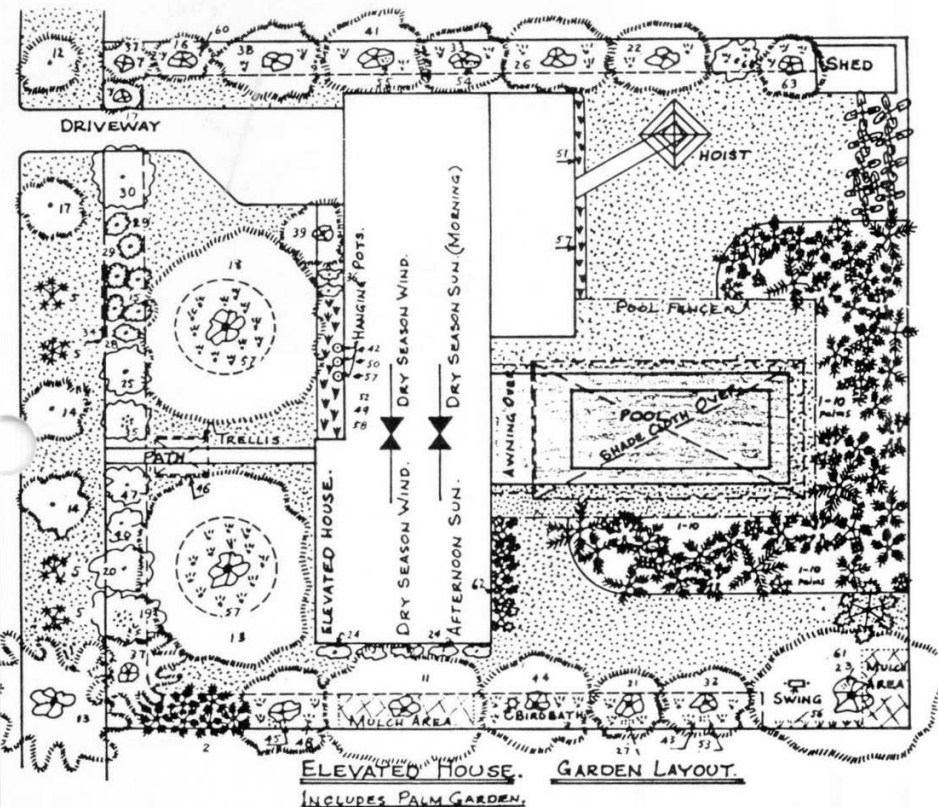
Ferns for garden layout opposite

48. *Acrostichum speciosum*
49. *Adiantum capillus-veneris* — bed
50. *Ampelopteris prolifera* — hanging
51. *Blechnum orientale* — in bed
52. *Christella dentata* — in bed
53. *Cyclosorus interruptus*
54. *Lygodium japonicum* — climb tree
55. *Lygodium microphyllum* — climber
56. *Microsorium scolopendria* — low hedge

57. *Nephrolepis cordifolia* — pot
58. *Pteris tripartita* — in bed
59. *Stenochlaena palustris*

Exotic Fruit Tree

60. Bread fruit
61. Custard Apple
62. Mango
63. Paw Paw
64. Sour sop or Jack fruit
65. Bananas



Palms

1. *Archontophoenix alexandreae*
2. *Carpentaria acuminata*
3. *Gronophyllum ramsayi*
4. *Hydriastele wendlandiana*
5. *Livistona humilis*
6. *Livistona 'Red'*
7. *Livistona mariae*
8. *Normanbya normanbyi*
9. *Ptychosperma bleeseri*
10. *Ptychosperma elegans*

Trees and Shrubs

11. *Acacia auriculiformis* — tree
12. *Acacia gonocarpa* — shrub
13. *Acacia moutfordae* — tree
14. *Acacia producta* — shrub
15. *Acacia nuperrima* — shrub
16. *Acacia latescens* — tree
17. *Acacia sublanata* — shrub
18. *Alphitonia excelsa* — tree
19. *Protasparagus racemosus* — scrambler
20. *Breynia rhynchocarpa* — tree
21. *Carallia brachiata* — tree
22. *Casuarina cunninghamiana* — tree

23. *Cayratia clematidea* — vine
24. *Pleomele angustifolia* — shrub
25. *Exocarpus latifolius* — shrub
26. *Ficus racemosa* — tree
27. *Flagellaria indica* — vine
28. *Grevillea dryandri*
29. *Grevillea goodii* ssp. *pluricaulis*
30. *Grevillea goodii* ssp. *goodii*
31. *Grevillea formosa*
32. *Grevillea heliosperma*
33. *Hibiscus tiliaceus* — tree
34. *Hoya australis* — vine
35. *Jasminum simplicifolium*
36. *Leea rubra* — shrub
37. *Leptospermum parviflorum*
38. *Melaleuca leucadendra* — tree
39. *Morinda citrifolia* — tree
40. *Myrtella cordata* — shrub
41. *Nauclea orientalis* — tree
42. *Portulaca* ssp. — herb in basket
43. *Smilax australis* — vine
44. *Syzygium angophoroides* — tree
45. *Tinospora smilacina* — vine
46. *Tylophora flexuosa* — vine
47. *Verticordia cunninghamii* — shrub

***Gronophyllum
ramsayi***

The palm ▷
and below ▽

From top:

feather leaves — A

crown shaft — C

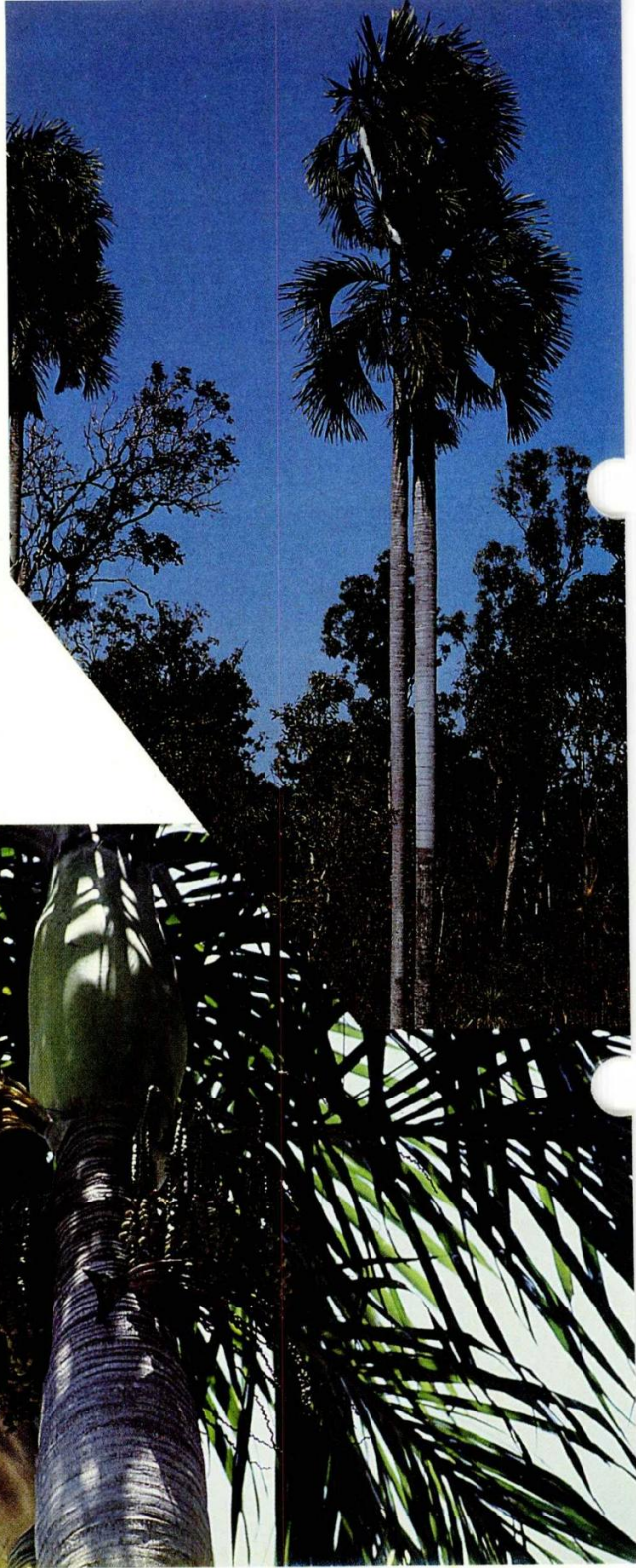
white flowers

coloured fruit — E

ringed trunk — F

letters refer to sketch opposite

Photography P. Ball



Palms of the Top-End

by Peter Ball

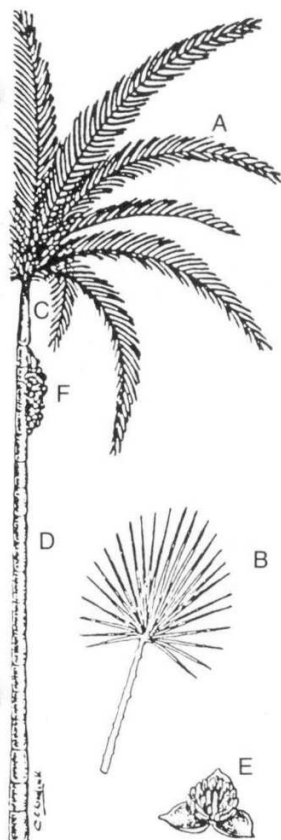
Most palms have a solitary trunk. Those which shed their leaves as they age leave a neat scar or ring whereas those which retain their leaves for a time leave a rough scar or ring or the leaf base. The trunk is made up of long parallel fibres scattered in a mass of thin walled cells which are made rigid by the pressure of sap. While many palms increase their trunk diameter in the lower part, this is done by swelling of the cell mass and forming air spaces between them. Unlike other trees, the living new tissue is in the centre of the trunk with the older "wood" on the outside. Any damage to the trunk remains and is not repaired as in trees.

Palm leaves (fronds) may be grouped as hand or fan-shaped (B) (palmate), or feather-shaped (A) (pinnate). The leaves are crowded together in a spiral at the top of the trunk in a crown or head. The base of the leaves broaden out to go around the trunk and these form a sheathing cylinder known as crownshaft and new leaves must grow up through this sheath, emerging at the top.

The crownshaft (C) formed grows up with the palm; as the lower frond ages its sheath splits at the side opposite the leaf stalk the whole falling off leaving a ring or scar (D) around the trunk. With other palms such as *Livistona* that do not form a crownshaft, the sheathing base is thin and disintegrates as the new leaves expand within it leaving coarse fibres surrounding the trunk. These palms usually retain the old leaves for long periods.

The flowers of palms are quite small, white to cream to yellow, often with a sweet perfume. The flowers in heads (E) are carried on a specialised branch arising amongst the leaf bases. As the lower leaves fall off feather palms, the flowering branch, and then the fruits (F), show on the trunk below the leaves.

Roots do not thicken with age and have limited branching. As the palm grows new roots emerge from between the existing roots and from the lower part of the trunk. Older palms have a mass of roots of equal thickness frequently emerging above the ground level. The root mass may lift the base of the trunk above ground especially in shallow soils or in containers. ■



Gronophyllum ramsayi

Gronophyllum occurs in Arnhem Land and in patches along the Arnhem Highway. The palms opposite are alongside the road near Jabiru. The odd colour on the lower trunk is fire damage. The closely packed tubular clumps of flowers appear several times a year, even continuously in the wet season. They are carried in a slim sheath which is eventually exposed by leaf fall. The seed is green ripening to red.

In the garden situation they are painfully slow in growth though heavy applications of Osmocote and fish emulsion have increased the growth rate. Planted in a part shade garden, specimens appear healthy and relatively immune from insect attack. However, the top end parrots love the seed, damaging many before maturity.

The only species of *Gronophyllum* known in the Northern Territory it is distinctive by the unusual tubular flower arrangement and the large diameter bottle shaped trunk. Fronds are an unusual grey/green colour making identification easy. The common name Kentia Palm may reflect the marked similarity of *Gronophyllum* to the Lord Howe Island Kentia Palm, *Howea fosteriana*. However, it is several times larger and although equally as hardy, may be too large for indoor/pot culture.

Livistona humilis

Fan Palm or Sand Palm

The smallest palm in the top end, occurring in large numbers in open forests in the Northern Territory. The well-cared for specimen in the photograph on page 193 has had the lower dead leaves and old seed stalks pruned away. It is 0.7 m high and seven years old. It is planted in a sunny spot receiving some fertiliser and water normal for the surrounding lawn. The flowers are shown in racemes above the plant at eye level with separate male and female inflorescences on different plants and can be produced several times a year. Copious numbers of small green seed follow the flowers, turning black when ripe to resemble grapes. These are used as a food by the Aborigines who bake them prior to eating. The fronds are true fans on thorny petioles (stalks), fully divided and flat when young.

There are five species of *Livistona* in the top end being distinguished from other palms in the area in that they are distinctly fan palms. Other species are:

Livistona mariae found in Palm Valley of the centre. Called Red Palm for its red juvenile fans.

Livistona benthamii, a green, shade loving tall palm with soft green fans.

Livistona humilis, a short sunloving palm with very large yellow flowers.

Livistona inermis, a short sunloving palm with very fine, thickly clustered fans.

Livistona rigida, is very similar to *L. mariae*. A red-leafed fan palm.

Livistona sp. a new species from Manton River. Very similar to *L. mariae* but with a lighter trunk and red young fans.

Livistona sp. a new species from Victoria River. Very slim, tall fan palm with grey, green fans.

Livistona inermis

Windmill Palm

A small bushy palm occurring in isolated areas of the top end. Fine leaved with attractive petioles (frond stalks), this palm is attractive in the garden. The trunk is normally fibrous. Heavy clusters of white flowers appear in the early dry, a startling white against the blue top end sky, attracting bees and birds. The leaves are distinctive as they radiate from the pink petiole like a windmill's sails.

Plant this palm in an area protected from wind but with at least 50% sun for best results. Medium watering and mulching is all that is required and the palm will give good results with most fertilisers when over two years old.

Carpentaria acuminata

Carpentaria Palm

Carpentaria is the favourite palm of the top end, the most common palm in Northern Territory gardens. It is perhaps the brightest, producing flaming red seed clusters several times a year. Fast growing with a single tapering trunk and heavy fronds, it can reach 8 m in four years. Plant in groups and mulch for best results. It is also an ideal plant for indoors. The palm appears resistant to the palm beetle. This is the only species of *Carpentaria*, it differs from other palms in its fast growth, large, brilliant red seed cluster, a favourite of Torres Strait pigeons, and smooth, lightly ringed trunk.

Hydriastele wendlandiana

A small, clumping, shade-loving palm with cane-like stems and thick green foliage, growing to 5 m. An interesting feature is the leaves especially on young palms. A heavy (wider) pair of leaves form a "moustache" in the middle of the frond and the leaves are entire, not splitting but spade-like. The flowers are white, thickly packed, and divided onto several fingers. They occur on only one trunk at a time, usually in the wet season unless growing in permanent creeks. The seed is thickly packed, red, often intermingling with green, on short stalks at the base of the long crownshaft.

An ideal pot plant or a plant for shady locations. It does poorly in sunny positions. Slow growing, fertiliser (not on young plants), mulching and water brings out the full beauty of this palm, one of the most beautiful in Australia. This is the only Australian species of *Hydriastele* and is found in coastal or near coastal swamps and soaks of the top end and in north-eastern Queensland on Cape York and south to Tully.

Ptychosperma elegans

Solitaire Palm

A palm growing to 5 m high, it is relatively small when mature after seven years. One of the best-looking palms of the top-end it is found on Groote Eylandt and on coastal areas across to Queensland. It does well in the garden in Darwin, preferring about 40% sun, preferably in the morning. It responds well to urea based fertilisers, resulting in new deep green healthy growth. It is a good pot plant for patio and indoors and is an excellent feature plant as a group of palms in the landscape. There are two species of *Ptychosperma* known in the top end, they differ from other palms in that the fronds are smaller each leaflet having a cut-off appearance.

Ptychosperma bleeseri

Clumping Palm

Preferring multitrunk growth, it grows to 3 m high. The cane-like trunks have short segments with white hair that appears temporarily. Older trunks are bright green with distinct woody brown rings. The leaf fronds end with two small leaves, others being alternate along the stem and of a length to give a squarish end to the frond. The taller trunks produce pale flowers, smaller than those shown for *P. elegans*, but with similar red seed.

Ptychosperma macarthurii from North Queensland is a similar palm but with broader leaves and a leaf end at one point rather than the double point of mature *P. bleeseri* leaves. Sold in large numbers in the top end, *Ptychosperma bleeseri* is ideally suited as a large tub plant (photograph on page 192) or as a leafy screen. Plant in full to part shade, heavily mulch and water. Do not use fertiliser until well established, then it likes it. Try N.P.K., Fish Emulsion and Osmocote.

Growing Palms in Victoria

by Neil Marriott

Although Victoria is regarded as a cold, wet place (especially by Sydney-siders!), it does in fact have many areas where the climate is so mild that rainforest plants will not only survive, but with a large range of species, really thrive. There are discontinuous remnant pockets of rainforest throughout Gippsland and the Otway Ranges, and the superb collection of rainforest trees and shrubs in the Melbourne Botanic Gardens has to be seen to be believed.

Palms are well represented in the Botanic Gardens, with extensive groves of palms of giant stature in the Palm Gully as well as elsewhere throughout the Gardens. Several forms of *Archontophoenix alexandrae* from the Iron Range and the McIlwraith Range can be found, along with great numbers of *Archontophoenix cunninghamiana*, the Bangalow Palm.

There are a number of the thorny "Lawyer Canes" including *Calamus australis*, *Calamus caryotoides*, the "Fish-Tail Lawyer Cane", and *C. muelleri*. Several specimens of the "Native Fishtail Palm" *Caryota rumphiana* can be found, as can a few *Hydriastele wendlandiana*, a slender, sucking palm.

The "Atherton Palm" *Laccospadix australasica* can also be found as can several specimens of the "Fan Palm" *Licuala ramsayi*. The beautiful dwarf "Walking Stick Palm" *Linospadix monostachya* is well represented throughout the gardens, while the "Cabbage Palm" *Livistona australis* is even more abundant. Several other *Livistona* species include *L. decipiens* the "Weeping Cabbage Palm" *L. inermis*, and *L. mariae* the "Central Australian Cabbage Palm".

Although not a true palm, the so called "Pineapple Palm" *Lepidozamia peroffskyana* is also well represented throughout the gardens. Readers interested in seeing these palms can find their precise locations in the Victoria SGAP book "Australian Native Plants in Melbourne" by Frank Shann. This wonderful book lists every native plant growing in all the major public gardens in Melbourne, and is available through SGAP Vic, booksales.

A number of these palms are being grown by home gardeners, and numerous fine specimens can be seen in frost-free areas, in protected gardens throughout the state. The most commonly grown species are *Archontophoenix cunninghamiana* which grows quite rapidly, *Livistona australis* the "Cabbage Palm" which occurs naturally in East Gippsland, and to a lesser extent *Linospadix monostachya* the "Walking Stick Palm". These three flower readily and set numerous seed when old enough. They are spectacular and distinctive feature plants which create a real tropical look when grouped together.

As young plants they can be grown readily as indoor plants when placed in a bright position. Plants should never be overwatered, being allowed to become almost dry between waterings. They can be repotted every year or two, depending on growth, and when too big for inside they can be planted outside in a well-drained but moist site. They love deep, well drained and composted soil and respond to extra summer watering. ■

Palm Study Group — Strange, there is no study group for the study of Australian palms. Who would like to be involved in such a group — to exchange notes (often with seed or plants) on the cultivation of the various palms and to develop outstanding specimens.

Australian Palms

by Alec Blombery*

Palms have a stem or trunk which is usually single but often multiple. The leaves are usually concentrated at the apex of the stem forming a crown. Generally, palms are of two types:

1. Feather palms in which the blade of the leaves have leaflets arranged in a pinnate or feather-like manner. The blade of the leaf is divided or partly divided into leaflets which are arranged along either side of the midrib in the manner of a feather. The leaflets may be pointed at both ends or appearing to be cut off at the outer end. The base of the leaves, with some exceptions, e.g., *Arenga*, *Howea* and *Cocos*, form a distinct sheathing base known as a crownshaft.
2. Fan palms in which the blade of the palm is shaped like the palm of the hand or fan-like. The blades divide into segments to varying depths, radiating out from a central point. The bases of these leaves do not form a crownshaft.

The leaves or fronds consist of three main parts: the sheathing base, the leaf stalk (petiole) and the blade (lamina). The base of a leaf completely surrounds the trunk and for species where the leaf falls off when dead, a distinct ring or scar is left on the trunk. For many feather species the leaf bases of the crown surrounding one another form a distinct cylindrical tube which is expanded or swollen in what has been called a crownshaft. New leaves develop at the centre of the extreme upper growing tip of the trunk. Hence a palm is a tree in reverse. A tree has growing tissue on the outside of the trunk but for a palm the vital growing tissues are in the centre of the trunk apex. As the outside is "old wood" and is not renewed as in a tree, scars are not repaired as there is no new tissue for deposition so take care not to deface the outer surface.

Small flowers form along a flower stalk and on maturity develop bright fruits (drupes). For palms with a crownshaft masses of these "strings" of flowers form a striking florescence from the base of the crownshaft. With other types that do not form a crownshaft, the inflorescences develop amongst the leaf bases or progressively down the trunk as in *Arenga* and *Caryota*.

For the cultivation of rainforest type palms, the soil should be enriched with leaf mould and peat moss to hold moisture. This should be renewed at regular intervals as it breaks down over a period. Palms are chiefly surface feeders and nutrient materials should be added to the upper layers of the soil. It is important that a plentiful supply of moisture be provided for all developing palms, particularly during the early stages of growth. During dry periods, watering of mature palms should not be neglected.

Palms from hot, humid, tropical areas will not grow successfully in dry or cooler areas unless the correct environment is provided such as in a glasshouse or in a suitable heated indoor condition as a potted plant with humid conditions.

Archontophoenix

pronounced ar-CHONTO-phoenix

This genus of graceful feathery palms comprises two species, both of which occur naturally in Australia. There may be several unnamed forms. They have solitary, greenish to grey smooth, tall, slender ringed trunks supporting a compact crown of spreading feather palm leaves some 20–25 m in the air when mature. The leaf bases form a smooth cylindrical crownshaft.

*The author gratefully acknowledges the assistance of Tony Rodd.

Archontophoenix cunninghamiana Bangalow Palm, Piccabeen Palm. Occurs at the margins of rainforest and moist gullies in coastal areas in south-east Queensland to the Eungella Ranges near Mackay, north-east Queensland. This species also occurs in New South Wales from Batemans Bay in the south, northward into Queensland. Photograph on page 212 by Murray Fagg, ANBG.

Archontophoenix alexandrae Alexandra Palm. There are several different forms of this species. One formerly known as *A. beatricae* is now regarded as a form of *A. alexandrae*. An impressive form known as the Mt Lewis form occurs on Mt Lewis. *A. alexandrae* occurs in rainforest margins and gullies from Oyster Creek south of Miriam Vale in central Qld to the top of Cape York Pen. and from sea level to elevations of about 1,200 m. Photo, page 189.

Arenga

ARR-en-ga

A genus of clumping feather-leaved palms with only one species occurring naturally on the mainland. The multiple trunks, usually 1–3 with a fringe of suckers, will grow to 10–15 m high, though, like most palms, their natural habitat in a forest sends them much taller. Photograph on page 212 by A. Rodd.

Arenga australasica occurs in lowland rainforest from near Innisfail, north-east Queensland, to the top of Cape York Peninsula. This species also extends to New Guinea and the Aru Islands. A specimen of *Arenga* was collected at Elcho Island off the coast of Arnhem Land, Northern Territory, and is believed to be *Arenga australasica* but lack of flower and fruit has prevented complete determination.

Arenga listeri occurs in lowland rainforest on Christmas Island.

Calamus

CAL-a-mus

Climbing rainforest feather palms. The common names of Lawyer Cane and Wait-a-while Palm attest to their spiny stems and a long flexible extension from near the leaf sheath, armed with hooked spines which act as a grappling organ for climbing. The multiple slender stems/trunks can form clumps on the margins of rainforest climbing to the tops of adjoining trees.

Calamus aruensis occurs along watercourses on the margins of rainforest and extends north from the Jardine River on the north-east coast of Cape York.

Calamus australis, Lawyer Cane, Wait-a-while Palm, Hairy Mary. Occurs in northeastern Queensland in rainforest along watercourses in both lowland and elevated areas to about 1,000 m altitude.

Calamus caryotoides, Fish Tail Lawyer Cane, occurs in lowland and highland rainforest, northeastern Queensland.

Calamus hallrungii occurs in lowland rainforest from Mission Beach north of Tully to the Iron Range, Cape York Peninsula, north-east Queensland.

Calamus moti, Yellow Lawyer Cane, Wait-a-while, occurs in lowland and elevated rainforest in northeastern Queensland.

Calamus muelleri, Lawyer Cane, Wait-a-while, occurs in rainforest from Kenilworth, south-east Queensland, and extends south into New South Wales to Bellingen.

Calamus radicalis, Vicious Hairy Mary, occurs in lowland and elevated rainforest to about 100 m and is found in northeastern Queensland.

Calamus warburgii occurs in lowland and elevated rainforest to about 100 m and is found in northeastern Queensland.

Carpentaria

car-pen-TAIR-ee-a

The only species of this tall, elegant feather palm is confined to Australia. Its smooth ringed trunk to about 20 m tall and 12–15 cm diameter is topped by a distinctive crownshaft and a crown of strongly arching feather leaves 3–4 m long. It produces numerous red shiny fruit as shown on page 193. *Carpentaria acuminata* occurs in small patches of riverine rainforest on small watercourses with permanent water in various areas around the Darwin area of the Northern Territory.

Caryota

carry-O-ta

Only one species of this unusual palm is found in Australia. This highly ornamental palm has a unique foliage. Unlike other palms which have the leaves divided in a pinnate (feather) or palmate (fan) manner, those of *Caryota* are bipinnate, that is, each of the primary leaflets is further divided into leaflets. These are more or less triangular with the outer corners elongated and the apical side toothed, in a fishtail shape, hence the common name of Fishtail Palm.

Caryota rumphiana, Fishtail Palm, occurs in lowland rainforest north of the McIlwraith Range, Cape York Peninsula, and extends to New Guinea. A large solitary trunked palm growing to 20 m with a distinctly ringed grey trunk, thicker in the middle and up to 70 cm in diameter.

Cocos

CO-cos

The only species is regarded as a non-native that has become naturalised on the tropical east coast. The grey trunk grows to 30 m high supporting a crown of feather-leaves. *Cocos nucifera*, Coconut Palm, occurs on coastal beach fronts in tropical north-east Queensland and adjoining islands. This species is naturalised throughout the Pacific Ocean area and on the Cocos-Keeling Islands rainforest on Christmas Island.

Corypha

CORYPH-a

The most massive of all fan palms it can grow to 20–25 m tall, a large part of the trunk covered with persistent leaf bases. It differs from most other palms in that flowering only occurs once, usually at 20–50 years, when the apex of the plant becomes a huge inflorescence. After flowering and fruiting, the palm dies. *Corypha utan* (syn. *Corypha elata*) occurs only in watercourses subject to flooding in monsoonal woodland in Cape York Peninsula, north-east Queensland. This species also occurs in the Northern Territory in similar situations in the Liverpool River area and on Elcho Island off the coast of Arnhem Land.

Gronophyllum

gro-no-FILL-um

The only Australian species of these tall feather palms grows to 20 m high, the grey to greenish ringed trunk frequently being enlarged around the mid-point. This palm is described and illustrated on page 196. *Gronophyllum ramsayi* occurs in monsoonal woodland areas subject to flooding in the Arnhem Land area and the Coburg Peninsula, Melville Island, Northern Territory.

Gulubia

goo-LEW-bee-a

The only Australian species is a tall, slender feather-leaved palm growing to 20–35 m tall. The palm resembles the Coconut Palm, but has a crownshaft. *Gulubia costata* occurs in lowland rainforest in upper north-east Cape York and extends into New Guinea and Aru Islands.

Hedyscepe

hed-is-SEE-pe

The only species is found on Lord Howe Island. It is a compact feather palm with a smooth, closely ringed, greenish to greyish, solitary trunk to 6 m high. *Hedyscapha canterburyana*, Umbrella Palm, Big Mountain Palm, occurs in mountain rainforest and mist forest from about 300 m up to the mountain peaks at 875 m on Lord Howe Island.

Howea

HO-wee-a

Commonly called Kentia Palm, the two species can be found only on Lord Howe Island. They are graceful, adaptable feather palms widely grown for outdoor and indoor decoration.

Howea belmoreana, Curly Palm, Belmore Sentry Palm, occurs in rainforest from sea-level up to about 500 m elevation on Lord Howe Island.

Howea forsteriana, Thatch Palm, Forster Sentry Palm, occurs in mixed rainforest and in pure stands in the lowlands of Lord Howe Island and up to about 250 m elevation, growing to about 15 m high.

Hydriastele

hy-dree-ass-TEEL-ee

The only Australian species is a slender feather palm 8–15 m high, usually with a clump of about three smooth ringed trunks fringed with suckers, each topped with a light crown of spreading feather leaves. *Hydriastele wendlandiana* occurs chiefly in lowland rainforest from about Tully, north-east Queensland, to the top of Cape York. It also occurs in the Northern Territory in small riverine rainforests where there is permanent water in various areas around Darwin.

Laccospadix

lack-o-SPAY-dix

A small, elegant, shade-loving feather palm, often with multiple trunks about 3 m high and 5 cm in diameter. The slender trunk is covered with old leaf bases or is closely ringed in older plants. The crown has a few arching feather leaves, 1.5–2 m long. *Laccospadix australasica* occurs in elevated rainforest on the northeastern tableland of Queensland at elevations of about 800 to 1,600 m. Photography opposite by A. Rodd.

Lepidorrhachis

lep-id-o-RAY-kis

Found only on Lord Howe Island, this dwarf, solitary trunked feather palm rarely grows more than 1.5 m tall, the thick trunk being prominently scarred with closely spaced rings. *Lepidorrhachis mooreana*, Little Mountain Palm, occurs in mountain mist forest from about 700 m to 875 m on Lord Howe Island.

Licuala

lick-you-AH-la

The unusual leaf shape found in these small to medium-sized tropical fan palms makes the genus instantly recognisable. The only Australian species is the largest growing species, the solitary trunk growing from 5 to 12 m high. The dense crown comprises leaves with blades almost circular in outline, one metre across, mid green, divided into wedge-shaped segments. *Licuala ramsayi* occurs in lowland rainforest from Tully in northeastern Queensland to the top of Cape York Peninsula. Photograph on page 233.



*Laccospadix
australasica*

Linospadix*

ly-no-SPAY-dix

These miniature feather palms are at their most attractive when carrying their slender, necklace-like spikes of brilliant orange or pink fruits. They grow from 1–4 m high.

Linospadix aequisegmentosa. A. K. Irvine in his studies of the genus *Linospadix* considers *L. aequisegmentosa* to be a form of *L. palmeriana* and occurs in rainforest in mountain areas of northeastern Queensland.

Linospadix microcarya occurs in lowland and elevated rainforest to elevations of 1,100 m in northeastern Queensland.

Linospadix minor occurs in rainforest and is widely distributed in northeastern Queensland.

Linospadix monostachya, Walking Stick Palm, occurs in elevated rainforest from Bulahdelah, northern New South Wales, extending northward into Queensland, mostly in elevated areas.

Linospadix palmeriana occurs in rainforest and appears to be confined to the higher parts of the Bellenden Ker Range in northeastern Qld above 800 m.

Linospadix species. This unnamed species occurs in the Mount Lewis and Mount Spurgeon area of northeastern Queensland.

Livistona

liv-is-TO-na

Medium-sized to tall fan palms (5–25 m) with masses of creamy to yellow flowers followed by densely clustered, attractively coloured fruits. They make striking robust landscape specimens. The grey or brown ringed trunk, which may have fine vertical fissures, supports a large crown of stiff leaves with the blade deeply divided into drooping segments, the leaves often hang beneath it for some time after dying. Growth is rather slow.

Livistona alfredii occurs along sandstone banks and cliffs of the Fortescue River in north-west Western Australia. Photograph on page 209.

Livistona australis, Cabbage Palm, occurs in moist protected areas and gullies in coastal and adjoining areas in eastern Queensland north to Fraser Island. An unnamed species in the Eungella Range, near Mackay and another unnamed species in the Paluma Range near Townsville, northeastern Queensland, are considered by some botanists to be forms of *Livistona australis*. This opinion is disputed by other botanists. *L. australis* is widely distributed in eastern NSW extending to protected gullies in the Orbost area of Victoria.

Livistona bentharii occurs in low lying areas and on the edges of swamps on Cape York Peninsula, north-east Qld. This species also occurs in similar situations in various areas around Darwin, Kakadu and Elcho Island, NT.

Livistona decipiens occurs in coastal areas of northeastern Queensland from just south of the Tropic of Capricorn to south of Townsville. Photo, page 208.

Livistona drudei occurs along watercourses in dry monsoonal woodland north of Townsville to Kurrimine Beach and also occurs on Hinchinbrook Island, northeastern Queensland.

*The *Linospadix* palms are of wide horticultural interest. No attempt has been made to include photographs here as, if readers will send me notes on their experiences in growing these palms, we will feature them in a future issue —Editor.

Livistona eastonii occurs in monsoonal woodland in bauxite soils on the Mitchell Plateau where it occurs in large numbers in the northern Kimberley, Western Australia. Photograph on page 212 by Alec Bombery.

Livistona humilis. Widely distributed in monsoonal woodland around the Darwin area, Northern Territory. It is the smallest of the Australian species. The growth is very slow. The photograph on page 193 is by Peter Ball.

Livistona inermis occurs in open forest and along watercourses on sandstone escarpments such as Katherine Gorge, Northern Territory, and Sir Edward Pellew Islands, Gulf of Carpentaria.

Livistona loriphylla occurs on sandstone slopes in monsoonal woodland in the northern Kimberley near Kalumburu, Western Australia.

Livistona mariae occurs in watercourses of the Finke River at Palm Valley, Central Australia.

Livistona muelleri occurs in eucalypt forest from south of Innisfail to the top of Cape York Peninsula, northeastern Queensland and also extends to New Guinea. Photograph on page 208 is by Murray Fagg, ANBG.

Livistona rigida occurs along watercourses on the Gregory River and its tributaries in northwestern Queensland north of Mount Isa and in watercourses at Mataranka and the Roper River, Northern Territory. It is considered by some botanists that this species should be included with the Central Australian species *Livistona mariae*.

Livistona species as yet unnamed. In addition to the described species and excluding the two species allied with *Livistona australis*, an unnamed species occurs on the Blackdown Tableland in eucalypt forest; another species occurs on the Dawson River and its tributaries including the Carnarvon Gorge in central Queensland; a further unnamed species occurs in the Burdekin-Ravenswood-Cape River area which is inland from Ayr, northeastern Queensland; a fourth unnamed species occurs near Cooktown and the Kennedy River and tributaries of the Endeavour River and Gap Creek near the Bloomfield River.

In Western Australia an unnamed *Livistona* species occurs in monsoonal woodland in granite soils in the King Leopold Ranges, southwestern Kimberley, Western Australia. A further unnamed *Livistona* species occurs in monsoonal woodland on the tributaries of the Ord River and the Bungle Bungles in the southeastern Kimberley, Western Australia. This species also occurs in the Victoria River area of the Northern Territory on sandstone cliffs and ledges.

Normanbya

NOR-man-be-a

This is a very beautiful feather palm. The slender solitary trunk grows to about 20 m high and 10–15 cm in diameter, tapering to the crownshaft. It is distinctly ringed with fine vertical corrugations and the base is bulbous.

Normanbya normanbyi, Queensland Black Palm, occurs in lowland rainforest and extends to elevated areas in areas north of Cairns, northeastern Queensland.



Livistona decipiens △
growing in Brisbane

Photography by Murray Fagg
Australian National Botanic Garden

▽ *Livistona rigida* with
Pandanus aquaticus





Livistona alfredii △

Photography by A. Rodd

▽ *Livistona muelleri*



Nypa

Ny-pa

These remarkable clump-forming palms are always found growing on tidal creek banks, the thick horizontal stems buried deep in soft mud. They branch to form large colonies, the upward pointing aerial roots protruding from the mud. From each buried stem apex, the massive feather leaves rise vertically to a height of 5–7 m with thick, straight leaf stalks and stiff, regularly spaced leaflets about one metre long. Photograph on page 233.

Nypa fruticans occurs along tidal watercourses and margins of sheltered bays growing in muddy soils, usually covered by water at high tide, in northeastern Queensland, and on the Coburg Peninsula west of Darwin, Northern Territory.

Oraniopsis

or-ain-ee-op-sis

The one species found in Australia is a robust feather palm with brownish-grey ringed trunk to 12 m high. The crown is of light to medium density with leaves 3–4 m long.

Oraniopsis appendiculata (syn. *Orania appendiculata*) occurs in dense rainforest along watercourses and adjoining slopes and extends to the tablelands west of Innisfail and the Atherton Tablelands to elevations of about 1,200 m.

Ptychosperma

ty-co-SPERMA

These slender tropical feather palms, 5–8 m high, have a smooth, ringed trunk, solitary or with several forming a cluster. Several species have been widely cultivated in warm, moist coastal areas, their coloured fruit, profusely borne, adding to their decorative qualities.

Ptychosperma bleeseri. A rare palm which occurs in limited areas of rainforest in wet soils with permanent water, mostly south of Darwin.

Ptychosperma elegans, Solitaire Palm, occurs in rainforest in coastal areas to elevations of about 600 m, from Fraser Island to the top of Cape York.

Ptychosperma macarthurii is a clump forming palm of lowland rainforest from the McIlwraith Range to the top of Cape York and extends to New Guinea.

Rhopalostylis

ro-pal-O-sty-lis

The Australian species is a feather palm 6–12 m tall, the single trunk being smooth with prominent, closely spaced rings, green when young. A distinctive feature is the bulging crownshaft supporting a crown of obliquely erect leaves.

Rhopalostylis baueri occurs in Norfolk Island's lowland rainforest from near sea level up to the highest point at 318 m.

Wodyetia

wod-YET-ee-a

This single species is a feather palm, the arrangement of the leaves often being referred to as resembling a "foxtail". The solitary trunk, 6–15 m tall, is prominently ringed, the general appearance being similar to *Normanbya normanbyi* but the trunk is swollen in the midpoint.

Wodyetia bifurcata, Foxtail Palm, occurs in woodland areas amongst granite boulders in the Melville Range near Bathurst Bay, Cape York Peninsula, north-eastern Queensland. ■

Australian Cycads

by Len P. Butt*

Cycads are spectacular plants for horticulture.

Cycas angulata is a large plant 3-10 m high with dark grey to black trunk 40-85 cm in diameter, often branched, commonly swollen at the base in both male and female plants. Distinguishing features — lower surfaces of pinnae are not strongly pitted, the foliage is a mid to light green and the stomata are surrounded by accessory cells with thickening only on inner cells. It occurs on the islands of the Gulf of Carpentaria and the east coast of Arnhemland.

Cycas armstrongii grows to four metres high with an average of 50 fronds each a little over a metre in length. The pinnae are pea-green on the surface and mottled yellow on the underside. Distinguishing features — pinnae flexible with a flat nerve equal on both sides. The mature fruit is orange, the female sporophylls are glabrous. Where it occurs in the Kimberleys it is known as *Cycas lane-polei*. It is also found around Darwin and on the north coast of Arnhemland, spilling over into areas where *Cycas calcicola* also grows. The photograph on page 213 is by Murray Fagg, Aust. Nat. Botanic Garden.

Cycas basaltica has silvery new pinnae contrasting with the rusty gold-brown of the rachis. The caudices (trunk) are stout to two metres high, swollen at the base. Distinguishing features — pinnae rigid, the nerve on the upper surface sunken (channelled above) making margins slightly recurved, the lower surface pitted with pustule-like protuberances surrounding the stomata; blade of female sporophyll is entire. Occurs on rocky hillsides in the Kimberleys.

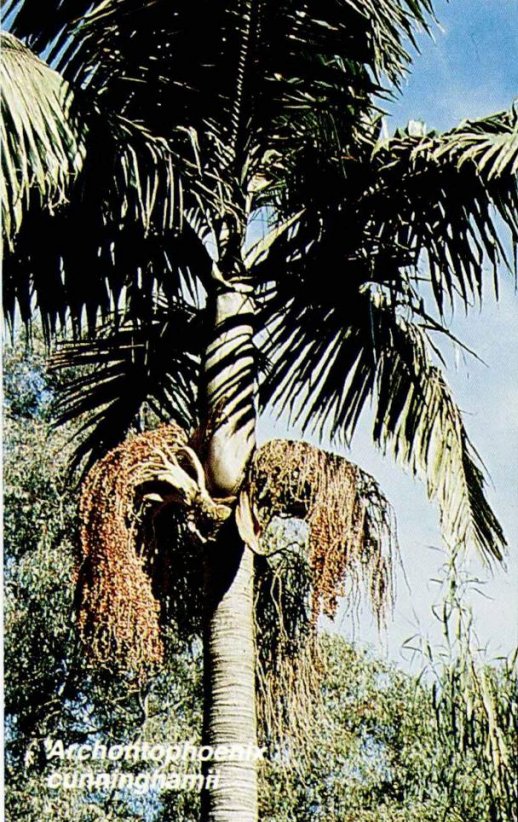
Cycas cairnsiana is a Queensland species in the vicinity of Cairns to Georgetown and Chillagoe. It is rarely above two metres high with a stout caudex swelling towards the base. Heavy crown of glaucous blue fronds arching bow-like from the apex of the caudex makes it an attractive plant. Distinguishing features — the strongly revolute pinnae (3-4 mm wide) are similar to those of the exotic *C. revoluta*; mega sporophyll is short, 160-210 mm, ferruginous, teeth weakly developed or absent; female sporophylls up to 35 cm long, the blade rhomboid lanceolate.

Cycas calcicola occurs in the Katherine area and north to the East Alligator River, Northern Territory. It grows to three metres high with a trunk 17-30 cm diameter, the dark green fronds being flattened, to 100 cm long with up to 300 pinnae each with revolute margins, glabrous or pubescent above, pubescent in channels below, the principal distinguishing feature.

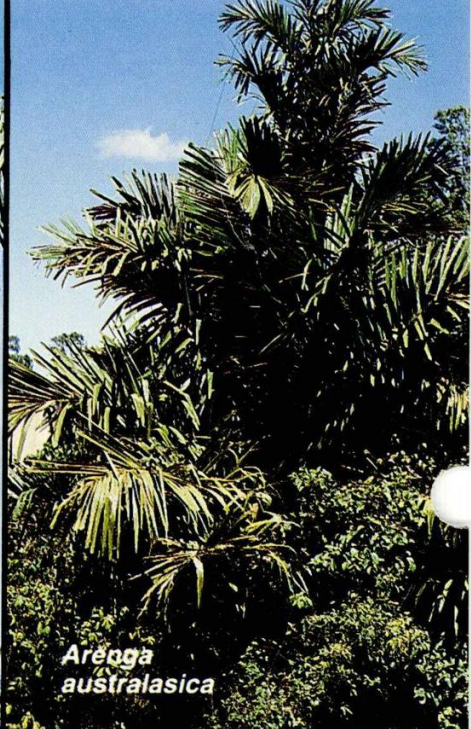
Cycas conferta grows around the Pine Creek area, north of Katherine, Northern Territory. Described as a horticulturist's dream, the fronds (40-60) are a beautiful sea-green with an abundance of soft crowned pinnae. The ovules are pear-shaped and turn brownish purple when ripe. It grows to four metres high with an average height of half of this, some branching.

*Len Butt, Leader of the *Cycad* Study Group is well known for his lifelong interest in Australian *Cycads*. In our No. 101 issue of Volume 13, *Australian Plants*, he described the species of *Macrozamia*, *Bowenia*, *Lepidozamia* and some *Cycads*, all illustrated in full colour.

The Genus *Cycas* in Australia is a booklet written by Len Butt and produced by and available from the Palm and Cycad Societies of Australia, P.O. Box 1134, Milton, Queensland, 4064, for \$10.00 including postage. For excellent information on cycads you would be well advised to send for the beautifully illustrated book above. It is spectacularly illustrated in colour, one of the photographs being reproduced on the rear cover of this issue. ■



*Archontophoenix
cunninghamiana*



*Arenga
australasica*



*Livistona
eastonii*



*Ptychosperma
macarthuri*



Cycas henrici

Cycas furfuracea grows in the King Leopold Range of the Kimberleys, Western Australia. The caudex is quite thick, somewhat like that of *Cycas media*, 1-2.5 m in height. Mature fronds are to one metre in length held stiffly and slightly curving out from the apex, intense glabrous blue above and furfuraceously grey beneath. Distinguishing features — leaves transversely V-shaped; megasporophyll 18-45 cm long; female sporophylls densely woolly.

Cycas kennedyana is a very variable species occurring from Bundaberg in small colonies on the ranges north to Gladstone, Rockhampton, Bowen to Cardwell, Queensland. The narrow caudex (10-15 cm thick) rising to two metres with a compact crown, a distinguishing feature of this plant. The microsporophyll is without an ascendant pointed apex; leaflets are 10-15 mm wide.

Cycas media has been widely grown. Many tall specimens to eight metres may be found in areas from Rockhampton to Cape York, Queensland. The caudex grows to three metres with a diameter of 64 cm. The distinguishing feature other than its size is the microsporophylls with ascendant sharp apex.

Cycas normanbyana found on the Normanby Ranges west of Bowen and south to the Burdekin River and Proserpine, Queensland. The caudex of five diamond shaped leaf bases is to two metres in height, the dark, shiny green fronds arching perfectly from the apex in multiple dense rows. Distinguishing features — leaves 90-150 cm long, 25 cm wide, leaflets 5-6 mm wide with flat margins; fruit orange; female sporophylls 15 cm long, narrowly lanceolate.

Cycas pruinosa is found in the Deception Ranges, north to the Kimberleys and Kununurra and the Ord River area of Western Australia. The stout trunk 0.6 to 2 m in length is crowned with arching fronds, distinctly curved from the apex and V-shaped in cross-section. There are two distinct colour forms, one a definite glaucous blue, the other rather grey-green. Distinguishing features — pinnae glabrous above and below, 2-3 mm wide; megasporophyll long, 28-32 mm, ferruginous, with large well-developed teeth. ■

Cycad Poisoning and Guam Disease

T. E. Bellas

Various authors have mentioned the use of cycads such as *Macrozamia* as a source of food. They are careful to define the methods recommended for the removal of toxins before use and one goes as far as to say "if indeed it is all removed." As these seeds, properly treated, have been eaten in the past some may feel that it is safe to eat them. Recent research has shown that a disease that afflicts some Pacific islanders who have traditionally eaten *Cycas* nut can now be definitely attributed to this diet. The disease, known for many years as Guam Disease, resembles Parkinson's and Alzheimer's diseases. Be warned! ■

Cycas sp. 'Bynoe/Cox Peninsula'

Rear Cover Plate

The Darwin Study Group of The Society for Growing Australian Plants reports that this plant grows right along the Cox Peninsula west of Darwin. It is probably a form of *Cycas armstrongii*. Other reports suggest that it could be a natural hybrid of *Cycas armstrongii* and *Cycas calcicola*. However, the larger caudex and growing habits are reminiscent of the Northern Territory giant, *Cycas angulata*. They grow to an average height of 2.5 metres tall with a maximum of 5 metres.

Xanthostemon in Australia

by Peter G. Wilson,¹
Royal Botanic Gardens, Sydney

Xanthostemon is a genus of approximately 45 named species in the family Myrtaceae. It has typically myrtaceous characteristics such as oil-glands in the leaves, numerous, long-exserted stamens and capsular fruit, but differs from most in having an almost superior ovary which develops to produce a typically globular fruit². The genus has an almost exclusively tropical distribution with only a single Australian species occurring south of the Tropic of Capricorn. Outside Australia, species occur in the Philippines, Indonesia, New Guinea, and New Caledonia (where a relatively large number of species is found).

Xanthostemon was described by Ferdinand Mueller in 1857 based on a single species, *Xanthostemon paradoxus*, that he had collected in what is now the Northern Territory. The name is derived from the Greek for "yellow stamens", a characteristic of that species. Mueller considered the genus to be closely related to *Metrosideros*. The second species described, *X. eucalyptoides*, differed from the first in having white flowers and opposite leaves. It was the occurrence of opposite leaves that led Bentham, in *Flora Australiensis*, to restrict *Xanthostemon* to species with alternate leaves and place all species with opposite leaves in *Metrosideros*. This led to a situation where, until relatively recently, two very closely related species *X. crenulatus* and *X. eucalyptoides* were commonly referred to as *Xanthostemon* and *Metrosideros* respectively. In fact, *Xanthostemon*, including the opposite-leaved species, is not especially closely related to *Metrosideros* and no species of the latter genus is found on the mainland (*M. queenslandica* is not a true *Metrosideros*; the only species occurring in Australia are found on Lord Howe Island).

Xanthostemon species are usually trees of rainforests or monsoon woodlands and are most suitable for cultivation in tropical or sub-tropical areas. Flower colours include red, yellow, cream or white. Mostly it is the red- and yellow-flowered species that have the greatest horticultural potential and some of these are already becoming recognised as likely subjects for gardens in warmer areas. Some of the New Caledonian species are also quite spectacular but, as far as I know, their horticultural potential is yet to be widely exploited.

Description of the Genus

Shrubs or trees; leaves alternate or opposite. Flowers axillary, solitary, in threes or raceme-like, often clustered at the tip of the shoot. Petals and sepals 4 or 5. Stamens much longer than the petals, numerous, free from each other. Ovary almost superior (sometimes partly inferior), mostly 3–5-locular, surrounded by a saucer- or cup-shaped hypanthium (Figure 1). Placentas axile, mostly rod-like and projecting into the loculi. Capsule woody, globular, dehiscent, with the hypanthium and remnant calyx partly enclosing or flattened under it. Seeds flattened, somewhat semi-circular, winged in two species.

¹This article is a summary of the author's revision of the genus published in *Telopea* 3 (4): 451–476 (1990).

²The plant family Myrtaceae — The principle characters that define the hundreds of plants grouped in this plant family are:

1. The presence of oil glands in the leaves, almost always conspicuous as in *Xanthostemon*.
2. Flowers with four or five petals (very rarely more). There are four or five petals in *Xanthostemon*.
3. The ovary is inferior or half inferior (rarely almost superior). *Xanthostemon* is one exception. See Fig. 1.
4. The stamens are usually numerous and they are often the prominent part of the flower such as for the "bottlebrush" group of plants in recent issues where many individual flowers are grouped together in a bottlebrush head, and for *Xanthostemon* as shown in photographs of this issue.



Xanthostemon paradoxus △

Photography by G. Sankowsky

▽ *Xanthostemon xerophilus*





Xanthostemon youngii △

Photography by G. Sankowsky

▽ *Xanthostemon* 'Tozer Gap'



The Australian Species of *Xanthostemon*

In Australia the species can be divided into natural groups based on the angle of the persistent, rod-like placenta in the open fruit. This is not particularly difficult to observe if mature fruit are present and produces more reliable groupings than any based on leaf arrangement alone. The various angles are depicted diagrammatically in Figure 2.

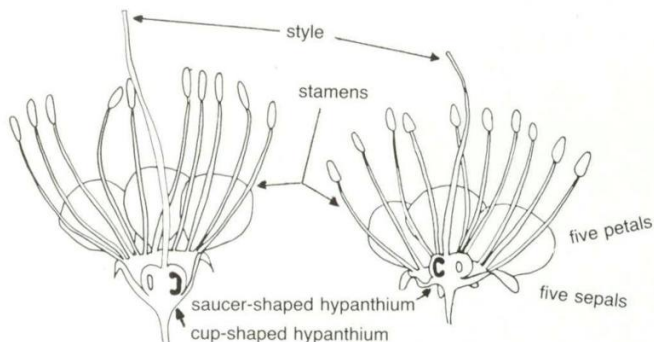


Fig. 1(a). Cup-shaped hypanthium

Fig. 1(b). Saucer-shaped hypanthium

Fig. 1. A section through the flower of *Xanthostemon* (see page 225 for simple description of parts). There are five petals on *Xanthostemon*, attached at the upper lip of the structure (hypanthium) encircling/containing the ovary in Fig. 1(a) which is characteristic for most species. Fig. 1(b) shows the saucer-shaped hypanthium characteristic of *Xanthostemon youngii* which is also found in *X. psidioides*, *X. graniticus*, *X. eucalyptoides*, *X. crenulatis* and *X. formosus*. The stamens are numerous and are the prominent part of the flower.

KEY TO THE AUSTRALIAN SPECIES

- 1 Placenta more or less horizontal in the fruit
 - 2 Flowers red 1. *X. youngii*
 - 2* Flowers yellow or cream to white
 - 3 Flowers with 5 distinct depressions around the ovary 2. *X. formosus*
 - 3* Flowers without depressions
 - 4 Leaves alternate (occasional branchlets of *X. whitei* have opposite leaves)
 - 5 Flowers yellow, leaves glabrous or white-pubescent
 - 6 Tree with fairly smooth, scaly bark (QLD) 3. *X. chrysanthus*
 - 6* Tree with rough bark (N.T., W.A.) 4. *X. paradoxus*
 - 5* Flowers creamy-yellow, leaves with dense yellow-brown indumentum 5. *X. whitei*
 - 4* Leaves opposite or whorled
 - 7 Leaves opposite
 - 8 Flowers yellow, bark rough 6. *X. xerophilus*
 - 8* Flowers white, bark scaly 7. *X. oppositifolius*
 - 7* Leaves whorled 8. *X. verticillatus*
- 1* Placenta oblique to erect in the fruit (flowers all cream to white)
 - 9 Leaves opposite
 - 10 Seeds not winged; petals elliptical, 3–4 mm wide 9. *X. umbrosus*
 - 10* Seeds winged; petals spatulate, up to 2 mm wide
 - 11 Leaves distinctly petiolate (QLD, P.N.G.) 10. *X. crenulatus*
 - 11* Leaves sessile or nearly so (N.T., W.A.) 11. *X. eucalyptoides*
 - 9 Leaves alternate
 - 12 Young shoots with cinnamon-coloured hairs; leaves 7–18 cm long (QLD) 12. *X. graniticus*
 - 12* Young shoots with golden-brown hairs; leaves 5.5–9 cm long (N.T., W.A.) 13. *X. psidioides*

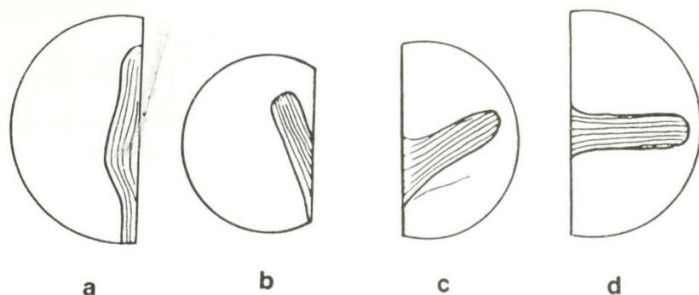


Fig. 2. Diagrammatic representation of the various placenta types found in *Xanthostemon*.

The placenta is that part of the ovary at the base of a flower to which the ovules are attached (on fertilisation these ovules mature to seeds). The placenta is usually rod-like and projects into the centre of the ovary, the ovary maturing to become the fruit containing the seed. Fig. 2 shows the placenta types found in the mature fruit of *Xanthostemon* and these can be easily seen: **type (a)** is found in fruit of *Xanthostemon eucalyptoides* and *X. crenulatus*; **type (b)** in *X. graniticus* and *X. psidioides*; **type (c)** in *X. umbrosus* and; **type (d)** is found in the remainder of the species.

Beginners, please note — It is international practice to classify plants of the world principally by the characteristic make up of the flower. The flower of *Xanthostemon* is shown in Fig. 1. The many colour photographs will almost enable you to identify species from "the pretty picture". An article by Gwen Elliot that describes the parts of a flower in simple terms is presented on page 225. If you are a beginner, you will very easily gain enough knowledge to identify plants yourself. — caption and comment by Editor.

Red-flowered species

1. *Xanthostemon youngii* C. White and Francis

A shrub or small tree to 10 m high with rough bark. The leaves are alternate; lamina glabrous (lacking hairs) and coriaceous (leathery), obovate and obtuse, with prominent venation, usually 5–8 cm long and 1.5–3.5 cm wide. Inflorescence of flowers that are solitary or in groups of three in the leaf axils and are crowded at the ends of the branches. Flowers red, about 4 cm across, with 5 depressions opposite the petals; stamens red, up to 2.5 cm long; ovary almost superior, densely covered with short, white hairs. Fruit about 1.5 cm across; seeds not winged. Photograph on page 217 by G. Sankowsky

This species was first collected in 1923 but was not re-collected until 1974. It is an uncommon tree that grows only on sand dunes in coastal areas in Cape York, e.g. Shelburne Bay, and is likely to be endangered if proposed sand mining of those areas goes ahead. It is not included in any reserve at present and has been classed as "Rare" in the most recent review of its conservation status.

This is the only red-flowered species in Australia and is, judging from photographs and specimens, quite spectacular. It is not widely cultivated as yet, but this will change as time goes on. The five depressions opposite the petals are likely to be nectar-bearing and associated with bird pollination. The only other species with both red flowers and these depressions, *X. speciosus*, is found on the island of Palawan in the Philippines. There are only a few other red-flowered species, found in New Caledonia, New Guinea, the Celebes and the central Philippines, but these are not necessarily closely related to each other or to *X. youngii*.



Xanthostemon formosus △

▽ *Xanthostemon chrysanthus*



Yellow-flowered species

2. *Xanthostemon formosus* Peter G. Wilson

Tree to 18 m high with flaky bark. The leaves are alternate; lamina glabrous and thinly chartaceous (paper-thin), narrowly elliptical and acuminate, with conspicuous venation, usually 12–22 cm long and 2–4.5 cm wide. Inflorescence of flowers that are solitary in the leaf axils and are crowded at the ends of the branches. Flowers greenish-yellow, up to 6 cm across, with 5 depressions opposite the petals; stamens yellow and 2–2.5 cm long; ovary almost superior, glabrous. Fruit 1.5–2 cm across, minutely warty; seeds not winged. Photograph opposite by G. Sankowsky.

This new species has only been known since the mid 1980s. It occurs in rainforest along Cooper Creek, north of the Daintree River and appears to be quite restricted in range. No conservation status has been assigned to this species yet, but it would be classed as "Rare".

The species has a very striking flower, with the same, possibly nectar-bearing depressions as found in *X. youngii* but is otherwise quite unlike that species. It is certainly worthy of cultivation.

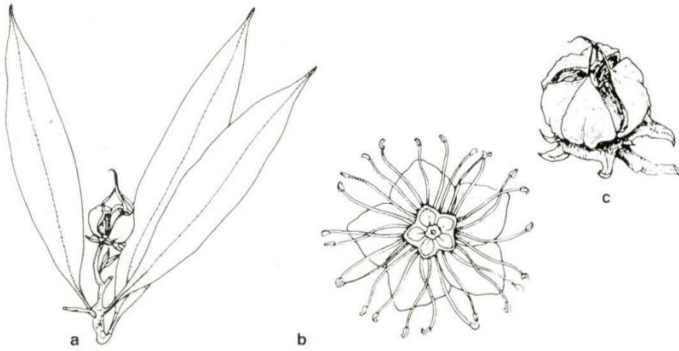


Fig. 3. *Xanthostemon formosus* (a) leaves and fruit; (b) flower; (c) fruit. Reproduced from *Telopea* 3(4) 1990 with permission.

3. *Xanthostemon chrysanthus* (F. Muell.) Benth.

Golden Penda

Tree to over 20 m high with smooth bark. The leaves are alternate; lamina usually glabrous and chartaceous, oblanceolate and acute, mostly 10–15 cm long and 3–4.5 cm wide. Inflorescence of flowers that are usually solitary or in groups of three in the leaf axils and are crowded at the ends of the branches. Flowers yellow, about 2.5 cm across; stamens yellow, 2–3 cm long; ovary almost superior, glabrous. Fruit up to 1.5 cm across; seeds not winged. A common tree of coastal rainforest along streams and rivers in Queensland from north of Townsville almost to the top of Cape York. Photograph by Bosworth.

This is the best known species in cultivation. It has gained wide publicity courtesy of the nursery selection *Xanthostemon* 'Expo Gold' featured at World Expo, 1988, in Brisbane (see *Australian Plants* Vol. 15, No. 117, p. 10). A small tree of this species, grown from seed collected by the author in Cape York, flowered well for the first time at the Royal Botanic Gardens, Sydney, last summer; it is not a particularly vigorous plant and has not formed a well-shaped tree under Sydney's climatic conditions.

4. *Xanthostemon paradoxus* F. Muell.

Tree to 12 m high with thick, grey, persistent bark. The leaves are alternate; lamina pubescent or glabrescent (becoming glabrous) and chartaceous, elliptical and acute, mostly 5–16 cm long and 3–6 cm wide. Inflorescence raceme-like or of flowers in groups of three, usually crowded at the ends of the branches. Flowers yellow, about 1.5 cm across; stamens yellow, 1.7–2.5 cm long; ovary almost superior, glabrous. Fruit up to 1.5 cm across; seeds not winged. Photograph on page 216 by Peter Wilson.

A widespread species occurring in the Northern Territory and in northern Western Australia. There is quite a range of variation in the species as defined here, with at least three different forms discernible: (1) trees growing on rocky outcrops that have pubescent leaves and small fruits 0.8–1 cm across; (2) trees in woodland with glabrous to pubescent leaves and fruits 1.1–1.4 cm across; and (3) trees in woodland with fruits as in (2) but very woody.

5. *Xanthostemon whitei* Gugerli

A rainforest species that grows on richer soils in the Atherton area, it is a tree to around 40 m high with scaly bark and conspicuous buttresses. The leaves are alternate (occasionally opposite on some branchlets); lamina pubescent and chartaceous, broadly elliptical or lanceolate and acute, mostly 7–16 cm long and 3–5 cm wide. Inflorescence of flowers in groups of three, or raceme-like and made up of 5–11 flowers, borne in the upper axils. Flowers creamy-yellow, up to 1.7 cm across; stamens yellow, 1.5–2.5 cm long; ovary half superior, becoming glabrous. Fruit up to 1.5 cm across; seeds not winged.

6. *Xanthostemon xerophilus* Peter G. Wilson

Tree to 16 m high with rough bark. The leaves are opposite; lamina glabrous and coriaceous, oblong-elliptical, obtuse, mostly 6–9 cm long and 2.5–5.5 cm wide. Inflorescence raceme-like, made up of 7–11 flowers, borne in the upper axils. Flowers to 2 cm across; stamens pale yellow, 1.5–2 cm long; ovary half superior, glabrous. Fruit up to 1.5 cm across; seeds not winged.

This newly described species occurs in savannah woodland towards the tip of Cape York (on both sides of the Jardine River). It is considered to be rare but at least part of the population is conserved in a National Park.

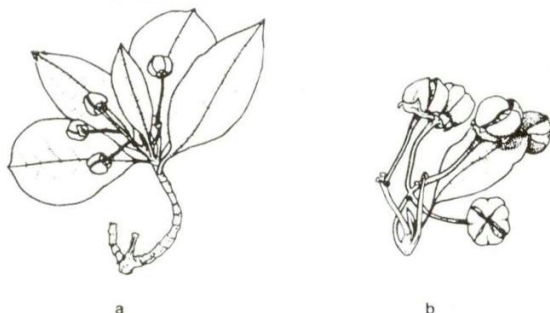


Fig. 4. *Xanthostemon xerophilus* leaves and fruit. Photo, page 216. Reproduced from *Telopea* 3(4) 1990 with permission.

White-flowered species

7. *Xanthostemon oppositifolius* F. M. Bailey

Tree to around 40 m high with scaly bark. The leaves are opposite; lamina glabrous and coriaceous, ovate to elliptical, obtuse, mostly 4–9 cm long and 2.5–5.5 cm wide. Inflorescence of flowers in groups of three, or raceme-like and made up of 5–11 flowers, borne in the upper axils. Flowers white, up to 2 cm across; stamens white, 0.8–1 cm long; ovary more than half superior, pubescent. Fruit 1–1.5 cm across; seeds not winged. Photograph, page 229.

This is the southernmost species in the genus; it grows in the rainforests around Gympie in southern Queensland. This area has long been exploited for timber and *X. oppositifolius* has become quite rare; part of its range is now in a reserve but the species is still considered to be vulnerable, i.e., at risk of disappearing from the wild if subject to continued depletion or change in land use.

8. *Xanthostemon verticillatus* (C. White and Francis) L. S. Smith

A small tree or tree to about 5 m high with flaky bark. The leaves are in whorls of 3–5; lamina glabrous and chartaceous, narrowly oblanceolate and obtuse, usually 4–9 cm long and 0.8–1.3 cm wide. Inflorescence of flowers that are in groups of three in the upper leaf axils. Flowers cream, to about 2 cm across; stamens cream, 2–2.5 cm long; ovary almost superior, glabrous. Fruit about 1 cm across; seeds not winged.

This unusual species (the only one in the genus with whorled leaves) was first collected in 1902 and was described in 1920 as a *Metrosideros*; its generic position was clarified in 1955 but the plant was only known from the original collection until 1978 when it was rediscovered. The species is uncommon and occurs as a poorly formed tree along watercourses in a restricted area south of the Bloomfield River. It is considered to be rare but is not yet conserved in any National Park or reserve.

9. *Xanthostemon umbrosus* (A. Cunn. ex Lindl.)

Peter G. Wilson and Waterhouse

A small tree or tree to 15 m high with scaly bark. The leaves are opposite; lamina glabrous and chartaceous, elliptical and obtuse, usually 5–8 cm long and 2–4.5 cm wide. Inflorescence of flowers that are in groups of three or 5–7 in the leaf axils. Flowers cream, up to 2 cm across; stamens cream, up to 1.5 cm long; ovary half superior, glabrous. Fruit 0.8–1.2 cm across; seeds not winged.

This species was originally described from a specimen collected in the Kimberleys, but it has not definitely been re-collected from there. It is very sporadic in its occurrence but is mostly found in sandstone gorge country across the north of Australia; it is less commonly found on sand or along creeks in Cape York. As accepted in the revision, it includes what has been called *Metrosideros tetrapetala* and is quite variable; further collection and study may distinguish two or three species from this complex. This species, or species complex, is more closely related to species in New Guinea and Indonesia than to other Australian species.

10. *Xanthostemon crenulatus* C. White

Tree to around 20 m high with flaky bark. The leaves are opposite; lamina glabrous and coriaceous, oblong to broadly elliptical, obtuse, mostly 9–17 cm long and 6–11 cm wide. Inflorescence usually a panicle of about 15 flowers, borne in the upper axils. Flowers white, up to 1.5 cm across; stamens white, 0.25–0.8 cm long, ovary almost superior, glabrous. Fruit about 0.7 cm across; seeds winged. Photograph on page 232.

This species is found in swampy sites and adjacent to creeks in Cape York and in the southwestern part of Papua New Guinea. It is very closely related to *X. eucalyptoides*, with which it shares a number of unique features (particularly the narrow petals, type of placentation and winged seeds), but these two species are otherwise unlike any others in the genus.

11. *Xanthostemon eucalyptoides* F. Muell.

Tree to around 18 m high with persistent, smooth bark. The leaves are opposite; lamina glabrous and coriaceous, oblong to broadly elliptical, obtuse, mostly 5–12 cm long and 3–7 cm wide. Inflorescence usually a panicle of about 21 flowers, borne in the upper axils. Flowers white, up to 1.2 cm across; stamens white, 0.45–0.85 cm long; ovary almost superior, glabrous. Fruit about 0.6 mm across; seeds winged.

Like its close relative, above, this species prefers to grow beside creeks or on swampy ground or ground subject to flooding in the wet season. It is common in Arnhem Land and is also known from a number of sites in the Kimberley.

12. *Xanthostemon graniticus* Peter G. Wilson

A small to medium tree to 13 m high with flaky bark. The leaves are alternate; lamina stiffly coriaceous, elliptical and acute, with sunken venation, usually 7–18 cm long and 4–10 cm wide. Inflorescence panicle-like, axillary. Flowers cream, up to 1.8 cm across; stamens cream, up to 1 cm long; ovary half superior, densely covered with short, reddish-brown hairs. Fruit 0.7–0.9 cm across; seeds not winged. Photograph on page 232.

This newly described species has so far only been collected a few times in mossy vine forest in peaty soil on granite near the headwaters of Roaring Meg Creek on the slopes of Mount Pieter Botte. It is considered to be rare but is not yet conserved in any National Park or reserve. This species and its close relative *X. psidioides* (with which it shares a fairly erect placenta and much-branched inflorescence) occupy an isolated position in the genus.

13. *Xanthostemon psidioides* (A. Cunn. ex Lindl.)

Peter G. Wilson and Waterhouse

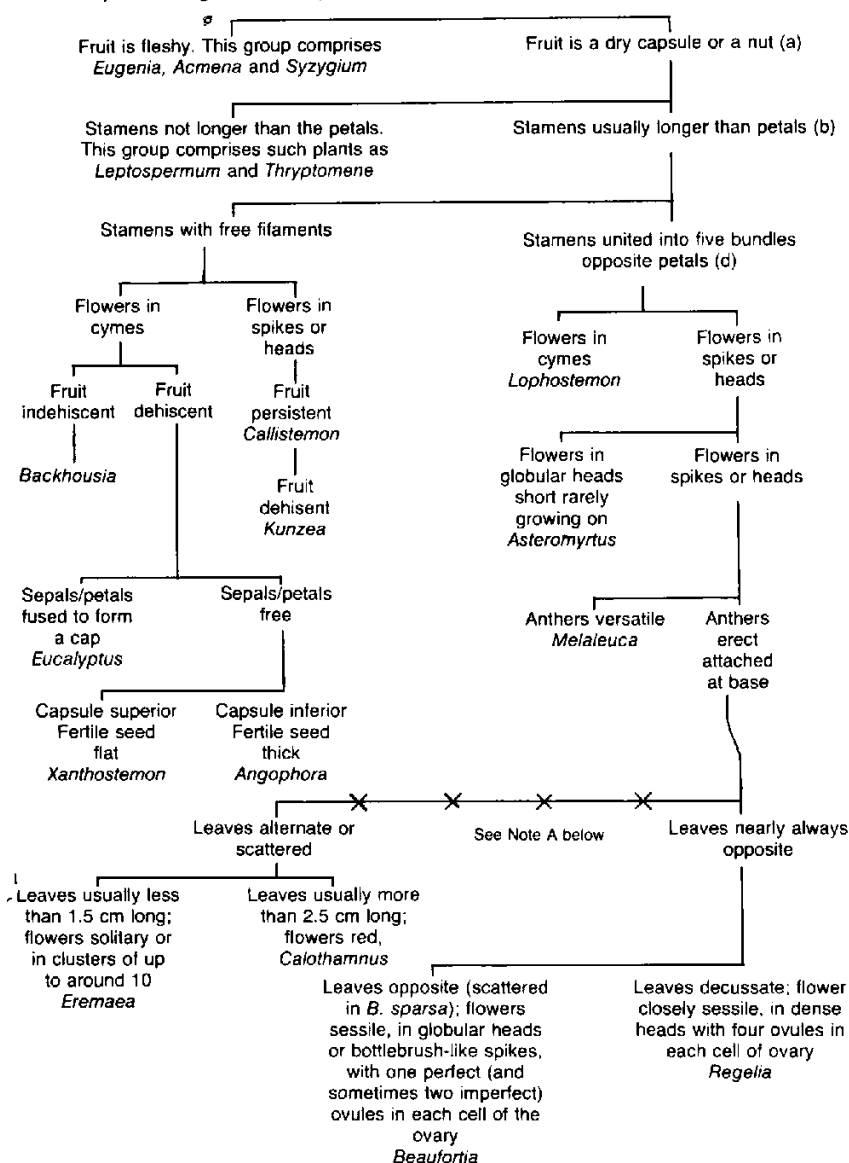
A small tree up to 10 m high with scaly bark. The leaves are alternate; lamina coriaceous, elliptical and acute, mostly 4.5–9 cm long and 2–4 cm wide. Inflorescence axillary, panicle-like or a panicle. Flowers cream, up to 1.5 cm across; stamens cream, up to 1.2 cm long; ovary almost superior, covered with short, golden-brown hairs. Fruit 0.6–0.7 cm across; seeds not winged.

This species occurs in Arnhem Land and the Kimberley where it grows on the tops or around the bases of sandstone escarpments, or along the rocky sides of watercourses. It is often found with the more rainforest-like plants of those areas. Photograph on page 229.

Xanthostemon and The Bottlebrush Group

The Plant Family Myrtaceae

Based upon the charts presented in "Australian Plants Identified" and modified with the assistance of Dr Peter Wilson to include *Asteromyrtus* and *Xanthostemon* the following chart will provide a guide to the plants in this and recent issues.



Note A: This line was omitted from a similar chart on page 11 of Issue 125 of Vol.16, for which the Editor apologises to Gwen Eliot and the reader. The chart was used to assist the reader to identify the bottlebrush group of plants.

Follicles

A follicle is also a dry fruit but, unlike a capsule, it develops from 1 carpel only, and opens with one split. There may be one, two or many seeds inside. Some follicles open when mature to shed their seeds, while others remain unopened on the plant for many years. Many Australian plants in the large Proteaceae family produce their seeds in follicles. The fruits may be leathery as in the case of many *Grevilleas*, or large and woody as seen in some *Hakeas*. The seeds inside the follicles may have papery wings to assist in their distribution, and this can be a feature to look for when identifying a plant.

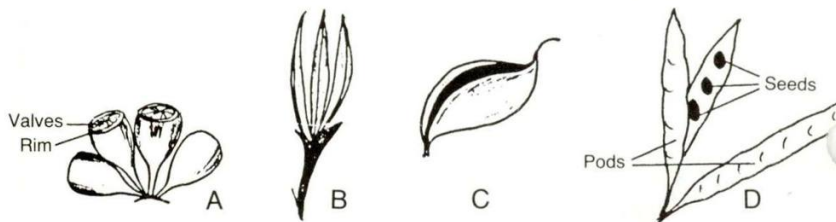


Fig. 4. A, capsules of *Eucalyptus* and B, capsules of *Blandfordia*, the Christmas Bells. C, follicle opening with one split e.g., *Grevillea* and D, the seed pods of *Acacia*.

Legumes or Pods

A legume can look like a follicle, but it is easily distinguished by the fact that it splits down both sides, while a follicle opens with one split. Like a follicle, a legume develops from one carpel. Plants in the family Fabaceae, commonly known as pea-plants, all produce their seeds in pods. Pods are also found in the family Mimosaceae which includes Australia's largest plant genus, *Acacia* or the wattles.

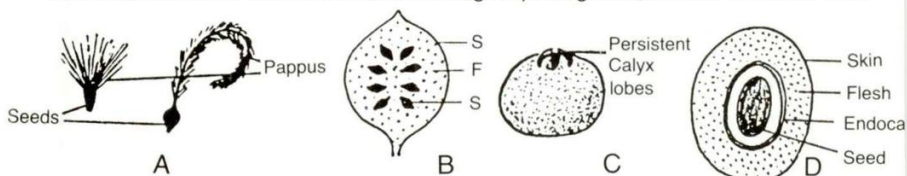


Fig. 5. A, achene, a non-splitting fruit with a plume-like appendage (pappus) to assist wind dispersal. B, a berry with the skin S, flesh F and seed S, and C the fruit of *Syzygium* with persistent calyx. D, a drupe with seed surrounded by a woody layer (endocarp), flesh and skin.

Nuts and Achenes

Dry non-splitting fruit

A nut is a dry non-splitting fruit, with two joined carpels and one single seed. The outer casing (pericarp) is usually woody and close to the seed, although not joined to it. Many Australian plants produce small nuts, including *Gahnia* and plants such as *Isopogon* and *Petrophile* in the Proteaceae family.

An achene is a dry non-splitting fruit produced from one carpel only. The flowers from which achenes develop have one pistil for each carpel from which a single achene is produced. The pericarp is usually leathery rather than woody. Fruits of the very large daisy family, Asteraceae, are achenes (or to be botanically correct cypselas). Many have a modified calyx called a pappus which is hair-like or plume-like and adheres to the mature achene to assist in its dispersal by the wind.

Berries and Drupes

Succulent and fleshy fruits

Sketches above — more details in future issues. ■



Xanthostemon oppositifolius △
Photography by Murray Fagg, ANBG

▽ ***Xanthostemon psidioides***
Photography by P. Gadek



Xanthostemon in Cultivation

by Garry Sankowsky
Atherton Tablelands, Queensland

In spite of the number of species within this genus in Australia, only one *Xanthostemon chrysanthus*, has been widely cultivated. Most of the species trialled by the author have proved hardy and quite easy to grow. The biggest problem with many species is germination of the seed. By far the most difficult species is *Xanthostemon umbrosus* which is found on the sandstone escarpments near Laura, Qld. From many thousands of seeds planted less than 10 have germinated. It is fortunate that many of the species which are difficult to grow from seed are fairly easy to propagate from cuttings.

These notes refer to the cultivation of the north Queensland species except *Xanthostemon verticillatus* and an, as yet, undescribed species.

Xanthostemon chrysanthus (Golden Penda) is well known as it has been in the nursery trade for many years. The seed is extremely easy to germinate and the plant rates as "very hardy". In New South Wales and southern Queensland it may take 5–8 years to flower. In north Queensland it can flower within the first year after planting. The bright yellow flowers are borne in large terminal heads and make a very spectacular display. As with most rainforest trees, flowers will only be obtained if grown in the full sun. Photograph, page 220.

Xanthostemon crenulatus is a small to medium tree which reaches a height of about 6–8 m in cultivation. This species is normally found in swampy areas on Cape York Peninsula, north of the Mclvor River. The most outstanding feature is the large crenulated leaves which are pinkish brown when in new growth. At a casual glance it resembles a eucalypt and is often not noticed for this reason. In cultivation it is extremely hardy and will flower within two years. The flowers are quite small and pale lemon. Seed germination is rather poor though results have been somewhat variable. A natural bushy shape is attained when grown in the full sun. Photograph on page 232.

Xanthostemon formosus is a very rare species, being found on only a few creeks in the Cape Tribulation area. Unlike most other *Xanthostemon* it can be grown in semi-shade. In the wild it is a sub-canopy tree and the strange, lime-coloured flowers are often found low down on the shaded area of the tree. In dry areas of north Queensland it suffers during the dry season but should do much better further south. The new growth is very spectacular and varies from pink to purple. Photograph on page 220.

Xanthostemon graniticus. Only a few plants of this species are in cultivation at present. These were grown from seed collected by Mick Godwin (National Parks and Wildlife, Cairns) when the one and only collection of ripe fruit of this species was made. The plant in the author's garden flowered after only 18 months. It has proved to be very hardy and showed no signs of stress in the recent dry season, which was the most severe for many years. The large, stiff leaves are quite different from any other species of *Xanthostemon*. The white flowers are not very showy and the unusual leaves are its main attraction. See photograph on page 232.

Xanthostemon umbrosus will probably never be widely grown in cultivation as the seed is almost impossible to germinate and cuttings are nearly as difficult to strike. It is a small tree which grows in the very dry sandstone area near

Laura which makes it extremely hardy. The rusty brown leaves are quite attractive. Flowering is very heavy and the small white blooms make a showy display. Like most *Xanthostemon*, the tree forms a natural bushy shape.

Xanthostemon whitei is the largest species within the genus and needs to be pruned rather severely, at least twice, to reduce it to a size suitable for the garden. Growth is very rapid and tip pruning should commence immediately after it is planted. The large soft leaves are covered with rusty brown hairs and are very attractive. The mass of bright yellow flowers makes a spectacular display, though you may have to wait up to five years before the first flowering occurs. It must be grown in full sun if it is to flower. It rates as very hardy and will stand some frost.

Xanthostemon xerophilus (Jardine Penda) occurs north of Heathlands on Cape York Peninsula and is an open forest species which can withstand fire and drought. It is little known in cultivation at present but well worth trying in the dry regions of Queensland. The glossy brown to reddish brown new growth is very attractive and the bright lemon flowers are very showy. Growth is rather slow, in fact it is the slowest growing species. Seed germination is rather poor but cuttings strike readily. Photograph, page 216.

Xanthostemon youngii (Red Penda) is without a doubt the most striking of all *Xanthostemon*. The vivid red to orange/red flowers make a spectacular contrast against the greens of the rainforest. This is quite a rare plant, being found only in rainforest on old sand dunes north and south of the Olive River. In the past it has not done well in cultivation. The secret is to have it well grown in a pot before planting out. If it is undernourished and in a generally poor condition it will never recover. Flowering should occur within six years provided it is planted in the full sun. Apart from the flowers, the colour of the new growth is quite striking. Both flowers and new growth will keep in a vase for several weeks and this species has enormous potential in this regard. The cut material has the amazing ability to completely recover even after severe wilting. In a garden situation it should grow to about 3–5 m high. Photograph, page 217.

Xanthostemon 'Mt Tozer'*. This is a rare species, which is found only along creeks rising on Mt Tozer near Iron Range. In spite of the fact that the plants are often growing permanently in water it is quite hardy and can tolerate very dry conditions. All plants in cultivation at present are from cuttings as the seed has never been collected in the wild as yet. The rusty brown leaves are quite attractive and provide a useful contrast in flower arrangements. Pale lemon to creamy white flowers are borne in small terminal bunches and last for quite a long time. Photograph on page 217.

Xanthostemon 'Olive River'*. is a rare species and is found in the same rainforests as *X. youngii*. As a pleasant change the seed germinate very easily and quickly. Cuttings strike quite readily also. No reliable recording has been made of the flowers of this species. One collector has reported seeing a yellow flowering *Xanthostemon* in this area. Each time the author has visited this region the trees have been in fruit. The new growth is very attractive, being glossy red to red/brown. Growth is quite rapid and the plant is very hardy. ■

*These forms have been included under the species *Xanthostemon umbrosus* in the article by Peter Wilson on page 223, pending further study.

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I need your comments on the cultivation of species of *Pimelea* and good colour slides. Please assist me to compile your journal. —Editor

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Office open Tuesday/Thursday — Tel. (09) 383 1254 (24 hr answering service).

PUBLISHED BY THE SOCIETY FOR GROWING AUSTRALIAN PLANTS — NSW LIMITED.

Under the direction of the PUBLISHING COMMITTEE — Editor: W. H. Payne.

Assisted by: P. D. Leak, B. Kennedy, A. N. Rodd and P. Bailey.

Editorial Material: Editor, Australian Plants, 860 Henry Lawson Drive, Picnic Point 2213. Enquiries by mail only.

PUBLISHING COMMITTEE: D. G. Brooks (Chairman), I. Cox, P. Lane, P. Olde, R. Page, W. H. Payne, H. Stacy.

Address all **non-editorial correspondence** to: SGAP Publishing Committee, P.O. Box 410, Padstow, NSW 2211.

NON-MEMBERS: Annual Subscription (4 issues) — \$15.00 within Australia; \$A27.00 overseas. Add the equivalent of \$A6.00 if not remitting in Australian currency.

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Cycad of Northern Territory