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Fig. 1.—Seven-year-old windbreak of *Pinus pinaster* at the Esperance Research Station (19 inch rainfall).

Tree Establishment on Esperance Plains

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SOME three miles north of Esperance, the land rises sharply to an extensive undulating peneplain of heath land, of about 500 feet elevation, some 30 miles wide and extending for many miles to the east and west. Except for limited areas of paperbark (*Melaleuca* sp.) and yate (*Euc. occidentalis*) in the swamps and scattered marlock (*Euc. tetragona*), chittick (*Lambertia* sp) and Christmas tree (*Nuytsia floribunda*) on the higher ground, little of this vegetation exceeds two feet in height. Much of it is capable of attaining somewhat greater stature, but has been prevented by frequent bushfires.

The soils of the area are of low fertility, and consist of heavy clay overlain by sands or laterites, or combinations of both, of varying depth. Roots of the natural vegetation are confined almost wholly to the surface soils and do not penetrate the clay to any extent. The depth of the soil above the clay is consequently of importance when considering tree establishment.

Although this land appeared agriculturally unattractive, some settlement had taken place over many years in the wetter

portions of the region—mainly within 25 miles of Esperance itself. On some of these older properties, occasional groves or lines of trees dot the skyline, showing where man has successfully established trees, where nature provided none. One would expect with its mild climate and assured, although not excessive, rainfall (26 in. at the coast) that the Esperance region would support some form of tree growth, and it is fortunate that some of the pioneers of the district, such as Mr. Fred Bow, the

late Mr. A. Turner, and Mr. A. Helms, actually demonstrated the practicability of tree establishment on their properties.

Moreover, the time which has elapsed since the earlier planting took place enables us to assess in some measure the value of the various species for farm planting on a long-term basis. Points which emerge clearly are that trees must be freed from scrub competition by thorough preparatory soil cultivation, and need the assistance of artificial fertilisers.

The Esperance Pine Plantation established in 1928-29, by Esperance Pine Forests, Ltd., when little was known of the importance of the above points, provided, in the light of present day knowledge, excellent examples of what not to do.

Advantage was taken, by the Forests Department, of this plantation to establish a number of experiments, which ultimately yielded valuable information on the nutritional requirements of the Cluster Pine (*Pinus pinaster*). Armed with the knowledge and supported by information

accumulated elsewhere in the State, the Forests Department carried out further plantings of pine, during the years 1951-56. By applying a limited amount of fertiliser, employing better soil preparation techniques, and using improved strains of pine, it was found that by 1958, trees planted in 1951 had surpassed the trees in the original plantation which had battled with scrub and soil poverty since 1928.

During 1951, the Forests Department, in association with the Department of Agriculture, carried out sowings and plantings of a number of tree species at the Esperance Research Station, and these are continuing.

The rainfall here (about 19 in.) is somewhat lower than at the other areas planted.

During the last four or five years, as a result of the accelerated tempo of agricultural development in this region, the necessity for extensive tree planting has become increasingly apparent, and interest in it has increased accordingly. Results of past



Fig. 2.—View of portion of Esperance Plantation (*P. pinaster*). Foreground: 1956 planting. Left background: 1951 planting showing result of advances in strain selection and establishment technique when compared with 1928 planting central background



Fig. 3.—Shade group of Bald Island Marlock established on cleared heath land on one of the older Esperance farms.

planting indicate that some half dozen species at least, can be successfully established in the moister region of the Esperance plains, and while no doubt, this does not include the whole range of those suitable, it would be inadvisable to depart from this list, except on a small experimental basis. This list is:—

Bald Island Marlock (*Eucalyptus Lehmanni*.)

Tuart (*Euc. gomphocephala*.)

Cluster Pine (*Pinus pinaster*.)

Tasmanian Bluegum (*Euc. globulus*.)

Stone Pine (*Pinus pinea*.)

Golden Wattle (*Acacia pycnantha*.)

A number of other species have been planted, and no doubt some of these may eventually be added to the recommended list. Trees still under trial include—

Sugar Gum (including the dwarf variety-Nana). (*Euc. cladocalyx*.)

Brown Mallet (*Euc. astringens*.)

Blue Mallet (*Euc. Gardneri*.)

White Mallet (*Euc. falcata*.)

False Mahogany (*Euc. botryoides*.)

Wandoo (*Euc. redunca*.)

Black Cypress Pine (*Callitris calcarata*.)

Arizona Cypress (*Cupressus Arizonica*.)

Canary Island Pine (*Pinus canariensis*.)

In tree establishment, a number of points must be considered—

- (1) How can trees be established, and at what cost—whether by planting or sowing (sowing is cheaper) or whether balled nursery stock or open-rooted plants would be used?
- (2) Purpose for which required—whether for windbreak, shelter belt, shade group, isolated shade trees, ornamentals, or timber and woodlot.
- (3) The susceptibility of the various species to damage or destruction by stock, vermin, or fire.

Briefly it may be stated that the Eucalypts must be established by the use of balled stock, i.e., plants raised in individual containers or in some cases by use of plants raised in trays.

The cost of production of these trees is in the vicinity of 2s. each to which must be added the freight charges from nurseries in the western portion of the State. Allowing for possible loss in transport and planting losses, planting with balled stock on an extensive scale can be

an expensive undertaking on the score of planting stock alone. The constant nursery attention required by plants raised in this manner necessitates an output of about 20,000 plants per year, to make their production at this price an economic proposition.

Most pine species can be produced at a much cheaper rate in nursery lines and transplanted open-rooted.

A brief description of the various species, and their possibilities follows:—

Bald Island Marlock.—This is a tree of the south coast and some of the islands of the Recherche Archipelago, and is naturally suited to the climate. It is one of the best of eucalypts, for either shade, low windbreak, or shelter belt. For very many years, the trees, if given ample growing space, retain their crowns, almost to the ground, and if planted in a single line, provide good low shelter and wind protec-

tion. As they age, they may attain heights of 15 to 30 ft. or more, and develop spreading umbrella-shaped, shady crowns. This is a particularly hardy, attractive and useful tree for the district. Plants are available in season from Dryandra or Hamel Nurseries.

Tuart.—This is a well known tree from the west coast of W.A., and where soils are reasonably deep, it does well in the Esperance district. It is a rapid grower when conditions suit it. As it ages, it tends to carry its crown upwards, and offers very little wind protection close to the ground. If required as a shelter belt, it would be as well to plant a row of tuarts parallel to a row of shorter-growing trees, such as golden wattle.

Plants available from Hamel Nursery.

Tasmanian Blue Gum.—Trees planted by Mr. Fred Bow on his property thrived well, but results at the Esperance Research

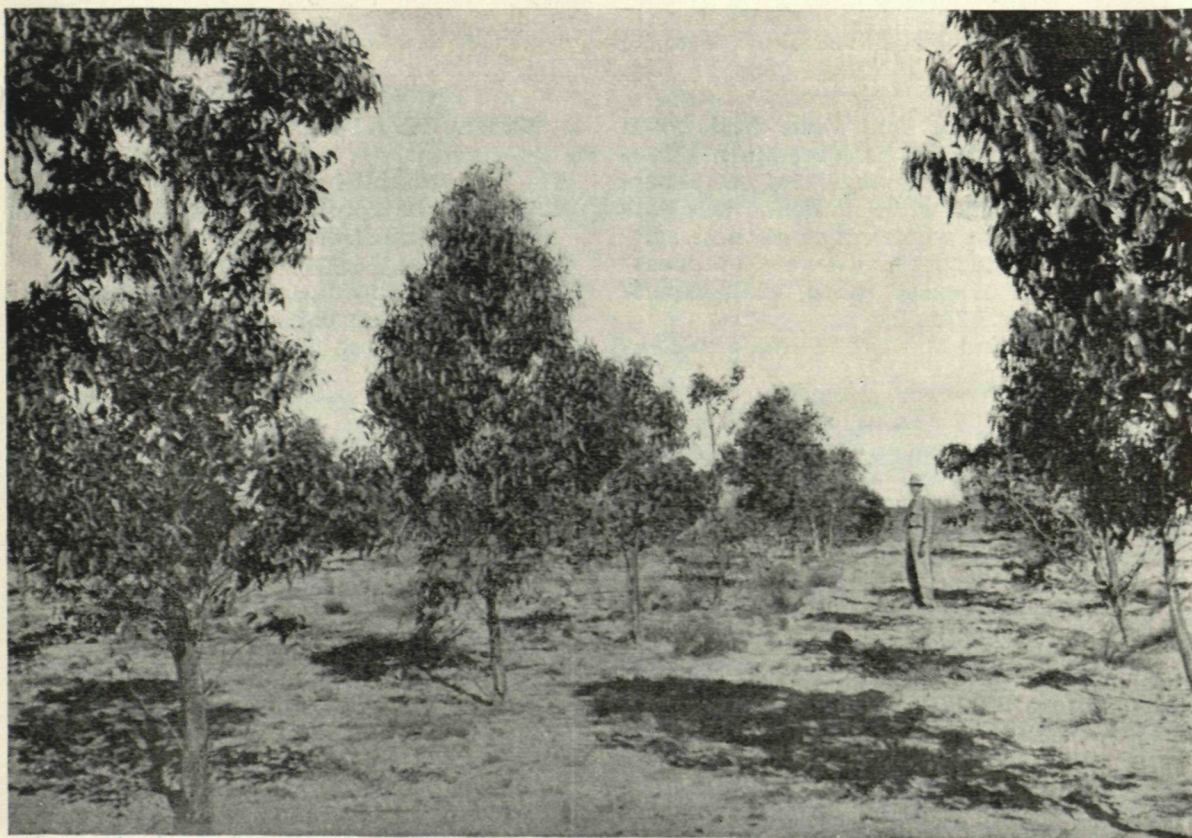


Fig. 4.—A range of Eucalypt species under trial in the arboretum at Esperance Research Station—1951 planting. With extensive agricultural development on the treeless Esperance plains, are associated problems involving the provision of shade and shelter from wind.



Fig. 5.—Lines of seven-year-old Bald Island Marlocks at the Esperance Research Station.

Station where the rainfall is somewhat lower, and the soils shallow, have been less spectacular. Its tendency to form a long trunk and small crown renders it rather ineffective either as a shelter belt or for shade purposes.

Trees available from Hamel Nursery.

Cluster Pine.—This tree has proved itself eminently suitable for the Esperance district, but it needs good soil preparation, superphosphate, and zinc, and protection from rabbits and stock. It is a dual-purpose tree, providing not only shade and wind protection, but also a useful timber. With softwood species, even very small trees can be utilised, for timber production. The timber is useful in smaller sizes, for case-making and in larger sizes for flooring, linings, etc. Pine has the advantage of easy and cheap propagation. It can be raised in nursery lines which do not require the constant attention needed for balled stock and can be transplanted to the field as open-rooted plants. It is drought-resistant and belts of half a dozen rows, or even blocks of an acre or more, at about 10 ft. x 10 ft. spacing will provide shade, shelter and timber. With suitable preservative treatment, pine fence posts have proved quite durable. It is anticipated that a limited number of

Cluster Pine seedlings will be available from the local Agricultural Research Station for the 1959 season.

Stone Pine.—In its native land (Italy), this tree is grown primarily for its nuts which are used for culinary purposes. As a timber producer, it is very poor. However, the large spreading crown makes it an extremely attractive shade tree, and isolated specimens of it could ultimately prove both useful and picturesque on Esperance farms. A line of these trees can be seen in the old Forests Department paddock near the Norseman Road, some 11 miles from Esperance. These have competed with scrub and fire, and look rather poor. The specimen on the northern end of the row received a couple of pounds of superphosphate, three or four years ago, and the response is obvious. With fertiliser application and freedom from competition this should be a worthwhile species.

Golden Wattle.—The wattles are comparatively short-lived trees and do not attain great size, but their attractive appearance and rapid growth make them very desirable subjects to provide quick shade and a quick return, while the slower-growing species are becoming established. Besides their usefulness in providing shade and shelter, the bark of these trees is a

valuable tanning material. Specimens raised from seed sown by Mr. A. Helms, some 30 years ago, can still be seen in the "Forestry paddock" mentioned earlier.



Fig. 6.—Seven-year-old Golden Wattles at the Esperance Research Station.

What are more interesting, however, are the numerous trees of younger age, which have become established naturally from seed from these originals. This demonstrates not only the species' ability to regenerate naturally, but also its non-palatability to rabbits, which enables it to persist when other trees are eaten out.

Perhaps the most attractive aspect of wattle growing is the cheapness of its establishment. This can be done by direct sowing in the early winter. The area or strip to be sown should be well cultivated, preferably twice, with a 12 months' interval between working. Seed, treated with hot water, should be spot-sown in a line, or lines, at about 8 ft. intervals. The seed treatment, as employed by different authorities varies slightly, but I have found it

quite effective to boil up some water, remove it from the fire for half a minute or so, and then pour it on the seed in a cup or tin, allow to cool, and sow the seed. It is probably inadvisable to treat more seed than can be sown on the same day. Each sowing spot should be hand cultivated to a diameter of about a foot, with a small hand hoe, to a fine tilth and a few seeds dropped into it. These should be covered by about $\frac{1}{4}$ in. of soil, which should be pressed lightly to firm it. A further light layer of loose soil is sometimes kicked over this. The addition of a small quantity of soil from near existing wattle may assist in ensuring soil inoculation. It is anticipated that some seed will be available from the Esperance Research Station, but settlers desiring to carry out large-scale wattle establishment would be advised to collect their own seed locally, during the early summer. Seed pods are picked as they dry, and put in a bag which should be rolled and generally kicked about to separate the seed from the pod.

For those who require only a limited number of golden wattles, balled plants are available at current rates from Hamel Nursery.

While it is as yet too early to make recommendations regarding other trees, the development of such species as Blue Mallet, Brown Mallet, inland Wandoo, dwarf Sugar Gum, Canary Island pine, and some of the *Callitris* or native pines, will be watched with considerable interest, particularly for use on the drier sections of the Esperance plain. One must expect with the rapid falling off in rainfall as one proceeds northwards, that a range of species wider than that given in this article, will be needed to ensure successful tree establishment over all sections of the Esperance plain.

