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**Floral arrangements with wildflowers
Learn how it is done!**

A new century for Australia

W. H. Payne

Very many Australians are concerned about the future of the Australian continent. Will it continue to degenerate to dust and salt? Our approach has always been a positive one, we must act now for future prosperity. There is evidence that many have heard our pleas but there is one vital area to which we may claim some experience, the future of the native flora and fauna. You may save the continent but lose much of our flora and fauna unless action is taken now, see page 40.

The two major political parties still appear to live in a political vacuum, the only thing that counts is winning the next election regardless of what it costs. There is an upsurge of concern for the future of our continent, especially by the younger generation and by country people.

Repairing Australia! See the last issue for a positive approach by an alliance of the conservation groups and the people owning and working the productive land, or what is left of it.

At last a positive sign of national leadership has been given by John Anderson, Leader of the National Country Party and Deputy Prime Minister. He is convinced a massive program is essential and has even evaluated the cost, a cost well within our national resources.

Does anyone else in authority care what happens to Australia?

Australian plants, conservation and cultivation, our main concern.

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Front cover: *Banksia coccinea* (red), *Isopogon latifolius* and *Minigum* provide the centrepiece. Other species of *Banksia* and *Isopogon* would work just as well. The grey leafed gum could be any *Eucalyptus* with similar foliage. Surrounding are Kangaroo Paw, some white filler such as *Thryptomene calycina*, *Banksia serrata* cones and emu grass. Photography by: Rob Barich.

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Growing *Hakea*

In a dry climate at Strathmerton, Northern Victoria

by Paul Kennedy

I had better start by defining what is meant by a drier climate. The average rainfall here is 450 mm. Rain is more likely to occur near Easter and then again in late winter and spring. There is no assurance that it will happen as the past four years have been dry, 350 mm falling each year. The summers are very hot with the temperatures to 45°C and no rain for months on end. Winters can be cool with frosts normally down to -4°C. In 1997 and 1998 the frosts went down to -6°C for a couple of days.

There are about 140 species of *Hakea* growing here amongst a large collection of other species. The revision of the *Hakea* genus in Flora of Australia, volume 17B*, resulted in the *Hakea* genus being expanded to 149 species and 17 sub species, into 30 groups.

The area where the *Hakea* are growing consists of two sandhills with a claypan in the middle. The sand is up to 20 m deep and becomes progressively wetter with depth. Last summer the sand was quite moist at a depth of 1.5 m in the middle of January. The pH of the soil varies from 5.5 to 6.0 which is ideal for Proteaceae.

The growing of *Hakea* has been a challenge for us and we have learnt from failures and observation. Once established they seem to be able to withstand long periods of dry without the addition of moisture. However there are some where the addition of water during dry periods is essential if they are to grow to a reasonable size and have plenty of flowers.

Initial efforts at growing *Hakea* from seed were not very successful. Often we would wait months for the seed to germinate and then see many die from damping off. I decided that there had to be an easier way and tried the method of putting the seed between moist kitchen toweling on a saucer inside a plastic bread bag. A label with the name of the plant and a clothes peg to secure the end of the plastic bag to keep it air tight completed the arrangement. The toweling is kept just moist and the plastic bag kept out of direct sunlight, preferably with the temperature kept around 20°C to 25°C. Within one to two weeks most of the *Hakea* seeds germinated and when the root was about 20 mm long I transferred it to a tube filled with a mix suitable for growing proteaceae. I am now able to produce *Hakea* seedlings through the year and observe them all the way. Damping off is still a problem but is being overcome by use of a fungicide and not adding any fertilizer until well established. I→

**Flora of Australia* is a series of scientific publications describing in volumes, the flowering plants of Australia. A scientific publication? yes, but not really. Information is presented such that a non-botanist can readily understand the descriptions of the species. (The information now becomes available to us all but the author above wishes to acknowledge the source of some details included in his article). Many sketches and colour photographs are included. A book intended as a scientific work, it is not a book not solely for scientists. Available from CSIRO Publishing PO Box 1139, Collingwood, 3066



Hakea multilineata, see page 22

Ivan Holliday



Hakea missouriensis, see page 23

Ivan Holliday



Hakea grammatophylla, see page 23 A. Lacey



Hakea bucculenta, see page 23 Ilma Dunn

Planting out of the *Hakea* seedlings is usually done in March as soon as the milder days arrive, or in September. I have found planting at other times of the year to be unsuitable due to frosty weather or too hot in summer. I have a great respect for the ideas of the late Ken Newby who said that the closer we grow the plant to its natural climate and soil conditions the more chance we have of success. As *Hakea* mainly grow in well-drained areas and often in sandy loams the sandhill has proved to be a good place to establish many of the species.

Watering of the new *Hakea* is done sparingly during the first summer and then left to nature unless it is known that the plant receives summer rains where it grows naturally. I have investigated the soil conditions and rainfall patterns where each of the *Hakea* species grow. As a result I have grouped *Hakea* into certain zones that mimic the rainfall patterns. This then defines whether I water a certain *Hakea* during dry periods or not. Apart from the corkwood group most *Hakea* grow quickly to about two thirds of their normal size. Do not be concerned to see leaf droppings in December as the plant is just disposing of old leaves to make way for new growth which starts in the heat of summer, usually in January here. I have observed that *Hakea* give a warning when moisture is lacking, the leaves tending to revert from their green colour to a yellow-green. Usually the addition of moisture in the cool of the evening sees the plant revert to its normal colour in a couple of days. I treat *Hakea* the same as *Banksia* where watering after the sun goes down appears to stop losses from placing moisture on soil and leaves exposed to the sun.

I have used the following zones as a guide as to where I plant a particular species and how it should be looked after. I often get asked if a *Hakea* should be watered or not. These are my observations.

The tropical zone. Here we have dry warm winters and hot wet summers. The *Hakea* of this zone grow on gravelly clays to loams and shed their seed as soon as it is ripe. The frost tolerance of these species is unknown. I have planted out *Hakea pedunculata* and *H. arborescens* and will observe how they handle the cooler conditions this winter. The plants require regular waterings during the summer and autumn period. *Hakea pedunculata* often grows on moist soils behind mangrove swamps, so it may need special attention to survive.

The sub tropical zone. This zone takes in the coastal area and adjacent foothills of the great divide from Rockhampton to Taree in NSW and the area Exmouth to Shark Bay in Western Australia. The rain fall pattern is again similar to the tropical zone but winter rains can also be expected. The eastern *Hakea* tend to grow in loam to clay loam soils and in open forest conditions. The exception is *Hakea actites* which grows in open moist heathland conditions. I have all the species from this zone growing in the open here at Strathmerton. They require regular watering and grow quickly. The cool winters have not been a problem but covering of new plants in their first year is recommended. The Western Australian species in this zone are the two forms of *Hakea stenophylla*. I have seen them growing in red sandhills and sandy-loams that, I suspect, are alkaline. They are slow growing here and susceptible to frost damage whilst young, but they seem to do better in the non-acid sandy soils.

The eastern highlands and southern zone. This zone consists of the area around Stanthorpe in Queensland, the New England plateau, the NSW coastal strip from Taree to Eden, all of Victoria except the Mallee, Tasmania and the portion of SA from the Adelaide hills to the Victorian border and including Kangaroo island. The *Hakea* of this zone receive most of their rainfall in winter to spring and experience dry warm summers except for the areas around Sydney and Stanthorpe where summer rains can be expected.

Most grow in sandstone, sandy loam to clay loam soils and have proved to be hardy to our drier climate. They will withstand long periods of dryness but prefer an occasional summer watering. Frost tolerance is high. It is interesting to note that street specimens of *Hakea salicifolia* died in the prolonged dry period in Albury a few years ago. Many grow naturally in open woodland and will tolerate semi-shaded conditions. There are five *Hakea* which grow in a different environment to the above. *Hakea lissosperma* grows in exposed sub alpine conditions which are often covered in snow in winter. Whilst it grows well in an open sunny spot in the garden, it does prefer afternoon shade and seed germination is most unreliable unless stored in the freezer before sowing. *Hakea microcarpa* grows in moist heathland areas on plateau or mountainous country. It does best if given similar conditions in your garden but can become quite hardy to drier conditions when older. *Hakea fraseri* is a rare plant from around the Macleay river waterfalls in NSW. It grows on scree slopes which are difficult to access. Some work is being done to propagate this and hopefully tube stock will be available shortly to enable the *Hakea* enthusiasts to establish it in our gardens. It is a member of the corkwood group. The last two are *Hakea pulvinifera* and *H. aenigma* which do not set seed and can only be propagated from root cuttings. The former comes from near Gunnedah, NSW, and the latter from Kangaroo Island. If any one has plants of these please contact me.

Other Tasmanian species grow well here despite the hotter summer, but like some moisture.

The dry inland zone. This comprises the area north of Port Augusta to Tennant Creek and the associated drier country of Victoria, NSW, Queensland and far inland Western Australia where rainfall is generally less than 300 mm and not reliable. Rain is more likely to fall in summer than other times of the year. The corkwood group is well represented here along with some other not so well known species. Most do not retain their seed which makes it difficult to obtain and are not grown in our gardens despite being very showy in flower. The plants grow on sand or hard gravelly to fissured rock pavements. Apart from *Hakea francisiana* they are slow growing and long lived. I have *Hakea ednieana*, *H. eyreana*, *H. collina*, *H. divaricata*, *H. lorea* ssp *lorea* (formerly *H. suberea*) and *H. macrocarpa* planted in clay to loam soils but they are very slow growing and it could be twenty years before the corkwood species flower. They are tolerant of cold conditions once established and appreciate an occasional watering over summer.

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Hakea archaeoides, see page 14
H. Blackney



Hakea cristata, see page 17
Ivan Holliday



Hakea erecta, see page 15
Ivan Holliday



Hakea purpurea, see page 14
G. Quint



Hakea macreana, see page 15
C.L. Wheeler



Hakea cucullata see page 10

Hakea leucoptera, which grows over a wide area of this region is extremely hardy to dry conditions. The scarlet flowers of *Hakea rhombales* are not often seen as the plant grows in Western Australia adjacent to the Northern Territory border. Darling Downs Queensland members have been growing it successfully on clay loam soils.

Western Australian wheatbelt & Eyre Peninsula of South Australian zone. This zone is noted for its hot summers and winter to spring rainfall. The *Hakea* of this area have proven to be drought hardy and once established prefer not to be watered in summer. Initial plants died when watered in summer. I now leave them unwatered through summer. They seem to have a drought mode built into them when the hot weather arrives. *Hakea* in this group include *Hakea erecta* *H. francisiana* *H. kippistiana*, *H. minyma*, *H. multilineata*, *H. pendens*, *H. preissii*, *H. recurva* ssp. *recurva*, and *arida*, *H. scoparia* *H. strumosa* (photo page 13), *H. subsulcata* and *H. invaginata*. The latter has proved to be very difficult to get established. I have seen it growing in large numbers out near Payne's Find on sand over clay in a very hot dry climate. I am sure water at depth is part of the secret of successfully growing it but getting it to put its roots down has been the problem. I will try autumn plantings this year and sink a length of 600 mm black poly-pipe into the ground beside it, fill this with water in the summer and see if moisture at depth is the answer.

Hakea recurva (photo page 13), *H. preissii* and *H. scoparia* have self-seeded in great numbers at Myall Park in south-east Queensland and eventually will become a menace if not culled. *Hakea cycloptera* from the Eyre Peninsula grows in sand and tolerates hot summers without watering here. It has lovely pinky white flowers in early winter.

The coastal sandheaths and escarpments zone stretches from Kalbarri around to beyond Esperance including the Stirling Ranges. It is an area where many *Hakea* grow and where summers are hot but often tempered by afternoon sea breezes. Inland from the coast, frosts do occur but generally they are not severe. Rainfall is mainly winter to spring but along the southern coast some rain falls in summer as well. The *Hakea* here grow mainly on sand to sandy loams, lateritic soils or sandy shales of the Stirling Ranges. I have found these plants to vary in their need for watering over our hot summers. *Hakea cucullata*, *H. corymbosa* (photo page 12), *H. newbeyana*, *H. verrucosa*, *H. stenocarpa*, *H. nitida*, *H. pandanicaarpa*, and *H. cinerea* seem to survive without watering in deep sand whereas *Hakea oleifolia*, *H. sulcata*, *H. hookeriana*, *H. drupacea*, *H. meisneriana*, *H. lehmanniana*, *H. petiolaris*, *H. victoria*, *H. florida* and *H. undulata* appreciate a watering occasionally in late evening. *Hakea nitida* has grown into 2 m by 3 m specimens in six years.

Hakea florida, *H. loranthifolia*, *H. lasianthoides*, *H. cristata*, *H. linearis* and *H. cyclocarpa* grow in forest conditions and prefer similar conditions here. The hot summer sun tends to make the leaves lose their lustre. Covering with hessian helps to keep their colour but this can only be done whilst they are young. *Hakea ceratophylla* and *H. sulcata* are often found in winter wet depressions and would be happier in well drained soils near water than on our sand hill. An occasional watering keeps them going.

The shell-like leaved plants of *Hakea conchifolia* and *H. smilacifolia* have been difficult to get established. Seed is not been readily available. A cool root system in gravelly type soils is probably preferred. Some members are growing them in large pots in a protected situation.

Most *Hakea* are hardy to moderate (to -4°C) frosts once established. I believe that most damage is done when they are stressed by drought and have to overcome the thawing out as well. **Frost damage** can be minimised by watering plants before the onset of frosts, planting amongst trees or planting on the west side of tall shrubs or trees such that the sun's rays do not hit the plant until it has thawed out. Young plants susceptible to frost damage can be covered with hessian or similar.

As rabbits and hares visit our property the new plants are protected initially by milk cartons and then by car tyres as they get taller. When the plant gets too big for the car tyre, it is removed. For plants that might be frost sensitive whilst young, a wire cage placed around them provides the support to fix a piece of hessian across the top.

Apart from rabbits and hares that still have a nibble at the lower foliage occasionally, the **only other pest** is the *Grevillea* looper caterpillar. It seems to have the knack of knowing exactly when to arrive as the plants put out new growth. If not removed they can eat nearly all the new growth in a matter of days and the plant is no better off for its effort. Many plants are perhaps a third less in height than they should be due to the appetite of these caterpillars. I think the long beaked honeyeaters would soon remove them from the plant but unfortunately the noisy minors drive most of the smaller birds away. In the long term the noisy minors will have to be removed if we want to see a great variety of birds.

There has been little evidence of mineral deficiency in the soil affecting the *Hakea*. They seem to tolerate a wide spectrum whereas the *Banksia* will show it in leaf colouring very quickly.

A lot of field work remains to be done on *Hakea*. The predominance of white flowers suggests that insects are the most likely source of pollination. Some *Hakea* do not set seed in our gardens and this could be due to some plants not being bi-sexual or the right pollinator not being present at the time of flowering. I try and plant two or three of each species to maximise the chances of seed being set.

In concluding I would like to say a few words about my aim to set up a group of *Hakea* growers around Australia whose aim is to try and grow as many species as possible. In doing so a lot more could be learnt about their hardiness to various climates and a seed source would be set up to ensure the rarer species are brought into cultivation. They are a fascinating group of plants with a wide variety of leaf shapes. Some are quite plain but others are very spectacular. So far eight of us from Kingaroy to Adelaide have banded together to form a "Hakea holics" group and many more are welcome. I wish also to acknowledge the help given by many members across Australia who are not in the position to grow many *Hakea* but have supplied valuable assistance in making our garden what it is and furthering the knowledge of the genus. □



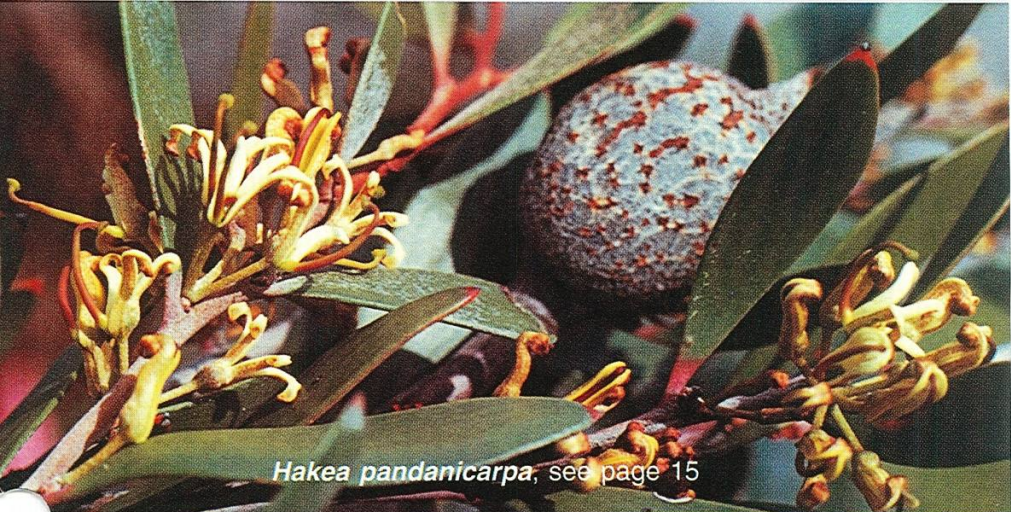
Hakea corymbosa see page 10 John Simmons



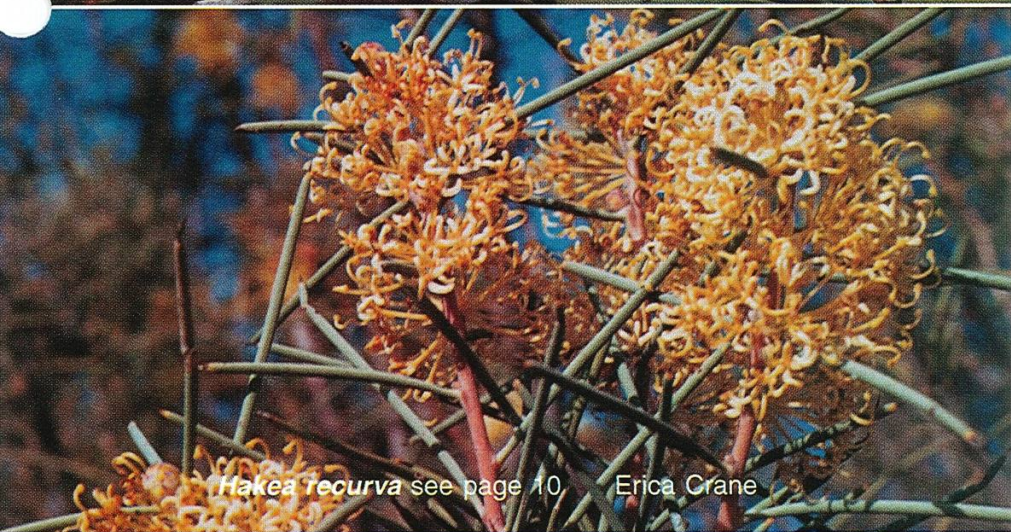
Hakea dactyloides, see page 14 Ivan Holliday



Hakea lissocarpha, see page 15 Bill Payne



Hakea pandanicaarpa, see page 15



Hakea recurva see page 10 Erica Crane



Hakea strumosa see page 10

Selected *Hakea*

By Paul Kennedy, Strathmerton, Victoria.

I became interested in growing *Hakea* as this group of plants has so many variations in leaf shape, all shapes and textures of woody seed capsules and many different flower arrangements. Generally they are small to large shrubs but some grow into tree proportions. Even when not in flower they are still appealing to look at. There is a *Hakea* to be found in nearly every part of Australia, so grow one in your garden.

The principal identifying feature of a *Hakea* is that it has a woody seed capsule (follicle see page 22). Two seeds are enclosed in a thick walled woody capsule and generally the seed is not released until the plant dies or the branch dies. Some *Grevillea* also have woody seed capsules but they are always thin walled and the seed is always released on maturity.

To illustrate the variations in leaf, follicle and flower of *Hakea* I have chosen fourteen species that appeal to me and generally can be grown over a wide selection of soil and climates. The zones are described in the previous article. If planted in autumn, all plants need some protection from frosts in the first winter and some watering through the first summer.

***Hakea archaeoides*.** Photo page 8

Sub tropical zone

A large shrub to 4 x 2.4 m from around Taree in NSW. Was originally included under *Hakea trineura* but has been separated because it has reddish flower racemes whereas *H. trineura* has lime green. The leaves are broad lanceolate to elliptical to 28.5 cm long by up to 3 cm wide with three to five prominent veins. The follicle is ovate, smooth surfaced and with a short curved beak. Tolerant of moderate frosts (-4°C) and grows on loams to well drained friable clay soils. Plants have flowered at Meredith in Victoria where winters can be very cold.

***Hakea purpurea*.** Photo page 9

Eastern highlands and southern zone

A medium sized shrub to 2 x 2 m but generally smaller. It has terete dark green leaves to 9.5 cm which are entire or divided 2-7 times and showy profuse red flowers in spring. It grows naturally across the western slopes of the Darling Downs from Toowoomba to Stanthorpe in friable clays and loam soils and is frost tolerant. There is a mass planting of them at Burrendong arboretum which become a vista of red when in flower. Follicle 3.5 cm long, oval and tapering to a point. Photo, page 9.

***Hakea dactyloides*.** Photo page 12. Eastern highlands and southern zone

A shrub to 4 m from the tablelands of southern Qld., NSW and eastern Victoria, photo, page 12. Stiff, leathery bright green leaves to 12 cm by up to 1.5 cm wide with three longitudinal veins. Non lignotuberos. White axillary flowers in late spring. It grows in a variety of well drained soils, is moderately fast growing, will tolerate shade and has withstood frosts down to -6°C. The lignotuberos version of *H. dactyloides* is now *H. laevipes*. It is a multi-stemmed plant with leaves up to 3 cm wide.

***Hakea rostrata*.**

Eastern highlands and southern zone

A medium shrub to 3 m from the south west of Victoria and lower SA. It has linear, terete, up curved, dark-green leaves to 15 cm long with a sharp point. Vivid white axillary flowers in late spring. Grows well in clay to sandy soils but appreciates some moisture in dry periods and semi shaded location. Frost tolerant to at least -6°C . Large follicle to 4.5 cm long, sigmoidal (S shaped). Who has a good photograph?

***Hakea macraeana*.** Photo page 9. Eastern highlands and southern zone

One of the hardiest *Hakea*, it grows in Deua National Park south of Nowra in NSW on steep mountain sides in forest and has lovely thin terete leaves to 15 cm. It has become popular as a garden specimen because of its dense habit and prolific show of white flowers in winter. Follicles are blackish, oval to 3 cm long with greyish postules. It grows quickly in well-drained clays and is hardy to frosts and extended dry periods. A good wind break species to 4 m by 4 m.

Hakea lissocarpa*. Photo page 12.

Coastal sandheaths

A densely branched spreading shrub to 2.5 m with pinnately divaricated, terete leaves to 4 cm long with up to 14 leaf segments. Flowers are normally white in axillary clusters but there is a lovely pink flowering form also. Follicle has a smooth surface with small twin horns at apex, 1.8 cm long. Winter flowering. Requires a well-drained site in clay loam to sandy soils. Withstands frost and extended dry periods. Grows naturally in forest and heathland in the south-west of WA. Marion and Peter Lang have a magnificent specimen in the garden adjacent to the nursery at Mildura. It seems to need two or more plants to set seed.

***Hakea erecta*.** Photo page 8.

WA wheatbelt

A shrub to 2.5 m with beautiful pink axillary flowers in spring. Leaves are erect, twisted at base, up to 10 cm long by 0.5 cm wide. Follicle is elliptical in shape with a warty surface and to 3 cm long. Found in the wheat belt of WA on sandy soils, it needs a similar situation in our gardens with full sunlight and loam to sandy soils. Has withstood frost to -6°C at Strathmerton and extended dry periods.

***Hakea pandanicaarpa*.** Photo page 13.

Coastal sandheath

Another species from WA, extending from the Stirling Ranges eastward towards Esperance. The axillary flower is very plain, but the shiny, leathery green leaves and large seed follicle make this a attractive plant in the garden. Leaves to 12 cm long. The subspecies *pandanicaarpa* has very corky mature follicles and leaves to 1.6 cm wide whilst ssp. *crassifolia* has a rough surface follicle and leaves appear to be wider to 3.3 cm. This species tolerates well-drained clay-loam to sandy soils in our gardens as well as being tolerant of moderate frosts and extended dry periods. The best specimens I have seen are where moisture has been available at some depth in the soil. Photo, page 13. ↪

*I have received very good photographs of this plant all showing the plant covered in a mass of flowers. None show the dainty flower as well as the photograph on page 12 taken of a plant in my garden that would be 10 years old and still only 1 m tall. We never cease to gaze in wonder at these dainty flowers just 2 cm across.

Editor



Hakea francisiana, from the garden of John Benzie,
see the next issue



Hakea petiolaris Ivan Holliday



Hakea prostrata Ivan Holliday

Hakea francisiana

Dry inland and WA wheatbelt

A tall shrub from the Great Victoria Desert, northern Eyre peninsula and wheatbelt of WA where it grows on deep sands. Flowers consisting of tapered axillary racemes can vary from deep pink to cream and the plant is very showy in flower. I have both the pink and cream forms that flower up to five months. Leaves are silvery grey to light green to 26 cm long. A species known as *coriacea* is now included under *H. francisiana*. It will take some time for seed suppliers and nurseries to delete the name *coriacea*. To grow on its own roots this plant needs deep sandy soils and plenty of sunshine with low humidity. Drought and frost tolerant. For those who do not have the right conditions it is recommended that a grafted plant be purchased. The cross with *Hakea bucculenta* on the rear cover could be a valuable horticultural plant.

Hakea cristata

Coastal sand heaths

A plant known for its unusual leaf and follicle shape. It grows in open woodland in the Darling Ranges east of Perth. The leaves are oval shaped and toothed and the follicle is oval shaped with a flanged wing on top. White axillary flowers in spring. Generally a small shrub in woodland, it grows much larger in a garden setting to 3.3 m. Tolerates well drained clay-loam soils in our garden but prefers a semi shaded location north of the divide. Pruning helps to keep the plant compact as it tends to be multi-stemmed and leggy. Who has a good photograph?

Hakea baxteri

Coastal sand heaths

Grown for its fan shaped leaf and large round seed follicle. It inhabits the Stirling Ranges where it is a multi-stemmed shrub to 3 m. This species does well in a wide range of soil types from well-drained clays to sandy loams and is drought and frost tolerant. A very similar species is *Hakea brownii* that comes from the Eneabba area north of Perth.

Hakea petiolaris

WA wheatbelt

I have included this plant because it has pin cushion type flowers, initially pink ageing to cream and purplish-maroon. This plant does well on a wide variety of well-drained soils from clay to sand. There are three subspecies though ssp. *trichophylla* is the most common in cultivation. It is a small tree to 9 m and has prominently veined rigid grey-green leaves, oval in shape with a blunt to long tapered point to 16 cm. Flowers in May and likes an open location.

Hakea prostrata

WA wheatbelt

The name can be a bit misleading in that this plant can vary from being prostrate to 4 m in height. The leaves are stem claspings, and taper outwardly to toothed auriculate edges with a variety of leaf shapes on each plant. Flowers are white to pinkish in leaf axis in spring. The follicle is ovoid in shape tapering to a slightly upturned beak. Follicle surface is smooth and seed is not retained when mature.

I hope you will try some of the above *Hakea* in your garden and come to appreciate the diversity of this genus. □

Grafted Hakea

by Doug McKenzie*

Over the past twenty years, grafted *Hakea* have been produced commercially and successfully grown in a variety of soils in gardens in eastern states; even in Adelaide or northern Victoria, in home gardens that are frequently watered or fertilized more than would usually be tolerated by these dry country species. Grafting *Hakea*, like any plant, is usually done to increase tolerance and enable strong growth in a wider range of conditions. Sensitive species are grafted onto tougher root-stock species with a recognised tolerance.

Grafted *Hakea* are suitable for planting in private and public gardens. Mass plantings in public open space, on nature strips, roadside or freeway plantations or golf courses make the most of their spectacular flowers and their tolerance of a range of site conditions.

Of the 130 species of *Hakea* half, probably with the greatest diversity, are found in the south-west of Western Australia. Many are highly ornamental with dramatic flowers and interesting fruit and some species have particularly striking foliage. In Western Australia soil types include deep sand to granite or gravelly laterite and red loams and grafting will accommodate these plants on eastern soils.

To determine the compatibility of species for grafting, a series of trials were undertaken at Bushgrafts Nursery in Ocean Grove, Victoria. Most grafts were completed using seedlings (both stock and scion) selected at cotyledon leaf stage. This method of grafting reduces the problem of stock shooting. The graft union, on now mature 13 to 14 year-old plants, is excellent, usually detectable only as a change in the bark texture between the stock and scion species. An ugly knot does not occur at the graft union as it may in other methods. The disadvantage of cotyledon seedlings grafting is that particular forms cannot be reliably replicated because seedlings are used as both stock and scion.

There is however no evidence that compatibility varies when different provenances of either stock or scion are used: if two species are compatible, seedlings from seed taken from any source will unite and grow well. Another minor disadvantage in this technique arises from the fact that young seedlings are also used as stock plants. Therefore, the graft is relatively close to the ground and care needs to be taken when planting out or potting on that the young plant is kept as high as possible from the soil surface to allow for greater air movement between the seedling and the soil surface. This problem can be reduced by using seedlings, deliberately produced by selection, that have long hypocotyls.

***Grafting of wildflowers.** Doug McKenzie has had success with grafted *Darwinia*, in *Australian Plants*, volume 18, page 239 and his success with *Sturt's Desert Pea* is legend. He supplies plants by mail, 35 Coolamon Close, Ocean Grove, Vic., 3226.

Grafting trials, results

Scion *Hakea bucculenta*, *H. cucullata*, *H. francisiana* (and its form *H. coriacea*), *H. grammatophylla*, *H. laurina*, *H. lehmanniana*, *H. minyma*, *H. multilineata*, *H. myrtoides*, *H. lorea* (formerly *suberea*) and *H. victoria*

Stock plants *Hakea laurina*, *H. nodosa*, *H. salicifolia*, *H. sericea*, *H. drupacea*

Results of grafted <i>Hakea</i> trials 1979-2000						
Stock Species	Scion Species	Com pat a bility	Incom pat a. Symp.	Num. Grafted	No. Sur.	Oldest Plant
<i>H. laurina</i>	<i>H. francisiana</i>	No	Sg,br	+5	0	18 m
<i>H. laurina</i>	& its sp. <i>coriacea</i>	No	Sg,br	+2	0	20 m
<i>H. laurina</i>	<i>H. multilineata</i>	No	Sg,br	+7	0	21 m
<i>H. nodosa</i>	<i>H. francisiana</i>	Yes	1g	+3	0	20 y
<i>H. nodosa</i>	& its sp. <i>coriacea</i>	Yes	1g	+30	+22	20 y
<i>H. salicifolia</i>	<i>H. bucculenta</i>	Yes	Nil	N	n	22 y
<i>H. salicifolia</i>	<i>H. coriacea</i>	Yes	Nil	N	n	22 y
<i>H. salicifolia</i>	<i>H. francisiana</i>	Yes	Nil	N	n	22 y
<i>H. salicifolia</i>	<i>H. grammatophylla</i>	Yes	Nil	N	n	18 y
<i>H. salicifolia</i>	<i>H. suberea</i>	Yes	Sg	+4	+2	19 y
<i>H. salicifolia</i>	<i>H. minyma</i>	Yes	Nil	N	n	10 y
<i>H. salicifolia</i>	<i>H. multilineata</i>	Yes	Nil	N	n	22 y
<i>H. salicifolia</i>	<i>H. myrtoides</i>	?	Sg	60	+10	11 y
<i>H. salicifolia</i>	<i>H. victoria</i>	No	Br	+6	0	1 y
<i>H. salicifolia</i>	<i>H. laurina</i>	No	Br	+5	0	6 m
<i>H. salicifolia</i>	<i>H. lehmanniana</i>	Yes	Nil	+4	+4	10 y
<i>H. salicifolia</i>	<i>H. hybrid</i>	Yes	Nil	+3	+3	9 y
<i>H. salicifolia</i>	<i>H. cucullata</i>	Yes	Nil	+2	+2	10 y
<i>H. sericea</i>	<i>H. francisiana</i>	Yes	Sg	+5	+4	20 y
<i>H. sericea</i>	<i>H. multilineata</i>	Yes	Y	+3	+2	20 y
<i>H. drupacea</i>	<i>H. multilineata</i>	No	Br	+3	0	1 y
<i>H. drupacea</i>	<i>H. francisiana</i>	No	Br	+3	0	1 y
- sg: very slow growth - n: numerous (over 1,000; produced commercially) - lg: loose in the pot/ground - d: death - y: yellowing of foliage - br: break at graft +: approximately						

To date, no problem with scion rooting has been noted. It is recommended that grafts produced using this method are planted in the centre of a slight mound when they are finally planted out.

While grafted plants flower profusely when planted in the ground they are unfortunately shy to flower in pots, unless they are grown in very large containers for quite a few years. In southern Victoria, flowers are generally produced in one to two years after planting out for *Hakea multilineata* and two to three years after planting out for most other species. *Hakea bucculenta* seems to be the slowest to flower, often taking four or more years. These flowering times may be much shorter in warmer climates.

At the Australian National Botanic Gardens, Canberra, a number of grafted *Hakea* (most on *H. salicifolia* root stock) are growing very well ranging in age from 12 to 22 years, all grafted at the cotyledon stage. →

Phytophthora resistant? Grafted plants growing at the Australian National Botanic Gardens, Canberra, are close to an area where *Phytophthora cinnamomi* was first isolated in the gardens. Very few plants susceptible to this fungal disease have survived in the bed. *Hakea salicifolia* is often quoted as being resistant to the cinnamon fungus, so it is not surprising that grafted plants have survived in these conditions.

A leaf spot disease is an occasional problem in very humid conditions. It can disfigure and set back a young plant. Juvenile foliage on very young plants in pots may be affected in autumn or spring, but this problem is not likely to worry plants in the open garden. The leaf spot disease has been identified as bacterial. Kocide, or another copper spray is effective in preventing infection but it should be applied to the unopened leaf buds as a preventative measure. It will not cure leaves on which the spot has appeared. These should be cut off when first noticed and the whole plant sprayed, especially the unopened leaf buds.

Ornamental trial notes

Hakea bucculenta: this takes a few years to flower in cool climates, but the wait is worthwhile. Some descriptions of this species indicate that it often produces bright red flower spikes hidden within the foliage. On fairly large, bushy, grafted plants in full sun, flowers have been produced in masses across the top of the foliage giving the appearance that the plant is on fire, see the photograph on page 5.

Hakea cucullata: only two specimens of this species were grafted onto *H. salicifolia* to test compatibility. These plants are growing well, but as it is fairly hardy in most climates, it may be unnecessary to graft this plant.

Hakea francisiana: a species which forms a dense, bushy, small tree and also grows rapidly in good conditions. Three to four-year-old plants come into flower when they are approximately 2 m in height. *Hakea salicifolia* appears to be the most successful stock for this and other 'grass-leaved' hakeas. Plants using *H. nodosa* as stock are slower and seem to have a tendency to become loose in the pot. However their root system develops and they soon strengthen when planted out. *H. francisiana* fails completely with *H. drupacea* stock and does not grow very well on *H. sericea* and the form previously known as *Hakea coriacea*: performs well as a grafted specimen. It is the tallest of the group of plants trialled. It was not compatible on *H. laurina* and has not been tried on *H. sericea*. Photographs on page 16 and 40.

Hakea grammatophylla: this species is from central Australia and is growing well as a grafted plant. When planted in an open sunny position, it produces masses of beautiful deep-pink flower spikes, even during the dreary, moist, cold winters on the southern coast of Victoria. The smallest of the 'grass-leaved' group, it becomes a rounded shrub of up to 2 m in approximately 10 years. Photograph on page 5.

Hakea lehmanniana: a small number of this species have been trialled on *H. salicifolia* and they appear compatible.

→

Australian Plants

VOLUME No. 20

Volume 20 comprises issues 157–164 of Australian Plants

Common names!

It is not possible to provide an index of common names as the Australian flora is so vast, many are known by a different common name in different areas. It is proposed that the first part of the botanical name (the generic name) be adopted as a common name for each group of similar plants. To assist, the pronunciation of this part of the botanical name is given in the following index.

Published by the Australian Plant Society

Index A General Interest Articles or of Plant Groups.

This is to provide a starting point for those wishing to access information in Australian Plants without first knowing botanical plant names.

Index B is an index to thousands of plants based upon the botanical name.

A feature of the index is the provision of a pronunciation for the generic name.

The letter D following the page number indicates that this reference relates to a description of the plant or its natural occurrence.

" " C refers to cultivation details.

" " P indicates a colour photograph.

" " L indicates a line drawing.

" " X gives propagation advice.

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(mac-a-DAY-mee-a)
tetraphylla 286C
Manittoa (man-il-TO-a)
lenticellata 121,128L
Mazus (MAY-zus)
pumilio 91CD,93P
Melaleuca
(mel-a-LOO-ca)
ericifolia 283C
eximia 113P
hypericifolia 283C
megacephala 89P,90C
nematophylla 112P
quinquenervia 283P
thymifolia 112P,115CD
Microseris
(my-cro-SEAR-is)
lanceolata 204P
Mimulus (MIM-yoo-ius)
gracilis, prostratus
repens 91CD,93P
Olearia (o-lee-AIR-ee-a)
picridifolia 233P
Oxylobium
(ox-ee-LO-bee-um)
alpestre, robustum 60D
Pararchidendron
(par-AR-chi-den-dron)
prunosum 76CDL
umbellatum 76CDL
Pararistolochia
praevensa 157P,158D
Paraserianthes
(par-a-see-ree-ANTH-eez)
lophantha, oona 70CDL
Peitophorum
(pel-TOFF-or-um)
pterothecum 119C,122L
Petalostylis
(pet-al-o-STY-lis)
cassioidea 26D
labicheoides 21D,26D

Phebalium
(fee-BAY-lee-um)
glandulosum 111D,129P
Philotheca
(fill-o-THEEK-a)
myoporoides 101CD,
105P,199CD
Philydrella fill-i-DRELL-a
pygmaea 202CX
Pimelea
(pim-MEEL-ee-a)
'Pink Cloud' 154CD
Pityrodia
(pit-ee-RO-dee-a)
terminalis 263D,280P
Platysace
(plat-ee-SAY-see)
cirrosa, deflexa 204P
lanceolata 161P,162CD
'Valentine Lace' 161P,
162
Pleurophyllum
hookeri 226CD,228CDP
Podolepis
(pod-o-LEEP-iss)
canescens 261P,262D
Poistichum
(polly-STEE-kum)
vestitum 227D
Prostanthera
(pros-TANTH-er-a)
ovalifolia 285P
scutellarioides 286C
Pterostylis
(ter-o-STY-lis)
nutans 163CD,164P
Ptilotus (ty-LO-tus)
rotundifolius 136P
Pultenaea pul-ten-EE-a
Gunnii, kraehenbuehlii,
largiflorens, platyphylla,
stricta 29P, 31D
Pycnosorus
(pick-no-SORE-us)
chrysanthus,
eremaeus, globosus,
pieiocephalus
thompsonianus 323CD,
324C,345P,346C
Rhizanthella
(ry-zan-THELL-a)
gardneri 204P

Rhodanthe

(ro-DANTH-ee)

chlorocephala 208P,
232P,260P,262D

Sarcocylus

(sar-cO-KY-lus)

falcatus, olivaceus 18C

Schoenia (SHO-nee-a)

filifolia 261P,262D

Senna

(SENN-a)

acclinis 247DL

aciphylla 236P,247DL,
250D

alicia 302DL

artemisioides 235C,
296D

barclayana 242DL

cardiosperma 294DL,
308P

charlesiana 292DL

chateaiinana 295D,304P

circinnata 292DL

cladophylla 290DL

clavigera 242DL

coriacea ft 237P,
250D,298DL

coronilloides 247DL

costata 248DL

curvistyla 240DL

cuthbertsonii 294DL

ferraria 292DL

filifolia 298DL,309P

flexuosa 294DL

gaudichaudii 248DL

gawlerensis 298DL

glaucofolia 292DL

glutinosa 295DL

goniodes 290DL

hamersleyensis 294DL

helmsii 289C,297P,302D

heptanthera 290DL

leptoclada 290DL

iuerssenii 296DL,297P

longifolia 304P

magnifolia 244DL

manicula 294DL

microphylla 296DL

notabilis 244DL,301P

odorata 247DL,249P

oligoclada 290DL

oligophylla 302DL

petiolaris 298DL

phyllodinea 292CD

pilocarpha 294DL

planitilicola 242DL

pleurocarpa 244DL,249P

procumbens 290DL

pruinosa 295DL,300P

quadrifolia 302DL

surattensis 247DL

sturtii 289C

stowardii 94DL

stricta 92DL

sturtii 289CX,300P,302D

symea 247DL

symonii 292DL

timorensis 244DL

venusta 244DL,301P

zygophylla 302DL,308P

Spiranthes

(spy-RANTH-eez)

sinensis 163CD,165P

Stenanthemum

(sten-ANTH-e-mum)

scortechinii 188P

Stylidium

(sty-LID-ee-um)

petiolare 202CX,204P

Swainsona

(swain-SO-na)

formosa now

Willdampia formosa

Syzygium

(siz-IDG-ee-um)

'Aussie Blood Oath' 106D

'Aussie Copper' 106CD

'Aussie Southern' 106CD

australe

'Beachball' 107CD,206D

'Blaze' 106CD

'Bush Christmas' 107D

'Elite' 107CD

'Tiny Trev' 102CD

'Little Lil' 107CD

'Lilyput' 107CD

'Royal Flame' 107CD

luehmannii 111CD

'Magenta Cherry' 109P,
110CD

'Minipilly' 106CD

oleosum 110CD

paniculatum 108DP,
110CD

'Beachball' and 'Little Lil'
107CD

'Undercover' and 'Tiny
Trev' 102CD,107CD

Telopea (tel-O-pe-a)

'Gembrook' *speciosissima*

x *T. oreades* 332C,335P

oreades 336P

speciosissima 334C

'Cardinal' 334C

Thelymitra

(thell-ee-MY-tra)

antennifera 264P,

265D,277P

circumsepta 264P,265D

agericoia, arenaria,

aristata, carnea, crinita,

erosa, flexuosa,

holmesii, imbricata 277P

Thomasia

(tom-ARSE-ee-a)

grandiflora, purpurea 13

pauciflora 5P

Thryptomene

(thrip-TOM-e-nee)

calycina 311C

'Centenary Starburst'

305P,311D

'Cascading Lace',

'Coral Lace', 'Ivory

Lace', 'Talbot Star',

'Winter Lace' 310/1D

ericaea 305P,311D

oigandra 328P

saxicola 286C,311D

Toona

(TOON-a)

australis 20CD,286C

Veronica (ver-ON-ic-a)

notabilis, plebeia 94C

Waterhousea

(water-HOUSE-ee-a)

floribunda 286C

Willdampia

(will-DAM-pee-a)

formosa 324CDP

Xanthorrhoea

(zanth-o-REE-a)

australis 180CDP,291P

Xyris

(ZY-ris)

atrovirida, bracteata,

exilis, flexifolia,

gracillima, gracilis,

inaequalis, indivisa,

acera, lanata, laxiflora,

marginata, maxima,

muelleri, operculata,

roycei, tasmanica,

ustulata 34D,36L,38L

Australian Plants, this periodical.

Australian Plants a periodical produced four times a year, is available internationally. It is devoted to the conservation of the Australian flora and its development for horticulture. It is produced by a group of autonomous societies now widely known as the Australian Plant Society (with variations in name as listed inside each rear cover). They are united in a co-operative manner under the name of the Association of Societies for Growing Australian Plants.

Australian Plants does not present local society concerns as each state has its own newsletter / periodical. However many issues presented are of major concern to members, some being debated at the bi-annual national conference or in their state newsletters. Politics and sectional interests are not presented, the statements made reflecting members concern over the shaky future of the Australian flora and its dependent fauna. These are critical to the future prosperity of the nation.

Wildflower Nurseries in Queensland

Fairhill Plants and Botanic Gardens — Huge range; rainforest plants, grafted grevilleas, rare plants, wildflowers, ferns, orchids, revegetation trees. Extensive display gardens. Open every day 8.30 a.m. to 5.00 p.m. Fairhill Native Plants, Fairhill Rd, Yandina, Qld 4561. Tel. (07) 5446 7088.

Nielsen's Native Nursery — Over 500 species including grafted grevilleas, eremophilas, eucalypts and brachyctons, also Fextall Palms, cycads, rainforest, Bush Tucker plants. Display garden. Open 8.00 a.m. to 5.00 p.m. every day. 49-51 Beenleigh Redland Bay Rd, Loganholme, Qld 4219. Tel. (07) 3808 1414.

Wildflower Nurseries in New South Wales

Annangrove Grevilleas — 98 Annangrove Rd, Kenthurst 2156. Tel. (02) 9654 1380. Wide range of natives including hundreds of different species in tubes — many hard to get. Ten percent discount to SGAP members.

Bryants Native Plant Nursery — Cosy Camp Rd, Bex Hill, N.S.W. 2480. Tel. (02) 6628 4323. 15 kms north of Lismore. Open 7 days (from 11 a.m. on Sundays). Extensive range. Excellent quality and service.

Dealbata (cold climate) Aust. Plant Nursery — off Bloomfield St, Dalgely 2630. Tel. (02) 6456 5043. Specialising in alpine and dry Monaro plants — Sorry no overseas orders. Phone to arrange a visit.

Illawamba Native Growers — P.O. Box 89, Cobargo, N.S.W. 2550. Tel. (02) 6493 7398, mail order specialist. Send 2 x 45c stamps for catalogue of our large range including rare species.

Newcastle Wildflower Nursery — 26Q Lake Rd, Glendale 2285. Tel. (02) 4954 5584. Extensive range of native plants including rare and endangered species.

Stocks Native Nursery — Lot 3, Simmonds Rd, Harden, 2587. Tel. (02) 6386 2682. Plants for frost and dry weather suited to Canberra, Wagga Wagga. Orange type conditions.

Sydney Wildflower Nurseries — South at Heathcote (02) 9548 2818; West at Marsden Park (02) 9628 4448; North at Terrey Hills (02) 9450 1555. Excellent range of native plants. Open 7 days.

Wirrimbirra Native Nursery — Hume Hwy, between Bargo and Tahmoor E. side 2574 (3 km from Freeway entry). Wide range including unusual plants. Tel. (02) 4684 1112.

Wirreanda Nursery — End of Wirreanda Rd, ingieside 2101. Tel. (02) 9450 1400. Growers of advanced and semi-advanced native trees and shrubs. Open 7 days.

Wildflower Nurseries in South Australia

Brenton Tucker Native Plants and Carawatha Garden — Placid Estates Rd, Wellington East via Tailum Bend. Tel. (08) 8572 7104. Wide range of tubestock and advanced plants. Extensive display gardens and picnic areas. Open weekends and public holidays March to November and by appointment, 10 a.m. to 4 p.m.

Wildflower Nurseries in Tasmania

Plants of Tasmania Nursery — 65 Hail St, Ridgeway 7054. SAE catalogue. Tel. (03) 6239 1583. Open 7 days.

Wildflower Nurseries in Victoria

Kuranga Native Nursery — Australia's largest range of Australian plants. Delivery Australia-wide. Free stocklist on request. The Kuranga Handbook of Australian Plants now available RRP \$19.95. A comprehensive guide on plants stocked at Kuranga, 393 Maroonah Highway, Ringwood 3134. Tel. (03) 9879 4076. Open 7 days.

Australian Wildflower Seed Suppliers

R. Horner — 1 Grundy St, Alice Springs, N.T. 0870. Seed of trees and shrubs of Central Australia. Please sent 45c stamp for a list.

Wildflower Society of Western Australia (Inc.) — P.O. Box 64, Nedlands 6009. A range of seeds available, labelled and packed, at \$1.00 (plus postage) per packet. Send for a 1997/98 Descriptive Seed List (\$1.95 posted) to: The Seed Sales Officer, Eastern Hills Branch, 65 Swan View Road, Swan View, WA 6056. Also available a book "Hints on Growing Native Plants" \$4.00 posted.

Grafted *Hakea* for cultivation, continued from page 20.

Hakea 'Burrendong Beauty' is a natural hybrid, that originated at Burrendong Arboretum in NSW, is a small spreading species often grown on its own roots which are quite vigorous and hardy. This species grafted onto *H. salicifolia* indicates no compatibility problem.

Hakea laurina, photo, page 25, is in wide demand but it is often difficult to grow on its own roots. In southern Victoria it is reliable as a stock species, however it unfortunately seems incompatible as a stock for the 'grass-leaved' species. When using as a scion and grafted onto *H. salicifolia*, it falls off the stock after initial fast growth.

Hakea minyma: is a central Australian species that is very vigorous when planted in a warm position. It has been growing for quite a few years grafted onto *H. salicifolia* and has been flowered in Victoria. It is not so spectacular as the other 'grass-leaved' species. Photo, page 4.

Hakea multilineata: is the fastest growing scion species, the distinctive beautiful axillary flowers forming 'spikes' up each branch. It is the earliest flowerer of the group, flowering at two or three years from seed when grafted onto *H. salicifolia* stock. *Hakea nodosa* stock is satisfactory, although slower. The rate of growth on *H. sericea* stock was slightly slower and the foliage yellowed for a few months after grafting. *H. multilineata* is not successful on *H. laurina* or *H. drupacea*. Photo, page 4.

Hakea myrtilloides: grafted plants at about four years old grow more vigorously than plants growing on their own roots. Grafted plants send out numerous side stems from a central lignotuber-like structure to form round, mounding shrubs up to 1 m in diameter. However, after about 4 to 5 years, the plants seem to deteriorate due to dieback of foliage and grafting is not very successful in overcoming this insect problem.

Hakea lorea syn. *suberea*: a number of grafts on *H. salicifolia* have been made and the plants have grown very slowly to 50 cm after 11 years. These plants will not thrive in cold conditions even as grafted plants.

Hakea victoria: six grafted plants were produced on *H. salicifolia* stock. They grew normally for six to eight months then all broke off cleanly right at the graft, indicating that the scion and stock were incompatible. □

Hakea in flower arrangements. 'Decorative arrangements' on page 27 refers to the interest created by *Hakea* nuts, sometimes known as 'leopard nuts'. As *Hakea* retain their fruits or seed capsules on the plant there is always a plentiful supply of nut with a range of foliage types.

Plants for nuts, seed pods and berries; palms, ferns and orchids.

Hakea bucculenta, photograph on page 5, one of the grass-leaved *Hakea*, displays long, rich, green coloured foliage and brilliant scarlet flower spikes. They have potential as focal flowers or secondary flowers in rustic bowls or baskets.

Hakea laurina, Pincushion *Hakea*, photograph on page 25, has a truly magnificent flower. This small tree has foliage eucalypt-like leaves, bronze when young. They offset the flower heads that resemble a red ball or cushion with pink stamens (pins). Excellent for a dramatic impact, use branches clustered with flowers on their own.

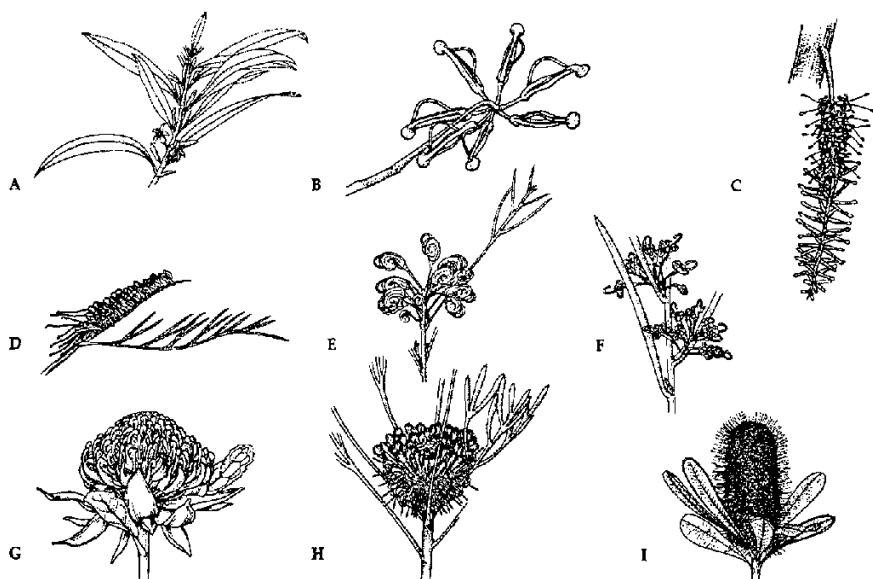


Figure 1. Arrangement of flowers of Proteaceae. A, flowers solitary in axils of leaves; B, flowers in a wheel, *Stenocarpus*; C the drooping tubular spike of *Hicksbeachia*; D and E, toothbrush and rounded heads of *Grevillea*; F, *Telopea*; H, *Isopogon*; I, *Banksia*.

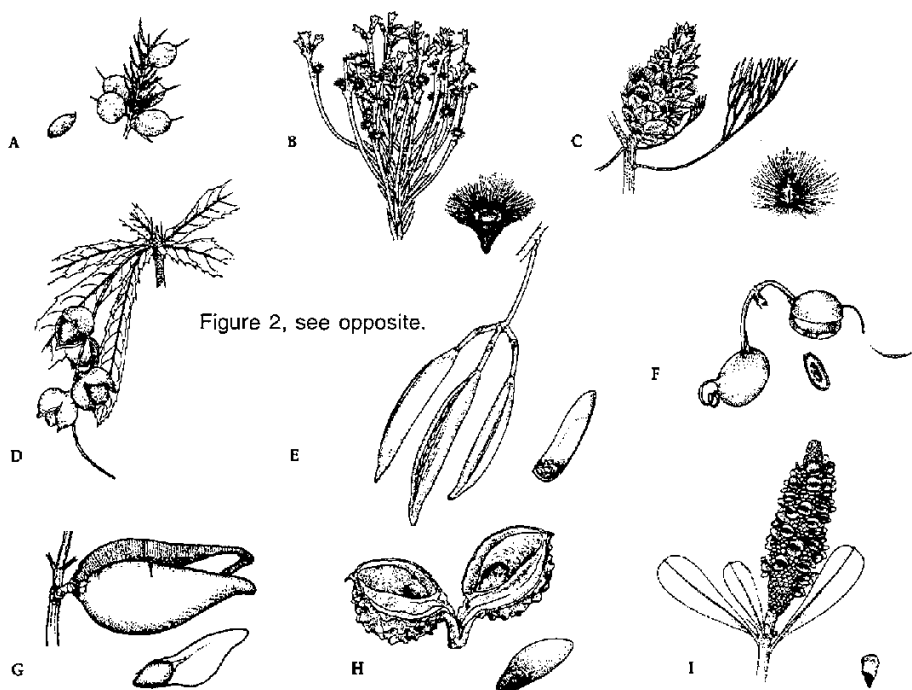


Figure 2, see opposite.

Spectacular *Hakea* of the *multilineata* group

Notes by W.H. Payne based upon Flora of Australia*

Everyone who sees one of the *Hakea* below, in full flower, wants to know its name and how to grow it. Now you can name your plant using the key below. The group is segregated, by the botanists, from the other 200 *Hakea* species by their flower heads, many individual flowers in a long simple raceme, developing in the leaf axils, axillary.

1. Leaves less than 3 mm wide, i.e. the leaves are long and thin:
 2. Rachis 3–3.5 cm long, hirsute flowers, about 100 *H. maconochieana*
(about 100 hairy flowers on a central core 3–3.5 cm long)
 2. Rachis 6–13 cm long, glabrous flowers, 250–450 *H. bucculenta*
(250–450 flowers in a long cone-like head 6–13 cm long)
1. Leaves more than 3 mm wide
 3. Flowers cream, rachis 2–6 cm long, fruit prominently beaked *H. minyma*
 3. Flowers red or pink
 4. Rachis 5–9 cm long, 150–500 flowers in a head *H. francisiana*
 4. Rachis 1–5 cm, 50–150 flowers / head.
Rachis glabrous, leaf veins 9–25 fruit doubly keeled *H. multilineata*
Rachis hairy, leaf veins 5–9, fruit scarcely beaked *H. grammatophylla*

*Flora of Australia, see page 3.

C

Proteaceae of New South Wales review by Editor

Produced by the Royal Botanic Gardens, Sydney, with editors Gwen T. Harden, David W. Harden and Dianne C. Godden, and published by UNSW Press, this large 200 page book is available widely for \$ 39.95. It provides a complete reference to all the species of Proteaceae of NSW, Waratah, *Banksia*, *Grevillea*, *Hakea*, *Persoonia*, *Isopogon*, *Petrophile* and all the lesser known genera such as *Lambertia*, *Strangea*, *Lomatia*, *Conospermum*, *Symphionema*, *Orites* and *Xylomelum* and the rainforest *Triunia*, *Macadamia*, *Stenocarpus*, *Alloxylon*, *Hicksbeachia* and *Floydia*.

Every species is described in simple easily understood terms, adjacent to a line sketch that will assist ready identification. There are field notes for those keen to collect, press dry and mount specimens. There is advice on how Proteaceae grow, their ecology, the "threatened species", as well as advice on plant identification. Two of the sketches from the book are reproduced on the page opposite, indicating the diversity of flower presentation and of the seeds. "The majority of the Proteaceae grow readily from seed" so try your hand at it, seed is plentiful. C

Grow Proteaceae from seed. Previous issues have given successful methods of germination of seed, one novel one being for *Hakea* on page 3 in this issue.

Fruit and seeds of Proteaceae, Figure 2. **A**, drupe and seed of *Persoonia*; **B**, fruiting branch and achene (seed inside a feathery capsule) of *Conospermum*; **C**, the cone head of *Petrophile* with a seed held between the 'layers' of the cone; **D**, the follicle of *Macadamia* holding the seed (nut) for harvest; **E**, the fruit (follicle) that opens to release the winged seed shown of *Stenocarpus*; **F**, the winged seed is contained in globular follicles in *Grevillea*; **G**, the woody pear, *Xylomelum*, has a large woody fruit like a pear, releasing 2 winged seeds; **H**, the fruit of *Hakea* normally retained on the plant until fire or harvest, that then opens to release a winged seed, and **I**, the *Banksia* flower head has matured, those flowers that have been fertilized forming woody follicles that open to release two winged seeds. C

Newly released plants

For your advice, W. H. Payne

The following information is based upon the limited information available. An unfortunate aspect of the wildflower nursery business is the lack of marketing skills. We all want to know about new plant releases and as much information as possible on the special virtues of the new plants. Australian Plants is a perfect venue for these nurserymen to promote their wares and we give them this service free of charge.

***Spathoglottis plicata* 'Odyssey'** is a natural selection by Darwin Plant Wholesalers for wide use as a house plant, for potted colour. The cultivar produces masses of bright purple flowers in summer. It prefers a semi-shaded or a well-lit situation indoors. Fertilise in summer, and as it is a pseudobulbous plant keep dry in winter. A terrestrial orchid, it occurs naturally on Cape York Peninsula northwards from the Endeavour River and north to New Guinea, Asia, Philippines, India and Pacific Islands. It is very similar to the other Australian species *Spathoglottis paulineae* that is found in the Northern Territory.

***Acacia cognata* 'Limelight'** has soft weeping foliage, growing to a height of one metre with compact growth to 1.5 m wide. It was developed as a landscaping feature plant.

***Artanema fimbriatum* 'Snappy Pink'**. The species occurs naturally in moist coastal areas from northern Queensland to NSW and is described in volume 17.163CD. The tubular flowers to 3 cm long are bright blue or violet. Under harsh conditions it is an annual, but if watered regularly and grown in a warm sunny frost-free position it may become a perennial. 'Snappy Pink' is a pink flowering form to 1 m high carefully developed for cottage gardens. Prune off old flower spikes and to obtain a good shape and it will live for "years."

***Austromyrtus acmenoides* 'Afterglow'** has dense, glossy foliage with shiny red new growth, on a compact, bushy shrub to 1.5 m high and wide. Very hardy for a rainforest shrub, it will tolerate most soil types from average to moist in a sunny to part shade position. It makes a good screen shrub, pruned to shape to encourage colourful new growth, or it can be topiaried.

***Dianella ensifolia* 'Border Gold'** is another production by Darwin Plant Wholesalers. The *Dianella* species are hardy clumping plants with long strappy leaves to 35 cm long. In this selection, developed for borders and rock features, has variegated leaves with cream to gold and green stripes.

***Isopogon anemonifolius* 'Woorikee 2000'** is a compact, dense form of the species with intricately divided foliage and, drumstick-like buds and fruits and yellow flowers. As with most Proteaceae, shape after flowering by removing spent flower heads and prune hard in early summer to promote flowering.

Continued on page 27.



Spathoglottis plicata 'Odyssey'



Hakea laurina, Pincushion Hakea, see page 21.

Ivan Holliday

Pink or Cape York Lily

Florence Treverrow, Goolmanger, NSW

Pink or Cape York Lily Curcuma australasica

Pink Lily is common in the open forest around Cooktown. It is a herb in the Ginger Family, producing striking cylindrical "flower heads" to 10 cm across. The "flower head" comprises prominent pouch-like (waxy petal-like) bracts, the lower two thirds of the spike being green and cupping pale yellow flowers, the upper bracts being flowerless but coloured a pale pink to a dark red. In the flower arrangements on page 28 you can see the artist has taken advantage of this colour change displaying the lower green portion as well as the pink upper section. The plants die back in autumn and shoot again in spring, the new foliage to 1.5 m high resembling banana leaves. The plant shoots from a small oval tuber, a single plant producing 3-4 tufts of 3-4 leaves

The plant likes a moist, open semi-shade position. For me here in northern NSW, near Lismore, the plant has been so easy to grow I have not made a special study of cultivation requirements. Selection of a good clone with desired colour is the secret to success in the long term. I have grown from my best forms with tissue culture. I have been selling a few flowers in Lismore and it is these that are featured in the floral arrangements on the next page. I have developing sufficient stock plants now to begin supplying the Sydney market.

Year 1. — Plant the tuber while dormant in reasonably well drained soil. Apply gypsum (or other calcium source) and some complete fertilizes, and mulch well. Water well once a week from about the beginning of September or when first shoots emerge. Keep well watered until late summer. The leaves will die down in autumn.

Year 2. — Kill off any weeds before new shoots emerge. Water as previously but fertilize after flowering. Cape York Lilies seem to respond well to fairly heavy rates of fertilizer and we have not had any problems.

Year 3. — Transplanting and thinning. After a few seasons dense clumps of plants will form. These can be divided up when the plants are dormant. When transplanting it is best to keep as many of the storage tubers attached as possible. The very small tubers that are sometimes found take three years to reach maturity.

Year 4. — Flower spikes can be harvested at any stage but will not develop further once harvested. The bracts are a much darker pink when they first emerge so it is possible to vary flower spike shape and colour by harvesting at different stages. Even though these are a tropical flower they can be stored at 4-5°C. □

Commercial development of the Australian Plants. This is a regular feature of Australian Plants, a valuable guide to the industry. Also: **Bushpicking**, plantation cultivation will beat it, providing better plants and **Cultivation of better plants** for landscaping and your garden. Editor.

Australian flowers in decorative arrangements

Growing and Arranging Australian Native Flowers*,

a book by Barbara Coates, reviewed by W. H. Payne

This book is designed for a wide range of uses including actual flower arranging techniques for native out flowers either commercially or by the home gardener. There are even chapters devoted to growing the plants used. To me its major value will be for those who wish to emulate the presentation by professional florists. Instructions supported by step-by-step sketches, using the techniques and equipment of professionals will assist a beginner to produce attractive arrangements.

The arrangements shown in this issue have used the flowers available to Barbara Coates either in the garden or as available at the local florist. Similar flowers from your garden can achieve the same professional look. Just follow the procedures in the book, some chapters being:

1. Guidelines and helpful hints - cutting and harvesting, containers, fixing and wiring materials, trimming & shaping foliage, shapes and styles.
2. Professional finishes - wiring and parafilming, wiring leaves, the arrangement, creating a focal line, modern grouped arrangements, traditional triangle, round bowl, flower basket, horizontal table centrepieces, exercises for you to try.
3. Natives dried - arranging, mixed dried and fresh, exercises.
4. Special occasions - gift basket, presentation sheath, exercises.
5. Wedding flowers - posy, bridal sheath, bouquet, buttonholes and corsages, church flowers, circle of flowers, handle styles, etc.
8. Native plants with outflower potential - for east coast cultivation, 28 small plants / shrubs and 27 large shrubs / trees are described. For west coast cultivation, 23 small plants / shrubs and 30 large shrubs / trees. □

***Growing and Arranging Australian Native Flowers** by Barbara Coates, published by Simon & Schuster the book is widely available for \$24.95

Newly released plants continued from page 24

***Prostanthera* 'Badja Peak'** has deep-green scented foliage with masses of white flowers. A shrub for general planting in a low-maintenance garden, it also makes a good medium hedge. □

***Syzygium* 'Cascade'**, a cross. *Syzygium leuhmannii* x *S. wilsonii*, has lush dense foliage with regular flushes of weeping pink to red new growth. It forms a dense, rounded weeping shrub 2-3 m high and wide, with a moderate growth rate. It can be topiaried or hedged to show off the attractive new growth or presented to make an impressive cascading feature plant. It prefers a sunny to part-shade, sheltered position on average-to-moist sites. Water during dry times, mulch and fertilise during warm weather. □



Rob Barich



Flower arrangement of the month.

Everyone who wishes is invited to prepare a simple flower arrangement or bouquet for each month of the year. The flowers used will depend upon what is available to you in your area. Hopefully you can get your arrangements photographed, any camera will do. As long as we can see what you have created and what flowers you have used it will be good enough. Say we have a friendly competition to see if your arrangement is the best in your state.

Why are we doing this, for fun but also for a very special reason. To promote our wildflowers and the people who are growing them in plantations, it is proposed to feature an arrangement for each month on the internet. If yours wins but your photograph is not good enough we will recreate it and have it photographed professionally.

Have fun and promote our wildflowers.



Above Almost a Mexican theme is produced, associating our native flowers with fruit. The Cape York Lilies provide the focal point. Note the blend of pink / red above the fresh green of the lower two thirds of the 'flower'head. The *Banksia* flower heads add contrasting colour and bulk. These are *Banksia menziesii* but almost any other species of *Banksia* would look almost as good. The background is provided by Kangaroo Paw to provide the outline and space, while some *Eucalyptus forrestiana* leaves and fruits provide balance, and a few fronds of *Macrozamia* present a sense of line. The fruits add interest and a variation in shape.

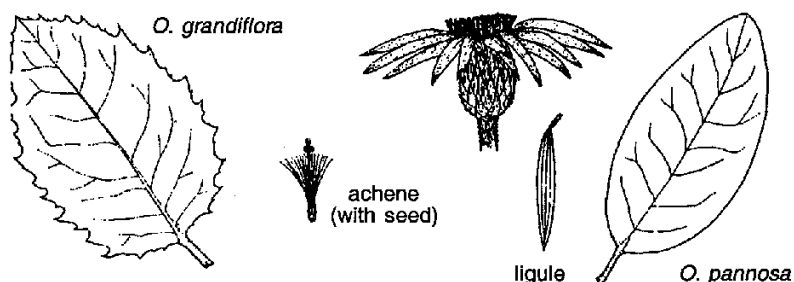
Opposite. A bridal sheath featuring Cape York Lilies, the large pink/red 'flowers', nesting in the white filler flower, a rice flower outlined by Kangaroo Paw and with the white flannel flower just above the golden bow. Step by step instructions in **Growing and Arranging Australian Native Flowers**, will enable a beginner to produce such a bouquet.

Olearia

Plants of the Daisy Family _____ by Ivan Holliday*

Olearia belong to the very large botanically complex daisy family Asteraceae that has the largest number of species of all flowering plant families in the world. In Australia most daisies are annuals, such as the many spectacular everlastings seen in masses after wet periods in the arid inland, or perennial herbs. However, a number of species of the *Olearia* genus are true shrubs with conventional daisy-like or ligulate flower heads. Olearias are found throughout Australia and also in New Zealand, usually displaying white, mauve, pink or purple flower heads.

What is an *Olearia*? The genus *Olearia* is distinguished by its tightly packed composite heads with single-rowed ray florets enclosed by small overlapping bracts, and its terete or slightly compressed achenes [fruits].



Olearia grandiflora is a low suckering, S.A. endemic, shrub found as an understory plant in semishade in eucalypt woodland or forest of the Mount Lofty Ranges near Adelaide. It is a many-stemmed, soft-wooded shrub to about 40 cm high but often spreading by underground root suckers. The leaves are dark shining green on the upper surface but white-tomentose beneath, mostly 4–10 cm long by 2–6 cm broad, on short petioles, ovate and denticulate, with prominent venation. The specific name refers to the large handsome flowers which form typical daisy-like heads, 6–7 cm across, with pure white ray florets, each ligule over 3 cm long, and yellow disc flowers in the centre. Each flower head is enclosed by an involucre of pubescent, acuminate bracts and is borne on a stout stalk 20–30 cm long. Flowering, November to December. The fruit is an achene about 2 cm long with many pappus bristles.

Olearia grandiflora has been a success having thrived for 30 years. It is growing in clay over limestone marl, receiving extra water in summer. It has spread underground, appearing nearby among other larger shrubs. Last summer, a long, dry, hot spell burnt the leaves badly but it has since recovered. It is best suited to well-drained but moist soil in semishade, producing numerous flower heads over several weeks.

*Some species of *Olearia* were featured in a past issue and readers were invited to provide notes on species they are familiar with. I am indebted to my good friend Ivan Holliday for his response. Who else will contribute? Editor.

***Olearia pannosa*, Silver Leaf Daisy**, is a very similar shrub differing in its leaves, which are entire, and more often oblong or elliptic in shape, with tomentum extending to the upper surface. It grows in similar conditions in the Mount Lofty Ranges, where there is some intergrading between the two species, but is also widespread throughout South Australia and Victoria, extending to NSW.

Olearia pimeleoides is a widely distributed small shrub found in dry, sandy or gravelly soils extending from W. A. to inland N. S. W. It is common in the northern parts of South Australia where the photograph on page 37 was taken. It is a small, rounded, hoary, soft-wooded shrub, sometimes reaching 1 m high by about the same breadth, the leaves and branches covered with a soft woolly tomentum. The name refers to the shrub's superficial similarity to *Pimelea*. The leaves are oblong-cuneate to obovate, 4–12 mm long by 3–4 mm broad, white-tomentose below but usually glabrous on the upper surface, with recurved margins. Profuse, white, daisy-like flowers are produced in solitary terminal heads, 2.5 cm across, in spring. Bracts numerous, subacute and woolly toward tips. Fruit is a terete, silky-pubescent achene with 40–60 pappus bristles. This shrub prefers a well-drained, light soil in an open sunny situation and temperate conditions. I have seen it flourishing in footpath median strips in the limestone soils of Adelaide's northern suburbs. My only attempt in this clay soil, red/brown earth of the Adelaide plains, was a failure.

Olearia axillaris, Coast Daisy Bush. Good forms of this species are valued for their ornamental grey-white foliage. It is a shrub normally 1–2 m high with insignificant white flowers. An inhabitant of exposed coastal sand dunes throughout Australia such as those of Kangaroo Island, it is an excellent shrub for these conditions. *Olearia axillaris* is easy to grow in coastal sands and other well-drained sites.

Olearia ciliata. This small shrub under 30 cm high is found throughout many areas of Australia in sandy, or well-drained, light soils. The rough, tightly compacted, linear leaves, usually 10–15 mm long, have ciliate margins, and the flower heads on reddish stalks are purple or purplish blue with a yellow disc in the centre. The variety *squamifolia* is found only on Kangaroo Island, restricted to sandy laterite on the eastern half of the island. It has smaller, tightly compacted leaves. It is an attractive subject for the rock garden, flowering in spring.

Olearia microdisca, Small-flowered Daisy-bush, is found only on Kangaroo Is. in heath and mallee and is endangered. An erect narrow shrub to 1–2 m high, it has sticky leaves and stems, flowering in autumn.

Olearia phlogopappa is grown frequently in Adelaide, particularly in the Mt. Lofty Ranges. All forms are very showy when in full flower, being covered with masses of pure white, pink (page 32) or mauve flower heads, 1.5–2.5 cm across. It appears to require plenty of summer water.

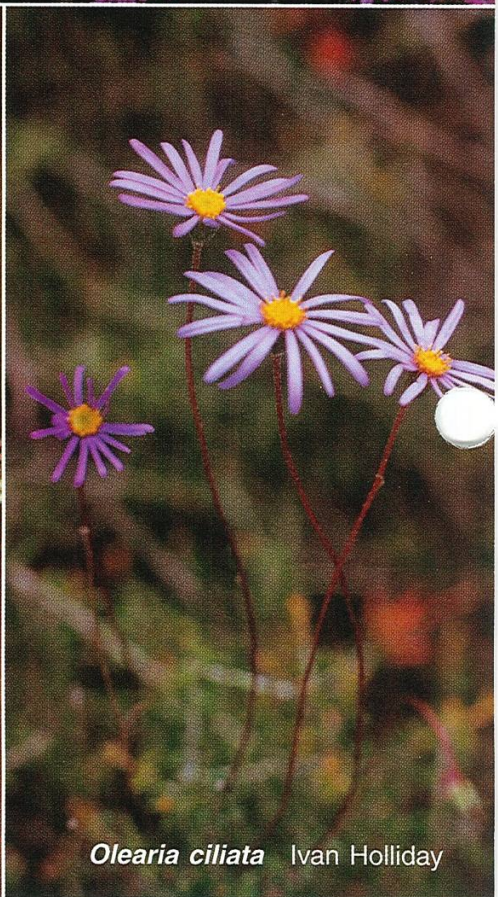
Olearia rudis, Azure Daisy-bush, is a slender erect, few-stemmed shrub to 1 m high, the larger leaves more or less elliptic and evenly toothed. It grows in limestone mallee on Kangaroo Island and occurs in WA, SA, Vic, NSW and Qld. Photo on page 33. □



Olearia phlogopappa (pink form) Ivan Holliday



Olearia microdisca Ivan Holliday



Olearia ciliata Ivan Holliday



Olearia floribunda Ivan Holliday



Olearia pimeleoides Ivan Holliday



Olearia rudis Ivan Holliday

Hundreds of thousands of Australians are taking the initiative we expect from a responsible federal government, by working on bush revegetation/restoration projects under various schemes and action groups. Society members are actively involved in most of these and brief reports will be made to acknowledge their work. CWC, Citizens Wildlife Corridors is a group based in Armidale, NSW, who aim to provide linkages to national parks, state forests and Stock Routes across the region. Their members now hold more than 5,000ha [12,350 acres] of protected refuges for wildlife. This has been achieved by personally visiting property owners with a map of the possible areas in their property and seeking active participation. Now 58 properties have used the available grants for funding of fencing for areas of native bushland and wildlife habitat and restoration of these areas. The funds for fencing are there for the asking, contact this Society or Greening Australia.

TREAT, Trees for Evelyn and Atherton Tablelands, promotes environmental awareness and tree planting programmes. Volunteers [600 plus] work each Friday at the Lake Eacham nursery of the Queensland Parks & Wildlife Service producing more than 35,000 trees annually and plants them in carefully planned projects such as the El Arish wildlife corridor. Rate rebates for conservation of habitat, Project 972177 with the Natural Heritage Trust Protect the biological diversity in key habitat areas of Johnstone Shire Council.

An initiative of the TREAT group this could be a model for local government authorities throughout Australia. Of 200 landholders contacted 40 have ignored requests to talk about key conservation areas on their properties but 80 are keen to participate and the rest are considering it. It is not just a matter of getting your council to agree to participate, it requires active consultation by members of the group to get the message across but! Look at the result. Most of those agreeing to participate are already aware of the benefits to the nation and their own quality of life and have been persuaded by this dedicated group TREAT.

Private land dedicated for conservation.

Our Rainforest Study Group Leader has supported his views on conservation by entering into a Voluntary Conservation Agreement with the State Government for 34 hectares of their own property. This gives permanent protection for the area, although still the private property of the Jenkinson's, providing an important wildlife corridor between the Quintex Ridge and the Broken Bago Range and onto the Comboyne Plateau in the Wauchope area of NSW. The area is an important habitat for threatened species including the Powerful Owl, Green Thighed Frog, Masked Owl and the Yellow Bellied Glider. Its diverse vegetation communities include grassland, Ironbark, Grey Gum and Grey Box forest, Tallowood, Mahogany, Grey Gum Forest, dry rainforest and sub-tropical rainforest. This is a positive way individuals can make a lasting contribution to conservation, we acclaim their actions and deep concern for the future health of this continent. □

Our garden No. 34

in Moss Vale, NSW. _____

By John Hulme

My interest in gardening (native plants) started 20 years ago when I married and bought a house in Lyons, ACT, and joined SGAP. I've driven past the house a couple of times in the past 5 years and its satisfying to see some of the "bush" still in the front garden.

Its funny how perceptions change. In Canberra, I enjoyed the open reserves, walkways, eucalypts and general "hard/dry" urban landscaping for five years. I did not see my garden fully established. Then to Moss Vale for five years, again not to see established growth. We've been in Forster for ten years and have finally seen my garden design aims more or less achieved, although a bit "scrubby". And ready for under planting.

Back to my Moss Vale garden. The site at front is generally clayey, dryish, gentle sloped, and north facing. After rotary hoeing (hard ground) to a shallow depth, I removed the grass and brought in a truckload of Robertson red soil to give a bit extra shape. The hoed ground was left rough, newspapers* laid, and red soil placed on top to a depth of 200 to 800 mm. There was some mounding but generally followed existing slopes so as not to look too artificial. Wood chip followed on top. When planting the newspaper was seen but the hope was that the papers would rot by the time the roots reached them. I've always used plants in 50 or 100 mm pots. The little ones will not establish as readily if not cared for. *Boronia* were placed close to the north wall. *Telopea*, *Boronia*, *Epacris*, *Darwinia*, *Grevillea*, *Helichrysum*, *Pultenaea* and ground cover *Banksia* survived two years or more, even through snow. Watering was regular at the start, but slowly decreased to natural rain, about 1200 mm annually.

The rear yard, photograph on next page, is lower and left that way. Ground was hoed. A small, rough concrete creek and waterfall was built up with rocks and a concealed hose to the top (from the garden tap) provide water. Taller shrubs were planted at the rear, *Anigozanthos*, *Helichrysum*, *Pimelea*, *Correa* and others now forgotten, elsewhere. Again, paper was used at the bottom and woodchip on top. Rocks were scattered around.

I think a native garden lends itself to the creation of a mini-environment that includes plants, birds and animals. Rocks, water, leaf-litter and mulch are as important as the plants, together with the family.

Attitudes are passed on through families. Gardening can be a family involvement. The yard/garden must cater for children's needs as well as clothes-lines, sheds, etc. This total involvement aspect is important to the future. My boys were part of making the garden. Now they're typical teenagers but seem to have retained some memories, attitudes and kindness for the garden and the environment. Here's hope for the future. □



Three *Boronia* behind *Darwinia* and carpet of *Myoporum*



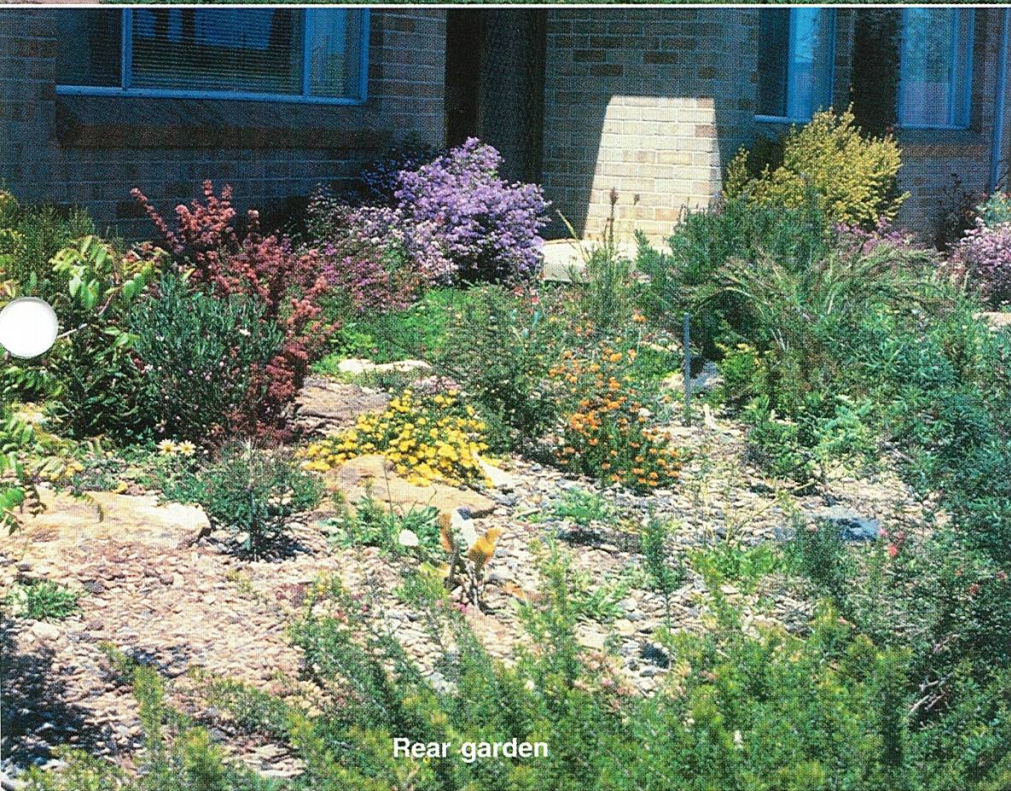
Epacris longiflora



Pultenaea capitellata



Front garden



Rear garden

Staff of the major botanic gardens of the nation are having a national conference* in Canberra as part of the 2001 Federation of Australia celebrations. Thirty years ago they initiated the concept of Regional Botanic Gardens as a vital strategy in the conservation of the flora and its general promotion. Except for some limited attempts to promote this concept, the project has received little active support, until recently.

This society has maintained active promotion of the scheme over the last 20 years, both politically and locally. Politically we maintained pressure for adoption of the scheme as part of the 2001 celebrations and the proposed meeting in Canberra will indicate how active the management's of the major botanic gardens have been in promoting it. Locally we have been successful in having a number of regional gardens started, in fact all those listed below. Hopefully the professionals have not let us down with their promotion.

The scientific approach, a great tourist trap as well

Conservation of the Australian flora, its dependent wild creatures, the very diversity of life, including the human race, is dependent upon the scientific management of our natural resources. In the future the only way this naturally interdependent diversity of life can continue to exist is in large, well-managed natural areas. As existing areas are being progressively reduced or depleted by adjacent development it will be necessary to relocate plants and creatures to the designated areas with adequate management practices to prevent degradation.

The Australian Flora Botanic Gardens scheme is the creation of managed research gardens in a range of climatic and regional areas. Each is to plant and support as wide a range of the Australian flora as possible such that the entire sensitive flora is represented in at least two such centres. If a plant is lost it can be re-established from other centres. Plants will be studied to develop the most effective propagation and cultivation practices to re-establish into natural areas and to develop of management practices for these natural areas.

Australian Flora Botanic Gardens will be a major tourist attraction. The sites are adjacent to large towns where their economy is based upon tourism. A number of such cities / towns have nominated to maintain these gardens because of the income to be earned from tourism and a number have been established. Major gardens have been established, the National Botanic Garden, Canberra, at Kings Park, Perth, Mount Annan at Sydney and, hopefully see below, Cranbourne near Melbourne. Regional gardens are established at Port Augusta, Batemans Bay, Wollongong, Newcastle, Gladstone, Rockhampton and Alice Springs. Other commenced are at Albany, Devonport, Maroochydore and Malanda. The contribution to the nation's wealth will be:

1. **Conservation.** — This is the main thrust of our proposal for a national network of Australian Flora Botanic Gardens as stated above.
2. **Education.** — The facilities provided would facilitate the education of our citizens, especially the young.
3. **Tourism.** — Where in Australia can tourists see a collection of our Australian flora. This aspect will contribute to their management and encourage tourism, our major foreign income.

***Gardens 2001 congress.** Public Gardens in 21st century, 17–21 April 2001, enquire ANBG.

The Grevillea Book, Volumes 1, 2 and 3, by Peter Olde and Neil Marriott, is a complete reference to all species of *Grevillea*. The Australian Plants Society NSW ensured that they were published to a very high standard with at least one large colour photograph of each of the 340+ species and easily read description of each species and details of its occurrence and cultivation. They are available from the Australian Plants Society NSW, PO Box 744, Blacktown, NSW, 2148, at \$44 per volume plus postage and handling of \$7.50 for 1 or 2 volumes and \$15 for 3 volumes within Australia.

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Hakea francisiana cross *Hakea bucculenta* N. Marriott