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Photography by C. Green

MELALEUCA RADULA

MELALEUCA SPECIES AT CANBERRA BOTANIC GARDENS—PART I

D. Verdon

INTRODUCTION

Melaleucas grow mainly in coastal or near coastal areas where winters are mild and yearly rainfall is relatively high. The small number that occur inland are usually found along water courses although a few, mainly western species, occur in drier habitats.

Minimum winter temperatures in these inland areas are not usually as low as those on the N.S.W. Southern Tablelands. The farthest inland penetration of Melaleucas in this region is at Tarago where *Melaleuca ericifolia* has been collected and near Braidwood where *M. capitata* grows on Currockbilly Mountain. The genus does not grow naturally in the A.C.T. where low winter temperatures, low yearly rainfall and high evaporation combine to give a harsh environment. Protection from these three inhibiting factors during the seedling and young plant stages, however, has enabled the establishment of over fifty *Melaleuca* species at the Canberra Botanic Gardens since the first planting in 1950.

This article on Melaleuca has been compiled to show how some of these species have reacted to conditions at the Gardens. Reference has been made to several aspects including horticultural potential, with emphasis on cool districts; the form and vigour of specimens in relation to age and situation, frost tolerance and a few suggestions for culture.

Frost tolerance ratings have been presented in table form and related to a minimum grass temperature of 20°F (–7°C approx.). When interpreting these ratings, however, several factors should be considered.For example confusion can arise from apparently contradictory results due to microclimate variations. Vigour is another factor which can cause unexpected reaction to frost. Small plants or those in poor condition may have less resistance than more vigorous specimens but it is not always the least vigorous plant that sustains most frost damage. The over-vigorous, lush specimen is often badly frosted due to its soft growth. Applications of nitrogenous fertilizers late in the growing season may promote this condition. Water stress is a factor that is not often associated with winter months by people living in cool areas. Death of growing tips and leaf loss, usually attributed solely to frost, may often be caused primarily by water stress. Long frosty periods, when days are dry and clear, and the associated westerly winds can cause extreme desiccation. If these conditions persist watering is necessary but extra care must be taken as imprudent watering in winter can itself cause problems.

It should be remembered that as Canberra Botanic Gardens is in a favourable position on the N.N.E. slopes of Black Mountain, the minimum temperatures are up to 7°C higher than the lower parts of Canberra.

Consideration must be given, as well to the unusual climatic conditions during 1971 when frost tolerance assessments were made. It is important to note that the preceding summer was one of high rainfall, 14.69 inches being recorded at Canberra Botanic Gardens in the three summer months. Of this total 8.10 inches fell in February and, in consequence, growth towards late summer was vigorous and lush. In contrast only 2.93 inches was recorded during the three Autumn months but this period and early June were exceptionally mild. As a result growth continued and out of season flowering was induced in many species. Night temperatures dropped fairly rapidly later in June and very low minimum grass temperatures were recorded constantly through winter into spring. Of 43 ground frosts recorded at the Gardens in June and July, 32 were between –3°C and –8°C and

significantly, three long periods of consecutive frosts were noted numbering 17, 10, and 7 nights.

This persistence was probably a significant factor in damage to plants that in previous winters had not been affected. Also of importance was the abundance of frost-susceptible, immature growth due to the mild Autumn and early winter, and the very low rainfall and high evaporation during June and July.

It is possible, then, that species given a moderate or low frost tolerance rating in this article could be grown in slightly cooler areas than those suggested. They would, of course, require a suitably warm sheltered position and be given extra protection during periodic cold winters and on colder nights in average winters.

The effect of morning sun on plant tissue in the presence of frost is another revelant factor to frost tolerance assessments. This was emphasised in the late winter and early spring of 1971 when unusually hard frosts occurred. During this period several *Melaleuca* species were extensively damaged on the eastern side. Significantly, some of these specimens sustained no damage from the harder frosts of mid-winter when the early morning sun was at a lower angle. This phenomenon has been the subject of much discussion. Suggestions, both theoretical and empirical have been put forward in attempts to explain it but full discussion of these will serve no purpose here. Certainly, there is an obvious need for protection from the morning sun when relatively hard late frosts occur. Some protection can be provided by planting on the north west side of a tall dense shrub or hedge, or near a wall facing north west. In positions such as these, however, the effect of harsh west winds must be considered. It may be better to select a north east aspect and to erect temporary hessian screens on the eastern side when late frosts are expected.

The poor form and loss of vigour observed in many older *Melaleuca* specimens at Canberra Botanic Gardens has shown a need for pruning. Many people consider, often without foundation, that this genus and other native genera will not tolerate pruning. True, no investigation has been carried out to ascertain the effect of pruning on this genus, but some species are known to grow well after being cut back hard. It would seem logical then, to suggest that many species would benefit from judicious shaping or removal of spent wood and flower heads and regular moderate pruning may obviate the need for hard cutting back. As in most evergreens, *Melaleuca* specimens should be pruned immediately after flowering. Flowers of many are produced terminally on young growth; the floral axis often continuing growth as a vegetative shoot. This continuous growth can result in a narrow habit so encouragement of controlled lateral growth is important to produce a neat rounded shrub. In a few species the flowers are produced on second year wood. Pruning of these should not be delayed as removal of wood late in the growing season will reduce the amount of flowering wood in the following year.

Few *Melaleuca* species need special treatment in cultivation; most are extremely adaptable. Swamp species will grow quite well under ordinary garden conditions if attention is given to watering and a mulch is provided to cut down evaporation. The few that grow in rocky or stoney drier situations would need a well drained situation but, apart from that, will tolerate most soil types. Where there are cases of soil type affecting flower production or general growth, these are dealt with under the species heading concerned. Most species should benefit from periodic applications of a complete fertilizer which contains a stated nitrogen, phosphorus and potassium ratio as % N.P.K. and important secondary and trace elements in balanced proportions. Single compound fertilizers such as sulphate of ammonia, lime and super-phosphate should not be used without prior knowledge of soil condition, the needs of the plant concerned, and the reaction the chemical may cause.

MELALEUCA L.

(Gk. compound from melas = black and leucas = white. The reason for the name is obscure).

Series I *Callistemoneae* Benth (Species listed alphabetically)

Flowers large red or rarely greenish-yellow in oblong or cylindrical spikes, lateral on the old wood or forming the bases of leafy branches Stamens above 1.3 cm.



Photography by D. Verdon

MELALEUCA ELLIPTICA

Species in this series have cylindrical spikes of flowers similar to the more widely known "bottlebrushes" (botanical name Callistemon—hence series name above). These are often red as above but can be greenish yellow as shown opposite. For description of *Melaleuca elliptica* see page 6.



Photography by C. Hubner

MELALEUCA DIOSMIFOLIA

Melaleuca diosmifolia Andr. (with leaves resembling those of a Diosma sp. (?))

A tall glabrous shrub 2-2.5 metres high with rigid, ascending and dense branches; the leaves alternate, crowded, ovate, lanceolate or oblong, obtuse, 6-8 (15?) mm long, flowers large yellowish green (Scheeles' green R.H.S. 144B) in dense oblong or cylindrical spikes on short lateral branches, the axis continuous vegetatively before anthesis; fruits depressed-globular often over 1 cm. dia.

One of the most handsome of West Australian *Melaleucas* which for many years has been cultivated in eastern Australia. Botanical collections of this species, however, do not appear to have been made since the original collections from coastal areas of the Stirling District.

Several specimens of the species were planted at C.B.G. during 1968 mainly in sheltered situations. The shelter varied from light tree cover to a warm position near the wall of a building, facing N.E. All specimens survived the winters of 1969-70 and by autumn 1971 had developed into relatively healthy shrubs 0.8 to 1.5 metres high. During the extremely cold winter of 1971, however, they sustained extensive frost damage from which only

the most sheltered specimen recovered. The recovery of this specimen was not spectacular. It required some drastic pruning and is now a poor specimen with relatively few branches and an open irregular appearance. Several younger branches have been produced from the base of the shrub but the tips of these have sustained frost damage during the recent (June 1972) persistent frosts.

It is clear that *M. diosmifolia* cannot be recommended for Canberra gardeners but in frost free coastal areas it would make an ideal specimen.

Melaleuca elliptica Labill. (referring to its often elliptical leaves).

A bushy sometimes tall shrub, 2-3 (5)? metres high; branches rigid, ascending to divaricate; leaves ovate-elliptical, obtuse, thick 6-12 mm long; flowers cardinal red (R.H.S. 53/C) in dense lateral spikes 5-8 cm long, the axis not continuous vegetatively; fruits depressed ovoid 6-8 mm long with persistent calyx lobes (sepals), the orifice almost closed, in very densely packed spikes.

Another worthwhile shrub from W.A. and one of the few *Melaleuca* species that are found in drier habitats. It prefers granite-rocky areas of the Avon and Syre districts in the South Western Province, and Coolgardie district of the Eremean.

The species has been cultivated at C.B.G. since 1959. Over this period one specimen which is in close competition with other tall shrubs and trees and now 2.5 metres high, has become sparse with gnarled, tortuous, mainly leafless branches and few short, leafy branchlets. Despite its position and poor appearance however, it still produces one or two flower spikes.

Other specimens vary from more or less open shrubs with few divaricate branches to dense bushy specimens clothed almost to ground level with greyish green foliage. The best of these is 2 metres high and 1.5 metres across with a slightly irregular, flat topped almost cylindrical form but narrowing towards the base. This form could be enhanced by light pruning which would control the growth of stray branches.

The flowering period extends from November to late summer with its peak in December and most mature specimens have a reasonably high flowering capacity. Due to their lateral position, however, flower spikes on the older branches are often hidden among the dense foliage.

During the severe winter of 1971 no adverse reaction to frost was recorded except leaf discolouration of young plants in exposed situations. With this in mind, recommendation of the species for the milder areas of Canberra can be made. A warm sheltered position is advised but close competition and heavy shade from trees should be avoided. It may be necessary to provide cover for young plants during the coldest periods.

Some shaping may be required in the developing stage to produce a neat specimen and, when mature, pruning and removal of spent flower spikes will maintain the vigour of mature plants. The divaricate branching of some forms suggests that it may be possible to train them as wall plants. This would entail the removal of all breast wood and the encouragement of lateral growth. Only experiment would determine the reaction of the species to this treatment but if reaction were not unfavourable the attractive flower spikes would certainly be displayed to advantage.

As far as soil type or condition is concerned, good drainage is possibly an important factor for optimum growth but, like many *Melaleuca* species, *M. elliptica* appears to be very adaptable.

Melaleuca fulgens R.Br. (from L. = shining, bright; probably referring to the bright carmine flower spikes).

A tall open shrub to 2 metres high with upright or ascending branches; leaves opposite, linear-lanceolate, concave, acute or obtuse, 19-30 mm. long; flowers carmine (R.H.S. 52/B), large, in loose lateral spikes the axis continuous vegetatively during or after flowering, fruits depressed urceolate 7-10 mm. dia., in loose spikes.

This desirable shrub from W.A. is well known in horticulture and has been cultivated in Eastern Australia for some years. It occurs naturally in granite rocky habitat in the south eastern part of the South West Province.

A number of specimens are established at the Gardens the oldest of which were introduced in 1967. These plants are in sheltered situations and appear to benefit from this. They are mainly vigorous shrubs 0.7-2 metres

high with long slender branches, and many leafy secondary branches giving them a loose bushy appearance. The mature specimens flower moderately well during the summer months and at times in Autumn and early winter.

An added attraction at flowering time is the appearance of many and varied Honeyeaters that eagerly search for nectar in the flowers.

As C.B.G. specimens are in sheltered situations true frost tolerance assessments cannot be made from them. In the Curator's garden, however, a specimen in an exposed situation was badly frosted and did not survive the winter of 1970. In view of this it is prudent not to recommend the species for Canberra gardens in general. However, if given a warm sheltered position it may be grown in the milder elevated areas of Canberra. An ideal spot appears to be near a westerly facing wall but with shelter from southerly and south westerly winds. Some overhead protection in extremely cold periods is necessary especially for young plants.

To ensure and maintain a dense well shaped shrub some pruning and shaping will be needed and should be carried out immediately after flowering. Removal of faded flowers before fruit formation will conserve energy and encourage strong vegetative growth. Colour plate Vol. 5 page 196.

As far as soil is concerned the main consideration should be drainage; an extremely well drained situation is necessary for optimum growth.

Melaleuca hypericifolia (Salisb.) M. Britton (with leaves that resemble those of Hypericum).

A tall and often broad shrub, with long slender branches, leaves opposite, lanceolate to elliptical-oblong obtuse or mucronate 1.5-3.5 cm. long, unusually soft in texture, the mid-ribs prominent beneath; flowers Jasper red (R.H.S. 39/A) in dense spikes forming the base of leafy branches, fruits ovoid-globular up to 1 cm dia. with persistent calyx lobes, spikes dense.

This elegant species inhabits sandstone country and dunes of the coastal headlands in New South Wales, often in wet places. It has been in cultivation at C.B.G. since 1950, where it has thrived despite a certain frost sensitivity.

The oldest specimen has attained large proportions in close competition with other shrubs and trees. This shrub is 3 metres tall and almost 3 metres broad. It is densely covered to the ground with the soft olive green leaves typical of the species but rare in the genus which, together with its long slender weeping younger branches makes this an attractive shrub, even without flowers. Several younger specimens planted in less sheltered positions have also developed into relatively large shrubs, attaining 2-2½ metres in height and 1-2 metres in breadth over a period of up to 10 years. From late spring to mid-summer the large attractive Jasper red flower spikes are produced in abundance but these are often hidden among the dense foliage.

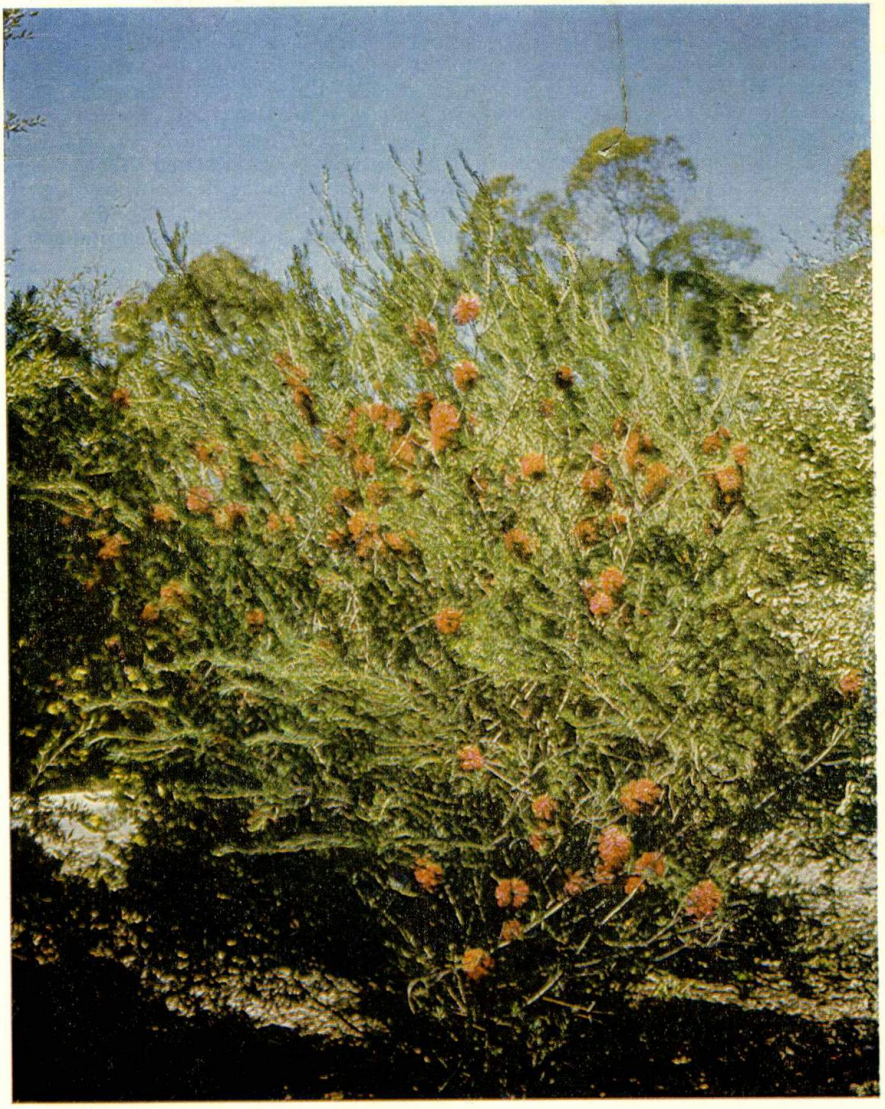
Most plants have been affected by frost to some degree. Those under tree cover have reacted with a slight change in upper leaf colour and those in less sheltered positions have been more extensively damaged with desiccation of young tips and most outer leaves. Despite this the species displays remarkable ability to recover and grow on as can be seen in the large size attained by the older specimens.

This desirable shrub should grow in warm sheltered positions in the milder elevated areas of Canberra. Any leaf damage that occurs during the coldest nights will be offset by quick recovery to an attractive appearance.

Overhead protection from frost is necessary for young plants and should be provided until they are well established.

This species responds well to pruning which should be carried out immediately after flowering. In frost-free areas, gardeners may wish to try the species as a wall plant or espalier. In this way the flowers may be shown to advantage. A wall plant simply requires the removal of all breast wood and stopping of excess leaders by tip pruning. Espalier plants, however, require somewhat more skill although a species such as this, that produces many vigorous slender branches should not present too much difficulty.

Soil type should not be a problem as the species seems to be reasonably tolerant in this respect. Attention to summer watering and provision of a good mulch is important.



Photography by D. Verdon of a plant growing at Canberra Botanic Gardens

MELALEUCA FULGENS

This species is such a beautiful shrub and flower that it has been photographed widely. A full colour plate of a good form is shown in "Australian Plants" Vol. 5, page 196. However we do not want to see a lot of beautiful pictures but also need some indication of how the flowers look on a bush as above. The species in the group *Callistemonae* grow to this size (or can easily be kept to this size). All are of good foliage although *M. diosmifolia* (which is a shy flowerer) and *M. hypericifolia* are grown for beautiful weeping foliage. Some such as *M. elliptica* and *M. macronychia* (opposite) hide their flowers a little as they grow on the old wood.



Photography by C. Hubner

MELALEUCA MACRONYCHIA

Melaleuca macronychia Turcz. (above)

(Gk. compound from Macros = long and onychos = claw, referring to the joined lower part of the staminal bundles).

An open shrub with virgate branches; leaves alternate, oblong-lanceolate, acute, narrowed at the base, 2.5-5 cm long flat or concave 1 or 3 nerved, the lateral nerves when present close to the margins; flowers carmine rose (R.H.S. 52c) in large dense lateral spikes, fruits depressed-globular up to 1 cm diameter.

This outstanding horticultural subject from West Australia is found in inland rocky habitats of the South West Province and in the Coolgardie district of the Eremean Province. It was first introduced to the Gardens in 1968 and only one specimen has reached the flowering stage. This specimen, which flowered initially in the summer months of 1971, has developed into a sparsely-branched, open shrub 1 metre in height. Its branches are slender but rigid, with few lateral branchlets. Despite its sparseness,

the shrub is vigorous and its relatively large, slightly glaucous leaves give it an attractive appearance. The shaded position of this specimen under the canopy of a tall Eucalyptus does not appear to have any adverse effect on its vigour and the production of only two flower spikes can possibly be attributed to immaturity.

Several two-year-old specimens are also displaying excellent vigour. All are open shrubs 0.5 metres high, with few slender well leaved branches. Although these shrubs are in open situations none have shown any reaction to frost during the extremely cold winter of 1971; this suggests a high frost tolerance under C.B.G. conditions.

M. macronychia then, may grow successfully in the milder areas of Canberra. In the cooler areas, however, it would require a warm sheltered position. A situation near a north-westerly wall with shelter from southerly winds would provide warmth, and some overhead protection from frost would be given by the house eaves. Extra overhead cover should be provided during exceptionally hard frosts, for young plants.

No special soil problems are apparent. The species seems to grow well in various situations and tolerates somewhat dry conditions but watering during periods of high evaporation will ensure optimum growth. Light pruning immediately after flowering and the removal of spent flower spikes to prevent fruit development will keep this shrub in vigorous condition.

Melaleuca lateritia Otto (from L. latericius = of bricks; used in Bot. to describe a dullish brick red, possibly refers to faded colour of older flower spikes of this species).

A glabrous shrub 0.5-1.5 metres high, branches virgate, leaves alternate, linear acute, flat or concave, nerveless or obscurely nerved. Mostly about 14 mm long (rarely 20 mm); flowers large, capsicum red (R.H.S. 33/A) in dense oblong-cylindrical spikes to 5 cm long, the axis usually continuous after flowering fruits depressed ovoid, 5-7 mm dia. in densely packed spikes.

This beautiful shrub from coastal South Western W.A. has been cultivated in Eastern Australia for some years, and since its first introduction to C.B.G. in 1950 has been cultivated here with some success.

Our oldest specimen, a 20 year old shrub about 1 metre in height has become craggy with unevenly gnarled branches up to 1 metre long, and thickened here and there with old fruit masses. In spite of this somewhat aged appearance, the shrub displays some vigour, with slender young branches in the upper part from which the orange-scarlet flower spikes are produced in moderate quantity. The craggy twisted form enhanced by these flower spikes has certain charm but many would prefer a more regular and vigorous specimen with a larger quantity of productive wood.

In contrast, the younger specimens, planted in more or less sheltered positions, but without overhead cover, are open upright, slightly irregular shrubs 0.6-1.5 metres high. They have long slender erect branches and fine densely leaved branchlets. Flower spikes are not produced prolifically as in their natural habitat but nevertheless give an attractive display among the mid green foliage in the late spring and summer months. As in *M. fulgens* flower spikes are sometimes produced in autumn and early winter, at least by specimens in sheltered situations. Colour plate Vol. 2 page 273.

The frost tolerance of *M. lateritia* cannot be confidently assessed as no specimens at C.B.G. are in exposed situations. However, in a garden situated in Yarralumla, one of the colder Canberra suburbs, several young potted plants have survived near a north-west wall with an overhead cover of sarlon at night. Temperatures as low as −8°C were recorded under the sarlon on the coldest nights. These plants showed no ill effects, although growth was virtually at a standstill; this may indicate little in relation to direct frost tolerance but it does suggest that the species is worth trying in the milder areas of Canberra at least. It would of course need a warm sheltered spot and extra protection on frosty nights especially when young.

As far as soil type is concerned, *M. lateritia* seems to have a broad tolerance, but it is a swamp or "damp sand flats" dweller and would require ample water during high evaporation periods. A mulch to counter moisture loss and to reduce weed competition is also important.

To maintain this shrub in young vigorous condition, pruning is necessary and should be carried out after flowering. Removal of spent flower spikes will prevent fruit formation which in turn will preserve energy and avoid the "ugliness" of old fruit masses later.

Melaleuca steedmanii C. A. Gardner (named in honour H. Steedman, collector of the type specimen).

A tall or spreading shrub to 2 metres high with ascending or spreading branches; leaves obovate or oblanceolate-oblong, flat or with incurved margins, 12 to 20 mm long; flowers scarlet (RHS 43B) similar to those of *M. fulgens* but with shorter staminal bundles, more numerous stamens in each bundle and slightly larger, more conspicuous bright yellow anthers; the axis is continuous vegetatively before anthesis and the fruits are depressed urceolate, 5-7 mm diameter and in loose spikes.

This attractive shrub is very close to *M. fulgens* and also has interesting affinity to *M. radula* in the series *Spiciflorae.* It occurs in similar habitats to those in which the former is found, but may have a more northerly distribution. Specimens at Canberra Botanic Gardens were collected in the Irwin district wheras *M. fulgens* was collected in southern coastal areas.

Several specimens of *M. steedmanii* are established at the Gardens two of which are in tree sheltered situations. These two specimens are not yet mature but the more advanced shrub may flower in the coming season (1972-73). This larger shrub is now many branched and 1 metre high with an uneven spread of 1.3 metres. It has slender, slightly flexuose branches many of which are divaricately spreading and its irregular shape is accentuated by a decided lean towards the light due to dense tree shade. Despite this it is vigorous and well clothed with the glaucous leaves that are a feature of this species. The smaller specimen is more open in habit and 0.8 metres in height with few ascending rigid branches. Though sparse it is vigorous and healthy; showing no reaction to somewhat light tree cover. A mature specimen can be seen in the Curator's garden growing well in an open situation. This shrub is more or less spreading and of an irregular shape, though less so than the larger specimen previously mentioned. Despite being damaged by frost in the persistent cold periods of 1971, it is vigorous, having displayed remarkable powers of recovery. The flowering capacity seems comparable with that of *M. fulgens* and it flowers during the summer.

Canberra gardeners in the milder areas should find this shrub a worthwhile specimen for selected positions. A warm sheltered situation would be the ideal with some overhead cover during hard frosts but dense tree shade is not advised. It may possibly succeed in less sheltered position providing care is exercised throughout the coldest periods. Colour plates 2:249 & 3:217.

Its cultivation requirements are similar to those of *M. fulgens* but some forms may need closer attention to pruning to maintain a neat shape.

Melaleuca steedmanii. Cultivar.

An interesting shrub known as Payne's Hybrid and said to be a progeny of *M. fulgens* and *M. steedmanii.* Like the latter it has affinity to *M. radula.* In fact it has an even closer affinity to that species due to its leafy few flowered spikes which resemble those of the *Spiciflorae* and to its tuberculate leaves (at least when dry).

Nine specimens of this shrub were planted during 1969 in a partly sheltered situation. These have displayed little vigour and in three years have grown to a height of 0.3 metres. They are poor specimens with sparse thin branches a few of which are leafy and show slight signs of new growth. The reason for this poor growth is not exactly certain but it is significant that two small specimens in more exposed situations did not survive the 1971 winter. Further studies are needed before a firm decision can be made about this shrub. On present knowledge, however it cannot be recommended for Canberra gardens. Full colour plate on page 196 of Vol. 5.

Series II—*Decussatae* Benth.

Leaves decussate, small, flat or concave, nerveless or 1 to 3 nerved. Flowers pink or white in small heads or clusters along previous years stems or forming short loose spikes at the base of new shoots.



Photography by C. Green

MELALEUCA ACUMINATA

Melaleuca acuminata F. Muell. (from L. acumen; referring to the leaf apex, in which the incurving margins meet in an abrupt point).

A shrub 1-4 metres tall, branches very slender, densely virgate, leaves opposite, lanceolate, elliptical, acute or acuminate, the tips often slightly incurved; flowers white In lateral clusters on previous year's wood; fruits nearly globular, truncate about 4 mm diameter.

This widespread species is found in forest habitats in the drier parts of temperate Australia and shows some promise as a horticultural subject.

(Continued on page 25)

SARCOCHILUS

THE GENUS by A. W. DOCKRILL



Photography by J. W. Wrigley

SARCOCHILUS CECILIAE F. Muell.

The genus *Sarcochilus* is one of the most popular of the Australian epiphytic (some species grow on rocks) orchid genera with growers of Australian orchids, and quite understandably so. All make quite attractive horticultural subjects and there is sufficient diversity amongst the species to make them interesting. There are 12 species, 11 of which are confined to

eastern Australia and the other, which is not a typical member of the genus, extends only as far south as the McIlwraith Range on Cape York Peninsula but occurs from New Guinea to the Solomon Islands.

Members of this genus are characterised by having short or somewhat elongated stems with alternating, but usually not numerous, leaves. The inflorescences may contain few or many flowers. In 11 species the flowers are not very numerous, last at least several days and usually do not all open at the one time so that the flowering period is extended. In the twelfth species, (the atypical one mentioned above), however, the inflorescence is elongated and has numerous flowers which develop simultaneously and last less than a day. The flowers are either rather widely opening or bell shaped with the sepals and petals varying from almost circular to narrow and may be white, pink or red, a mixture of white and pink or red, green, cream, yellow or even brownish. The lip is small or rather small, hinged to the apex of the column foot, is shallowly cup-shaped, has a more or less slipper shaped hollow or fleshy spur in front, has erect side lobes and a very small, usually fleshy middle lobe which is attached to the top of the spur near its opening; there is a large more or less erect callus arising from the floor of the cup and this callus is longitudinally grooved on top, sometimes to the extent of making the callus double headed, and there are two swellings (bosses) on the walls of the cup, one at the base of each side lobe.

The species are readily separable into groups:

1. those with inflorescences in which the flowers do *not* all develop simultaneously and they last at least several days (all but one species).
2. that in which the inflorescences is elongated, with the numerous flowers developing simultaneously and lasting a single day—*S. moorei.*

In group 1 the species can again be readily separated into groups:

1a. those which have flowers with broad sepals and petals which are white or pink with or without a reddish base. These can be further divided into:
   (i) those which have broad leaves and a lip which does *not* have hairs inside;
   (ii) those which have narrow leaves and a lip which *has* hairs inside.

1b. those which have flowers with narrow sepals and petals which are green, yellow, brown or dull red (none of these has a lip which has hairs inside).

Group 1a species, section (i)—broad leaves, flowers white or pink, no hairs on lip. *Sarcochilus falcatus* usually grows on trees, has short stems and thinner leaves than the other two species. *S. fitzgeraldii* and *S. hartmannii* usually grow on rocks and have rather longish stems and leaves which are rather long and somewhat fleshy. *S. fitzgeraldii* has side lobes of the lip which are erect, large and sickle-shaped, whereas in *S. hartmannii* the side lobes of the lip are broadly oval.

Group 1a species, section (ii)—narrow thick leaves, fls. white or pink with hairs inside lip. There are four species. Two of these usually grow on rocks and usually have erect inflorescences with more or less bell-shaped flowers; of these, *S. ceciliae* has both middle lobe and side lobes of the lip hairy at least on the inside, whereas *S. roseus* does not have hairy side lobes of the lip. The other two species in this group are very small plants which usually grow on smallish trees and have pendulous inflorescences with flowers which are usually rather widely opening, but whereas in *S. hillii* the side lobes of the lip are shorter than the middle lobe and the spur is quite pronounced and directed more or less backward, in *S. tricalliatus* the side lobes of the lip are about equal in length to the middle lobe and the spur is not very pronounced and is directed more or less forward.

Group 1b—(i.e. flowers with narrow sepals and petals which are green, yellow, brown or dull red), there are 4 species, and of these, *S. olivaceus* has side lobes of the lip which are oblong sickle-shaped; *S. dilatatus* has

side lobes of the lip which are semicircular; *S. australis* has side lobes of the lip which are oblong; *S. harriganae* has side lobes of the lip which are more or less spoon-shaped.

A brief description and a few notes on each species follows.

1. *Sarcochilus falcatus* R.Br.

The stems of this species are rather short and the leaves are 3 to 8 in number, from 2 to 6 inches long by 1/3rd to 1 inch broad, more or less sickle-shaped and pale or yellowish green. The racemes are usually short and bear from 3 to 12 flowers. The flowers are from ¾ of an inch to 1½ inches in diam. and, in the typical form, have a fragrance resembling that of orange blossoms, giving rise to the common name of "orange blossom orchid" for this species; there are several variations of this smell, however, one notable one being like that of tuberose; the colour of the flowers is usually snow white with, on the outside, a purplish stripe on each sepal and there are orange or yellow markings on the lip.

Distributed sporadically from eastern Victoria to the base of Cape York Peninsula. In Victoria, New South Wales and southern Queensland it occurs at altitudes from almost sea level to 3,500 ft. but in northern Queensland is rarely found below 2,000 ft. It shows a preference for those districts which have rock which is basaltic or granitic but rarely grows on rocks, usually growing on rainforest trees. Colour plate "Australian Ind. Orchids" p. 715 or "Australian Plants" Vol. 1, 6:24.

2. *Sarcochilus fitzgeraldii* F.v.Muell.

The stems of this species may grow to 3 ft. long, but are usually much shorter, and are branching so that the plant forms into a clump or mat. The leaves are from 4 to 8 and confined to the area near the tip of the stem, are from 2½ to 8 inches long, average about ½ an inch broad, are twisted half a turn at the base so that they lie more or less flat, are rather thick, fleshy and brittle and dark green. The racemes are from 4 to 8 inches long and bear from 4 to 15 flowers. The flowers are from 1 inch to 1½ inches in diam., usually widely opening so that the sepals and petals do not touch each other, usually white with the basal third of the sepals and petals blotched with cerise or crimson but very occasionally the whole of these segments is this reddish colour. Colour plate "Australian Ind. Orchids" p. 715.

Distributed from about the Macleay River in north-eastern New South Wales to south-eastern Queensland. It usually grows on rocks in rather heavily shaded situations, such as in ravines, in the foothills or low on the ranges and seldom occurs above an altitude of 2,000 ft.

3. *Sarcochilus hartmannii* F. Muell.

The plant of this species rather closely resembles that of *S. fitzgeraldii* but the leaves are usually thicker, more deeply channelled, more sickle-shaped and usually, but not always, a pale colour. The racemes are from 2½ to 10 inches long and bear from 5 to 25 flowers which are crowded toward the end. The flowers are from 2/5ths of an inch to 1 and 1/5th inches in diam., usually not opening flat so that the sepals and petals are usually touching each other; the colour is sometimes wholly white (or cream) but usually white with varying amount of maroon spotting on the base, both inside and outside, of the sepals and petals.

Sporadically distributed from about the southern tributaries of the Hastings River in north-eastern New South Wales to south-eastern Queensland, this species occurs up to about 3,000 ft. altitude on ranges not in close proximity to the sea. It grows on rocks or cliffs, often in exposed situations, but sometimes in sheltered situations.

4. *Sarcochilus ceciliae* F. Muell.

The stems of this species are from 1 to 5 inches long and branching so that the plant usually grows into densely packed tufts. The leaves are

extremely variable and may be suberect or almost pendulous, may be over 3 inches long and only 1/16th of an inch broad or less than 2 inches long and 2/5ths of an inch broad; they are, however, usually very thick, channelled and spotted. The racemes are usually erect, but sometimes almost pendulous, and the 3 to 14 flowers they bear are congested at the top and all facing the end of the inflorescence. The flowers average ¼ of an inch long, are usually bell-shaped (but variable in this regard) and pink but vary from white to red. The lobes of the lip are hairy. Colour plate on page 13.

Distributed from about the Hastings River in north-eastern New South Wales to the Atherton Tableland in north-eastern Queensland. It grows on rocks, seldom below an altitude of 1,500 ft., sometimes in rain forest and sometimes in open forest.



Photography by A. McWhirter

SARCOCHILUS SERRULATUS D. L. Jones

Sarcochilus serrulatus can readily be recognised by its brown flowers, with broad perianth segments, that are fairly crowded on the clavate peduncle. When not in flower it can be distinguished by its then flaccid leaves that have serrulate margins. The flowers of *S. olivaceus* may be brown or green with narrow segments, and are scattered along a slender peduncle. Its leaves are thicker and have entire margins.

Previously confused with *S. olivaceus* Ldl. var. *borealis* W. H. Nicholls, which appears to be merely the North Queensland form of the type species, this newly named species *S. serrulatus* is confined to the ranges and Tablelands of North Queensland and does not seem to grow at less than 760 metres altitude. It prefers densely shaded humid areas around small water courses.

5. *Sarcochilus roseus* (Clemesha) Clemesha

This species is little more than an extreme variation of *S. ceciliae.* The stems are usually erect and unbranched and hence the plants usually do not grow into tufts. The leaves are usually shorter, broader and less spotted than those of *S. ceciliae.* The flowers are much similar to those of *S. ceciliae* but are thicker in texture, more rose-coloured and the side lobes of the lip are not hairy.

So far this species has only been recorded from near the Atherton Tableland in north-eastern Queensland, growing on rocks in exposed situations.

6. *Sarcochilus hillii* (F. Muell.) F. Muell.

This little plant has a more or less pendulous habit. The stems are from very short to several inches long and bear from 2 to 10 leaves. The leaves are from 1 inch to 4 inches long, from 1/16th to 1/10th of an inch broad, thick, channelled and usually spotted. The racemes, which on rare occasions are branched, are from 1 inch to at least 4 inches long and bear from 2 to at least 10 flowers. The flowers are from ¼ to 2/5ths of an inch in diam., usually, but not always, widely opening, and frosty white or pale pink. The sepals and petals are broad. The front lobe of the lip is hairy.

Distributed from the Illawarra District of south-eastern New South Wales to central-eastern Queensland but the exact northern limit is uncertain as its identity, in this region, is sometimes confused with *S. tricalliatus.* It grows at altitudes from almost sea level to about 2,500 ft. and although in some districts it grows on typical rain forest trees (or even rarely on rocks) fairly close to the coast, typically it grows in "dry scrub" areas, sometimes well back from the coast, on small shrubby trees.

7. *Sarcochilus tricalliatus* (Rupp) Rupp

This species is little more than a northern form of *S. hillii* but whereas in *S. hillii* the side lobes of the lip are shorter than the front lobe and the spur is directed more or less backward and quite pronounced, in *S. tricalliatus* the side lobes of the lip are about equal in length to the middle lobe and the spur is directed more or less forward and is not very well pronounced. In this species, also, the leaves are up to about twice as broad as those of *S. hillii* and tend to be less spotted.

An eastern tropical species, extending at least as far north as Princess Charlotte Bay but its exact southern limit is uncertain, as mentioned in the distribution of *S. hillii,* but is probably in the vicinity of the Tropic of Capricorn. It grows on small trees in "dry scrub" from coastal plain to 100 miles inland.

8. *Sarcochilus olivaceus* Ldl.

In New South Wales the stems of this species grow up to 3 or more inches long and the leaves to 5 inches long by 1½ inches broad and the racemes to 4 inches long. In the tropics, however, the stems are usually short and the leaves and racemes seldom longer than 2 inches. The flowers are from ½ an inch to 1 inch in diam. and usually widely opening. The sepals and petals in the typical form are narrow and from olive green to old gold and the lip is white with red markings. In the northern limits of the range of this species, variety *borealis* Nich. occurs. This variety is characterised by the leaves being minutely toothed on the edges and the sepals and petals of the flowers either entirely brick red or heavily blotched with brick red.

Sporadically distributed from the Clyde River in south-eastern New South Wales to the Bloomfield River in south-eastern Cape York Peninsula. It grows on rain forest trees or in some localities, on rocks. In New South Wales it occurs from sea level to 2,000 ft. but in the tropics, seldom below 2,500 ft.

9. *Sarcochilus dilatatus* F. Muell.

Rather closely related to *S. olivaceus* but does not reach the dimensions of that species, the leaves rarely being longer than 2 inches. The racemes are from ½ an inch to 3 inches long and contain from 2 to 12 flowers. The flowers are upright, widely opening and from ½ to 4/5ths of an inch in diam. The sepals and petals are more or less spoon-shaped with the

narrow basal portion from pale green to pale brown and the dilated portion usually deep brown but sometimes the sepals and petals are entirely brick red or entirely green. The lip is white with a few yellow and red or purple markings; the side lobes of the lip vary from almost semicircular to oblong and the spur is more or less conic and fleshy.

Sporadically distributed from the Richmond River in north-eastern New South Wales to about the Burnett River in central-eastern Queensland. It is essentially a species of the dry scrubs of the lowlands or low on the ranges well back from the coast but in a few localities (Ldl.) typical rain forest.

10. *Sarcochilus australis* (Ldl.) Rchb. f.

The stems of this species are seldom longer than 2 inches. The leaves are from 3 to 10, vary from 1 inch to 3 inches long and from 1/3rd to 3/5ths of an inch broad and are pale green. The racemes are pendulous, from 1 inch to 6½ Inches long and bear from 2 to 15 flowers. The flowers are from 2/5ths of an inch to 1 inch in diam. The sepals and petals are rather narrow and from pale yellowish green to brownish. The lip is rather large, white with yellow suffusions and the large side lobes have red or purple stripes.

A temperate species, distributed from Tasmania through eastern Victoria and eastern New South Wales to the extreme south-east of Queensland. In New South Wales its distribution is sporadic and it is extremely rare north of the Hunter River system. It grows at altitudes from sea level to 3,000 ft. and at least in the southern half of New South Wales prefers to grow on rather smooth barked trees such as some species of *Tristania* which overhang water courses, even, in some localities, overhanging salt water but it also occurs on the ranges up to 80 miles Inland. It is intolerant of dense shade.

It is unfortunate that this handsome small species does not seem to respond to ordinary cultural methods. Colour pl. "Aust. Ind. Orchids" p. 741.

11. *Sarcochilus harrlganae* Rupp

The only material of this species known to exist is two preserved flowers in the National Herbarium of New South Wales and most botanists are loth to damage these flowers In a dissection to ascertain the true nature of the labellum so we are dependant on Rupp's description and illustration, neither of which furnish the details we require, for an "understanding" of the species. It is quite possible that it may be a juvenile plant of *Parasarcochilus spathulatus* (Rog.) Dockr. or a hybrid with it and *Sarcochilus olivaceus* Ldl.

The following is gleaned from the description of Rupp.

Plant resembling a small plant of *Sarcochilus falcatus* R.Br. but leaves with dark spots. There were only 2 flowers on the only flowering specimen Rupp mentioned and these flowers somewhat resembled those of *S. olivaceus* Ldl. but were of a more opaque green. Sepals and petals broadly lance-shaped with the top sepal larger than the other sepals and the petals and about 2/7ths by 1/8th of an inch. The lip had long, erect spoon-shaped side lobes and the middle lobe (? spur) had a ring of purple spots or splaches.

12. *Sarcochilus moorei* (Rchb. f.) Schltr.

This species is not a typical member of the genus and, in some ways, resembles Rhinerrhiza but does not have the raspy roots of that genus.

Stems from an inch to over a foot long. Leaves from a few to rather many, from 5 inches to over a foot long and up to at least 2½ inches broad and may be pendulous when large and may or may not be heavily suffused with purple on the under surface. The racemes are pendulous and from 5 to 18 inches long and bear numerous flowers which develop quickly, open together and last less than a day. The flowers are from ¼ to 4/5ths of an inch In diam. and are usually yellow and heavily spotted and blotched with brown but quite pale forms occur. The sepals and petals are oval and on short stalks. The spur of the lip is directed forward, from conical to oblate.

It was the intention to include a line block of a species from the book "Australian Indigenous Orchids" on the opposite page. The way the printer returned the hundreds of line blocks, it would take hours to find a particular one and I did not have the time. Please accept the Editor's apologies. If you are interested in epiphytic orchids, this is the only book available that fully describes and illustrates all of them.

GROWING SARCOCHILUS

by Brian Muffet, Canberra Botanic Gardens

The genus *Sarcochilus* R.Br. is distributed in Asia, the temperate and tropical Pacific Islands and Australia. The exact number of species is not known but could be approximately 40. The Australian species occur along the entire East Coast and Tasmania, and it is doubtful if all 12 species can all be grown successfully under one roof. The greatest number of species is found around N.E. corner of N.S.W. and S.E. Qld.

They are extremely floriferous if their basic cultural requirements are met, and some species have a delightful fragrance. The ease with which some species may be grown has been a major factor in their introduction to Orchid collections, and the main cause of death has been the initial disturbance from their natural habitat and subsequent re-establishment, as most species do not enjoy this root disturbance.

Their ability to cross pollinate with other members of the genus has been proven, but natural hybrids are not known, and some inter generic hybrids have been produced. For the most part these hybrids have not brought about greatly improved blooms though in some cases the flowering period has been increased, and the F2 hybrids of some of these may result in some excellent plants. The ease with which *Sarcochilus* hybridize with other members of the tribe *Sarcanthinae* make them very interesting to Orchid breeders; and foreshadows enormous potential. We can expect some very good hybrids in due course.

In re-establishing *Sarcochilus,* the best time appears to be just prior to the flowering period. The flower spikes should be cleanly removed with a sharp knife and all broken, damaged or old roots should be removed. In extreme cases, sufficient roots should be left to enable the plant to be tied onto the new host, as tying across the stem of the plant can cause injury and result in the loss of the plant. Prior to mounting or potting, whichever is applicable, the Orchid can be immersed for several hours in a weak solution of Aquasol and Formula 20, and should not be fed again till ample new root growth is evident. The exception to this is in the case where Organic foods are used, but these too must be used with caution. Once established, an organic liquid fertilizer should be applied at regular weekly intervals during the growing season.

All species require glasshouse culture in Canberra but in areas of more temperate climate, are easily grown in bush or shadehouses.

Sarcochilus falcatus R.Br. can be successfully grown on a variety of hosts and seems to do best on limbs with persistant bark e.g. *Melaleuca* and softwoods are good. Plants grown on tree fern blocks and hardwood palings are equally at home but do not appear to reach their best root development. The same is true of plants grown in pots or shallow saucers. A shade intensity of 50% is ideal and artificial watering should be in balance with the root growth. Many "forms" are found naturally as this species has the widest distribution of all the Australian species. My favourite for flower colour and size comes from the mid south coast of N.S.W. It carried 48 opened flowers at one time this last flowering season, and in all produced over 100 flowers.

Sarcochilus olivaceus Ldl. occurs as an epiphyte or a lithophyte and although not easy, it can be made to root readily if kept well shaded, at least 70%, and moist at all times. After roots are produced in sufficient quantity to sustain the plant the water may be decreased to the average needs of the rest of the species and then grown normally, resting and feeding as with the other species. It resents

having its roots covered to any great extent and seems to do best on a piece of limb from its natural habitat rather than tree fern fibre, *Melaleuca* or pots. Those plants that occur as lithophytes seem to re-establish easiest. The quantity size and colour of the flowers seems to depend largely on the district, and the area south of Sydney has been the source of some excellent variants.

Sarcochilus serrulatus D. L. Jones has been known to me as *S. olivaceus* var. *borealis,* Nich. It occurs only in the northern part of Qld. and due to its comparative rarity is little grown in southern collections. Its brick red spotting and colouring make it distinctive from the type. Only one plant has been tried to date and it seems quite happy on a small tree fern block and is currently making good root growth.

Sarcochilus fitzgeraldii F. Muell. is a species which needs little introduction as much has been written about it in the past. Normally a lithophyte it is easily grown in shallow pots or saucers with pieces of rock or other coarse medium. Its requirements for shade are between 55% and 70% and ample moisture, although perfect drainage is essential. Many colour variants are available and a good plant can carry 30 to 40 flowers at one time.

Sarcochilus hartmannii F. Muell. Much has been written on this species in past issues and needs little additional information. The cultural requirements are similar to that of *S. fitzgeraldii* though slightly less shade seems desirable. It is a most satisfactory pot specimen and the variations of plant form and flower size and colour are endless.

Sarcochilus ceciliae F. Muell. Has two varieties, *S. ceciliae* v. *ceciliae* and *S. ceciliae* v. *albus.* Both varieties are treated together here. A favourite with growers because of its numerous flowers over a lengthy period. Essentially a lithophyte growing very often in exposed positions, both varieties can be grown in pots or saucers of course media with pieces of rock in good quantity, providing the perfect drainage which this species seems to enjoy. It does not enjoy excess humidity or dense shade and about 40% shade seems ideal, with good air circulation around the plant. Air circulation around all members of the genus is necessary, particularly with respect to glasshouse grown plants.

Sarcochilus roseus Clemesha culture as for *S. ceciliae.*

Sarcochilus hillii F. Muell. This species seems particularly resentful of removal from one host to another and eventually dies back after one or two years. Reasonably good success can be had by collecting plants aleardy growing on twigs or small branches. Shade of 40 to 50% seems ideal and watering should be slightly less than the species previously mentioned.

Sarcochilus dilatatus F. Muell. Is a species that requires much the same culture as *S. hilli.* Plants I have had for 4 years have not made much root or vegetative growth but seem to be at last moving forward. They are probably now acclimatized to their present environment after being moved from town to town four times in four years.

Sarcochilus australis Ldl. Is one of the more difficult species to cultivate, and again seems most intolerant of root disturbance. I have tried many unsuccessful means of growing this species over a period of time but because of the beauty of the flower will try again. It's well worth the effort.

Sarcochilus harriganae Rupp; *S. moorei* Reichb; and *S. tricalliatus* Rupp. I have not been able to try and grow, so offer no information.

Sarcochilus hybrids being developed by some of the better known breeders in Australia are generally cultured as pot growers and the parents should give some guide as to their cultural needs. Some of the registered hybrids are S. 'Fitzhart' = *S. hartmannii* x *S. fitzgeraldii* S. 'Canary' = *S. hartmannii* x *S. olivaceus* S. Melba = *S. hartmannii* x *S. falcatus;* S. 'Lois' = *S. hartmannii* x *S. ceciliae;* S. Minuet = *S. hartmannii* x *S. hillii* S. Phyllis *S. ceciliae* x S. 'Canary'.

Some intergeneric hybrids using *Sarcochilus* and related genera are *Sarcochilus hartmannii* x *Rhinerrhiza divitiflora* Brown as *Sarcorhiza* "Dorothy"; *Sarcochilus fitzgeraldii* x *Rhinerrhiza divitiflora* known as *Sarcorhiza* "Rona".

Some intergeneric hybrids using Australian *Sarcochilus* and exotic *Phalaenopsis* were made by Wayside Nursery, Port Macquarie. Though I have not seen the product I understand that they have been most successful; *Sarcanopsis* "Jean Cannons" is a hybrid between *Sarcochilus hartmannii* and *Phalaenopsis schillerana. Sarcanopsis* "Macquarie Sunset" is between *Sarcochilus hartmannii* and *Phalaenopsis* "Aristocrat"; *Sarcanopsis* "Macquarie Lilac" between *Sarcochilus hartmannii* and a *Phalaenopsis* sp.

The product of such hybrids would probably be cool growing plants with very desirable features.

Who is going to cross Sarcochilus with *Phalaenopsis amabilis* var. *rosenstromii?*

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AUSTRALIAN PLANTS—Nos. 46, 47, 48 & 49—Issues of 1971.

The demand for these issues has been phenomenal. They are no longer available separately but can be obtained in Volume No. 6 when it is bound in December 1972. I apologise to new readers for this but spare copies are all gone—Editor.

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Australian Plants

A PUBLICATION OF THE SOCIETY FOR GROWING AUSTRALIAN PLANTS

VOLUME VI INDEX

Volume 6 comprises issues 45-52 of the periodical "Australian Plants"

Australian Plants is a periodical devoted to the preservation of the Australian Flora and its application to horticulture. Volume No. 6 comprises issues 45 to 52 and represents a book of considerable value. An index to Volume No. 6 is given below. This makes it a complete book in itself and it is not necessary to have the first five volumes to appreciate Volume No. 6. However, the Australian Flora is so vast and unique that there is very little repetition in the volumes as they are produced and anyone keen to know all they can of our wildflowers may refer to last issue enclosed for details on how to obtain all copies.

GROWING WILDFLOWERS: First refer to issue No. 52, pages 334, 356-371. This includes a ready reference to articles in all previous issues under various headings, on page 356. Issue no. 50 is devoted to ground cover plants.

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MELALEUCA SPECIES—continued from page 12

Melaleuca acuminata is established in the Gardens, the earliest planting being in 1950. This older specimen is a large thicket-like shrub to approximately 4 metres tall, and 2 metres across, with numerous spindly upright branches bare of leaves except for the short branchlets. Although untidy and scrubby in appearance, this old shrub still flowers moderately well, but would be improved if pruned immediately after flowering to encourage young growth from the lower part.

Other specimens of this species under 10 years old are, in the main, dense rounded shrubs 1-2 metres tall, 1-1½ metres in diameter. The branches are extremely fine and densely leaved, but the shape in some cases, is spoilt by elongated laterals and leafless young tips. Shrubs planted under dense tall shrubs or trees show a lean towards light, which spoils their shape.

In late October many two-year-old branches are virtually covered with small but numerous white to cream/white flowers. These form interrupted spikes, often 0.5 metres or more in length, making this an attractive shrub.

Under C.B.G. conditions, *M. acuminata* sustains only minor frost damage and it recovers quickly from this in the growing season. The species could be grown in the milder areas of Canberra if a warm sheltered position is selected. Overhead protection should be given to young plants during the coldest periods of winter. Permanent dense overhead cover such as that under trees is not recommended.

Some pruning is necessary to maintain vigour, shape and compactness, and should be carried out immediately after flowering. It is important when pruning to remember that the flowers of *M. acuminata* are produced on second year wood. Young wood must be conserved but removal of dead material together with careful pruning of older, non-productive branches will encourage production of potential flowering wood for the following season.

Soil wise, this is an adaptable species which requires simply a well drained situation, reasonable moisture supply in very dry periods, and possibly a periodic application of a balanced fertilizer.

Melaleuca decussata R.Br.

(From L. decussis = cross used in Botany to describe leaf position, where each opposite leaf pair is at right angles to the pairs above and below).

Densely branched vigorous shrub 2-4 metres high; leaves opposite, linear to oblanceolate, concave, obtuse or acute, 5-18 mm. long; flowers lilac to pink in decussate pairs forming spikes 1-2 cm. long; the axis continuous during flowering; fruits 2-3 mm. diameter more or less immersed in the thickened rachis.

This species occurs in damp situations in the southern districts of South Australia and in Northern and South Western Victoria. Taxonomically it is very close to *M. gibbosa* from which it can usually be separated on leaf shape and size. The converging limits of the two species, however, include forms that can be difficult to separate.

Many specimens of the species have been cultivated at C.B.G. since the first planting in 1950. The oldest of these is now a large dense thicket like shrub 3½ metres high, with numerous intricate leafless branches and many dry twiggy branchlets. Despite this "spent" appearance the uppermost young branchlets seem relatively vigorous and well leaved. Colour pl. page 33.

Other specimens from 1957 plantings are similar in stature and have the same mass of "leafless" branches and branchlets. These however have an outer covering of numerous well leaved young branchlets giving them an overall dense leafy appearance. This early leaf loss from maturing branches can also be seen in relatively young shrubs although to a lesser degree.

The specimen has a somewhat extended flowering period ranging from October to a peak at the end of November, and then flowering spasmodically throughout the summer months.

No reaction to frost has been observed during the recent unusually cold winter. This makes it possible to recommend *M. decussata* for the milder areas of Canberra. It may also grow in the colder areas if given a warm sheltered situation but overhead protection is essential especially for young plants during heavy frosts.

To keep the species within reasonable proportions and encourage leafy growth, pruning is necessary. This should be carried out after the peak flowering period; the removal of flowering heads prevents the formation of fruits and in turn conserves energy.

No special soil problems are apparent. The species seems to grow well in various situations; it tolerates somewhat dry conditions but watering during periods of high evaporation will ensure optimum growth.

Melaleuca gibbosa

(L. gibbosus = "swollen on one side"—"with hump-like swellings"—from gibbus = hump). Colour plate on page 36.

An erect glabrous shrub 2-3 metres high, dense and bushy or with loose slender branches, leaves opposite, decussate, ovate, sub acute, spreading, concave above, keeled below, 2-5 mm long, often recurved in the upper part, flowers mauve, cobalt violet or pink fading to white with maturity, in decussate pairs forming spikes at the end of young shoots, the axis continuous vegetatively during flowering; fruits 4-5 mm in diameter at base, partially immersed in the woody thickened rachis.

This well known horticultural subject grows naturally in damp habitats of south east S.A. including Kangaroo Island and occurs also in Victoria and Tasmania. It is closely allied to *M. decussata* and some forms are often confused with that species. It can usually be separated by its *ovate* leaves as opposed to the linear to *obovate* leaves of the latter.

Specimens of *M. gibbosa* at Canberra Botanic Gardens are less robust in habit than those of *M. decussata*. The largest specimen here is an old shrub which was planted in 1950 and is now 1.6 metres high and 2.5 metres across. Its branches are very slender and loosely intricate with numerous fine branchlets. Several of the larger branches are widely and irregularly spreading, giving the shrub its broad, somewhat unruly appearance. As with many old Melaleucas, only the younger branches and branchlets are leafy and the shrub is marred by a dense mass of leafless, twiggy branches towards the centre. Flowering capacity is reduced due to this scarcity of young wood.

An interesting form, from seed collected in Victoria during a 1963 trip, is represented by several specimens which are now very dense, compact shrubs 1 metre high and 1.5 metres across. These specimens are atypical in that they have very small leaves scarcely 2 mm in length, and extremely short internodes giving them a much more dense appearance than other specimens. They differ also in their short rigid branching as opposed to the long slender branching usual in this species. Flower spikes are produced in reasonable number but are less conspicuous than in other forms. As well as being relatively shorter, they tend to be hidden among the very dense foliage. Fruits are not produced, although the rachis swells, giving the appearance of normal fruiting. This form displays good potential as a small specimen shrub and seems to grow well under C.B.G. conditions.

There are many specimens in various situations here that have the more typical form. Most are slender branched shrubs 1-2 metres high, with numerous fine branchlets. Even in the younger specimens, evidence of early leaf loss from maturing wood can be seen, but this is generally hidden by a covering of young leafy branchlets. Despite this fault which may be overcome by pruning, these are quite attractive shrubs, especially when in flower.

Although many specimens of *M. gibbosa* are growing in more or less open situations, no significant frost damage was observed during the extremely cold 1971 winter. All forms then, should grow in the milder areas of Canberra if given sheltered positions. In cooler areas they would need extra care and overhead protection on very cold winter nights, especially when young.

The species generally appears to be adaptable to average garden conditions. The main requirement is adequate moisture and provision of a mulch to reduce evaporation.

Melaleuca leptoclada (Gk. comp., from lepto = slender and -cladus = branches; "with slender branches").

Shrub, low with spreading, elongated almost filiform branches; leaves opposite, often distant, elliptical, oblong linear or lanceolate, acute or obtuse, flat or concave 4-6 (-12) mm long; flowers white very small and few at base of leafy branches; fruits ovoid 3 mm diameter, solitary or few.

A little known shrub from coasts of Stirling and Darling districts, W.A.

Specimens of this species were planted recently and most are just 30 cm high. At present they are not impressive, being weak in appearance with very slender branches. They seem relatively frost tolerant; some have discoloured leaves but none are damaged to any greater extent. Most of them are planted in open positions, some in cold areas of the gardens.

As the species has small unspectacular flowers its value in the garden will probably depend on form. The decussate, divaricate branches with white bark and closely appressed, distant leaves together with its low-spreading habit suggest possibilities as a ground cover or rockery subject.

Melaleuca platycalyx Diels.

(Gk. comp., platy- = broad and -calyx).

A low dense often ± flat topped shrub 0.5 to 0.8 metres high with rigid, intricate or spreading branches; leaves opposite, elliptical to broad ovate, obtuse to almost acute, thick, 3 nerved, the outer nerves close to the margins, 6 to 8 (-10) mm long; flowers pale mauve to mauve, few sessile in decussate pairs or forming short spikes at the base of lateral branchlets; fruits ± broad urceolate to almost shortly cylindrical, the orifice about 3 mm diameter, the slightly immersed bases often expanded.

The distribution of this species does not appear to be well known. Under his description of the type specimen Diels states "It grows in the Irwin district not at all far from the Moore River extending north towards Watheroo estate—" and it has been said by more recent authors to have a restricted inland distribution. However, specimens at C.B.G. have been collected as far apart as Gnowangerup in the Stirling district and near Jurien Bay in the Irwin district. Further collections must be made and field studies undertaken to gain more knowledge about the true distribution.

The single surviving garden specimen of *M. platycalyx* at C.B.G. is an eight year old shrub situated in a sheltered woodland area. This is a dense flat topped shrub about 1 metre high and 1.3 metres diameter with numerous almost divaricate but intricate branches. In habit it is very similar to some forms of *M. violacea* but with a very different inflorescence. Many spent branches and branchlets form a twiggy mass in the lower centre of the shrub but these are virtually hidden by the vigorous young top growth. The mauve flowers are produced in summer but, in this situation at least, they are not numerous. The species may possibly flower more profusely in a sunny situation.

No assessment of frost tolerance is possible until specimens of this species are grown in more open positions. Nevertheless it is a worthwhile shrub that gardeners in areas where severe frosts are no problem could grow, and one which is sure to be appreciated.

M. thymifolia Sm.

(Irregular compound from Thyme and the L. suffix -folius — with thyme like leaves). Full colour plate Vol. 1 issue no. 10.

A low widely spreading shrub 0.8 to 1 metre high with slender often lax branches; leaves alternate, lanceolate to elliptic-oblong or almost linear, ± acute, 6-12 mm long; flowers mauve in few flowered spikes or clusters at the base of second year branches, often solitary; fruits almost globose with persistent calyx lobes (sepals).

This relatively "easy to grow" subject is found in various habitats from the south coast of N.S.W. to Southern Qld. It is reasonably well known to horticulturists as a low spreading shrub, useful in the front of hte shrub border, but sometimes needing control to avoid untidiness.

A number of specimens are growing in various situations at C.B.G. The oldest specimen here has developed into a bushy, irregularly spreading shrub 1 metre high and about 2 metres across. It has many slender ascending branches and vigorous leafy branchlets in the upper part, but several tortuous almost decumbent older branches demonstrate a need for judicious pruning and shaping. Most younger specimens are, by comparison, relatively tidy in habit but several have lax spreading branches that show a tendency to unruliness. *M. thymifolia* seems to be an early maturing species and many quite small specimens produce flowers in some profusion. Plants of various ages can be found in flower over an extended period from November to June. Flowering is often halted, if the summer is expectionally hot and dry.

In open situations late flowers may be damaged by frosts but vegetatively, mature shrubs display little or no adverse reaction. Young plants on the other hand often sustain tip damage and extensive change in leaf colour.

This attractive shrub has distinct possibilities for the milder areas of Canberra and if given a warm sheltered situation it may grow successfully in cooler areas. However, care must be taken with young plants. Overhead protection is necessary during frosty weather and should be provided until the shrub is reasonably advanced.

Pruning and shaping should be carried out immediately after flowering and care must be taken to avoid excessive removal of first year wood which is the potential flowering wood of the following season.

Melaleuca violacea Lindl.

(From L. violaceus = violet, referring to the flower colour).

A low sometimes flat-topped shrub to 0.8 m high with spreading intricate branches; leaves opposite, broad ovate-cordate to narrow ovate; flowers violet in lateral or auxillary clusters or solitary, fruits "star-like", thick with persistent calyx lobes (sepals).

A useful growing shrub from the Stirling and Eyre dist. of South West W.A. with a spreading habit that makes it suitable for the rockery or for edging a shrub border.

The species was first introduced to C.B.G. in 1966 and is established in sheltered and open positions. Specimens under tall tree cover have developed into compact densely leaved almost flat topped shrubs 0.8 metres high and nearly 1 metre in diameter. They are healthy vigorous shrubs with many young branchlets covering the thickened somewhat corky older branches, but flowering is spasmodic. In more open situations, however, specimens of the same introduction produce many more flowers although differing little in growth or vigour.

Specimens of a very interesting form have been planted en masse in a triangular bed near the public car park, and have displayed a remarkably high frost tolerance in this, one of the colder parts of the Gardens. These are extremely flat-topped shrubs 0.5 metres high and the more vigorous specimens have grown together creating a table-like ground cover. Their appearance is slightly marred by a few thickened and leafless branches showing a need for some pruning during development. Careful pruning of mature shrubs also will promote the growth of young leafy branchlets.

As no significant reaction to frost has been recorded in this species in open relatively cold situations, it could be recommended for the milder areas of Canberra. It may also grow in cooler areas if a warm sheltered position is selected and overhead protection is provided during extremely cold nights, especially for young plants. In the coldest areas of Canberra tub culture is worth trying. A compact shrub such as *M. violacea* should make an ideal tub specimen and if grown in this way it could be moved into frost free areas in winter. Colour plate 2:276.

Melaleuca wilsonii F. Muell.

A spreading shrub 0.2 to 1.5 metres high with dense intricate branches; leaves opposite, linear to linear-lanceolate, acute, obscurely 3 nerved below, 8-15 mm long, 1-2 mm broad, flowers magenta to fuschia purple in few flowered clusters, axillary or lateral on second year branches; fruits ± campanulate 2-3 mm diameter with persistent calyx lobes (sepals).

Well known to native plant enthusiasts as one of the most attractive of the eastern *Melaleuca* species. It grows naturally in the dry north west Victoria and in South Australia and is often found in "whipstick scrub".

First introduced to the Gardens in 1951, it has since been cultivated here with some success. Several excellent specimens are established in various situations but some of the older shrubs have become somewhat gnarled, with many thickened old branches that are leafless and corky, with old fruiting clusters making them even more craggy. However they are topped by many younger branches which still produce flowers quite profusely. During a good flowering season, these seem to mask the aged appearance of the lower part.

Younger shrubs, though intricate and irregular, are vigorous, with numerous leafy young branches. The dense mid-green of these specimens when splashed with the magenta of many flower clusters is an unforgettable sight.

Little or no reaction to frost was recorded from specimens in sheltered or open situations. This suggests that *M. wilsonii* may have potential as a border shrub in the milder areas of Canberra. If given a warm sheltered position, it may also be tried in cooler suburbs, but results cannot be guaranteed in these areas.

Light pruning as young shrubs develop will help to achieve a neat rounded form. Mature shrubs may be improved by judicious pruning immediately after flowering. This would increase vigour, promote development of young wood and improve the general appearance.

The species will grow in various soils provided they are well drained.



Photography by A. McWhirter

MELALEUCA WILSONII

The flowers of *M. wilsonii* are shown in close up in "Australian Plants" Vol. 6, page 181. We take this opportunity to show how the bush appears. The flowers are clustered along the branches and the bush flowers profusely. It is a small squat bush and can be controlled to quite a small space in the garden but if allowed to grow it could reach 1.5 to 2 metres in height.

Series III *Laterales* Benth.

Flowers usually small, in axillary or lateral clusters the axis rarely continuous vegetatively.

Melaleuca neglecta Ewart & Wood

(From L. neglectus = neglected, possibly referring to habitat of species) (including *M. oraria* J. H. Black—from L. ora = coast referring to habitat)

Erect or spreading shrub with long, slender, sometimes tortuous branches, leaves linear-lanceolate, obtuse, plano-convex, flowers white/pale cream on previous year's branches, at times forming long interrupted spikes. Fruits ovoid, 4 mm diameter, often corky.

The taxonomic status of *M. neglecta* has been in doubt for some time. Willis (1967) stated ". . . When the closely related W.A. species *M. brevifolia* Turcz. is better known, separation of *M. neglecta* may prove to be unwarranted; for the present, retention of the latter name for eastern populations seems desirable". Victorian and S. Australian specimens at C.B.G. herbarium placed under *M. neglecta* do not appear specifically distinct from W. Australian specimens that go well with Turczaninow's description of *M. brevifolia.* This seems to bear out W. G. Willis' suggestion but further study is needed before a nomenclatural change can be effected.

M. neglecta has been cultivated at the Gardens since 1950 and several specimens from this and later plantings are growing well in various situations. The oldest of these is a sparse open shrub 2 metres high with weak ascending branches. The lower half of this shrub is hoary and lichen-covered but the fine secondary branches in the upper part are well leaved and healthy in appearance. Several ten year old specimens in tree shade are low decumbent shrubs 0.5 metres high with tortuous lateral branches 0.8 metres long. Secondary branches are few, very slender and tortuous but well leaved and relatively vigorous. Other ten year old specimens, planted in more open but not exposed situations are also decumbent shrubs. These however have attained a height of 1 metre and an almost one-sided lateral spread of 1.8 metres. Their many primary branches are tortuous and they have numerous slender weeping secondary branches and branchlets. All are well covered with leaves except the lower old branches which are becoming hoary and thickened. The form of these specimens is somewhat untidy but if pruned and trained when developing their decumbent tortuous habit could be used to advantage.

Along the branches of the more vigorous specimens, numerous white flowers are produced in late Spring to early Summer adding a touch of beauty to the unruly but interesting form.

No reaction to frost has been recorded but no specimens are in fully exposed positions. Several, however, do not have direct overhead cover.

M. neglecta should succeed in the milder areas of Canberra if given a sheltered position and overhead cover during extreme frosts. The habit of the spreading form lends itself to "wall plant" culture by which method a warm position against a westerly wall can be given, with shelter from the eaves. Young plants may require special consideration with extra protection on frosty nights. A cautionary assumption of only moderate frost tolerance has been made but the true tolerance of this species in exposed positions is not yet known.

Some pruning may be necessary to avoid the hoary, sparse appearance displayed by many specimens. It is important to note that this species flowers on the previous year's wood and pruning should not be delayed. It must take place immediately after flowering as late pruning and removal of growing young wood may reduce flowering potential for the following year.

Series IV—*Circumscissae* Benth.

In Niedenzu's revised classification raised to sub-section rank as 'b' *Asteromyrtus* Schau.

Leaves alternate (usually above 2.5 cm long). Flowers in axillary, lateral or rarely terminal globular heads. Calyx tube circumsciss at top of ovary

after flowering and falling with the lobes. Fruits ± cohering in a globular head.

No specimens of this series at C.B.G.

Series V—*Spiciflorae* Benth.

Leaves alternate or opposite. Flowers either solitary or few and distinct or in ± interrupted oblong-cylindrical elongated spikes, sometimes ± terminal, the axis continuous during flowering, rarely in dense lateral cylindrical spikes.

Melaleuca alternifolia (referring to the alternate leaves)

A glabrous tree 4-6 metres tall with loose or dense head; leaves alternate, narrow linear, 20-35 mm. long, usually recurved, not rigid; flowers white, loosely scattered in an interrupted spike, the axis continuous during flowering, fruits ovoid about 3 mm diameter in loose spikes or reduced to 3 or 4 and scattered.

A "swamp paperbark" closely related to *M. linariifolia* Sm. that grows on the edges of swamps and creeks in the north coast districts of N.S.W.

It is represented at C.B.G. by one specimen which was planted in 1950, and is now a multi-stemmed shrubby tree 5 metres tall with interesting off-white bark. At 1.5 metres from ground level, its stems branch to form a loose more or less rounded head consisting of many ascending slender branches and fine, almost weeping branchlets. All are densely clothed with leaves similar to *M. linariifolia* but of a slightly deeper green. In late spring to summer the tree is enhanced by numerous white flower spikes that complement the soft green foliage.

The only reaction to frost observed was a slight discoloration of some leaves. The specimen, however, is in a more or less sheltered position among other tall shrubs and trees, but without overhead cover.

Gardeners in milder areas of Canberra, wishing to grow this attractive tree would be advised to select a warm sheltered position, protected from the cold southerly winds, and the westerlies which can be extremely desiccating in summer and winter. Protection from frosts in the form of hessian frames or other overhead cover is necessary for young plants.

Pruning and shaping the developing tree, and maintaining a single trunk would probably result in a tree of better form, but the multi-stemmed habit may be preferred by many gardeners. As with most "swamp paperbarks", the main cultivation requirement is ample moisture and provision of a good mulch to reduce evaporation.

Melaleuca armillaris Sm.

(from L. armilla = bracelet. Adjectival form = bracelet like—referring to the inflorescence).

A tall shrub or small tree 6-9 metres high; leaves alternate, crowded, narrow linear, acute, often recurved at the apex, 12-25 mm long; flowers white/cream, almost immersed in the rachi of dense or interrupted cylindrical spikes forming the bases of previous year's shoots or young laterals; fruits depressed globular in very dense oblong-cylindrical spikes.

This is a common species in damp places on the coasts of N.S.W. and Victoria and is often found on headlands or along river banks.

Since its first introduction to Canberra Botanic Gardens in 1950, many specimens have been planted in various situations; most have adapted well, displaying exceptional vigour.

One 20-year-old specimen has developed into a massive shrub 7 metres tall and 8 metres across, with an apparent upright rounded form appearing densely leaved to ground level. On close examination, however, it can be seen that the large diameter is due to its several sprawling stems. These are thick and gnarled with age but from them grow numerous densely leaved ascending branches, forming the leafy outer cover. (This specimen has since shown some deterioration and has been drastically pruned—summer, 1972).

Other specimens, about ten years old, are not sprawling, but some are multi-stemmed. The stems of these are more or less erect, slender and many-branched from a short distance above the ground, giving them a loose-headed tree-like appearance. This multi-stemmed habit can be controlled by "stopping" of vigorous secondary leaders in the early growth stages. This entails the pinching out of growing tips following which the branches can be

removed when the tree is larger. Conversely, a hedge or screen plant may be required and upright growth should be "stopped" to encourage branching.

The main flowering period of this species at Canberra Botanic Gardens extends from October to January but flowers are often produced in May and June. When the winter is mild flowers may be seen in early spring.



Photography by D. Verdon

MELALEUCA ARMILLARIS

A free flowering hardy species that is widely used in landscaping schemes.

This species displayed definite reactions to frost during the extreme winter of 1971. Although only light frost damage had occurred in previous recent winters, several losses were recorded among young specimens in various parts of Canberra in that year. At the Gardens extensive desiccation was observed on exposed specimens but these plants recovered strongly during the following growing season. Despite these losses under exceptional conditions *M. armillaris* has been cultivated with reasonable success in the milder areas of Canberra. However, it is advisable, even in these areas to provide overhead protection for young plants during frosty periods.



Photography by D. Verdon

MELALEUCA DECUSSATA

This species belongs in Series II—Decussatae and is described on page 25.

Melaleuca cheelii C. T. White

(Named in honour of Edwin Cheel, eminent botanist of that time and curator of the National Herbarium Sydney).

Spreading tree to about 10 metres with papery bark; leaves opposite, elliptic or ovate, very shortly petiolate, rather thick, 3-5 nerved, but the outer nerves not obvious, 0.8 - 1 cm long; flowers creamy white in short terminal spikes, the rachis continuous vegetatively before flowering; fruits ellipsoid or sub-globose 0.5 cm diameter few in interupted spikes.

An interesting small tree that occurs naturally in the Burrum River district about 180 miles from Brisbane. It is close to *M. squarosa* and on superficial observation can be confused with the ovate leaved, tree-like forms of that species. Closer inspection, however, shows *M. cheelii* to be quite distinct. The main differences being its 3 (or 5) nerved leaves in which the *2 (or 4) outer nerves* are obscure, and its flowers which are *solitary* within each floral leaf. *M. squarrosa,* on the other hand, has *5-7 nerved leaves* and flowers that are *ternate within each floral leaf.* These two species and other members of *Spiciflorae* have been discussed in "Australian Plants" (Dec. 1963).

It is perhaps surprising that a species with limited occurrence in a warm coastal area of Queensland has been successfully established at Canberra Botanic Gardens. The single specimen was introduced about twenty years ago and is probably a survivor of several plantings. It is now a reasonably well shaped small tree, 4.5 metres high, somewhat loosely branched and with an open, more or less conical head. It still has good leaf cover and displays an interesting pale brownish paper-barked trunk. The creamy white flower spikes, produced in late spring, are not numerous but are attractively displayed at the tips of lax slender young branches.

Little frost damage has been recorded but it must be stressed that this specimen is situated among other tall shrubs. These afford some protection although they do not provide direct overhead cover.

The potential of *M. cheelii* in ornamental horticulture needs little emphasis but its height under Canberra Botanic Gardens conditions is well below its natural maximum which could be 10 metres.

It would not be prudent to recommend this species to Canberra gardeners on the performance of a single specimen grown in a more or less sheltered position. It may grow successfully in milder elevated areas, however, if given a warm sheltered position and protection from frosts.

Melaleuca decora (Salisb.) Britten, (syn. *M. genistifolia* Sm.)

(L. feminine of decorus = beautiful or noble).

Shrub or bushy-headed tree to 15 metres with whitish papery bark; leaves scattered, linear-lanceolate, acute, 1 or sometimes 3 nerved, 8-16 mm long 1.3-2 mm broad. Flowers white to cream in spikes 2-6 cm long, sometimes interrupted and leafy, the axis continuous. Fruits broadly ellipsoid, truncate with narrow bases, rugose, about 3 mm long, 3-3.5 mm broad.

A swamp paper bark from the north and central coasts of N.S.W. the Darling Downs, and Moreton districts of Queensland. Several specimens are established at the Gardens in various situations, some of which were planted in 1950. An example of these early plantings is now a triple-stemmed tree about 8 metres tall with a somewhat loosely open head. It would probably be much neater grown from a single trunk. A multi-stemmed form however, has appeal to many, as it features the bark advantageously.

Mature plants appear to have a fairly high frost tolerance, but younger plants are more sensitive and there have been some losses in very young specimens. The species flowers moderately well here, producing longish spikes of cream flowers from late spring to Jan. See colour plate page 40.

Canberra gardeners wishing to grow this species would need to select a warm sheltered position. Extra overhead protection on frosty nights should be continued for as long as the size of the plant permits. The most important factor in the cultivation of the species, is the avoidance of moisture stress, especially during the initial growing period. A balanced watering programme and provision of a good mulch is necessary.

Melaleuca groveana Cheel & White

(In honour of the type specimen collector Grove).

Shrub or small tree 2-5 metres high with hard, whitish, paper-like bark, a bushy green crown and purplish young growth; leaves alternate, (the term alternate is used here in a general sense meaning not opposite or whorled (not sensu stricta)), lanceolate-linear or oblanceolate-linear, acute or shortly acuminate with a very acute (not pungent) tip, 2.5-5.7 cm long and 2.5-8 mm wide, 3-nerved with lateral nerves close to margin, rarely sub-5-nerved; flowers white in spikes 1.5-3 cm long 2.5-3 cm wide, terminal or in the upper axils, the axis continuous vegetatively as flowers fade; fruits truncately ovoid to barrel shaped 5-7 mm long, 5.7 mm wide.

According to S. T. Blake (1968) this is "apparently a rare species about which little is known". It has been collected as far south as Port Stevens on the N.S.W. North Coast and as far north as Preston in the Burnett district, Qld.

Only one specimen is in cultivation at C.B.G. and this is an immature plant which flowered initially in late October 1971. It is at present an open finely branched specimen with a slender trunk and has attained a height of 1.5 metres. The slender sparse open habit may be due to its position in tree shelter but this does not appear to have affected its general vigour or its flowering capacity. In fact it presented an eye catching picture with its many relatively large flower spikes.

No recommendations can be made in relation to growth in Canberra generally until further study is made of this species.

Melaleuca hamulosa Turcz.

(from L. hamulosus, diminutive of hamosus = hooked referring to the small hooks at the leaf apices).

A virgately branched shrub 2-4 metres high; leaves alternate, linear-terete, with hooked apices 6-15 mm long, often recurved; flowers white (to pinkish?) in dense spikes to 3 cm long, the axis continuous vegetatively before and during flowering; fruits 3 mm diameter in dense or interrupted spikes.

Another shapely shrub from the southern part of the South West Province of West Australia which also occurs at Coolgardie in the Eremean Province. Owing to its inflorescence it is placed in the *Spiciflorae* but, vegetatively, some forms display close affinity to *M. viminea. M. hamulosa* can usually be separated from the latter by the fine hooked point at the apices of its narrower to terete leaves and its usually longer inflorescence.

C.B.G. specimens of the species are all from a 1968 collection and are not yet fully mature. They are open but densely leaved shrubs 1 to 2 metres high with many long ascending, vigorous branches that give rise to numerous very fine and more or less weeping laterals. Two of the most advanced specimens have produced a few early flower spikes but full flowering capacity will not be reached until at least the next flowering season (1972-73).

These specimens have shown no adverse reaction to frost, but all are in somewhat sheltered situations, although without direct overhead cover. A general recommendation for planting in Canberra cannot be made until *M. hamulosa* has been tested in exposed positions. It could be tried in the milder elevated areas but a sheltered position may be advisable. Overhead protection should be given on frosty nights for as long as shrub size permits.

Melaleuca huegelii Endl.

(Named in honour of the collector Huegel).

An erect shrub 1.3-2.6 metres, occasionally more than 4 metres, branches virgate or spreading, often weeping; usually glabrous except the inflorescence; leaves alternate, spiral, sessile, attached by the broad concave base. Flowers white, in dense but slender cylindrical spikes 2.5 cm to 7 cm long the axis, soon continues, fruit globular, 4 mm diameter, crowned by persistent calyx lobes. (Sepals).

This is another of the many W.A. species with horticultural potential. It is a coastal species from the Irwin and Darling districts growing mainly in limestone hills. Full colour plate Vol. 2 page 273.

Our one specimen of the species is the sole survivor of several plantings since 1956. Growing among other large shrubs and trees it has attained a height of 3.5 metres in fifteen years. It is an attractive relatively narrow shrub having several main stems with upright slender branches and many spreading laterals. Its beauty lies however, in the densely leaved, very fine weeping branchlets and exceptionally long flower spikes. The flowers are purplish in bud but display delicate white filaments when open, and are produced from mid-January to February.

No frost damage has been recorded during the cold 1971 winter. This single specimen, however, is in a sheltered situation, and the species cannot be recommended for Canberra generally on its performance under these conditions. However, people in the milder elevated areas could try this attractive shrub in a well sheltered position but it will need extra protection on frosty nights especially when young. When making the above suggestions it is assumed that the species may have only a moderate frost tolerance. It is not proven that losses incurred were due to frost.



Photography by D. Verdon

MELALEUCA GIBBOSA

The species belongs to the Series II—Decussatae group and is described on page 26. It is shown here because of the restriction on colour plate positions.

When the species is grown successfully, pruning and shaping would be advisable to maintain an attractive appearance. Carried out immediately after flowering, this will prevent formation of fruiting spikes and encourage production of the attractive weeping branchlets.

Melaleuca linariifolia Sm.

(Irregular L. compound from linaria and -folius = with Linaria like leaves).

A tall shrub or tree to 10 metres high with slender branches, the young shoots and inflorescence pubescent, the adult foliage glabrous; leaves opposite, linear or linear-lanceolate, concave or keeled, rigid, acute, 13 to 35 mm long 1 to 3 mm wide; flowers white in distinct pairs forming + dense spikes 2.5 to 4 cm long, at first terminal, but the axis continuous vegetatively during flowering; fruits + campanulate 4 mm diameter with ± persistent calyx lobes (sepals).



MELALEUCA LINARIIFOLIA

M. linariifolia inhabits the edges of swamps or creek beds in shale and sandstone areas of the N.S.W. and Qld. coast. It was first introduced to C.B.G. in 1950 and at present several specimens of various ages are in cultivation here. The oldest of these, a twenty-one year old specimen is a

dense irregular headed tree 7 metres in height, its soft pale yellowish green leaves contrasting well with the deeper, harder greens and the greys of other Myrtaceae shrubs and trees. Younger specimens are less tree-like in habit. Several which were planted in 1961 are irregular shrubby plants 3-5 metres high and branched from close to the ground. They are densely leaved and in good seasons during December or January, and are enhanced by numerous white flower spikes.

Adverse reaction to frost in mature specimens growing in open situations was negligible during the very cold winter of 1971. This species, then, can be suggested as a potential lawn specimen in the milder areas of Canberra. Shelter from cold southerly wind is necessary and overhead protection should be provided during frost periods as long as possible.

Like many swamp Melaleuca species *M. linariifolia* seems to adapt well to ordinary garden conditions. Its main requirement is ample moisture during periods of high evaporation, and a good mulch to reduce moisture loss. Where the tree is planted in a lawn there should be a large circle free of grass around its base and a mulch should be provided.

Melaleuca lanceolata Otto

(L. = lance, or spear shaped, referring to the leaf shape of some forms of this species).

Shrub or tree to 10 metres high with blackish rough bark; young branches with white lines below the leaf petioles; leaves alternate, linear-lanceolate, acute ± erect or spreading, recurved towards the tips, concave above, indistinctly 3 nerved; flowers whitish in interrupted, sometimes leafy spikes, the axis continuous vegetatively before the flowers open; fruits ovoid or subglobose 4 mm diameter, calyx lobes persistent or at length deciduous.

This species is fairly widespread across the southern part of Australia and also occurs in the Darling Downs district of Queensland. It has been cultivated for many years in Europe and America and, in fact, was described, in 1820, from a plant growing in Berlin Botanic Gardens. Some forms of the species are fair sized trees but C.B.G. specimens are all shrubby forms.

First planted at Canberra Botanic Gardens in 1950, *M. lanceolata* has since been cultivated here with reasonable success. The oldest specimen is rather scrubby, with a very short, thick trunk 30 centimetres high and 15 centimetres diameter and several spreading, almost tortuous main branches to 1 metre. These branches are gnarled but not large in diameter being only 3 to 8 centimetres at their bases. They branch at 1 metre into many slender secondary branches and a dense head of numerous very fine branchlets. The whole shrub attaining a height of 3 metres and a width of 1.5 metres. The younger branchlets only are leafy, demonstrating the need for pruning to maintain a leafy cover. The few attractive white flower spikes also are confined to the upper part of the head.

Other specimens all under ten years old vary from weak young shrubs 1 metre high to open irregular but vigorous shrubs of 1.8 metres. Most are well leaved and mature specimes flower moderately well in spring.

The only reaction to frost recorded from plants in open situations consisted of slight desiccation of young shoots and discoloration of a few leaves on the eastern side of the shrub during relatively hard frosts of late winter and early spring. All plants recovered well in late spring, growing on vigorously as the night temperatures increased.

M. lanceolata can be recommended for the milder areas of Canberra and may grow in other areas if given a warm sheltered position. Overhead protection is needed for young plants during the coldest periods. Care must also be taken if hard frosts occur in late winter and spring. A screen on the eastern side of the shrub may be necessary.

If deciding to plant this species, it must be remembered that some forms develop into rather tall trees. Whether they will attain the same height under Canberra conditions as in their natural habitat, is not known.

Melaleuca laxiflora Turcz.

(L. comp. laxi- = loose and -flora = flowers).

A more or less spreading shrub 1-1.5 m high with somewhat dense ascending, virgate branches; leaves narrow linear to lanceolate or oblong, incurved, narrowed at base, thick, obscurely 1 or 3 nerved, 6-18 mm long; flowers pale red in interrupted leafy spikes forming the base of lateral shoots; fruits ovoid to 4 mm diameter with narrowed orifice, the calyx lobes (sepals) persistent for a short period.

For horticultural description see rear cover.

Melaleuca pulchella R.Br.

(from L. pulchellus = "pretty little")

(syn. *M. serpyllifolia* Dum. Cours ex DC.)

A widely spreading slender branched shrub; leaves alternate oblong-ovate, obtuse, spreading 3-5 mm long, 2-3 mm broad, rigid, nerveless or 1-2 nerved; flowers pink, solitary or 2-3 together below ends of branches, fruits urceolate-globular, crowned by persistent, spreading lobes.

This attractive species from the southern coastal heath of the Western Province of W.A. is well known in horticulture for its unique claw-like staminal bundles. It was first introduced to C.B.G. as a single planting in 1951. This specimen is now a dense low shrub 1 metre high and about 1 metre across, with slender but rigid spreading to decumbent branches. It has maintained its vigour, and although some dead wood is in evidence, an outer cover of vigorous leafy branchlets gives the shrub a healthy appearance. Many younger specimens can be found in various parts of the Gardens, most of which are thriving. Some losses have occurred, but in general the species has adapted well to C.B.G. conditions. Colour plate Vol. 2, page 293.

The attractive "claw" flowers are produced from mid-November to December. These are outstanding in size and colour, but are few in number. Careful pruning immediately after flowering may be beneficial.

Mature specimens of *M. pulchella* displayed little adverse reaction to frost during the cold 1971 winter. Young, recently planted shrubs however, were discoloured and several sustained tip damage.

Where minimum terrestrial temperatures do not fall below –7°C this shrub can be recommended. In the milder areas of Canberra it should grow satisfactorily if given a warm sheltered position. Young plants will require overhead protection during very cold periods.

There should be no problems in cultivation as the species appears to have a broad tolerance, but attention to drainage of very heavy water-retaining soils is advisable.

Melaleuca radula Lindl.

(from L. = seraper; probably referring to the rasp-like lower surface of its leaves).

An open, glabrous shrub with virgate branches; leaves opposite, linear, concave or with involute margins, nerveless or obscurely 1 nerved 2-3 (-5) cm long; flowers pink, mauve to whitish, sessile in opposite pairs forming interrupted spikes or reduced to 1 or 2 pairs towards the base of or below the tips of young shoots; fruits depressed, globular 3-4 mm diameter.

An attractive species that has a fairly wide distribution in south western W.A. and prefers granite soils. A discussion of its habitat and distribution can be found in an article by C. N. Debenham ("Australian Plants", Sept. 1964).

The species was first introduced to C.B.G. during 1961 and several specimens of this introduction are established in an open forest situation in the upper part of the Gardens. The largest of these is a sparse very open shrub 1.5 metres high with few slender but reasonably vigorous spreading branches. Lateral branches are sparse and fine with almost weeping tips. All branches are well leaved but, due to the fairly long internodes, the leaves are not dense. Flowering in these tree-sheltered specimens is very spasmodic but even in its natural habitat, the species does not flower as profusely as other Melaleucas.

A specimen in a lower part of the Gardens that was planted in 1960 under a tall Eucalyptus has a similar habit to those mentioned. It is 1 metre high and branches a little more, with shorter, stouter laterals but is still a loosely open shrub. This specimen flowered moderately well in January 1972 following a rather poor display in the two previous years.

The beautiful, relatively large lilac to white flowers of this species are never in dense spikes and in fact are sometimes produced in one or two opposite pairs. However, the variation in flower production and in flower colour should give encouragement to the plant breeder. Judicious breeding could result in some outstanding cultivars. Colour plate on cover.

M. radula does not appear to have a high frost tolerance as plants in the open do not fare very well and those in tree shelter react with some change in leaf colour. It cannot be recommended for Canberra gardens in general but in the milder areas it could be tried under high tree cover.



Photography by C. Green

MELALEUCA DECORA

As described on page 34, white flowered species make good bushes.



Photography by C. Green

MELALEUCA SQUARROSA

Melaleuca squarrosa Sm.

(From Latin squarrosus meaning scales projecting outwards usually at about 90°, referring to the leaves of this species).

A handsome erect shrub, often very dense, 2-3 (-6) metres high; leaves opposite, broadly ovate-cordate to ovate-lanceolate 5- to 7-nerved, rigid, acute, about 7 mm long; flowers yellow to cream ± dense spikes 10-15 mm long, the axis continuous before flowering; fruits sub-cylindrical 3-4 mm diameter In long ± dense spikes.

This is an attractive member of the swamp "paper bark" group which makes up a large part of Bentham's series *Spiciflorae*. It has a wide distribution from the central coast of N.S.W. southward into Victoria and South Australia (Kangaroo Island), and is widespread in Tasmania.

The species is well represented at the Gardens where species of various forms are established. The oldest of these—a form from Victoria which was introduced in 1950, is tall and tree-like to about 5 metres. It has stout, widely-spreading main branches and slender secondary branches that are well leaved, but the relatively thin-textured ovate leaves are not nearly as dense as those of the shrubby forms. In direct contrast, the latter are bushy, more or less rounded shrubs 2.5-3 metres in height, and densely covered to ground level with the better-known rigid, broad cordate leaves. All forms produce numerous dense cream flower spikes during the spring months.

No adverse reaction to frost has been recorded from this species and several specimens are planted in relatively open positions. The species then, can be recommended, at least for the milder elevated areas of Canberra. In cooler areas it would require a warm sheltered position with protection from southerly winds and overhead cover during extremely cold winters.

Melaleuca rhaphiophylla

(Gk. comp. from raphis = needle, and phyllon = leaf).

A tall shrub or tree up to 10-12 metres with deciduous paper-like bark; leaves alternate, narrow-linear, terete or semi-terete, mostly acute, 15-35 mm long, 1 mm broad; flowers cream in oblong or cylindrical spikes terminal or the axis continuous vegetatively before anthesis; fruits smooth, nearly globular, 4-6 mm diameter, sessile.

This swamp "paper bark" from the south western Province of W.A. is not well known in horticulture. It is represented at C.B.G. by several young specimens which were planted in 1970 in a relatively open situation, but which have shelter from southerly winds.

These specimens are at present sparse open shrubs, 0.5-0.8 metres high with few upright slender branches. Vigour is good and they display excellent potential. With no adverse reaction to frost in these young plants, it suggests that the species may have possibilities in the milder areas of Canberra.

In its natural swamp habitat *M. rhaphiophylla* often attains 12 metres in height. Under garden conditions it may remain much shorter.

The performance of this species under very hot and dry Canberra summer conditions has yet to be observed.

Melaleuca sieberi Schau.

(In honour of the collector Sieber).

Shrub or tree to 9 metres high with whitish paper bark, leaves alternate, dense, very shortly petiolate, twisted, flat, linear-lanceolate, or linear-elliptic, acute, 4.5 to 9 mm long, 1 to 1.8 mm wide; flowers white (the buds pink), in dense spikes 1 to 2 cm long, the axis continuous vegetatively after flowering fruits cupuliform with persistent incurved calyx lobes (sepals).

An interesting "paperbark" from the central and north coasts of N.S.W. and the most southerly coast of Queensland. It is represented at the Gardens by several specimens from a 1961 collection. The best of these is a shrubby tree of 3 metres. It is dense, somewhat irregular and branched from near ground level and in shape is roughly oblong, but mishapen due to several widely spreading low branches. This irregular shape, though possibly not to the purists liking, is nevertheless an interesting outline that is handsomely filled in by dense slightly twisted deep green leaves. In late October attractive pink buds add highlights which chameleon like seem to change colour as the white staminal bundles appear, finally dominating the pink of its petals.

Another specimen demonstrates the variability of this species. From the same seed lot, it stands only 1.5 metres high, is more shrub like with an extremely irregular spreading habit, has fewer and finer branches and seems to have a lower frost tolerance. An even more divergent specimen, planted in a wooded situation has an almost "bonsai" form. It stands about 1.2 metres high and has more or less horizontally spreading branches measuring 2 metres across one axis. Many leaves of these specimens turned a deep russet during the winter of 1971 but there was no evidence of dessicated tips.

This then is a species of good horticultural potential where winter temperatures do not fall below –7°C. Some forms may grow in the milder areas of Canberra if given a warm sheltered position with provision of overhead cover for young plants on frosty nights.

Melaleuca subfalcata Turcz. *(M. brachystachya* F. Muell.)

(L. comp. sub- = close to and -falcatus = sickle shaped referring to the leaves of this species).

A spreading bushy shrub 1-1.5 metres tall with intricate branches; leaves scattered, linear, flat or semi-terete rigid, acute, often falcate 12 to 19 mm long; flowers pink in oblong dense or interrupted spikes, the axis continuous vegetatively before flowers expand; fruits 4 mm diameter sometimes immersed in the rachis, in more or less interrupted spikes.

There is only one mature specimen of this species in the Gardens, the sole survivor of a 1963 planting. This is a dense, low, spreading shrub 0.6 m tall and 1.8 m in diameter with more or less decumbent branches. It has an irregular but neat, low "mound like" form which makes it ideal for positions where taller shrubs would impede light or vision. The attractive pink flower spikes produced usually in late Spring and Summer are not numerous under conditions here and are at times hidden among the dense foliage.

In form and leaf size this plant seems closer to Mueller's description of *M. glaberrima* than that of his *M. brachystachya,* but it has the silky pubescent young shoots and inflorescence of the latter. All our herbarium specimens of *M. glaberrima* are completely glabrous as in Mueller's description but the specific limits of it and *M. subfalcata* seem on close study to be unsatisfactory. The possibility arises that the two are conspecific as suggested by Bentham in Flora. Aust. Vol. 111. However, it must be stressed at this point that there is not a wide specimen range of either species at C.B.G.

The mature shrub under discussion is planted in an open situation in the lower part of the gardens and in that area it seems to have a fairly high frost tolerance. Its leaves did become reddish in the long very cold winter of 1971 but the only real frost damage was sustained by the "out of season" flowers. How tolerant the species is when young, however, cannot be stated as the reason for the loss of other specimens is not certain.

One must add that strict forms of *M. subfalcata* sometimes grow to more than 1.3 m as do the divergent forms of *M. glaberrima* and so vegetative propagation is necessary to be certain of obtaining the low forms. These low forms of the species would be worth trying as tub plants by the enthusiast.

Melaleuca styphelioides Sm.

(Irregular compound from Styphelia and Gk. suffix -oides meaning "resembling styphelia").

Tall shrub or tree 4 to 15 (-20) metres high, narrowly branched to ground level or with a broad conical head; leaves lanceolate to ovate, acuminate, pungent pointed many nerved, often twisted, 10-15 mm long, 3-6 mm wide; flowers cream/white in loose spikes, the axis continuous vegetatively during flowering; fruit ovoid with persistent calyx lobes (sepals) in loose spikes.

One of the most handsome of the "paperbarks" occurring on the central and north coasts of N.S.W. It inhabits sandstone and shale areas and coastal river banks.

Several specimens are established at C.B.G., the oldest of which was introduced in 1950. One specimen in a tree shaded situation is a weak-stemmed shrub to 2 metres high with an open loosely branched habit. This shows the effect of shaded conditions whereas a specimen in an open situation has an attractive, though irregular, conical habit despite close competition from other shrubs. The latter is densely branched to ground level and has attained a height of 4 metres. It is well covered with the striate, interestingly twisted leaves typical of the species which give it an overall deep green shade that contrasts well with the paler green of a neighbouring *M. linariifolia.* During the summer months this attractive form is enhanced by numerous cream/white flower spikes.

The species appears to have a relatively high frost tolerance as reaction to frost has been no more than slight discoloration of a few young tips. It should grow well in the milder elevated areas of Canberra but will require a sheltered position and extra protection on frosty nights when young. However, though it flowers as a shrub or small tree, in ideal conditions this species can attain large tree proportions. This is illustrated by the very large attractive tree at the Royal Botanic Gardens Melbourne.



Photography by F. W. Humphreys

MELALEUCA LAXIFLORA

The two more or less mature specimens at C.B.G. are close to Turczaninow's description of the species. They are loosely, but many branched shrubs 1.4 metres high and 0.8 metre across. In shape they are slightly irregularly rounded but with a number of vigorous laterals.

In an open situation these specimens seem to sustain frost damage only after long persistence of frosty conditions. The damage then is confined to young tips and recovery is quite rapid when spring growth begins. It seems, then, that this species would grow successfully in the milder areas of Canberra. A warm sheltered position should be selected and overhead protection should be provided during frosty periods especially for young plants. Soil type should not create any problem as the species seems quite adaptable. It is a sand heath species said to grow mainly in yellow alkaline sands but both plants at the Gardens are growing well in a not too well drained slightly acid situation.

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