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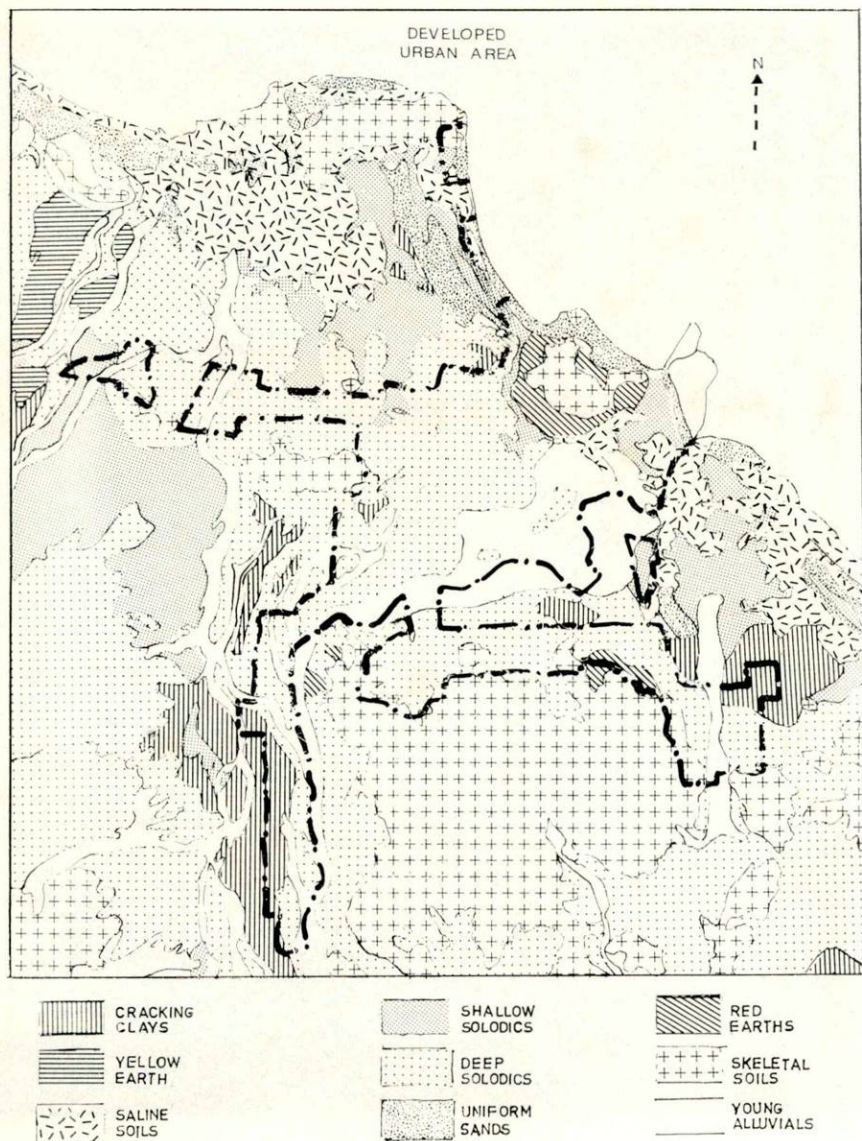
Photography by M. W. Hodge and J. Harmer

GREVILLEA PTERIDIFOLIA

GARDENING IN THE DRY TROPICS

FOREWORD by John Donohue

Over the last few years, much has been written on the cultivation of Australian Plants but unfortunately very little information is available on the selection and growing of Australian Plants suitable for Townsville. I hope that the information contained in this publication will in some small way help make Townsville the tropical garden city that it could and should be.



SOURCE: G. G. MURTHA

SCALE 1:150,000 APPROX.

GROWING WILDFLOWERS

CLIMATE, SOILS AND WATER SUPPLY IN THE TOWNSVILLE AREA

R. Reid

CLIMATE:

The climate of the Townsville area is warm and sub-humid with a marked summer rainfall maximum. There are two seasons, a hot wet summer of variable duration and a warm dry winter. Rainfall is the dominating climatic factor influencing plant growth as temperatures remain moderate to high throughout the year.

Rainfall: The seasonality of Townsville's rainfall is most pronounced with 80 per cent falling between November and March. The sporadic nature of tropical cyclones and the fact that much of the rainfall is convective is reflected in the high rainfall variability. Monthly and annual totals in individual years vary considerably from the long term average and in fact analysis of the long period rainfall records reveals that the area receives more below average annual totals than above average. Within the area, there is considerable variation in rainfall totals, with the city average being 1128 mm per annum whilst areas to the south receive only 865 mm per annum. This variation is also reflected during periods of storm activity where some areas can experience very high totals whilst other parts of the city receive no rain at all. Rainfall intensities can also be high with falls exceeding 375 mm in 24 hours. Hail is a very rare occurrence.

The greatest daily range of temperatures occurs in the Winter months and the smallest in Summer. The hottest months are December and January with July being the coolest month. The immediate city area is frost-less although in some years a light frost is experienced in the country to the south.

The city is not normally subjected to strong winds although strong to gale force winds associated with thunderstorms or tropical cyclones may occur. The latter occur particularly from December to March. Flooding can be expected in the same months. The climate is summarised in Table 1.

Townsville Monthly Climatic Averages

Average Max. °C	30.7	30.5	30.3	29.2	27.3	25.1	24.0	25.3	26.8	28.3	29.5	30.5	28.2
Average Min. °C	24.5	24.5	23.2	21.4	18.5	16.6	15.4	16.3	18.7	21.4	23.2	24.2	20.6
Rainfall mm	267	318	218	57	25	30	21	9	9	25	47	98	1128

SOILS:

For general discussion the soils of the city and surrounding area have been combined into 9 very broad areas. The distribution of the soils group are illustrated in the map opposite.

1. **Cracking clay soils**—these are often associated with black earths and have developed in old alluvium. A characteristic feature is their gilgai micro-relief of a varying degree of development. They are very alkaline and often have nodules of calcium carbonate at depth. These soils cover an extensive area between the Ross and Bohle Rivers. They are extremely difficult to either adapt plants to or to ameliorate because they are usually flooded during the wet season and become extremely hard in the dry season. Not surprisingly some plants from the clay plains of Western Queensland such as *E. camaldulensis* and *E. microtheca* perform fairly well in this situation.

2. **Yellow earths**—these are gradational textured soils that overlie heavy clay D horizon deep subsoil rich in sodium. Although small in area these soils occur extensively as minor associated soils over much of the older plain. They are difficult soils to work and are usually seasonally flooded.

3. **Saline soils**—these include the saline muds of the mangroves, salt pan soils and the solonchaks of the salt water couch marine plain; all of which are subject to inundation to a degree by tidal waters. These soils are unsuitable for general gardening conditions.

4. *Shallow solodics* — these duplex soils have a thin silty or sandy loam A horizon or topsoil and an abrupt change to alkaline heavy clay subsoil. The subsoil B horizon is very poorly drained and they are generally unsuitable for gardening due to the moderate to high salt levels and high exchangeable sodium levels in the shallow clay subsoil.
5. *Deep solodics* — have a strongly bleached A horizon and a usually impermeable B horizon. These are the most widespread soils in the Townsville coastal plain and occur in the older alluvium and piedmont slopes. They are usually somewhat better drained than the shallow solodics.
6. *Uniform sands of beach ridges and fans* — this group includes soils on the beach ridges fringing the coastline, older stranded beach ridges and sandy soils in the colluvial fans along the base of the surrounding mountains. The deep sands of the frontal ridges are calcareous and all the sands are naturally well drained.
7. *Red earths* — are gradational in that there is a gradual textural increase down the profile. They occur mainly along the lower slopes of Castle Hill and Mt. Stuart and provide good surface drainage. Small areas are often found along some stream levee banks.
8. *Skeletal soils* — are found on the granite massifs such as Castle Hill, Mt. Stuart and Mt. Louisa, where slopes are generally in excess of 20° and there is much gravel, both in the soil surface and through the profile. Rock outcrops are common, and the soils are usually shallow.
9. *Young alluvials* — are a group that embraces a range of soils that occur in the younger alluvial flood plains, terraces and levees. Many occur in areas prone to flooding, which is the only important limitation to plant growth.

With the exception of the younger alluvial soils, all soils can be regarded as generally infertile and phosphorous is grossly deficient. Obviously those soils subject to tidal inundation will have high salt levels, but some of the shallow surfaced solodic soils also have levels sufficiently high to inhibit the growth of all plants except those with a strong salt tolerance. Sulphur and molybdenum deficiencies have been found in some soils and trace element deficiencies, particularly copper and zinc, may be expected in the leached siliceous sands. Acute iron deficiencies occur in most soils when they are saturated for any length of time by irrigation or during the wet season. The chief factor limiting garden potential of the solodic soils is the heavy clay B horizon together with the moderate to high levels of exchangeable sodium which render these soils highly impermeable. This, coupled with the very low gradient of much of the city area, results in waterlogged conditions for considerable periods during the wet season.

With such seasonal rainfall, supplementary irrigation is required for all but local and inland species. Large areas of the Townsville district are well endowed with reasonably shallow underground aquifers. The distribution pattern and quality of water is extremely variable. Water quality is of particular importance due, firstly, to species tolerance of such things as high pH or salinity and secondly, as many of the soils are highly impermeable, any addition of salt will be accumulative; this is especially significant in the shallow surfaced solodic soils. Continual applications of saline water will eventually cause a buildup in salt levels sufficient to severely inhibit vegetative growth.

Many of the early failures in Townsville can be attributed to the lack of understanding on the part of the grower of the climatic-soils-water supply relationships and the effect on temperate and inland plants of high summer humidities and high minimum temperatures. This does not mean, however, that one must only attempt to grow tropical plants as some species from other parts of Australia have proved to be highly adaptable. However, in the main, the successful species have originated in areas that are dominated by a summer rainfall pattern. There are also a number of plants which require low minimum temperatures in order to initiate flowering. A good example of this can be illustrated in the many southern *Acacias* that grow quite well in Townsville but never flower, i.e. *A. decurrens* and *A. spectabilis*.

A further complicating factor is the fact that the high humidities, especially just after periods of extended rain, encourage the development of soil borne fungi, particularly Root Rot Fungus (*Phytophthora cinnamomi*) and many plants that have grown happily usually die during this period. This means that precautions such as removal of surface mulching from immediately around the trunk and the use of appropriate fungicides have to be taken during this period or better drained conditions provided.



Photography by M. W. Hodge

GREVILLEA DECORA

This is the plant that may be most popular in Townsville in the future. Growing prolifically on the Burra Range west from Townsville, it resembles the colour plate as above very closely in dry conditions. In Townsville gardens it has proved very hardy and floriferous, the flower being a more vivid red and the leaves greener, making a lovely bush.

HILLSIDE GARDENING

John Donohue

Those living on the lower slopes of Castle Hill and Mt. Stuart are fortunate in that these suburbs offer the chance to grow the widest possible variety of Australian plants. The factors which inhibit garden potential in most areas of Townsville are absent and the gardener has the following very great advantages—good drainage, well textured acid soil and high natural iron levels. With care almost all of the species which will grow in other locations in Townsville can be grown successfully, but there is also the potential to grow many species from lower rainfall areas of tropical Australia as well as some of the more spectacular shrubs from Southern areas.

Castle Hill is far from being the bare rock which so many people imagine, although successive fires over the years have decimated much of the native flora which formerly colonised this granite massif. It still supports a surprising range of plants which are suitable for garden culture. *Acacia flavescens*, *A. leptostachya*, *A. holosericea* and *A. simsii* occur naturally on either Castle Hill or Mt. Stuart and will grow without any attention at all in a garden situation. *Bursaria incana* is also naturally occurring in the area. *Grevillea parallela*, the local *Grevillea* which has proved so difficult to grow in cultivation in Townsville, grows naturally on vacant blocks in the hillside suburb of Yarrowonga. The Kapok tree, *Cochlospermum gillivraei*, can also be seen in the gullies on the seaward side of Castle Hill and in the higher parts of Wulguru. Some of the other species which may still be found are *Eucalyptus tessellaris*, *E. drepanophylla*, *E. alba*, the Burdekin plum *Pleio-gynium cerasiferum*, *Persoonia falcata* and *Ficus* species. *Abelmoschus moschatus*, the dainty creeper with hibiscus like flowers, grows on the lower slopes of both mountains. *Erythrina vespertilio* is found on the lower slopes of Mt. Stuart.

The problems met in gardening on these elevated slopes are entirely different from those encountered in more poorly drained, lower lying areas. Problems of water-logging and root rot are not normally met and instead of building up garden beds it is often necessary to construct walls and embankments to retain soil and provide pockets where plants can be established. Shrubs and trees which grow naturally on hillsides are very often found growing in spots where there is some soil at depth and where they can take advantage of what natural rainfall is available. The process of natural selection ensures that those plants growing in the most favourable environment are the most vigorous. The hillside gardener should aim to duplicate these conditions and to provide planting areas where there is an adequate depth of friable soil. In these conditions plants will make good growth and the natural advantages of good drainage and good soil texture will ensure a healthy plant.

Although the soil texture is good and provides an excellent medium for growing plants, the soil is basically infertile and very often it is deficient in humus. Fortunately the humus content of the soil can be built up by incorporating leaf mould, compost and other vegetable matter and the addition of fertiliser such as the slow acting Blood and Bone will improve the soil fertility to the desired level.

The topography of most of Townsville is depressingly flat with few of the features which one reads about in landscaping books and gardening magazines. There are few outcropping rocks and even fewer natural contours to be jealously guarded and incorporated into a garden design. There is no gentle slope on which to plant those trees and shrubs which appreciate better drainage. The average suburban allotment is as flat as a board and if one wishes to have a rock outcrop it must be imported at vast expense. Likewise, if a raised area garden is planned, then a load of "River Loam"

is ordered. This very often turns out to be a fine black silt which goes as hard as a rock when dry and which is almost completely impervious to water. Those who live on the slopes of Castle Hill, Mt. Stuart and Mt. Louisa have a very great advantage when it comes to designing their gardens, as natural contours and rock outcroppings do occur. They should be incorporated into the garden setting to produce a more natural and aesthetically pleasing effect. This can be accentuated by the careful use of natural materials such as stone, logs and even discarded railway sleepers. Retaining walls built of these and similar materials are much more natural and acceptable than those constructed of concrete.

Most of the trees and shrubs listed in other sections can be grown quite well in these slightly elevated areas and I will only refer to those which have proved outstandingly successful or whose potential is so promising that every effort should be made to grow them in these situations. Many Eucalypt species are suitable for hillside gardens. The very tall trees such as *E. robusta* and *E. citriodora* grow easily, whilst smaller trees such as *E. peltata*, *E. similis*, *E. melanophloia*, *E. aberghiana* and *E. torrelliana* are being grown without any difficulties at all. The colourful tropical Eucalypts *E. miniata* and *E. phoenicea* stand a far better chance of growing and flowering in these areas, whilst the lovely pink or red flowered *E. ptychocarpa* "Swamp Bloodwood" is surprisingly well adapted to these excellently drained sites. A new addition to Townsville gardens, the small mallee *E. ptychocarpa* with its huge yellow flowers and red capped buds is growing extremely well on the higher slopes of Wulguru.

Although the "Black Bean" *Castanospermum australe* and the "Umbrella Tree" *Brassaia actinophylla* are rainforest species, they have been grown successfully on Melton Hill and Stanton Hill for many years. The fine leaved *Casuarina inophloia*, *C. torulosa* and *C. littoralis* respond well to supplementary watering and have been incorporated into many gardens.

A rich variety of small trees and large shrubs have proved successful and quick growing. *Acacia* sp. are often planted to provide initial colour and interest. *A. flavescens*, *A. platycarpa*, *A. dictyophleba*, *A. leptostachya*, *A. fimbriata*, *A. holosericea* and *A. simsii* are all grown without any special care or attention. Probably the most outstandingly successful large shrub is *Grevillea decora*, which has completely adapted to this environment. *G. banksii*, *G. glauca*, *G. pteridifolia*, *G. 'Goochin Hills'*, *G. sessilis*, *G. hookerana* are the more successful of the larger *Grevilleas*, whilst the smaller *Grevillea* sp. aff. *decora*, *G. dryandrii*, *G. 'Robyn Gordon'* do well. *G. biternata*, a prostrate species which is very susceptible to fungal attack, can be grown quite successfully over the rocky outcrops.

Provided that supplementary watering is available, *Callistemon* will thrive and are regarded as completely reliable plants for these positions. The most successful is probably *C. polandii*, but *C. viminalis*, *C. 'Tinaroo Falls'*, *C. formosus*, *C. pachyphyllus*, *C. 'Guyra Hybrid'*, and a form of *C. 'Tinaroo Falls'*, known locally as 'C. Running River', are all worthy of a place in the hillside garden. *Melaleucas*, with their great variety of leaf forms, are often grown as foliage plants to complement other species. *M. decussata*, *M. erubescens* and *M. armillaris* are good examples of plants grown primarily for this purpose. *M. thymifolia* flowers prolifically and is widely used in rock gardens and in niches where its small size is a great advantage. *M. tamarascina*, with its gnarled and twisted paper bark trunk and very fine leaves, is fast becoming a firm favourite in these areas because of its very distinctive appearance and trouble free growth.

The potential for growing Australian plants on the lower slopes of Mt. Stuart and Castle Hill is very great indeed. It is on these slopes that some of the more difficult species from dry tropical Australia will first be grown. The very great advantages which these areas enjoy should make gardening with Australian plants a very rewarding experience.

NATIVE PLANTS ON CLAY SOILS

G. Macfarlane

Clay soils, which represent the predominant soil type in the Townsville area, as well as occurring in many other localities in North Queensland, present many problems concerning the establishment and cultivation of native plants. As other articles deal with soils and the chemistry of plant and soil requirements, this article will deal with the cultivation techniques, plant selection and establishment for clay soils.

To understand some of the problems concerning cultivation practices on clay soils, a brief look at the physical and chemical aspects is required. The physical aspects of aeration, drainage and moisture retention in clay soils often present the initial problems in cultivation.

Aeration—Due to the very small size of the dispersed clay particle the air spaces within the soil are greatly reduced. This reduces the essential movement of gases within the soil.

Drainage—With the small size, and great cohesive powers when wet, of the clay particle, the rate of movement of water within the soil is greatly reduced.

Soil Temperature—During periods of wet weather the slow movement of water within a clay soil causes large fluctuations in sub-surface soil temperatures.

Moisture Retention—Due to the very small pore space and reduced water movement in clay soils, wide fluctuations in moisture retention occur.

The chemical aspects of clay soils, such as improvement of structure and the availability of nutrients in soils in general, are dealt with in other articles.

Development of Clay Soils:

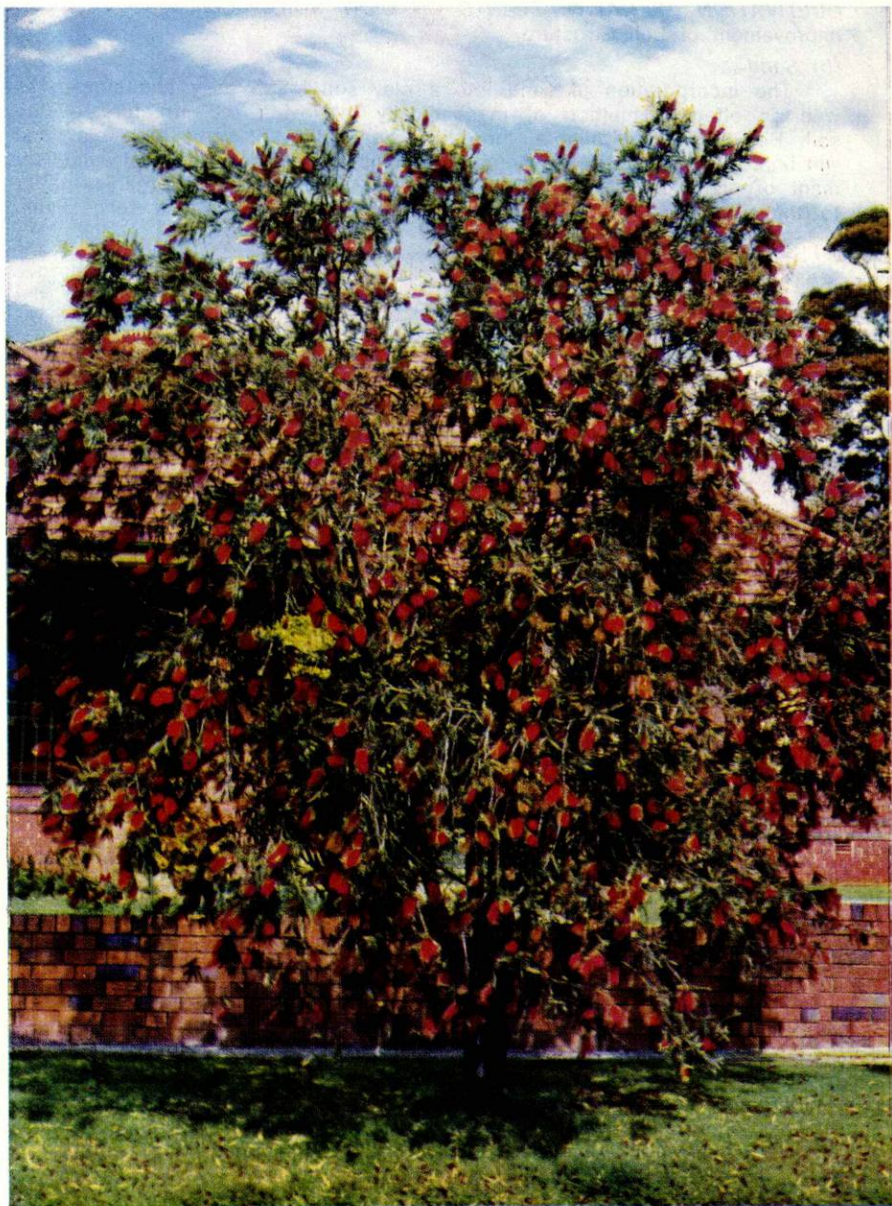
For the improvement of the physical aspects of clay soils the following methods are recommended:

Improvement of Soil Structure—As one of the main problems with clays is the close textured, greatly adhesive powers of the fine clay particles, the initial development should be the improvement of the structure of the clay soil. This can be carried out in several ways.

(a) Organic Matter

By the incorporation of organic matter, clay soils are improved physically as well as chemically. Organic matter is an excellent material for the immediate as well as the long-term improvement of the soil structure. Due to its light, bulky nature organic matter initially assists in mechanically improving the structure of the soil. With the decomposition of the organic matter by soil fungi and bacteria, plant resins are liberated into the soil, which assist in flocculating the fine clay particles into larger groups of particles. This then increases the size of the air spaces between the flocculated particles. The periodic supply of organic matter to the soil is required as the decomposition process takes place. Not only does the organic matter improve the physical structure of the soil, but also provides nutrients required for plant growth.

Although the obtaining and incorporation of organic matter is sometimes a time-consuming and difficult process, it is one of the most effective, especially in the long-term view where satisfactory soil structure is required. Organic matter may consist of partially rotted leaves, composted organic material or animal manure. If undecomposed organic material such as raw sawdust, bagasse, rice hulls, etc., are incorporated into the soil, the application of blood and bone, sulphate of ammonia or urea must be made with the undecomposed material to prevent the removal of nitrogen from the soil during decomposition. Decomposition takes place more rapidly during the warmer weather. The material can be either incorporated by digging in by hand, or by mechanical means with a rotary hoe for large areas.



CALLISTEMON VIMINALIS — Weeping Bottle Brush

This beautiful plant, a native to the Townsville area, has been chosen as the floral emblem of that fine progressive city. From the picture above it will be seen why it is so widely grown throughout Australia. Many forms have been developed, featuring larger brushes. One, known as *Callistemon* 'Captain Cook' is a unique dwarf shrub with the same large brushes and is being widely used for landscaping. It needs a little shading by larger shrubs in Townsville. Two forms discovered by Townsville members on their bush rambles are very successful in Townsville, the deep red flowers withstanding the hot humid summers in vivid beauty.

CULTIVATION OF NATIVE PLANTS ON CLAY SOILS—Continued

Improvement of Soil Structure

(b) Sand

The incorporation of sand into a clay soil is an easy and simple, as well as effective method of mechanically improving the structure of the soil. Being readily available, the initial application of sand to a clay soil will improve its structure providing conditions suitable for the initial establishment of plants. However, with the follow-up applications of organic matter to the area, a further improvement in soil conditions would take place.

(c) Soil Conditioners

Soil conditioners are substances which, when applied to the soil, improve the physical structure without contributing greatly in other ways to the soil. Lime and gypsum are examples of soil conditioners. These substances assist in the flocculation of the clay soil particles. Artificial soil conditioners such as krillium can be used, but these are very expensive.

Planning of the Garden Area:

Taking into consideration the general properties of clay soils, and the particular type of clay soil being dealt with, appropriate measures for the improvement of the soil should be carried out. The natural drainage pattern noted, variations in soil type if present and approximate height differences within the area should be sketched on a simple plan. These details will be useful in assessing the most appropriate areas for the cultivation of various types of plants. Even if the clay soil is reasonably uniform in texture within an area the noting of naturally raised areas can assist in the selection of specific planting areas.

Future planning for features and facilities which may not be envisaged at the present should be considered in the overall planning. This enables the basic framework planting of larger and slower developing features to be commenced in the initial stages of the establishment of the area. Although this aspect may seem difficult to envisage due to possible modification of facilities, with careful planning a certain flexibility can be included within the overall layout.

Landscaping Features:

Whether the area of land be very limited in size or of larger dimensions the provision of an interesting and decorative effect can be achieved on clay soil garden areas. Some of the features which should be considered are set out below:

(a) Shelter—Whether dense or intermittent shelter—screen plantings are required, shelter is essential as a modifying element in any garden. On clay soils, where great variations in temperature and moisture are often encountered, the use of strategically placed groups of peripheral plantings are useful both to modify temperature and wind velocity and to enable a greater variation of plant material to be cultivated. Where space is very limited, the use of basic shelter specimens, associated with groups of low-growing subjects, can provide an ornamental as well as effective boundary planting. Native plants are particularly effective as composite group plantings, using the variations in plant form and colour.

(b) Shade—In many clay areas one of the initial requirements sought by people in establishing a garden is the provision of shade and framework features to complement buildings. By the same placement of groups or specimen trees within an area valuable shade and the formation of pleasing vistas can be obtained within an area regardless of the size of the allotment. Although rapid effects can be achieved by the use of large trees, consideration should always be given to the height and habit of the trees. This is important so that the desired effects are not jeopardized by the ultimate necessity of removal or needless destruction of the undesired large tree.

(c) **Raised Beds and Borders**—On flat areas of land, particularly on clay soils, it may not be practicable to modify the soil to enable particular plants to be either grown successfully or displayed to their best advantage. A very effective feature in this situation is the building of raised or artificially elevated areas in the form of beds or garden borders. The provision of artificially elevated areas improves not only the conditions for plant growth but greatly enhances the overall area by the provision of focal points, secondary vistas and an overall blending of the associated plantings and facilities. Raised areas may be created by the use of low dry-walled beds or borders, or may be raised mounds which are designed to blend into the surrounding area. By the use of plants selected for the particular location on a basis of plant form, structure, colour and contrast, a most effective as well as colourful feature can be created. In the formation of elevated areas on clay soils it is important that before building the bed to cultivate the underlying clay soil and incorporate either gravel or large quantities of sand in the upper few inches to provide drainage, as well as assisting in blending the imported soil with the lower clay soil areas. Equally important is the aspect that the lower sand-incorporated area must not be made as a shallow pit, but gradually phased out beyond the extremities of the elevated area. This ensures that the excess moisture drains naturally away from the area. In excavating to incorporate the sand/gravel substratum, the lower clay zone should be loosened with a fork to provide a broken, integrated zone. Soil used for the building of the elevated area should be of a sandy loam to sand type, depending on the type of plant material envisaged.

(d) **Rock Gardens**—The use of rock gardens as an integrated feature of native plant gardens, as well as specific features, enlarges the range of plant material which can be effectively grown in gardens. The rock used in rock gardens should be weathered, natural rock, arranged to simulate as far as possible natural outcropping. It is recommended that the use of medium to large sized rock be used which will provide an effective and suitable foil to the plants to be used. As a guide-line, half to three quarters of the height of the rock should be buried below ground level. The rock features within the rock garden are created by the selection of suitably shaped, large rocks. Many of our native plants which are not seen in the garden at present, lend themselves admirably to rock garden planting and would create new and interesting subjects in gardens in the North.

Native plant rock gardens are most effectively located where they are associated as an integrated feature with groups of trees and shrubs in a naturalistic setting.

Methods of Planting in Clay Soils

Due to the characteristics of clay soils, planting techniques used vary from those used for other mediums. In preparing the planting holes for plants, particularly trees, a narrow, deep hole is not recommended. The hole should be wide with a depth sufficient to accommodate the root-ball of the plant and a small quantity of sand or well-decomposed organic matter. The incorporation of the sand or well-decomposed organic matter is only for the initial establishment of the plant, as the plant must be able to survive in the surrounding clay eventually. The use of the organic matter must be restricted to very well-decomposed material otherwise nitrogen deficiency may result, unless additional nitrogen is added. In areas where the clay soil is very impervious and tends to remain wet for long periods the plant should be planted with the base of the plant slightly raised above the existing surface level. In the latter case a raised mound of soil should be built up and the subject planted on the mound. Unless the soil is moist, apply water to base of hole before planting.



LEPTOSPERMUM FLAVESCENS

A very variable shrub with a number of forms occurring around Townsville and Cardwell. The picture shows the usual character of the bush that may be pruned to any shape as desired. The characteristic *Leptospermum* flower is also shown above, usually white but pinkish in bud. The bush is so variable and the other species in the area so similar that their names have been misapplied at various times:

Leptospermum sericatum is a larger tree with rough bark and narrow silvery leaves.

Leptospermum baccata is distinguishable by its semi-succulent fruits.

Leptospermum brachyandrum has a smooth deciduous bark that gets a reddish brown tinge.

It has larger leaves than *L. flavescens* with smaller white flowers.

THE TOWNSVILLE MELALEUCA

Some of the species of *Melaleuca*—paper-bark trees and shrubs—to be seen when touring North Queensland will include the following prominent species occurring around Townsville.



MELALEUCA VIRIDIFLORA

A small broad leaved tree which grows on the coastal plains around Townsville. The flowers are usually green to cream produced in large bottle-brush type spikes to 10 cm long in Autumn. The red flowered form shown above occurs in isolated communities, near the road up to Mount Stuart.

This tree would have the broadest leaf of the paper bark trees commonly occurring around Townsville, others being:

Melaleuca quinquinervia is very similar to *M. viridiflora* but is usually a larger tree with slightly narrower leaves 14-16 cm long, 3 cm wide.

Melaleuca argenta is often confused with *M. quinquinervia* but it usually has more narrow silvery leaves. It is often a narrow willowy tree producing bright green slender bottle brush flower heads.

Melaleuca saligna is also a willowy type tree but with bright green leaves.

Melaleuca leucadendron is a widely distributed weeping paper bark growing along the banks of the rivers. They can grow quite large—to 20 metres high—and the masses of white bottle brush flowers attract the winged life.

CULTIVATION OF NATIVE PLANTS ON CLAY SOILS—Continued

With trees and large shrubs a stout wooden or bamboo stake 50 mm in diameter should be placed down the side of the hole *before* the subject is placed in the planting hole. The soil is then placed and firmed around the plant and stake. This prevents damage to the root-ball by the stake being driven through the root system. After planting, firm the surface around the plant, form a saucer shaped depression around the base of the plant and water the plant.

When planting trees and shrubs on clay soils, particularly make sure that the plants are not root-bound in the containers before planting. Preferably select material which is growing vigorously in its container. With the dense compacted nature of most clay soils, should a rootbound specimen of a tree be planted, the root system will have great difficulty in developing properly, if at all. Although the basal roots of a rootbound plant may sometimes be teased out, this is often a hazardous technique with plants which resent root disturbance. Plants which refuse to make satisfactory growth, although they appear healthy, often are found to have the roots in much the same constricted form as when originally taken out of the container.

Cultivation Practices

Due to the wide fluctuation in clay soil moisture content, watering is an important aspect. Also with continual watering the surface of clay soils becomes compacted, which assists in the evaporation of soil moisture. It is therefore necessary to either cultivate lightly over the surface of the ground or preferably apply a light layer of mulch material over the soil around the base of the plant. It is important that the mulch be kept away from the base of the plant, otherwise the moist conditions provided could encourage fungal attack of the base of the stem near ground-level. A layer of sand incorporated into the surface soil around the base of the plant will prevent soil compaction. Mulching material assists in keeping the soil surface cooler during the hot summer months. When watering subjects on clay soils it is important to apply water slowly so that the moisture travels down into the root zone. Light watering not only leaves the important root zone dry, but, importantly, encourages the surface roots and eventually the main roots to accumulate within the surface layers of the soil. Not only does this make the plant dependent on artificial watering but should a drought occur the plant would be very susceptible to drought damage. It is important to encourage the root system to penetrate as deeply as possible, so deep watering is absolutely essential. One method which has been used is to sink clay field pipes of 10 cm diameter, placed vertically end to end in two or three positions around the base of the tree. A cover may be placed over one end of the pipes, which may contain gravel or may remain empty. When watering by hose or other means the water is directed down the pipes and refilled as absorption takes place.

General Considerations for Plant Selection

A common complaint is that one cannot grow a great variety of plants on the often stiff clay soils. It is hoped the above may assist in this respect. However, when one is faced with the selection of plants to cultivate on clay soils, the adaptability of plants must be taken into consideration. Those people who are able to observe native plants in their natural habitats, will notice the plants which will tolerate and even thrive in clay areas. It will also be observed the degree of tolerance which the plants have for clays. As many of the plants are grown in gardens in widely differing localities, it is possible only to assess the tolerance and adaptability of various plants according to the conditions under which they grow. For those people who are able to take the time to study the adaptability of untried plants within an area, an increasing variation of plant material could become available to many areas.

SOME SELECTED PLANTS FOR CLAY SOILS

Trees

A useful, hardy tree with a light, shady canopy is *Acacia aulacocarpa* var. *macrocarpa* "Northern Hickory Wattle". This adaptable tree with its sickle-shaped blue-green phyllodes and bright yellow cylindrical flower spikes, forms a useful small to medium shade tree. The "Black Bean" or "Moreton Bay Chestnut", *Castanospermum australe*, although a rainforest tree, will tolerate clay soils and form a slow-growing but effective specimen of shade tree. Its attractive dark green foliage contrasting with the colourful orange and yellow pea flowers provides a useful feature. The ubiquitous *Casuarina* or "Sheoak" is a very valuable shelter and shade tree for the harsh conditions on many clay soil areas. The pyramidal canopy of fine thread-like branches of the "River Oak" *Casuarina cunninghamiana* blend well with the contrasting foliage and forms of other native plants. Where a dense, reasonably compact tree is required, under which smaller shrubs and plants can be planted, the "Thready-Barked Sheoak" *Casuarina inophloia* merits selection. With fine thread-like branches, this small tree makes a pleasant contrast to any planting, particularly when the male trees are adorned with their brick brown cloak of flowers. A narrow spike-shape tree with greyish green semi-pendulous thread-like branches is "Black Oak" *Casuarina cristata*. This tree used singly, or in groups, would provide a good background for a dry-land border planting or rock garden.

For larger areas where artificial watering is available, the magnificent "Silk Cotton Tree" *Bombax malabaricum*, with its large waxy red waterlily-shaped blossoms, massive branching framework and large flange-like buttresses, is a sight to remember. This tree, though slower growing on clay soils, would provide an interesting and colourful backdrop for a large planting scheme. An attractive medium sized tree with deep green foliage of semi-pendulous habit, which provides pseudo-autumn tints as some of the older leaves turn bronze, is *Pongamia pinnata*. The pendulous racemes of lilac flowers within and near the edge of the canopy, provide a pleasant contrast to the foliage. Although this tree requires a reasonable amount of water, it is worthy of wider use in gardens and bush garden settings. The "Umbrella Tree" *Brassaia actinophylla* is a popular and widely planted tree in gardens and deserves its reputation because of its usefulness and adaptability. Its attractive, bold foliage comprising radiating leaflets arranged like the spokes of a wheel and the long spikes of reddish pink flowers make this a feature in any garden. The shaft-like habit of the "Silky Oak", *Grevillea robusta*, with its fern-like foliage and its elongated heads of golden spidery flowers is a tree requiring either the association of other tall features or a bold garden formation to complement its habit. *Grevillea pteridifolia*, the "Golden Spider Flower" provides a daintiness to a planting with its fine fern-like foliage and narrow (second) one-sided orange flowers. This tree is most effective where group planting is possible. The much maligned garden plant, *Grevillea striata* or "Beefwood" is moderately large. The pendulous bluish-grey foliage and dark rough trunk would provide a fine background feature to lower, shrubby plantings. When in flower the dense heads of creamy-white flowers are a striking sight. This tree is fairly slow growing, but the attractive foliage compensates for this aspect.

Eucalypts which give a distinctive appearance to the medium to large areas include the narrow-leaved "Ironbark", *Eucalyptus crebra*. Although eventually a large tree, the pendulous foliage forming a shady canopy, contrasting with the rough, black bark makes this a useful shade and group planting subject in the larger areas. The common "Moreton Bay Ash" or "Blackbutt" *Eucalyptus tessellaris* is a decorative tree particularly in the young stages as a dense canopied shade tree. The pendulous green foliage and smooth light coloured branches contrasting with the black rough bark at the base, makes this tree worthy of cultivation.

PLANTS MUST ALSO BE CYCLONE HARDY

Trees and shrubs that have proved themselves in Townsville cyclones are described in a later article. One recommended is the beautiful tree shown below. It is also tolerant of a wide range of soils including the difficult clays.



Photography by M. W. Hodge

CASTANOSPERMUM AUSTRALE

The "Black Bean" or "Moreton Bay Chestnut"

A slow growing but effective shade tree. Its attractive dark green foliage contrasts with the colourful orange and yellow flowers shown above.

A QUEENSLAND RAINFOREST TREE

There are some very beautiful trees found in the North Queensland rain forests. They grow quite high in inaccessible rain forest areas but when introduced into garden conditions many make a beautiful specimen medium sized tree that is very adaptable.



Photography by John Donohue

XANTHOSTEMON CHRYSANTHUS

A large spreading tree which can grow to 30 metres in its native North Queensland rainforest, but will be much smaller in an open garden situation. One magnificent specimen in a garden in Townsville sheltering behind a house on the water front covers itself in bloom during May and makes a lovely dense shade tree during summer.

PLANTS FOR CLAY SOILS—Continued

The "Spotted Gum", *Eucalyptus maculata*, although of lesser dimensions than observed in the south, makes a dense canopy tree useful for shade and ornamental purposes. The distinctive white to cream trunks are blotched with light grey. *Eucalyptus microtheca*, "Coolabah" with its dense umbrageous canopy and rough dark bark on the lower trunks provides a useful shade. The smooth white mottled bark and canopy of medium green foliage makes the "Forest Red Gum" *Eucalyptus tereticornis* a useful subject for the larger areas, particularly in the moister locations. This tree is fast growing, hardy and produces good nectar flows.

Smaller growing species of eucalypts which would be suitable for small-sized areas are *Eucalyptus peltata* in its many forms and *Eucalyptus ptychocarpa*. *Eucalyptus peltata*, "Rusty Jacket", is a very distinctive, ornamental tree with yellow-rusty brown, short-flaky persistent bark throughout. The oval to ovate-lanceolate, coriaceous leaves of medium to dull green provide a pleasing contrast to the colourful trunk and stems. The young shoots are often a pinkish-red in colour. A very useful shade and ornamental tree. The "Swamp Bloodwood", *Eucalyptus ptychocarpa*, with its large heads of showy pink to red flowers and broad pendulous foliage is a very highly ornamental and colourful flowering tree. Being a tree of moderate dimensions, with a dense pendulous branching habit makes this colourful tree a first-rate garden plant.

Being a medium-sized, dense, bushy tree, with bold cordate foliage to ground-level, the yellow flowered *Hibiscus tiliaceus*, or "Cottonwood" is a useful shade, screen and ornamental tree. Although often of smaller stature when growing on clay soils compared with its counterparts in sandy coastal precincts, it is a very useful subject for the medium sized garden. Occasionally when space permits the selection of a *Ficus* is desired. For clay areas the bold dark green glossy foliage of the "Rock Fig", *Ficus platypoda*, with its attractive smooth, light grey trunk and yellow fruits, makes this useful shade tree worthy of cultivation in large areas.

Paperbarks provide an extremely useful array of plants for many purposes in the native garden. The "Weeping Paperbark" *Melaleuca leucadendron*, with its white papery bark, attractive weeping branches and highly perfumed white flowers, is justifiably popular in gardens. Although eventually a medium sized tree, the narrow habit of the canopy enables the subject to be used successfully in reasonably limited areas. A paperbark, which grows in swampy areas, which has a light greyish papery trunk, compact rounded canopy and attractive silver-grey young foliage, warrants planting in moist areas. The tree is large but affords good shade, its name is *Melaleuca dealbata*. An attractive small tree of compact, dense habit is *Melaleuca genistifolia*. The foliage is dark green, short and narrow, of a slightly harsh texture. The plant is reasonably fast-growing with the provision of artificial watering. When in flower the canopy is a mass of small white flowers. For that bush garden setting the green flowered paperbark would add an unusual splash of colour. The broad, thickened leaves of *Melaleuca viridiflora* provide a foil to the large "brushes" of lime green flowers with their conspicuous filaments. A red flowered form also occurs. This plant tolerates swamp conditions. For those who seek something different for that special feature, *Melaleuca tamarascina*, with its often contorted, white papery branches and fine scale-like leaves, deserves greater recognition. The slightly pendulous branches add to the bizarre bonsai appearance of the tree. The small white brushes adding a "snow-like" appearance. This plant grows in moist or dry areas, but prefers reasonable moisture.

A wattle which has attractive long narrow, blue-grey, pendulous foliage is the "Native Willow", *Acacia stenophylla*. This is a hardy tolerant tree, with pale yellow globular flower heads, which is worth growing for its foliage alone. Although it often attains the dimensions of a tree, it sometimes remains as a large shrub. The foliage provides a useful contrast in colour and form.

Shrubs suitable for clay soil planting

The bottlebrushes provide a wealth of colour and form, combined with an adaptability to tolerate reasonably harsh conditions. *Callistemon viminalis*, which can attain the stature of a small tree, is a valuable plant for the provision of colour throughout the year. This plant is also a useful one for group planting where the pendulous habit can be used as a foil for associated lower plants and shrubs. An erect, rigid leaved shrub of compact habit is *Callistemon rigidus*. The narrow foliage and large brilliant red brushes make this hardy plant a useful garden subject. Growth is moderately fast when plenty of water is available. *Callistemon polandii* with its somewhat weeping habit of the young shoots which assume a plum-red colour provides a dependable brilliant display of gold-dusted anthers complementing the brilliant scarlet of the blooms. This plant is of bushy habit, being of reasonably fast growth. A dense, bushy plant which assumes a graceful semi-pendulous large shrub with fine medium green foliage, is *Melaleuca linariifolia* var. *trichostachya*. The juvenile foliage is bluish-green with the young shoots assuming a pinkish-plum colour. The plant is free-flowering when quite young, with short white, but numerous brushes. It is a very useful low screen subject.

An unusual shrub sometimes attaining the height of a small tree, is a seldom cultivated *Petalostigma banksii*, or "Quinine Bush". The slender branches form a rounded canopy of small oval green leaves which are glossy. The globular, orange fruits are an added attraction.

Feature Plants

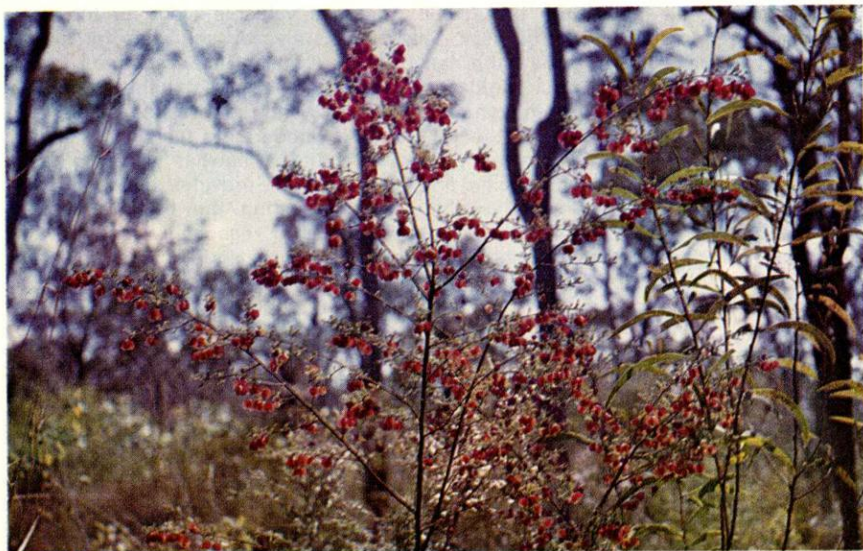
Certain plants, due to their aesthetic structural qualities, are admirably suited to forming features and focal points of interest. Certain plants such as the "Screw Pine" *Pandanus pedunculatus* and other species of that genus with their bold, narrow serrated-edged foliage, arranged in a spiral fashion on a stout trunk, can create interesting focal points in a garden. By the careful selection of complementary plantings to harmonise the overall effect, fresh and exciting vistas can be created. Other plants which can be used in this manner are the "Blackboys", *Xanthorrhoea* spp. or commonly called grass trees, so typical of the Australian bush setting, with their stout black stems and narrow linear leaves. The "Zamia Palm" *Cycas media*, with its often tall, stout stems and canopy of palm-lime fronds is a most distinctive plant.

Herbaceous Plants

For rock garden as well as ground cover growing amongst native shrubs and trees, certain plants provide both a splash of seasonal colour as well as complementing woody subjects. *Lomandra* species with their narrow graceful rush-like foliage and bizarre but colourful flowers of yellow and white are most useful tufted ground cover plants for the rock garden or near the base of a clump of small trees. The foliage varies from green to a bluish-grey, with flowers which are useful in floral arrangements in the home, should one wish to do so. The tufted habit of the "Blueberry Lily", *Dianella* species, with their flaccid green foliage, delicate heads of small blue flowers followed by striking globular blue fruits, are very effective plants for massed planting. Groups used in rock crevices and ledges on a rockgarden provide a delicate combination of colour and effect. The "Blood Lily" *Haemodorum corymbosum*, with its rigid, thickened leaves, produces tall heads of small orange-scarlet flowers, which blend in very effectively amongst the low shrubs and trees.

During the wet season the white, spidery flowers of *Crinum angustifolium* appear on short stems, with the narrow light green foliage. This plant is useful to provide seasonal interest and change in the garden. *Crinum pedunculatum*, which forms a large plant sometimes several feet in height, of bold green foliage on a stout stem, is useful for the larger natural bush style garden. Its large heads of white flowers forming a striking feature with the foliage.

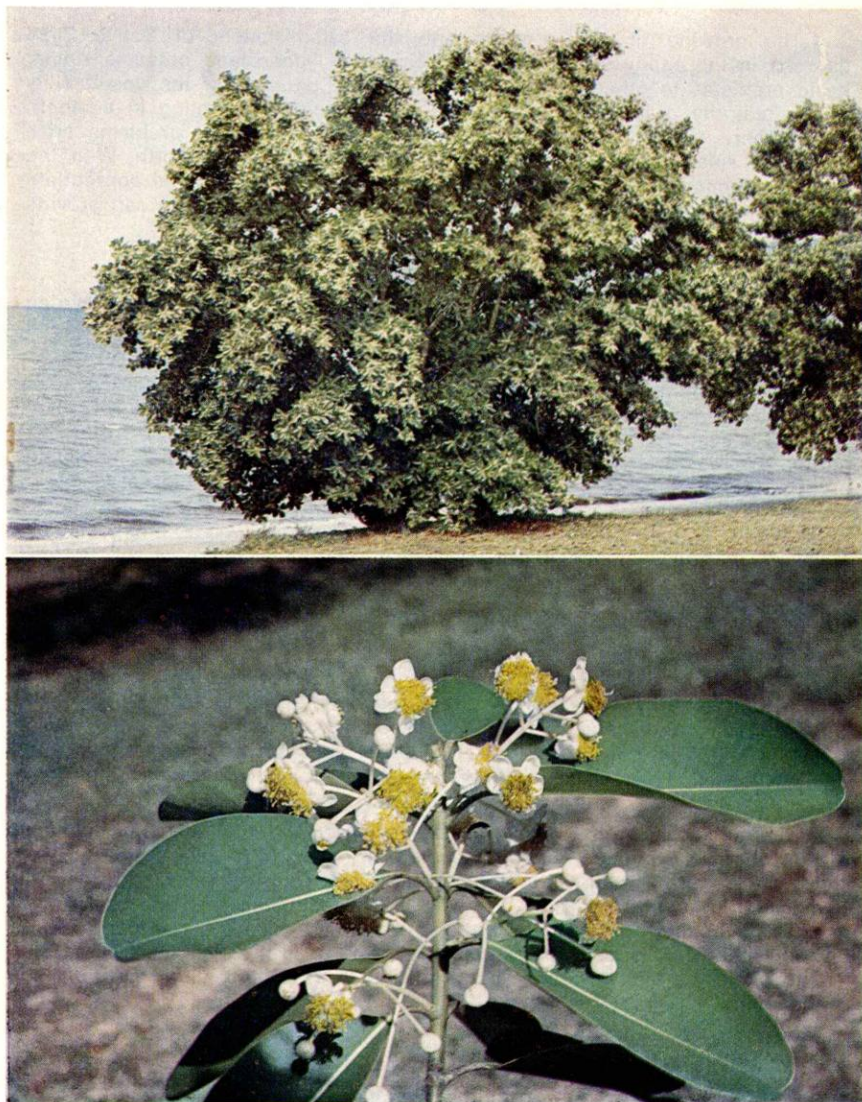
Gardening on clay soils in Townsville is not really as difficult as many people imagine. By careful selection of suitable native plant species it is possible to create an effective and aesthetically pleasing garden.

BUSHES WITH CHARACTER AND COLOUR

Photography by John Donohue

DODONAEA TENUIFOLIA

Many plants suitable for special effect planting or of an unusual character for a garden are described in articles following. One of these is *Dodonaea tenuifolia*. Although the flowers are insignificant, the fruit is the bright red 3-sided winged capsule shown above. They are very long lasting on the bush or in a vase. This small shrub to one metre is found in open forest behind Mt. Spec and in many southern and western localities.

SEASIDE PLANTING

Photography by A. Chapman (top) and G. Macfarlane

CALOPHYLLUM INOPHYLLUM

Shade, shelter and windbreak trees are essential for gardens near the sea. Such a hardy tree is shown above. It may be pruned to provide a cool shaded area beneath, or left as shown for a windbreak. As you see it covers itself well with flower and the leaves are quite attractive.

SEASIDE PLANTING

G. Macfarlane

The growing of native plants and the establishment of Native Plant gardens in the sandy seaside areas of Northern Queensland presents similar basic problems to other coastal areas. However, because of the unsuitability of the majority of native plant species used in coastal planting in southern areas where highly decorative species are readily available, problems arise as to the selection of plants for small garden areas in the North. With the careful selection of plant species, suitable planning of the site and appropriate maintenance for establishment of the plant material, native plants can provide a pleasant and effective setting for residential environs.

Planning.

The primary considerations in the initial planning of a seaside garden are the modification of the effects of wind and excessive evaporation of soil moisture together with the provision of shade.

The reduction in the wind velocities within a proposed garden area is important as a determining factor governing both the variety of plant material which can be grown and also the usage of the area. An effective barrier can be achieved without destroying vistas or much needed modifying breezes, by the use of suitably located screen or shelter highly wind resistant species used as a group or screen planting in exposed situations. With the reduction in wind velocities, the excessive evaporation of soil moisture is greatly reduced. The provision of shade is important in any garden and is particularly so in the case of the seaside garden during the hot summer months.

Maintenance.

When planting is being carried out on a new or recently cleared site it is recommended that a shallow dish shaped depression be made approximately 80 cm in diameter and 10 cm deep in the ground around the base of the plant. The depression assists in the retention of water applied to the plant and assures its absorption within the immediate zone of soil containing the roots.

Where exposed windy situations are evident, and particularly for young trees, the newly planted subjects should be staked to ensure that satisfactory stem and canopy development is assisted. Staking also prevents stem and root "wrenching" through wind movement. Stakes should preferably be 30 mm square for small subjects and 60 mm square for larger plants. Bamboo stakes of suitable diameter can also be used if available. It is important to place the stake on the windward side to prevent damage by abrasion to the plant.

Plant Selection.

The plants listed below are some of those which grow along the sandy coastline as well as plants which can be grown within this region. As the climatic conditions in coastal areas vary considerably, a selection of plants is also given for the higher rainfall seaside areas.

The following are brief lists of some of the plants associated with areas with brief notes on the plant species.

Some Plants found along the lower rainfall Coastal Dune Areas — North Queensland.

A dominant and important tree along many coastal dune areas is the Northern Hickory wattle *Acacia aulacocarpa* var. *macrocarpa* with its characteristic rounded bushy canopy often to ground level and rough furrowed

dark bark. The sickle-shaped bluish-green to green coloured phyllodes complement the golden coloured cylindrical heads of flowers. Another important dune tree is the graceful threadlike branched *Casuarina equisetifolia*. When growing in dense groves, this tree is of valuable assistance in sand stabilization and the establishment of other ground flora. On the more stabilized dunes, particularly in the moister depressions, a variety of trees is found including *Cupaniopsis anacardioides* with its small rounded canopy of deep green compound foliage and pendulous racemes of orange coloured fruits. *Mimusops elengi*, with its deep green, coriaceous, elliptical leaves and oval fleshy orange fruits, forms a dense rounded small tree affording protection to the other plants. *Alphitonia excelsa*, with its lanceolate dark green foliage displays its silvery undersides of the leaves when rustled by the wind. This small bushy tree, with its light grey bark is also found on the upper dune areas. *Canarium australasicum*, with its large pinnate leaves held above erect grey branches, produces elliptic blue fruits. The greyish papery trunk of *Melaleuca dealbata* is seen in the moist and swampy areas. Its attractive silvery-green foliage is an interesting feature of this plant which complements the dense shapely canopy. The weeping lanceolate, green foliage of the weeping paperbark *Melaleuca leucadendron* together with its white papery bark is a feature in many areas.

Acacia holosericea, a shrub or small tree with its broad silver phyllodes and characteristic clusters of narrow, black twisted seed pods, is often seen in moist depressions within the stabilized dune areas. Other trees commonly seen in this area are *Terminalia muelleri*, with its small to medium sized oval leaves and small blue elliptical fruits, as well as *Terminalia melanocarpa* with its larger leaves and oval blue fruits 30 mm to 45 mm long. The characteristic feature of the *Terminalias* is their horizontal branching habit which makes them effective "nurse" plants within the community as well as having a light canopy therefore affording conditions for the establishment of plants in the lower vegetation strata.

The Burdekin Plum, *Pleiogynium cerasiferum*, with its dark green pinnate foliage, dark rough bark and globular depressed purplish fleshy fruits, is a common feature of many dune areas. A eucalypt found in the moist areas is the Moreton Bay Ash, *Eucalyptus tessellaris*, with its narrow, pendulous foliage and rough black bark at the base of a smooth white trunk. On the drier regions of the dunes a small shrubby tree with light green coriaceous falcate foliage, *Persoonia falcata*, also grows. Along the stabilized dunes several shrubby plants are found. These include *Clerodendron floribundum*, an erect small tree with rough bark and broad foliage which produces clusters of tubular white flowers.

Two species of rattlepod are common in certain areas, namely the taller *Crotalaria laburnifolia*, a slender plant which grows to 120 cm high and bears large lime green flowers. *Crotalaria trifoliastrium* with its small clover like leaves forms small dense bushes 30-40 cm high, covered with masses of small golden yellow flowers. A prostrate to low shrub with trifoliate grey green foliage and spikes of small purple-blue flowers is *Vitex ovata*.

On the seafront dunes, a rounded dense shrub with large fleshy bright green foliage and thick fleshy stems is *Scaevola taccada*. This plant has white fan-shaped flowers and white succulent fruits.

Hibiscus tiliaceus, "Cottonwood" is often seen along the margins of coastal rivers and creeks and also on the dunes. This is a large bushy tree growing to 8 m high with cordate, dark green foliage and yellow hibiscus flowers with a red blotch at the base of each petal. Various species of *Pandanus* "Screwpine" grow in the moist swampy depressions and also on the frontal dune areas. These plants grow into striking specimens with their long, narrow serrated-margined foliage and large dense pendulous heads of orange coloured fruits.

HARDY SHRUBS FOR SEASIDE PLANTING**CROTALARIA LABURNIFOLIA**

There are some species of *Crotalaria* recorded in Queensland including a few exotics that have naturalised. The form known as *Crotalaria laburnifolia* around Townsville needs to be checked. The true native *Crotalaria laburnifolia* is recorded from Leichhardt, Cook and N. Kennedy in Queensland.

Crotalaria are hardy shrubs, the above species being particularly so in gardens in most parts of Australia.

SEASIDE PLANTING NEED NOT BE WITHOUT
DELICATE BEAUTY



Photography by M. W. Hodge.

COCHLOSPERMUM GILLIVRAEI — "Native Kapok"

This small deciduous tree which can grow to 12 metres in height occurs on low rocky ranges of coastal North Queensland. You will find it on Magnetic Island and the foothills of Mt. Elliott. The 10 cm diameter flowers are produced on leafless branches. The large leaves are deeply lobed on long stalks. The fruits to 8 cm diameter have a papery outer covering which splits at maturity showing alternatively light and dark segments enclosing black seeds.

Plants of the Higher Rainfall Coastal Sand Dune Areas.

The dune areas in the higher rainfall areas contain several well known and useful garden plants. A familiar tree in many coastal gardens is *Calophyllum inophyllum* which occurs in these regions. The glossy, dark green foliage, large heads of snowy white flowers and globular green coloured fruits on long stalks, are features of this useful coastal tree. *Barringtonia speciosa* is a small tree found on the coastal dune area. This tree has very large, glossy bronze green coloured leaves often 30 cm long. The fibrous quadrangular fruits are often seen washed up on beaches. In the coastal dune scrub an attractive bushy shrub with elongated deep green foliage, white flowers and showy red twin fruits, elliptical in shape, 4 cm long is found. This plant is *Ochrosia elliptica*.

A small tree with shape and habit similar to that of the frangipanni is *Cerbera odollam*. This attractive plant which grows on the margins of the dunes has light green, elongated foliage, showy white frangipanni-like flowers and large globular-elliptic plum coloured fruits. *Sophora tomentosa* is an ornamental shrub which has silvery pinnate foliage and pendulous racemes of yellow flowers. The fruits which are constricted between the seeds resemble strings of beads. *Canarium australasicum* is another common plant in these regions.

Plants for cultivation in Coastal Sandy Areas.

In order to facilitate selection of suitable plants for the various aspects in the garden the following lists of recommended species are set out.

Exposed Screen Plantings:

As mentioned previously the selection of suitable wind resistant plants to form a screen is essential. Plants such as *Scaevola taccada*, *Vitex ovata* are excellent for low screens whereas *Pandanus* sp., *Acacia aulococarpa* var. *macrocarpa*, *Casuarina equisetifolia* and *Hibiscus tiliaceus* are suitable for medium to tall screen planting.

Shade and Shelter:

The provision of shade and shelter can be achieved with the use of suitable placed plants of *Melaleuca dealbata*, *Calophyllum inophyllum*, *Terminalia* species, *Mimusops elengi* or *Canarium australasicum*.

A Selection of Plants suitable for Specimen and Ornamental Use:

The selection of plants for inclusion in the garden area for ornamental use is governed by site, exposure and space available. The following is a brief selection. Many plants described elsewhere are suitable for inclusion in the ornamental aspects of the garden. Some of the more outstanding are:—

<i>Cerbera odollam</i>	<i>Eucalyptus tessellaris</i>
<i>Ochrosia elliptica</i>	<i>Barringtonia speciosa</i>
<i>Cochlospermum gillivrae</i>	<i>Canarium australasicum</i>
<i>Sophora tomentosa</i>	<i>Crotalaria laburnifolia</i>
<i>Crotalaria trifoliatrum</i>	<i>Cupaniopsis anacardioides</i>
<i>Abelmoschus moschatus</i>	<i>Eucalyptus miniata</i>
<i>Eucalyptus peltata</i>	<i>Brassia actinophylla</i>
<i>Araucaria cunninghamii</i>	<i>Fenzlia obtusa</i>
<i>Casuarina littoralis</i>	<i>Callistemon rigidus</i>
<i>Grevillea pteridiifolia</i>	<i>Grevillea robusta</i>
<i>Acacia podalyriifolia</i>	<i>Acacia simsii</i>
<i>Melaleuca armillaris</i>	<i>Xanthorrhoea media</i> sub. sp. <i>latifolia</i>
<i>Plants which are worthy of trial, particularly if shelter and moisture are provided include:</i>	
<i>Callitris columellaris</i>	<i>Callistemon viminalis</i>
<i>Leptospermum juniperinum</i>	<i>Lomandra species</i>
<i>Cycas media</i>	<i>Hibiscus heterophyllus</i>
<i>Hibiscus diversifolius</i>	<i>Gossypium sturtianum</i>
<i>Grevillea banksii</i> 'fosteri'	<i>Acacia leptostachya</i>

NORTH QUEENSLAND ORCHIDS

by R. Smythe

The complete range of species of native orchids in North Queensland will not be known until areas of Cape York Peninsula have been fully explored. Many interesting species have come from the McIlwraith Range in central Cape York but with the exception of *Dendrobium wasselli* and *Vanda whiteana*, few have been grown to any extent by Townsville enthusiasts.

The interest in native orchids lies generally with epiphytic (growing on trees) and lithophytic (growing on rocks) orchids as these are usually the most attractive as far as plant form and flower are concerned. The ground orchids are usually much less significant in flower and form and are often very difficult to cultivate. On the other hand, *Phaius tancarvilleae*, *Calanthe triplicata* and *Dipodium ensifolium* are some specific examples of ground orchids which are extremely attractive and suitable for pot cultivation. The epiphytic orchids are the most useful orchids in the suburban garden situation as they look attractive growing on the trees in the garden. Lithophytic orchids will usually adapt successfully to tree culture and have the added advantage that they can be clumped in rockeries or around the base of trees at or near soil level. Two species of orchids which are most suited to this latter type of cultivation are *Dendrobium discolor* and *Dendrobium speciosum*. Some extremely fine specimens of the lithophytic form of *Dendrobium speciosum* can be seen in the rugged granite outcrops at the tops of mountain ranges near Townsville and in rather harsh dry eroded creek beds in the Herberton area.

The two most common orchids in the Townsville area are *Dendrobium discolor* and *Dendrobium canaliculatum*. These two species suffer great losses in the native state in the wet season as they fall to the ground in large numbers. It is not unusual to see dozens of plants of *D. discolor* piled up in creek beds after the water has subsided. *Dendrobium canaliculatum* favours growing on older specimens of *Melaleuca viridiflora* which itself suffers from borers and falls to the ground in great numbers during our wet Summer. When the grasslands dry out, these plants are destroyed by grass fires. The collection of these orchids in Queensland is illegal unless the collector has received written permission from the owner of the property.

Areas where Orchids are found near Townsville

Several orchids, rather surprisingly, are native to the Townsville district. Some of these are *Dendrobium canaliculatum*, *D. discolor*, *D. mortii*, *Sarcophilus ceciliae*, *S. tricalliatus* and the ground orchid *Nervilia holochila*. Within a few miles of Townsville the pendulous pencil orchid starts to appear in trees overhanging creeks as does the most spectacular spider orchid *Dendrobium tetragonum* variety *giganteum*.

In the high altitude areas around Townsville a host of new species can be found but most are not readily adaptable to the Townsville environment and they are best observed in their native state. *Dendrobium ruppiatum* and *Dendrobium adae* have to some extent been successful in Townsville gardens but bush house cultivation is best for them in Townsville. It is of interest that *Dendrobium ruppiatum* is a very successful native orchid when cultivated in Southern Queensland which would indicate that its flowering performance is improved by cold nights, so rarely experienced in Townsville.

Our Northern forms of *Sarcophilus falcatus* also suffer from the lack of cold nights necessary for the production of flush flowerings. This species flowers sequentially down the flower spike in Townsville whereas in its native state and at higher elevations, flush flowerings are normal and can be most spectacular.

On the dry foothills of the Seaview Ranges, the most common genera encountered would be *Dendrobium*, *Cymbidium*, *Dipodium* and *Geodorum*. Along the riverbanks as we proceed into the mountains and enter the rain

forest areas, the genera *Bulbophyllum phalaenopsis* (in a few creeks only), *Taeniophyllum*, *Oberonia*, *Pholodotia* occur with an occasional *Camarotis* and *Calanthe* at higher altitudes. On entering the rain forest proper the small orchids like *Oberonia palmicola* and *Bulbophyllum newportii* become more predominant. High in the tree tops *Dendrobium ruppianum* can be observed with *Dendrobium adae* hiding lower down in the dark of the rain forest.

Passing through the rain forest to the dry western slopes the oaks carry a few remnants of the epiphytic orchids of the rain forest finally giving way to species of ground orchids.

Some rather rare and beautiful epiphytic orchids can be found in the rain forest fringes by the observer with a keen eye. Two of these are *Dendrobium bairdianum*, a short rather squat Dendrobe with attractive glabrous flowers about 2.5 cm in diameter with yellow-green sepals and petals contrasting with a purple lip, and *Dendrobium argostophyllum* with its delicate buttercup yellow flowers clustering at the apex of the plant. *Habenaria anomala* occurs sporadically in swamp areas at the base of foothills of the Seaview Ranges. This species, along with *Habenaria terinandi* and many other species of ground orchid are much more concentrated in the wet lowland areas of Rockingham Bay. Some interesting and rare orchids such as *Dendrobium lobii*, *D. luteocillium* and *Trixspermum platystachys* along with the more common orchid *Dendrobium smilliae* (the bottle brush orchid) also occur throughout the lowland areas of Rockingham Bay.

West of Townsville, orchids are very uncommon with the exception of the black orchid *Cymbidium canaliculatum* which is commonly encountered once over the Mingela Range.

Integrating Orchids into the Garden Setting

If you are thinking of adorning your trees with native orchids follow these guidelines.

Plant only on mature trees as orchids develop slowly and are easily shed by the expanding tree trunk.

Plant only on trees with permanent bark.

Do not plant epiphytic orchids in pots unless they are of the thick root species, e.g. *Dendrobium discolor*.

Do not use plants from elevated areas as they do not flower well.

Water frequently and spray with very dilute fertilizer.

Keep the plants free of pests, especially the Dendrobium Beetle, scale and red spider.

Do not water while in flower or when dormant.

The following species are the most hardy and withstand the harsh drying winter winds:

Dendrobium canaliculatum, *D. speciosum*, *D. bigibbum*, *D. superbiens*, *D. johannis*, *D. mortii*, *D. smilliae*, *D. rigidum*, *D. discolor*, *D. nindii*, *D. tetragonum*, *D. teretifolium*, *Cymbidium madidum*, *C. calaliculatum*, *Eria fitzalanii*, *E. inornata*.

The soft orchids from the subfamily Sarcanthanae, with the exception of *Pomatocalpa macphersonii*, should be avoided unless shade house conditions are available.

Of the ground orchids, only four are recommended and these must be protected from winds. These are *Phaius tancarvilleae*, *Calanthe triplicata*, *Geodorum pictum* and *Dipodium ensifolium*.

Native shrubs and trees make suitable hosts for orchids with the most highly recommended being *Grevillea banksii*, *Grevillea robusta*, *Tristania conferta*, *Callistemon viminalis* and *Brassia actinophylla*. *Eugenia smithii* is a very popular host in the wild and should offer, in the garden, the wind protection necessary if more delicate species or orchids are to be grown.

Because of space limitations only a few species are more fully described here. Most plants recommended have been described and illustrated in colour in issues of the periodical Australian Plants. I shall give cultivation details in a future issue, of the *Dendrobium* orchids to grow.



Photography by R. Smythe

Phalaenopsis amabilis "Mt Spec Orchid", "Moth Orchid"

This is one of Australia's most outstanding orchid species. It is the only Australian member of a genus which rates amongst the most splendid genera of the family Orchidaceae. It was once plentiful in the Mt. Spec area but now is quite rare due to commercial exploitation in times gone by. This orchid still exists in the tree tops as is evident by the occasional find of the plant on a dead branch on the rain forest floor.

To grow this plant allow it only morning sun, protect from winds, and mount it in such a way that water will not lodge in and rot out the crown. Bugs and scale congregate in the overlapping areas of the leaves and these insects must be removed. Red spider attack must also be prevented. Evidence of this pest is a pitting and a silvery sheen on the underside of the leaf. Root room is very important as *Phalaenopsis* appear to carry out considerable photosynthesis within the roots. Use potting material in very large chunks.

In the native state the leaves of these plants are fleshy and hang limply from the side of moss covered trees. Broad flat roots running up and down the tree are the best indicator of the presence of a plant somewhere in the tree. Each individual *Phalaenopsis* flower is 5 to 8 cm in diameter, of a sparkling white texture having a few yellow markings on the lip. The rather flat, open flowers alternate along a gracefully arching stem.

Flower stalks are often branched in adult plants and can be made to branch by clipping off spent flowers just below the most basal flowers. Branched flower spikes arise from the old flower stem the following year. Flower spikes are extremely long lasting, unless pollinated, and have been known to last from September to Christmas.

Dipodium ensifolium

Some forms of this vandaceous ground orchid found in the Mt. Spec area are truly magnificent and contrast with the more washed out colour form found in Rockingham Bay. It is possible that the acidic soils found at the rain forest margins may contribute to the depth of colour found in the red spotting of these predominantly white flowers. This plant grows well in a mixture of sand and leaf mould and requires repotting once the leaf mould has decayed; not deeply in soil otherwise the plants will snap off and quite often not reappear. These plants look like miniature vanda orchids and form from a bunch of thick fleshy white roots. Flowering time is Summer and the flower stands erect above the plant.

Eria fitzalanii & *Eria inornata*

These two species are so alike that they are not easily separated from each other by even orchid enthusiasts. The former has three ridges (keels) under the lip of the flower whereas in the latter these are absent. *Eria inornata* is the most popular of the two because of its stouter pseudobulbs and more erect flower spike. They make very attractive specimens favouring coconut husk or fern fibre as a potting medium. These orchids by nature should attach to trees having papery bark. Both species do very well in Townsville with some quite large specimens formed over ten years of growing. Pseudobulbs are of soft texture and leaves are thin and broad having a fresh appearance. Flowers are small but plentiful of various shades of cream. Massed flowering occurs in late Winter.

AUSTRALIAN PLANTS FOR CYCLONE AREAS

By John Donohue, Townsville

Experience in Townsville during Cyclone Althea has shown that carefully selected Australian trees and shrubs serve a very useful function as screen plants during cyclonic storms.

Most houses are initially damaged by flying debris, and if it is possible to keep this debris away from them damage is minimised.

The riverine and coastal species such as *Callistemon*, *Melaleuca*, *Casuarina* and *Leptospermum* are particularly suitable for this function.

Occurring naturally in the beds of fast-flowing rivers or beaches, these plants are subjected to periodic flooding or high winds. To survive in these conditions they have developed as flexible, resilient species with substantial deep-root systems.

Callistemon are particularly suitable for screen planting in cyclone areas, as they grow easily in all soil types. *Callistemon polandii*, *C. viminalis* in

its many forms, *C. formosus*, *C. "Tinaroo"* are species which performed well during Cyclone Althea.

Our local *Melaleuca*, *M. leucadendron*, *M. linariifolia*, *M. orgentia*, *M. bracteata* and *M. vitidiflora*, which occur in fast-flowing northern creeks and rivers, are equally suitable for this type of planting. The wide-leaved form of *M. leucadendron* is a very large tree, and although there was little or no evidence of branches snapping, it is not recommended for planting close to a dwelling. However, this tree may be pruned to keep it at a suitable height. The fine-leaved form which occurs in the Ross and Black Rivers is a much smaller tree and is recommended for suburban gardens.

Casuarina are becoming popular in Townsville for their attractive foliage and form. The fine needle-like branchlets offer little resistance to wind, but the trees are effective in trapping flying debris. *Casuarina inophloia*, a small tree to six metres, is one of the most suitable. The larger *C. equisetifolia* and *C. littoralis* do well on clay areas. *C. cunninghamiana* is regarded as being suitable for larger gardens only, although it can be pruned to size.

Baeckea virgata is an outstanding shrub for use as a screen plant. It grows well on all soil types and its soft green foliage makes an interesting contrast to the harsher foliage of other species, and this shrub is rarely without some small white flowers.

Leptospermum, particularly the forms of *L. flavescens* from Cardwell and the Paluma Range areas, are also very suitable; like *B. virgata* the soft fine foliage and weeping habit makes them ideal for specimen or group planting.

Some other large trees deserve special mention, as almost all specimens came through Cyclone Althea with very little damage. These are *Castanospermum australe* or "Black Bean", *Alstonia scholaris* "Milky Pine" and *Calophyllum inophyllum*. As with all large trees they are best planted at some distance from the house.

It is necessary to ensure that all trees around homes in cyclone prone areas are sound and healthy. Dead or diseased limbs will break off and should be removed as soon as they are apparent.

It is best to plan the siting of large trees very carefully, as pruning and other maintenance can be difficult if the tree is planted too close to a dwelling. It is also necessary to consider the effect of large trees on adjoining properties.

The local *Eucalypts*, *E. tessellaris* and *E. tereticornis*, are large trees, which, with some spectacular exceptions, withstood the high velocity winds of "Althea" very well. The very beautiful white-trunked *E. alba* was stripped of large branches and cannot be recommended for planting in a small suburban garden.

Trees with deep tap-root systems and small canopies are more suitable than a tree such as *Melaleuca viridiflora*, which is a shallow-rooted tree with a large canopy. The plains north of Townsville were littered with thousands of *M. viridiflora* which had blown over.

I do not wish to give the impression that the trees and shrubs mentioned are the only ones suitable for planting in cyclone-prone areas. Many species, both Australian and exotic, stood up to "Althea" quite well, but those which I have mentioned seemed to be most successful of the Australian species.

There is no guarantee that any measures taken to minimise cyclone damage will be effective, but trees and shrubs dissipate strong winds and create turbulence. By careful selection of suitable species the destructive effects of cyclonic winds may be diminished.

For maximum effect, trees and shrubs should be planted densely in groups, the smaller shrubs no more than 1.5 m. apart with larger trees in the background. It is possible to have wind screens which are functional and which provide privacy as well as being aesthetically pleasing.

ORNAMENTAL PLANTS

or Plants for Special Effects in a Garden

Plants in this section do not classify comfortably under any of the general headings. Many of the plants are either herbaceous or have bulbs and periods of dormancy. Water lilies and creeping plants are also included.

Abelmoschus moschatus var *tuberosus*

An exciting hibiscus-like plant that occurs in the Townsville area. It is almost completely prostrate and has hibiscus-like watermelon pink flowers. Unlike native hibiscus indigenous to this area the flowers stay open till sunset. The foliage, which is extremely variable, looks well when the plant scrambles over feature rocks or logs in the garden.

This plant can be grown in full sun but in nature is found in open forest and on wooded hillsides. Partial shade is preferred. The plant dies back during the cooler months and remains dormant until the summer rains. It is difficult to propagate from seed but grows extremely well from cuttings.

Acacia whitei

This prostrate wattle, sparsely branched, bears small bright yellow spikes. It could be useful as an open ground cover for dry exposed areas. The limited tests in Townsville appear quite successful.

Glinanthus formosus — Sturt's Desert Pea

This is one of Australia's best known wildflowers. A sprawling annual with large scarlet pea-shaped flowers, some of which have a black boss (antri) whilst others have red. This plant needs full sun and near perfect drainage. Depending on the situation, supplementary irrigation can be advantageous although some growers have had outstanding success growing the plant with an absolute minimum of additional watering.

A raised seed bed of sandy loam is the ideal medium. The seeds, which require scarification or nicking before sowing must be planted in a weed free area as these plants will not tolerate root disturbance. The soil should be kept wet until after the seedlings have appeared and then water may be applied sparingly whilst the plant is establishing itself.

Growth will be rapid and flowering should commence about 16 weeks after germination. The plant, which grows to 30 cm, will sprawl and eventually cover an area at least 2 m square.

This outstanding plant is easy to grow and will become increasingly popular as an annual. Sow seeds in March-April.

Curcuma australasica — Cooktown or Cape York Lily

This beautiful plant, with large green leaves, which grows to 1.5 m is not a lily but is related to the ginger family.

In Spring it produces yellow flowers which are enclosed by bracts that emerge from the top of the spike pink and change to green as the flowers open.

The leaves and flowers are used in floral art.

Dianella caerulea — Blueberry Lily

This small herbaceous plant is a perennial. The long, narrow, erect green leaves 30-45 cm x 12-15 mm are clustered at the base and so the plant has a tufted appearance. Its small, dainty, light blue flowers are held well above the foliage in slender panicles. Flowers are followed by shiny rich deep purplish-blue berries about 15 mm long hanging in very attractive pendulous clusters.

This compact plant is usually seen growing amongst surface scattered rock in hillside grassland in many areas of coastal Queensland, and also occurs in other states. It is a most valuable addition to both bush and rock gardens and can be used as underplanting beneath small trees and shrubs as it will grow in partial shade.

NORTH QUEENSLAND HIBISCUS

Warmer climates bring to mind exotic flowers. Queensland has many native Hibiscus type flowers, unfortunately not very prominently displayed in the scrub these days. They are easy to propagate and easy to grow. Most are trees or shrubs but the species below is a creeper.



Photography by L. K. Bates

ABELMUSCHUS MOSCHATUS var. TUBEROSUS

This plant was previously known as *Hibiscus rhodopetalus* but because of its affinities botanically to a previously described plant in India it has had to assume the incredible name above. The picture does not do the flower justice as it is normally a much richer deep watermelon pink. The flower size is variable being 8 to 10 cm in the wild but given good conditions in the garden can reach 12 cm. It grows as a creeper along the ground thrusting up its brilliant blooms in unexpected places. Out of season it will die back but do not dig out its tuber as next season it will spring to life again.

Dianella laevis — Greater Blueberry lily

A small herbaceous plant with erect branching stems 45-50 cm high. The leaves, of a distinctive dark green to blue green shade, are flat and narrow, 25-40 cm long by 12 mm wide, and are borne in clusters on the slender main stem.

The dainty blue flowers are similar to those of other species of *Dianella* up to 1 cm in diameter, and form panicles 25-30 cm long. The shining oval fruits are a dark purplish-blue. In Queensland this plant may be seen growing in moist areas in well drained soil both in low grassland areas and on grassy hillsides of coastal ranges. It also occurs in moist rainforest scrub. This attractive species forms a many-stemmed clump and is useful for bush gardens and shrub borders.

Dischidia nummularia — Button Orchid

This is not an orchid as the common name would indicate but grows as an epiphyte on *Melaleuca viridiflora*, often in association with the orchid *Dendrobium canaliculatum* and less frequently with the ant plant *Myrmecodia* sp. The plant is a long scrambling plant densely compressed against the tree trunk looking very much like stumps of buttons. The flowers are of no consequence but the plants unusual colours, grey white when dry, green when wet is most attractive. Although the plant is partially parasitic in nature it will grow on dead timber and has been established quite effectively on concrete walls. The unusual plant for the unusual effect.

Fenzlia microphylla

The exquisite small pink flowers of this plant are displayed on the ends of the branches. The leaves are grey green above whilst the lower surface is white and hairy. This is a shrub of the sandstone regions. In exposed situations it is a small bush to 40cm whilst in more protected locations it assumes much larger proportions. The red drupes which contain the hard seeds are quite conspicuous. Seed germinates readily after scarification and plants are growing satisfactorily if slowly, in cultivation.

Haemodorum corymbosum — "Blood Root Lily"

During the wet summer months, this small lily like plant is common on the outskirts of Townsville. It reaches a height of 1 m. The brick red flowers, held erect on long straight stalks, make this one of the showiest of our local natives. Although it is not yet widely used as a garden plant this small plant should become very popular as more people become aware of it. To provide an effective display it needs to be grown in clumps.

The plant grows easily, if rather slowly, from seed which should be collected at the end of summer. This is the closest east coast relative of the famous Kangaroo Paws from Western Australia. The flowering is improved by encouraging the natural dormancy period in late Winter.

Helichrysum bracteatum — Paper Daisy

This is a variable annual growing from ½-2 m high. It is very easily grown in virtually all situations and will flower continuously if the spent blooms are removed. It usually sows itself around the garden but it can be easily propagated by cuttings.

The papery flowers dry well and are useful in floral arrangements.

Helipterum floribundum — Everlasting Daisy

A plant of the daisy family that has proved valuable in cultivation. The white flowers are small, 2 cm across, and have a yellow centre. A quick grower that may flower when only 20 cm high.

Helipterum roseum — Everlasting Daisy

Another of the Everlasting Daisies; growing a little taller than *H. floribundum* with the flowers having more of a pink tinge. Grows easily and flowers well in Townsville.

Hoya australis

A slow growing climber whose thick fleshy leaves are arranged in pairs on the stem. It produces large clusters of scented white flowers in Autumn and requires a lightly shaded position.

Suitable as an indoor, or patio, plant in a hanging basket or pot. It grows easily from cuttings.

Lobelia membranacea

A very small blue flowering prostrate herb. Rooting at almost every node to form a dense ground cover, this dense mat of plant is beautifully enshrouded by a canopy of very delicate flowers, each flower being only a few millimetres in size and held five centimetres above the ground. It flowers all the year round and makes a most attractive pot plant for indoors. *L. membranacea* needs broken shade and a moist condition.

Melastoma polyanthum — Pink Lasiandra

This attractive local native thrives well under damp to boggy conditions. In the garden this plant grows to less than one metre and displays beautiful pink to mauve large regular flowers throughout the year. Unusual dark fruit speckled with seed follow flowerings. The attractive blue grey foliage is also attractive. The plants will not take drying out which means that in many garden positions it might better be used as an annual. Grows from cuttings.

Murdannia graminea

A small grasslike plant found in swamp areas in Townsville. Flower spikes to half metre covered with delicate pale mauve flowers opening while in strong light and closing in shade. Flowers prolifically during the wet season. Each flower is very delicate, having three light mauve petals.

Nymphaea gigantea — Giant Water Lily

A magnificent water lily with pink or blue flowers up to 30 cm across. It occurs naturally in local lagoons and waterholes, but is very suitable for a water garden. The pond for such a garden should be at least 30 cm deep, and for safety, must be fenced.

The large bulbs are placed on the pond bottom in pots containing good, fertile soil, and soon after the plant becomes established, the huge flowers appear, held erect on long, fleshy peduncles. Mosquitoes can breed in water gardens, but they are easily controlled by the introduction of freshwater fish from local streams.

Pandorea doratoxylon — Wonga Vine

A vigorous scrambling creeper which occurs in North Queensland. It has masses of sweetly scented white tubular flowers with brown spotted throats. This vine is more suited to the larger property as, in time, it will cover a large tree. The flowers appear in July.

Pimelea decora — Flinders Poppy

An annual which has a woody rootstock and several erect stems to 50 cm. The smooth foliage is bluish green and the leaves are quite thick. The numerous bright red flowers are borne in dense clusters at the ends of the stems. Occasionally, yellow flowering specimens have been recorded.

Although this plant sets large quantities of seeds, complete lack of germination has been a problem. Fortunately it will propagate from cuttings, but even this method is not reliable. It has flowered quite well and although it comes from the cracking clay soils of the Hughenden area it seems to perennate on the coast only in a well drained situation. Once established, very little watering is required as it is very susceptible to root rot.

Thysanotus tuberosus — Fringed Lily

This is one of our most delicate and beautiful Australian wild flowers. It is widely distributed and is prolific in swampy areas in North Queensland. After the "Wet", new grass-like foliage emerges from the ground followed by a cluster of successively opening delicate mauve flowers at least 3 cm across. The petals are fringed on the margins.

This plant grows from tubers and is most suitable for a bog garden. In ordinary situations it will grow well, provided watering is plentiful and it is not disturbed during its dry season dormancy.

Triumfetta repens — Cucumber Daisy

A prostrate plant with attractive dark green leaves similar in shape to the cucumber plant. The small daisy-like flowers appear during the dry season.

This creeper was first introduced to Townsville gardens as cuttings from plants growing in sand, just above high water mark at Kurrimine Beach.

Viola hederacea — Native Violet

This is a delicate gem from the bush. Its flowers compare well with the cultivated exotic violet. It is a small creeping plant growing very much after the style of a strawberry with runners going off on straight lines. The flowers are quite showy being 2 cm across with violet centres and white perimeters. They stand up high and are well displayed 4 cm above the plant. In Townsville growth is not as rampant as in the South. It makes a very attractive ground cover, pot plant, basket plant or terrarium subject. *Viola hederacea* should be planted in a cool, shaded, damp position. If the plant dies back check for red spider

Wedelia spilanthoides

A small spreading herb with a multitude of yellow daisy flowers, each flower with a diameter of 3 cm. This plant cultivates very well in the garden and is most suitable for an arid exposed position. The plant is prostrate covering up to half a square metre with flower heads 15 to 20 cm above the ground. Flowers all through Summer.



PIMELEA DECORA

A most unusual plant from Western Queensland is this showy little plant. The plant above is garden grown and stands about 30 cm. Easily grown from seed, this is a gem for garden cultivation.

NEW AND UNUSUAL PLANTS

One of the fascinations of growing Australian Plants is the almost endless variety of beautiful and interesting plants that just might grow in your garden. There is a great deal of active experimentation being carried out by members of the Townsville branch of the Society for Growing Australian Plants to extend the numbers of species which are adaptable to Townsville's climate and varying soil types. Many of the plants described before have been grown successfully but some are unfuriously difficult to grow or to flower or to just keep alive. Until recent years, the only choice open to the Townsville gardener was southern varieties. Many of these have been tried and some have been outstandingly successful, but many more have been discarded as unsuitable. It is only lately that growers have been seeking out shrubs and trees from Northern Australia and the results to date indicate that this is from where we must seek our interesting and exciting new plants.

Some North Queensland species presently under trial in Townsville gardens are listed below.

Acacia galioides

This *Acacia* grows into a small shrub 30 cm high and with a similar spread. The deep green tiny phyllodes are about 125 mm long arranged in evenly spaced whorls along the branches.

The deep yellow flowers are globular, about 1 cm in diameter and the shining seed capsules are very sticky. The seeds germinate easily, but the seedlings are difficult to maintain over the hot humid Summer months.

The small size and attractive form of this *Acacia* makes it one of the useful small plants found at the Burra Range.

Astrotricha pterocarpa

This is a most unusual plant with a single stem and very large entire leaves densely covered with stellate hairs. It grows at least 4 m high and in the deep gullies of the Burra Range it can be considerably taller. The small flowers are creamy white, held erect on a large flower spike.

To date it has not been cultivated in Townsville.

Acacia lysiphloia — Turpentine Wattle

Occurring from Torrens Creek through to Port Hedland, this small shrub of about 1.5 metres high and 2 metres across should be suitable for most areas of Townsville. The spikes of orange yellow flowers appear over a long period during Winter and are followed by resinous seed pods which are a feature of this shrub. The phyllodes, which are less than 4 cm long, are often resinous.

Acacia purpureapetala

The specific name of this *Acacia* refers to its unusual small purple petals; because of these petals the globular heads of flowers are mauve pink balls rather than yellow.

It is a small shrub to 30 cm high with small 2 cm phyllodes alternate along the stem. It is found in the Herberton-Irvinebank district on the road which links the two centres. Flowering occurs in late Winter.

Atalaya hemiglauc — White Wood

It is surprising that this small tree has not been recorded as being grown in Townsville. It grows on the western approaches to the city in heavy clay soils and would seem to be one plant which has an excellent chance of being grown successfully. The conspicuous large panicles of creamy white flowers make a splendid showing against the glaucous foliage of this very attractive tree.

Bossiaea carinalis

The most striking feature of *Bossiaea carinalis* is the maroon and yellow pea-shaped flowers held erect above the horizontal branches.

The shrub, which grows from 2-4 m, is found growing in sheltered gullies in the sandstone regions at the Burra Range. The seed is easy to germinate but the shrub appears to be very particular as to its soil requirements and it is difficult to keep alive. This is one shrub which may grow satisfactorily on Castle Hill.

Borya septentrionalis — Resurrection Plant

An unusual plant growing in tufts to 20 cm high. It resembles a miniature grass tree. The sharp spiny leaves are shed as the plant grows producing a scaly trunk with aerial roots. In good growing conditions, the foliage is a vivid green, but as surroundings dry out, and the humidity drops, the leaves change colour gradually to brilliant orange and finally a rusty brown. When conditions improve the foliage changes overnight to the brilliant green phase. Small white flowers are borne in globular heads up to 2 cm diameter on erect peduncles 15-30 cm long. This striking plant grows in peat on rock faces and is found on the crest of the Seaward Range, and, further north, on the Cardwell Range as well as in some inland areas. This plant propagates readily from cuttings.

Dodonaea physocarpa

A large rounded shrub at least 2 m across and 1 m high with a distinctive flattened top. The attractive pinnate foliage is stiff to the touch.

It can be found as a roadside shrub growing in dry stony areas south of Forsyth in North Queensland.

The large papery fruits to 1.25 cm, turn from pink to a "paper-bag" brown and are retained on the bush for a prolonged period giving the shrub a most striking appearance. The fruits are so numerous that they almost conceal the leaves.

This plant has defied all attempts to grow it to maturity under Townsville conditions.

Dodonaea teunifolia

This small shrub up to 1 m high, occurs in the dry open forest behind Mt Spec as well as in many southern and western localities. The small compound leaves are composed of 5-13 leaflets, each 3-5 mm long. Although the flowers are insignificant, the fruit is an extremely attractive red 3-sided papery winged capsule. The fruits are very long lasting on the bush or in the vase. It is not yet known whether the plant will produce the brilliant red hue it develops in its native habitat. It should have good drainage. Grows readily from cuttings.

Grevillea sp. aff. Grevillea decora

A small shrub growing to 1.5 m with large bronze tipped simple leaves. It can be seen in the Herberton-Irvinebank area where it is a roadside shrub. The plant is in many respects similar to *G. decora* but it is much smaller and the flowers, which are smaller and less hairy than those of *G. decora*, are a distinct orange.

It grows naturally in harsh dry conditions, but has adapted well to cultivation. This small shrub flowers all the year round.

Jacksonia ramosissima — Pentland Pea

In its natural state this dense, rounded, bushy shrub grows up to 2 m in height but more usually it grows to 1 m. It is a common roadside shrub between Pentland and Torrens Creek, North Queensland. The numerous small, deep yellow pea flowers first appear in April and spent flowers are retained on the shrub for many months so that the bush goes through a gradual colour transformation from bright yellow through to a deep golden

brown. This outstanding shrub has not been successful in cultivation in Townsville but efforts are continuing to find a way to add it to the growing list of Australian Plants from the Burra Range which have been successfully introduced into cultivation.

Hakea lorea — Bootlace Tree

One of the most outstanding specimen trees. This small tree grows in very dry locations of Northern Queensland and elsewhere. It is a tree of immense character with gnarled twisted branches and slender cylindrical pendulous leaves, 30 cm long.

It makes a very beautiful sight when silhouetted against the sky. It flowers in July when large spikes of white to cream flowers are borne at the ends of the branches. It is not for lack of effort that this tree has not been introduced into Townsville gardens. It has proved very difficult to obtain seed of this species.

Kunzea sp. Cardwell Range

This attractive bushy shrub has linear-lanceolate leaves about 1 cm long. In September it bears numerous globular heads of small white flowers.

This undescribed species has been found in peat covered areas in water-courses on the Cardwell Range and on Hinchinbrook Island, where it grows to nearly 3 m high. It has recently been successfully introduced to several Townsville gardens.

Lomandra multiflora

A small rainforest tree which can be seen growing on the rocky banks of the creek at Jourama National Park as well as in other rainforest areas as far south as Rockhampton. It has large simple leaves and huge bunches of deep purple ovoid drupes up to 2 cm long sheltering under the canopy. The fruit has a glaucous bloom which results in a very grape-like appearance.

Lomandra leucocephala

This small rush-like plant can be found on deep red earths near Pentland, N.Q. The leaves, which bear long silky hairs, are produced in small tufts. The white flowers form delicate papery spheres 3 cm across, borne erect on flower spikes up to 20 cm long. As many as 3 but usually 2 flower heads have been observed on the same branch.

Near the Burra Range this lovely plant grows in sparse grassland under the canopy of *Eucalyptus miniata* and is very hard to find except when the magnificent flowers appear in Winter. It has not yet been successfully introduced into cultivation in Townsville.

Lomandra multiflora

The spectacular glaucous blue foliage of this small tufted herb is its most outstanding feature. The leaves which may exceed 30 cm in length are narrow and strap-like. The cream flowers grow in an erect panicle of clusters. It is common in open sandy areas at the Burra Range and propagates readily from seed. It is hoped that it will retain its glaucous foliage in cultivation in the more humid climate of Townsville but it is feared that it requires the very cold winter nights sometimes experienced at the Burra Range to grow as well in cultivation as it does in its natural habitat.

Rylstonea sp. (formerly *Darwinia thomasii*)

The exquisite small bell-shaped pendulous flowers are cream at the base, shading to the pink petals and the bright pink style. This is one of the most interesting and unusual shrubs at the Burra Range. Distribution is restricted to sandstone escarpments, where it grows in the more protected areas.

A shrub growing to 2 m with pale-grey oblique-foliate leaves, this species has defied all efforts at propagation, cuttings have not been successful and, although the bush flowers heavily, it has proved impossible to collect seed.

Perserverance, and possibly a little luck are required to bring this gem into cultivation.

WILDFLOWER AREAS OF NORTH QUEENSLAND

R. Smythe; J. Donohue

Though North Queensland is very rich in wildflowers there are not many areas where mass displays can be seen. Those who wish to admire the beauty of our wildflowers must seek them out. This section has been prepared to assist locals and visitors alike to find areas where it is possible to see wildflowers in their natural state. The areas mentioned are not the only places where wildflowers may be seen; indeed flowers are almost everywhere if you will only look carefully, but the localities mentioned are accessible to conventional vehicles.

The most popular and spectacular wildflower area is the Burra Range which is 300 km due west of Townsville on the sealed Flinders Highway. It lies midway between the small townships of Torrens Creek and Pentland. It is a fascinating area with many spectacular and interesting plants. Plants from this area are now appearing in Townsville gardens and so our reliance on imported southern varieties is steadily diminishing. Grevilleas and Acacias are the outstanding genera to be seen. Wildflowers have colonised areas disturbed during the building of the Townsville to Mt. Isa railway and it is in these localities that the most spectacular and concentrated displays are to be seen. The disturbed areas, lacking topsoil, have eroded to pebbles and sand which has proved unsuitable for the regeneration of native grasses and since the trees were removed with the soil the shrubs have grown without competition.

The undisturbed areas, whilst lacking the concentrated displays of colour are also spectacular with a large wildflower population. There are quite diverse soil types throughout the area; these range through deep red earths, poorly drained swampy areas, sandstone escarpments and deep grey deposits of decomposed sandstone. The diversity of the soil types is reflected in a bewildering array of wildflowers.

The flowering period commences in May when *Grevillea decora*, *G. pteridiifolia*, *G. sessilis* and *G. glauca* begin to flower and continues until October when the magnificent purple heath, *Calytrix exstipulata* is at its best. *Melaleuca tamarascina* and the silver leaved Ironbark, *Eucalyptus melanophloia* are the dominant trees in the depressions or water sinks. There are also many smaller shrubs such as *Thryptomene parviflora* and *Melaleuca nodosa* as well as *Drosera burmonii*, *D. indica*, Utricularias and other fascinating small plants. The sandstone escarpments have a varied plant community but possibly the most spectacular shrub is *Acacia uncifera*, a large *Acacia* with large ball flowers. It is at its most colourful in August when almost all of the Acacias are in bloom. Some of these Acacias are *A. leptostachya*, *A. platycarpa* and *A. dictyophleba*, *A. galioides* and *A. shirleyi*.

Eucalyptus peltata, with its interesting pink new growth, yellowish fibrous bark and the closely related *E. similis* with its orange bark are common, but most visitors seek the beautiful orange flowered tropical eucalypt *E. miniata* which can be seen flowering in March.

Magnetic Island is an interesting area for the wildflower enthusiast and the tourist. The National Park walking tracks between Nelly Bay and Arthur Bay are quite interesting during the late Winter months. There are no mass displays but there are many beautiful and interesting plants to be seen. *Acacia leptostachya* and *A. simsii* make a splendid showing during Autumn and Winter. The magnificent red flowered passionfruit *Passiflora aurantia* can be seen on these walks. *Ochrosia newelliana* with unusual boat shaped orange fruits and *Ochrosia elliptica* with large red ovate fruits may also be seen. The spectacular Kapok tree *Cochlospermum gillivraei* flowers in August and the large capsules mature in November.

THE BURRA RANGE

The scene below speaks for itself. Species included in this scene include *Calytrix*, *Boronia*, *Kinzea*, *Grevillea*, *Acacia* and *Jacksonia*.



The plant thrusting up from nature's garden above is *Grevillea sessilis*, the flower being shown in the upper picture. The form of this plant is similar to that of *Grevillea pteridifolia* shown on the cover of this publication and this also grows freely in the Burra Range. Members have found natural crosses between these two species in this area.

Mount Spec National Park, with its well maintained walking tracks is a must for those wishing to see mountainous tropical rain forest with its many and varied plant communities. It is reached on a narrow winding sealed road which presents no difficulties to a conventional vehicle. It is possible to drive through the township of Paluma and down the range on the inland side to the small village of Hidden Valley on Running River. The steep, rapidly des-

cending gravel road passes through rain forest and then through stands of the majestic *Eucalyptus grandis*. In contrast the delicate pink ground orchid *Caladenia carnea* can also be found here. As the road descends, the country becomes drier and *Casuarina torulosa* and *Syncarpia glomulifera* are the dominant trees with the lovely golden paper daisy *Helichrysum bracteatum* beginning to appear by the roadside. After a few miles the country becomes extremely dry and a totally different flora is evident as this is the rain shadow area behind the Paluma Range. Flowering time in this area is determined by the timing of the wet season but August and September are considered the best months. The delicate beauty of the snow white *Leptospermums*, *L. flavescens*, *L. semibaccatum* and *L. sericatum*, which grow in all the sandy creeks, contrasts with the bright red fruits of *Dodonaea tenuifolia* which grows on the gravelly flats as well as in the creek beds. This alone makes the drive worthwhile. Variety is not obvious to the inexperienced eye but with diligent searching one may find truly delightful ground orchids such as *Dipodium ensifolium*, *Caladenia carnea*, *Diuris aurea* and *Thelymitra* sp. It should be noted that ground orchids are totally protected. Epiphytic orchids such as *Dendrobium speciosum*, *Dendrobium rupianum*, *Cymbidium madidum* also occur in this area. *Thysanotus tuberosus*, *Hoya australis* and that exquisite creeper *Pandorea pinnata* are found close to the roadsides in the very dry regions.

The road continues to Hidden Valley past stands of *Casuarina inophloia* and, in the creeks, *Callitris endlicheri* and *Stenocarpus angustifolius*. Some of the best northern forms of *Callistemon viminalis* may be found in Running River. This is an easy day trip from Townsville.

Rockingham Bay has been described as a botanist's paradise. It is claimed to have one of the densest populations of plant species in the world. This is not the area to seek the spectacular, but an area to search for the unusual, the rare and the beautiful. The area is so densely populated with plant species that even today undescribed species are being found here. Cardwell is the largest town and on its beach-front can be seen huge trees of *Calophyllum inophyllum*, but it is in the swampy lowlands and the creeks which cross the plain, that the best areas to explore are found. Insectivorous plants, epiphytic plants such as *Dendrobium smilliae*, *Dendrobium canaliculatum*, *Cymbidium suave* and *Thrixspermum platystachys* and ground orchids *Habenaria anomala*, *Anoectochilus yatesae*, *Apostasia stylidioides* and *Calochilus* sp. as well as the "Shy Lady", *Geodorum pictum* may be found in the rainforest's boggy areas in this vicinity by the observant person.

On the higher slopes of the Cardwell range the magnificent *Borya septentrionalis* can be seen and admired. This plant turns from green to orange to straw coloured with changes in humidity. The changes are reversible within limits.

Sea level rain forests are fascinating areas in which to explore. Good examples can be found north at El Arish through to Mission Beach and Bingal Bay. These areas are representative of sea level rain forests throughout North Queensland. They are very accessible and are probably the easiest rain forest areas to visit. Many of the plants found in mountainous rain forests are also represented in this vicinity. It has been found that plants propagated from material from these coastal rain forests grow and flower more readily than those from colder mountain regions. *Eugenia wilsonii*, one of the showiest of Australian plants is not uncommon as an understory shrub in these rain forests. There are also some interesting palms including *Normanbya normanbyi* with its slender trunk and long pinnate leaves and the fan palm *Licuala muelleri*. This palm is very difficult to grow in cultivation.

Many Australian wildflowers tend to thrive in harsh dry environments. The Herberton-Irvinebank region is just such an area. Near Herberton, in or near the banks of the Wild River the following species may be found:— *Banksia spinulosa*, a very good form of *Callistemon viminalis*, *Leptospermum* species

and a beautiful, fine leaved *Baeckea* species whose identification is not certain as flowers have not been available. The interested observer may also find lovely ground orchids such as *Diuris* and *Thelymitra* spp: Epiphytic orchids *Dendrobium speciosum*, *Dendrobium bairdianum*, *Mobilatum hamatum* and *Sarcophilus falcatus* occur in this area.

The well-formed gravel road between the historic old mining town of Herberton and Irvinebank, the centre of John Moffat's long past tin mining empire holds a challenge for the wildflower enthusiast for it is in this region that the purple flowered *Acacia purpureapetala* has been found. It grows as a small low-growing roadside shrub about 30 cm high and has been observed flowering in October-November. Plants in this immediate area are the orange flowering *Grevillea* sp. aff. *decora*, *Grevillea dryandrii* with its huge pink flower spikes, *Acacia wickhamii*, and a magnificent purple leaved form of *Acacia platycarpa* with large creamy white ball flowers. The *Acacias* flower in mid-year. The dry regions north west of Mareeba on the road to Chillagoe are also very interesting areas for those who care to leave their cars and stroll around. Between Mareeba and Dimbulah, large stands of *Grevillea parallela* which flowers in Winter may be observed. From Dimbulah onwards, *Melaleuca minutifolia* is a common large shrub along the roadside.

The road to Chillagoe can be very rough and intending travellers should check before attempting this journey. Chillagoe, as well as being of interest to the serious student of Australian plants is a fascinating area for the historically inclined. The limestone caves are spectacular and intending visitors are advised to time their visits to coincide with the very interesting conducted tours of the caves.

Most formed gravel roads in North Queensland are quite trafficable to conventional vehicles in the dry season. Road trains tend to pound corrugations into them so the best time to travel is after the "Wet" when the roads have been repaired, but before there are heavy stock movements. Fortunately this is probably the best time to see wild flowers in this region.

The road from Georgetown, through Forsyth and Einasleigh to The Lynd passes through large stands of *Eucalyptus miniata* and also traverses country reminiscent of the Burra Range with *Grevillea decorata*, *Jasksonia*, *Eucalyptus melanophloia* and *Eucalyptus peltata* as well as many smaller shrubs and herbaceous plants. The unusual *Dodonaea physocarpa* can be seen in this section although it is much more common on the very rough road to Agate Creek. This road is not recommended for conventional vehicles.

North of Hughenden, there is a very interesting and scenic area known as Porcupine Gorge. It is a sandstone region and in the gorge itself there are many interesting plants including *Eucalyptus miniata*, *Lysiphyllum carroni* and many *Acacia* species. In places at the bottom of the gorge there are large stands of *Melaleuca linariifolia*. Some areas of the gorge are very reminiscent of wet open scrub. It is an area for the enthusiast and not the tourist. This locality is hard to find even though the road skirts the gorge in places. It is wise to seek local guidance and advice before attempting this trip.

Cape York Peninsula with its heaths, rainforests and coastal dunes is an area with many interesting wildflower communities but because of poor roads and inadequate communications this region has not been considered.

This information is not considered comprehensive, other wildflower areas are known or have been reported but details have not been included because of the lack of reliable data.

In conclusion, I would like to repeat that it is possible to find wildflowers almost anywhere. Our advice is not for the high speed tourist "doing" North Queensland in 3 days. The observant and those who make the time to seek, to look and to admire are the ones who will enjoy North Queensland's wildflowers.

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Australia does not have many species of *Gardenia*. They have not been developed or exploited commercially as with most plants of our North. Some no doubt have considerable horticultural potential.



Photography by A. Chapman

GARDENIA OCHREATA

Occurring in the scrub along the banks of creeks around Townsville is this small tree to 4 metres. While some plants have been grown in gardens in Townsville and found quite hardy, careful selection could develop a prized garden shrub. The large pale green "furry" leaves are crowded together towards the end of the branches. The very pleasantly perfumed flowers are terminal, that is they show well on the outside of the foliage. Here is another wildflower to add fragrance to the garden.

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SPECTACULAR WILDFLOWERS OF QUEENSLAND

The wealth of wildflowers from the rain forests of Queensland has not been fully realised. Many adapt very well to garden conditions.



Photography by M. W. Hodge

EUGENIA WILSONII

As grown in the garden this magnificent shrub is a medium to tall loose-growing garden shrub ideally suited for semi-shaded moist soil areas. It flowers from late October to mid December and bears large inflorescences of a deep crimson colour, the stamens form to what looks like a 10 cm conical shaped powder puff. The blooms form on the tips of the branches, their weight causing the branches to become somewhat pendulous. The bloom is followed by quick maturing white fruits. Leaves are a dark glossy green, the new growth being a deep red to bronze.

I would like to acknowledge my sincere thanks to the following persons, for without their co-operation this publication would not have been possible:— Dr. Betsy Jackes, Chris Leigh, Kath Greenway, Margaret Green, Margaret Holmes, Bob Smythe, Les Polkinghorne, Evan Griggs, Graham Macfarlane, David Greenway, Bob Reid, Graham Murtha, David Hockings and Bill Payne.

John Donohue, May 1975.