15.

FOREST FOCUS

NUMBER 15 AUGUST 1975

▲ *Although one of the smaller mallees, mottlecah* (E. macrocarpa) *produces the largest fruits and flowers of the whole genus.*
(Both by Brian Stevenson)

▼

E. "Pterocarpa" *near Norseman.* (Govt. Photographer) ▶

▼ E. "pterocarpa" *flowers, Dryandra arboretum.*

▲ *Dundas mahogany* (E. brockwayi) *resembles salmon gum in appearance and is very suitable for planting as a shade tree in agricultural areas.*
(Govt. Photographer)

FOREST FOCUS

Number 15, August 1975

Published for Mr. B. J. Beggs, Conservator of Forests, Forests Department of Western Australia, 54 Barrack Street, Perth.

Photographic processing by Brian Stevenson

Text (10 on 12pt. Times) by Monofoto Typesetters.

Offset plates by Art Photo Engravers Pty. Ltd

Printed in Western Australia by the Government Printing Office.

AT ISSN 0049-7320

Compiled and photographed by
Dale Watkins
(unless otherwise credited).

‡ Photographer unknown.

Front cover:

Flowers of the *Eucalyptus youngiana* tree which grows to a height of five or six metres and occurs naturally in the arid region fringing the eucalypt zone. It also occurs in small belts of eucalypts which extend as outliers far into the mulga zone and into South Australia. Blossoms can vary from light butter yellow to deep red.

Back cover:

Top: Bushwalking through state forest and the Murray Valley near Dwellingup.

Bottom: Rock outcrops like Boulder Rock (Brookton Highway) and Sullivan Rock (Albany Highway) provide variety for picnickers and walkers.

FOCUS on Inland Eucalypts — a valuable biological resource

An area in the south-west of Western Australia between the 200 mm and 500 mm rainfall isohyets which is less than five per cent of the Australian continent's total area, is the natural habitat of about 25 per cent of all the eucalypt species.

(There are about 500 species within the genus *Eucalyptus*. However, if numerous varieties and hybrids are included, together with newly recorded species, the total goes up to over 650. The genus includes not only trees of high commercial value for their timber, tanning materials and oil-producing foliage, but also many trees and shrubs of considerable aesthetic value.)

The woodlands of this arid and semi-arid region constitute a biological resource which is of scientific value to the world as well as to Western Australia. These species have the capacity to form relatively tall woodlands under low rainfall conditions, to produce substantial volumes of wood and to regenerate adequately after cutting.

Clearing for agriculture has greatly reduced the woodlands in the 380 mm to 500 mm rainfall zone.

Similarly in the drier 280 mm to 380 mm range most of the original woodland has been cleared and burnt for wheatfields. Firewood for the goldfields water supply pumping stations, domestic firewood and fenceposts have also taken their toll.

Important development role

Inland from Southern Cross there has been a continual demand for the local timbers since the pioneering days when gold was first discovered and deep underground mining commenced.

Selected local timbers are admirably suited for the construction of underground shafts, passageways and ore passes because of their toughness and ability to withstand pressure.

Prior to the comparatively recent electrification and diesel powering of such items as the large winding engines at mines, town electricity generation plants, the eight water pumping stations on the goldfields water supply scheme, and other industrial and domestic firewood requirements, vast quantities of firewood and mining timber were extracted from surrounding woodlands. It is claimed that in Coolgardie alone, 100,000 gallons of distilled water was produced each day with wood-fuelled stills.

During the 70 years of full-scale mining, the eucalyptus timber used for industrial and domestic purposes in the goldfields region consumed 350,000 tonnes annually, or a total of 25 to 30 million tonnes. The yield per hectare in these areas ranges from seven to nine tonnes, so that during this period some 3.4 million hectares of inland forest had been cut over. Wood fuelled steam locomotives operated along "woodlines"

ranging up to 200 km from Kalgoorlie to obtain some of this timber.

This eucalypt woodland is most impressive for such an arid environment—growing up to 22 m in height in a 200 mm (8") rainfall. That it is capable of utilisation and management in the traditional forestry sense is demonstrated by the 80-year old regrowth stands surrounding Kalgoorlie. These now comprise the "green belt" jealously preserved by the local people. There seems little doubt that its controlled utilisation for mining purposes can proceed indefinitely without fear of ecological deterioration.

About 70 to 80 km north of Kalgoorlie, eucalypt woodland gradually gives way to mulga (*Acacia aneura*) which was used in the distant north mines. In one large mine 240 km north of Kalgoorlie a quantity of 750,000 tonnes was felled during the 50 years life of the mine. During the 1930's the introduction of oil fuel began and by 1960 wood fuel was entirely replaced by oil at all mines.

Other values

As the demand for mining timber declined, other items of forest produce, such as fence posts and honey production, came into prominence.

Seed of many of the inland species has been in constant demand, both for local use and for supply to overseas countries, particularly those near the Mediterranean.

Renewed activity within the eastern goldfields following the discovery of nickel and increases in gold prices, now place the value of the woodlands into a new perspective. The protective and aesthetic qualities of the vegetation are appreciated by the new inhabitants and shelter, outdoor recreation and resource conservation have a new emphasis.

Current interest by the Forests Department in this woodland resource focuses primarily on biological, aesthetic and recreational values. Particularly, it is considered essential that valuable gene pools and seed sources for the major eucalypts be preserved. Representative samples of important ecosystems have been surveyed and selected with the object of reservation.

Areas formerly reserved as State Forest generally contain the only uncut segments of the vegetation and include sites of maximum biological value.

The eucalypt species of this arid and semi-arid region offer nurserymen, landscapers, parks administrators and home gardeners about 115 separate species.

Any healthy tree may be considered to possess aesthetic value, and this may be either, or a combination of, beautiful blossoms or fruits, attractive foliage, or unique bark.

Also worthy of note are examples of amenity and ornamental plantings of indigenous trees in townships and around homesteads in the region: The gimlet (*E. salubris*) street trees at Menzies, the wide variety of species in parks and streets of Kalgoorlie, the drought defiant green of the kurrajongs (*Brachychiton gregorii*) transported mature and fully grown from woodland to street at Kambalda, the astounding tuart (*E. gomphocephala*) growing at Kookynie, and others.

Arboreta

Seed from these arid and semi-arid species was used in a Forests Department nursery established at Kalgoorlie in 1946 to produce trees for the drier inland areas. This nursery was transferred to Dryandra in 1955, and finally to Narrogin in 1967. Another nursery had previously been established at Hamel, near Waroona, in 1896, and is still in operation supplying seedlings to farmers and other people in country areas.

To demonstrate the advantages of tree planting and to test species for suitability in the agricultural areas of the state, more than sixty arboreta have been established since 1949.

Over 9000 trees of many different species have been planted in locations ranging from Yuna in the north to Esperance and Boxwood Hills in the south. Recently, more attention has been given to tree planting and arboreta in the Kimberley and Pilbara regions.

The arboreta enable the department to assess which are the most suitable trees for planting in different localities and to investigate spacing and planting methods. They have been invaluable to the department's advisory service. A number of leaflets have been prepared setting out lists of suitable species with descriptions and advice on planting and care of trees.

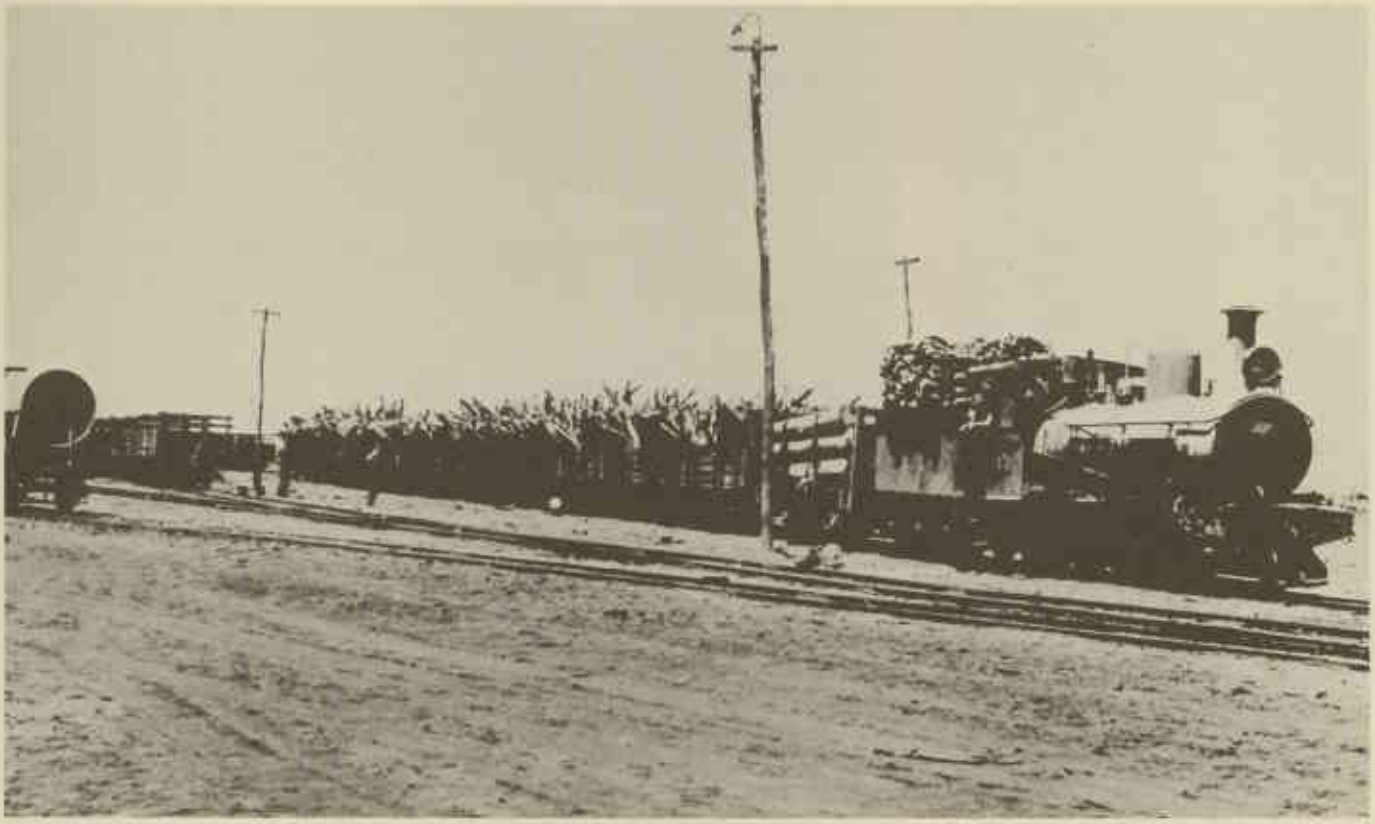
Annual drought

The annual domestic crops receive favoured treatment to free them from competition and encourage development. They are drought-escapers in that they complete their life cycle during the wetter portion of the year and unlike trees, do not have to withstand the rigorous testing period of the annual drought.

The wheatbelt climate, which includes an annual summer drought of at least six months, necessitates the use of hardy trees and gives ample reason for research into drought resistant species and tree spacing trials.

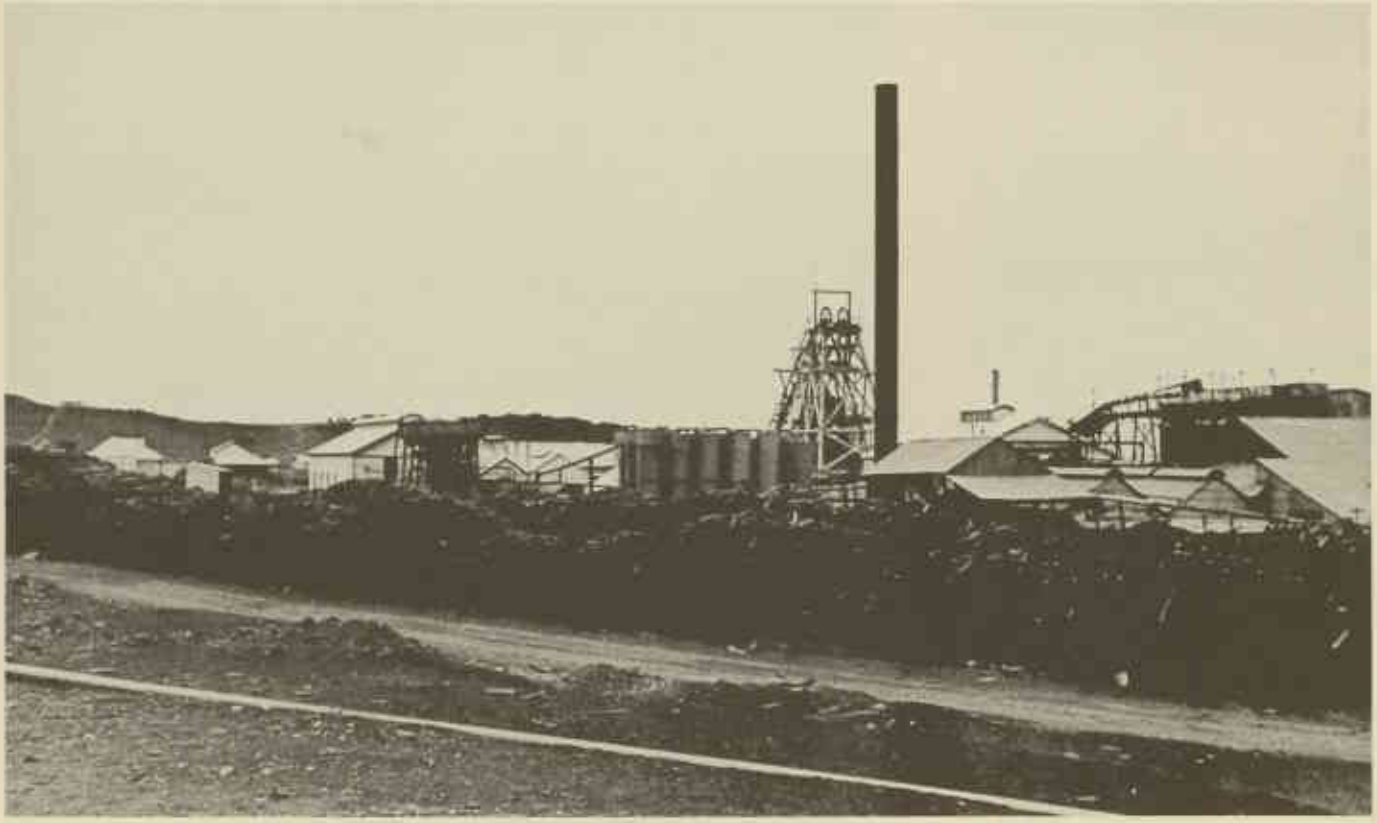
The trials have shown that a number of exotics (eucalypts and non-eucalypts) perform quite well in these situations. A wide range of seedlings is therefore raised annually by the Forests Department and sold at cost throughout the farming areas. Native cypress (or pine) (*Callitris*) and sheoak (*Casuarina*) species have even better adaptations for drought resistance.

The severe drought to which arboreta were subjected during 1969-70 provided a real test. Results of a recent assessment have been very encouraging and almost without exception, well established trees have survived.



▲ *Goldfields woodline train. The first wagon is carrying logs for mining timber.*

▼ *Firewood stacked near a mineshaft.*



▲ *Lemon flowered gum* (E. woodwardii) *in a Kalgoorlie street, and, below, its flowers.*

▼ (Govt. Photographer)

▲ *Merrit* (E. flocktoniae) *with regeneration in the background.*

▼ *Mature coral-flowered gum.* (Both Govt. Photographer)

▲ *Normal coral flowered gum blossom.* (Govt. Photographer)

▼ *Yellow flowered variety of the coral-flowered gum.*

North-western areas

Following the success of this work in the southern half of the state, a forester was seconded, late in 1963, to investigate and promote the growing of trees for amenity purposes in the rapidly developing north-western areas. This project has developed considerably and has received excellent support from the expanding communities of the townships and from the mining companies.

The Pilbara is one of the most highly mineralised regions on earth. The key mineral in the dramatic development of this region is iron ore, although bauxite and other deposits are quite extensive and will also influence the region.

One result of this massive development has been that towns or settlements which previously had populations of only a hundred or so are rapidly growing into towns of several thousands. In addition, new centres are being established. The new towns are of two types, the "company" towns and the "open" towns developed under normal government guidance and administered by a local authority.

The more important of these open towns are the developments at South Hedland and Karratha. It is estimated that the Port Hedland area population is likely to reach 20,000 by 1980, with most of the increase occurring in the satellite township of South Hedland.

Karratha, situated near Roebourne, is likely to have a similar population and construction of new homes in this township commenced in 1969. However, the precise dates and locations of the proposed steel works and offshore gas pipeline will be the determining factors in development of these two centres Both are being developed mainly by the State Housing Commission.

Shelterbelts

In this semi-arid region, trees and shrubs play an important role in

▲ *Three flower colour variations of the goldfields sand mallee* (E. eremophila) ‡

providing shade and shelter, in improving the aesthetic appeal of residential and recreational areas and in assisting in the control of windblown dust.

During 1970, the chairman of the North-West Planning Authority requested advice from the Conservator of Forests on possible establishment of shelterbelts around the towns. Later in the year Forests Department officers, Eastman and Batini, visited the Pilbara region accompanied by the current tree adviser, Fred Lullfitz.

Inspections were carried out at six Pilbara centres, and a list of recommendations was included in a report.

The Pilbara region is unsuited to commercial production of timber or other forest products. Tree growing is concerned primarily with provision of shade, dust barriers and amenity values. The visual amelioration of this harsh landscape is considered to be an intangible asset of great importance.

Under domestic conditions growth rates are rapid—particularly with species such as river gum which can grow to 3-5 m by the age of two years, and corkbark (*Sesbania grandiflora*) which has grown to 3-4 m at the age of eighteen months. Some insect problems (galls and termites) do occur, but can usually be controlled.

Some species can withstand moderate cyclones by shedding their leaves, or through other survival mechanisms. The success of any long term planting schemes in this region will depend on the tree's ability to withstand the occassional severe cyclone which occurs.

Much of this area is naturally treeless and satisfactory growth—if any at all—could only be achieved by watering the planted seedlings during their early years. Results already obtained in this region by artificial watering are quite remarkable.

Shelterbelts of native shrub species (including wattles and hakeas) would require less water and fostering to boost their growth than introduced tree species—particularly after establishment. This native shrub shelterbelt would be a poor alternative to the higher tree shelterbelt, but could give a minor level of protection against dust for a relatively low cost.

Irrigated silviculture at Ord

The Agriculture and Forests Departments are co-operating with the Commonwealth Forest Research Institute's experimental irrigated tree plots in the Kununurra area.

There is little available world-wide information on the performance of eucalypts under irrigation, other than that from the F.R.I.'s experiment near Darwin, which used sewage effluent. In this trial the growth of several species was very promising and has indicated that under irrigation, adequate growth rates can be maintained throughout the year. Unfortunately this experimental plot was damaged during the Darwin cyclone.

Thirty-two tree species are under test in the Darwin experiment. In one twelve-months-old plot the mean height of one species was 7·05 m. The fastest growing four or five species put on between 10 and 12 tonnes of wood a hectare. It is expected that this rate of wood production will increase dramatically in the second and third years.

Two problems to be faced at the Ord location are a higher pH (alkaline) reaction in the soil and a higher salt level in irrigation water.

Closer to Perth, the C.S.I.R.O. and Metropolitan Water Board are co-operating (with some initial assistance from the Forests Department) in an experiment using effluent from the Beenyup waste water plant near Wanneroo to irrigate softwoods. After initial nutrient

▲ *Young white mallee* (E. erythronema) *in a Kalgoorlie street.* ‡

imbalance problems had been rectified, the trees are showing excellent growth rates.

Kimberly Trials

Two Kimberley seedling trial plots were commenced in December, 1972—a two-hectare plot seven miles north-east of Kalumburu mission on the extreme northern tip of Western Australia; and a one and a half hectare plot near Drysdale River homestead.

The main vegetation type on both plots was a fairly dense woodland dominated by messmate (*E. tetrodonta*) and wollybutt (*E. miniata*). The Kalumburu site had previously carried a considerable number of northern cypress (*Callitris intratropica*) stems, the bulk of which have been felled for local use.

Each plot is fenced to exclude cattle, and in the case of the Kalumburu plot, additional fencing was needed to keep out the rock wallabies. Species planted included northern cypress, river gum, Caribbean pine (*Pinus caribaea*), and African mahogany (*Khaya senegalensis*).

Trees for the North-West

As a result of Mr. Lullfitz's experience, his recommendations on some of the most suitable species for the region are listed below, and could be of interest to people living in the North-West. However, before undertaking a serious or extensive tree-planting scheme, it is strongly recommended that advice be sought regarding suitable species for the soil types, climatic factors, availability of artificial watering and water quality in the areas to be planted.

River gum (*E. camaldulensis*)
Coolibah (*E. microtheca*)
Gum topped bloodwood (*E. dicromophloia*)
White gum (*E. bigalerita*)
Cabbage gum (*E. grandifolia*)
Kopi gum (*E. striaticalyx*)
Corkbark (*Sesbania grandiflora*)
Chintabel (*Erythrina vespertilio*)
Cadjeput (*Melaleuca leucadendron*) and related species
Rottnest tea tree (*M. lanceolata*)
Indian tulip or portia tree (*Thespesia populnea*)
Kurrajong (*Brachychiton* species)
White cypress (*Callitris glauca*)
Sheoak (*Casuarina glauca*)
Wattle (*Acacia* species)
Leichardt pine (*Nauclea orientalis*)
Cluster fig (*Ficus glomerata*)
Poinciana or flamboyant tree (*Delonix regia*)
Golden shower (*Cassia fistula*)
Cape lilac (*Melia azederach*)
Moon tree (*Kigelia pinnata*)
Tamarind (*Tamarindus indica*)
Coconut palm (*Cocos nucifera*)
Port Jackson fig (*Ficus rubiginosa*)
Carob bean (*Ceratonia siliqua*)
Jacaranda (*Jacaranda mimosifolia*)

Mr. Lullfitz has established a nursery at Broome, where plants

▲ *Variations in the blossoms of white mallee. This is one of the species with an extensive range, and observations suggest that the proportion of red and pink flowered specimens is higher east of Merredin. In the northern extensions (Wongan Hills and Morawa) a more upright, slender variety is found.* ‡

are raised and sent to other holding nurseries in the North-West, such as the shire nursery at Port Hedland.

Reference books

The following publications will be of value to those interested in further information:
Suitable trees for planting in the wheatbelt*
Suitable trees for planting in the South-West and Esperance plains*
(free Forests Department leaflets)
Selected Flowering Eucalypts of

of W.A.*† (Forests Department booklet $1)
Eucalypts of the W.A. goldfields and adjacent wheatbelt† (Forestry & Timber Bureau $3.75)
Growing trees on Australian farms† (Forestry & Timber Bureau $4.40)
The use of trees and shrubs in the dry country of Australia† (Forestry & Timber Bureau $6.85)
Forest trees of Australia† (Forestry & Timber Bureau $8.50)
Forestry in Western Australia* (Forest Department $1.50)

*Available from Forests Department, W.A.
†Available from Australian Government Publishing Service.

◀ *Boongul* (E. transcontinentalis) *reaches its best development in the goldfields (up to 20m), but in some areas grows as mallee.* (Govt. Photographer)

◀ *Boongul flowers.* (Govt. Photographer)

Seedlings (normally first year stock) are available for sale to people and local authorities in country areas from department nurseries at Hamel and Narrogin.

People interested in obtaining seedlings should first obtain the leaflet "Trees for shade, shelter and conservation" which contains conditions of sale, ordering advice, prices and a list of species available.

◀ *Salmon gum* (E. salmonophloia) *and gimlet* (E. salubris) *regeneration, 40 years old, north of Kalgoorlie.* (George Nunn)

Torwood

No article on dry land eucalypts—particularly those from the Kalgoorlie region—can be complete without some mention of the torwood.

The torwood is a hybridisation of the two species *E. torquata* (coral-flowered gum) and *E. woodardii* (lemon-flowered gum). When these two species from widely separated areas of natural distribution are brought together under cultivation, hybridisation occurs freely.

The progeny of two such colourful parents has naturally caused considerable interest in horticultural circles. When first raised in the Kalgoorlie nursery, they were dubbed "torwoods".

As one would expect, wide variations in vigour, tree form, leaf formation and the colour of the flowers became apparent as they developed.

By culling weak seedlings it is possible to obtain trees of greater vigour, denser crown and better appearance than either parent, but there appears to be no sure way of selecting blossom colour. Some trees will produce blossoms of similar colour to those of the individual parents, particularly the yellow of *E. woodwardii*, but most will be of intermediate shades. While shades approximating to orange are general, some of the more spectacular blossoms show unusual dual tones, the outer part of the blossom showing a distinct colour difference from the centre.

Two different flower types of torwood. (Govt. Photographer) ▶

▲ *Torwood street tree, Kalgoorlie.* ‡

▼ *Parents of the* E. torquata E. woodwardii *hybrid in the grounds of the North Kalgoorlie school.* ‡