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THE PLANT FAMILY FABACEAE — PAPILIONACEAE — PEA FLOWERS?

The botanists may have themselves confused about the scientific family name but to the layman the vast array of pea-flowered wildflowers bring colour to the bush scene and joy to the garden.

This huge family of plants was for years included in the family Leguminosae as they had one thing in common with the wattles, the seed matured in a long capsule that hung from the plant until ripe, very similar to peas, widely grown as a vegetable.

While the seed capsules were similar, the flowers of a wattle differ considerably from the pea-flowers and the new family Papilionaceae was erected to include only plants producing the characteristic pea-flower. As described opposite these butterfly-like flowers have a characteristic shape which can be readily seen in the colour plates of this issue.

To further confuse us this family is also known as Fabaceae and this looks to be the generally accepted name in the future.

Reference to the past 78 issues of Australian Plants will show that while the pea-flowered plants have received honourable mention as very good plants for horticulture, the family has not received the prominence it deserved. For many years I have been seeking competent botanists to write articles on these plants and to place them in perspective.

We are indebted to John Wrigley, Curator of the National Botanic Gardens, who has accepted the challenge to present this large family in simple broad terms.

Cliff Debenham produced for me a key to genera in the family based on easily discernible characters for use by the layman and this is started on page 124. This key was set up some years ago when Cliff's health enabled him to be the vital contributor that he was to your journal. Possibly Australian Plants would not have survived without the support of Cliff Debenham and we are all deeply indebted to him. Readers are asked to accept this key for what it is, the work of a brilliant and dedicated botanist ever conscious of the need to involve the ordinary citizen and home gardener in the latest research of the specialist scientist, and to forgive any small errors if they exist, which have no doubt come from more recent research before Cliff started to lose his sight.

Cliff, on behalf of thousands of Australians, I salute you.—Editor.

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COVER PLATE:

Chorizema cordatum

Photography by M. Fagg.

This plant is ideal for the cover of an issue presenting the pea flowered plants for horticulture. In my garden I have 30-40 plants of this *Chorizema* flowering every spring. The gardens of "wildflower nuts" tend to become botanical zoos. The flora is so immense, there is a temptation to have one or two plants of as many species as possible. What is needed is a few easily grown species that will flower well and planting them throughout the garden, become a unifying element to produce an overall pleasing effect.

Chorizema cordatum is an easily grown plant that flowers profusely as shown on the cover of this issue. This is not an unusually vigorous plant; all plants can be expected to grow to a metre high and a metre across and flower just like this one. For that rocky area they can be made to grow prostrate as a ground cover but will insist on throwing up their long heads of flower starting in July and going right through to November. After flowering cut them back very hard leaving just short stalks 10-15 cm long. Provided there are a few leaves on each stalk.

Chorizema may be grown from seed to get your first lot of plants but from then on grow from cuttings. They grow so easily from cuttings that they are ideal for the beginner to start on. A 10 cm long cutting from the end of each growing branch in August to December stripped of all but the top 3-5 leaves and placed into a pot of clean sand will root in 4-6 weeks. A medium-wood cutting powder could be used. I put my 10 cm pots containing 40 cuttings in an old concrete washing tub covered with a sheet of glass, watering every 2-4 days depending on the weather.

The flowers of all *Chorizema* are similar to those shown on page 104. You must grow some. —Editor.

Australian Pea-Flowers

Their Cultivation

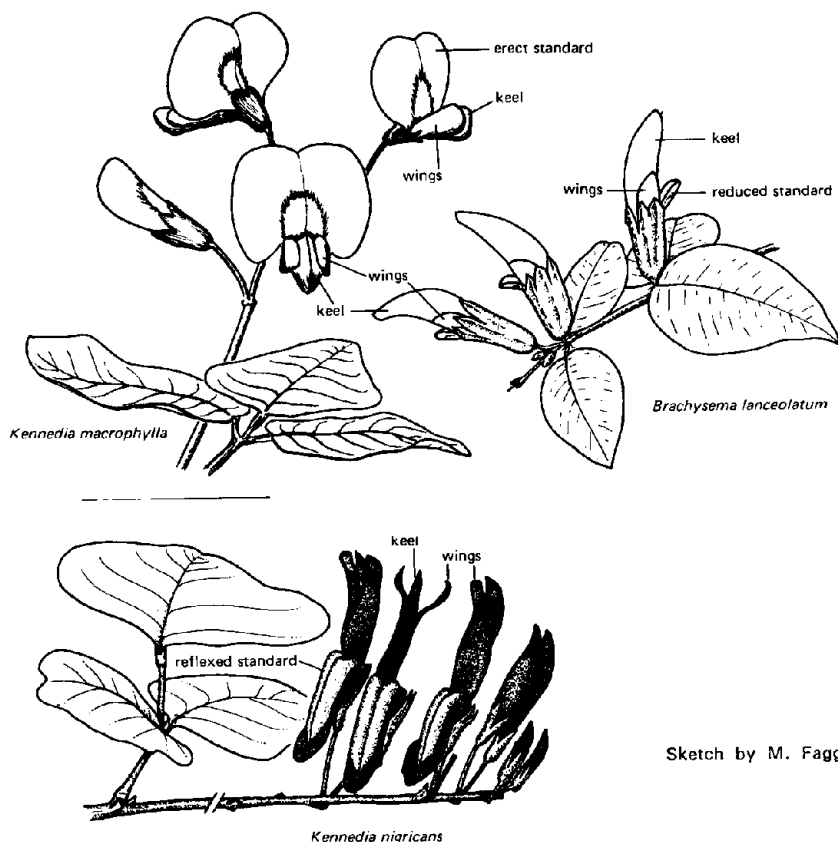
By J. W. WRIGLEY, Curator, National Botanic Gardens

NOTE: This article is composed of extracts from the new book, "Australian Native Plants", written by John Wrigley and illustrated by Murray Fagg. The book is published by William Collins Pty. Ltd. and is available from most booksellers.

Introduction

The family Papilionaceae forms an important part of the Australian flora. Genera such as *Bossiaea*, *Daviesia*, *Dillwynia*, *Eutaxia*, *Gastrolobium*, *Oxylobium* and *Pultenaea* all make up the "bacon and eggs" component of our spring wildflowers. Others such as *Kennedia*, *Hardenbergia*, *Milletia*, *Mucuna*, *Canavalia* and *Entada* are climbers which provide colourful interest and often very fast growth and vigour to cover unsightly fences and other garden structures. A few make handsome trees, and amongst these are *Barklya*, *Castanospermum* and *Erythrina*.

The name Papilionaceae alludes to the butterfly-like flowers, and because of this descriptive allusion I prefer the name to the modern alternative Fabaceae. Both names are legitimate.



Sketch by M. Fagg

The pea-flowers have a characteristic shape with a usually erect standard, two lateral petals forming the wings, and two protruding, partially fused

petals to make the keel. The characteristic flowers of most species in this genus are shown in the sketch above of *Kennedia* and in the photograph of *Gompholobium* below.

In some genera such as *Brachysema* the standard is reduced and the keel is the prominent part of the flower as shown in the sketch above and the photograph opposite.

Pea-flowers come in most colours, with yellows and reds being the most common. Even black, a rare colour in flowers, is present in *Kennedia nigricans*. As shown in the sketch, the standard in this case is reflexed (bent back).

Propagation and cultivation is dealt with under the individual genera and species, but it is worth making several general comments on seed collection and treatment.



Gompholobium huegelii

Photography by C. Green.

Gompholobium huegelii is a small rockery plant which demands good drainage. *Gompholobium* usually has large showy flowers as seen here. The digitate leaves of this species are also a common characteristic.

Brachysema latifolium

Photography by M. Fagg.

This *Brachysema* is a useful ground cover or rockery plant as shown opposite. The lower photograph shows the flower and the reduced standard typical of the genus.



Collection of Seed

Collection of seed of pea-flowers can be a most frustrating business. Maturing time of most of the spring flowering species is December. Most species are subject to caterpillar attack, often from the diminutive common grass-blue butterfly (*Zizina otis*), which is found throughout Australia. Seed should be dusted with an insecticide after collection.

The other problem is that in many species all the seed matures at the same time and as soon as it is ripe it is released from the legume. Gauze bags can be used effectively to save seed.

Seed Treatment

Seeds of pea-flowers have a very hard coat. These seeds have to have this hard coat or testa broken to allow moisture to enter the seed and commence the germination process. In nature, this may happen as a result of bushfire or by repeated baking and wetting with the changes of weather.

Artificially, there are several methods which may be used.

1. Seed may be scarified by rubbing between two sheets of coarse emery paper until the testa is sufficiently thin to allow moisture penetration. Mechanical seed scarifiers can be made where seed is tumbled against a metal cylinder lined with emery paper by a blast of high pressure air. This method is used only where large quantities of seed have to be handled. Such a device, designed by the C.S.I.R.O., is in use at National Botanic Gardens.

2. Seed may be nicked with a sharp knife or razorblade. This method is very slow and particularly tedious when the seed is small. Care has to be taken not to destroy the internal tissue by cutting too deeply.

3. The third method of treatment is to place the seed in a cup and pour boiling water over it. This tends to soften the hard testa and the seed imbibes water and swells. The swollen seed is then removed to the sowing punnet. Usually, with this method, only some seeds swell after the first treatment. Those that have not swollen after overnight soaking may be treated again.

Key to Symbols

Symbols are used after each plant description in order to summarise the plant's qualities and uses.

- A Ground covers suitable for sloping banks or large expanses without trees or shrubs.
- B Ground covers suitable for sloping banks with some trees or shrubs, or large areas between shrubs.
- C Ground covers for areas where some height is required.
- D Ground covers for small areas between shrubs or between driveway strips.
- E Plants suitable for poorly drained areas.
- F Plants suitable for heavy shade.
- G Plants suitable for areas of low maintenance, e.g. road batters.
- H Frost-hardy plants. (Plants given a H rating will tolerate frosts to -7°C in conditions of normal rainfall.)
- I Plants suitable for a small rockery pocket.
- J Rockery plants which will trail or spread over rocks.
- K Rockery plants which reach more than 50 cm high.
- L Plants recommended for their foliage.
- M Rockery plants which are reduced to a bulb or tuber in dormancy.
- N Plants found naturally in alpine regions.
- O Plants which may attract birds.
- P Plants which may be used as features.
- Q Useful as cut flowers, foliage or fruits.
- R Aquatic plants.
- S Suitable as indoor plants or potted specimens.
- T Suitable aquarium plants.

- U Suitable hedge or screen plants.
- V Plants with attractive fruits.
- W Resistant to salt spray.
- X Attractive bark or trunk.
- Y Street trees.

SHRUBS (Key to Sizes)

Small — less than 1 m. Medium — 1 m to 3 m. Large — 3 m to 6 m.

PLANT DESCRIPTIONS

Abrus precatorius

Vigorous stem twiner with pinnate leaves to 12 cm and elliptical leaflets to 2 cm. Bears white to lilac-pink pea-flowers to 1 cm in sprays to 10 cm long. Seed pods to 5 cm, opening to expose beautiful red and black seeds.

These seeds are deadly if swallowed, although they were used extensively by Aborigines for ornamentation. Distribution: northern areas of Queensland, the Northern Territory and Western Australia.

Propagation: From scarified seed.

Cultivation: Grows readily, but should not be planted where seeds are accessible to children. V. See North Australian Plants, page 50.

Aotus ericoides (Medium)

Variable heath-like shrub from 1-2 m high and 1 m or more across. Bears yellow and red pea-flowers in terminal heads in spring. Distribution: all States except the Northern Territory.

Propagation: From scarified seed.

Cultivation: Needs well-drained, sandy soil and full sun. Very attractive in flower. Frost hardy. H.

Barklya syringifolia

Medium-sized tree to 20 m (less in exposed sites in cultivation). Leaves are heart-shaped, to 10 cm long. Sprays of orange flowers appear in early summer. Distribution: rainforests in Queensland and New South Wales.

Propagation: From scarified seed.

Cultivation: A handsome plant in and out of flower. Used successfully as a street tree in Ipswich, Queensland. Well-composted soil preferred, and most aspects. Slow growing, but flowers at 2 m high. L. P. Y.

Brachysema aphyllum

Prostrate, leafless plant with strap-like stems overlapping to form dense cover. Spread to 1 m. Large, scarlet pea-flowers borne along stems appear in spring. Distribution: Western Australia.

Propagation: From cuttings or scarified seed.

Cultivation: Excellent drainage and full sun required. Frost hardiness not fully tested. J.

B. lanceolatum (Medium)

Spreading, rounded shrub, 1.5 m high and 3 m across. Bears red pea-flowers with prominent keel in spring. Glauous foliage. Distribution: Western Australia.

Propagation: From scarified seed or cuttings taken in mid to late summer.

Cultivation: Needs a sunny position in most well-drained soils. Will respond well to pruning. C. H. L.

B. latifolium

Prostrate, trailing plant with orange-red pea-flowers appearing in spring. Distribution: Western Australia. Colour plate on page 97.

Propagation: From scarified seed.

Cultivation: Needs a sunny, well-drained position. Will cover 1 m² in two years, although often slow to start. A large-flowered, dark red form is in cultivation in Melbourne. B. D. H.



B. praemorsum (Small)

Spreading shrub to 30 cm high by 1.5 m diameter with ovate leaves to 6 cm. Dull red, large pea-flowers appear in spring. Distribution: Western Australia.

Propagation: From scarified seed or cuttings.

Cultivation: Good low shrub or ground cover. Needs a well-drained, sunny position. *C. H.*

Bossiaea

Bossiaea is another endemic Australian genus and contains about 40 or 50 species. They are mostly small shrubs with yellow and brown pea-flowers, and provide a significant part of the bacon and eggs' element of the Australian bush. Several, including the beautiful *B. walkeri*, have brilliant red flowers. In some species the leaves are reduced to scales, except in seedlings, and the stems are flattened into cladodes which carry on the photosynthetic processes. These species are novel and particularly attractive in the garden.

In general the genus is readily cultivated in a sunny, well-drained position. Propagation is from scarified seed borne in flattened pods.



Bossiaea cinerea

Photography by M. Fagg.

Bossiaea cinerea is in cultivation in Canberra. With a large upright standard the flower of *B. cinerea* is typical of the genus.

Bossiaea dentata (above, opposite)

Photography by M. Fagg.

Bossiaea dentata is rare in cultivation but photographed here in a Melbourne garden. This species belongs to a small group of the genus with a flower having a reduced standard and extended keel. *B. dentata* is one of several *Bossiaea* spp. with opposite leaves (contrary to the key published in this issue).

Lotus corniculatus (below, opposite)

Photography by C. Green.

Lotus corniculatus as a ground cover in the National Botanic Gardens. This species occurs outside Australia also and opinion varies as to whether it was introduced from European sources many years ago. The photograph illustrates an application for this plant. Lotus is the vigorous growing yellow flowered plant.

Bossiaea buxifolia (Small)

Low, spreading shrub to 30 cm high by 1 m diameter. Small, dark green ovate leaves to 5 mm. Yellow and brown pea-flowers appear in spring. Distribution: Victoria, New South Wales, Australian Capital Territory and Queensland.

Propagation: From scarified seed.

Cultivation: Likes well-drained soil in sunny or half-shaded position. May be useful for hydro-seeding work on road batters. Has neat foliage. G. J. L. (N).

B. dentata (Medium)

Erect shrub to 3 m high. Leaves minutely toothed, ovate to 1.5 cm. Bears large orange-red flowers with prominent keel and reduced standard in winter. Distribution: Western Australia. Colour plate on page 100.

Propagation: From scarified seed.

Cultivation: Successfully cultivated in moderately shady position in Melbourne. Needs sandy soil. Further trials necessary to establish optimum conditions. Frost tolerance not tested. F.

B. heterophylla (Small)

Erect, open shrub to 1 m high. Stems are flattened, leaves variable, ovate to near linear, to 3 cm long. Large yellow and brown pea-flowers appear in autumn. Distribution: Queensland, New South Wales and Victoria.

Propagation: From scarified seed.

Cultivation: Well-drained sandy soil preferred. Needs full sun. Some clones have particularly large flowers and these should be selected for propagation. H. Colour plate in Issue 35, page 285.

B. lenticularis (Small)

Straggly shrub to 1 m. Round, leaves 7 mm diameter. Yellow and brown pea-flowers appear in spring. Distribution: New South Wales.

Propagation: From scarified seed.

Cultivation: Grows well in sandstone soils of Sydney, where it is native. Should be continuously tip-pruned to maintain its shape. Frost tolerance not tested. K.

B. linophylla (Medium)

Rounded shrub to 1.7 m high by 1.3 m across. Leaves linear to 3 cm. Bears yellow and red pea-flowers in spring. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Hardy, fast-growing species. Reasonable drainage and full to half sun are recommended. Good small screen plant. H. U.

B. rhombifolia (Small)

Open shrub to 70 cm high by 50 cm diameter with light green elliptical leaves. Bears yellow pea-flowers in spring. Distribution: N.S.W. & Qld.

Propagation: From scarified seed, but will give some germination even without treatment.

Cultivation: Needs well-drained soil and a sunny position. Often seeds itself when conditions are optimum. Frost tolerance not tested. K.

B. scolopendria (Small)

Erect, leafless plant to 1 m. Bears yellow and brown pea-flowers in spring. Distribution: New South Wales.

Propagation: From scarified seed.

Cultivation: Needs well-drained soil and a sunny position. Makes an interesting feature plant. H. K. L. P.

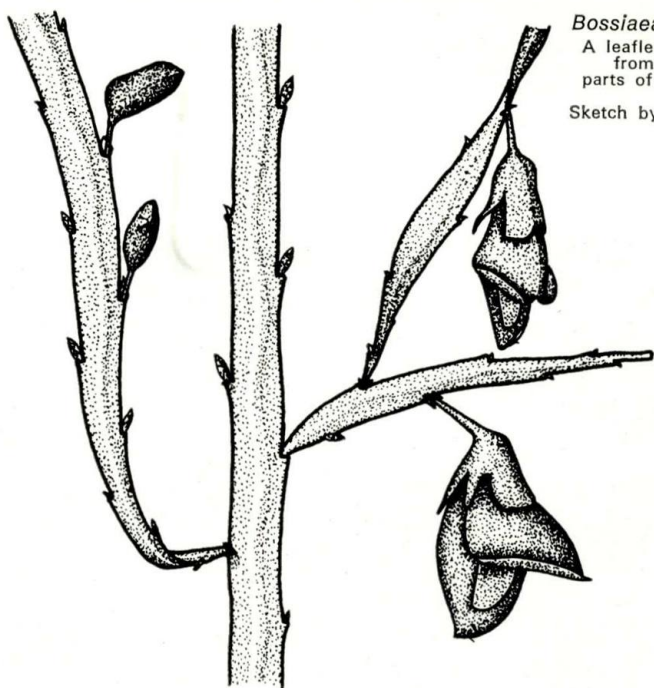
B. ensata is very similar to *B. scolopendria*, but with narrow cladodes. It has also been successfully cultivated.

B. walkeri (Medium)

Rounded bush to 2 m high by 2 m diameter. Leafless grey stems are held erect. Bears large, brilliant red pea-flowers in spring. Distribution: semi-arid areas of New South Wales, Victoria, South Australia and W.A.

Propagation: From scarified seed or cuttings.

Cultivation: Needs well-drained soil and full sun. Keep reasonably dry. Spectacular shrub when grown well. H. L. P.



Bossiaea walkeri

A leafless species
from semi-arid
parts of Australia.

Sketch by M. Fagg

B. webbii is in cultivation in Melbourne, but little is known of its long-term performance. Has neat foliage and attractive, large flowers.

The following species have also been noted in cultivation: *B. carinalis*, *B. cinerea* (colour plate on page 101) and *B. obcordata*. They are mainly of interest to the collector.

Burtonia scabra (Medium)

Bushy shrub to 1.5 m with linear, heath-like leaves. Bears large mauve pea-flowers in leaf axils in spring. Distribution: Western Australia.

Propagation: From scarified seed. Colour plate on rear cover, page 148.

Cultivation: An outstanding plant, but very difficult to maintain. Well-drained, well-mulched soil is suggested and part shade. *H. P.*

Canavalia maritima (Syn *C. rosea*)

Vigorous creeper with large, glabrous trifoliate leaves. Large pink pea-flowers appear in summer. Distribution: Sea coasts from Sydney to northern Australia.

The vigour of this species may lend itself to sand-dune stabilisation work on northern beaches. The large bean-like pods contain seeds which were cooked and used as food by the Aborigines.

Propagation: From scarified seed.

Cultivation: Grows in well-drained, sandy soil in sunny position. Single plant will cover many square metres. Very frost tender. *A. B. G. W.*

Castanospermum australe

Black bean

Large tree to 40 m with shiny dark green pinnate leaves. Leaflets are elliptical, to 12 cm. Yellow and red pea-flowers, 4 cm long, occur in spring. Large boat-like pods to 25 cm. Distribution: rainforests of Queensland and New South Wales. Colour plate in Issue No. 62, page 64.

Propagation: From seed.

Cultivation: Beautiful specimen tree for parks. Used as a street tree in Sydney, but it is too big where telegraph wires are present. Good indoor foliage plant. Most soils and aspects are suitable. Fruits can make interesting ornaments. *L. P. S. V.*

Chorizema

Flame peas

A genus of about 18 species, all but one endemic to Western Australia, the other, *C. parviflorum*, is native to New South Wales and Queensland. They are shrubs or twiners and have masses of spectacular orange and/or red pea-flowers in spring. They require a well-drained soil and some shade for best results.

Propagation is from scarified seed or cuttings, which do not give a high percentage of success.



Chorizema diversifolium

Photography by M. Fagg.

Chorizema diversifolium is a climbing species which appreciates shade. The photograph illustrates the large wings which exceed the keel and are typical of the genus. A shrubby species of *Chorizema* is on the front cover the flowers being very similar to those above.

Chorizema aciculare (Small)

Straggling shrub to 50 cm. Curving, linear leaves with a pointed end. Bears pea-flowers in spring. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Requires well-drained, sandy soil and half shade. Good rockery plant for coastal areas. F. J.

Mirbelia speciosa (upper plate, opposite)

Photography by M. Fagg.

Mirbelia speciosa has been grown only as a potted specimen in Canberra. Calyx lobes can be seen to be of approximately equal length.

Hovea lanceolata (lower plate opposite)

Photography by M. Fagg.

Hovea lanceolata flowers in late winter or early spring. The purple flowers in axillary clusters are typical of the genus.



C. cordatum (Small)

Erect or spreading plant to 80 cm, some forms spreading to 1.5 m. Heart-shaped leaves to 4 cm. Bears orange-red or yellow pea-flowers in spring. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Probably the best-known species in cultivation; several forms are available. Useful as a rockery plant or to set amongst shrubs. A yellow-flowered form is also in cultivation. Spectacular in flower. *F. J. P.*

C. diversifolium

Delicate stem twiner with narrow-elliptical leaves to 5 cm, rarely toothed. Orange-red pea-flowers occur in spring. Distribution: Karri forests in W.A.

Propagation: From scarified seed.

Cultivation: Very showy, non-vigorous, twining climber for shade or semi-shade. Well-composted soil and good drainage required. Grows in Canberra in a sheltered position. *F. (H).*

C. dicksonii (Small)

Erect shrub to 50 cm. Pointed leaves to 1.5 cm. Orange and red pea-flowers occur in spring. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Needs well-drained soil with a good mulch in half shade. Good rockery plant. *I.*

C. ilicifolium (Small)

Weak shrub with long, slender branches, tending to be supported by surrounding shrubs. Branches may reach 2 m. Leaves holly-like, to 6 cm. Bears red pea-flowers in spring. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Grows well in well-drained soil with added compost and a good mulch in half shade. *J.*

Clanthus formosus (Syn. *C. dampieri*, *C. speciosus*)

Sturt's desert pea

Trailing plant with glaucous, pinnate leaves on stems spreading to 2 m. Bears pea-flowers of brilliant red with black boss on erect peduncles. Other colour variants are known. It is the floral emblem of South Australia. Distribution: arid parts of southern Australia, often in sandy soil over limestone. Colour plate in No. 12 issue and No. 38 issue, page 49.

Propagation: From scarified seed.

Cultivation: One of our most famous wildflowers, Sturt's desert pea has been in cultivation for many years. Nevertheless, it is not an easy plant to grow. It does not like disturbance, so seed should be sown *in situ* or in a "jiffy pot". At this stage special care should be taken to prevent snail damage. A well-drained soil should be prepared and half a bucket of limestone chips placed 15 cm below the surface. Some growers prefer to plant in pipes standing on end to obtain perfect drainage. Seed should be sown in March or April for spring flowering, but as the species is frost tender protection must be given in cold areas. It is usually grown as an annual. It is a plant for the larger rockery and must have full sun. Micrografting techniques have been used at National Botanic Gardens, using the New Zealand *C. puniceus* as a stock. As a result, plants have survived for a second season. Many years ago in England *Colutea arborescens* was used as a stock plant. *J.*

Crotalaria laburnifolia (Medium)

Bird flower

Erect shrub to 3 m with light green, soft textured leaves. Yellow-green pea-flowers to 6 cm with bird-like shape occur in summer. Distribution: northern areas of Western Australia. Colour plate, issue 62, page 72.

Propagation: From scarified seed, also cuttings.

Cultivation: A hardy plant for frost-free areas. Suited to most soils and a sunny position. Plants must be pruned hard after flowering to maintain reasonable shape. *C. cunninghamii* has greyish, hairy leaves and similar flowers. It is also in cultivation. *Q.*

Daviesia

A large endemic genus of 70 or more species, *Daviesia* is distributed over the whole of Australia, but the west has the greatest variety, with over 50 species. Usually with yellow and brown pea-flowers, they form part of the 'bacon and eggs' component of the Australian bush. Some species regenerate rapidly after fire and become dominant in certain areas. Several interesting western species have bright red flowers, but they are rarely seen in the eastern States. All are small to medium sized woody shrubs and are characterised by triangular pods containing two hard coated seeds. In cultivation all species require good drainage and full to half sun. They are reasonably hardy plants, but occasionally seem to die quickly and without warning. This may be due to *Phytophthora cinnamomi*, as the root rot fungus has been isolated from plants that have died in this manner. Propagation is easy from scarified seed and, as growth of most species is reasonably fast, seed should be collected and retained for replacements.

D. epiphylla (Small)

Staghorn bush

Strange, leafless plant to 1 m high, often spreading to 1.5 m in the field. Cladodes are rigid, flat and lobed, reminiscent of a staghorn. The plant is spiny. Large red pea-flowers appear in summer. Distribution: W.A.

Propagation: From scarified seed.

Cultivation: Reported to be growing well in King's Park, Perth. Not known in the eastern States. See note on genus, above. Frost tolerance not known. L.

D. mimosoides (Medium)

Open, often pendulous, shrub to 2.5 m high by 2 m diameter with lanceolate leaves to 10 cm. Sprays of yellow and brown pea-flowers occur in spring. Distribution: Queensland, New South Wales, Australian Capital Territory and Victoria.

Propagation: From scarified seed.

Cultivation: See note on genus. A hardy species, very colourful for four weeks in spring, but of little value for the rest of the year. F. H.

D. latifolia (Medium)

Open, straggly shrub to 3 m with ovate leaves to 8 cm. Yellow and brown pea-flowers occur in spring. Distribution: Queensland, New South Wales, Victoria and Tasmania.

Propagation: From scarified seed.

Cultivation: See note on genus. Not of great horticultural value. Very hardy. F.. H.

D. umbellulata (Medium)

Rounded bush to 1.5 m. Heart-shaped, pointed leaves to 2 cm. Bears brown and yellow pea-flowers in spring. Distribution: N.S.W. and Queensland.

Propagation: From scarified seed.

Cultivation: See note on genus. Compact plant with neat foliage. F. H. L.

Derris involuta

Moderately vigorous climber with pinnate leaves with 9-13 elliptical leaflets to 5 cm long. Bears sprays of white and pale pink pea-flowers to 1 cm long. Distribution: Queensland and New South Wales.

Propagation: From scarified seed.

Cultivation: Used for bank stabilisation in south Queensland. Hardy in frost-free areas. Grows in sun or part shade. Roots used as a fish poison and as a component in insecticides. G.

Desmodium varians

Weak-stemmed twiner. Trifoliate leaves with almost round leaflets to 2.5 cm. Bears pink pea-flowers for most of the year. Distribution: Queensland, N.S.W. Australian Capital Territory, Victoria, Tasmania and New Caledonia.

Propagation: From scarified seed.

Cultivation: Not showy, but may be grown with interest trailing among other shrubs. Hardy in sheltered situations. H.



Dillwynia

Dillwynia, like *Daviesia*, is yet another genus of 'bacon and eggs' pea-flowers. With 20 or more species, it is also an endemic Australian genus. Several species have been brought into cultivation, but again, like *Daviesia*, may succumb very rapidly, probably due to *Phytophthora* infection. They require good drainage, preferably a sandy soil, well mulched and about half shade. Propagation is by scarified seed.

D. floribunda (Medium)

Open shrub to 1.5 m high by 1 m diameter with near terete leaves to 2 cm. Bears pea-flowers, mostly yellow, in upper leaf axils in late winter and spring. Distribution: Queensland and New South Wales.

Propagation: From scarified seed. Colour plate in issue 35, page 296.

Cultivation: See note on genus, above. Pruning after flowering is necessary. Very colourful in flower. Well-drained sand seems essential. *F. H.*

D. retorta (Medium) (Syn. *D. ericifolia*).

Rounded or upright shrub to 2 m with heath-like foliage. Bears red and yellow pea-flowers in profusion in spring. Distribution: Queensland, New South Wales, Australian Capital Territory and Victoria.

Propagation: From scarified seed.

Cultivation: See note on genus, above. Colourful in flower. *F. H.*

D. glaberrima, *D. hispida*, *D. oreodoxa* and *D. sericea* are all in cultivation and may be handled similarly.

Entada phaseoloides (Syn. *E. scandens*)

Matchbox-bean

Very vigorous climber, forming lianes. Large trifoliate leaves. Bears sprays of small white pea-flowers and enormous flattened pods to 1 m with shiny dark brown seeds to 8 cm diameter. Distribution: Queensland rainforests.

Propagation: From nicked seed.

Cultivation: Extra vigorous climber suitable only for very large pergolas, etc. Grown mainly for interesting fruits. Very frost tender. Grows strongly in Brisbane. *U. V.*

Eutaxia

Eutaxia is a small shrub genus of pea-flowers with eight species, all Western Australian endemics except *E. microphylla*, which extends across the whole of the continent. They are mostly small, woody shrubs bearing yellow and red flowers in spring. They require good drainage and a sunny situation. Propagation is by cuttings or scarified seed.

E. microphylla (Small)

Two forms exist.

1. Prostrate, spreading plant forming tight mat to 1.5 m diameter with heath-like leaves to 5 mm.

2. Much-branched shrub to 1 m high by 1 m diameter. Slightly broader leaves to 1 cm. Flowers of both forms are yellow pea-flowers with red centres and are profuse in spring. Distribution: Western Australia, South Australia, Victoria, Tasmania, New South Wales and Queensland.

Propagation: From cuttings or scarified seed.

Cultivation: The prostrate form is an excellent ground cover or spreading rockery plant for a well-drained sunny position. Foliage is neat. The shrubby form is a useful shrub, again requiring good drainage and full sun. *1. A. B. H. J. 2. H.*

Eutaxia cuneata (opposite)

Photography by M. Fagg.

Eutaxia cuneata is a spreading shrub as shown opposite growing at the National Botanic Gardens. The lower plate shows the characteristic crowded flowers of the genus and the decussate leaf arrangement.

E. obovata (Small)

Rounded shrubs to 1 m high by 60 cm across with lanceolate leaves to 2 cm in four rows. Flowers are yellow with a red keel and appear in spring. Distribution: Western Australia.

Propagation: Scarified seed preferred.

Cultivation: Shrub has performed well in Sydney and Canberra. Hardy in moist soils, but good drainage recommended. Will accept a little shade. Neat shrub. *E. cuneata* is also in cultivation. *H. L.*

Erythrina vespertilio

Bat's wing coral tree

Deciduous tree to 25 m. Corky bark with thorns. Leaves are trifoliate; leaflets variable, mostly two-lobed. Red pea-flowers to 4 cm appear when leaves are absent. Pod to 10 cm. Distribution: open forest country in Queensland, New South Wales, the Northern Territory and Western Australia.

Propagation: From scarified seed.

Cultivation: Grows well in coastal areas as well as inland. Frost tender on tablelands. Grows in most soils. Full sun required. *P.*

E. phlebocarpa from north Queensland is also in cultivation in Brisbane.

Gastrolobium

Poison peas

With over 40 species, *Gastrolobium* forms an interesting part of the Western Australian flora. Most are endemic to Western Australia. The exceptions, *G. elachistum* from South Australia and *G. grandiflorum* from northern Australia, including Queensland, are not known in cultivation. Flowers and foliage of many species are attractive, but, in general, they have been avoided in cultivation, probably because of the poisonous components in their foliage. The pea-flowers are yellow and red, orange or all red and are usually well displayed. Most species will require good drainage and a warm, sunny position. Propagation is by scarified seed.

G. callistachys (Medium)

Rock poison

Erect shrub to 2 m with linear leaves to 5 cm. Long sprays pea-flowers, yellow-orange, occur in spring. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Well-drained, sunny position required. Has adapted well to cultivation. *H.*

G. tricuspidatum (Small)

Prostrate plant, spreading to 60 cm. Light green leaves with three points. Yellow pea-flowers with brown centre occur in spring. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Best grown as a rockery plant. Good drainage essential, but tends to die out in centre after two or three years. Frost tolerance not tested. *J.*

G. truncatum (Small)

Prostrate plant spreading to 50 cm. Leaves almost round with undulate margins, 1.5 cm long. Pea-flowers not seen by author. Distribution: Western Australia.

Propagation: From cuttings or scarified seed.

Cultivation: Recently introduced by a Melbourne nursery. Appears to have potential as a rockery plant or small ground cover plant. Good drainage and full sun recommended. *D. J.*

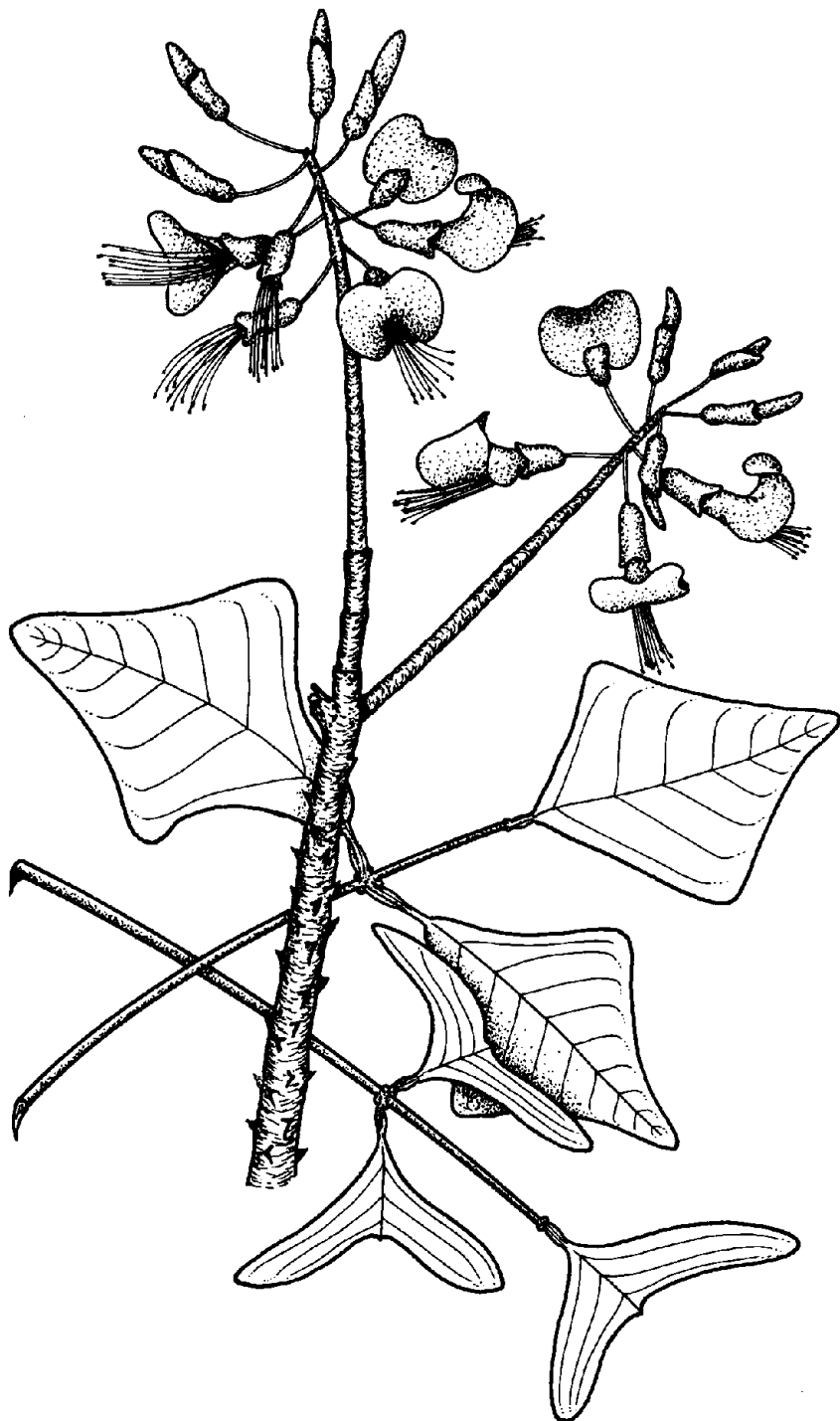
Glycine clandestina

Non-vigorous twining plant with trifoliate leaves with variably shaped leaflets. Sprays of small bluish pea-flowers, rarely pink, occur most of the year. Distribution: all States.

Propagation: From scarified seed.

Cultivation: Of little horticultural value. Adds some interest, as it climbs through other plants. *H.*

G. tabacina is very similar, varying mainly in leaf structure. It is also in cultivation.



Erythrina vespertilio

The leaves are not present at flowering, but the drawing shows variation in leaf form which may occur.

Sketch by M. Fagg.

Gompholobium

An endemic Australian genus with about 25 species, *Gompholobium* spp. are mainly small, woody shrubs with sizeable yellow or greenish pea-flowers, mostly borne in spring. They are not easy to cultivate, although most are showy enough to warrant further investigation. They seem to demand perfect drainage and reasonably dry conditions with some overhead shade. Propagation is easy from scarified seed, although seed is often difficult to obtain because of insect damage. See page 98.

G. grandiflorum (Small)

Erect, often spindly, shrub to 1 m and narrow, digitate leaves with three leaflets 2.5 cm long. Yellow pea-flowers, standard 2.5 cm, occur in spring. Distribution: New South Wales. Colour plate, issue 18, page 185.

Propagation: From scarified seed.

Cultivation: See note on genus. Has been successfully cultivated in Sydney and Canberra. Very showy in flower. Needs half shade. F. H.

G. latifolium (Small)

Erect shrub to 1 m. Digitate leaves, much wider than *G. grandiflorum*, with three leaflets to 5 cm. Largest flowers of the genus. Bears yellow pea-flowers, a standard 3 cm long, in spring. Distribution: Queensland, New South Wales and Victoria.

Propagation: From scarified seed.

Cultivation: See note on genus. Very showy shrub. F. H. P.

Gompholobium polymorphum

Slender semi-twining climber, mostly relying on other shrubs for support. Leaves with five linear leaflets arising from stem. Bears large pea-flowers to 2 cm diameter, orange to pinkish-red, in spring to early summer. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Not common in cultivation. Useful plant for rockery, growing amongst other shrubs. Requires good drainage, semi-shade. Not tested for frost tolerance.

G. huegelii is also in cultivation. See colour plate on page 96.

Goodia

Goodia is a small genus of three species, all Australian. They are woody shrubs with yellow pea-flowers and very hardy in cultivation. They seem to adapt to most soils and most aspects. Propagation is from scarified seed, or in the case of *G. lotifolia* by root suckers.

G. lotifolia (Medium)

Vigorous, suckering plant to 2.5 m high by 3 m and more wide with trifoliate, light green leaves. Leaflets ovate, 1.5 cm long. Bears yellow flowers in spring. Distribution: Queensland, New South Wales, Australian Capital Territory, Victoria, Tasmania and South Australia.

Propagation: From scarified seed or by division of root suckers.

Cultivation: Very hardy. Thrives in most situations. May be too vigorous in a small garden. Useful, fast-growing screen plant. G. H. U.

G. pubescens (Small) (Syn. *G. lotifolia* var. *pubescens*)

Small, rounded shrub to 1 m high by 1 m diameter. Leaves are trifoliate, slightly hairy. Leaflets are ovate, to 1.5 cm. Yellow flowers appear in spring and summer. Distribution: Victoria and Tasmania.

Botanists do not agree as to the correct nomenclature of this taxon and both of the above names will be seen in literature.

Propagation: From scarified seed.

Cultivation: Much more compact than *G. lotifolia*. May seed itself around the garden. Useful small shrub which accepts most soils and aspects. H.

Hardenbergia comptoniana

Moderately vigorous twining climber with trifoliate leaves with generally oblong leaflets to 6 cm. Sprays of purplish-blue pea-flowers occur in spring. Distribution: Western Australia. Colour plate in issue 33, page 200.

Propagation: From scarified seed.

Cultivation: Well-known in cultivation. Not as dark in colour as its eastern counterpart, *H. violacea*. Hardy in well-drained, semi-shaded position. Excellent for trellis or smaller pergola. *F. H. P.*

Hardenbergia violacea (Syn. *H. monophylla*)

False sarsaparilla

Trailing plant covering at least 1 square metre. Flowers are generally purple, but white, pink and pale mauve shades are known. Distribution: South Australia and eastern Australia (coast and tablelands).

Common name refers to the superficial likeness of its foliage to *Smilax glycyphylla*. This shrub is variable in form. Upright clones are unsuitable for ground-cover work. The frost rating is bracketed, as there may be some doubt as to the hardiness of coastal and northern clones. Tablelands collections are frost hardy.

Propagation: From scarified seed, or cuttings to preserve clonal properties.

Cultivation: Grows in well-drained soil in sun or semi-shade. Density of growth can vary. *A. (H).*

Hovea

Hovea is a small genus, of 12 species, all endemic to Australia, occurring in both east and west. They are generally small to medium, open, woody shrubs with masses of purple pea-flowers in spring. Albino forms of most species are known. In cultivation they require excellent drainage and some overhead shade. A cool root run, supplied by a heavy mulch or strategically placed sandstone slabs, is also desirable. Propagation is easiest from scarified seed.

H. acutifolia (Medium)

Erect, bushy shrub to 1.5 m high by 1 m across. Leaves are elliptical to 8 cm. Purple pea-flowers occur in late winter to early spring. Distribution: Queensland and New South Wales.

Propagation: From scarified seed.

Cultivation: See note on genus. This fine shrub was seen thriving in a cool, shaded situation against a house in Brisbane. Frost tolerance not tested. *F. L.*

H. chorizemifolia (Small)

Erect, sparsely branched plant to 60 cm, with ovate, holly-like leaves to 3 cm. Deep purple pea-flowers occur in spring. Distribution: W.A.

Propagation: From scarified seed.

Cultivation: See note on genus. Rare in cultivation. Has been successfully grown in eastern States in conditions described. *F. H. K.*

H. elliptica (Medium)

Erect, open shrub to 3 m high (sometimes taller) by 2 m across, with elliptical leaves to 8 cm. Purple pea-flowers occur in spring. Distribution: Karri forests of Western Australia.

Propagation: From scarified seed.

Cultivation: See note on genus. Attractive in flower. Flowering period only about three weeks. *F. H.*

H. lanceolata (Medium)

Open shrub to 2 m high by 1 m across. Leaves are oblong to 6 cm. Blue pea-flowers occur in late winter to spring. Distribution: Queensland and New South Wales. Colour plate on page 105.

Propagation: From scarified seed.

Cultivation: See note on genus. *H.*

Hovea linearis (Small)

Straggly little shrub with weak branches from base of plant, often tending to lie flat unless supported by other plants. Bears purple pea-flowers in leaf axils in early spring. Distribution: the coast and ranges of central New South Wales.

Propagation: From scarified seed.

Cultivation: Perfectly drained sandy soil is essential. Needs full sun or part shade. *F. H. I. J.*

H. longifolia (Medium)

Erect, open shrub to 2 m high by 1 m across and narrow leaves to 7 cm. Mauve-blue pea-flowers are produced in late winter and early spring. Distribution: Queensland, N.S.W., Victoria, Tasmania and South Australia.

Propagation: From scarified seed.

Cultivation: See note on genus. One of the hardiest members of the genus. *F. H.*

H. pungens (Small)

Erect, open shrub to 1 m high by 1 m across (often taller in the field). Prickly, linear leaves to 2 cm. Bright purple pea-flowers occur in winter. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: See note on genus. *H.*

H. trisperma (Small)

Small, open, spreading plant to 60 cm by 1 m wide. Leaves are variable, linear to elliptical, to 7 cm long. Purple pea-flowers occur in winter. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: See note on genus. Not commonly cultivated in the eastern States. Suitable for a rockery or among other shrubs. *F. H. K.*

Indigofera australis (Medium)

Open, spreading or erect plant to 2 m high by 2 m across, occasionally sparsely branched. Pinnate leaves are bluish-green. Elliptical leaflets grow to 2.5 cm. Sprays of purple, or rarely white, pea-flowers appear in spring. Distribution: all States. Colour plate on page 140.

Propagation: From scarified seed. Cuttings are also successful where flower colour needs to be reproduced.

Cultivation: Although a common shrub in the field, this species is not grown as frequently as it deserves. It is hardy and well-shaped when regularly pruned from an early age. It will grow in most soils except very wet soils and will flower well in shade or sun. Very frost hardy. *F. G. H.*

I. australis var. *signata* (Medium)

Similar to *I. australis*, but leaves are much more crowded, with small obcordate leaflets and shorter flower stems. Distribution: Queensland, New South Wales and Victoria.

Propagation: From scarified seed.

Cultivation: As for *I. australis*, but foliage is more attractive. *F. G. H. L.*

I. leucotricha (Small)

Low, spreading shrub with leaves and branches covered with dense white hairs. Pinnate leaves with 9-15 obovate leaflets to 1 cm. Purplish pea-flowers. Distribution: dry areas of New South Wales, South Australia and the Northern Territory.

Propagation: From scarified seed.

Cultivation: Attractive foliage plant. Not fully tested in cultivation, as only young plants have been seen. Should thrive in dry, warm areas. *L.*

Jacksonia scoparia (Large)

Shrub, often with tree-like form, to 4 m high by 2 m across. Leafless branches, usually pendulous. Profuse yellow and red pea-flowers occur in spring. Distribution: New South Wales and Queensland.

Propagation: From scarified seed.

Cultivation: A handsome foliage plant, attractive in flower. Long-lived in well-drained soil in sun or semi-shade. *H. L. P.*

J. sericea

Prostrate, woody, leafless plant with small orange pea-flowers most of the year. Dense habit despite lack of leaves. Generally glaucous appearance. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Rarely seen in the eastern States, this species has performed well in sand at King's Park, Perth, Western Australia. Plant at 1 m centres. *A. B.*

Kennedia becxiana

Vigorous climber. Bears large, orange-red pea-flowers, well displayed. Distribution: Western Australia.

Although a climber, on banks free of trees and shrubs, it will trail and form an excellent ground cover.

Propagation: From scarified seed.

Cultivation: Needs a sunny position and ample watering. Plant at 3 m centres. *A.*

K. coccinea

Vigorous climber with masses of small, orange-red pea-flowers in spring. A very showy species. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Will grow in a well-drained position in sun or partial shade. Good ground cover in the absence of trees. Plant at 2 m centres. *A.*

K. eximia

Prostrate trailing plant less vigorous than former species. Bears red flowers in spring. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Needs a well-drained, sunny position. Plant at 1 m centres for dense cover. *A. B.*

Kennedia glabrata

Probably the least vigorous of the genus. Prostrate trailer with small, bright green trifoliate leaves and small orange-red flowers, well displayed. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Good drainage is important. Sunny position. Plant at 50 cm centres. *D.*

K. macrophylla

Very vigorous climbing plant with large, glabrous, light green, trifoliate leaves. Bears dull red pea-flowers in spring and summer. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Most soils and aspects are satisfactory, but heavy frosts must be avoided. Plant at 3 m centres. *A.*

K. microphylla

Tight, mat-forming plant spreading to 1 m. Small trifoliate leaves. Bears brick-red pea-flowers in winter and spring. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Very neat ground cover or rockery plant. Good drainage and full sun preferred. Not tested for frost tolerance. *D. J.*

K. nigricans

Very vigorous climber with large, dark green trifoliate leaves. Unusual black and yellow flowers. Distribution: Western Australia.

This is the most vigorous species of the genus *Kennedia* and probably one of the most rampant plants of southern Australia. It should be used for quick cover of unsightly scars, fences or banks.

Propagation: From scarified seed. Colour plate, issue 50, page 240.

Cultivation: Most situations are satisfactory provided the plant has room to move. Plant at 5-6 m centres, avoiding heavy frosts. A.

K. procurrens

This rare plant occurs in south-western Queensland and there is some doubt as to whether the plant reported in cultivation is this species or *K. prorepens*. Both have purple pea-flowers and both inhabit dry country. A. B.

K. prorepens

Trailing plant with dull green leaves, prominently veined and slightly hairy. Bears purple flowers on long, erect peduncles. Distribution: Western Australia and possibly South Australia.

Propagation: From scarified seed.

Cultivation: Needs a well-drained, dry, sunny position. Often a sparse grower. Plant at 1 m centres. A. B.

K. prostrata

Scarlet runner, running postman

Variable in vigour and form, but always prostrate. Bears scarlet flowers in spring and early summer. Distribution: temperate areas of Australia.

Propagation: From scarified seed.

Cultivation: Well-drained position preferred, but quite adaptable. Vigorous forms should be planted at 1.5 m centres. A. B.

K. retrorsa

Vigorous climbing plant with dark green leaves and purple pea-flowers. Distribution: New South Wales.

This is the only *Kennedia* sp. that has proved completely frost hardy in Canberra. It is a rare plant in the field, having been rediscovered only in recent years.

Propagation: From scarified seed.

Cultivation: Most situations are satisfactory. Plant at 4 m centres. A. H.

K. rubicunda

Vigorous climbing plant with dark green leaves and large dull red flowers. Distribution: Victoria, New South Wales and Queensland.

Propagation: From scarified seed.

Cultivation: Most positions are suitable. Plant at 3 m centres. A.

K. stirlingii

Prostrate plant forming dense cover 1-2 m diameter. Bears red flowers. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Some shade and reasonable drainage preferred. A. B.

Lonchocarpus blackii

Moderately vigorous, semi-deciduous climber, with pinnate leaves with ovate leaflets to 4 cm. Dark purple pea-flowers in branching sprays occur in late spring to early summer as new leaves are appearing. Distribution: Queensland and New South Wales.

Propagation: From scarified seed.

Cultivation: Has been used to stabilise road batters in south-east Queensland. Hardy in warm, sunny situations. G.

Lotus australis (Small)

Rounded shrub, 50 cm in diameter, with trifoliate leaves. Pea-flowers are usually an uncommon pale pink with no tinge of mauve. Distribution: temperate Australia.

Propagation: From scarified seed.

Cultivation: Needs full sun and reasonable drainage. Often short-lived in cultivation, three to four years being the normal life span. Resistant to salt spray. H. J. W.

L. corniculatus

Vigorous spreading plant to 20 cm high, with light green leaves. Bears yellow pea-flowers for most of the year. Distribution: Widespread in Australia, also New Zealand and South-East Asia. Colour plate, page 100.

This plant may have been introduced from Europe many years ago.

Propagation: From scarified seed.

Cultivation: Likes most locations, provided ample water is available. Plant at 1 m centres. *A. B. H.*

Milletia megasperma

Native wistaria

Very vigorous climber forming lianas in nature. Pinnate leaves with 7-13 glossy elliptical leaflets to 9 cm. Bears large white to purple pea-flowers in terminal sprays to 15 cm. Distribution: rainforests in Queensland and New South Wales. Colour plate on page 133.

Propagation: From scarified seed.

Cultivation: Excellent climber for covering a pergola, or fence in milder climates. Seen growing well near Toowoomba, Queensland, so reasonable frost levels are tolerated. Very showy. *L. P.*

Mirbelia

An endemic genus of pea-flowers, the genus *Mirbelia* includes about 24 species. Not many are in cultivation, although most have horticultural potential. They vary in size from low, procumbent shrubs to the erect *M. dilatata*, which may reach 3 m. Flower colour varies from orange-yellow to purple. In general the genus is not easy in cultivation, most species requiring particularly good drainage. A semi-shaded situation seems to be best suited to the few species tried. Propagation is usually by scarified seed, but cuttings also are generally successful.

M. dilatata (Medium)

Erect, almost columnar, shrub to 3 m high by 70 cm across. Prickly, lobed leaves to 2.5 cm. Large, mauve-purple pea-flowers occur in spring. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Well-mulched, well-drained position in full sun or part shade is most suitable. Fast growing, but often short-lived in cultivation. Frost resistance not fully tested. *L.*

M. oxyloboides (Medium)

Variable shrub to 1 m high, slightly grey, oblong leaves to 1 cm. Orange-yellow pea-flowers occur in late spring and early summer. Distribution: New South Wales, Australian Capital Territory and Victoria.

Propagation: From scarified seed or cuttings.

Cultivation: Well-drained, semi-shaded situation is preferred. One of the hardiest *Mirbelia* spp. *F. H.*

M. rubrifolia (Small) (Syn. *M. reticulata*)

Straggly shrub less than 50 cm high, but with branches occasionally spreading to 80 cm. Whorls of small (3 cm) lanceolate leaves are sharply pointed with reticulate veining. Magenta pea-flowers appear in spring. Distribution: sandstone areas around Sydney, New South Wales.

Propagation: From scarified seed.

Cultivation: Usually short-lived in cultivation. Needs well-drained sandy soil, half shade, and a mulch of sandstone chips. *F. J.*

M. speciosa (Small) from New South Wales has been successfully grown as a potted plant in Canberra. Colour plate on page 105.

Mucuna gigantea

Very vigorous twining climber forming lianas in far north. Trifoliate leaves with ovate-lanceolate leaflets to 10 cm. Bears long, pendant sprays, to 30 cm, of large green pea-flowers. Distribution: rainforests in Queensland, New South Wales and the Northern Territory.

Propagation: From scarified seed.

Cultivation: Fast-growing vine for fence or large pergola in warm areas. Flowering habit attractive. Well-composted soil and ample moisture required. Fruits covered with irritating hairs. Seeds are edible. *L. U.*

Oxylobium

An endemic Australian genus of about 30 spp., *Oxylobium* spp. are woody plants varying from prostrate to medium-sized trees. Many are reported to be toxic to stock and are declared noxious weeds in some States. They are pea-flowers with yellow or yellow and red blooms, mostly borne in spring. Some have interesting foliage. In cultivation they require excellent drainage and full sun with a good mulch applied to maintain a cool root run. Propagation is by scarified seed, but some success has also been obtained from cuttings.

O. cuneatum (Small) (Syn. *Nemcia cuneata*)

Rounded shrub to 1 m high (or less) by 60 cm across. Leaves have a blunt end to 2 cm. Bears orange-red pea-flowers. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: See note on genus. *H.*

O. ellipticum (Small to Medium)

Variable shrub, prostrate to upright, to 2 m, with dark green elliptical leaves to 2 cm. Bears profuse yellow pea-flowers in spring to summer. Distribution: Queensland, N.S.W., A.C.T., Victoria and Tasmania.

Propagation: From scarified seed.

Cultivation: See note on genus. Outstanding shrub. Low growing alpine forms are particularly attractive. Requires good drainage and will tolerate some shade. *H. P.*

O. ilicifolium (Medium)

Erect, often straggly, shrub to 2 m high by 1 m across. Rigid, holly-like leaves to 4 cm. Bears yellow-orange pea-flowers in spring. Distribution: Queensland, New South Wales and Victoria. Colour plate on page 136.

Propagation: From scarified seed.

Cultivation: See note on genus. Often difficult to maintain. Interesting foliage. *H. L.*

O. lanceolatum (Medium)

Shrub to 2 m high by 1 m across. (Taller tree form is also known.) Leaves lanceolate to 12 cm (often less) in whorls of three. Flowers are orange-yellow and occur in spring and summer. Distribution: W.A.

Propagation: From scarified seed.

Cultivation: A fast growing shrub. See note on genus. *H. U.*

Oxylobium linearifolium (Large)

Pendulous shrub to 5 m high by 4 m across with linear leaves to 6 cm. Bears yellow and red pea-flowers in spring. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: See note on genus. Handsome habit. *H. L.*

O. parviflorum (Small)

Rounded shrub to 1 m high by 60 cm across, with oblong leaves to 5 cm. Yellow and red pea-flowers in winter and spring. Distribution: W.A.

Propagation: From scarified seed. Cuttings also successful.

Cultivation: See note on genus. *H.*

O. robustum (Small)

Rounded, open shrub to 1 m high by 1 m across, with broad linear leaves to 5 cm. Yellow pea-flowers occur in spring and early summer. Distribution: Queensland and New South Wales.

Propagation: From scarified seed.

Cultivation: See note on genus. *H.*

O. scandens

Prostrate, trailing plant with elliptical leaves to 5 cm. Bears orange pea-flowers. Distribution: New South Wales.

Propagation: From scarified seed.

Cultivation: Prefers heavy soils, full sun. Plant at 1 m centres. *A. B. D.*

Platylobium

Platylobium is a small genus of four species of pea-flower, related to *Bossiaea* and all occurring in eastern Australia. They are small to medium-sized shrubs, with good-sized yellow and red flowers. Only two of the species are known to be in cultivation, and these are hardy in most soils and aspects, provided that they are not too wet. Propagation is by scarified seed.

P. formosum (Small)

Spreading or upright shrub to 1 m high (occasionally taller), with heart-shaped leaves to 5 cm. Yellow and red pea-flowers occur in spring. Distribution: Queensland, New South Wales, Australian Capital Territory, Victoria and Tasmania. Colour plate on page 137.

Propagation: From scarified seed.

Cultivation: See note on genus. Hardy plant. Common in cultivation. Some low growing, spreading forms are known and should be encouraged. *F. H.*

P. obtusangulum (Small)

Slender shrub spreading or erect, to 1 m high. Leaves are variable, more or less triangular or arrow-shaped with one or three sharp points. Yellow and red pea-flowers occur in spring. Distribution: Victoria, Tasmania and South Australia.

Propagation: From scarified seed.

Cultivation: See note on genus. Should be kept reasonably dry. Interesting foliage. *H. L.*

Psoralea adscendens (Small)

Spreading shrub 1 m or more across and up to 60 cm high. Sprays of purple pea-flowers displayed well against deep green trifoliate leaves in late spring. Distribution: higher country in New South Wales, Victoria and Australian Capital Territory, with isolated occurrences in South Australia and Tasmania.

Propagation: From scarified seed.

Cultivation: Needs a sunny position with reasonable drainage. *H. J. K.*

Pultenaea

Bacon and eggs

Pultenaea, with about 100 species, is the largest genus of the Australian endemic pea-flowers. Its members vary from prostrate to tall, woody shrubs and include some diverse foliage types. Flowers are usually yellow or yellow and red, and in many species are crowded into dense terminal heads. They mostly make handsome horticultural subjects and are not grown as much as they deserve. In cultivation good drainage is important and a soil rich in leaf litter is an advantage. Most will accept full sun or partial shade. Flowering usually lasts for a month or six weeks in spring, but in many species the foliage provides year-round interest. Propagation is by scarified seed.

P. altissima (Medium)

Erect shrub to 2 m high by 1.5 m across. Leaves are narrow-obovate, to 1 cm. Bears yellow pea-flowers in spring. Distribution: New South Wales and Victoria.

Propagation: From scarified seed.

Cultivation: See note on genus. Some shade appreciated. Neat foliage. *F. H. L.*

P. baeuerlenii (Small)

Low, woolly shrub to 60 cm. Terete leaves to 1.5 cm. Yellow and red pea-flowers crowded at ends of branches occur in late spring. Distribution: southern tablelands of New South Wales.

Propagation: From scarified seed.

Cultivation: See note on genus. Rarely seen in cultivation. *H.*

P. blakelyi (Medium)

Slender shrub to 2 m high. Leaves oblong to 3 cm. Bears yellow pea-flowers in spring. Distribution: New South Wales.

Propagation: From scarified seed.

Cultivation: See note on genus. Should be pruned annually after flowering. *H.*

P. cunninghamii (Small)

Erect or rarely prostrate plant. Upright form rarely exceeds 1 m in cultivation, often taller in the field. It has an open habit. Leaves are light green, rounded, with a pointed tip, 1.2 cm long. Orange-red pea-flowers occur in spring. Distribution: Queensland, New South Wales, Australian Capital Territory and Victoria.

Propagation: From scarified seed.

Cultivation: See note on genus. Prostrate form is in cultivation in Melbourne and shows promise. Attractive shrub. *H. L.*

P. daphnoides (Medium)

Erect shrub to 3 m high by 1.5 m across with dark green leaves, obovate, with a flattened end. Yellow and red pea-flowers in terminal heads appear in spring. Distribution: Queensland, New South Wales, Victoria, Tasmania, South Australia and New Zealand.

Propagation: From scarified seed.

Cultivation: See note on genus. One of the commonest *Pultenaea* spp. Will accept reasonable shade. *F. H.*

P. empetrifolia (Small)

Low spreading shrub to 40 cm high by 50 cm across, with terete leaves to 1 cm. Orange-red pea-flowers in heads occur in spring. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: See note on genus. *H.*

P. euchila (Medium)

Erect shrub to 3 m high by 1.5 m across. Leaves are narrow-oblong, to 3 cm, without a point at the end. Yellow pea-flowers occur in spring. Distribution: Queensland and New South Wales.

Propagation: From scarified seed.

Cultivation: See note on genus. Reasonably hardy species. *H.*

P. ferruginea (Small)

Erect shrub to 1 m high by 60 cm across. Leaves are oblong, to 7 mm. Yellow axillary pea-flowers occur in spring. Distribution: New South Wales.

Propagation: From scarified seed.

Cultivation: See note on genus. *H.*

P. flexilis (Large)

Erect shrub to 4 m high by 2 m across. Leaves are narrow-oblong to 2 cm. Profuse yellow and red pea-flowers occur in spring. Distribution: Queensland and New South Wales.

Propagation: From scarified seed.

Cultivation: See note on genus. Good background shrub. Likes some shade. *F. H.*

P. incurvata (Small)

Erect, open, hairy shrub to 1 m high by 40 cm across. Leaves are linear, to 1 cm, curving up towards the stem. Yellow and red pea-flowers in heads occur in spring and summer. Distribution: the Blue Mountains, N.S.W.

Propagation: From scarified seed.

Cultivation: See note on genus. Although this plant grows in wet places, it seems to prefer reasonable drainage in cultivation. *H.*

P. largiflorens (Small)

Stiff, sprawling plant to 1 m high by 1.5 m across. Light green leaves, obovate, to 1 cm, often two-lobed at the end. Bears yellow and red pea-flowers in axillary clusters in spring. Distribution: N.S.W., Victoria & S.A.

Propagation: From scarified seed.

Cultivation: See note on genus. *H.*

P. microphylla (Small)

Prostrate or erect plant to 1 m high. Leaves are narrow-obovate, to 8 mm, with a blunt end. Bears yellow and red pea-flowers in upper axils in spring. Distribution: Queensland and New South Wales.

Propagation: From scarified seed.

Cultivation: See note on genus. Prostrate forms make useful ground covers in perfectly drained situations. (A) (B) *H.*

P. obovata (Medium)

Bushy shrub to 2 m high by 1.5 m across. Leaves spatulate, to 9 mm. Bears yellow pea-flowers in spring. Distribution: near Guyra, New South Wales.

Propagation: From scarified seed.

Cultivation: See note on genus. One of the hardiest species in cultivation. Neat, fresh green foliage. Enjoys some shade. *F. H. L.*

P. pedunculata

Prostrate, trailing plant with mid-green leaves and yellow-orange pea-flowers in spring. Distribution: South Australia, Victoria, New South Wales and Tasmania.

Propagation: From scarified seed.

Cultivation: Often unreliable in cultivation. Well-drained soil in sun or part shade is recommended. Plant at 60 cm centres. *D. H. J.*

P. polifolia (Small)

Weak, spreading, open shrub to 30 cm high by 1 m across. Leaves are narrow-elliptical, to 3 cm. Bears yellow and red pea-flowers in spring. Distribution: Queensland, New South Wales and Victoria.

Propagation: From scarified seed.

Cultivation: See note on genus. Best suited for a rockery or wall where branches hang down. Long-lived in cultivation. Full sun is satisfactory. *H. J.*

P. procumbens (Small)

Common undershrub of dry sclerophyll habitats. Low bush 30 cm high by 1 m across. Leaves are small, pointed and slightly hairy. Yellow and brown pea-flowers occur in spring. Distribution: high country in New South Wales, Australian Capital Territory and Victoria.

Propagation: From scarified seed.

Cultivation: Well-drained soil with some shade is required. *F. H. J.*

P. rigida (Small)

Erect, stiff shrub to 1 m high. Leaves are lanceolate, to 1 cm. Bears axillary, yellow and red pea-flowers in spring. Distribution: South Australia.

Propagation: From scarified seed.

Cultivation: See note on genus. *H.*

Pultenaea sp. (Diamond head)

Woody, prostrate shrub spreading to 1.5 m. Elliptical leaves are small, light green and slightly hairy. Flowers are yellow. Distribution: Collections were made by the author at Diamond Head on the mid-north coast of New South Wales in 1966. The species probably occurs over a wider area, but this has not been checked.

Propagation: From cuttings and probably also scarified seed.

Cultivation: Needs a well-drained, sunny position. *D. H. W.*

Pultenaea stipularis (Small)

Erect, sparsely branched shrub to 1 m high by 60 cm across. Soft, pine-like leaves to 4 cm. Dense terminal heads of yellow pea-flowers occur in spring. Distribution: New South Wales.

Propagation: From scarified seed.

Cultivation: See note on genus. One of the best *Pultenaea* spp. Attractive foliage. Hardy in well-drained, semi-shaded locations. *F. H. L. P.*

P. subalpina (Small)

Erect shrub to 1 m high by 70 cm across. Leaves terete, to 2 cm. Pink pea-flowers occur in spring. Distribution: the Grampians, Victoria.

Propagation: From scarified seed. Also has been grown from cuttings.

Cultivation: See note on genus. This rare shrub is difficult to maintain in cultivation. Pink flowers are spectacular. *H.*

P. subspicata (Small)

Low spreading shrub to 80 cm high by 1 m across. Leaves are linear, to 1 cm. Bears yellow and red pea-flowers in terminal heads in spring. Distribution: New South Wales, Australian Capital Territory and Victoria.

Propagation: From scarified seed.

Cultivation: See note on genus. *H.*

P. subternata (Small)

Low shrub with hairy branches. Leaves are ovate, to 8 mm, pointed and hairy. Yellow-brown pea-flowers appear in upper leaf axils in spring. Distribution: New South Wales.

Propagation: From scarified seed.

Cultivation: Very useful rockery plant. Needs good drainage, full sun or part shade. Not fully tested for frost tolerance.

P. villosa (Medium)

Pendulous, spreading shrub to 1.3 m high by 2 m across. Leaves hairy, narrow-oblong, to 6 mm. Bears yellow and red pea-flowers axillary, in spring. Distribution: Queensland and New South Wales.

Propagation: From scarified seed.

Cultivation: See note on genus. A hardy plant with very attractive habit. Looks well in well-drained soil at pool edge. *H. L. P.*

Sophora tomentosa (Medium)

Open shrub to 3 m high (sometimes taller) by 1.5 m across, with pinnate leaves with ovate leaflets, each 2.5 cm long. Both are silvery-grey. Bears terminal sprays of lemon-yellow pea-flowers followed by long pods to 15 cm, constricted between seeds. Distribution: Sea coasts of the Northern Territory, Queensland and New South Wales.

Propagation: From scarified seed.

Cultivation: A hardy plant for frost-free areas. Excellent specimen plant for coastal areas of Sydney and further north. Needs good drainage and a warm location and is resistant to salt spray. *L. P. V. W.*

Sphaerolobium vimineum (Small)

Erect, leafless shrub to 60 cm high by 60 cm across. Profuse yellow and red or orange and red pea-flowers are borne along the stems in spring. Distribution: heathland in temperate regions of Australia.

Propagation: From scarified seed, but cuttings will strike.

Cultivation: Excellent drainage and full to half sun are required. Not easy to maintain. A mulch of sandstone slabs may be effective. *H.*

Swainsona

About 50 *Swainsona* spp. are recognised, all endemic, mostly in inland areas. They are semi-herbaceous perennials, or sometimes annuals, with very colourful pea-flowers. They are easy to grow in warm, dry areas, only a few being frost hardy. The perennials should be cut back to ground level each winter to make way for a new flush of spring growth and the display of flowers. Propagation is by scarified seed.

S. burkittii (Small)

Spreading perennial to 30 cm high by 60 cm across, with woolly pinnate leaves. Spikes of deep purplish-red flowers, very dark, occur in spring. Distribution: New South Wales and South Australia.

Propagation: From scarified seed or cuttings (no mist).

Cultivation: See note on genus. Very frost tender. Interesting plant probably best suited to the dry, sunny rockery. *J.*

S. galegifolia (Small)

Darling pea

Perennial to 1 m with stems of pinnate leaves. Bears sprays of large pea-flowers in spring. Flower colour varies from white to deep red, with mauve-pink the most common. Distribution: semi-arid parts of South Australia, New South Wales and Queensland. Colour plate on page 141.

Propagation: From scarified seed.

Cultivation: Plant in a sunny position in all but very wet soils. Cut back old stems in late winter. *H. K.*

S. maccullochiana

Ashburton pea

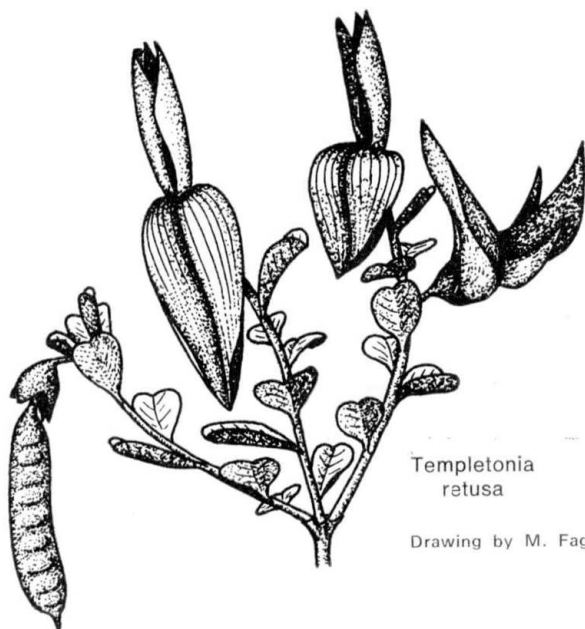
Tall annual to 2 m with pinnate leaves. Bears long heads of rose-pink pea-flowers to 2 cm in summer. Distribution: Western Australia.

Propagation: From scarified seed.

Cultivation: Grown successfully at King's Park, Perth, in sandy soil. Should perform well in the eastern States if seed is available. Sow in July. May be best positioned against a fence or trellis. *P.*

Swainsona greyana is very similar to *S. galegifolia*, but with white woolly hairs on inflorescence and under leaves.

Many other *Swainsona* spp. warrant cultivation. Some have been grown from time to time, but few others are in regular cultivation. All can be grown readily from scarified seed, and a sunny, well-drained location should be used, at least for starting them.



*Templetonia
retusa*

Drawing by M. Fagg

Templetonia retusa
(Medium)

Rounded spreading shrub to 2 m high by 3 m across. Leaves obovate to 4 cm. with a flattened end. Large red pea-flowers with reflexed standard occur in winter and early spring. Occasionally flowers are all yellow or partly yellow. Distribution: on limestone in S.A. and W.A.

Propagation:

From scarified seed.

Cultivation:

Excellent shrub for limestone areas. Resistant to salt spray. Limestone

underlay may prove beneficial in culturing this plant in other areas. Good drainage and full sun to half shade are required. *H. W.*

Viminaria juncea (Syn. *V. denudata*)

Native broom

Small tree or tall shrub occurring in swampy ground with pendulous, leafless branches and sprays of yellow pea-flowers in spring. Distribution: all States except the Northern Territory.

Propagation: From scarified seed.

Cultivation: Does well in damp soils in full sun. The plant is effective near a pool with branches overhanging the edge. It may reach 6 m, so sufficient space should be allowed. *E. H. L. P.*

The Plant Family Fabaceae

By C. N. DEBENHAM

The plant family Fabaceae, formerly known as Papilionaceae, has some 480 genera throughout temperate and tropical areas of the world. Of these, 92 genera are found in Australia. They are herbaceous to woody plants, usually shrubs, but include creepers and climbers and some very beautiful trees.

Botanical characteristics of this large family of plants are:—

Inflorescence (hand of flowers): solitary-flowered to racemose, paniculate, capitulate, spicate.

Flowers: mostly bisexual and irregular, collectively known as pea-flowers. **Calyx** of five sepals partially united to form a five-lobed or -toothed tube.

Corolla of five free, imbricate petals, papilionaceous in most, i.e. the uppermost petal (the standard) exterior, two petals lateral and almost parallel to form "wings", and a lower pair innermost and partially united by their margins to form a "keel" enclosing the stamens and gynaecium.

Stamens usually 10, free or variously partially united by their filaments into a closed or open tube or sheath, the uppermost (adaxial) filament showing varying degrees of cohesion and sometimes absent. Anthers opening lengthwise.

Gynoecium: monocarpellate, superior, the 1-locular ovary produced to a simple style and stigma. Ovules one to many, attached to the ventral suture of the carpel, usually in two rows.

Fruit: a one to many seeded pod; a legume when opening to two valves by one or both sutures; a lomentum when breaking up into 1-seeded, usually indehiscent, joints (articles), or the pod indehiscent or winged. Seeds usually with a leathery-textured testa, sometimes with an external fleshy tissue (a strophiole), rarely with endosperm.

Leaves: except in Australian genera, the leaves are rarely opposite or simple, but with stipules often present and sometimes also secondary stipules (stipels) at the base of the leaflets.

Roots: a symbiotic relationship with a nitrogen fixing bacteria makes these plants important for soil improvement.

Not native to Australia, but widely cultivated here, are the several food ("pulse") and "green manure" crops, e.g. of *Phaseolus* (various beans), *Pisum* (various peas), *Cicer arietinum* (chick peas), *Vicia faba* (broad bean), *Glycine max* (soybean), *Arachis hypogaea* (peanut), such pasture crops as the clovers and trefoils of *Trifolium* and *Lotus*, the medics and lucerne (*M. sativa*) of *Medicago*, the vetches and tares of *Vicia* spp., and the many ornamentals as *Lathyrus*, *Lupinus*, *Spartium*, *Ulex*, *Cytisus*, *Chamaecytisus*, *Sarothamnus*, *Wistaria*, *Erythrina*, etc.

Also familiar to the Australian scene are the products derived from overseas, rotenone (an ingredient of certain insecticides) from *Derris* spp., liquorice from *Glycyrrhiza* spp., and Gum tragacanth from *Astragalus gummifera*.

Many of the Australian natives are becoming established world-wide as ornamentals. Black Bean, *Castanospermum australe*, is a recognised source of a high quality cabinet timber. While palatable to stock, a number (especially of *Gastrolobium* and *Oxylobium*) are poison plants, the toxic principle of the two genera, monofluoroacetic acid, reaching dangerous levels, particularly at flowering and fruiting times. Other genera, both cultivated (e.g. *Lupinus*, *Lotus*, *Trifolium*) and native (e.g. *Goodia lotifolia*, *Indigofera australis*), have been shown to produce toxins largely of the glycosidal (often cyanogenetic) and alkaloidal groups.

KEY TO THE GROUPS OF GENERA

Genus
No. In
Group

- A. Filaments all free from one another.
 - Petals all free, similar and almost equal 1
 - Petals free, or the lower two overlapping, but not united.
 - Corolla papilionaceous to almost regular 2-4
 - Petals partly united, dissimilar. Corolla papilionaceous.
 - Standard much shorter than the wings 5-8
 - Standard longer (and larger) than the wings.
 - (i) Calyx deeply divided to valvate lobes 9-11
 - (ii) Calyx not valvate; lobes rarely longer than the tube.
 - Ovules 4 or more 12-16
 - Ovules 2 17-28
 - B. Filaments variously united. Corolla papilionaceous.
 - I. Filaments all united in a sheath open on the upper side. Fruit dehiscent.
 - Leaves unifoliate or reduced to scales 29-34
 - Leaves digitate, of three leaflets. Mainly herbs 35-38
 - Leaves pinnate. Mainly shrubs 39-41
 - II. Filaments united in a closed sheath, the upper (adaxial) free at the base or becoming quite free.
 - Trees, tall shrubs, or woody climbers, pinnately-leaved, the leaflets at least five. Fruit indehiscent (or finally dehiscent in some 42) 42-45
 - Herbs or shrubs (usually dwarf), pinnately-leaved, the leaflets mainly three. Fruit dehiscent. Refer also 70 46-49
 - III. Filaments all united in a sheath open on the upper side, or in two equal bundles, or the adaxial absent. Fruit indehiscent. Pinnately-leaved trees 50
 - IV. Filaments united in a sheath open on the upper side, the adaxial free, or partly united or (63) absent.
 - (a) Leaves pinnate or 1-foliolate, with T-shaped hairs. Connective of filament with gland-like tip. Pod septate between seeds, but not jointed 51
 - (b) Leaves pinnate or digitate. Pod indehiscent, 1-seeded. Leaves glandular 52-53
Leaves not glandular, pinnately 3-foliolate 91-92
 - (c) Leaves pinnate or digitate, glandular. Pod dehiscent, rarely 1-seeded 54-58
 - (d) Leaves pinnate, of several leaflets bordered by glandular teeth. Pod indehiscent, 1 or 2-seeded 59
 - (e) Leaves pinnate, of several non-glandular leaflets. Pod dehiscent; seeds many 60-62
 - (f) Leaves pinnate, of several leaflets, the petiole ending in a bristle, non-glandular. No adaxial stamen. Pod dehiscent, several-seeded 63
 - (g) Leaves pinnate, non-glandular, without a bristle. Pod dehiscent.
 - (i) Trees, shrubs, or woody climbers. Leaves 3-foliolate 64-67
 - (ii)-(iv) Herbs or dwarf shrubs. Flowers axillary 68-76
 - (h) Annual herbs, 3-foliolate, the leaflets on long slender petioles. Flowers in axillary sessile clusters. Pod dehiscent 77
 - (i) Perennial herbs, 5-foliolate, three leaflets close together at the top, two at the base of the petiole. Flowers axillary, umbellate. Pod dehiscent 78
 - V. Filaments all united in a split sheath. Leaves pinnate. Fruit jointed, the joints often separating, rarely dehiscent 79-82

- VI. Filaments united in a closed tube, the adaxial free or united. Leaves pinnately 1 or 3-foliate. Fruit jointed, the joints separating into indehiscent, 1-seeded segments 83-89
- VII. Filaments all united in a closed tube; anthers alternately long and short. Leaves digitate, 2-4 foliolate. Pod of several indehiscent joints 90

KEY TO GENERA IN THE FAMILY

- A. Filaments free; anthers uniform (except in *Euchilopsis*). Pod remaining whole. Trees or shrubs, herbaceous only in *Isotropis*. Corolla regular, the petals all free, similar and almost equal. Leaves alternate, unifoliate. Trees.

Petals with long claws, shorter than the filaments. Flowers in long terminal racemes, orange yellow. Pod flat, 1 or 2 seeded. A single species of the tropical and sub-tropical eastern coast.

1. *Barklya*

Corolla papilionaceous or almost regular, the petals free or the lower two overlapping, but not united. Leaves unequally pinnate, the leaflets more than 10. Trees or tall shrubs, tropical or sub-tropical.

Lower petals longer than the upper, all free, narrowed into claws, almost similar. Leaves opposite. Flowers in racemes or panicles, rose-coloured. Pod 4 to 1 seeded.

2. *Podopetalum*

Lower petals shorter than the upper (standard), free or (*Sophora*) overlapping to form a keel. Leaves alternate.

Flowers in loose racemes axillary to the older leaves or lateral on old wood, yellow, large. Pod up to 20 cm long, turgid, almost woody; seeds several, large, globular. One species.

3. *Castanospermum*

Flowers in simple racemes or in large panicles, terminal, yellow. Pod up to 15 cm long, woody or leathery, constricted between the globular or ovoid seeds.

4. *Sophora*

Corolla papilionaceous. Leaves mostly simple or reduced (sometimes digitate or pinnate in *Gompholobium* and *Burtonia*. Shrubs often dwarf or prostrate, rarely small trees (*Jacksonia*) or herbaceous (*Isotropis*). Temperate or tropical. (Tribe *Podalyreae*).

Standard small or narrow, much shorter than the wings, the keel usually longer and broader than the wings. Ovules 4 or more. While all genera are represented in W.A., only *Leptosema* (sometimes equated with *Brachysema*) is known elsewhere, i.e. N.T. south to central tropical Q.

Calyx with lobes almost of equal length, the 2 upper often united higher up. Flowers red, or red with orange or purple, rarely green-yellow.

1

Calyx with 2 upper minute teeth and 3 lower elongated lobes, its upper surface split obliquely.

Flowers red, at first 4 together within a 4-leaved involucre, forming a nodding, sessile, terminal head. Shrubs with opposite, simple, broad and obtuse leaves. One species.

5. *Jansonia*

1. Leaves simple, opposite or alternate.

2

Leaves reduced to small scales.

Flowers either solitary or clustered within the nodes of the winged stems, or crowded in short radical scapes. Fruit ovate or ovoid, inflated; seeds (where known) not strophiolate.

6. *Leptosema*

2. Bracteoles absent. Flowers solitary or few, infra-terminal or axillary. Fruit ovoid or elongated; seeds strophiolate.

7. *Brachysema*

Bracteoles 2, orbicular, forming a large cup below the calyx. Flowers axillary, solitary or paired on slender pedicels. Leaves alternate, narrow and long, with recurved margins. Fruit ?. One species.

8. *Cupulantes*

Standard well-developed, longer than the wings, orbicular or reniform.

- (a) Calyx deeply divided to valvate lobes, the 2 upper usually broader, but (except for a tendency in some *Jacksonia*) not united. Seeds without a strophiole.

Leaves simple or digitate, or pinnate with the terminal leaflet always sessile. Flowers solitary, few, or in racemes usually terminal. Pods ovoid or globular, inflated, often oblique. Shrubs.

1

Leaves usually reduced to minute scales, sometimes few and 1-foliate. Flowers in terminal or lateral spikes or racemes, or scattered along the branches. Pod ovate or oblong, flat or inflated. Shrubs or small trees with angular or winged branches and branchlets either resembling flat leaves, or spiny and branched, sometimes angular and rod-like. Flowers yellow, or red-purple and yellow.

9. *Jacksonia*

1. Flowers solitary, few, or in short racemes usually terminal, yellow or red with a dark-coloured calyx. Ovules rarely 4, usually 8.

10. *Gompholobium*

Flowers solitary in the axils of the upper leaves or in terminal racemes, yellow, orange-red or bluish-purple, the calyx dark-coloured. Ovules regularly 2.

11. *Burtonia*

- (ii) Calyx-lobes not longer than the tube or, if longer, as in *Isotropis*, *Euchilopsis* and some *Pultenaea*, not valvate, sometimes reduced to $\pm$ equal teeth as in *Viminaria*, some *Latrobea* and many *Daviesia*, but in most the 2 upper broader than the lower 3 and united to form a lip.

Calyx-lobes mostly of equal or near-equal length. Ovules 4 or more, except in *Mirbelia*, where sometimes 2. Leaves simple, entire, or with pungent-pointed lobes, or (in some *Isotropis*) unifoliate. Colour of flowers orange, red or purple; calyx and ovary usually silky-haired. Pod with an undivided cavity; seeds 4 to many, strophiolate only in *Nemcia*.

1

Pod divided by a longitudinal partition developed from the lower suture; seeds 2 to many, not strophiolate.

Flowers in racemes axillary or terminal, or solitary or clustered and axillary. Pod ovoid or oblong, inflated. Shrubs sometimes spinous.

12. *Mirbelia*

1. Calyx-lobes, when long, not forming an almost entire lip. Pod ovoid or oblong, inflated or flattened. Flowers in terminal (most *Chorizema*) or axillary racemes, sometimes in axillary or terminal clusters, or solitary. Stipules spinous (some *Oxylobium*), scale-like or absent. Shrubs. Calyx-lobes long, the 2 upper forming an almost entire lip. Pod oblong, linear or lanceolate, acute, somewhat inflated, with numerous seeds. Flowers solitary on axillary peduncles or forming a loose terminal raceme. Leaves alternate, herbaceous, with lanceolate, linear or minute stipules. Herbs or low shrubs.

2

13. *Isotropis*

2. Keel about the length of the wings, but broader. Leaves mostly opposite or in whorls of 3. 3
Keel much shorter than the wings. Leaves rarely opposite or whorled. Flowers mostly in terminal racemes. 14. *Chorizema*
 3. Flowers in terminal or axillary clusters. Seeds strophiolate, 4 to 6 15. *Nemcia*
Flowers in terminal or axillary racemes or clusters.
Seeds not strophiolate, from 4 to many. 16. *Oxybolum*
- Calyx-lobes rarely of equal length. Ovules 2. Seeds 1 or 2 (as in some *Mirbella*).
- Bracteoles persistent, adnate, or close to the calyx, leafy or scale-like. Leaves simple, entire, mainly alternate. Flowers axillary and solitary, or crowded at or near the ends of the floral shoots. 1
- Bracteoles not persistent and minute, and remote from the calyx or absent.
1. Stamens quite free from the petals. Leaves from linear to broad, terete to flat, or with margins revolute, recurved, or incurved, sometimes concave or channelled above; stipules rarely absent. Flowers orange-yellow, often with a purplish keel, when in heads often surrounded by leaf- or scale-like stipules or bracts. Pod ovate, flat or inflated, often beaked. Seeds strophiolate. 17. *Pultenaea*
Stamens all, or at least the outer, adnate by their bases with the petals. Leaves linear, with revolute margins; stipules absent or minute. Flowers yellow, or purple-red and yellow. Bracts small or absent. Pod ovate, inflated; seeds not strophiolate. 18. *Phyllota*
 2. Leaves linear, with involute or incurved margins, or terete and grooved along the upper surface. Stipules minute or absent. Pod ovate or rounded, flattened or inflated; seeds strophiolate. 3
Leaves from linear to orbicular, or modified, the margins when not flat recurved or revolute, or sometimes thickened. 4
 3. Leaves alternate. Flowers few together in axillary or terminal racemes or heads, rarely solitary, yellow or yellow and red, the standard broader than long. 19. *Dillwynia*
Leaves opposite and decussate. Flowers solitary or 2-4 together, sometimes crowded at or near the ends of the shoots, axillary, yellow and orange to red or purple. 20. *Eutaxia*
 4. Pod ovate, ovoid or globular (? *Erichsenia*), flat or inflated. 5
Pod triangular, flattened, the upper suture almost straight, the lower sharply curved.
Leaves either flat and horizontal or vertical, or terete and spinescent, sometimes reduced to short teeth, or absent. Flowers yellow to red, mostly in axillary or lateral racemes, rarely terminal. Calyx-lobes usually very short, in some the upper 2 broader and united. Seeds with a prominent strophole. 21. *Daviesia*
 5. Stems reed-like, leafless, or leaves modified, narrow. 6
Stems not reed-like, normally bearing leaves. 7
 6. Leaves when present narrow. Flowers yellow or red, in terminal racemes or lateral racemes or clusters. Upper 2 calyx-lobes forming a prominent falcate lip. Style with a longitudinal membrane and ring of hairs below the stigma.
Pod globular, flattened, oblique; seeds strophiolate.
22. *Sphaerolobium*

Leaves usually all reduced to long filiform petioles, rarely 1-3 foliolate. Flowers orange-yellow, in terminal racemes. Calyx-lobes reduced to short equal teeth. Pod ovoid-oblong, indehiscent; seeds with a small strophiole. 23. *Viminaria*

7. Calyx-lobes almost equal, either ribbed or reduced to teeth (*Latrobea*), or rounded and shorter than the tube (*Erichsenia*). 8

Calyx-lobes unequal, the upper 2 usually broader and united higher up. 9

8. Leaves alternate or scattered, simple, usually narrow. Flowers yellow and purple, in axillary racemes. Leaves hooked; stipules bract-like. One species. 24. *Erichsenia*

Flowers yellow or purple, solitary or in heads or clusters, terminal or axillary. Leaves concave or channelled above, obtuse or pointed, but not hooked; stipules absent. Pod ovate or lanceolate, flat or compressed; seeds strophiolate. 25. *Latrobea*

9. Anthers alternately longer and shorter. Upper calyx-lobes large and orbicular, the lower 3 very small. Flowers orange-red, axillary, solitary or paired. Pod oblique, rounded, somewhat compressed; seed without a strophiole. One species. 26. *Euchilopsis*

Anthers uniform. Upper 2 calyx-lobes not conspicuously larger than the lower 3.

Flowers axillary, solitary, or in clusters, rarely in short terminal racemes, yellow or yellow and purple. Leaves alternate or in whorls of 3, usually narrow or broader when whorled, margins recurved or revolute; stipules absent. Pod ovate, flat or somewhat inflated; seeds usually without strophioles. 27. *Aotus*

Flowers in axillary or terminal racemes, or in dense axillary clusters, yellow or with red-purple. Leaves opposite or whorled, flat, usually broad, often toothed, lobed, or pungent-pointed; stipules rarely absent. Pod ovoid, inflated; seeds strophiolate. 28. *Gastrolobium*

- B. I. Filaments 10, all united in a sheath split above. Pod 2-valved, dehiscent, not jointed, 1-seeded only in *Plagiocarpus*.

Exceptional to the group is *Plagiolobium* (based on *Hovea chorizemifolia*), in which the adaxial filament usually is free to the base.

- (a) Leaves calyfoliate or reduced to scales. Flowers axillary; upper 2 calyx-lobes broader and usually much larger than the lower 3. Seeds strophiolate, several to many, or 2 in some *Scottia*.

- (i) Anthers uniform. Flowers solitary (or 2-3 together in some *Bossiaea*), yellow in *Platylobium*, yellow with red or brown, or orange, or orange and purple in others.

Leaves opposite, branchlets slender and terete.

Leaves opposite or alternate, mostly entire, in some reduced to scales or absent. The branchlets, terete, angular or winged, flattened or spinescent, sometimes leafless. Pod flat, not winged, several seeded. 29. *Bossiaea*

1. Leaves entire, angled or deeply sinuate, or denticulate or prickly-toothed, from minute to 20 mm or more long. Pod flat, not winged, usually with a long stalk (stipe); seeds from 2 to 8. 30. *Scottia*

Leaves entire or with acute or obtuse angles or lobes, reticulate, 20 mm or more long. Pod flat, winged along the upper suture, opening elastically in 2 valves, rolled back, but not separating from the wings, several seeded.

31. *Platylobium*

- (ii) Anthers alternately long/erect, and short/versatile. Adaxial filament quite free from the others.

Leaves pungent-pointed, sinuate and prickly-toothed, ovate to lanceolate, reticulate; stipules spinous. Flowers 2-6 in the axils, blue. Pod 2-8 seeded. One species.

32. *Plagiolobium*

Adaxial filament united with the others. Leaves entire, rarely unifoliate in *Templetonia*, few or none.

Stems terete or flattened, usually grooved or striate; stipules minute or spinescent. Flowers red, yellow or with purple, solitary or 2-3 together. Pod flat, oblong or linear, usually with several seeds.

33. *Templetonia*

Stems terete, rarely spinescent, stipules minute or none. Flowers blue or purple, or white, in clusters or very short racemes, rarely solitary. Pod inflated, obliquely globular or ovoid, rarely more than 2-seeded.

34. *Hovea*

- (b) Leaves digitately 3-foliate. Calyx-lobes almost equal. In *Crotalaria*, leaves sometimes simple, unifoliate, or up to 5 digitate; upper 2 calyx-lobes sometimes forming a lip with the lower 3 $\pm$ united. Calyx-lobes very unequal in *Muelleranthus*.

- (i) Anthers alternately erect and versatile, almost equal in *Plagiocarpus*, long and short in *Crotalaria*.

Flowers solitary and axillary. Pod inflated, obliquely ovate, with 1 strophiolate seed. Dwarf shrub. One species.

35. *Plagiocarpus*

Flowers in axillary, leaf-opposed, or terminal racemes, yellow or blue. Pod inflated, globular or oblong, with 2 or more seeds not strophiolate. Herbs, or shrubs, usually dwarf.

36. *Crotalaria*

- (ii) Anthers uniform. Flowers solitary (1-2 in *Rothia*) on leaf-opposed peduncles. Seeds not strophiolate. Annual herbs, tropical.

Calyx-lobes almost equal. Pod linear or linear-lanceolate, with numerous seeds.

37. *Rothia*

Calyx-lobes very unequal, the 2 upper short, the lower-most longest. Pod linear-oblong, up to 9 seeds.

38. *Muelleranthus*

- (c) Leaves pinnately 3-foliate, the leaflets entire. Upper 2 calyx-lobes united in a 2-toothed lip, the 3 lower equal. Anthers uniform. Flowers terminal/leaf-opposed racemes, yellow seeds 2-4, strophiolate. Shrubs.

39. *Goodia*

- (d) Leaves unifoliate, upper 2 calyx lobes united in a 2-toothed lid, the three lower equal. Anthers almost uniform. Flowers in terminal racemes, yellow with brown. Pod flat, oblong.

39(a). *Aenictophyton*

- (e) Leaves pinnately 3 or more foliolate, rarely unifoliate. Calyx deeply split, the upper 2 lobes united almost to the top. Anthers uniform. Flowers axillary, 1-2, yellow, small. Pod flat, oblong-linear, septate between the numerous strophiolate seeds. Erect shrubs, tropical.

40. *Lamprolobium*

- (f) Leaves unequally pinnate with 7-11 leaflets, the leaflets entire. Flowers solitary on terminal long peduncles, yellow or blue; 2 upper calyx-lobes united in a truncate emarginate lip. Anthers uniform. Ovules 4. Pod and seed?

Annual or perennial herbs.

41. *Ptychosema*

- II. Adaxial filament free at the base, then $\pm$ united with the others in a closed tube, or becoming quite free; anthers uniform. On this character, *Glycine* 70 (IV) must be included.

- (a) Trees, tall shrubs, or woody climbers with unequally pinnate leaves, the leaflets at least 5 in Aust. reps. Pod indehiscent, or finally dehiscent in *Milletia* when 2-valved, flat, linear to oblong, membranous to almost woody; seeds not strophiolate, flat, orbicular to reniform. Flowers in racemes or panicles; calyx truncate or with short teeth or lobes. Tropical or sub-tropical.

Racemes terminal or paniculate at the ends of the branches. Flowers purple, pink or white. Pod almost woody, dehiscent (finally) when 2-valved, with usually numerous seeds.

42. *Milletia*

Racemes axillary or forming large terminal panicles. Flowers violet, purple, or white. Pod membranous or coriaceous, indehiscent, usually 1 or 2 seeded. Trees or tall climbing shrubs.

43. *Lonchocarpus* (*Kunstleria*)

Racemes axillary. Flowers white. Pod coriaceous to almost woody, indehiscent, 1-seeded. Trees. One species.

44. *Pongamia*

Racemes axillary. Flowers violet to purple or white. Pod thin to coriaceous, indehiscent, the upper or both sutures bordered by a narrow wing, 1 or few seeded. Tall, woody climbers, rarely trees.

45. *Derris*

- (b) Herbs, or shrubs, usually dwarf, with trifoliolate pinnate leaves, stipulate (minute or none in *Canavalia*) and stipellate in *Dioclea* and *Canavalia*, or in *Tephrosia*, from numerous to 1, or rarely simple. Pod dehiscent, 2-valved; seeds strophiolate only in some *Tephrosia*.

Flowers in terminal, leaf-opposed, or rarely axillary, racemes, red, purple or white. Calyx-teeth or lobes almost equal, or the 2 upper ones more united, or the lowest the longest. Standard with appressed hairs. Pod linear, rarely ovate, flat; seeds usually many, often with a small strophiole. Herbs or dwarf shrubs.

46. *Tephrosia*

Flowers in axillary clusters. Calyx longer than the shortly-haired petals, deeply divided to linear-subulate, free, almost equal lobes. Pod oblique, 1-seeded. Dwarf shrubs, densely silky-haired. One species, C.A.

47. *Paratephrosia*

Flowers in axillary racemes on a thick or elongated peduncle, blue, violet or white. Upper 2 calyx-lobes united in a lip. Standard lobed at base. Pod coriaceous or woody, the upper suture dilated, or both sutures winged; seeds from 2 to many. Shrubs.

48. *Dioclea*

Flowers in axillary racemes on an elongated peduncle, the floral shoot noded, pink. Calyx 2-lipped, the upper lip with two broad rounded lobes. Pod oblong or linear, inflated, with a rib or wing on each side of the upper suture; seeds numerous. Climbing or prostrate herbs.

49. *Canavalia*

- III. Filaments all united in a sheath open on the upper side, or in 2 equal bundles, or the adaxial filament absent; anthers uniform, erect, didymous. Fruit indehiscent. Leaves pinnate, with many leaflets, without stipeis.

Flowers small, numerous, in axillary or terminal cymes or panicles, blue or white. Pod thin and flat, oblong or linear; seeds 1 or few. Trees, sometimes climbing.

Tropical.

50. *Dalbergia*

- IV. Adaxial filament free (absent in *Abrus*), the others united in a sheath open on the upper side, except in *Glycine* where all filaments are united in a closed tube with the adaxial often becoming free. In *Pycnospora* the adaxial filament is at first united with the others, and in *Glycyrrhiza* it is slightly coherent.

Pod 2-valved and dehiscent, or indehiscent in *Glycyrrhiza*, *Psoralea* and *Meladenia*.

- (a) Leaves 1 foliolate or pinnate with 3 or more leaflets, rarely glandular. Herbs or shrubs with appressed, or with a sprinkling of grey or silvery hairs attached by the centre (i.e. T-shaped), sometimes with other hairs in addition, but in *Indigofera australis* often glabrous. Flowers in axillary racemes or spikes. Anthers uniform, the tip of the connective gland-like. Pod 2-valved, septate between the seeds, but not jointed; seeds 1 to many, not strophiolate.

Flowers usually red or purple, gibbous or spurred on each side of the keel. Calyx with tube short, broad and oblique, the teeth or lobes almost equal or the lowest longest.

51. *Indigofera*

- (b) Leaves digitate or pinnate, with 3 or more leaflets, or 1-foliate, glandular-punctate, if present, hairs not or T-type. Pod indehiscent, ovate, rarely longer than the calyx and usually enclosed by it; seeds 1, not strophiolate.

Calyx-lobes almost equal, or the lowest the longest, the upper 2 sometimes united. Flowers in axillary spikes or racemes, usually small, purple, pink, blue or white. Stipules embracing the stem by a broad base. Endocarp of pod free from the seed. Shrubs.

52. *Psoralea*

Calyx 2-lipped, the upper lip 4-lobed. Flowers in axillary short racemes or clusters. Leaves unifoliate, densely studded with black dots, present also on the calyx and bracts; stipules linear-subulate. Endocarp of pod adherent to the seed. Glandular, silky-haired shrubs, tropical.

53. *Meladenia*

- (c) Leaves pinnately 3-foliate or, in *Moghania*, digitately 3-foliate, or unifoliate in some *Moghania* and *Eriosema*, glandular-punctate, usually with a silken down. Flowers axillary, in racemes or clusters, or solitary, usually yellow, but in *Moghania* red or purple with yellow. Standard usually with 2 lobes at the base. Pod 2-valved, dehiscent. Tropical or sub-tropical herbs or small shrubs. Ovuies 4 or more. Pod flat, linear or oblong. Seeds strophiolate.

Fruit septate between the seeds, obtuse. Twining herbs or erect shrubs.

54. *Atylosia*

Fruit not septate, obliquely acuminate. Twining herbs.

55. *Dunbaria*



Millettia megasperma

Photography by M. Fagg.

Millettia megasperma is a vigorous woody climber which forms lianas in our eastern rainforests. This species is sometimes referred to as native wisteria and has similar uses to the well-known exotic climber. Description on page 117.

Ovules 2, sometimes 1 in *Rhynchosia*. Pod not septate; seeds not strophiolate, except in some *Rhynchosia*.

Pod inflated, short and very oblique. Leaves digitate or unifoliate, with veins prominent on the under-surface. Flowers in dense panicles or spike-like racemes. Herbs or shrubs.

56. *Moghania*

Pod flat, obliquely orbicular or oblong.

Seeds obliquely transverse, attached to the funicle at one end. In single Aust. rep. an erect herb from a perennial tuber, 1-foliate, hairy in all parts.

57. *Eriosema*

Seeds not transverse, attached centrally to the funicle. Herbs twining or erect, or dwarf-shrubs, 3-foliate.

58. *Rhynchosia*

- (d) Leaves pinnate, of several leaflets with one terminal, bordered by minute glandular teeth; stipules narrow, membranous, not persistent; stipels absent. Flowers in axillary racemes or spikes, blue to lilac. Calyx-lobes equal or the upper two shorter. Anthers alternately unequal. Pod flat, glandular, not septate, indehiscent, with 1 or 2 seeds not strophiolate. Erect or semi-prostrate herbs or dwarf shrubs, temperate.

59. *Glycyrrhiza*

- (e) Leaves pinnate, of several leaflets, not glandular, stipulate, but with stipels minute or absent. Flowers in axillary racemes. Calyx truncate or with almost equal teeth or lobes. Pod 2-valved, dehiscent, or only partly so; seeds many, not strophiolate. Herbs or shrubs.

Leaflets in equal pairs; stipules setaceous, rarely persistent. Flowers large, yellow, red, variegated or white. Pod linear and long, thick, septate within between the seeds. Herbs or shrubs, or short-lived tall shrubs or small trees, mostly tropical.

60. *Sesbania*
Leaflet-pairs terminated by a single leaflet; stipules herbaceous. Style longitudinally bearded on the adaxial side towards the end. Pod not flat.

Standard acuminate, closely reflexed over the calyx. Flowers large (in the one Aust. rep.), red with a deep purple or black shining blotch at the base of the standard. Pod oblong, acuminate. Prostrate or ascending herbs or dwarf shrubs, inland to interior.

61. *Clianthus*
Standard almost orbicular, on a short claw, the claw often thickened or with calli above. Flowers large or small, violet-purple, blue, red, white or yellow. Pod ovoid or oblong, sometimes divided by a longitudinal partition. Herbs or dwarf shrubs.

62. *Swainsona*

- (f) Leaves pinnate, of several equal pairs of leaflets, the petiole ending in a bristle, without stipels. Flowers in racemes, axillary or terminal, clustered on lateral thickened nodes, small, pink, purple or white. Calyx truncate or shortly or broadly toothed. Adaxial filament absent; anthers uniform. Pod 2-valved, flat, oblong or linear, partially septate between the seeds; seeds several, not strophiolate, sometimes black or red and spotted. Tropical twiners, woody at the base.

63. *Abrus*

- (g) Leaves pinnate, 3 or 5-foliolate, rarely 1-foliolate, not glandular, stipulate and stipellate. Flowers axillary or occasionally terminal when in racemes. Anthers uniform except in *Mucuna*.

Pod 2-valved, dehiscent, rarely septate and never jointed.

- (i) Erect trees, shrubs, or woody climbers with 3-foliolate leaves. Flowers in axillary or terminal racemes, in clusters on lateral nodes along the peduncle (but only with a tendency in *Vandasia*). Tropical. Seeds not strophiolate, few in the pod, ovoid or orbicular, large.

Wing and keel longer than the standard. Calyx with the 2 upper lobes united in 1. Anthers alternately longer and erect, shorter and versatile, often bearded. The single Aust. rep. a large twiner with greenish-yellow flowers in short, loose corymbs. Pod thick, but flat, at first with stinging hairs.

64. *Mucuna*

Standard the largest. Calyx truncate or 5-toothed. Anthers uniform. Flowers red or scarlet. Keel and wings much smaller than the standard. Calyx truncate, split, or 5-toothed. Racemes axillary and leafless, or terminal and leafy at the base, the flowers large and few in the clusters. Pod linear-falcate, acuminate. Trees, often large and deciduous, or shrubs, often the trunk and branches with prickles.

65. *Erythrina*

Keel almost equal to the standard and beaked, wings much shorter. Calyx with broad, obtuse teeth, Racemes from long, often pendulous, axillary peduncles. Pod ovate to oblong, oblique. Climbing shrubs.

66. *Strongylodon*

Seeds strophiolate, several in the pod, oblong, large.

Flowers in axillary racemes or in terminal panicles, violet spotted with yellow, several in the clusters; keel incurved, obtuse, almost equal to the wings, standard the largest. Pod broadly linear, flattened, silky-haired. A single species of climbing shrubs.

67. *Vandasia*

- (ii) Herbs, prostrate, twining, or erect with 1-5 leaflets, when 5 the lateral ones in 2 opposite pairs. Flowers axillary. Pod linear, with several strophiolate seeds.

Flowers in axillary racemes, the racemes sometimes in terminal panicles, small, violet, blue or pink. Calyx-teeth short. Glabrous herbs twining, prostrate or erect.

68. *Hardenbergia*

Flowers in racemes, umbels, pairs or solitary, on axillary peduncles, sometimes above 25 mm long, scarlet, red, blue, or black with yellow. Calyx with 2 upper lobes united in an emarginate or 2-toothed upper lip. Perennial herbs, prostrate or twining, usually hairy.

69. *Kennedia*

- (iii) Herbs, perennial, prostrate or twining, 3-foliolate, usually hairy. Flowers in loose axillary racemes, very small, blue or pink. Calyx with the 2 upper lobes united in a 2-toothed or 2-lobed upper lip. Adaxial filament at first united with the others in a closed tube, often becoming finally free. Pod linear or falcate, with several seeds not strophiolate.

70. *Glycine*

Calyx with 2 upper lobes united completely. 70(a). *Shuteria*

- (iv) Herbs, annual or perennial, prostrate or twining, 3-foliolate. Flowers in pairs or clusters along or at the end of a long peduncle arising from swollen or gland-like nodes, purple, red or yellow. Upper calyx-lobes or teeth united in a lip, entire, or (*Phaseolus*) 2-lobed, or (some *Vigna*) united at the base only. Adaxial filament free; anthers uniform. Pod linear, flat or terete, with several seeds not strophiolate.

Keel not beaked or incurved. Style filiform, not bearded; stigma terminal. Stipules small and not persistent.

71. *Galactia*

Keel beaked or incurved. Style thickened, bearded lengthwise in the upper part; stigma oblique or on one side of the style. Stipules usually broad and persistent, often striate.

Keel prolonged into a long linear beak, spirally twisted with the style.

72. *Phaseolus*

Keel incurved, either obtuse or with an oblique beak, not spirally twisted.

73. *Vigna*

- (v) Herbs, erect or twining, 3-foliolate, or (some *Clitoria*) 1-foliolate; stipules ovate to lanceolate, striate, persistent. Flowers few, clustered on very short peduncles. Calyx not lipped. Pod flattened, linear, with several seeds not strophiolate. Tropical segments of large genera with greater diversity in character.



Oxylobium ilicifolium

Photography by M. Fagg.

In the genus *Oxylobium*, the keel is about the same length as the wings as shown above. A feature of *O. ilicifolium* is the holly-like leaves. See page 118 for a description.

Flowers not 20 mm long, yellowish. Calyx campanulate with subulate lobes longer than the tube. Keel very incurved with a short, obtuse beak; style with a small tuft of hairs around the terminal stigma. (Austrodolachos?)

74. *Dolichos*

Flowers large, white. Calyx tubular, about 20 mm long, the lobes acuminate and acute, about the length of the tube. Standard much longer than the other petals; keel incurved, acute. Style bearded longitudinally on the adaxial side.

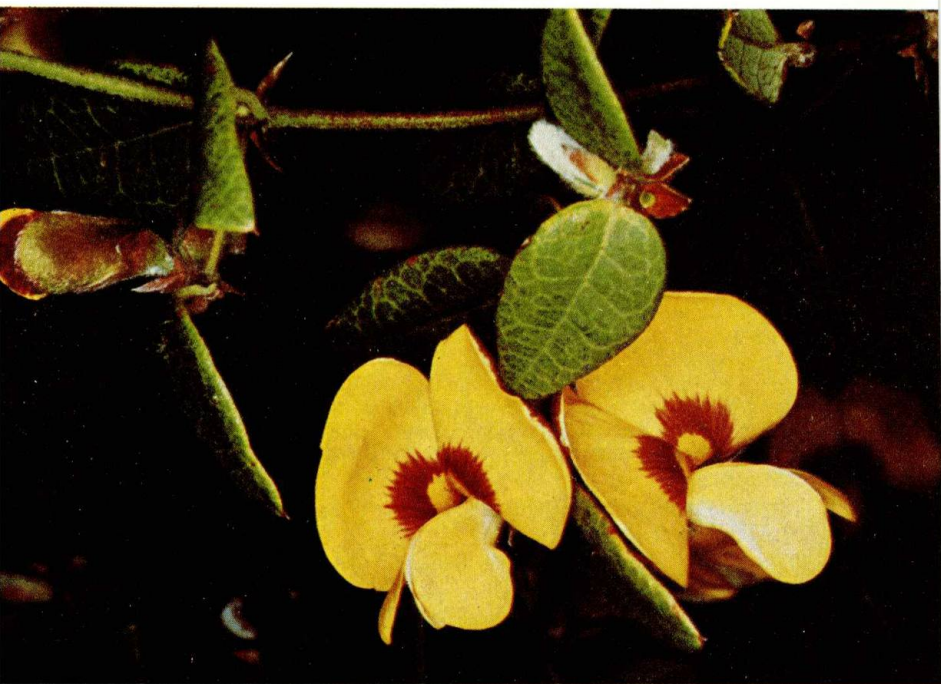
75. *Clitoria*

- (vi) Dwarf shrubs. Leaves pinnately 3- or 1-foliolate. Flowers in terminal racemes or panicles, small, purple. Calyx with the 2 upper lobes united in 1. Adaxial filament free or at first united with the others. Pod oblong, inflated, transversely-veined, with several seeds not strophiolate. Tropical.

76. *Pycnospora*

- (h) Annual herbs, prostrate or ascending, 3-foliolate, the leaflets somewhat denticulate, on a long slender petiole; stipules adnate the petiole, in single Aust. rep. deeply toothed. Flowers in axillary sessile clusters, small, yellow. Calyx with almost equal teeth. Adaxial filament free, or at first united with the others; anthers uniform. Pod linear, 2-valved and dehiscent, curved, with several seeds not strophiolate. Temperate.

77. *Trigonella*



Platylobium formosum

Photography by M. Fagg.

The genus *Platylobium* has opposite leaves. Some of the low-growing, spreading forms make good rockery plants. See page 119 for a description.

- (i) Herbs, perennial in Aust. reps., 5-foliolate, 3 leaflets close together at the top of a flattened petiole, and 2 at the base stipule-like; stipules absent or tubercle-like. Flowers from few to several together, umbellate from an axillary peduncle, with a leaf-like bract under the umbel, pink, white or yellow. Adaxial filament free, the others alternately dilated near the top; anthers uniform. Fruit 2-valved and dehiscent, linear, terete, septate between the seeds; seeds several, not strophiolate.

78. *Lotus*

- V. Filaments all united in a sheath open on the adaxial side, often splitting also on the lower side or forming 2 distinct bundles. Flowers few on axillary short peduncles, usually racemose, yellow. Calyx usually 2-lipped. Fruit jointed, the joints often separating, but rarely dehiscent. Leaves pinnate, stipulate, but not stipellate. Tropical segments of genera with greater diversity.

Tall shrubs with unequally pinnate leaves of 4-7 leaflet-pairs. Flowers solitary or 2-3. Pod linear, flattened, striate, dividing into 2 or more oblong, indehiscent joints.

79. *Ormocarpum*

Herbs or dwarf shrubs.

Leaves unequally pinnate, of from 3 to 30 leaflet-pairs. Pod stipitate, separating into 2 or more short, flat, usually indehiscent, reticulate joints. Herbs, annual or perennial.

80. *Aeschynomene*

Leaves unequally pinnate, of from 3 to 6 or more leaflet-pairs; stipules with a basal 2-lobed appendage. Racemes reduced almost to sessile clusters. Pod stipitate, enclosed by the persistent and enlarged calyx; joints indehiscent. Perennial herbs. 81. *Smithia*
 Leaves equally pinnate, of 2-5 leaflet-pairs. Racemes umbel-like. Pod compressed and disc-like, circinate, of 8-9 dehiscent joints. A single species of erect herbs. 82. *Cyclocarpa*

VI. Filaments united in a closed tube, the adaxial one free or united; anthers uniform. Flowers in terminal or axillary racemes, purple, blue, pink or white. Calyx with 2 upper lobes or teeth $\pm$ united and the lower 3 acute or acuminate. Ovules numerous to 2. Style inflexed or incurved; stigma terminal. Pod exerted from the calyx, flat, jointed, the joints separating into 1-seeded indehiscent segments; seeds not strophiolate. Herbs or shrubs, pinnately 3 or 1 foliolate, the terminal leaflet with 2 stipels, the lateral when present with 1 stipel; stipules usually striate and membranous. Tropical, 1 or 2 pancontinental.

(i) A genus of great diversity which provides the key characters for the group. 83. *Desmodium*

(ii) Leaves 1 foliolate. Adaxial filament free. Ovules numerous. Pod free from calyx.

Flowers in slender terminal, rarely axillary, racemes, the pedicels usually in pairs, small. Calyx deeply divided, the lobes stiff and dry, the 2 uppermost often united into 1. Pod erect, straight, almost terete, or flattened but thick; joints ovate or globular, or truncate at each end. Tropical herbs. 84. *Alysicarpus*

Flowers in terminal, pendulous racemes, clustered in the axils of setaceous bracts. Calyx of 4 short, angular lobes. Ovary surrounded by a tubular disc; style curved, spirally twisted; stigma lateral. Pod linear, compressed or somewhat inflated; joints unequally-sided, 4-5 times longer than broad. A single species of climbing shrubs. 85. *Hanslia*

(iii) Leaves 3-foliolate. Adaxial filament free from at most the middle of the tube. Pod free from calyx.

Flowers in terminal racemes, in clusters of 2-3 to each stipule-like bract. Calyx of 2 upper almost fully united lobes, the lower 3 acute. Ovary with a thin tubular disc around the base, 2-ovuled. Pod straight, flat, of 2 orbicular, narrowly truncate joints. Tropical perennial herbs. 86. *Dicerma*

Flowers umbellate on axillary short peduncles. Calyx of 4 lobes. Ovary with several ovules. Pod somewhat falcate, of several square or orbicular-truncate joints. Tropical trees or shrubs. 87. *Dendrobium*

(iv) Leaves 3 or 1 foliolate, or rarely more in *Uraria*. Adaxial filament free. Joints of pod ovate, folded back upon each other within the calyx. Flowers in terminal racemes, purple or yellow. Tropical herbs or dwarf shrubs.

Calyx broadly campanulate, of equal broad lobes, enlarged after flowering. Flowers small, the pedicels in pairs. Herbs. 88. *Christia*

Calyx of subulate lobes, the 2 upper shorter, remaining small. Flowers reversed by the inflexing of the paired pedicels. Herbs or dwarf shrubs. 89. *Uraria*

VII. Filaments all united in a closed tube; anthers alternately long and short. Flowers in terminal and axillary loose spikes, each enclosed by a pair of oblique striate bracts, yellow and red. Calyx small and thin, of unequal lobes, the upper 2 united. Ovules several to numerous. Pod with the upper suture almost straight, the lower deeply indented; joints several, flat, smooth or bristly, indehiscent; seeds not strophiolate.

Leaves digitate, of 2 or 4 often pellucid-punctate leaflets; stipules strate, often punctate and produced beyond their attachment; stipels absent. Herbs.

90. *Zornia*

VIII. Filaments united into a split sheath, the adaxial one free or partly united with the others; anthers uniform. Flowers axillary, small, in clusters, pink or purple. Calyx with almost equal lobes, the 2 upper partly united. Pod indehiscent, flat, ovate to orbicular, reticulate, with 1 seed not strophiolate. Leaves pennately 3-foliolate, not glandular.

Erect shrubs, stipulate but not stipelate. Standard not appendaged style filiform with a small terminal stigma. Temperate.

91. *Lespedeza*

Climbing herbs, stipulate and stipelate, the stipules (as in 91) narrow and not persistent. Standard with inflexed lobes at the base. Style thickened above, incurved, with a capitate stigma. Tropical.

92. *Phylacium*

Weed Control in Gardens of Australian Plants

by C. J. Borough

A weed can be defined as — 'a plant out of place'. A plant such as *Macrozamia communis*, which has inedible leaves and poisonous fruit, is considered a weed by graziers but thought to be a highly desirable plant by those who see beauty in its intricate leaf shape and large cones. Probably the majority of Australian native plants cultivated in gardens could be classed as weeds in specific situations. To the gardener specialising in native plants weeds could embrace all non-indigenous plants plus some indigenous species. Weeds compete with the desirable plants for moisture and nutrients and, in the eyes of the beholder, look 'out of place'. Australians are increasingly establishing gardens devoted entirely to Australian native plants but subsequent invasion by weeds may reduce growth of the desired plants and alter the character of the garden. There is little information available that specifically relates to the problem of weed control in native gardens.

Weed control in native gardens must be able to cope with a wide range of species without adversely affecting desired plants. The three basic methods of achieving weed control are:

MECHANICAL — CHEMICAL — BIOLOGICAL.

MECHANICAL WEED CONTROL

In agriculture, mechanical control of weeds is achieved through broad-area cultivation of the soil. In a native garden broad-area cultivation is only practicable prior to establishment but local cultivation such as the removal of individual weeds is probably the most widely practised form of weed control. The major disadvantage with this form of control is damage to roots of desirable plants which, in the case of some native plants, are reputed to be relatively intolerant of soil disturbance.

Considerable improvement in the ability to control weeds can be gained by the use of mulch, particularly when combined with a physical barrier between mulch and soil. Mulches such as pine bark, wood-chips and gravel



Indigofera australis

Photography by A. McWhirter.

This *Indigofera* is a widespread shrub which, when regularly pruned, makes a valuable spring display. Description on page 114.

are commonly used to assist moisture retention. Seeds will not germinate readily in these mulches and those that do germinate are mostly easy to remove. Extractives from some mulches may retard plant growth, however, and the breakdown of wood chip mulches depletes soil nitrogen. The addition of a physical barrier between soil and mulch, such as newspaper or plastic, retards the growth of weeds through the mulch from seeds present in the soil or from vegetative growth of plants in the soil. Newspaper is a good barrier allowing movement of water into the soil and breaking down after the initial value of the barrier is diminished. Plastic is widely used but on heavy soils the ground is kept too wet encouraging root rots whilst on light soils it prevents entry of moisture into the soil (W. Martin, pers. comm.). One disadvantage of the physical barrier, is that natural regeneration of desirable species may also be prevented.

CHEMICAL WEED CONTROL

The potential benefits of pesticides and inorganic fertilisers, particularly during the establishment phase, are being recognised by many native gardeners. Attention should also be given to chemical weedkides as a means of weeding without mechanical disturbance of the soil. Weedkides vary considerably in both their effectiveness, mode of action and relative cost. They can be broadly classified by their action:

Foliage contact weedkides only effect those parts of the foliage that are contacted by the chemical. They normally act rapidly and if used with care can be used to selectively kill weeds growing between desired plants. Relatively ineffective against plants with well developed root storage systems.

Foliage translocated weedkides are absorbed by the foliage and then moved within the plant where they begin with effect basic physiological



Swainsona galegifolia

Photography by M. Fagg.

This is a perennial shrub which should be pruned hard each winter for beautiful display in spring. Description on page 123.

functions. They act slowly compared to foliage contact weedicides but have the ability to kill without complete coverage of the foliage.

Weedicides that act through the *soil* are difficult to categorise as either contact or translocated. Soil applied weedicides can be used to kill existing plants through root uptake but are more commonly used to exert an influence on germinating weed seeds and are often termed 'residuals'.

There is a large range of weedicides on the market consisting of different mixes of chemicals. In agricultural situations weedicides are formulated on their ability to selectively remove weeds from a crop. In the industrial situation non-selective features are desirable to obtain control of a broad spectrum of weeds. In a native garden the range of desired species is large as is the range of weed species and localised control of a broad spectrum of weeds is the requirement. To assist in the evaluation of the suitability of weedicides for use in native gardens I have selected some of the weedicide chemicals used in preparations available to the general public for a discussion of their properties.

Paraquat and *diquat* are quaternary ammonium compounds that are commonly available. They are foliage contact weedicides with some foliage translocation features. They are rapidly absorbed by the foliage and act quickly. Paraquat is most effective on grasses. They are inactivated by adsorption immediately on contact with soil. The concentrated liquid form of paraquat in particular is dangerous to humans and great care must be exercised in handling. For this reason these chemicals are often sold in granular form to be dissolved and used as a very dilute liquid.

2,4-D and *MCPA* are phenoxyacetic acids that are widely used to control herbaceous plants. They are readily translocated within the plant where they act on growth regulation mechanisms. Both are broken down

in the soil within a few weeks of application. Although they have relatively low toxicity to adults in the concentrated form there has been some suggestion of foetal damage from mothers drinking contaminated water.

2,4,5-T is also a phenoxyacetic acid but it is used to kill woody plants. It is absorbed through stems as well as foliage and acts in the same way as 2,4-D and MCPA but is much more persistent in the soil.

Aminotriazole (amitrole) enters plants both through the foliage and the roots and is readily translocated. It results in chlorotic shoots due to interference with chlorophyll production. It is relatively non-selective and has found use for weed control in industrial situations when combined with 'residual' weedicides.

Glyphosate is a recently developed chemical that enters through foliage and stems and is readily translocated. It appears to influence plant metabolism being most effective when applied during growth periods. It has been found to be extremely effective in killing weeds with underground storage systems such as nut grass, couch grass and sheep sorrel. It is rendered inactive once in contact with the soil.

Dalapon (2,2 DPA) is a translocated herbicide which is particularly toxic to grasses. It is most active when applied to the foliage but also produces effects when taken up from the soil. It only persists for a few weeks in soil and has low toxicity.

Simazine and *atrazine* are substituted triazines that are commonly used for control through the soil although the more soluble atrazine can enter through the foliage. The major use of these chemicals is to prevent development of germinating weed seeds but at high concentrations they can also be used to kill established plants.

Monuron and *diuron* are two of the many urea derived weedicides. They are absorbed through roots and are often used agriculturally as 'pre-emergents' controlling the germination of weed species. They persist in the soil for long periods and are particularly dangerous for use in garden situations.

Weedicides most suited to use in native gardens are those with minimal soil persistence. Combinations of paraquat and diquat are useful for the control of a wide range of weeds with minimum risk to desired plants with accidental contact. However a number of weed species such as nut grass and couch grass will be relatively unaffected. *Dalapon (2,2 DPA)* is useful against persistent grass species and thus safe for use amongst most native plants commonly found in gardens. *Glyphosate*, marketed commercially as **ROUNDUP***, is my choice combining broad spectrum coverage with no effect on the soil. Great care must be exercised in spraying to avoid accidental drift onto desired plants but if reasonable precautions are taken problems are minimal. It is wise to treat all weedicides with caution. Concentrated chemicals should only be handled with gloves and care taken not to inhale vapours when spraying.

Chemical weedicides are applied either through plant foliage or through the soil. A dilute solution of weedicide applied as a mist spray is the most effective method of foliar application. Most weedicides require the addition of a surfactant to spread the spray droplets on leaf surfaces and thus allow maximum uptake. Household detergents are often satisfactory for this purpose. Successful spraying requires an even, fine flow of spray that can be directed to avoid desirable plants. Spraying during still conditions minimises risk of accidental drift. Spray units that utilise air stored under pressure and that have an on/off trigger control allow the degree of control required. For soil application drifter bars that give even coverage of large droplets are widely used.

*Registered trade mark of Monsanto Australia Ltd.

BIOLOGICAL WEED CONTROL

Biological control using *insects* is well known to most Australians by the example of the destruction of prickly pear by the introduced moth borer *Cactoblastis cactorum*. In South Africa researchers are raising colonies of

a seed eating weevil to help control the spread of *Hakea sericea*. This type of control is not of practical significance to the native gardener faced with a broad spectrum of weeds but other forms of biological control are most effective. Weeds, as well as looking out of place, compete strongly with the desired plants for moisture, nutrients and sometimes light.

The key to biological control by *competition* is to ensure that the desirable species dominate to such an extent that weeds cannot successfully compete. At the planting stage all efforts should be made to ensure plants establish themselves quickly. Only vigorous plants should be selected from the nursery and care exercised in handling and planting. Cultivation around the area to be planted will kill existing weeds and other root competition allowing rapid establishment of the new plant. Fertiliser applied at the base of the plant or in the planting hole will aid the plant in establishment and although weeds will also be stimulated control is easier on a small area than over a wide area. As the crowns of closely spaced plants begin to close, shading will suppress the growth of most weeds which tend to be pioneer species requiring high light levels to flourish.

CONCLUSIONS

Weed control in native gardens is essential for the preservation of an Australian character and to ensure the successful establishment and continued growth of desired species. The choice of weed control method depends on the nature and extent of the weed problem. Chemical weedicides have a place in native gardens where minimal soil disturbance is desirable. A sensible combination of mechanical, chemical and biological techniques will probably be the most suitable approach to weed control in native gardens.

ACKNOWLEDGEMENTS

I would like to thank Mr. W. Martin of the A.C.T. City Parks Administration for his valued criticism.

FURTHER READING:

The Australian Weed Control Handbook, third edition) by J. T. Swarbrick (Plant Press, Toowoomba, Qld.)

Weed Control Handbook — Volume 1. Principles Edited by J. D. Fryer and S. A. Evans (Blackwell Scientific Publications, Oxford, U.K.).



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Burtonia scabra

A magnificent shrub from Western Australia as described on page 103. It is significant that we finish the issue with this plant. All the other species illustrated are reasonably hardy and can be grown in the situations recommended with some assurance. This plant is difficult to establish and maintain. What is needed is a planned effort by a competent horticulturalist to study the needs of this plant. Who will try? This could be one of the horticultural marvels of the Australian Flora. —Editor.