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Wildflowers for Horticulture

The wildflowers of other lands have been developed to produce the garden exotics of today. The unique wildflowers of Australia represent a vast unexploited resource for the garden and landscape of the future. This issue presents a group of plants known as *Calytrix* (pronounced CAL-ee-trix) of unusual charm. Individually, they are small flowers 1–2 cm across, but in mass, a floral spectacle covering the well shaped small shrub.

As with all untamed living things from the wild, there are problems. We do not want them as reluctant caged creatures, but as guests to our home that enjoy and flourish under our hospitality. Our problem is that for this group of wildflowers, *Calytrix*, we do not know how to make them feel at home. On page 300 we take a closer look at the conditions under which many of them grow. Years ago, the "expert" on wildflowers advised "study the conditions under which they grow naturally and copy these." To those who can unravel the mystery of growing conditions or can turn their gardens into a sandplain between the Indian Ocean and the Gibson Desert aspect, we wish you well. The probability is complete failure.

We need to apply horticultural practices, developed over the ages, to produce bushes with flowers twice the size; plants that can be purchased from the nurseryman with full confidence that they will prosper in a reasonable range of good garden conditions without special care. Our earlier issues have indicated what we can do to conserve our flora from extinction. Our other objective is its horticultural development as above.

With *Calytrix* we have a real challenge, for scientists to solve the nutritional problems at the roots, for the propagators to produce from the best forms and for the horticulturist (and this includes you the home gardener) to grow plants, to select the best and most reliable survivors for development. ■

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COVER PLATE

Calytrix gurlmundensis

Photography by Neil Marriott

A flowering shrub from open scrub in the Gurlmundi area of southern Queensland, that has been popular in gardens of eastern Australia. The flowers are 18–22 mm (up to almost an inch) across. The features of the *Calytrix* flower are well shown, five petals (in this case white), many yellow stamens in the centre, and long awns (whiskers) each attached to the end of the five sepals behind the petals. Further details and advice on cultivation are given on this and many other species in this issue.

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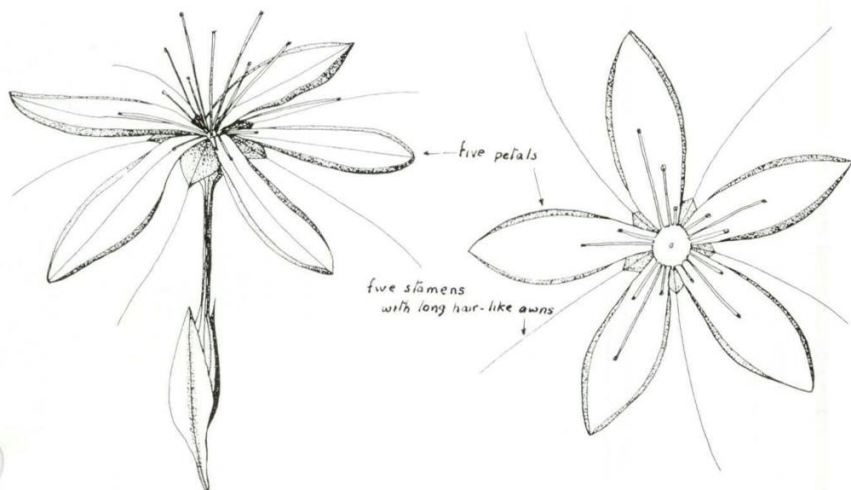
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Calytrix

by L. A. Craven, Australian National Herbarium
CSIRO Division of Plant Industry
Canberra, ACT

Most growers of Australian plants in eastern and southeastern Australia probably have heard of, even if they do not recognize, *Calytrix tetragona*, and they might also know of *Calytrix alpestris* and *Calytrix fraseri*. These are likely to be the only *Calytrix* species familiar to people who have not visited the species-rich southwestern corner of Australia and there encountered some of the more flamboyant members of this attractive genus.

*Calytrix*¹ is a genus of Myrtaceae², classified with genera such as *Darwinia*, *Chamelaucium* and *Thryptomene* in the tribe Chamelaucieae. The species formerly included in *Lhotskya* are now known to belong to *Calytrix* and the enlarged genus presently comprises 72 species. This number will be increased to 75 as two new species have been discovered since the revision was prepared and a third species needs to be transferred from a related genus. Names for these three species are not yet available and in the list of species given in Table 1 they are referred to informally.



The *Calytrix* flower has five petals, as above, nicely coloured as shown in the colour photographs throughout this issue. A characteristic feature of most species is the five, long, hair-like awns that radiate out between the petals. All captions and footnotes by the Editor after consultation with author.

¹Taxonomy of the genus *Calytrix* was revised in 1987 [Craven, L. A.. (1987). A taxonomic revision of *Calytrix* Labill. (Myrtaceae). *Brunonia* 10: 1-138.] was the first comprehensive account of *Calytrix* since the publication in 1867 of Bentham's treatment of it in his *Flora australiensis*. If you have an interest in botany and wish to know more about *Calytrix*, copies of the taxonomic revision are available at a cost of \$A25.00 from Collector of Moneys, CSIRO, Publications Sales Office, 314 Albert Street, East Melbourne, Victoria 3002, Australia.

²The plant family Myrtaceae is a very large one and the botanists have divided it into a number of large groups as described on page 299. Other genera in this group with over 20 stamens are *Balaustion*, *Homalocalyx* and *Hypocalymma*. These footnotes have been added by the Editor.



Calytrix alpestris — see page 306 △

▽ *Calytrix angulata* — see page 306





Calytrix aurea (above)

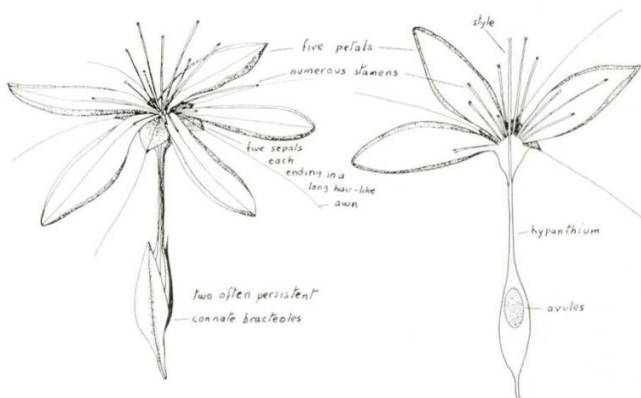
Photography by J. Glass

With the bright yellow flowers being 19-20 cm across, these abundant heads of flower make a stunning plant for any garden. Further details are given on page 307

What is a *Calytrix*?

Although not all of the species necessarily possess each of the following features, *Calytrix* is characterized by the following:

1. leaves small to minute, alternate¹, decussate or verticillate;
2. flowers one per leaf or bract, often aggregated towards the ends of the branchlets, subtended by two often persistent and connate bracteoles;
3. characteristic parts of the flower² as shown on sketches below are:
hypanthium long and narrow, free from, or adnate to, the style; calyx lobes persistent, usually very long, attenuate at the apex (awned); stamens indefinite in number; ovary unilocular with two ovules on an axile-basal placenta;
4. fruit dry, indehiscent; seed one;
5. embryo straight with two short plano-convex cotyledons at the apex of the thickened hypocotyl.



¹The leaves are usually alternate but are verticillate for *Calytrix verticillata* and decussate for *Calytrix decussata*, *C. nematoclada*, *C. parvivalis* and *C. praecipua*. In the photographs that give a glimpse of the leaves you will see that they are all tiny.

²The characteristics of the flower shown in the above sketches are: petals — 5
sepals — 5, like fine leaf-like “petals” behind and alternating with, the petals, the calyx is the term used to describe the group of five sepals and “calyx lobes persistent” means that as the flower is fertilized and matures, the petals fall leaving the five sepals, i.e., the calyx, on the plant. For most species of *Calytrix*, the ends of each of these five sepals end in a long hair-like awn (attenuate at the apex). *Calytrix* may be recognized by these long awns protruding from between the petals. When the petals drop off, the cup shaped calyx with its awns remains.

stamens — numerous, usually over 20 and in one ring (uniseriate as for in the *Calytrix tetragona* group of species — see Table 1 and nominated by 1-5 in Fig. 4 on page 295, as well as the *Calytrix achaeta* and *Calytrix decandra* groups of species) or in more than one ring of stamens around the central style of the flower, for all other species.

hypanthium — this is a tube that encloses the ovary, the style passing up through the centre from the ovary to the stigma on its end ready to receive pollen. The variation in hypanthium in species of *calytrix* is shown in Fig. 4 on page 295. The hypanthium is adnate (fused or joined) to the style in that area that is shaded but in many cases there is an area (unshaded at the top) where the style is free from the hypanthium.

***Calytrix* for Horticulture**

Flowers are white, pink, rose, mauve, purple or yellow in colour and are often bicoloured with the staminal filaments and petal bases differently coloured to the larger part of the petals. The generalized flower colour is given in the Table of Species on the following pages. The flowers sometimes are borne in great profusion, so much so that the foliage can be obscured totally. In habit the species are shrubby and range from being prostrate to erect. Commonly their height is between 0.5 and 2 m. Because of these qualities many of the species seem to be well-suited for growing in domestic gardens and it is surprising that so few of them are in cultivation.

Some of the species have scented flowers which, although not having the fragrance of such plants as *Boronia megastigma* or *Daphne odora*, is a bonus. One species, *Calytrix eneabbensis*, has striking purple and yellow flowers which last well when picked and this species is used in the wildflower trade in Western Australia. After flowering, some of the species with long calyx awns provide an unexpected display as the fruiting hypanthium can develop rich reddish or yellowish tones and the awns give the branchlets a feathery look.

The species are listed in the Table in groups which indicate relationship as well as current knowledge permits. It may well be that unrelated species independently have evolved features so similar that the real relationships of the species are very difficult to determine. This may be the case with the *Calytrix vioiacea* group as its species do not constitute a very homogeneous assemblage.

Calytrix is widely distributed in Australia, although for the most part species density is low with the exception of the south-west of Western Australia and the Top End of the Northern Territory. In spite of the paucity of species in the east and south-east of Australia it should be possible to select suitable species for cultivation in any region within Australia with the exception of the tropical rainforest regions of Queensland where the high rainfall and humidity may defeat even the most optimistic gardener. To assist with the selection of possible candidates for trial, the major climatic region in which the species occur is indicated in the table. The species mostly grow in sandy soils although there are some which grow in rock crevices, on clay soils, and so on. All the species apparently grow in very well drained sites and in cultivation free drainage will be essential.

For the keen horticulturist two avenues of research are available in the quest to increase diversity in cultivated *Calytrix*. The first is to use hardy, proven species such as *Calytrix tetragona* for hybridizing experiments with some of the more showy western species; the second method of obtaining a wide range of plants for cultivation is to develop quick and easy grafting techniques to get the less tolerant species onto vigorous, more forgiving root systems such as those of *Calytrix tetragona*. One way of overcoming problems with damping off is to take seedling cuttings; this is described in the accompanying article on page 297 by Gwyn Clarke, Convenor of the *Calytrix* Study Group.

The author does not propose to describe all the species of *Calytrix*. The Table of Species, following will give a guide to the botanical relationships. The many colour photographs will provide a further means of identification of species. The following articles describe many species. — Editor.



Calytrix eneabbensis — see page 311 $\triangle$ ∇ *Calytrix exstipulata* — see page 311



***Calytrix* Species Recommended For Cultivation**

The following is a concise list of *Calytrix* species which cover the range of variation in the genus and should be able to be grown in southern Australia. At least three of them (as recorded below) are in the nursery trade in the south-east.

Calytrix alpestris — awnless, the flowers being rather similar to *C. tetragona*.

It is often available in the trade.

Calytrix aurea — flowers large and a bright yellow. Not known to be in the trade but occasionally grown by enthusiasts.

Calytrix brevifolia — very large rich pink flowers.

Calytrix chrysantha — one of the few summer flowerers with bright yellow flowers.

Calytrix depressa — a variable species. Both solid yellow and purple and yellow-flowered forms occur.

Calytrix eneabensis — flowers purple and yellow, very showy.

Calytrix formosa — extremely long awns, flowers a lovely rich pink.

Calytrix fraseri — long awns, flowers a lovely pink. Widely available in the trade.

Calytrix glaberrima — flowers scattered along the branchlets, not clustered as in most of the species.

Calytrix glutinosa — flowers mauve pink, keeps in water.

Calytrix gracilis — flowers purple.

Calytrix strigosa — the mauve and pink forms are very attractive. The hairy awns are an unusual feature.

Calytrix superba — another summer-flowering species, large rich pink flowers with the biggest petals in the genus.

Calytrix tetragona — a very variable species, prostrate and upright forms available. Some of the pink forms are most attractive, some forms are in the trade.

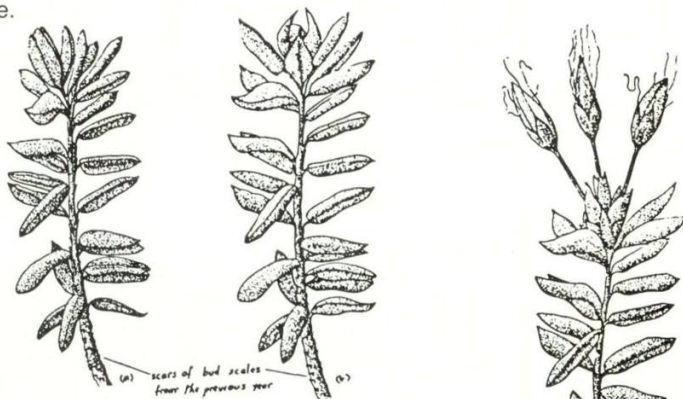


Fig. 3. The ends of growing branchlets of a *Calytrix tetragona*. As in Table 1, the *Calytrix tetragona* group of species have "petiolar bud scales present", indicated by PBS in Fig. 4. These are derived from normal foliage leaves. Fig. 3(a) shows a growing branchlet that has emerged from the top of a group of last season's flowers, the lower end showing the scars (PBS) left by the previous year's bud leaves that have dropped off. In Fig. 3(b) there is a dormant bud enclosed by bud leaves (modified foliage leaves) at the apex. In Fig. 3(c) three flowers still in bud have emerged from the protecting bud leaves, the buds growing in size and their stalks (peduncles) elongating. At the lower end of the bud is the calyx comprising the five sepals and the hair-like awn on the end of each sepal is already evident.

Northern *Calytrix* for Horticulture

Growers in the northern areas or those with a glasshouse and an interest in the unusual may like to consider trying some of the northern species. The following are not in the nursery trade although *Calytrix decussata* was once grown in the Botanic Gardens in Canberra.

Calytrix decussata — this makes a lovely small plant for a pot.

Calytrix exstipulata — this species has masses of pink to mauve flowers.

Calytrix micrairoides — a prostrate species with large pink flowers.

Calytrix mimiana — slender erect growth, terminal clusters of pinkish flowers.

Calytrix — The Species

Table 1. *Calytrix* species listed in groups based on apparent relationship.

The region of occurrence is indicated by the symbols: northern — n, arid — a, southwestern semi-arid — sws, southwestern humid — swh, eastern — e, southeastern semi-arid — ses, south-eastern humid — seh.

Section I

Species with stamens uniseriate (i.e., in one ring around the style, 1-3 in Fig. 4).

Petiole bud scales are present (indicated by PBS in Fig. 4). This refers to the growing shoot of some species as shown in Fig. 3. The hypanthium is short as in *Calytrix glaberrima* or long as in *Calytrix tetragona*.

Calytrix tetragona group:

1. *Calytrix glaberrima* (syn. *Lhotskyia glaberrima*) white to mid pink; seh
2. *Calytrix smeatoniana* white to mid pink; seh
3. *Calytrix alpestris* (syn. *L. alpestris*) white to mid pink; ses, seh
4. *C. tetragona* (syn. *C. sullivanii*) white to pink; a, sws, swh, e, ses, seh
5. *Calytrix involucrata* white; ses, seh
6. *Calytrix warburtonensis* white; a
7. *Calytrix gypsophila* white; a
8. *Calytrix erosipetala* white; a

Petiole bud scales absent, hypanthium short

Calytrix achaeta group:

9. *Calytrix brownii* (syn. *C. brachyachaeta*) white; n
10. *Calytrix achaeta* white; n
11. *Calytrix verticillata* white; n
12. *Calytrix rupestris* white; n

Petiole bud scales absent, hypanthium long, HL, with stamens uniseriate

Calytrix decandra group:

13. *Calytrix decandra* pale to mid pink, mauve to purple; swh
14. *Calytrix duplistipulata* pale to mid pink to purple; sws
15. *Calytrix praecipua* pale to mid pink to white; a
16. *Calytrix verruculosa* pale to mid pink; a
17. *Calytrix glutinosa* pale to mid pink to mauve; sws, swh
- 17A. *Calytrix* sp. nov. (Teutonic) white; a

Section II

I. Stamens 2 to several-seriate. (Stamens in two or more rings around the style).

IIA. Hypanthium produced beyond the ovarian region. Hypanthium free from (sometimes partly adnate to) the style.

Calytrix exstipulata group:

18. *C. depressa* (syn. *C. tenuifolia*) mauve to purple or yellow; sws, swh
19. *Calytrix eneabensis* purple; swh
20. *Calytrix oldfieldii* pale to mid pink to mauve to purple; sws
21. *Calytrix purpurea* purple; sws

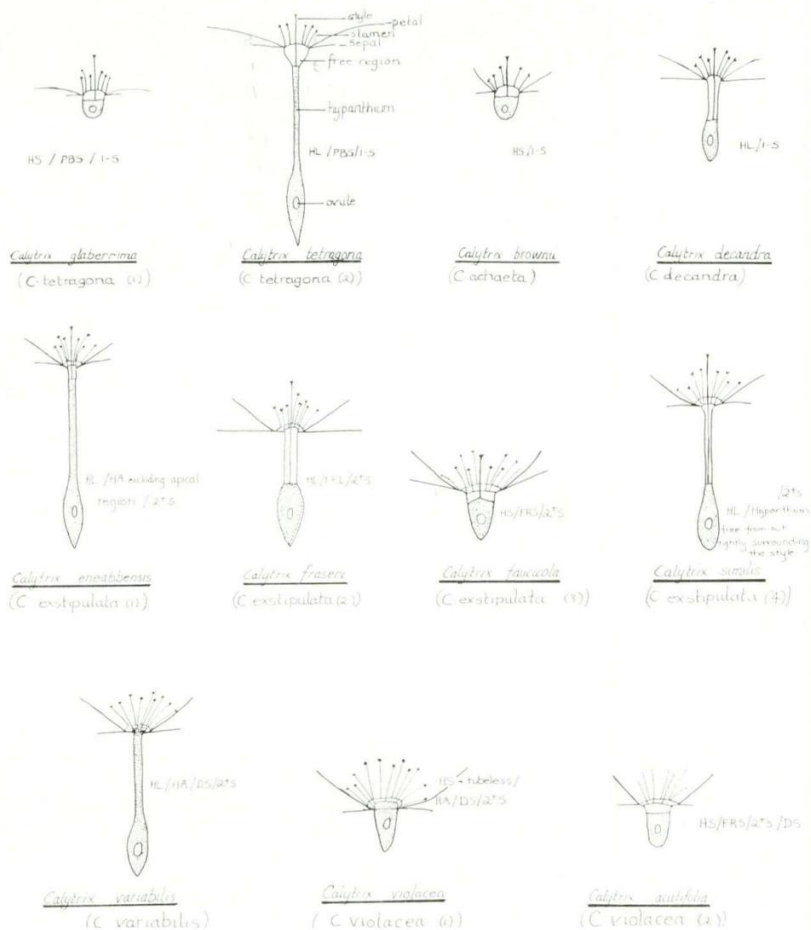


Fig. 4. The variation in the hypanthium of the flowers of *Calytrix* species as listed in groups in Table 1 opposite. The hypanthium is that part of the flower between the flower stalk (peduncle) and the petals, the upper end (known as the receptacle) providing the point of attachment for the floral parts, the sepals, petals and stamens as shown in Fig. 2 on page 290.

The hypanthium may be short (HS) or long (HL), adnate (fixed or joined) to the style (HA), in the area where it is shown shaded, or free from the style, called the free region (FR) in the sketches, and this may be long (FRL) or short (FRS).

The sepals and petals are attached to the upper outer rim of the hypanthium as shown for *Calytrix tetragona* above.

The stamens are in one ring, uniserate (1-S) as for *Calytrix glaberrima*, *C. tetragona*, *C. brownii* and the *Calytrix decandra* group of species as listed in Table 1, or in two or more rings for all the remaining species (indicated by 2+S).

The style is deciduous (DS), above the hypanthium in the *Calytrix variabilis*, *C. violaceae* and *C. acutifolia* groups. That is, it drops off after the flower is fertilized as distinct from other species where it is persistent.

Petiolar bud scales (PBS) are present in the upper four groups of species, as shown in Fig. 3.

Caption prepared by the Editor after consultation with the author.

22. *Calytrix harvestiana* purple or yellow; sws
23. *Calytrix angulata* yellow; sws, swh
24. *Calytrix divergens* yellow; a
25. *Calytrix platycheiridia* yellow; sws
- 25A. *Calytrix* sp. (*Calythropsis*) yellow; sws
26. *Calytrix fraseri* pale to mid to deep pink; sws, swh
27. *Calytrix arborescens* white; n
28. *Calytrix faucicola* yellow; n
29. *Calytrix surdiviperana* pale to mid pink; n
30. *Calytrix mimiana* pale to mid to deep pink to mauve; n
31. *Calytrix megaphylla* pale to mid to deep pink to mauve; n
32. *Calytrix microcoma* pale to mid to deep pink to mauve; n
33. *Calytrix carinata* pale to mid to deep pink to purple; a
34. *Calytrix longiflora* pale to mid pink to mauve; e
35. *Calytrix leptophylla* pale to deep pink to purple; n
36. *Calytrix micrairoides* pale to mid pink; n
37. *Calytrix exstipulata* (syn. *C. microphylla*) pale to mid pink; n
38. *Calytrix gurlumundensis* yellow or white and yellow; e
39. *Calytrix islensis* white; e
40. *Calytrix decussata* pale to mid pink to mauve; n
41. *Calytrix birdii* purple; a
42. *Calytrix similis* purple; swh
43. *Calytrix strigosa* pale to mid pink, mauve to purple or yellow; sws, swh, a
44. *Calytrix desolata* pale to mid to deep pink to purple; a
45. *Calytrix creswellii* white; a

Hypanthium adnate to (sometimes partly free from) the style

***Calytrix variabilis* group:**

46. *Calytrix flavescens* yellow; swh
47. *Calytrix asperula* yellow; sws, swh
48. *Calytrix chrysanthia* yellow; sws
49. *Calytrix aurea* yellow; swh
50. *Calytrix drummondii* yellow; sws, swh
51. *Calytrix sapphirina* (syn. *C. empetroides*) deep pink to purple to mauve; sws, swh
52. *Calytrix habrantha* pale to mid to deep pink and purple; sws, swh
53. *Calytrix superba* pinkish purple; swh
54. *Calytrix plumulosa* purple; sws
55. *Calytrix simplex* purple; sws, swh
56. *Calytrix brevifolia* (syn. *C. muricata*) pink or pinkish purple; sws
57. *Calytrix truncatifolia* pink or pinkish purple; a
58. *Calytrix formosa* pale to mid to deep pink; sws
59. *Calytrix paucicostata* deep pink; sws
60. *Calytrix amethystina* purple; a
61. *Calytrix gracilis* purple; sws
62. *Calytrix variabilis* purple or pink; swh
- 62A. *Calytrix* sp. nov. (Toodyay) purple; swh
63. *Calytrix breviseta* (incl. *C. stipulosa*) purple; sws, swh
64. *Calytrix pulchella* pale to deep pink; swh
65. *Calytrix tenuiramea* purple; swh
66. *Calytrix leschenaultii* (often called *C. brachyphylla*) purple; sws, swh
67. *Calytrix sylvana* (syn. *L. brevifolia*) purple; swh

IIB. Hypanthium not produced beyond the ovarian region

***Calytrix violacea* group:**

68. *Calytrix merrelliana* purple; a, sws
69. *Calytrix violacea* (syn. *L. violacea*) purple; sws
70. *Calytrix parvivalis* purple; sws
71. *Calytrix nematoclada* (syn. *L. ciliata*) purple to deep pink; sws
72. *Calytrix acutifolia* (syn. *L. acutifolia*, *L. ericoides*) white; sws, swh ■

Growing *Calytrix*

by Gwyn Clarke
Calytrix Study Group Leader

The *Calytrix* or Star flowers are rarely seen in gardens, and most people would not realize that there are over 70 species growing in the wild. They are quite spectacular when in flower and have colourful calyces to follow. The most commonly grown species is *Calytrix tetragona* which is very widespread and variable. Other species may be available from time to time at specialist nurseries. Why then have these plants not been seen more often in cultivation?

Availability. Since many of the species come from Western Australia, obtaining plant material has not been easy. Seed has generally proved to be of low viability. Perhaps the seed was old, had dormancy factors or germination inhibitors or sustained considerable insect damage. When seed has germinated it has been slow to grow on and has had poor root systems. Cutting material has given greater success, but is more difficult to obtain.

Experimenting With Seed

I purchased seed from Nindethana Seed Co. in Western Australia. The seed of *Calytrix* is indehiscent with calyx and awns present. The calyx and awns were removed, and the seed pushed into the soil point first. The top of the seed should be level with the soil. The seed was watered by lowering the seed punnet into the water until water level was at the top of the punnet, the seed punnets were then placed in a capillary bed. Air movement around the seed punnets was important as seedling *Calytrix* are very prone to fungal attack. The seedlings were kept inside the house with underfloor heating operating. The temperature in the room varied between 15 and 23 degrees. This was done because it was winter in Canberra and I had no other suitable facilities. Germination time was very variable, *Calytrix angulata* appearing after six weeks and *C. aurea* after 13 months. Plants should be potted on as soon as practicable.

I had success germinating the following species: *Calytrix angulata*, *C. glutinosa*, *C. leschenaultii*, *C. exstipulata*, *C. fraseri* and *C. depressa*. *C. aurea* only produced one seedling which died before reaching a usable size.

The seedlings were potted on and there were the usual losses. Most of the living seedlings grew until they were about 2.5 cm. Then they just sat there. Some damped off and I was afraid I was going to lose all of them.

Experimenting With Cuttings

Lyn Craven suggested I take cuttings from the above seedlings as this might help break their dormant state. This proved to be the case. The cuttings taken were 2 cm long, with about 4-5 pairs of leaves. They were prepared in the usual way, care being taken not to damage the delicate stem. They were placed around the edge of a black pot in a mix of 2/3 washed river sand and 1/3 peat. The pot was then placed in the hot bed. Within 10 days most of the cuttings had roots and were potted up. I used the hot bed because this material was quite soft.

That was in January 1985. Most of those plants are still alive today, two doing very well in a raised garden bed, the others quite happy in pots. The cuttings of *Calytrix angulata* and *C. glutinosa* haven't flowered yet, while those of *Calytrix leschenaultii* and *C. depressa* have.

Cuttings of *Calytrix* should always be taken from young growth before it becomes too woody. Small cuttings, i.e., 4-5 cm, do very well. I have used liquid hormone, 1 000 ppm IBA 250 ppm NAA, but have also had good results without hormone. Cutting mix was 4 parts washed river sand, 4 parts perlite, 1 part peat. However, any well drained and aerated mix will do. They then prefer open shade with low humidity.

A hot bed may be used for very soft material, but I have found that placing the plants in a cold frame or in open shade with low humidity gives better results than a hot bed, even though it may take a little longer. This was particularly true for *C. longiflora* from Queensland and all forms of *C. tetragona*. Timing is also important, and I have found Dec.-Jan. an excellent time in Canberra. It may be earlier in warmer climates.

***Calytrix* in the Garden**

Interesting species in this genus have often proved short lived in cultivation, and susceptible to grey mould. However, given the correct conditions, *Calytrix* can do well and live for a reasonable length of time. At present our garden specimens are at least five years old and very healthy.

Calytrix like good drainage, in sun or semi-shade and enjoy living close to other species. They also like a spot with plenty of air movement as this helps prevent grey mould. I have mine in garden beds with gypsum and washed river sand added, or in raised beds made of washed river sand, peat, compost and local clay. Raised beds are particularly important for species from Western Australia. All the beds are mulched with sand or an open mix of stems, twigs and leaves. This allows good aeration round the stem and prevents collar rot. Some mulches pack down hard around the stem and should be avoided. *Calytrix* should also be pruned lightly and regularly to avoid woodiness. If a plant should become woody heavy pruning can restore vigour.

Plants doing well in the described environment include upright procumbent and prostrate forms of *Calytrix tetragona*, *C. angulata*, *C. longiflora* and *C. leschenaultii*.

Pot Culture of *Calytrix*

Some of the small species from Western Australia make excellent pot plants. All those I have in pots are doing well. They do not require repotting too often (about every two or three years) and respond well to regular watering with half strength Aquasol.

What Can You Do?

There is still much work to be done with this genus. New members to the Study Group are always welcome. You do not have to be a great propagator. Perhaps you would be more interested in trialling plants, working on pressed specimens for a herbarium collection, collecting plant material in the field to assist the propagators, or preparing a taped script to go with the slide collection. You may even have interesting ideas of your own of ways in which you could assist. I am always happy to hear from anyone who would like to be involved.

Members of the Canberra Region have volunteered to assist. Some will do this through their involvement with the propagation group, and others have volunteered their help in other ways. One member has offered to write the newsletter. This kind of support is very encouraging and gives me renewed energy to carry on, for being a Study Group Leader can be very lonely and frustrating. I'm sure all leaders feel this way from time to time. Think of your favourite native plants. You could join the Study Group, or if there isn't one yet, maybe you could start one with the help of your local group or some SGAP friends.

Horticultural Potential

Anyway, *Calytrix*, with their dainty star flowers are really worth growing, and with a little care they can be propagated and maintained in the garden. The flowering period can be quite short, but the colourful calyces which follow are as delightful as the flowers themselves.

We are only at the beginning of the development of these plants for horticulture. There are still many things to be discovered, and many experiments to be attempted. Cross pollination between species could produce plants with larger flowers or extend flowering times. The robust qualities of *Calytrix tetragona* could perhaps be passed on to its more fragile relatives. Grafting, budding and tissue culture have yet to be attempted.

You can be part of the development of and the experimentation with this genus. These little gems will reward you with their colourful flower displays, bright calyces and scented leaves. I have even found seedlings growing happily under the parent plants. What greater reward could you ask? ■

The *Calytrix* Study Group

This group, capably led by Gwyn Clarke, offers a challenge to those who can participate. A Study Group comprises people in all parts of Australia, who maintain contact by mail through the Study Group Leader and a group newsletter. The cost of participation, \$4.00 per year, covers only administrative expenses, mostly postage. A Study Group maintains a seed bank for the keen ones, but its role is mainly advisory. Members obtain their own plants from a native plant nursery or exchange of plants or cuttings between members of the group. The guidance offered and the opportunity for members to exchange notes and learn from practical experience is invaluable. The pleasure and challenge offered by these beautiful plants is available to you. Contact Gwyn Clarke, 26 Henry Street, Cook, A.C.T. 2614.

Calytrix and its position in Myrtaceae

P. E. Bailey

The plant family Myrtaceae is a very large one. The botanists have it divided into a number of large groups of genera. The genus *Calytrix* belongs to the group known as the Chamelaucium alliance, a group with mainly indehiscent fruit. Other genera include *Actinodium*, *Astartea*, *Baeckea*, *Balaustion*, *Corynanthera*, *Darwinia*, *Homalocalyx*, *Hypocalymma*, *Micromyrtus*, *Pileanthus*, *Rinzia*, *Scholtzia*, *Thryptomene* and *Verticordia*. Most of the genera have up to 20 stamens which separates them from the genera with more numerous stamens, over twenty, which include *Balaustion*, *Calytrix*, *Homalocalyx* and *Hypocalymma*. *Balaustion* and *Hypocalymma* are distinguished in having a somewhat similar but are distinct in having two or three-celled ovary while *Calytrix* and *Homalocalyx* have a single celled ovary. *Calytrix* and *Homalocalyx* have very different embryos, those of *Calytrix* being straight whereas in *Homalocalyx* the embryo is curved (the cotyledons are folded partly around the hypocotyl). ■

Plant Life of Western Australia

by J. S. Beard and W. H. Payne*

This book* is about vegetation as it gives character to the landscape. There are basically two ways of looking at the plant cover. One can regard it as an assemblage of plant species, each to be identified and named, not necessarily in relation to the others present nor to the habitat. This is the taxonomic approach. Alternatively we can regard each example of the plant cover as a type of vegetation which has a particular structure (height, density, stratification), a particular set of plant forms (trees, shrubs, grasses, saltbush and so on) and a particular habitat. This is the ecological approach and the naming and classification of species is interesting but not vital.

The principal characteristics of vegetation are:

1. Floristic composition. Vegetation is composed of individual plants.
2. Structure. Component species will be of a certain size, and arranged in definite patterns horizontally and vertically, that is, in layers (strata) of a certain spacing.
3. Growth-form. Components will vary in their morphology, i.e., they may be grasses, succulents, mosses and so on, may be annual or perennial, evergreen or deciduous, and have leaves of a certain texture, size and shape.

The vegetation of a given area will be found to consist of a certain list of component species with particular dominants. This is called a plant association. These various associations are the basic mapping unit of vegetation. It is assumed that the environmental factors, climate, topography and soil, are sensibly uniform throughout the range of an association and that changes will be reflected in a change of association.

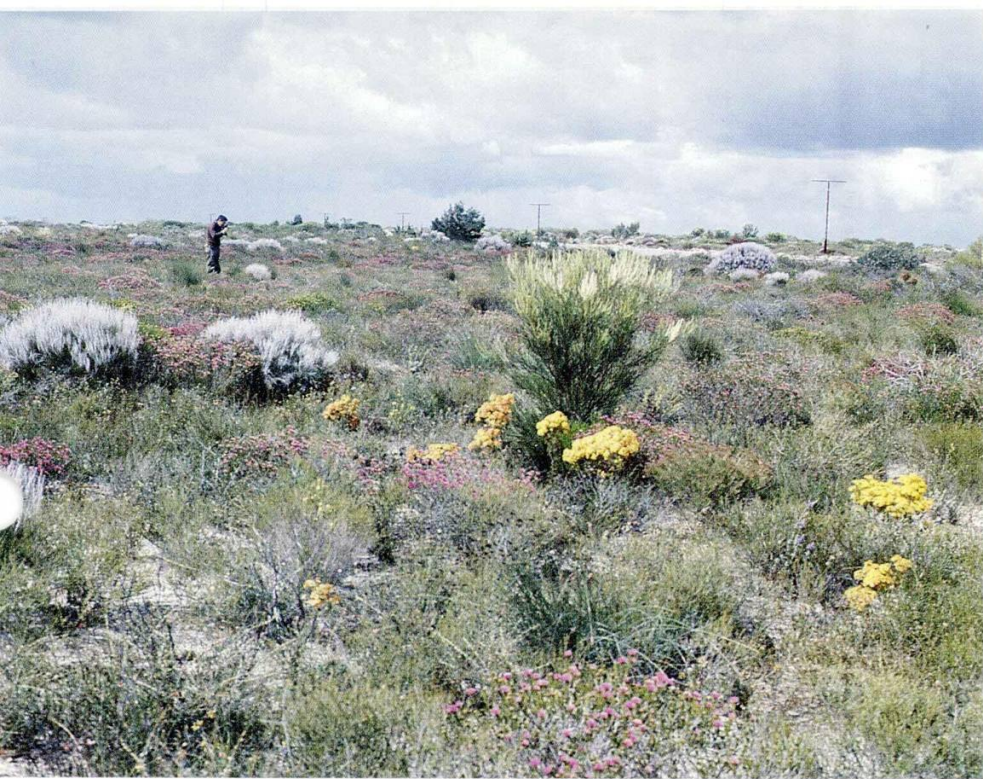
*A book by this title, is now available for \$49.95 at your bookseller (or \$45.00 plus \$5.00 NSW or \$7.00 interstate postage from P.O. Box 104, Winmalee, NSW 2777). I am normally pleased to review new books on our wildflowers. In this case I am so excited about this particular book that a normal review seems so inadequate and could be misleading. The first sentence, quoted from the book, says it all. The book is about vegetation and the landscape of Western Australia. In the hope of presenting such an important book to you adequately, I have quoted extensively from it to widen your appreciation of the beautiful *Calytrix*. We seek to use these plants in our home landscape but let us reflect on their natural habitat. John Beard was very disappointed when requested to prepare this article for us that he was just off to Europe. Hopefully he will forgive my efforts to do this. On his return he will prepare another article on the same subject but from a different aspect. Most of the comment is directly quoted from the book. The overall interpretation only being mine. Editor ■

The Sandplains of Western Australia (photo opposite) *Calytrix* Country

Reproduced from "Plant Life of Western Australia" with permission. Captions for photos opposite.

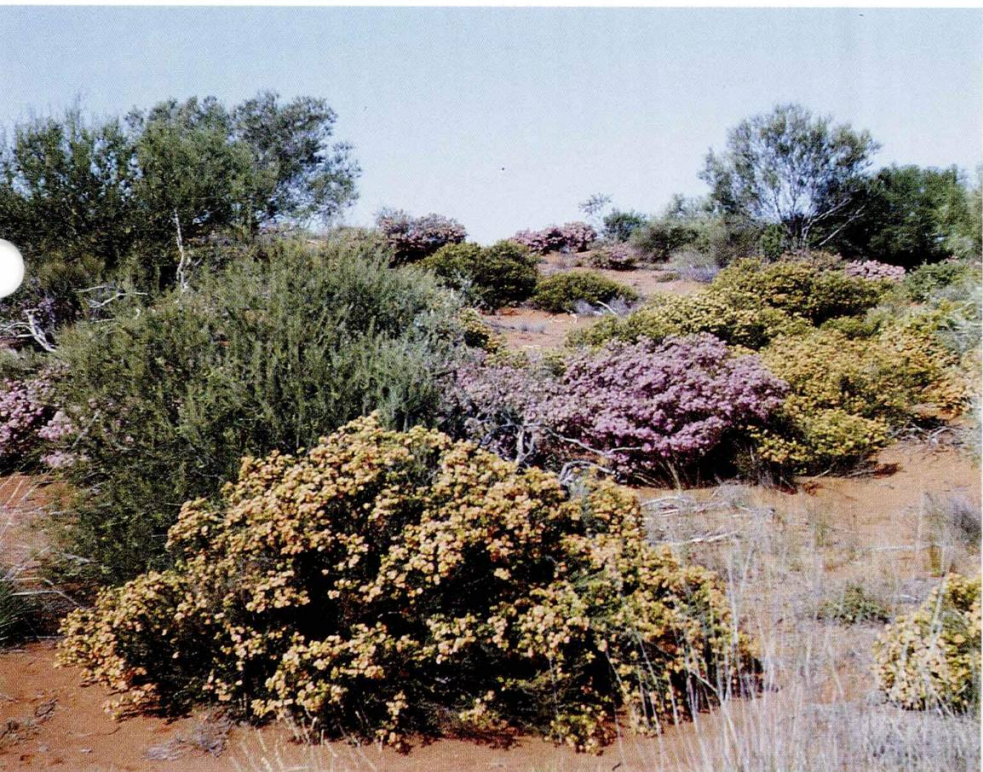
The Western Australian Sandplains — The scene, opposite top, shows the largest and richest remnant of the original kwongan of the Northern Sandplains as preserved in the Kalbarri National Park, on a sandstone plateau near the mouth of the Murchison River. The kwongan has a number of different aspects, according to time elapsed since the last fire, local soil differences, and the season of the year. In this September scene colour is provided by *Conospermum stoechadis* (smoke bush, white), *Melaleuca scabra* (reddish), *Verticordia grandiflora* (yellow) and the taller shrub *Grevillea bifloris* (yellow). In the general area grows a species of *Calytrix* such as *Calytrix brevifolia*, *Calytrix formosa* and *Calytrix purpurea*.

The scene, opposite bottom, is from an area beside the highway, 120 km north of Carnarvon. The orange flowers belong to *Pileanthus peduncularis* known as Coppercups, and the pink flowers are of *Calytrix truncatifolia*. This species is closely related to *Calytrix brevifolia* shown on page 305.



The Sandplains of Western Australia — see opposite

Calytrix Country



Detailed vegetation maps have been produced by Dr. John Beard and his associates. This book seeks to crystallize this 30 years of intensive study and transform the flat two dimensional detail of a map to an absorbing picture of living structures set upon a spectacular backdrop of stark scenery. The state of Western Australia is divided up into major divisions using various criteria as clearly defined. The vegetation in these divisions is described based on the various plant associations met as you journey through it. These descriptions are interesting and easily read. For those who are frightened off by a few strange words, however, the book may be read and understood simply by looking at the hundreds of colour photographs in the order presented and reading the interesting captions.

If you are to travel in Western Australia, please get a copy of the book, it will add another dimension to the scenery. The vistas you see out the window will be represented in the many photographs of the area you are in and suddenly you become an expert on vegetation, land form and the history of nature.

In this instance, we are more interested in the way the wildflowers survive and prosper and shall concentrate on the introductory chapters. Hopefully John Beard will not be too upset with this over simplification of a complex natural system, the accent being the sandplains and the beautiful *Calytrix* plants.

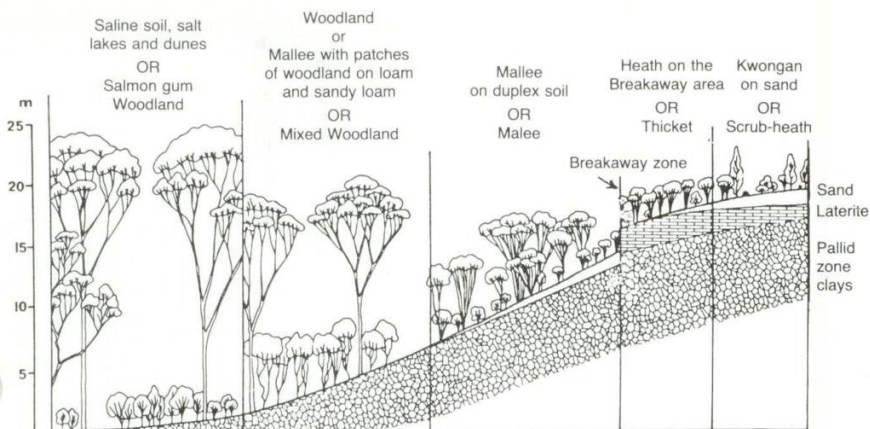
The Landform and Soils

The book outlines the geological history and changes of climate over the ages. Here we will concern ourselves with the heath/sandplain, *Calytrix* country. By the end of the Cretaceous period 65 million years ago, after the ice had retreated, the elements of the Western Australia we know today seem already to have come into being. The principal feature is a gently undulating plateau, its monotony broken only here and there by hills of harder and more resistant rock — bosses of granite and ridges of banded ironstone.

The continent was then covered with rainforest which in turn was largely eliminated by climatic changes. The area suffered a "deep weathering", softening of the surface rock and leaching out of the more soluble constituents of the original minerals. Unfortunately, this included the principal plant nutrients leaving a very infertile weathered profile, mostly inert quartz crystals surviving to become sand grains. Other principal constituents are oxides of iron and aluminium, and kaolin (complex aluminium silicates) which is white and colours the weathered profile so strongly that it is known as the pallid zone.

A later process, when the climate became drier and more seasonal, that of surface lateritization, resulted in the formation of a hardened laterite (ironstone) layer on the surface, called a duricrust. Lateritic duricrust is normally present in most areas of Western Australia capping the higher ground. In the wheat belt for example, it is absent from valleys but caps all the watersheds, its edge often marked by a small scarp or breakaway.

The further process has been the formation of a surface layer of sand above the duricrust, and this is normally present to varying depth except close to breakaways. The extensive sheets of sand overlying duricrust in the higher ground gives rise to a peculiarly Western Australian phenomenon, the sandplain. In the south-west, the low, open sandplain vegetation is known as "kwongan". In the dry Eremaea inland it is known as "acacia scrub" or "spinifex grassland" and in the Kimberley area as "pindan".



In Western Australia, the widespread arrangement of sandplain on the higher ground, red loam soils in the valleys gives rise to systems of soils called *catenas* (Latin for chain). You will find a sequence of different soil types arranged like links in the chain down the slope and up the other side in reverse order. A particular soil type is always linked to its position on the slope. We may begin at the margin of a salt lake in the valley bottom with a saline loam (or woodland in areas near the south coast where the salt has been washed out) and pass gradually up the slope through red loam soils, very heavy at first with a high proportion of clay, becoming more sandy until the **breakaway**, marking the edge of the duri crusted upland, is encountered. For 50-100 m there will be exposed laterite followed by the sandplain. Climate changes gradually from west to east with declining rainfall and for each soil type there is a corresponding vegetation regulated by this climate.

Soil poverty, is due, in the first place, to a general deficiency in Australian rocks of the essential plant nutrient, phosphorus, and secondly to the deep weathering and leaching of the soil mantle. The inertness of the landscape has left most of this exhausted material in place as a thick overburden preventing access to fresh rock beneath. However, fertility means one thing to agricultural crops and another to native vegetation. The latter has evolved over a long period to be adapted to these conditions.

There is an unusual number of insectivorous plants exploiting a source of nutrients independent of the soil, and of parasitic plants robbing nutrients from each other. Leguminous plants and *Casuarina* fix nitrogen in root nodules, adding to the nutrient pool. Many plants develop a mycorrhizal association with other organisms in the soil, helping each other to utilize the nutrients that are available. This applies to many plants of the sandplain including *Calytrix*.

The effects of deep weathering are not all adverse. The soil profile is never sealed off from penetration of moisture or plant roots by its overlying duricrust. The pallid zone beneath, by its depth, has a great capacity for cool moisture storage. However, without the flushing effect of good rain, the pallid zone stores salt, some carried in by wind from the ocean, an increasing problem because of man's agricultural exploitation of low rainfall sandplains.

The periodic burning off by Aborigines had the effect of liberation of nutrients back into the soil and the temporary removal of competition, leading to a flush of growth and flowering. This was early man's way of "farming the country" which led to an ability of the plants to recover in a spectacular way after "pruning" and "fertilizing". What can we learn from this? ■



Calytrix amethystina — see page 306 ▲

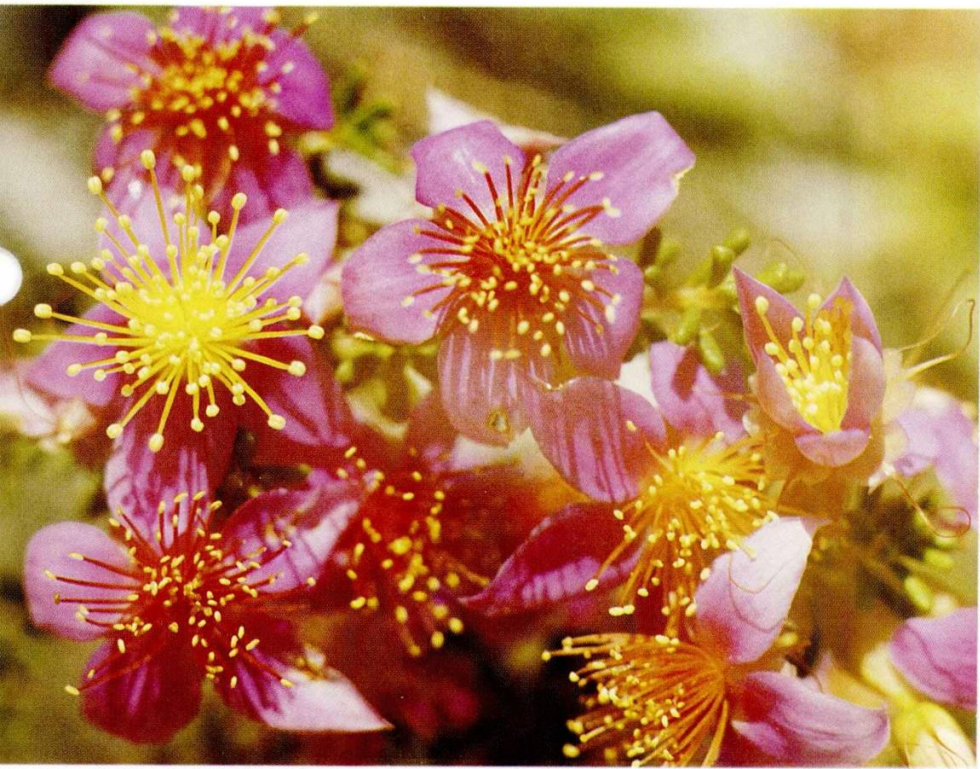
▼ *Calytrix carinata* — see page 310





Calytrix decandra — see page 310 △

▽ *Calytrix brevifolia* — see page 307



Calytrix for Horticulture

by Rodger Elliott and David Jones*
W. H. Payne based notes from
Lyn Craven

Calytrix species known to, or recommended for horticulture. Included also are descriptions of the many species illustrated in colour photographs.

***Calytrix achaeta* (without flowing hair)**

WA, NT

A dwarf to medium spreading shrub, 0.3-4 m × 1-3 m, branches short, many, often hairy; leaves about 0.2 cm long, three-angled, narrow, overlapping, blunt; flowers open-petalled, about 0.5 cm diameter, nearly sessile, profuse, white to cream or light yellow; calyx tube about 0.2 cm long, hairy; awn very short. Flowering Jan-Aug. Evidently not in cultivation. This species occurs naturally on rocky outcrops in woodland or open forest with a variety of soils. It should be useful as a garden plant, especially for northern Australian areas. Propagate from cuttings.

Calytrix alpestris — with very attractive spreading medium shrub to 2.5 m tall, commonly known as Snow Myrtle in the highlands of Victoria and South Australia. See the photograph by J. B. Fanning on page 288. It is unusual in that the flowers have scarcely awned sepals and none show in the photograph. The leaves are 1-5 mm long on the hairy branches, flowers 8-12 mm across. This species is closely related to *Calytrix smeatoniana*. One of the forms of *Calytrix tetragona* is rather similar.

Calytrix angulata — a small dense shrub from Western Australia to one metre tall, with soft yellow flowers. The individual plants normally have a low, bushy, vegetative section from which the erect to semi-erect flowering shoots are produced, photo p. 288 by J. Simmons. Flowers are 11-16 mm across. It is closely allied to *Calytrix divergens* having a very similar leaf and flower form. It occurs in heathy banksia and eucalyptus woodland and in scrubby heath.

Calytrix amethystina — a small shrub to 60 cm tall from Western Australia where it is found on the summit of lateritic or sandstone breakaway[†], scattered between rocks. This may be difficult to maintain in cultivation. The flowers are purple to violet, white in the centre ageing to reddish purple, 14-20 cm across. The white stamens also age to a reddish purple as shown in the photograph on page 304 by L. Craven. It is closely related to *Calytrix gracilis* differing from it in the shorter leaves and shorter hypanthia.

*The original scheme was to have a separate article by Rodger Elliott and David Jones, which was a reprint, by permission from Encyclopaedia of Australian Plants. It was to describe all *Calytrix* species in their Volume 2, that are not elsewhere described in this issue as captions to the many colour photographs. The captions were prepared by W. H. Payne based on notes supplied by Dr Lyn Craven and extracts from his original scientific publication. The captions became too large to be included with the colour photographs, so rather than two separate lists of species, the photograph captions were integrated with the notes extracted from the Encyclopaedia of Australian Plants. The object was to coincide with the publication of Volume 5 of the Encyclopaedia of Australian Plants. The descriptions of *Calytrix achaeta* and other species in a similar manner will give a guide to the method of presentation of thousands of species in this series. See page 320 for further details of this series.

[†]For a more detailed reference to the natural growing conditions in Western Australia, refer to "Plant Life of Western Australia" on page 300.

Calytrix arborescens (tree-like)

NT

A medium shrub to small tree 3-6 m × 2-5 m; trunk fluted; branchlets short, many; leaves to 0.1 cm long, scale-like, glabrous, crowded; flowers about 1 cm diameter, borne on short thick stalks in upper axils, profuse, greenish-creamy to white; calyx tube about 0.6 cm long; awn slightly longer than petals. Flowering April-Oct.

This tropical species has had limited cultivation, but has potential as an ornamental shrub, with the flowers well displayed against the scale-like leaves. It occurs on deep sands, and should grow in most well drained soils, with dappled shade, partial or full sun. Propagate from seed or cuttings.

Calytrix asperula (with fine bristles)

WA

A dwarf to small dense shrub 0.3-1.5 m × 1-2 m; branches glabrous; leaves to 0.5 cm long, more or less spreading, narrow, three-sided, blunt, glabrous; flowers open-petalled, about 1 cm diameter, nearly sessile, profuse near ends of branchlets, pale yellow; calyx tube about 1 cm long; awns about 1 cm long. Flowering Oct-Feb.

This decorative species is found growing on sand in heaths and woodlands from the Stirling Range, westwards to Albany. It is evidently not well known in cultivation, but should grow in relatively well drained, light to medium soils, with dappled shade or partial sun. Propagate from seed or cuttings.

Calytrix aurea — In addition to being a bright yellow, the flowers are scented. As shown in the photograph on page 289, by J. Glass, the plant can be quite showy with flowers 19-20 cm across and carried in abundance. It is a small upright shrub 1.2 m tall from Western Australia where it occurs in heath on pale yellowish grey sand or in low heath on grey lateritic sand over outcropping laterite, and also among jarrah and white gum on gravelly soil. Compared with other species of *Calytrix*, the leaves are large, up to 12 mm long and 5 mm wide. It is most closely related to *Calytrix flavescens* which has smaller leaves.

Calytrix birdii (after Samuel Dougan Bird)

WA

Small shrub 1 m × 1 m; leaves about 0.3 cm, linear to oblong, alternate and scattered; flowers open-petalled, about 1 cm diameter, purple, axillary forming terminal clusters; calyx tube about 0.7 cm long; awns longer than petals. Flowering Sept-Nov.

Evidently not well known in cultivation. This is an ornamental species that inhabits sandy soils of low rainfall regions. It should therefore do best in well drained soils in a warm to hot situation. Tolerates light frosts. Propagate from seed or cuttings.

Calytrix brevifolia — was previously known as *Calytrix muricata*. It is an erect small shrub, the height varying from 0.5 m to 2.5 m. This is a large-flowered species, 16-23 mm across, with colouration very like that of *Calytrix formosa*, pink to magenta with a yellow centre. As well as large flowers the plant has long awns. It has been found in heath on yellow sand, on a sandy ridge, in dense heath on white sand, in wind-shorn heath on exposed sandstone bluffs and in woodland with dense heath understorey. It is closely allied to *Calytrix truncatifolia* and *Calytrix creswellii*. Photograph on page 305 by T. Tapper.



Calytrix erosipetala — see page 311 △

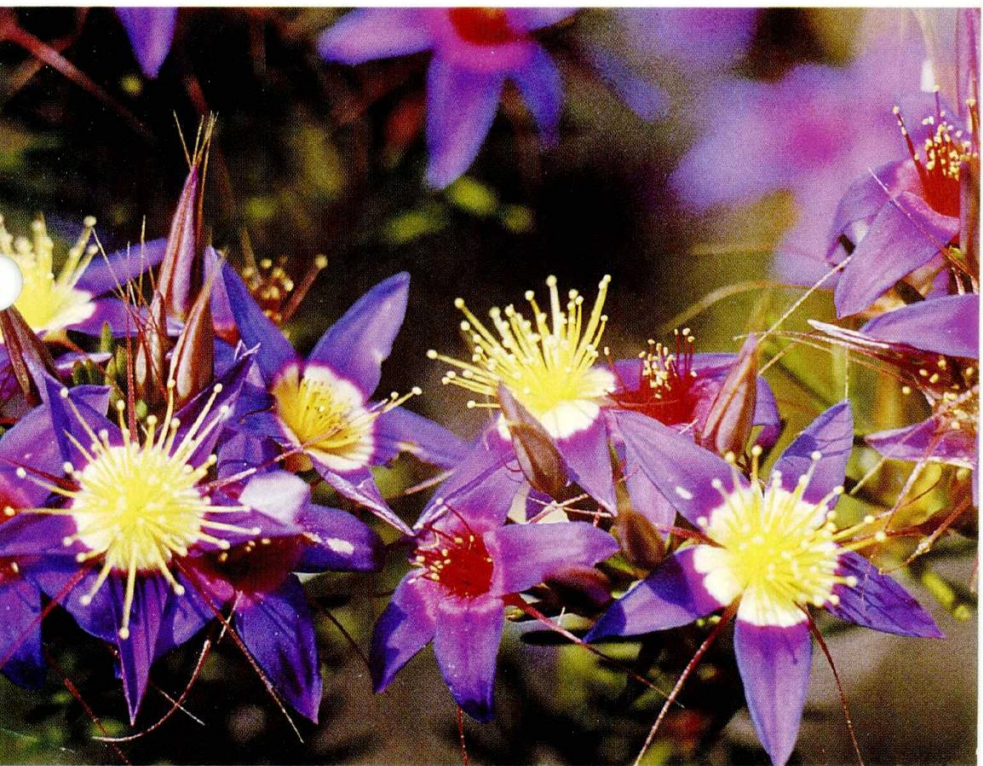
▽ *Calytrix desolata* — see page 311





Calytrix flavescens — see page 314 △

▽ *Calytrix depressa* — see page 311



Calytrix breviseta (short bristles)

WA

A form of this species has been known as *Calytrix stipulosa*. It is an erect to spreading, dwarf shrub 0.3-1 m × 0.5-1.5 m; branches twiggy; leaves about 0.5 cm long, linear, erect or spreading, blunt or pointed, glabrous; flowers open-petalled, about 1.5 cm diameter, nearly sessile in upper axils, profuse, pink; calyx tube about 0.6 cm long; awns longer than petals. Flowering Aug-Nov.

Evidently not in cultivation. It should require well drained soils, with dappled shade, partial or full sun. Withstands light frosts and extended dry periods. For gardens or containers. Propagate from seed or cuttings.

Calytrix brownii (after Robert Brown)

QLD, WA, NT

Previously known as *Calytrix brachychaeta*, it is a tall shrub 2-5 m × 2-5 m; branches many, usually hairy; leaves about 0.4 cm long, narrow, three-sided, blunt or pointed, imbricate or crowded; flowers open-petalled, about 1 cm diameter, nearly sessile, borne in axils near ends of branchlets, greenish-white; calyx tube about 0.5 cm long; awn about 0.4 cm long. Flowering Feb-Dec.

This calytrix is from the tropical regions, where it occurs in sandstone and lateritic areas. It is not well known in cultivation, but should grow in most well drained soils with partial or full sun. Well suited to northern Australian gardens. A form with a strong weeping habit is grown in Darwin gardens. Propagate from seed or cuttings.

Calytrix carinata — A shrub to two metres tall from the arid regions of Central Australia. When in full flower it creates a bright splash of colour against the reddish soils of the 'Dead Centre'. The photograph on page 304 by L. Craven shows it growing with a clump of grass. The flowers may be pink to purple, red, white in the centre and 12-22 mm across.

Calytrix decandra — is an erect to spreading shrub to less than a metre high with small, thin leaves to 1 cm long. The flowers are 2-3 cm across and a profuse pink (or mauve to magenta, purplish at the base) as shown in the photograph by G. Clarke on page 305. The hypanthium (the tube supporting the flower) is 13-18 mm long as shown in the fourth sketch of Fig. 4. The 10 stamens (white ageing to pink) are in one ring just inside the petals. It is found on the southern region of WA from Bremer Bay to Israelite Bay in *Banksia speciosa* heath, grey sandy soil over gravelly clay, or stony sand.

Calytrix decussata (decussate)

NT

Dwarf to small shrub 0.2-5 m × 1-2 m; branchlets woolly; leaves 0.1-0.5 cm long, narrow linear to lanceolate, blunt apex, hairy, distinct oil dots; flowers open-petalled, about 1.2-1.5 cm diameter, bluish-mauve, nearly sessile, solitary.

This recently named species inhabits sandstone regions in Arnhem Land. It has some similarities to *C. tetragona*. Little is known of its performance in cultivation. It needs well drained soils, with plenty of sunshine, and is probably best suited to tropical and subtropical areas. Propagate from seed or cuttings.

Calytrix depressa — Previously known as *Calytrix tenuifolia*. A dense small shrub usually less than a metre tall, from Western Australia where it occurs on granite outcrops, gravelly quartzitic hillslopes and in heath on a wide range of soils. The flowers are mauve to violet, yellow in the centre, 10-22 mm across. The photograph on page 309 by T. Tapper shows the darkening that occurs to the yellow centre as it ages. This is probably an indication to pollinating insects that pollen and/or nectar is no longer available from the flower. It is closely allied to *Calytrix purpurea* which can be readily distinguished by its total lack of an awn on the calyx segments.

Calytrix desolata — A usually dwarf shrub that may grow to a metre tall, from Western Australia where it occurs on granite wash and on stony ground. The photograph on page 308 by L. A. Craven is of a flowering branchlet of a plant grown in a pot for several years, using a coarse sandy soil. The general leaf form and other features of the flower are similar to *Calytrix cresswellii*. The flowers may be pink to purple, 15-23 mm across. The pink white filaments age to red.

Calytrix eneabbenis — A shrub to 0.5 m high occurring in heath on sand and in shrubland on grey sand over laterite in the Eneabba district of Western Australia. The purple flowers are yellowish white in the centre and 14-20 mm across as in the photograph on page 292 by I. Dunn. It is closely related to *Calytrix depressa* which has narrower leaves.

Calytrix erosipetala — A shrub to 60 cm tall occurring on granite and sandstone breakaways in Western Australia. The species is close to *Calytrix tetragona* but has almost terete leaves in contrast to the angular leaves of the latter species. As shown in the photograph on page 308 by L. A. Craven, the white flowers become pink in the centre with age and are 11-12 mm across. It is related to *Calytrix warburtonensis* with a slightly different petal margin.

Calytrix exstipulata — This species is very common in the monsoon region of northern Australia, and of all the pink flowered forms, has the widest ecological range. It is closely related to *Calytrix microcoma* which also has pink to mauve flowers but with wider petals and is also from the north, but lacks stipules on the mature plant. Its masses of pink to mauve flowers (12-28 mm across) with white centres ageing to red as shown in the photograph on page 292 by J. Simmons. The proven hardiness in northern gardens makes it a valuable garden plant.

Calytrix faucicola (refers to its natural habitat of gorges)

NT

Dwarf shrub 0.3-1 m × 1-2 m; branches spreading; branchlets slightly hairy; leaves about 0.1 cm long, very narrow, linear to ovate, alternate, overlapping, erect, slightly hairy; flowers open-petalled, 1.5-1.8 cm diameter, pale yellow, nearly sessile, borne at ends of the branchlets; calyx tube about 0.5 cm long; awns to 0.7 cm long. Flowering April-Oct.

A recently described species from the Katherine area, where it occurs in crevices of sandstone gorges. Probably best suited to tropical or inland areas where it should do well in soils with good drainage, and partial to full sun. Propagate from seed cuttings.



Calytrix formosa — see page 314 △

▽ ***Calytrix fraseri*** — see page 314





Calytrix leschenaultii. *Calytrix* are small shrubs rarely over one metre high. This plant is described on page 315 where it states that it may grow to 1.5 metres high. This plant, growing in a Western Australian sandplain, has been restricted in height by the harsh conditions. Pruning of plants growing in the garden will produce a dense, prolifically flowering shrub to one metre all round.

Calytrix flavescens — This brightly-coloured yellow-flowered species has scented flowers 11-20 mm across, often in clusters as shown in the photograph on page 309 by J. Glass. A dwarf shrub to 0.8 m tall, it is an outstanding shrub for the garden or container. It is found in Western Australia on a variety of habitats, in low heath on grey sand with laterite, in open heath or red loam derived from a laterite outcrop, in a swampy area of sand and in mallee scrub. It is allied to other species with yellow petals and filaments, *Calytrix asperula*, *C. aurea*, *C. chrysantha* and *C. drummondii*.

Calytrix formosa — This beautiful low species to 0.7 m tall is from the sand plains of Kalbarri National Park in Western Australia, as shown in the photograph on page 301. It has extremely lovely fuchsia-pink flowers, 12-14 mm across with extremely low awns as shown in the photograph on page 312 by L. A. Craven. The yellow centre becomes pinkish mauve on ageing. It is similar to *Calytrix brevifolia* with a similar flower colour, although the leaf shape differs.

Calytrix fraseri — This species is reasonably commonly grown in southern Australia and for good reason. The bright pink flowers, 12-28 mm across and with long awns, are very showy. The yellow centre becomes ochreous with age as shown in the photograph on page 312 by F. W. Humphreys. There are white flowered forms also. An open spreading dwarf shrub 0.5-1.5 m high, it is a very decorative shrub, responding well to pruning. In Western Australia it is found in heathy banksia woodland on white sand, and in low heath on grey sand and lateric gravel, and on exposed decomposing granite outcrops. It is similar to *Calytrix superba* in the shape of leaves and bracteoles and in flower colour.

Calytrix glutinosa — An erect spreading dwarf shrub to one metre tall, it has proven adaptable in cultivation in a range of soils. The striking, soft mauve-pink flowers, 18-23 mm across, display well and last reasonably well in water when picked. As shown in the photograph on page 332 by R. Burbury, the white centre ages to a reddish purple. It occurs on a range of soils in Western Australia, in woodland on gravelly hillsides (laterite and quartz), on reddish lateritic sand, on a granite outcrop and in banksia and mallee country.

Calytrix gracilis — The rich purple flowers of this species are very striking. A small shrub to one metre tall, it is found in a range of situations in Western Australia, on open heath, on yellow sand, on white gravelly sand, on open heath on yellow-brown loam, in grey sand on the edge of a dry swamp and on gravelly breakaway soil. It is closely related to *Calytrix amethystina* that has shorter leaves and hypanthia.

Calytrix gurulmundensis — For years this unnamed species from the Gurulmundi area of Queensland was unofficially known by this name. A plant of the open shrubland on lateritic yellow sandy clay on ridge tops, it has been widely sought after for planting in eastern gardens. It grows to two metres tall in shrubby country but in a garden situation, could be kept much smaller. As shown in the photograph on page 285 by N. Marriott, the white to cream flowers are yellow in the centre displaying the numerous yellow stamens to advantage. It is closely related to *Calytrix islensis* known only from collections from Isla Gorge, Queensland.

Calytrix harvestiana — This dwarf shrub to 0.75 m tall looks very like some of the purple-flowered forms of *Calytrix depressa*. As shown in the photograph on page 328 by L. Craven, the flowers are purple-mauve to red-purple, 11-13 mm across. The pale yellow stamens age to red-purple. It is remarkable in that the calyx falls away after flowering, which never happens with *Calytrix depressa*. It occurs in Western Australia in sand heath on shallow white sand over sandstone and in tall heath on pale brown, fine, sandy loam.

Calytrix involucrata (provided with covering)

SA

Small shrub 1-2 m × 1-2 m; branches glabrous or nearly so; leaves to 0.4 cm × 0.1 cm, more or less spreading, somewhat three-sided; flowers open-petalled, to 1.5 cm diameter, pink or white, sessile, usually 2-5 in terminal cluster but can be solitary, surrounded by flattish bracts; calyx tube about 1 cm long; awns longer than petals. Flowering Aug-Nov. It is closely allied to *C. tetragona*, which usually does not have the prominent bracts surrounding the flowerheads. This most ornamental species is not widely cultivated. It requires well drained soils and tolerates dappled shade to full sun. Relatively frost tolerant. Responds well to pruning after flowering. Propagate from seed or cuttings.

Calytrix leptophylla (narrow leaves)

QLD

Small to medium shrub 1-3 m × 1-2 m; leaves about 0.5 cm long, slender linear, semi-terete or three-sided, more or less blunt, crowded, glabrous; flowers open-petalled, about 1 cm diameter, pink, nearly sessile, borne in upper axils; calyx tube about 1 cm long; awns slightly longer than petals. It is allied to *C. longiflora*, which has larger flowers. Flowering March-Nov.

Evidently not in cultivation, this species from north Queensland grows naturally in sandstone and granite. It is probably best suited to northern Australia, where it will require very well drained soils with dappled shade to full sun. Propagate from seed or cuttings.

Calytrix leschenaultii — was previously known as *Calytrix brachyphylla*. It is a purple-flowered, erect shrub to one metre tall and is the most common and widespread species of *Calytrix* in south-west Western Australia. As shown in the photograph on page 313 by N. Marriott, the purple flowers are white or yellow at the centre and are 9-15 mm across. Mauve, blue, violet and pink flowers have been observed. It is most closely related to *Calytrix sylvana* which has a shorter hypanthium and awnless calyx segments. The reference in Encyclopaedia of Australian Plants reads:

Previously known as *Calytrix brachyphylla* this is an open, often upright, small shrub 1-1.5 m × 1-2 m; branches many; leaves about 0.2 cm long, overlapping or spreading, ovate to oblong, glabrous, often crowded; flowers open petalled, small, less than 1 cm diameter, nearly sessile, borne in upper axils, profuse, bright pink to purple; calyx tube about 0.7 cm long; awn slightly longer than petals. Flowering Aug-Nov.

An adaptable species which will grow in most well drained soils, with dappled shade, partial or full sun. It prefers some protection for its root area. Withstands light frosts and periodic inundation. Pruning will produce dense growth if required. A dainty plant for gardens and containers. Propagate from seed or cuttings. This species has often been available as *C. brevifolia*.



Calytrix platycheiridia — see page 318 △ ▽ *Calytrix longiflora* — see page 317



Calytrix longiflora — A spreading shrub from the Springsure-Tambo district of Queensland, southwards to the Yantabulla-Bourke district of New South Wales. It occurs in eucalyptus/triodia vegetation on red sandy loam of sand dunes and on sandy ridges where it may grow to 2.5 m tall. In the garden it has a much smaller stature. The pink to mauve flowers are 18-21 mm across, the yellow stamens ageing to red as shown in the photograph opposite by D. Hockings. It is quite similar to *Calytrix carinata*.

Calytrix megaphylla (large leaves)

NT

Dwarf to small shrub 0.5-1.5 m × 0.5-1.5 m; branchlets short; leaves about 1.2 cm long, linear, slender, narrowed at base, pointed, leathery, glabrous; flowers open-petalled, to 3 cm diameter, pinkish-mauve to reddish-purple satiny, nearly sessile, in clusters in upper axils, profuse; calyx tube about 1.5 cm long; awns longer than petals. Flowering Jan-July; also sporadic.

A rare species found in gravelly soils among sandstone, this calytrix shows potential for cultivation especially in tropical regions. It should grow in relatively well drained soils, with dappled shade, partial or full sun. Naturally it has an erect growth habit, and may require pruning to promote a bushy shrub. Plants in flower are very showy. Propagate from seed or cuttings.

Calytrix micrairoides (similar to the genus *Micraira*)

NT

Dwarf prostrate × 1-3 m shrub; branches sparse, trailing for 2-3 m, producing adventitious roots; leaves to 1 cm long, linear, slender, three-sided, mucronate, crowded on short branchlets, erect, grey-green, glabrous; flowers open-petalled, about 1.5 cm diameter, pink, nearly sessile, borne in upper axils; calyx tube about 1.5 cm long; awns longer than petals. Flowering February.

A recently described species with potential for cultivation, because of its prostrate growth habit and ability to self-layer. It occurs naturally on sandstone in Arnhem Land and is a remarkable mimic of the grass *Micraira* with which it grows. Will require well drained soils with a warm to hot situation. Propagate from seed, cuttings or layers.

Calytrix mimiana (refers to Mount Isa Mines Ltd.)

NT

Dwarf to small slender shrub 0.5-2 m × 0.5-1 m; branches upright, glabrous; leaves to 1 cm long, very narrow, linear, trigonous, alternate, crowded, erect to spreading, glabrous, acute apex, often recurved; flowers open-petalled, 1.2-1.5 cm diameter, deep pink to pinkish-mauve, nearly sessile, borne in clusters at ends of the branchlets; calyx tube about 0.8 cm long, awns to 0.7 cm long. It is similar to *C. leptophylla*, which is bushy and does not have recurved leaves. Flowering Jan-July.

This slender species is at present known only from a very restricted area south-west of the Gulf of Carpentaria. It occurs in crevices on a deeply dissected sandstone bluff. In cultivation it is probably best suited to tropical regions. Would need excellent drainage and plenty of sunshine. Propagate from seed or cuttings.

Calytrix oldfieldii (after Augustus Oldfield)

WA

A dwarf to small shrub 0.5-1.5 m × 1-1.5 m; leaves 0.2 cm long, oblong, three-sided, blunt, glabrous; flowers open-petalled, about 1 cm diameter, nearly sessile, borne in upper axils, more or less in heads, profuse, violet and pink; calyx tube about 0.5 cm long; awns about same length as petals. Flowering July-Jan; also sporadic.

A most ornamental *calytrix*. It occurs over a wide area of south-western WA, where it is usually growing in sand-heath. For cultivation it will need well drained soils, with dappled shade, partial or full sun. Will withstand light frosts and some periods of dryness. Responds well to light pruning. Suitable for gardens or containers. Propagate from seed or cuttings.

Calytrix platycheiridia — is a glabrous shrub to half a metre tall. The stem clasping leaves to 4.5 mm long support the yellow flowers on the ends as shown in the photograph by L. A. Craven on page 316. The petals are creamy becoming yellow in the lower half, the flowers being 1 cm across. There are 35 to 50 yellow stamens in two to three rings. Superficially it is rather similar to *Calytrix aurea* with botanical affinities to *Calytrix angulata*. It is found in open, low heathy vegetation on pale yellowish brown sand ridges and in tall *Melaleuca* shrubland in the Coorow-Watheroo District of WA.

Calytrix sapphirina (like a sapphire)

WA

A dwarf shrub 0.5-1 m × 0.5-1.5 m; leaves about 0.5 cm or slightly longer, linear, three-sided, blunt or pointed, usually spreading; floral leaves with soft hairs; flowers open-petalled, to 1 cm diameter, nearly sessile, borne in dense terminal clusters, pink, violet or purple; calyx tube to about 1 cm; awns longer than petals and slightly hairy. Flowering Aug-Nov.

An ornamental species that is little-known in cultivation. It occurs over a wide area of south-western Western Australia, growing mainly in sand-heath plant communities. It is probably best suited to well drained, light to medium soils with dappled shade or partial sun. Will tolerate full sun if there is protection for the root system. Propagate from seed or cuttings. The photograph on page 328 is by Geof. Clarke.

Calytrix simplex (simple)

WA

A form of this species has been known as *Calytrix stenophylla*. It is a dwarf shrub 0.1-0.5 × 0.2-0.5 m; branches slender, slightly spreading; leaves less than 1 cm long, slender, semi-terete or three-sided, glabrous or slightly hairy; flowers open-petalled, about 1.2 cm diameter, borne on very short peduncles in upper axils, pink or lilac; calyx tube about 0.8 cm long; awns longer than petals. Flowering Sept-Nov.

This outstanding species is evidently not well known in cultivation. Its dwarf habit of growth and floral display would make it an excellent species for use as an undershrub. Would grow best in well drained light to medium soils, with dappled shade or partial sun. It may grow larger in cultivation than in its natural habitat. Recommended as a container plant. Propagate from seed or cuttings.

Calytrix strigosa — A small shrub to one metre, it is very widespread in Western Australia. A variable species, many of the forms have mauve pink flowers 8-22 mm across as in the photograph on page 325 by I. Dunn. There are yellow-flowered forms in the arid zone. As in the photograph, the masses of flowers may conceal the foliage. A form has been known as *Calytrix watsonii*.

***Calytrix superba* (superb)**

WA

Dwarf shrub 0.3-0.5 m × 0.5-1 m; branches slender, erect; leaves 0.5-1 cm long, oblong-linear, erect or appressed, thick, concave, scattered; flowers open-petalled, to 3.5 cm diameter, bright pink, terminal; calyx tube to 1.5 cm long; awns slightly shorter than petals. Flowering Nov-Feb.

This *Calytrix* species with the largest flowers of the genus is confined in nature to sand-heath near Eneabba, north of Perth. At this stage it is not well known in cultivation. It will grow in very well drained soils, with partial or full sun. Will probably tolerate dappled shade in hot locations. Withstands light frosts, and extended dry periods. An outstanding ornamental for gardens or containers. Propagate from seed or cuttings.

***Calytrix surdiviperana* (refers to the locality, Death Adder Gorge)**

NT

Small shrub 1-1.5 m × 1-1.5 m; branches glabrous; leaves to 1.1 cm × about 0.15 cm, linear, straight, spreading to reflexed crowded, with prominent stipules, blunt apex, glabrous; flowers open-petalled, about 2 cm across, pink to red, nearly sessile, borne in clusters at ends of branchlets; petals pinkish; sepals red-purple; awns longer than petals. Flowering Feb-Mar.

This little-known ornamental species from Arnhem Land occurs naturally on sandstone conglomerate. Grown on a limited scale in Darwin but has potential for wider cultivation in tropical regions. Needs very well drained soils, with partial to full sun. May be worth trying as a container plant in temperate regions. Propagate from seed or cuttings.

***Calytrix tenuiramea* (slender branches)**

WA

A dwarf shrub 0.5-1 m × 1-1.5 m; branches slender, much-divided; leaves to about 0.6 cm long, semi-terete, three-sided, usually blunt, glabrous, not crowded; flowers open-petalled, to 1.5 cm diameter, borne on short stalks in upper axils, pink-purple; calyx tube about 0.7 cm long; awns rigid, longer than petals. Flowering Sept-Nov.

This ornamental species is evidently not common in cultivation. It occurs in sand-heath plant communities, in the south of Western Australia. It will grow in well drained soils, with dappled shade or partial sun, and would possibly tolerate full sun providing there is protection for the root system. Propagate from seed or cuttings.

Calytrix tetragona — This small shrub is the most widespread species occurring across southern Australia, from Western Australia to South Australia and Victoria, down to Tasmania and north to the Springsure district in Queensland. It has been reliably grown in a wide range of soils in public and private gardens. The single series of stamens with white filaments and red anthers at the end can be clearly seen in the photograph on page 325 by Ilma Dunn. The flowers may be a pink tinged white as shown, to an attractive deep pink, a form widely sought after. The flowers are 7-15 mm across. It is closely related to *Calytrix involucrata*.

A dwarf to small shrub 0.5-1.5 m × 1-1.5 m; branches usually erect and slender; leaves to 1.2 cm long, linear, slender and three-sided, or thickish and oblong; floral leaves short and broader than others, glabrous; flowers open-petalled, to 1.5 cm diameter, borne on short stalks in upper axils, pink to mauve forming elongated heads; calyx tube to 0.8 cm long; awns longer than petals, sometimes slightly hairy. Flowering Sept-Nov.

Not well known in cultivation, but should be useful as a low shrub. It requires well drained soils, with dappled shade or partial sun. Will possibly tolerate full sun provided there is some protection for roots. Propagate from seed or cuttings.

***Calytrix verticillata* (verticillate)**

Dwarf to small shrub 0.5-1.5 m × 1-2 m; branchlets hairy; leaves to 0.5 cm long, very narrow, linear to nearly lanceolate, in tight whorls or rarely opposite, erect to spreading, densely hairy, blunt apex; flowers open-petalled to 1 cm diameter, white, more or less sessile, borne solitary or several at ends of the branchlets; calyx tube about 0.3 cm long, hairy. Similar to *C. achaeta* and *C. brachychaeta*, which do not have verticillate leaves. Flowering June-Oct.

A newly described species from the Katherine region, where it occurs in open sandstone areas, and on laterite in eucalypt woodland. Should be best suited to tropical areas. It needs well drained soils with partial or full sun. Propagate from seed or cuttings. ■

Encyclopaedia of Australian Plants — Vol. 5

The most complete reference to Australia's wildflowers presented with easily read descriptions, is now available for species commencing with the letters G to J. You will readily perceive that this covers many groups of excellent horticultural species including *Grevillea*. Due to delays in press, I was advised that a copy may not be available for me to refer to before this issue was finished. I took this opportunity to present from Volume 2, those species of *Calytrix* that are not already described in this issue. This will give new readers an excellent guide as to how each of these volumes are presented including the new Volume 5.

A copy of Volume 5 is now to hand and what a magnificent effort it is. The volume is worth a place in your reference collection, just for the *Grevillea* and *Hakea* descriptions alone. As most are aware, the genus *Grevillea* has been reviewed at a scientific level and many name changes were made together with numerous new species. The 251 species are described under their now correct names. In addition, in the competent, painstakingly accurate way of the authors, over 180 *Grevillea* garden cultivars are described. A complete reference in such an acknowledged authoritative way, has never before been available. As an added bonus, the section on *Grevillea* commences with extensive notes on cultivation of these beautiful plants both in the garden and in containers. Reference to the extracts from the series on *Calytrix*, in this issue will show that the extensive practical advice on cultivation and propagation of *Grevillea* under all conditions, is supplemented by advice for each of the 251 species and 180 cultivars described. One cannot speak too highly of this magnificent series of volumes and every wildflower enthusiast should have a complete set.

Individual volumes or the whole series, may be obtained from the SGAP Booksales Service in your state or from P.O. Box 104, Winmalee, NSW 2777, \$63 for Vol. 1, \$76.50 for Vols 2, 3, 4 or 5, the postage on each being \$6.00 in NSW and \$8.00 for interstate. The normal retail price per volume is \$85.00.

Cultivating Calytrix

by Neil R. Marriott
"White Gums Nursery"
Stawell, Victoria

Calytrix, with their fluffy star-flowers, are an extremely showy group of generally small to medium sized shrubs that deserve to be cultivated far more than they are at present. I have often wondered about this as many of them are as good as, if not better than, some of the popular *Verticordia* — a genus that *everyone* wants in their garden!

Perhaps it is their rather "unexciting" and fine "heath-like" foliage; it certainly can be hard to tell one species from another when they are not in flower. However, this similarity of foliage between different species can be used to great advantage in garden design. Drifts of different species can be massed together to provide a unity of foliage that is transformed during the flower season into a spectacular display of contrasting flower colours. Imagine the effect of species such as *Calytrix aurea* (yellow), *C. leschenaultii* (purple), *C. decandra* (pink), *C. depressa* (lemon), and *C. fraseri* (lilac) when all flowering together in a mass planting!

If, on the other hand, toning of colours instead of contrasting them is more to your liking, then this can be achieved in a similar manner. East of that quaintly named town of Walkaway, Western Australia, I once saw nature blend colours together in a most beautiful way; a patch of low heath was a blaze of purple, mauve and pink with the odd touch of white — and all were *Calytrix*.

Calytrix as a genus grows most successfully in a sunny to dappled shade site, favouring well drained acid sandy loam or composted sand. Eastern species respond to occasional deep waterings during the drier months, although most western species are extremely hardy to long, dry summers.

Several species such as *Calytrix fraseri* and *C. superba* have frustrated me (and lots of other growers!) for many years; plants grow well for a year or so, flower beautifully, and then promptly drop dead — usually after a humid or wet spell. Several years ago in the west I discovered why; an area of beautiful bush on deep sand near the Moore River had been bulldozed for wheat — a favourite and still continuing practice over there, but that's another story. After bulldozing, the area had been left for several months, and thousands of seedlings of all the local plants were coming up. Amongst these were many *Calytrix fraseri* seedlings several inches high — we attempted to dig several up, only to find that even at this stage their roots went deep down into bottomless, perfectly drained white sand. Duplicate this in the garden and I am sure we could easily grow these beauties.

If, on the other hand, you cannot afford a pile of sand several metres deep, then you can stick to some of the hardy and adaptable species. These include *Calytrix aurea* with its masses of spicy-perfumed yellow flowers, *Calytrix alpestris* and *C. tetragona* (previously known as *Calytrix sullivanii*) with their lovely pink buds and white fluffy flowers, *C. depressa* with large pale yellow flowers, *C. glutinosa* with mauve-purple flowers, and *C. tetragona* with a profusion of white to pink flowers.

In fact, *Calytrix tetragona* is such an attractive and variable species that it deserves to be used a lot more than it is in the garden. Besides the range in flower colour, *C. tetragona* can also be a dense groundcover, a rounded, metre high shrub, or an upright columnar shrub to 1.5 m high and only 0.3 m wide.

The closely related *Calytrix involucrata* was recently observed growing on the dry, stony hills of the Gawler Range in inland South Australia. This is another variable and most beautiful species that shows great potential for dry land and inland gardens.

The majority of *Calytrix* are spring and summer flowering, and once flowering is finished, plants should be pruned back by 30-50%; in the wild most species are heavily browsed by kangaroos. If left unpruned in the garden they tend to become rather leggy and sparse of flower and foliage. Pruned annually, they make spectacular and long lived plants most worthy of cultivation, and up there with the best of Australian plants. ■

Grow What *Calytrix* Where

Australian Plant
Study Group

This excellent reference book has been expanded and reprinted. It is available at the excellent price of \$40.00 retail*. The book is the work of The Australian Plant Study Group that had its beginning in the Society in Victoria. The first edition in 1980 became extremely popular and has now been expanded to 420 large pages and lists 2 750 species of wildflowers. Yes, the whole book is lists of plant species names, but what an incredible reference in the 106 tables. The plants are listed under conditions required for their reliable cultivation or application to your special needs. All this will mean very little to you if you have not seen the book and I can appreciate the scepticism that may be generated by the above review. To really get the message across, I have represented the manner in which they deal with *Calytrix*.

Calytrix, as you will see from this issue of Australian Plants, are a beautiful group of flowering shrubs, but problem plants in cultivation. The Australian Plant Study Group is made up of very practical, experienced horticulturists with one objective — to help you to reliably grow wildflowers. Their recommendations are based on sound, practical experience. In the book the index references the species of *Calytrix* they have known to succeed as follows:

<i>Calytrix alpestris</i> (F) PN m	4, 6, 13, 14, 18, 26, 30, 40, 50, 52, 61, 63, 78, 97
<i>angulata</i> (F) P s	2, 18, 30, 37, 52
<i>aurea</i> F P s	2, 18, 19, 26, 30, 37, 42, 50, 52, 61, 63, 77
<i>depressa</i> F P s	2, 18, 30, 50, 52, 61
<i>flavescens</i> F P s	2, 18, 26, 30, 33, 37, 42, 52, 77
<i>fraseri</i> (F) P s	2, 18, 19, 30, 33, 37, 38, 49, 50, 52, 56, 61, 63, 74, 98
<i>glutinosa</i> F P s	2, 18, 20, 30, 50, 52, 61
<i>oldfieldii</i> F P s	2, 18, 19, 30, 50, 52, 61
<i>sapphirina</i> (F) P s	2, 18, 30, 49, 52
<i>sullivanii</i> F P m	4, 5, 6, 7, 12, 13, 14, 18, 19, 26, 27, 28, 29, 40, 50, 52, 61, 63, 78
<i>tetragona</i> F P N s, m	2, 4, 5, 6, 7, 13, 14, 15, 18, 19, 26, 28, 29, 40, 45, 50, 51, 52, 61, 63, 74, 78

Key: F, full sun for most of the day; (F), full sun in cool areas.
P, partial sun, some overhead cover or morning sun; (P), partial sun in hot areas.
s, shrub up to 1 m; m, shrub 1-2 m.

The numbers refer to the tables of species (106 tables) that make up the body of the book and the recommended situations for the cultivation of these 11 species are given in the following tables:

*You may purchase from the SGAP Bookseller in your state or from P.O. Box 104, Winmalee, NSW 2777, for \$36 plus \$5 in NSW or \$7.00 interstate postage.

2. Rockery Plants. Following a brief introduction on rockeries, nine species of *Calytrix* are listed.
4. Fence-screeners. Plants, dense to the ground. *Calytrix alpestris*, *C. sullivanii*, and *C. tetragona*.
6. Hedges. The same three plants are listed. This is a good guide as to their growth habit.
7. Windbreaks. The last two above are listed.
8. Shady Moist. Plants that will grow with very little sun throughout the year, the same three species.
9. Shady Dry — Ordinary shade without artificial watering. The same three species.
18. Sandy Soil — *Calytrix aurea*, *C. fraseri*, *C. glutinosa*, *C. oldfieldii*, *C. sapphirina*.
Heavy and Clay Soils — Table 12. The same plants if the natural soil is sand over clay.
19. Dry Conditions — How to get the above species plus *C. sullivanii* and *C. tetragona* to prosper.
26. Second-line Coastal Plants — Plants for coastal planting with some first line protection. *Calytrix aurea*, *C. flavescens*, *C. sullivanii*, *C. tetragona*.
27. Moderately Lime Tolerant Plants — People in alkaline areas are often desperate for plants. *Calytrix sullivanii*.
28. Very Lime Tolerant Plants. An interesting table of plants for difficult situations.
30. Usually Frost Resistant Plants. The plants above plus *C. angulata*, *C. depressa*, and *C. flavescens*.
37. Summer Flowering Plants — *Calytrix angulata*, *C. aurea*, *C. flavescens* and *C. fraseri*.
38. Autumn Flowering Plants — The table only lists the best and includes *C. fraseri*.
42. Yellow-flowered Plants — Only strong yellow-flowered plants, *Calytrix aurea* and *C. flavescens*.
49. Other Showy Flowers — Among the best of wildflowers is listed *C. fraseri* and *C. sapphirina*.
50. Cut Flowers — Nine species are listed, the nine of the species mentioned above.
52. Container Plants — The reference simply says "all species of *Calytrix*".
56. Hanging Baskets — *Calytrix fraseri*.
61. Bird Attracters — For Insect-eaters. The plants recommended above are listed.
63. Butterfly Attracters — *Calytrix alpestris*, *C. aurea*, *C. fraseri*, *C. sullivanii*, *C. tetragona*.
74. Interesting Buds or Fruits — *Calytrix fraseri* and *C. tetragona*.
77. Perfumed Flowers — *Calytrix aurea* and *C. flavescens*.
98. Plants Susceptible to *Phytophthora cinnamomi* — *Calytrix fraseri*.

The remaining tables are for situations or types of plants that you will meet. ■

***Calytrix* Labill**

An interesting note by P. E. Bailey

The genus *Calytrix* is uniquely Australian. It was established by Labillardiere in 1806 when *Calytrix tetragona* was described from material collected in Western Australia. Since then the spelling has been altered twice. These 'corrections' came about because various authors were not happy with the combination of the elements from the Greek *calyx* and *thrix*, hair, in reference to the hair-like apex of the calyx lobes. In 1828 de Candolle reinserted the 'h' and published '*Calythrix*' and in 1838 Meisner inserted 'co' in place of the missing 'x' and published '*Calycorthrix*'. Both these names are illegitimate and should be ignored. Schauer, in 1841, reversed the derivatives and published '*Trichocalyx*' which has since been rejected.

Calytrix in WA

by Bob Dixon,
Horticultural Advisor
Kings Park and Botanic Garden

Propagation and Cultivation

Calytrix, commonly known as starflowers, are without doubt one of the most attractive wildflowers found in Western Australia. They are very floriferous with their small flowers often covering the entire plant so as to hide the foliage. Most flowers are two tone, with the petals being a different or lighter colour than the throat of the flower and filaments usually being bright yellow. Another attractive feature of some species is the often bright red calyx seen after the petals have fallen. The flowering season in general is at its height in spring, however, you always find a few species in flower every month of the year, therefore it is possible to have a display throughout the year in temperate regions of Australia.

Calytrix are not widely grown except for a few species such as *Calytrix angulata*, *C. fraseri* and *C. tetragona*. Unfortunately they are notorious for keeling over, especially when grown in the open ground. The reasons for this sudden death syndrome are not fully understood and could be a combination of factors. One of the most important requirements for success is a sheltered position, they prefer to be grown amongst other small shrubs, and dislike root disturbance. While most species prefer full sun, many adapt well to broken sunlight or light shade during the hottest part of the day in summer. Good drainage is essential, with plants preferring a light loamy sand.

Many species have been successfully grown in containers in both soil and soilless potting mixes with low rates of general slow fertilizer. When container grown they require light or broken shade from late spring to early autumn. Most species respond well to light pruning if necessary, although many, especially those without a lignotuber (which affects the ability to resprout after the fire from their woody base), are killed by hard pruning.

Propagation by Seed

The fruit which contains a single seed in the lower part of the calyx tube is described as a nut, but is not hard or woody. When ripe the fruit with floral tube and calyx intact, falls to the ground. Old seed still attached to the plant is usually insect infested. Many species appear to produce few viable seed and when good seed is available it is difficult to germinate. However, after saying that, it occasionally germinates like mustard and cress. Fresh seed appears to give better germination rates than older seed. Seedlings are prone to damping off disease, therefore the seed mix should be sterilized and or drenched with a suitable fungicide e.g., Previcur.

Propagation by Cuttings

The preferred method of propagation is by soft wood cuttings usually about 4 cm long, depending on the species. They can be taken any time of the year when material is available although most new growth is in late spring and early summer. Strike rates of 100% have been attained with some species whilst others constantly give poor results. Increased strike rates can be achieved by



Calytrix strigosa — see page 319 △

▽ *Calytrix tetragona* — see page 319



using cuttings from stock plants rather than using bush picked material. Hormones in the form of a cutting powder or liquid for semi hardwood cuttings, are suitable for this type of cutting. One major problem is growing on the struck cuttings, this is often due to an imbalance of nutrients in the potting mix or bad drainage.

Notes on Selected Species

Most of the following information on strike rates and germination times was extracted from Kings Park Nursery Records.

Calytrix angulata — An erect shrub up to 1 m high but usually much smaller. When young it is a compact bush becoming open as it ages. The light yellow to creamy yellow flowers with a lighter centre are found mainly between late September and December. Plants occur naturally on poor sandy soils from the Pingelly to north of Watheroo, mainly in open *Banksia* woodland. This species is usually killed by fire, producing numerous seedlings which readily transplant at the cotyledon stage.

In cultivation it has proved fairly easy to grow on, especially in poor sandy soils. It tolerates fairly hard pruning in its natural habitat but usually dies when hard pruned in cultivation. It is drought tolerant once established. Local nurseries inform me this is one of the easiest species to grow on. It is an attractive species and more effort should be made to cultivate it. As a cut flower it lasts for about two weeks in a vase.

Strike rates of up to 50% have been recorded with softwood cuttings taken in August, although rates of up to 75% have been recorded when cuttings were taken from stock plants. Cuttings are prone to mildew attack and regular spraying with a suitable fungicide is necessary. Germination in ideal conditions takes about 29 days.

Calytrix aurea — An erect shrub to 1.2 m high. In its natural habitat, it is usually killed by fire regenerating freely from seed which produces dense stands. Due to intense competition from other plants they become straggly as they age. Plants can be found on the eastern part of the Coastal Plain usually on sandy loams in winter wet areas, also on the Darling Scarp near Perth and as far north as Eneabba. The attractive light yellow flowers, which have a spicy fragrance, are normally produced between October and January.

This species has proved extremely difficult to establish in poor sandy soils, even with regular summer watering. It requires the protection of other plants and dislikes hard pruning although light tip pruning after flowering, especially when young, encourages the plant to become bushy.

Strike rates of 40% have been recorded. Plants are difficult to grow on, often turning yellow and dying. However, at least one commercial nursery finds that new healthy growth, with fat leaves, strikes easily and these grow on well in containers. Germination in ideal conditions takes 32 days.

Calytrix brevifolia — A small many branched shrub, usually up to 1 m high but sometimes larger. It occurs naturally in heath land in sandy soils between Mogumber and the Murchison River. A very attractive species with deep pink to purplish flowers it is similar to *Calytrix leschenaultii*. This species has proved

extremely difficult to establish in the open ground so container growing is recommended. Strike rates of 40% with cuttings taken in May, have been recorded. In ideal conditions seed germinates in 26 days.

Calytrix depressa — A small shrub to 1 m high, it can be compact and erect, or low and spreading up to 2 m across. The flowers which can be seen from August to December are held on short terminal branches. Southern forms are usually yellow flowered whilst northern forms are generally pink/purple, often with a yellow centre. The northern forms from Kalbarri south are found in sandy or sandy lateritic soils whilst the southern populations on the Darling Scarp, as far south as Jarrahdale, grow on shallow soils over granite. Although rarely seen in cultivation it grows fairly well, especially in sandy loams, with some protection from surrounding plants, and is drought tolerant once established. It tolerates light pruning and is a good container plant. This plant was previously known as *Calytrix tenuifolia*.

Strike rates of 13% were recorded in August whilst 30% was realized in September. I have recorded higher strike rates from stock plants with cuttings taken in autumn and spring, usually taking 5-6 weeks to strike. This is also a species where I made only one sowing of seed with estimated germination rate of 70%; the seed took 19 days to germinate. I doubt if I would be lucky enough to get such a high germination rate again.

Calytrix fraseri — An erect shrub to 1.5 m high. When old the shrub is usually open and straggly as it grows in close competition with other small shrubs. It is found on poor sandy soils often in *Banksia* woodland e.g., Kings Park, or in winter wet areas from north of Kalabarri to south of Lake Grace. Flowers are pink to purple pink, sub terminal, and can be found almost any month of the year although the main flowering period is from November to May. It is killed by fire and regenerates freely from seed. It is one of the easiest species in cultivation, but it prefers shelter from surrounding plants and a high water table or an occasional summer watering in poor sandy soils. It tolerates light regular pruning and makes a good container plant. Plants are readily available in local nurseries.

Strike rates of 58% were recorded in December. Commercial nurseries also record good strike rates. It is rarely grown from seed, although, in ideal conditions, seed germinates in 34 days.

Calytrix glutinosa — An erect shrub to 1 m high but usually much smaller. It occurs on the Darling Scarp on granitic soils, northwards to north of Northampton and inland to Wyalkatchem generally on sand or sandy loam. Flowers which are produced between August and November are pale or deep pink and sometimes mauve, usually with a whitish centre.

In cultivation this species is difficult to establish in the open ground. The local Darling Range form is easier to keep in containers; this may be because it tolerates the wetter cooler conditions during winter. It tolerates light regular pruning but forms which resprout after fire may tolerate harder pruning.

Strike rates of up to 100% have been recorded from cuttings taken in spring and early December. In ideal conditions seed germinates in 35 days.



Calytrix sapphirina — see page 318 ▴ ▽ *Calytrix harvestiana* — see page 315



Calytrix leschenaultii — An erect shrub up to 0.8 m, occurring on sandy soils, often with a high loam content, from Kalbarri to Israelite Bay and inland to Southern Cross. When in full flower the small purple flowers cover the whole of the bush and can be seen between July and November. Another attractive feature of the plant is the bright red young fruit which give a good display for about three weeks. This species has previously been referred to as *C. brachyphylla*.

In cultivation it prefers a loamy sand or lateritic soil and some protection from surrounding vegetation, under these conditions it is drought tolerant, once established. It is rarely available from nurseries because it is hard to grow in poor sandy soils.

Strike rates of 18% have been recorded although I have recorded 40% from bush material in August, and one commercial nursery reports it is easy to strike. Heavy losses often occur when potting on. In ideal conditions seed can germinate in 17 days.

Calytrix sapphirina — An erect shrub to 1 m high, sometimes compact but generally open with the flowers concentrated at the end of short or long branches, giving a compact ball-like appearance. These flowers are mauve to deep purple or pink and are seen mainly between August and November. Plants occur naturally on sandy soils from Kalbarri to Lake Grace.

Plants are usually difficult to establish in the home garden preferring a sandy loam or sandy lateritic soil and protection from surrounding vegetation. They are not readily available in nurseries as they are difficult to grow on. They make good container plants, which may require regular light pruning after flowering. For this purpose select a compact form. This plant was previously known as *C. empetroides*.

Cuttings taken in July from a non-flowering plant producing new growth, gave a 45% strike rate. I found they are difficult to grow on after potting out. In deal conditions seed takes 33 days to germinate.

Calytrix superba — A small slender erect shrub up to 0.5 m but usually much smaller. It is confined to the Eneabba area and grows in sand heath on sandy to lateritic soils. This is the largest flowered species. Each flower is up to 3.5 cm across and is bright pink, the flowering period is from November to February. In cultivation it is extremely difficult to establish on poor sandy soils. However, it makes a good container plant lasting for at least four years when grown under broken sunlight.

This species is rare in its natural habitat and propagation material should only be collected by competent propagators. Cuttings taken from September to December have given strike rates of 30%. Stock plants should enable us to get much better strike rates.

Calytrix tenuiramea — A small upright shrub about 50 cm high with terminal pink to purple flowers. It occurs in the south coastal area such as near Bremer Bay and Esperance, Mt Barker and further inland on the Fraser Range. Unfortunately we have not been successful in establishing this species in the Botanic Garden and it is fairly difficult as a container plant. Cuttings taken in February gave a strike rate of 70%. ■

Correction

In our No. 121 issue, on page 221, the origin of *Callistemon* 'Glasshouse Country' was incorrectly attributed to Mr W. G. Trapnell. The credit for the origin of this plant is rightly credited to Mrs E. J. Morgan of the Glasshouse Mountains, Queensland. I apologise to Mrs Morgan for making this error. — Editor.

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

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Calytrix glutinosa — see page 314 for a description