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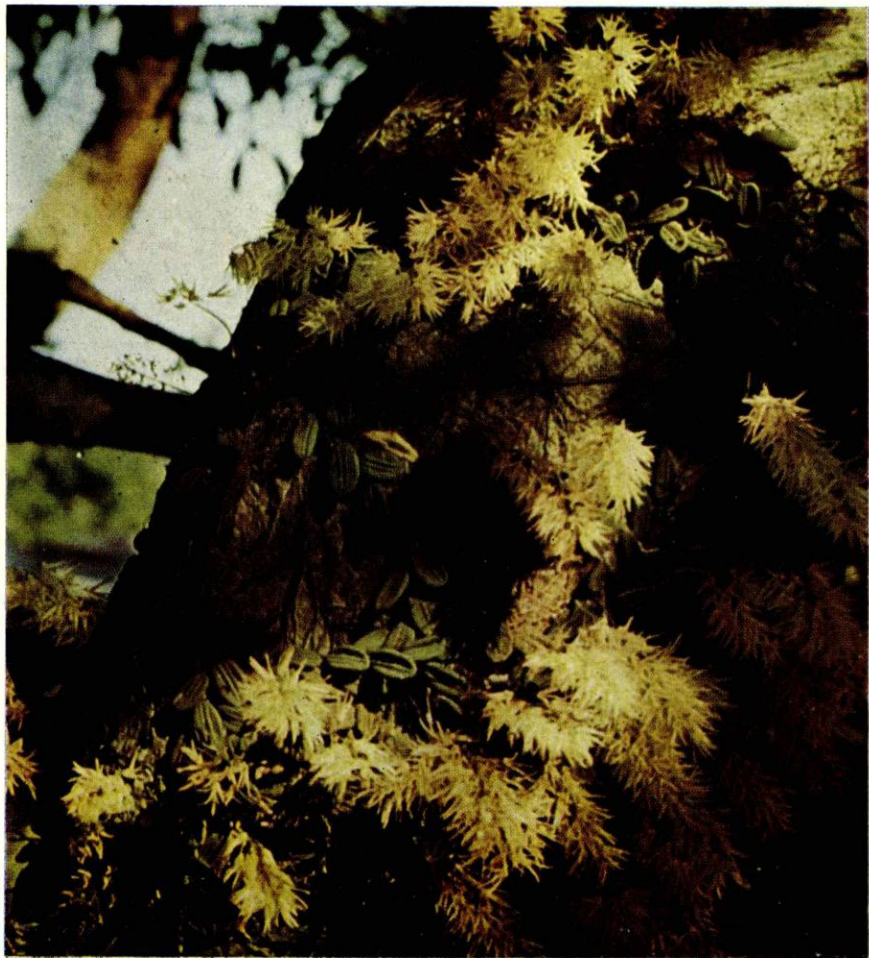
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Colour photography by Keith Holmes

THUMB-NAIL OR TONGUE ORCHID

THE CULTIVATION OF QUEENSLAND ORCHIDS is given from page 18
QUEENSLAND WILDFLOWERS and their cultivation in YOUR GARDEN

The cultivation of AUSTRALIAN ORCHIDS in Queensland

CONTENTS OF THIS ISSUE

The principal theme of this issue is the cultivation of wildflowers in Queensland and the use of Queensland wildflowers in gardens in other States. Following issues will present the wildflowers of Tasmania, South Australia, N.S.W., W.A. and Victoria, possibly in that order. The eight issues of two years are bound and offered for sale as a book and as such are complete without it being necessary to have the preceding volumes to take full advantage of the information published. This issue is the first of Volume No. 5 and for those who would like to know what is in Volume No. 4, the index is on pages 23-26.

QUEENSLAND WILDFLOWERS

It would be impossible to present the flora of Queensland (or those species of horticultural value) in a small book. Previous issues have presented many hundreds of them and those described in this issue are:

- ACACIA—"Wattle Trees"—The Cultivation of Queensland Species of Acacia—page 15—44 species.
 BOTTLE TREE—*Brachychiton australe* and *B. rupestre*—page 14.
 DROSERIA—SUNDEWS—Growing *Drosera binata* and *D. pycnophylla*—page 33.
 EUGENIA WILSONII—A very fine red "lily-pilly"—page 20.
 OREOCALLIS—QUEENSLAND WARATAH—The Genus, page 5; TREE WARATAH, page 4.
 QUEENSLAND NUTS, *Macadamia*—page 29. Fine trees with commercial value.
 RHAPHIDOPHORA PINNATUM—page 10. A climber of the rain forests.
 RHODODENDRON—Australia's only *Rhododendron*—page 48.
 ROCK GARDEN PLANTS—Fourteen small plants for a rock garden are described—page 13.
 SCAEVOLA TACCADA—A large bush from the north—page 12.

QUEENSLAND ORCHIDS

In this sphere Queensland surpasses all other States. The articles on three species of *Dendrobium* is the first in a series on all the Australian *Dendrobium* species.
 DENDROBium ORCHIDS—*D. cucumerinum*, *D. linguiforme* and *D. wassellii*—page 16, 18 & 19.
 PTEROSTYLIS IN BRISBANE—page 19.

OTHER AUSTRALIAN WILDFLOWERS

- ANNUALS—Blue flowered. *Brachycome*, *Trachymene*—page 9.
 EVERLASTINGS, *Helipterum manglesii*, *H. roseum*, *Helichrysum*—page 8.
 EUCALYPTUS CINEREA—A "gum" suitable for street planting or as a specimen—page 35.
 JACKSONIA—Yellow pea-flowered trees of W.A.—*Jacksonia floribunda*, *J. furcellata*, *J. lehmannii*—page 47.
 SCAEVOLA AEMULA—A wildflower of Victoria that has proven itself in gardens—page 11.
 STURT'S DESERT PEA—page 9.

GROWING WILDFLOWERS

This is the principal objective of this publication. All articles have a section on the cultivation of the plants described. Of particular interest are the following articles:
 GROWING WILDFLOWERS IN QUEENSLAND—page 3.

PHYSIOLOGY OR IRON CHLOROSIS—page 27. A serious problem in the establishment of many wildflowers appears to be iron chlorosis as mentioned on page 4 on *Oreocallis*.

PROPAGATION OF WILDFLOWERS

Although nurserymen specialising in the supply of wildflowers are listed readers are urged to try propagation of their own plants. Many are quite easy. Advice on propagation is given in the articles for the species described there but special articles for your advice are:
 PROPAGATION OF NATIVE PLANTS—page 21.
 WILDFLOWERS FROM SEED—page 7.

Dendrobium linguiforme (Cover Plate)

by Keith Holmes, Kempsey, N.S.W.

The plant of *Dendrobium linguiforme* shown on the front cover was fastened with fencing staples to the bark of a "Small Leaved Fig", *Ficus eugenioides*, over twenty years ago. The original plant consisted of two stems with a dozen or so leaves. Today the plant covers over ten square feet of the fig tree and in early November is covered with hundreds of feather-like sprays of fragrant flowers.

This species of fig has proved a good host for many species of *Dendrobium*, particularly *D. speciosum* var. *hillii* and var. *gracillimum*, *D. gracilicaule*, *D. pugioniforme*, *D. teretifolium* and *D. aemulum*.

For further details on *Dendrobium* turn to page 16.

AUSTRALIAN ORCHID PHOTOGRAPHERS

It seems a tragedy but Alice Dockrill's book "Australian Orchids" due to be released next year will not be adequately illustrated in colour because I cannot get suitable colour slides. Please photograph rare orchids at every opportunity. There must be some good slides if the owners would only stand by us. The next article in the series on *Dendrobium* will describe and illustrate the section *Lataurea* containing *Dendrobium batrdianum* and *D. bifalce*. Please forward slides of these—Editor.

GROWING WILDFLOWERS

IN QUEENSLAND by *David Hockings*

Queensland broadly speaking, has 3 wet Coastal belts (1) The Border to Noosa; (2) Mackay, Proserpine and (3) Innisfail, Cairns. There are also two dry Coastal sections, (1) around Rockhampton and (2) around Townsville. There are the Coastal Ranges and the Great Dividing Range and then there is the Inland, west of the Divide, which can of course be further divided into several Sections.

On the coast the soils vary from deep sands through gravels and gravelly clays to shallow soil overlying heavy clay and to low-lying poorly aerated soils subject to waterlogging. There are areas of red soil on the ranges and Coastal hills and where these drain freely they are ideal for a large range of native plants.

The inland soils range from heavy clays such as the black soil plains to deep sands and here and there the old eroded remnants of hills or ranges that are mostly sandstone or ironstone gravel.

The Coastal soils are mainly acid in reaction. The limiting factors to cultivating native plants seem to be mainly physical, in other words drainage or aeration. The high humidity however limits some of the species from low rainfall areas, particularly the low rainfall parts of West Australia. Possibly the reason some of these plants are so susceptible to foliage diseases here in our hot wet summer is due to the fact that they are normally dry in summer. These plants, the flowering gums, *Verticordias*, some of the *Melaleucas* and so on, also suffer on the ranges and Coastal hills for the same reason—high rainfall and humidity.

West of the Divide you find the heavy soils are mainly alkaline, the sands along the waterways may also be alkaline because of the high lime content of the water. The cypress sand ridges and gravel ridges are mainly acid to strongly acid. These gravel ridges carry a wealth of top quality flowering shrubs as do some of the sandy areas.

Unfortunately though understandably the human population dwells mostly on the heavy soils because of their greater fertility and productivity both agriculturally and pastorally. From a gardening point of view these soils pose several problems. Firstly they are alkaline and the majority of our shrubs prefer acid soil conditions. There appears to be more scope or more tolerance to alkalinity amongst trees such as some of the flowering eucalypts. Secondly, the physical conditions of these heavy clays are very hard on plant life. They are extremely wet in the wet season, extremely dry in the dry with periodic droughts and dryness may be accompanied by deep and extensive cracking. A third factor is the temperature range, high summer temperatures and very low humidity and yet heavy frosts in winter. Many of our Coastal plants are quite useless west of the Divide even though some of them survive Coastal frosts reasonably well.

If you look at a temperature graph you will see that coastal frosts here are of short duration—the temperature drops down to freezing and quickly back up again. Inland the temperature may drop below freezing at 9 or 10 at night and stay below freezing until daybreak. It is the duration of the frost that does the damage. In spite of this where soil conditions west of the Divide suit the plants there has been a greater measure of success with a

TREE WARATAH

OREOCALLIS IN SYDNEY by H. M. Hewett, Plant Recording Officer, N.S.W. Region

Both *Oreocallis wickhamii* and *O. pinnatum* have been grown to a limited extent in Sydney where they form small trees up to 25 ft in height with dense crowns of attractive foliage. During the flowering period of late spring to mid-summer when they adorn themselves with masses of brilliant crimson terminal "Spider" flowers, like giant blossoms of *Grevillea pumila* they are truly magnificent and fully justify the colloquial name of "tree Waratah".

The best example of *Oreocallis wickhamii* with which I am acquainted has been grown in the Sydney Royal Botanic Gardens. It is approximately sixteen years old and grows in a sunny and relatively protected area in a soil of sandstone parentage enriched by application of humus, although no



Photography by M. Hodge

OREOCALLIS PINNATUM

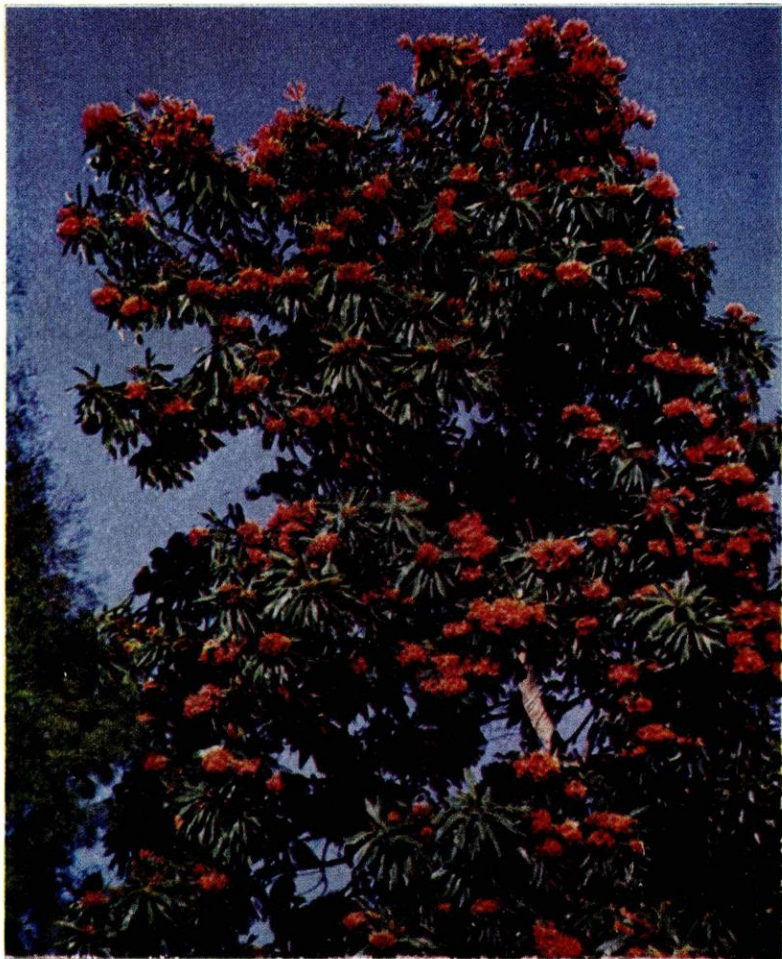
Above are the flower heads characteristic of *Oreocallis* and opposite is a specimen tree in full flower. The main superficial difference between the two species is in the leaf shape. Both species show a tendency to iron chlorosis in the early stages and for this reason an article "Physiology of Iron Chlorosis" is included on page 27.

(Continued on page 36)

QUEENSLAND WARATAH

by Merv Hodge

The two species of *Oreocallis* must surely be rated among the best of Australia's many beautiful rainforest trees. At first I found it difficult to understand why more of them are not grown in Brisbane gardens. Now that I have attempted to grow both species I realise why perhaps *Oreocallis pinnatum* is not as popular as expected but I am still puzzled about *O. wickhamii*. I doubt that size would have deterred many, because other



Photography by M. Hodge

OREOCALLIS WICKHAMII

trees of similar proportions are quite popular in home gardens. Both species are reputed to attain a height of 60-80 ft. and a trunk diameter of more than 2ft. in their natural habitat but specimen trees in the garden rarely exceed 30 ft.

Oreocallis wickhamii grows naturally in heavy soils in hot wet coastal lowlands and eastern slopes of the ranges of tropical Queensland. It

produces a soft durable wood known in the trade as "Satin Oak" or "Pink Silky Oak". Attempts to grow *O. wickhami* have produced more encouraging results than *O. pinnatum*. The only three failures known to me were growing in dry positions. One was propagated by cutting and the other two were seedlings.

The following information was collected on four specimens growing in Brisbane:

1. An 11 year old specimen 25-30 ft. high, planted when two years old and commenced flowering when eight years old. It is growing in sandy soil on a very slight slope. The tree is taller than the shrubs in its immediate vicinity and is well covered with foliage. Flowering has improved each year and in its latest effort it carried flowers from June to November. It has set a fair quantity of seed.
2. An 11 year old specimen 25-30 ft. high, planted when two years old and commenced flowering when eight year old. It is growing in heavy soil among other tall trees. The flowers and foliage are restricted towards the top of the tree. The last flowering season, approximately two months, was during September, October and November. It has not set seed yet. Others planted seven years ago in the same property have not shown the same progress.
3. A 10 year old specimen 8 ft. high planted in sandy soil in the same property as the plant of *O. pinnatum* mentioned below. It is growing in an open position and carried its first flower last season.
4. A 3 year old specimen 7-8 ft. high planted in 12 to 18 inches of soil over heavy red clay. Two doses of iron chelates were applied soon after planting to correct chlorosis (probably caused by depletion of nutrients in the potting soil). Watering was gradually tapered off over a period of a few months and now it relies mainly on natural rainfall. It was mulched with 3-4 inches of bark chips when planted. There are signs of insect attack on some of the foliage but it appears to be only a minor problem. The pH of the soil sample taken nearby was 6.5.

The juvenile foliage of seedlings of *O. wickhami* varies. On some it is similar to the adult tree and on others it is lobed and very similar to that of a Firewheel Tree (*Stenocarpus sinuatus*). Specimen No. 4 above still carries lobed foliage.

Oreocallis pinnatum is found in the elevated, high rainfall areas from Dorrigo Plateau to the MacPherson Range. Although the northern limit of natural occurrence of this plant is close to Brisbane it has proved to be a difficult plant to establish here. Success with this species has been reported in mountainous areas near Brisbane.

I know of two successful specimens of flowering age in Brisbane growing in the same garden. They are 10 years old, 12 ft. to 15 ft. high, and commenced flowering when 5 years old. This garden is almost flat and has a good depth of sandy soil. Others attempted, including one established specimen 2 ft. high, died during hot dry periods. The two survivors were planted in exposed positions but were well watered in the early stage. Flowering usually takes place in November to December and lasts about one month. They have shown reluctance to set seed but hand pollination has proved successful.

I have attempted ten to fifteen *O. pinnatum* in my garden with disappointing results. The soil varies in depth from a few inches to eighteen

inches over deep, red clay, on a moderate slope facing west. The pH of the soil varies between 6.0 and 6.5. I altered the treatment given to each new plant when it became apparent that it was going to be difficult to establish. It appears to appreciate an adequate supply of water but I feel that overwatering on this clay soil caused the death of some plants. Dry conditions particularly in hot exposed positions accounted for other losses. A few died in containers but other losses occurred during periods of a few weeks to six months after planting. An analysis of the roots of one plant revealed a species of phytophthora, a soil born fungus. I have two surviving specimens in sheltered semi-shaded well-drained positions. The potting mixture used for these plants was coarse sand and peat moss. I am of the opinion that rather rich soil used in a potting medium for some of them contributed to the death of at least two of the preplanting losses. Two plants using the sand and peat moss mixture were lost but they were planted in dry exposed positions. Usually the first sign of trouble is chlorosis and once this occurs there seems to be only a slight chance of survival.

As a matter of interest, where *O. pinnatum* and *Telopea speciosissima* have been tried together the results have been similar and it may be that if success is achieved with one there is a good chance of growing the other. This similarity prompted me to try a method recommended for Waratah in Vol. 3, page 15 "Australian Plants". One seedling was planted in a mound of soil as specified to shed excess water, and although it has shown very slow progress it has survived longer than most of the others attempted.

One grower recommends fresh seed because the viability decreases rather rapidly. Another uses only fresh seed and reports tend to confirm that fresh seed is desirable. *O. pinnatum* has been successfully propagated from cutting.

WILDFLOWERS FROM SEED

by Gaye Reeve, Woody Point, Qld.

With limited material and experience I have found that one can have a great deal of success with the germination of seeds. The method I use is similar to the "cotton-wool sandwich" method ("Australian Plants", No. 12, page 17). But instead, I used the absorbent type paper napkins as a medium, as the radicle can become entangled in the cotton-wool and break off when the seed is removed.

By this method I have successfully propagated *Eucalyptus*, *Casuarina* and several types of hard testa seeds including acacias. The soft testa seeds need only be placed between the moistened "sandwich". Hard testa seeds are best prepared before doing this. Covered with hot water, left overnight to soak, the outside skin will soften and the seed may swell. The seed is then nicked carefully, at its pointed end, just enough to allow moisture to penetrate and the radicle to escape.

I experimented with this method during the summer. The container of seeds was kept on a sheltered verandah, the roof of which is unlined and becomes very hot in the afternoons. Apart from the interest of watching the seeds sprout, the results were most gratifying.

Growth was fast and on an average the radicle reached $\frac{1}{2}$ " in length four days from commencement. At this stage they were planted out in individual pots, under the influence of more intense light, not direct sun.

Other details of propagation are given on pages 10, 11, 21.

NATIVE ANNUALS

by Ann Hamilton

For a SPRING FLOWERING DISPLAY in the garden, why not try the native annuals available commercially. City chain stores have seeds and country stores could probably order them from Yates.

Sturt's Desert Pea, *Clianthus formosus*; Swan River Daisy, *Brachycome iberidifolia*; Acroclinium, *Helipterum roseum*; Didiscus, *Trachymene* sp.; Straw Flower, *Helichrysum* sp., all add colour to the garden.



Colour photography by K. Hubner

PINK EVERLASTINGS

The upper flowers are *Helipterum roseum* commonly called "Acroclinium". The lower flowers are *Helipterum manglesii*, commonly called "Rodanthe".

The No. 19 issue of "Australian Plants" describes many annuals in the large plant family of Compositae. Those for which seed is readily available are: ACROCLINIUM grows to 12". Leave 3 plants to a pot and plant at 9" centres. Flowering period is prolonged if spent flowers are nipped off.

RODANTHE is usually a smaller daintier plant although in lush garden conditions can grow to two feet. The silvery outer bracts merge into the rich pink ones of the flowers that can be up to 1½" diameter. The buds are hanging but on opening, rise and face the sun. Leaves are heart-shaped and stem clasping.

HELICHRYSUM garden hybrids grow from 2' to 4', sometimes bushy, sometimes tall. Leave 2 plants to a pot and plant 15" apart. Nip off spent flowers. There are many species of *Helichrysum* throughout Australia and some are not quite as leafy as the garden hybrids marketed. Why not try to grow some of the everlastings from your own area?

BRACHYCOME grows to 9". A soft little plant with small plentiful flowers, blue, mauve and white. Leave 6 seedlings to a pot and plant clumps 9" apart in groups or rows.

Annuals that do not belong to the family *Compositae* are:

TRACHYMENE—The Rottnest Daisy, grows to 18". Leave 3 seedlings to a pot and plant at 18" centres. Nip off flowers as they fade, flowering declines as seeds form. This plant was formerly known as *Didiscus* and seed could still be labelled this.



Colour photography by Frank Hurley

Blocks by courtesy of John Sands Pty. Ltd.

THE ROTTNEST DAISY—*Trachymene caerulea*

STURT PEA—*Clianthus* often difficult. Each seed should be nicked or filed. Pour boiling water on the seeds and soak overnight. Germination starts very quickly. Sow 3 seeds to a pot, or straight into the ground if constant attention can be given to keeping the spot moist. It is not likely to succeed in less than 3' depth of porous soil with perfect drainage. It is subject to mildew in Brisbane and should be dusted with sulphur at the first signs, not easy to detect on the grey leaves. Watering round the roots is better than overhead watering. At best it may make runners 4' long, 9" high, so it may take up space, but will run through shrubs in the sun.

Planting the Annuals

The spacing given above, with luck, gives a patch of colour. Temperate climate plants tend to grow bigger, and appear less floriferous, here. The plants mentioned may well be more compact further south. Timing also is for northern gardens. Early spring is July, August and flowering goes off in October as the sun gets hotter. Soil is ordinary garden soil. In my case a dry stony shaly ridge built up over the years with manure, compost sand, sawdust and various organic fertilisers, Fish 4 etc. In its natural state it is deficient in all elements and about pH 6.5. When planting new treasures one tries to simulate likes and known dislikes to get them off to a fair start, but in the end it is a matter of adaptation and survival.

All of these annuals need sun and regular water to soak down to the lowest roots. Surface watering is useless. In the early months nip out the tips to induce flowering laterals. All respond to light fertilizing. Mulch the surface with leaves or gravel to reduce evaporation.

Grow Annuals from Seed

Seeds should be sown in March or early April in 4" plastic pots of friable soil. Shelter from heavy rain. All of these seeds germinate quickly and must be kept growing steadily to get flowering plants by early spring. Water by standing in water up to the level of the soil in the pot until it is saturated and remove immediately for draining. Sow the seed thinly, a packet should do about 12 pots. Pull out surplus seedlings if necessary, do not try to separate. Plant the whole pot full, with the minimum root disturbance when plants are 3" or 4" high.

Rhaphidophora pinnatum

by L. P. Butt, Brisbane, Qld.

This giant climber of the North Queensland rain forests is equally as good as many of the exotic Philodendrons which it resembles. Until recently the plant has been known as *Epipremnum pinnatum*. I have seen this plant twined around many a scrub tree and rain forest palm. In fact in one particular spot near Tully it intertwines itself in a great mat of leaves to a height of about forty feet.

The glossy leaves are pinnate at an early stage and in maturity are somewhat like a long narrow version of *Monstera deliciosa*. One special characteristic of the leaf is the row of "pin holes" which run parallel up each side of the mid rib. The stems are of a dark green, rather coarse and roughened to the touch, with aerial rootlets all along its length. Although this is a rampant climber this is hardly ever the case around Brisbane, but it will grow into quite a nice trellis subject in time. As a trellis or pergola subject, the beauty is initially in the foliage. The flower appears only on a very mature plant and is cream in colour and very similar to flowers of *Monstera*.

The main problem seems to be establishing the cuttings. This is best done in moist sand and the cuttings best taken about September-October. Cuttings taken as late as early Autumn will grow but the striking of these is naturally a bigger problem.

Scaevola aemula

by Ann Hamilton

This plant has proved a good garden plant for Brisbane, after several years of testing. It is hardy in average garden conditions with average regular watering. It is a good cut flower. It flowers profusely for four months or more, starting in August-September. It is available commercially from specialising nurseries now, in limited quantities.

Plants in Brisbane are derived from a plant I brought back from a nursery in Canberra in September, 1963. Growing in South Australia (native), Canberra and Brisbane indicates a high degree of climatic and soil tolerance. It is flowering satisfactorily at this time in several Brisbane suburbs in varying soils.

It is a decumbent plant—elliptic, toothed leaves, 1"-2" long, with spikes of 1" flowers of 5 bright mauve petals fanning out from a white and yellow base. It sprawls and creeps on the ground except for the terminal flower spikes which stand up 10" high. When cut the flower spikes remain rigid for arranging and last two weeks. The second week the newly opened buds will be paler and it is better to shorten the stems and re-arrange in fresh water.

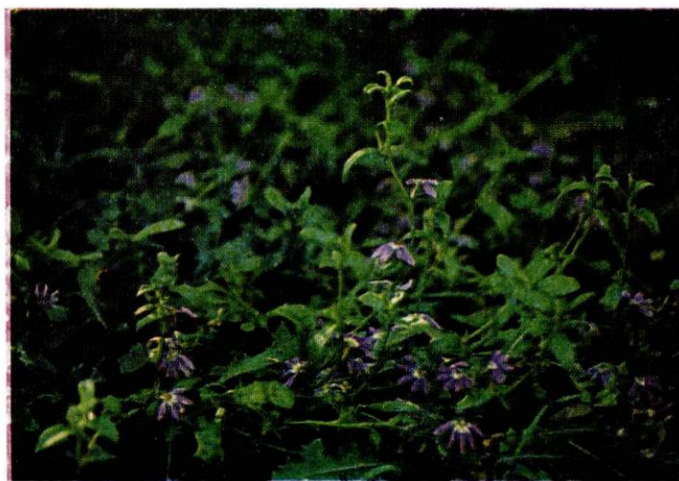
The leaves and stems are soft, so obviously it needs regular water to maintain them. It will not stand draught, though it can be nursed back to impaired health after temporary wilting. It is not a plant for that hot, dry, neglected spot. It will stand even the hot midday sun in Brisbane without wilting, providing the soil is reasonably moist. It flowers best with a fair amount of sun, moving shade from tall trees is ideal. At the beginning, I planted it in the semi-shade or early morning sunshine required here by many temperate climate plants. This was a mistake, plants are much more vigorous and floriferous in more sun. It responds to occasional Aquasol. It has never set seed in my garden. I propagate from cuttings.

The best cuttings are unflowered tips or laterals about 3" long from new growth. I have struck much less ideal pieces at all seasons except mid-winter. To have a sizeable plant ready for flowering in mid-August, to take advantage of the maximum flowering season, it is necessary to take cuttings at least in early March, since they may take up to 3 months to make good root. I have 2 plants, 3' across with many flower spikes, in their second flowering season. Plants are possibly not long lived, so it is desirable to keep cuttings coming along. Flowering is prolonged if scraggy flower spikes are shortened back to induce new laterals. In summer after flowering is finished, stems should be cut back as far as possible while retaining some leaves, and kept watered to stimulate growth for the new season.

If you do not have a misting apparatus, or a closed propagating box, try my method. I use 2" terracotta pots filled with a mix of "humic" potting soil plus extra coarse sand, with a few crushed gum leaves in the bottom of the pot to prevent the soil from drying out. I stand the cuttings in F20 overnight and then firm the individual cutting in each pot by immersing in weak Aquasol. I stand the pots in ¼" of water in a large terracotta saucer

and cover completely with clear plastic. It is necessary to keep the plastic off the foliage so I use an old wire basket inverted. Water is added as necessary to the saucer. Stand out of the sun, but in good light. Do not mistake elongation of the stems for true growth. It is unlikely that roots will form before four or five weeks. By inverting the pot and tapping gently the ball of soil and the undisturbed cutting will slide out on to your hand. If roots are showing around the sides, the ball can be planted into a 4" pot in good potting soil. If not, put it back under cover again. Plain sand may disintegrate in your hand, but the addition of some humic soil will usually hold firm enough to get it back undisturbed. It is essential to keep the foliage turgid. The cutting will usually collapse if the cover is left off. Several cuttings around a larger pot can also be satisfactory, in the more usual way, but a complete cover with a plastic bag is necessary until rooting takes place.

After re-potting, do not let the young plants dry out. Do not plant out until it is growing vigorously and keep watered until it is well established. Tips can be pinched out until May. The more laterals that grow, the more flower spikes.



Block donated by N. B. Thompson.

FAIRY FAN FLOWER—*Scaevola aemula*

Scaevola aemula is very widely grown as garden plant being quite hardy and reliable. This colour slide was taken in the Grampians in Victoria. It appears that a name, *S. macrocarpa* has been applied to forms of this plant in error.

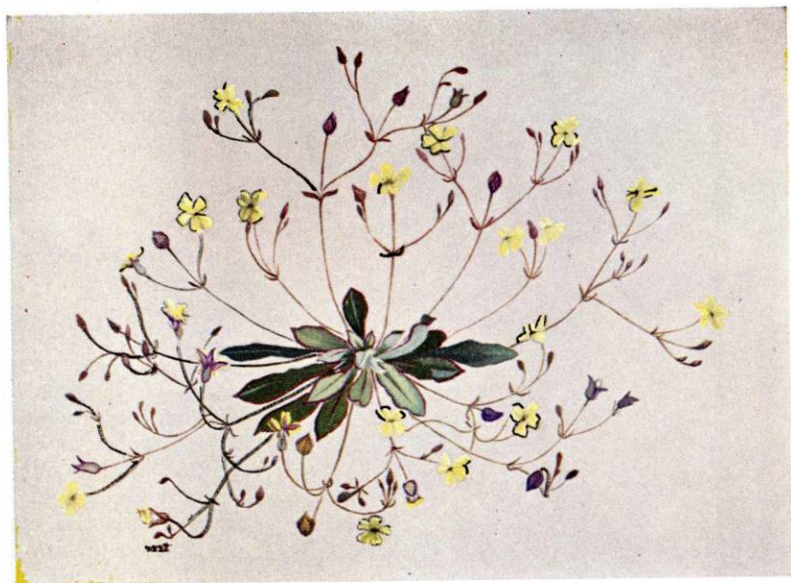
Scaevola taccada—A note by Vera Scarth-Johnson

This plant is a large bush with white flowers followed by white berries. It grows just above high water mark on the sea-shore of central and northern Queensland.

ROCK GARDEN WITH A POOL

by Vera Scarth-Johnson, Alloway, via Bundaberg, Qld.

May I suggest suitable plants for a small rock garden with a pool? The first three are bog plants. *Lobelia membranacea* is a very small straggling plant with many small vivid, blue flowers. *Stylidium debile* is a small pink trigger plant with almost spoon-shaped leaves. *Mimulus repens* is a small creeping plant, the flowers having a blue corolla with a yellow centre. Others for this tiny pool and its banks might be *Drosera spathulata* and *Viola hederacea*. For the water itself, a nice small water lily is *Ottelia ovalifolia* (three white petals, red towards the centre). For further back onto any soil and rocks *Lobelia gracilis*, *Pelargonium australe*, *Swainsonia* spp., *Glycine tabacina*, *Wahlenbergia* sp., *Grevillea leiophylla*, *Gompholobium pinnatum* (very easy from seed or cutting), *Stylidium serrulatum* (might be too big as it grows up to one foot) and *Velleia spathulata*. All these do best in their natural conditions in poor soil and filtered sunlight, but warm.



Reprinted from "Wildflowers of the Warm East Coast" by Vera Scarth-Johnson by permission of the Jacaranda Press.

WILD PANSIES—*Velleia spathulata*

Velleia spathulata makes a nice compact little plant and grows best in low-lying damp spots. It also makes a good indoor decoration if the plant is taken in its entirety and placed in a low bowl. The flowers last a long time on stems 6-8 inches.

For a larger rockery *Hardenbergia violaceae* and *Pimelea linifolia* keep fairly small and compact if grown in full sun, as does *Phebalium woombye* pink form. *Micromyrtus* sp. looks wonderfully small and graceful.

My garden soil is rich red forest loam, and nearly all the plants I try come from poor, sandy or stoney soil, so I grow them close together and don't fertilize but mulch with clippings, garden rubbish etc. and never water except in the worst drought.

Editor's Note: This article follows one in the last issue of a garden pool in Mareeba, North Queensland.

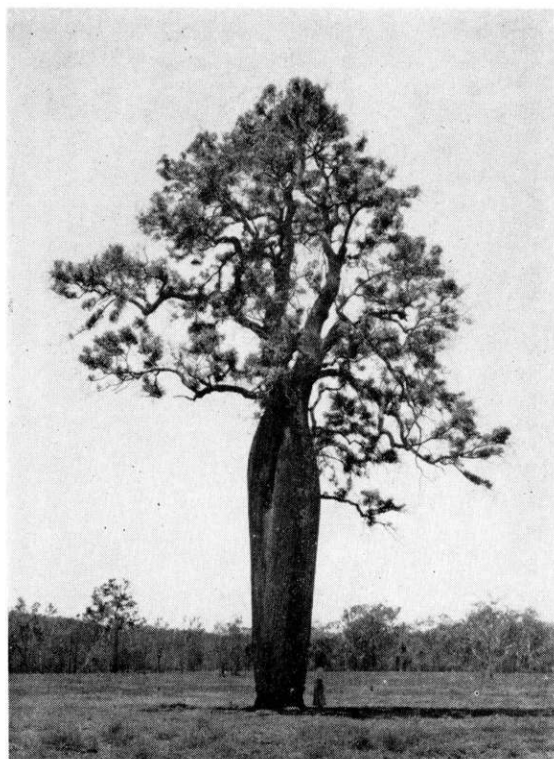
BOTTLE TREES

Contributed by F. M. Officer, Gordon, N.S.W.

Bottle trees (*Brachychiton* spp.), which are native to Queensland, are so called because of their shape, as their trunks bulge out from ground level then gradually taper until they branch out.

There are two species, *Brachychiton australe* and *B. rupestre*. In both species the leaves are readily eaten by stock and the wood is a very open grain with soft fibres.

According to the botanist J. H. Maiden, the aborigines ate the succulent roots, and liked a gummy substance like tragacanth found in the stem. They also made nets from the fibre and F. M. Bailey adds that they ate the seeds.



Brachychiton rupestris

THE BOTTLE TREE

This tree is growing a few miles from Callide between Rockhampton and Biloela.

These *Brachychitons* can grow quite tall. I have seen several of both species fully 20 feet high, and one *B. rupestre* with a girth of 18 feet at 7 feet from the ground and 35 feet high. An old *B. rupestre* in the Murray Memorial Garden in Parramatta Park has a full height of 15 to 20 feet. I could not find out the age of this particular tree, but the former ranger, Mr. C. A. Sim, told me that it was

transplanted about 1909 from the old Dispensary Hall in George Street to make way for the Manchester Unity Office. It was big and heavy enough when being unloaded to tip the cart so much that the horse harnessed to it was lifted off the ground.

The tree was split in the moving and in 1923 when Mr. Sim took office he cemented up the crack. The tree is still flourishing. Mr. Sim planted two *B. rupestre* near the ranger's cottage in 1927 and they are now nearly 6 feet in girth and about 25 feet high.

A young *B. australe* on my son-in-law's property on the Dawson River in Queensland has grown to about 12 feet in 12 years, which gives some idea of the rate of growth.

WATTLES

THE CULTIVATION OF QUEENSLAND SPECIES OF ACACIA

(Lecture given by Mr. L. Pedley, October, 1966)

Little is known about Queensland wattles in their native habitats and much less is known about them in cultivation. The genus *Acacia* is a huge group of plants distributed throughout the world though most species are found in Australia, and it is here that the phyllodineous species are concentrated. Phyllodes are merely modified leaves and present no problems to anyone cultivating wattles. Species with true leaves do occur and I have a little to say about them later.

One of the major groups of *Acacia* contains those with flowers in spikes. Many of these occur in tropical Queensland and I hope some of these will eventually be cultivated. There are about 600 species in Australia, and more than a quarter of these are found in Queensland. I shall not go through all the species as many are unattractive and not worth growing, and others are extremely rare.

From my work with wattles I know something of their requirements with regard to soil and water. It is impossible to predict how some species will behave when cultivated, but a knowledge of a plant's natural habitat may prevent growers attempting the impossible. It is well to note how our climate differs from that of southern Australia. Such commonly cultivated wattles as *Acacia pycnantha*, *A. buxifolia* and *A. baileyana* (which was described from a plant growing in Brisbane) probably will not thrive here as they come from areas with a predominantly winter rainfall.

Within the State too there are areas which are markedly different from the south-eastern corner, notably the Granite Belt and the tropics. I will deal with plants from these areas separately. Many fine wattles grow outside these areas and many of them will probably grow well here.

Wattles are usually regarded as plants of sunny, open situations with free-draining soils. With the possible exception of a couple of rain-forest species wattles do like an open situation, but not all prefer well-drained soils. There is a group of closely related species (some of them undescribed) which grow on heavy soils in inland Queensland. Probably the best of these is Myall, *A. pendula*, a greyish tree with beautiful weeping foliage, though others worthy of mention are Brigalow, *A. harpophylla*, Gidyea, *A. cambagai*, and Boree, *A. cana*. All of these are rather large and would be rather a nuisance in anything but a large garden. A smaller species with weeping foliage and attractive red arils is Willow Wattle (*A. salicina*), a very widely ranging species.

A few species prefer intermediate soils and the two species I call to mind are well worth cultivating. They are Gundabluey, *A. victoriae*, and *A. decora*. The latter is especially attractive.

The remaining species are all found on light soils. I could give a long list, but will select some and give a few notes which may be helpful.

DENDROBIUM ORCHIDS

An article in a series on the genus *Dendrobium*—Family Orchidaceae
by I. D. Walters

PART 1 — SECTION RHIZOBIUM OF GENUS DENDROBIUM

This section of the Genus *Dendrobium* is characterised by having rhizomes, or stems, creeping, or pendulous and elongating, with scarious sheathing scales. Leaves solitary, fleshy. Inflorescence few to many flowered, flowers usually whitish, with narrow segments.



Colour photography by Eric Gordon

DENDROBIUM CUCUMERINUM

The plant is shown $1\frac{1}{2}$ times full size. It is very difficult to get slides that will reproduce with the flowers just the right size. Over enlargement is very undesirable but plates that do not show any flower detail are also of little value. So as not to mislead the reader this plate should be viewed in conjunction with that of *Dendrobium linguiforme* on the front cover. The flowers are comparable in size. Both *D. linguiforme* which has tongue-shaped leaves and *D. wassellii*, which has rather long somewhat cylindrical but grooved leaves, have more elongated inflorescences with the flowers arranged along them and the sepals and petals do not have the pronounced striping as on the species above.

THE GENUS DENDROBIUM

It is proposed to present to the reader in alternate issues, the whole genus *Dendrobium* in a series of articles such as this. We desperately need good colour slides to adequately illustrate this series. If you have good colour slides please forward to the editor for inspection. If you are a competent photographer and have a rare *Dendrobium*, photograph it at the first opportunity —Editor.

Dendrobium cucumerinum. Rhizome creeping, often forming large masses on tree trunks and limbs. Leaves solitary, oblong, fleshy, about one inch long, marked with longitudinal raised tuberculate ribs to give the appearance of a small cucumber. Inflorescence short, few flowered. Sepals and petals yellowish white streaked with reddish purple, about $\frac{3}{4}$ inch long. Lateral sepals twisted, the dorsal sepal and petals flat, recurved. Spur short and conical. Labellum shorter than sepals, lateral lobes prominent, almost acute. Mid-lobe of labellum ovate, short, acute, much recurved, the edges undulate crisped. The disc with 3 or 5 longitudinal keels, very undulate on mid lobe. Labellum white with red purple spots, keels brownish.

The "Cucumber Orchid" is cultivated under similar conditions to the "tongue orchid" and because of its unique appearance, attracts more attention for its leaves than for its somewhat insignificant flowers.

Dendrobium wassellii S. T. Blake. This is a little known species from Cape York. The rhizome is long, the plants scrambling over the trunks of trees on the edge of rain forest. The leaves are solitary, to several inches apart, fleshy, erect, cylindrical or somewhat angular, with a blunt point. The inflorescences are produced from the base of the leaves and are erect, many flowered, to about eight inches long. Flowers are white, the sepals and petals narrow, acute, about $\frac{3}{4}$ inch long to one inch long. The labellum is not quite as long, narrow, the lateral lobes small, erect. Midlobe of labellum about $\frac{1}{2}$ inch long, recurved, somewhat broader than sepals, the edges undulate-crisped. All segments white, with some red-purple staining on lateral lobes and column. Labellum keeled.

The flowers are similar to those of *Dendrobium linguiforme*, but are somewhat larger and are produced on a longer raceme, which is more densely flowered. The inflorescence is cylindrical, the flowers not drooping under their own weight.

The species has been grown successfully in a shallow pot in oakbark and also quite well on a slab of tree fern, in moderate shade. It seems to require plenty of water when growing but of course requires good drainage at all times.

Dendrobium linguiforme Sw. The type species is found in N.S.W. and southern Queensland, the variety *nugentae* F. M. Bail. being the typical North Queensland form. It occurs under varying conditions, either as an epiphyte or lithophyte (rock grower) in both wet rain forest and dry scrub.

The rhizome is creeping, branched, often forming large mats. The solitary leaf is thick and fleshy, flat and wrinkled, each one usually borne close to the last one. The leaf is tongue shaped, up to 2 inches long and 1 inch wide, dark green-grey-green, sometimes flushed dark red-purple, flat on the rhizome. The inflorescences are produced at the base of the leaves, and are up to 4 inches long, erect or arching, with up to 20 flowers.

Dendrobium linguiforme var. *linguiforme*—Type form: Sepals and petals narrow, linear, lanceolate, to $\frac{3}{4}$ inch long. Labellum small, half the length of the sepals, the lateral lobes rather broad, prominent, obtuse. The middle lobe of the labellum longer than lateral lobes, narrow, ovate, obtuse, the disc with 3 prominent raised keels. The keels extend to the tip of the mid lobe, where they are very undulate.

Dendrobium linguiforme var. *nugentae*—Flowers smaller, the petals being longer than the sepals and the labellum less than half the length of the

other segments. Lateral lobes of the labellum stained red-purple. The leaves are more robust than the type form and apart from the smaller flowers, the variety agrees with the type form.

"The "Tongue Orchid" is easily cultivated on everything from old "shin bones", "ceramic pipe" to pots and treefern slabs. This orchid requires maximum moisture and drainage when growing and will take a large amount of sunlight. The var. *nugentae* has been observed with a deep red purple colouration in the leaves when grown in near full sunlight.

THUMB-NAIL OR TONGUE ORCHID

Observations on Dendrobium linguiforme by L. P. Butt

This quaint creeping orchid is especially endeared to me. It was the first indigenous orchid I attempted to grow in cultivation. Known by the usual few common names, the pick of these being "thumb-nail" or "tongue" orchid, the little dendrobium occurs from way down in N.S.W., through southern Queensland. One form is noted in the Ipswich area and a northern form var. *nugentae* occurs in parts of North Queensland.

This orchid grows a creeping rhizomous stem which branches freely. Tough leathery oval leaves sprout from along the main stem with no recognisable stalks being evident. Generally ridged lines are to be seen along the centre of the leaves, which resemble a large thick, thumb-nail. The name *linguiforme*, however refers to its resemblance to a tongue.

Dendrobium linguiforme forms a mat of stems and flattened leaves and grows practically flush against the body of its host. It occurs quite freely on casuarina oaks and some kinds of melaleuca trees. Also it is to be found growing across rock surfaces. In fact in one place known as "Diana's Bath", I have seen it growing prolifically on the sides of large boulders almost in conjunction with a certain so called "rock fern".

The flowering racemes come from the base of the leaves where they join the stem and it produces a large number of feathery white blooms which are in such profusion that quite often the plant is hidden from view by them. At Mt. Gipps in S.E. Queensland, when on a study trip with the S.G.A.P., we found it growing on tall casuarinas in a small gully. The entire branches of any note and part of the trunk of all trees was covered.

Many of our indigenous orchids are variable and judging by the several leaf forms I have found of *D. linguiforme*, I would say it is no exception. Some are chubby and nearly round, others oval, and then again some thick narrow and falcate. The last mentioned we found in districts toward Samford, S.E. Queensland.

The flowers of *D. linguiforme* have long thin sepals and petals and a small labellum. They get a pink colouration just before dying. Although my best specimen is on a casuarina branch, the growing mediums are many and it prefers full sunlight to attain best flowering potential. Length of flower racemes on all varieties I have seen is about up to 6 inches. However, the form var. *nugentae* has a marked difference in flower shape and size.

Orchid Study Section—Len Butt is the leader of our native orchid study group. One objective is to develop better forms of orchids by selection. If any reader has a plant that he considers has outstanding qualities such as size of flower, colour, vigour, etc. will they please advise. Address mail, c/- The Editor.

DENDROBES IN MELBOURNE

by David L. Jones

Both *Dendrobium linguiforme* and *Dendrobium canaliculatum* have been grown successfully by the author in an unheated glasshouse under Melbourne conditions.

Dendrobium linguiforme was first obtained about eight years ago and grew successfully in the shelter of a large cumquat tree for two years although it did not flower. It was then transferred to an unheated glasshouse where growth improved (as shown by leaf size and vigour) and the plant has flowered regularly every Spring. Further plants have been obtained since. The growing medium is tree fern slices or paperbark wraps with the plants being tied securely on for the first year. One plant in Melbourne is thriving growing directly onto moist cinder bricks which form the wall of a glasshouse. The rhizomes can be cut into three-leaf sections to induce branching and the plant responds well to liquid monures. It prefers a sheltered wall near the glass but out of direct sunlight.

Dendrobium canaliculatum grew for four years in the same unheated glasshouse. The plant grew well in spring and summer just under the glass in full sun but obviously did not like the Victorian winter. Previous experience showed that the only way to overwinter the species is to keep it bone dry and do not water until new growths are visible. Flower buds formed in several years but aborted under the conditions. Even with heat this orchid is difficult to grow and flower regularly in Victoria. My plant finally succumbed last summer from a combination of lack of water and neglect.

GROWING PTEROSTYLIS

Pterostylis in Brisbane by George Ashby

The first thing to consider is the size of the containers. I find four inch pots are most suitable if only a few tubers are to be grown. For a larger number of plants I have in use some terra-cotta pots, or more correctly, bowls made for pigeon nesting purposes. They are ten inches across by three inches deep. Holes have to be drilled in the bottom, an easy job with a masonry drill. These bowls make a fine show when some thirty or more blooms are out at the one time. As the holes in the bottom can become blocked if left on the ground, causing waterlogging and tuber rot, holes should be drilled in the side just up from the bottom, to overcome this trouble.

Drainage is most important. I use broken crocks and hardwood charcoal, large pieces at the bottom and then progressively smaller, until approximately one third of the pot is filled.

For compost I use one third part sand, which is about the consistency of sugar and is a golden colour, collected from a creek. One third old dry cow manure collected on outings (this I soak for a few days in water and then crumble it up in my hands). The larger lumps I place on top of the drainage material. A 50-50 mixture of peat moss and garden loam, make up the final one third part of the compost. This mixture is passed through a quarter inch mesh sieve, thus mixing everything together thoroughly. Before potting I moisten the compost as this helps in watering later. The pots are filled to within a half of an inch of the top of the pot with this

EUGENIA WILSONII

by Merv Hodge

During recent years *Eugenia wilsonii* has been one of the most admired and photographed plants in the Brisbane Botanic Gardens. This plant has the combination of good foliage, spectacular crimson flowers and attractive white fruits. It is destined to be a most popular garden subject once it becomes more widely known and when nurserymen build up supplies.

Eugenia wilsonii was introduced to cultivation in the Brisbane Botanic Gardens in June, 1961. A small plant was donated by Mr. Geoff Tracey, a botanist with the C.S.I.R.O. Forest Ecology Section, who had collected a few seedlings while on a field excursion earlier in the year. Mr. Tracey reports having seen this plant common on the fringes of rain-forests in North-eastern Queensland on soils derived from granite and various metamorphic rocks especially deeply weathered shales. It occurs from sea level to at least 2,000' and in zones where rainfalls from 55 to 150 inches plus per annum are recorded. It may occur as an understory shrub in simple and mixed types of rainforests which are found under such conditions but when it does it is tall to about 15' and spindly.

Observations indicated that in nature it thrives best in secondary forest often dominated by *Acacia mangium* and *Acacia aulacocarpa* and is often seen along roadsides. Prominent occurrences were noted along the El Arish-Mission Beach road at Kuranda, Danbulla, Mt. Spec, Western Kiriama and is thought to be freely growing in many similar areas in North East Queensland.

Mr. Bill Jones, a field Botanist with C.S.I.R.O., reports having seen a coral pink form of *Eugenia wilsonii* at Bloomfield. It is hoped one day to add this form to the collection of the Brisbane Botanic Gardens.

For the botanically minded F. Manson Bailey, in Part II of "The Queensland Flora", describes *Eugenia wilsonii*, F. Muell.

"Glabrous. Leaves broadly lanceolate, acuminate, 5 to 6 inches long rounded at the base with a short petiole finely and transversely pinnely. Flowers large, in a short dense terminal cyme almost contracted into a head. Calyx tube very narrow-turbinate about 4 lines long; lobes 4 rounded about 1 line diameter and nearly equal. Petals 1½ lines diameter separately deciduous. Stamens reddish-purple, the longer ones nearly 1½ inches long. Anthers small. Ovary about half the length of the calyx-tube, concave at the top and scarcely fleshy. Ovules numerous in each cell, in two rows, ascending from a pendulous placenta. Fruit ovoid, about ½ inch long narrowed at the top and crowned by small calyx-lobes. Seeds usually 2 or 3; cotyledons thick and fleshy but separate."

Gardenwise *Eugenia wilsonii* is a medium to tall loose-growing garden shrub ideally suited for semi-shaded moist soil areas. It flowers from late October to mid December in South-east Queensland and bears large inflorescences of a deep crimson colour, the stamens form to make what looks like a four inch canical shaped powder puff. The blooms form on the tips of the branchlets, their weight causes the branchlets to become somewhat pendulous. The bloom is followed by quick maturing white fruits.

Leaves are a dark glossy green, the new growth being a deep red to bronze, adds to the overall attractiveness of this garden gem.

Like most Eugenias scale infestations have been noted mainly pink wax and soft mussel scale. Use of Rogor at regular intervals has kept the plants at the Brisbane Gardens free of scales. *Eugenia wilsonii* has shown good response to regular applications of general garden fertilisers.

Editor's Note: This is such a spectacular plant it was proposed to feature it on the front cover. However the colour slide was not available in time.

PROPAGATION OF NATIVE PLANTS

by A. Hamilton of Brisbane

For SEED RAISING use containers in plastic, terracotta or non-rusting materials not less than 3" deep. Natives often make roots 3" long before the second pair of leaves. Even though the seedlings are separated while very small there is danger of undesirable root disturbance and exposure if the containers are shallower. Members who require only one or two plants will do better to use a few seeds in individual tubes or small pots of plastic or terracotta and pull out surplus seedlings. Water all seed pans from below by standing in water up to the level of the soil (not over the top of the container) until the soil is saturated and then removing for draining before the roots drown. Close covering with glass is only desirable, not essential, to keep the top from drying out. It is essential, particularly with fine seeds, to keep the top from drying out until germination. Any covering must be removed when germination starts or seedlings will be weak. Full sunlight in Qld. is too severe, keep in filtered sun or light shade. If attention cannot be quite adequate standing the containers in $\frac{1}{2}$ " of water will help, some of the water will be absorbed, some will evaporate, but the soil will keep moist with less constant attention. Small terracotta pots dry out so quickly that it is necessary to have them in at least $\frac{1}{4}$ " of water all the time.

I prefer plastic for most cuttings, 2 or 3 cuttings in individual tubes. Whether individual tubes are used or more cuttings in bigger containers, they should be kept in a cool shady place and sprinkled frequently, or in a large box closely covered with clear plastic.

Re-pot into plastic pots or tins. Length is more important than width at the top. 1" of soil, at least, is necessary below the roots of the plant being moved. Deeper rooting is advantageous to the young plant. A 29 oz. fruit tin $3\frac{3}{4}$ " across by $4\frac{1}{4}$ " deep will hold a plant satisfactorily for a longer time than 4" tapered plastic pot. A double length fruit juice or beer can will hold it longer still although they are only $3\frac{1}{4}$ " across and use less potting soil than a pot of similar depth. It is not always convenient to deal with a plant just when it is ready. It is much easier to remove plants from plastic pots than tins, but tins cost nothing and are as good provided that the bottom has been cut almost out and then pressed back into place.

Ice cream can and other tins with lids are best used upside down, with the lid on and perforated for drainage, and the bottom cut right out. It is easy to lever the lid off and push the plant out.

Before removing any plant from any container, it is desirable to immerse it in a bucket of water until bubbles cease to rise from the soil and then drain for a few minutes. Invert a plastic pot on to the spread hand, tap the edge of the pot on any firm edge and the plant will slip out. With tins, run a knife blade around the inside of the tin, prise up the bottom which has been cut, and gently push out on the hand. A third hand is a help. If the bottom has not been cut around, it is advisable to cut the tin up the side. Too many valued plants have been seriously damaged because the lower roots have adhered to the rust on the bottom or to the jagged edges of the side drainage holes and have broken when the plant has been shaken out. There is no need for additional side holes if the bottom is cut almost around.

Generally, I find it inadvisable to set out very small plants, conditions of climate and soil are seldom favourable enough. I find it safer to stage them into larger containers first. From nurseries it is better, when possible, to

buy small plants in small containers and re-pot. Even though nursery plants have been hardened in sun and rain, they are used to constant moisture conditions and shelter from wind. It is expecting much to put them into a totally different environment without help over the transition.

Often, a desired, sometimes rare, plant will be available only as an older plant which has been in a long tin a long time. A fair chance of successful transplanting requires special measures. Sometimes the roots and soil will have compacted to a solid peat-like cylinder. It is difficult to keep moist in the tin. It is useless to plant it out as it is. It is impossible to keep it evenly moist. The compact root ball will stay dry while the surrounding soil is quite wet. It is necessary to soak the plant well in a bucket, cut up both sides of the tin to remove, re-pot in a larger container in good soil. Press the new soil in firmly and keep the whole uniformly moist until new roots are indicated by good new growth. If no new growth appears it is useless to plant it out. When it is growing, it can be planted out and kept moist until well established. This might take months. Unless you are prepared to do all this, the purchase of old plants in tins is hazardous and disappointing.

Period of Germination for Some Seeds

by G. Simmons

Factors that influence seed germination are many. Some seeds have special requirements before the process will start but most seeds will germinate providing the moisture and temperature requirements are met. Under home gardening conditions temperature control is difficult and moisture content of the seed raising medium undoubtedly varies even though constant attention is given to watering. In the saturated soil or bog method the amount of watering presents no problems but when this method is not used once or twice daily watering may be necessary.

The following germination periods were obtained after sowing seeds in Yates seed raising mixture in 4" peat pots. Seeds were covered by about $\frac{1}{8}$ " of the same medium. The pots were watered daily and received almost full sun. Sowing took place in the period March to August. Yates mixture is a good medium for germination of seeds as damping off is minimised and it holds moisture well and does not contain weed seeds. However it does suffer from the disadvantage that tangled roots are difficult to separate. Some germination periods under these conditions were *Hakea leucopteris* 27 days, *H. multilineata* 59, *Eucalyptus oleosa* 28, *Isopogon dubius* 31, *Melastoma* 69, *Banksia oblongifolia* 31, *B. compar* 29, *B. ericifolia* 20, *B. dentata* 88, *B. repens* 67, *B. aemula* 44, *Pimelia decora* 21, *Kennedya procurrens* 32. In the last case the seeds were filed.

PRESERVATION BY CULTIVATION

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P. J. PARRY

AUSTRALIAN PLANTS

CONTENTS OF VOLUME No. 4

Volume No. 4 comprises issues numbers 29 to 36 inclusive. Also bound with it after No. 36 issue, is the book, available separately as desired, *Western Australian Plants For Horticulture* by K. Newbey.

An index to Volume No. 4 is contained on the next page. The book "*Western Australian Plants for Horticulture*" carries a further index of its own contents.

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Volume No. 1 (bound) issues 1-12, has now sold out. Except for issues 2 & 3 the remaining 10 issues are available at 40 cents each + 5c postage or \$4.00 + 20c postage for the Vol. 1 set. Supplies of Volume No. 2 (issues 13-20) at \$6.00 + 20c postage are still available, many of the issues being no longer available singly. Volume No. 3 (issues 21-28) is also available fully bound at \$6.00 + 20c postage. Volume No. 4 (issues 29-36) is now available at \$6.00 + 20c postage, from February 1969. Some issues are available singly at 40c + 5c postage. For overseas, postage x3.

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AUSTRALIAN PLANTS FOR HORTICULTURE

Western Australian Plants for Horticulture—Part I. Plants from the south-west coast.

This is the first in a series of proposed books dealing specifically with wildflowers and their horticultural applications. The main body of this book comprises 120 pages with a full colour plate on the right hand page and descriptions of three plants on the opposite page from the genus illustrated. On page 47 of this issue you will see a sample of the descriptions provided. These were type set for the book but not used as we could not get a good enough colour slide to adequately show the reader what a *Jacksonia* does actually look like.

We feel that very simple descriptions, an honest report from a home gardener as to the value and appearance of the plant, and a large full colour plate of the whole plant for preference, is what the horticulturalist wants. With a further eight page introduction giving details of where these plants grow in nature, and under what conditions, together with details of the author's garden, we feel that at a price of only \$3.00 plus 20c postage, a gardener will get the best and most complete advice at a very low cost price. Available from Feb. 1969.

If you will buy this book we can then proceed with the finance to produce the next one.

BOOK REVIEW

Books available from your bookseller, NOT from the Editor.

A Field Guide to Victorian Wattles by F. J. C. Rogers

Price \$1.75

A small reference book for beginners, naturalists, scouts, teachers, etc. 82 species of wattle representing most of the species commonly found in Victoria are described, one to each page with a reference to its natural occurrence. The descriptions are very clear and simple but hardly necessary as each species can be readily recognised from the very clear line sketches.

The Endemic Flora of Tasmania—Part II

Price \$50.00

The second part of five of this fine monograph is now available. A feature of the magnificent work is the full size full colour painting of each species described. This makes the book quite large. The 16" x 12" full linen board pages with 24 plates in 6 colour litho, and with 64 pages of text are real value at this price. The sponsor of this project, Lord Talbot de Malahide, fully realises that such a large book at such a price will have a limited market but is very satisfied with its reception by fine book connoisseurs throughout the world.

GROWING WILDFLOWERS

How many wildflowers are grown successfully? Generally speaking most can be grown as easily and as simply as most garden exotic plants imported from other countries. For reasonable results a gardener would not plant exotics without some selection of plants, preparation of ground and care during growth. For best results with wildflowers the same approach is necessary.

Many plants have prospered without any preparation of the beds, or care, and indeed there is a very wide range of natives that will reward such a casual approach. Attempts to grow all natives like this has produced failures

that, in some quarters, has given natives a bad reputation as garden subjects.

The approach in this periodical is to present the magnificent flora of Australia, a genus at a time, i.e. a group of very similar species, and to give detailed advice on their cultivation. Hence if you wish to grow a Waratah or a Geraldton Wax, turn to the articles especially written about them as indexed on the next page.

However this is not a great help in the overall preparation and care of a garden to be provided for wildflowers and for this reason many special articles are included and may be found as follows:

WILDFLOWER GARDEN FOR SMALL SHOWY WILDFLOWERS:

"A Wildflower Garden—Part 3, Soil Treatment"—30:67.

Useful information is also contained in the cultivation recommendations associated with *Hypocalymma robustum* 31:96 and *Hibbertia stellaris* 33:193 for the more difficult species.

WILDFLOWER GARDENS:

Clay Soils—"Native Plants on Clay Soils"—31:105; and for Nth. Qld.—33:198.

Light Soils—"Gardening on Bush Sand"—31:02; "My Native Garden"—32:162.

Cultivation of Soil—"Growing Waratah"—29:3, the case for cultivation of deep rooted species.

Surface Treatment of Soils—"Garden Preparation"—35:313; Mulching 35:314.

Watering—"The Root and the Soil"—33:208.

Fertilizing—"Nutrition" 29:39. The article deals specifically with *Grevillea robusta*.

Frost—"Garden Eucalypts" 30:69. A series of articles on Eucalypts in England.

Pruning—"Tree Pruning" 35:303 in particular Eucalyptus. "Root Pruning" 32:161.

Pond Treatment—"A Natural Pond For Your Garden" 36:367.

Special Treatment—A guide for difficult species—"Geraldton Wax" 32:82—Waratah 29:3.

PROPAGATION — GROW YOUR OWN PLANTS

Many wildflowers are easy to propagate. Seed supplies are listed in each issue. Those that are difficult from seed are usually easier from cuttings so that plants purchased from the nurserymen advertised in each issue will serve as stock plants.

Some methods are more productive for some people than others. You will soon find the method that is more attune to your habits and facilities. Special equipment and facilities are not necessary.

PROPAGATION FROM SEED

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PROPAGATION BY CUTTINGS

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PHYSIOLOGY OF IRON CHLOROSIS

Reprinted from "Tree", Vol. 28, No. 4, dated May, 1968—An American periodical devoted to the horticultural application of trees.

By JAMES A. GOSS, Associate Professor, Kansas State University, U.S.A.

Introduction

Iron chlorosis is a pernicious disease of many plants of economical value including some of our most desirable shade trees. It is often insidious because it is not always possible to predict the appearance of the disease until several years after the tree has been planted. I first became interested in this problem of iron chlorosis, as a young man in Utah, because of my concern for the fruit orchards in which I worked and for a row of silver maple trees growing on the campus of the University of Utah. These trees showed the typical symptoms of iron chlorosis, namely the leaves turned yellow; many of them showing green veins with the remainder of the leaf yellow. This chlorotic condition of the leaves occurred first on the youngest leaves. Strangely enough, this chlorotic condition would not affect the entire tree uniformly, but often would affect only one branch on the tree with the remainder of the tree appearing healthy.

As the disease persists, the trees become stunted with a reduction not only in the size of the tree but also in the dry weight of its tissues. If it is a fruit tree, yield may also be greatly reduced.

What a tree is and what it may become depends upon its genetic constitution, which sets its potential, and upon its environment, which determines how closely the tree will approach this potential. Both affect the tree only as they affect the physiology of the tree. Therefore, to understand the appearance of the symptoms described above, it is necessary to study the changes in the physiology of the tree that cause these symptoms. This article will review our knowledge of these changes in the physiology of the plant in response to iron chlorosis.

Function of Iron

To begin with, let's consider the occurrence of iron in the plant, because iron chlorosis is associated with the inability of the plant to obtain or use iron properly. Iron is an essential mineral nutrient-fertilizer for all plants. In other words, all plants must have iron, and they must have a continuous supply of it or they cannot survive, and will soon die. When we grow plants hydroponically, we must be sure an adequate supply of iron is present in the water or the plants will die within a few days. The amount of iron needed by the plant will vary with the species of plant studied, but the total iron content of the plant is less than that of nitrogen, phosphorus, potassium, calcium, magnesium or sulphur. About 200 times as much nitrogen is present in plants as iron. Therefore, iron is one of the micronutrients, needed in small amounts but nevertheless essential.

Not all parts of the plant contain the same amounts of iron. The iron enters the plant through the roots, but moves up through the trunk into the other parts of the tree. Although some iron is found in all cells of the tree and must be there for survival, chemical analyses have indicated that most of the iron in the plant is found in the leaves. It seems to accumulate in the leaves and is probably needed in greater amounts by them than by other plant structures. In the leaf the iron is found in greatest amounts in the chloroplast. The iron seems to be located in greatest amounts in these chloroplast, which are located in the palisade and spongy

parenchyma cells of the leaf, although, a few chloroplasts may also be found in the guard cells which surround the stomates. Chloroplasts are not found in the other epidermal cells, or in the cells of the xylem and phloem tissues. The cells which contain the chloroplasts give the green colour to the leaf, and this green colour is due to the presence of chlorophyll in the chloroplasts of the leaf.

Studies have been carried out to determine the amounts of iron in the leaves that show symptoms of iron chlorosis and to compare such analyses with healthy leaves. Such studies do not always show less iron to be present in the chlorotic leaves. In fact, chlorotic leaves sometimes have more iron than the healthy leaves, and yet, if the chlorotic leaves are sprayed with an iron solution, they lose their disease symptoms and regain their normal green colouration. An explanation for this apparent anomaly will be given later.

IRON DEFICIENCY REDUCES CHLOROPHYLL

Let us consider now the function of iron within the leaf. If the green colour of the normal tree leaf is due to the presence of chlorophyll in the leaf, and if the chlorotic leaf is yellow instead of green, then this must indicate an absence of chlorophyll in the chlorotic leaf. Since iron spray will often restore the chlorophyll, iron must be necessary for chlorophyll to be present. Indeed it is. Several scientists have demonstrated that as the iron content of the leaf decreases, the amount of chlorophyll in the leaf decreases also. Shetty and Miller, in 1966, demonstrated the dependence of chlorophyll synthesis on iron by the use of radioactive glycine, an amino acid that is used by the plant as a building block for leaf pigments. Glycine is used to synthesize both chlorophyll and the carotenoids. The carotenoids are pigments found in all leaves, and they give the yellow colouration to the leaves when the leaves become chlorotic or when they turn yellow in the Fall. In the absence of iron, neither chlorophyll nor carotenoids were synthesized. When iron was present, but in lower concentration than required for healthy leaves, chlorophyll was not synthesized but carotenoids were. This would explain then, the change of leaf colouration from green to yellow when low concentrations of iron were present, and the greening up of the leaf when iron is sprayed on the leaf. When chlorophyll is present, it hides the yellow colour of the carotenoids.

IRON NEEDED FOR THE SYNTHESIS OF PROTEINS AND ENZYMES

Chemical analyses have shown that chlorotic leaves have lower protein nitrogen contents than normal, healthy leaves. All proteins contain nitrogen as part of the amino acids from which they are synthesized. Therefore, if there is a decrease in protein nitrogen in the chlorotic leaves this indicates a decrease in the amount of protein in these leaves. Proteins are synthesized because the DNA of the chromosomes produces messenger RNA which moves to the chloroplasts and is responsible for the synthesis of the protein by joining together numerous amino acids to form the protein molecule. Now less protein would be synthesized if the iron deficiency resulted in less DNA or RNA than healthy leaves. Therefore, the iron deficiency must affect the synthesis of the proteins by the RNA. Amino acids are not deficient for protein synthesis because chlorotic leaves contain more amino acids than non-chlorotic leaves.

(Continued on page 40)

The Queensland Nuts

by Frank Wood, Victoria

There are four Australian species of *Macadamia*, and two have assumed economic importance because of the valuable nut crop.

Some years ago the Queensland Department of Agriculture made a survey of established plantings and a number of promising types of both kinds were selected and subsequently tested for their yielding and processing qualities. The tests have established that although the *M. tetraphylla* types as a whole bear thinner shelled nuts, and therefore tend to produce higher kernel yields, the quality of the processed product is not as good as with the generally thicker shelled *M. integrifolia* types. In addition, thin shelled nuts have a tendency to germinate prematurely and are more susceptible to bug and grub damage. It is therefore recommended at this stage that the *M. integrifolia* selection be planted in preference to the *M. tetraphylla*.

Unfortunately cross pollination occurs very freely in the *Macadamia*. Most of the orchards which are now in bearing were originally planted from seedling trees, and it is obvious from these that even where seed was selected in the first place from high yielding trees with good quality nuts, the performance of their progeny has been very variable. The majority of these seedling orchards would contain less than 10 per cent of trees acceptable by modern orchard standards, and it is apparent therefore that sound commercial plantings must be based on trees propagated by vegetative means, grafting being the best method.

Macadamias will grow satisfactorily on a variety of soils, but will do best on deep well drained soils. They require a 40" rainfall. In commercial orchards the trees need to have 30' between rows and to be in rows of 20'. Windy situations should be avoided and young trees should be trained so that branches are at different heights of the trunk. If this is not done a very weak crotch will result.

Fertilising should be carried out in early winter and early summer with a complete fertiliser at the rate of 1 lb. per year of age, up to a maximum of 10 lbs. Only half the amount of fertiliser should be given in summer as that given in winter. Pests should be controlled by applying DDT 0.2% sprays at flowering and other times if necessary.

The nuts drop when dry and can be raked up. They should be husked within a few days of harvesting and allowed to dry on racks under shelter for two or three weeks before despatch. *Macadamia* is not such a tough nut to crack if you plant grafted trees from developed orchard varieties.

The main advantages of grafted trees are that they will produce nuts at an early age of uniform size and thinness of shell making an easier job for the grower and the processing factories. Trees of improved varieties come into production in Queensland after three or four years but not in commercial quantities. The yield increases every year and full production is reached in about ten years, but they are long lived trees and a *Macadamia* orchard produces for at least twice as long as a citrus orchard—experts estimate 40 or 50 years.

Not many people are aware that this is the only Australian tree or plant that has made the grade as an economic plant. Of course there are plants here that had possibilities such as some kinds of Queensland

lemon which could have been developed over a long period of hybridisation and selection into commercial varieties, but the white man brought already developed lemons with him.

Apart from orchardists one wonders why more gardeners don't grow this handsome ornamental evergreen tree, so neat and symmetrical in appearance, growing 25'-30' in height. It is a compact tree and provides good shade and grows well even in southern Victoria. I know of trees which have yielded a surprising crop of nuts even though they have had no special treatment.

The blossom of these trees is attractive long festoons of light cream, white or pinkish flowers.

Seed should be sown 1" deep in good compost and transplanted with plenty of soil into tins. They should be planted out into permanent positions when about 2 years old. Transplanting seems to pose no problems—a rare thing among native plants.

Macadamia tetraphylla—"Rough-shell Queensland Nut". The nut is usually slightly elliptical or spindle shaped, the surface pebbled. The leaves, commonly four to a node, rarely 3 or 5, are usually larger and longer than *M. integrifolia*, up to 20 inches in length. The leaves appear sessile or on stems with very short petioles, and the margins are serrate with many spines along the edges. The young leaves are purple or reddish in colour and the flowers are pink. Height and bark of tree is similar to *M. ternifolia*. Distribution is mainly in northern N.S.W. but extending into southern Queensland.

Macadamia integrifolia—"Smooth Shell Nut". The nut is round, or nearly so, with a smooth surface. The leaves are three to a node (except for young seedlings which have two), 4" to 12" in length, on stems usually about ½" long. The leaf margins on mature trees are much less spiny than *M. tetraphylla* and often without spines. The young leaves are pale green or bronze. The flower colour is creamy white. Height and bark of the tree is similar to *M. ternifolia*.

Macadamia whelani—A glabrous tree of medium size with an erect trunk and smooth bark. Branches reddish when young, grain deep red; leaves in whorls 4-7" long, points elongated, midrib prominent; panicles erect, terminal, numerous, starting from a whorl of leaves; peduncles slender, 3-4"; spike-like racemes 1½"-2½" long, flowers scattered, pedicels free and, together with the rhachis, densely covered by short white hairs, about 1 line long, filaments flat inserted near base of perianth segments; anthers with gland like connectives, hypogynous glands united, forming a cup; ovary clothed with white hairs on the outside, revolute to the base; fruit slightly ferruginous, globular, 2" or more in diameter, over 2½" when containing twin nuts, exocarp, coriaceous, 2 valved. Abundant along Tringilburra Creek and thence to Whelanian Pools, near Babinda, Qld. It is recorded from the foothills of Mt. Bartle Frere and Mt. Bellenden Ker and on the coast range near Mossman, Nth. Qld.

Macadamia ternifolia—A tree to 60 ft. in height, with a stem diameter often, one foot. The bark is rough but not wrinkled or furrowed, brown in colour, dark red when cut and up to ¾ inch thick. All parts of the tree are hairless, except young shoots which are hairy and parts of the inflorescence that bear a few minute hairs. The branches are cylindrical but clothed with fairly numerous small raised dots (lenticels). The leaves are arranged on

branches in groups (whorls) of three, sometimes 2 or 4; the stalks are $\frac{1}{4}$ "– $\frac{1}{2}$ " long; the leaves are rigid in texture, narrowly elliptical, or very long and narrow with margins indulate, entire or divided into rigid and pungent teeth; the midrib is lateral and nerves very numerous with fine net veins conspicuous on both surfaces. The leaf blade can measure from 3 to 9 inches long, 3 to 4 times as long as broad.

The flowers are in long narrow racemes, springing from axils of leaves or from above scars of fallen leaves on branchlets below the leaves. The racemes are pendant and up to 10 inches long, the individual flowers being arranged regularly on stalklets approximately $\frac{1}{8}$ " long. The outermost part of the flower (perianth), consists of 4 yellow narrow lobes which are rolled back as the flower expands. Situated on the inner side of each perianth lobe and adhering to it is a stamen consisting of an anther, narrow, about $\frac{1}{12}$ " long. In the centre of the flower is an ovary which is egg shaped and tapers very gradually into the style which is club shaped being thickest towards the apex. The ovary and style together measure $\frac{3}{10}$ " long. Surrounding the base of the ovary is a ring about $\frac{1}{40}$ " in height which represents the united hypogynous glands. The flowering period is September. The fruit is globose, green, one inch or more in diameter, the outer green part (pericarp $\frac{1}{8}$ " thick) splitting open on one side. The seed inside, one or very often two, are the well known "Queensland Nut". They consist of a very hard shell (testa, outer seed coat and tegmen, inner seed coat, $\frac{1}{12}$ "– $\frac{1}{5}$ " thick, combined) and the kernel or embryo (consisting of two large cotyledons and a minute almost globose body, the plumule and radicle, inserted between the two cotyledons at the lower end of the seed).

Distribution—Found in scrubs from Camden Haven, N.S.W. to Maryborough, Qld. *Macadamia ternifolia* var. *minor* has leaves $1\frac{1}{2}$ " to $4\frac{1}{2}$ " in length. A form first collected at Eumundi, Qld. *Macadamia ternifolia* var. *lowii* has leaves $2\frac{1}{2}$ to 7 inches in length. A form first collected at Yandina, south of Gympie, Qld.

Macadamia whelani

by J. H. Buzacott

The species *Macadamia whelani* was originally named by Bailey from trees discovered in 1899 by the Bailey, Bellenden Ker Expedition, growing along Tringilburra Creek some 20 miles south of Cairns, North Queensland. This creek is now universally known as Behana Creek and this has caused some confusion to collectors trying to locate the type locality.

The writers first experience of *M. whelani* was in 1935 when Dr. Pemberton of the Hawaiian Sugar Producers' Association Experiment Station staff, visited Queensland. At that time Hawaii was expanding its commercial *Macadamia* nut production and their geneticists, breeding these nuts for larger kernel, thin-shelled types, were anxious to procure seeds of the species *M. whelani*. This commission was passed on to Dr. Pemberton.

At that time (1935) there was no readily available road into the headwaters of Behana Creek, but there was relatively easy access to similar type rain forest at Fishery Falls, ten miles further south. There, only

a few hundred yards from the falls, large *Macadamia* nuts were found on the ground. Although they have a very hard shell, over an eighth of an inch in thickness, every nut found on the ground had been gnawed by rats and the kernel removed. After some scouting round a very tall tree was found, bearing the nuts, but these were quite inaccessible. A few days after a pair of climbing irons was borrowed and the writer ascended the tree and succeeded in knocking down some thirty nuts which were taken back to Hawaii by Dr. Pemberton.

In 1964, in company with Mr. A. Lowndes, who was associated with a project of the C.S.R. Co., to develop *Macadamia* plantations, we collected more than 100 nuts on the ground by visiting the Fishery Falls trees daily. This was in December and that is the period when the nuts mature.

The kernel of the *Macadamia* nut was eaten by the aborigines but was regarded by them as dangerous to eat without proper preparation. This consisted of grinding the kernels to meal and washing them in a dilly-bag in running water for at least two days before eating. In the untreated state they are reputed to have a high HCN content and no doubt bitter experience led to the aborigines careful treatment. The principal value of *M. whelanii* in a breeding programme would undoubtedly be the size of the kernel produced. The diameter of the nut itself, in a well-developed specimen, approaches two inches and the kernel can be well over an inch in diameter. Its intensely thick hard shell, its poisonous properties, and its tall-growing habit are deleterious characters from a commercial aspect which would have to be bred out. The species was named for Sergeant Whelan, a policeman who accompanied the expedition which first discovered it.

A REPORT ON MACADAMIAS IN HAWAII

The smooth shell *Macadamia* nut, *M. integrifolia* Maiden & Betche, is perhaps the most promising of various tree crops being considered for increased planting in the Hawaiian Islands at the present time. There are several reasons for this: the finished vacuum packed product ranks among the finest confectionary nuts of the world in texture and flavour; it also commands a fairly high price and finds ready consumer acceptance on both local and mainland markets, the demand exceeding the supply. The earliest known importations of *Macadamia* seed nuts were by William Purvis in 1882. Acreage in 1959 was 3,026 acres.

As in most other cultivated fruit and nut crops the variety grown is important. It is conservatively estimated that grafted trees of varieties now available will produce three to five times more nuts on an average than seedling trees of similar age and size. No commercial grower can afford not to take advantage of this. How well these trees yield may be seen by the fact that a 16-year-old tree of the variety *ikaika* produced 202 lbs. of husked nuts in one year—an average of 65 nuts to the pound with an average of 36% kernel. A variety known as *keauhou* produces large nuts, 55 to the pound, with 39% kernel. It is said to be very disease resistant and to yield, under good conditions, 170 lbs. of husked nuts per year.

Grafts from improved varieties are bark or side wedge grafted on to seedling trees. In grafting, wood from branches several years old with relatively few leaves attached are considered best. Younger wood may be used, but the percentage of successful grafts is likely to be smaller.

SUNDEWS

GROWING *DROSERA BINATA* AND *D. PYGMAEA* IN SYDNEY

by Stephen Clemesha

The genus *Drosera* or the Sundews have two basic habits of growth. That is from a tuber or a fibrous root system as with the following:



Photography by John Fanning

DROSERA BINATA

The long blade-like leaves with their sticky beads are clearly shown with small insects caught on the leaves. Unfortunately the white flowers of the plant are not shown.

D. binata Labill. Nov. Holl. Pl. spec. i.78 (1804) which sometimes is called the forked sundew, is the largest species of the genus in Eastern Australia. It is found from as far north as Fraser Island in Queensland through N.S.W. and Victorian coastal areas and coastal ranges to Tasmania and the Mt. Lofty Ranges in S.A. and also is known from New Zealand and a few inland locations. Favourite habitats in the south are sandy heathlands while in the Sydney Blue Mountains area it can often be found in black swampy soils on dripping rock faces. In all its habitats the soil is wet all the year round.

The root system of this species is large and made up of unbranched long black roots usually 9" long. In the springtime its sticky, attractive, fern-like, often forked leaves appear. These average about 6" in length. The delicate white showy flowers soon follow and are produced irregularly through the summer. Seed matures within a few weeks and germinates readily if sown when fresh. As winter approaches all leaves disappear and plants remain dormant through the winter. Curiously, small seedlings do not go dormant but grow through the winter. Summer bushfires often interrupt this cycle but plants shoot up vigorously soon after.

My cultivated plants of *D. binata* catch many small flying insects on their sticky leaves and occasionally a house fly, though these are more a specialty of my larger exotic pitcher plants.

D. binata can be cultivated in a preferably sunny spot in a pot of its original soil but this in my opinion is a poor excuse for cultivation and I prefer to grow it the same way as I do the South African *Drusera capensis* and my North American pitcher plants (*Sarracenia* species and *Darlingtonia californica*) and it does better this way. Plants are removed from their original soil, washed clean and potted in pure sphagnum moss (preferably living as it looks better and increases in quantity). Seedlings have often appeared around plants potted in sphagnum but never around those in their original soil. In either method the pot must be stood in water all the year round and this should be kept fresh by changing.

This sundew can easily be increased by seed or division of clumps which can be done at any time of the year but for appearances sake, preferably winter.

While *D. binata* is the largest species in Eastern Australia, *D. pygmaea* D.C. Prodr. 1 (1824) is the smallest. It produces a small rosette scarcely half an inch across. The small leaves which catch tiny insects are round and on slender stalks. The rosette has a conspicuous bud of white stipules in the centre. In winter mature plants become dormant and all that remains of them is the central bud and few thread-like roots. Juvenile plants do not become dormant but grow on, as do those of *D. binata*, through the winter. The small white flowers are produced singly on thread-like stems. This species has the same general distribution as *D. binata* but drier habitats that remain damp throughout the year. In some places where I have seen *D. pygmaea* it probably dries out in droughts in summer. If so it would probably become dormant again. However I have no proof of this and have not experimented with it in cultivation.

I have found two ways of growing this little sundew.

1. In pots of broken up house bricks (free of mortar) which are stood in a saucer of water and tested to see they remain damp (this testing is done by wetting the brick thoroughly then standing the pot in water. If it does not dry out within a few days it is all right). My plants are in a position that receives winter shade and summer sun. My eight plants potted this way almost a year ago have now increased to at least 50 (where they come from I don't know) and obviously I will soon have a dense colony. New pots could easily be established by removing a few plants and potting them similarly.

2. In pots of vermiculite standing in water. However, this medium has the disadvantage of being easily dislodged in accidental overhead waterings. My plants have not been in this medium long enough to increase. I have tried *D. pygmaea* in a wide variety of other media but all have failed including its original soil.

Eucalyptus cinera — “Argyle Apple”

by R. W. BODEN, Research Arboriculturist, Parks and Garden Branch,
Department of the Interior

This species is native to dry sites of low soil fertility on the central and southern tablelands of N.S.W. and extends into the northern parts of Victoria. In its natural habitat it is often stunted and twisted in form, but when grown under good horticultural conditions with adequate soil moisture it develops into an attractive ornamental tree, growing to a height of 30 feet with a crown spread of up to 25 feet. It is one of the few Eucalypts which retains its juvenile foliage throughout the life of the tree, some others being *E. perriniana*, *E. risdonii* and *E. pulverulenta*. This foliage is rounded in shape and an attractive blue-grey colour which contrasts well with darker green foliage of other trees.



***Eucalyptus cinerea* as a street tree**

Another characteristic possessed by this species, but by few other Eucalypts, is the habit of retaining the lower branches, even as an old tree. This enables Argyle Apple to be used as a screen or windbreak tree in parks and playgrounds. The bark is reddish brown and fibrous, somewhat resembling members of the stringybark group.

Buds are borne in threes in the axils of the round blue green leaves, and open to small white flowers in spring. It hybridises freely with other species such as *E. blakelyi*, *E. mannifera*, *E. rubida* if growing nearby and flowering times co-incide. Natural hybrids in a batch of seedlings can generally be identified readily by the differing leaf shape.

Plants are easily raised from seed but care must be taken to ensure that a strong root system develops in the nursery stage, otherwise the tree may not become windfirm when planted in the street or park. As with other *Eucalypt* species seedlings of Argyle Apple should never be raised in tapered pots or round metal drums which encourage root spiralling.

E. cinerea may be slow to develop a strong leading stem during the first year but can be assisted by judicious pruning, and staking if absolutely necessary. Staking should not persist beyond the first year. Once established the tree grows vigorously, in some cases up to 3-4 feet per year.

Pruning in later life may be necessary to balance the crown, however the ultimate natural shape is round headed, in contrast to species such as "Lemon Scented Gum" which develop a main central trunk and leading shoot. Where it is desirable to remove the lower branches to obtain clear vision in street planting, this can be done at any time throughout the year, however the height of pruned stem should never exceed $\frac{1}{4}$ of the total tree height.

In some situations Argyle Apple is affected by *Eriococcus* scale which forms a white coral like cover on young branches. The sugary exudate from this scale encourages the growth of black sooty mould which may be unsightly on the leaves or soil beneath the tree. Leaf damage may result from attacks by beetles. Where necessary these pests can be controlled by spraying, but this should only be carried out when the tree is young. As the tree grows it becomes increasingly difficult to spray the crown without spray drift occurring onto neighbouring trees, gardens and pavement.

Eucalyptus cinerea has been used successfully as a street tree in a number of areas including Canberra, A.C.T. It is a useful medium sized, evergreen native tree for street and park work in areas of low rainfall, down to 20", and is extremely hardy to frost.

TREE WARATAH—continued from page 4

special fertilising has been applied. First flowering occurred in 1958, approx. 6 years after planting, and although it has produced annual displays from this date, no seed has been set. The leaf form of this species bears a striking resemblance in shape and texture to that of *Stenocarpus sinuatus*, while that of *O. pinnatum* is, as the name implies, quite obviously pinnate, and lacks the glossy appearance of the former.

O. wickhamii has been reported a little easier to establish in Sydney although both have shown some tendency to become chlorotic in the early stages of growth with consequent loss of vigour. This seems to be the danger period when most casualties have occurred, as plants carried successfully beyond this stage seem to be relatively hardy, and respond favourably to light manuring and generous mulching.

I am well acquainted with a specimen of the *Oreocallus pinnatum*, which has been grown in a medium sandy loam in a garden with a relatively high humidity factor from associated foliage to a height of seven or eight feet and it seems to relish this condition. Perhaps the semblance to rain forest climate is a little akin to its natural environment.

GROWING WILDFLOWERS IN QUEENSLAND—Continued from page 3.

wider range of West Australian plants than has been possible on the humid Coastal areas.

Brisbane is certainly tropical in comparison with the climate in the south where the large active groups of our Society are operating. However if we have problems because of this then the really tropical northern half of our State is a completely closed book.

Climatically most of the plants that native plant enthusiasts are playing about with are ruled out in the north. I fear that we here in Brisbane also waste too much time on temperate species instead of trying a broader range of plants initially and also breaking new ground. So much of the work and writings on the cultivation of Australian plants has been done in the southern States and mainly with plants from the southern half of the Continent.

Taking into account this very much generalised and over simplified version of growing conditions here in Queensland do you think we've made much progress in determining plants for different districts? There has been quite a lot of work done on lighter soils on the Darling Downs and an extensive range of genera and species has been trialed west of there at Glen Morgan but as I mentioned earlier, so many of the inhabitants out there live on the heavier soils. Bowenville, Dalby and Brookstead are black soil areas where many native trees are planted and some of the West Australian Eucalypts do very well.

Get away from these areas further west and in the tropical north and our knowledge fades out. We need members in these areas with the enthusiasm to collect their local plants and to make trial plantings of a whole range of plants.

The value of decorative plants around the home can't be reckoned up in dollars and cents. They mean more than just the physical comfort that may be gained by their equalising effect on climatic extremes, cool shade in summer and shelter from cold winds in winter. A home attractively set among flourishing plants encourages a sense of pride—a pride of ownership—pride of citizenship and a sense of well-being.

The range of ornamental plants for Coastal conditions either here or in the tropics is quite extensive just with the exotics without considering the possibilities of the many native plants. These exotics are mostly quite unsuitable away from the coast because of the climatic extremes. Plants like Crotons, Ixoras etc. would quickly die of cold or dry heat if not from unsuitable soil conditions. The temperate plants grown here are mostly nearing their climatic limits. Roses for instance do not reach full dormancy and the quantity and quality of blooms suffer. These temperate plants are more successful away from the coast with colder winters but further north it is just too hot.

Our greatest need is for suitable ornamental plants for inland, both north and south, to decorate the homesteads and country towns, to soften living conditions and help make life easier and more attractive. West Australia has a special Government Department—The Dept. of the North West—experimenting in ways to do just this, with the idea that it will help keep some population in the empty spaces.

The special virtues of native plants are their resistance to unfavourable weather conditions and their low maintenance requirements. These qualities are scarcely understood and barely appreciated here as yet. However, recently there have been a couple of short news items on how much better

some native plants are surviving the drought in Victoria and Canberra than are exotic plants.

Anyone who has grown a number of natives will have noticed how little time is spent holding a hose on them in comparison with the regular waterings of exotic shrubs and how unnecessary it is to dig around them. In fact it can be quite harmful. The ornamental value of native plants in general has not yet been appreciated by much of our population. They are still tied to conventional ideas of symmetry, of flowers that are mainly petals, and the temperate flowering plants and dwarf conifers. They think of gardening more as if they were emigrants here from Europe instead of Australians.

The beauty of our plants is in the character of the individual blooms and in the graceful form of the plants, not in symmetry. It's their sweeping lines or unusual form, an intangible something that characterises the Australian bush.

As we experiment with various native plants we must constantly measure them up to see they reach the requirements that make them worth cultivating. Some improve florally with cultivation, others run more to foliage. So many need trying we can't waste time and space with the doubtful ones.

Showiness is of course one of the main basic reasons why we should cultivate a plant. Flower for flower or more accurately plant in bloom for plant in bloom a large number of our plants can easily hold their own with the exotics. Sometimes our plants only do this where they grow naturally or in certain aspects. Do these same plants reach this standard in your garden?

We can so easily get carried away with a couple of flowers of something that is a favourite in another state. Look critically at it—is it just a couple of tiny flowers on a spindly or sickly plant? Does it fill a place here?

We are trying to gain a place for our natives among the accepted garden plants. They have to appeal to everyone by standing on their own virtues as ordinary plants. Plants have no special virtue merely because they are native. They have to compare as shrubs. The general public doesn't always see them as a native plant enthusiast does.

Adaptability is the second of these basic qualities we must look for in natives. It may be beautiful where it grows naturally in the bush or in cultivation in a different climate from here but how does it look in your garden. It must grow satisfactorily and flower well when it is cultivated. Until a plant has been tried in a district it is difficult to know how it will behave. We need enthusiasts in all parts of the state and on different soils.

Suitability for mixed plantings. The most useful natives for Brisbane in particular are going to be those species that are suitable for mixed plantings with exotic shrubs. There are definite hazards associated with this because many of the natives resent the amount of water normally applied to the exotics. Largely this problem is a matter of selection which is why initially we must try as many species as possible. It certainly limits the useful plants from the present range of cultivated natives. Our knowledge of natives that thrive in mixed plantings is very limited at present and must eventually include a large number of our own rainforest plants.

Plan the use of Natives. A garden needs to be planned carefully to show off natives in a way that will advertise them. You can have a landscape planting which involves a certain amount of duplication for the sake of continuity or unity or you can have, as is too often the case with native gardens, a collection planting with every plant different.

THE CULTIVATION OF QUEENSLAND SPECIES OF ACACIA—continued from page 15

GRANITE BELT.

I am doubtful how these species will behave in Brisbane where they do not get the marked cold period.

A. ruppii: A shrub resembling *A. conferta* with bright yellow racemes.

A. adunca: A small tree widely grown in southern States.

A. rubida: A shrub with reddish leaves. It retains its true bipinnate leaves for a considerable period.

A. floribunda: A shrub with long, loose, pale spikes.

A. granitica: A low growing shrub which forms mats on granite outcrops. It may be useful in rockeries.

A. pubifolia: A silvery-leaved tree.

TROPICS.

Some tropical species are susceptible to cold and I do not know of many having been cultivated but some worth considering are:-

A. simsii: A small tree bearing many beads of flowers.

A. luerksenii: A shrub with very narrow leaves.

A. hilliana: A dense rounded shrub with leaves which point upwards.

A. leptostachya: A small tree very much like *A. cunninghamii*.

A. calyculata: A spindly shrub with white spikes.

A. humifusa: An almost prostrate shrub with broad hairy leaves.

A. whitei: A narrow leaved shrub which flowers when extremely small.

The following species are common and most would probably do well here in Brisbane. I have had to be very selective and there are many more species almost as attractive.

A. plagiophylla: A low shrub, rather open as are many of our species.

A. ulicifolia: A low shrub with prickly leaves.

A. conferta: A shrub to 8', fairly dense and very attractive.

A. macradenia, Zig-zag Wattle: A shrub with short sharp branchlets.

A. bancroftii & *A. waddellii*: Small trees, broad leaves and white trunks.

A. doratoxylon var. *angustifolia*: Usually a shrub like *A. granitica*.

A. neriifolia: A shrub or small tree.

A. hakeioides: An upright shrub which is one of our most attractive species.

A. fimbriata: The most commonly cultivated wattle in Brisbane.

A. podalyriifolia and *A. jucunda*: Both have silvery foliage but the latter does not seem to be as susceptible to sooty mould.

A. aneura, Mulga: A nicely shaped tree which needs lots of room.

A. burrowii: A tree. There are some local species which may be worth cultivating, *A. julifera*, *A. maidenii* and *A. cunninghamii*. Flowers in spikes.

All the plants mentioned so far have phyllodes and bear true leaves for a brief period when they are seedlings. There is a group, fairly well represented in Queensland, with true bipinnate leaves. These are what some people describe as "true wattles". *Acacia arabica* is an introduced plant now a naturalized weed and *A. farnesiana* is a prickly bush found on heavy soils but the others are quite attractive.

A. glaucocarpa is a small tree with a dark trunk and masses of cream flowers found naturally on sandstone and an undescribed species related to *A. dealbata* with silvery leaves and golden flowers occurs between Warwick and Stanthorpe and will grow here, but the remainder prefer richer soils. They have not very conspicuous flowers but the foliage is graceful and as the trees are quick growing they may be useful as windbreaks. The coastal *A. irrorata* and inland *A. deanei* are particularly good, while *A. oshanesii* is somewhat smaller.

PHYSIOLOGY OF IRON CHLOROSIS—continued from page 23

The proteins that synthesized are used by the leaf either for the construction of the many membranes of the cell or to form enzymes. Enzymes are organic compounds that are necessary for each of the many organic chemical reactions that take place in the tree cell. Each cell contains about 1000 different kinds of enzymes. These enzymes are made up of proteins, and each is synthesized by a different kind of RNA molecule. Now the next question we may ask is, does iron deficiency decrease the production of each kind of enzyme to the same extent? Apparently the answer is no, since studies by Agarwala et al. in 1965 demonstrated that some proteins were present in greater amounts and some in lesser amounts in iron deficient plants.

In addition to being proteins, some enzymes also contain iron. These include enzymes used in respiration such as catalase, peroxidase and the cytochromes. Of course if iron was deficient, we might expect the activity of these enzymes to be curtailed, which is indeed the case. On the other hand, enzymes that do not contain iron may or may not have their activity depressed. For instance, aldolase and phosphorylase activities are decreased with iron deficiency whereas alanine-glutamate transaminase activities are stimulated with iron deficiency. The reasons for the stimulation of the activities of these enzymes when iron is deficient are not known and further research must be done before an explanation will be forthcoming.

Some of the proteins of the plant cell form enzymes and some are used to form the membranes of the various structures within the cell, structures such as the chloroplasts, mitochondria, nucleus and plastids. If proteins are not synthesized, fewer chloroplasts will be present and the cell will lack its normal enzyme complement necessary for its well being. The integrity of the chloroplasts is necessary for chlorophyll formation and therefore for the green colouration of the tree leaf.

In spite of the decrease in the amount of protein present in chlorotic leaves, we have known for several years that the total nitrogen content of chlorotic leaves is higher, not lower, than in healthy leaves. Also, the content of total amino acids and amides that are free within these cells is higher than in healthy leaves. The higher total nitrogen content can be explained on the basis that the increase in free amino acid and amide content is greater than the decrease in proteins. This reveals then, that there is more nitrogen getting into the leaves of chlorotic plants than into healthy leaves. This is interesting in view of the observation that the total content of mineral elements in chlorotic leaves is less than in normal leaves, and since the uptake of nitrogen by the normal plant is similar to the uptake of other minerals. The explanation for this anomaly is not known.

Causes of Iron Deficiency

Since iron chlorosis is caused by a deficiency of iron in the plant, one might ask what causes this deficiency. The most logical explanation would be a reduced entrance of iron into the plant and this is one cause, but translocation and antagonism also function to cause iron deficiency.

AVAILABILITY OF IRON IN THE SOIL

There may be many reasons why iron does not enter the plant in amounts adequate to prevent iron chlorosis. Uptake depends upon the movements of iron to the root surface, and into the apparent free space of

NUTRITION EXPERIMENT USING GREVILLEA ROBUSTA

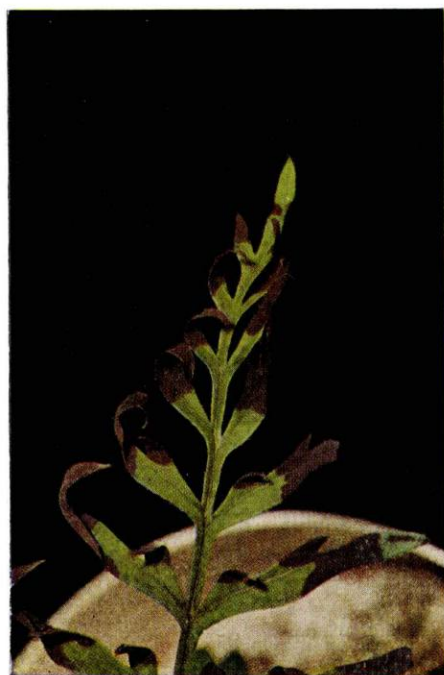


FIG. 1—Leaf of plant grown without potassium. Note that blackening commences just below the tips of the pinna segments and spreads in both directions. The tips of the pinna segments turn inwards.

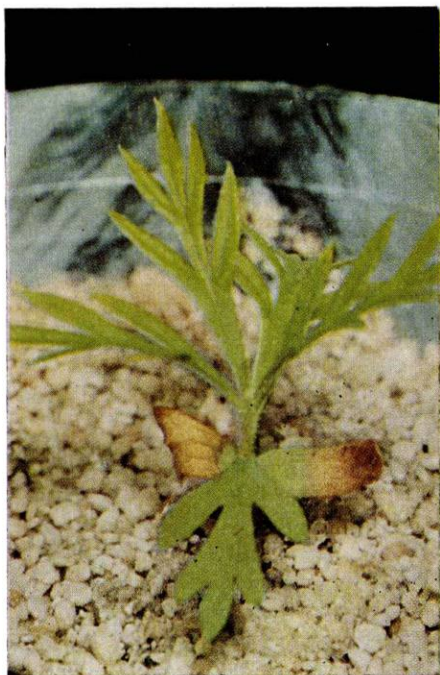


FIG. 2—Plant grown without nitrogen. Note stunting and general chlorosis is most severe in the older parts of the plant (cotyledons and older leaves).



FIG. 3—Plant grown without iron. Note stunting and severe chlorosis in younger parts of the plant. The cotyledons and first leaves remain green. The development of pale brown areas on the leaves is also characteristic of iron deficiency.

the root. This iron must then be in a form that can be taken up by the plant, and finally the machinery for taking up the iron by the plant must be functioning properly. Iron is usually considered to enter the plant as the ferrous or ferric ion but some evidence of molecular uptake is now becoming evident. Irrespective of the form taken up, this iron must first move from the soil to the root surface. Therefore, it must be dissolved in the soil water. The lack of adequate iron in the soil water may be due to insufficient iron in the soil or to the iron being tied up in the soil, usually as insoluble iron minerals or salt precipitates. **A high pH of the soil or a high phosphorus content will cause iron precipitation.**

ABILITY OF ROOTS TO TAKE UP IRON—SOIL CONDITION

The actual entrance of iron into the root cells of the tree is dependent upon active uptake or in other words, upon the use of energy derived from respiration of the root cells. Therefore, anything which may hinder respiration of these cells will reduce iron uptake. This may be one reason why a high bicarbonate concentration in the soil solution will often cause a type of iron chlorosis. Poor aeration, compact soil, or a water-logged soil may also function to reduce the rate of respiration of the root cells by reducing the amount of oxygen available for this respiration since oxygen must be present in adequate concentrations for adequate respiration to occur. Low soil temperature may also hinder root respiration and therefore iron uptake, as may the presence of chemicals in the soil that are inhibitory to respiration.

TRANSPORTATION OF IRON FROM ROOT TO LEAF CELLS

After the iron gets into the tree root cells, it must be translocated or moved up the trunk into the leaves. Anything that interferes with translocation may also cause a deficiency of iron to occur in the leaf cells. One can often detect translocation inhibition by determining the amount of iron in the roots and in the leaves. If iron is present in high concentrations in the root cells, but in low concentrations trouble in the translocation system. To be translocated, iron must move out of the cells of the root into the vessel elements of the xylem and move up the tree trunk through these vessels. When it gets to the leaf it must move out of the vessels into the parenchyma cells of the leaf. Since iron is an inorganic element, it moves up the trunk dissolved in the water in the vessels. This solution is pulled up the trunk by water being lost through transpiration from the leaves. Therefore, if transpiration is hindered by such factors as the stomates remaining closed, the stomates being plugged or the atmosphere around the leaf remaining saturated with water, translocation may be reduced causing an iron deficiency in the leaf even though the tree has adequate iron in it.

Sometimes translocation is inhibited because conditions develop within the vessels which cause the precipitation of iron within these vessels. A high concentration of phosphorus will often cause iron phosphate precipitation, and this precipitate remains within the vessels and is therefore not available for use by the leaf cells so iron deficiency symptoms occur even though adequate amounts of iron will be available within the top of the tree.

Recent evidence indicates that iron must move up the trunk in combination with certain organic acids. If organic acids are not produced by the root cells or cannot be released into the vessels, translocation of iron will be reduced.

Editor's Note: The sentence featured in bold type near the top of the page is editor's emphasis. A high pH has been considered by many as essential for natives whereas some experimental trials have proved that growth is much more vigorous with a nearly neutral soil.

CHLOROSIS IN YOUNG LEAVES

When considering the symptoms of iron chlorosis, we saw that the youngest leaves were first to show the symptoms. This too can be explained on the basis of our knowledge of translocation. When the leaves first appear on the tree, they utilize what little iron may be available from the roots or from that stored within the plant. As these leaves mature, the iron is bound to the enzymes or other organic compounds within the leaf and cannot be removed by the plant for use by the young developing leaves. Normally, translocation can occur not only from root to leaf but from older leaves to younger leaves. In the case of certain mineral nutrients, such as nitrogen, phosphorus and potassium, after the leaf reaches maturity, these minerals are translocated out of the leaf and move up to the young developing leaves to help supply their requirements. However, iron cannot do this. It remains in the older leaves and, as a result, as the iron supply to the plant decreases, the young leaves suffer most from this deficiency and show the symptoms first.

ABILITY OF LEAF CELLS TO USE IRON AVAILABLE

If uptake is adequate and translocation rate is normal, the iron will get to the leaf in sufficient amounts to keep the tree healthy. However, even now the tree may suffer from iron deficiency because conditions may be such that this iron cannot be used by the cells of the leaves. This inability to use the iron present is often caused by ion antagonism. If the plant has excess amounts of some of the heavy metals, such as manganese, zinc or copper, these materials replace some of the iron in its functions within the cell. However, when they do this, the function is interfered with so that pigments are not synthesized, and protein synthesis is inadequate so in effect the plant is still suffering from a deficiency of iron even though normally adequate amounts of iron are present in the leaf cells. This is one cause of the apparent anomaly referred to earlier where it was pointed out that chlorotic leaves may have as much or more iron than healthy leaves and still will be suffering from iron deficiency.

TREATMENT OF IRON CHLOROSIS

From physiological considerations, the treatment of iron chlorosis involves getting iron into the chloroplasts of the leaf in a form that can be used by the leaf. Since several soil factors are associated with iron chlorosis and any one or more of these may be causing the iron deficiency in each case, the exact treatment will vary with the species of tree affected and the soil in which it is growing. Some scientists recommend drilling holes in the trunk and inserting iron salts or driving iron nails into the tree, and some recommend iron salts, such as iron sulphate, either as a spray or as a soil treatment.

Summary

In summary it can be said that iron chlorosis is due to iron deficiency at the site of iron metabolism in the leaves. This iron is normally used to synthesize certain proteins and enzymes and in leaf pigment synthesis, and chlorosis is a result of inadequate synthesis of certain of these proteins and enzymes which result in less chlorophyll being produced and the subsequent decrease in photosynthesis which eventually results in stunting and reduced yield. The iron deficiency may be due to insufficient amounts of iron entering the roots of the tree, reduced translocation of the iron from the roots to the leaves or the inability of the leaves to use the iron once they get it.

GROWING *PTEROSTYLIS*—Continued from page 19

compost. After planting I top up the pot with a quarter of an inch of chopped up *Cosuarina* needles. This helps to retain moisture.

I have used this compost with all my *Pterostylis*, having grown *P. nutans*, *P. concinna*, *P. ophioglossa*, for a number of years and other species more recently. *Pterostylis pusilla*, *P. cynnocephala* and *P. hamiltonii* need limestone. This I have supplied by breaking up some marble pieces from a monumental works. The marble breaks up into crystal-like coarse grit and helps with the drainage when mixed with the drainage material also.

I repot each year, after the plants have gone dormant. The lifted tubers are kept dry during this period.

My *Pterostylis* are now grown in a bush house, the shade loving ones are kept under the bench, receiving plenty of light through the batens facing north. Those requiring more light I grow on the benches. Light requirements can be met by watching growth, give more light if plants tend to get long and spindly or more shade if tending to yellow from too strong light, this is something that has to be estimated individually.

Editor's Note: Alternate issues describe epiphytic orchids and terrestrial orchids. The last issue gave details of cultivation of many species of *Pterostylis* and the next issue will again deal with this large genus.

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WESTERN AUSTRALIAN WILDFLOWERS FOR HORTICULTURE

See details of this new book on page 2, the following being a sample of its contents.

JACKSONIA

JACKSONIA FLORIBUNDA

HABIT—A single or few, rigid stemmed, not much branched, open, upright or spreading shrub to 7 ft. high and 8 ft. across.

HABITAT—An inland species found growing on open plain country on deep white or yellow sand in 25" rainfall.

Leaves—Flattened leaf-like branches are $\frac{1}{2}$ " to $2\frac{1}{2}$ " long, $\frac{1}{8}$ " to $\frac{1}{4}$ " wide, toothed, wavy, slightly reflexed, often slightly twisted, rigid, prickly and dull green in colour.

Flowers are pea type, $\frac{1}{2}$ " high, $\frac{1}{4}$ " across, with $\frac{1}{8}$ " keel; yellow, orange and dull red in colour; calyx lobes dull light yellowish red on the inside, light grey on the outside, covered with dense, fine hair, axillary, on long woolly flower stalks, usually forming fairly dense spikes up to 6" long on the new or newer wood and scattered. Flowers during the spring and summer. Individual plants flower for long periods.

HORTICULTURAL FEATURES AND CULTIVATION—

A good ornamental species with average foliage and attractive flowers. Some pruning would be helpful.

A hardy species which requires good drainage. Makes moderate to quick growth.

JACKSONIA FURCELLATA

HABIT—An upright to spreading, single or few rigid stemmed, open to dense, untidy leafless shrub to 8 ft. in height and 8 ft. across.

HABITAT—A coastal or inland species found growing on creek or river flats above the salt water level on sand or loam in 15" to 25" rainfall. Ph is 6½-7.

Leaves—Branchlets are terete, 1/32" diameter, divided into 3 spreading segments, often divided again, $\frac{1}{8}$ " long, $\frac{1}{8}$ " wide, young growth is flexible but becomes rigid and pungent with age and light green in colour.

Flowers are pea shaped, 5/16" wide, $\frac{1}{8}$ " high, with $\frac{1}{4}$ " keel, orange and dull red in colour, racemose, on short flower stalks and numerous. Flowers during spring.

HORTICULTURAL FEATURES AND CULTIVATION—

An average ornamental species with unusual "foliage" and average flowers. Only has a life span of about 6 years. Numerous small birds build their nests in this shrub.

A hardy species which requires good drainage. Makes quick growth.

JACKSONIA LEHMANNII

HABIT—A few, tough stemmed, upright branched, upright to spreading, fairly dense, "leafy" shrub to 6 ft. high and 6 ft. across.

HABITAT—An inland species found growing on ridges amongst other dense scrub, on gravel loam in 14" rainfall. Ph is 7½.

Leaves—Does not have true leaves. Branchlets are terete, under $\frac{1}{8}$ " diameter, flexible, dull green in colour and becoming harder and thicker with age.

Flowers are "pea" type, $\frac{1}{8}$ " high, $\frac{1}{8}$ " wide, with $\frac{1}{8}$ " keel, orange in colour with a little dull red in the throat, single, on $\frac{1}{4}$ " long flower stalks, terminal and very numerous. Flowers mainly during summer but on and off at other times of the year.

Fruit—Pods are roughly oval, drawn out to a point at each end, $\frac{1}{8}$ " long, 3/16" wide, flattened, $\frac{1}{8}$ " thick and dull grey in colour.

HORTICULTURAL FEATURES AND CULTIVATION—

A good ornamental or windbreak species with good "foliage" and flowers.

A very hardy species which requires good drainage.

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RHODENDRON LOCHAE

At first sight it does not look like a Rhododendron at all. Instead of the erect head of a large number of flowers, this one has only about six flowers in each head, and each flower hangs like a bell. The substance of the flower is more solid, it looks as though it has been skillfully fashioned out of bright red wax. Each flower is about two inches across the mouth and rather more than that in length.

The plant has proved hardy in Melbourne in a garden bed with other Rhododendron and Azaleas in a situation without direct sunlight. Exceptional results have been obtained by growing in a pot in a Cymbidium orchid culture with a little peat added. Protection from wind and direct sunlight is essential with up to "dark" conditions. With a feed of half strength aquasol in spring and autumn and adequate water over summer, a large plant can be grown in quite a small container.