INFORMATION SHEET 47

MANAGING JARRAH FOREST FOR WOOD PRODUCTION

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Introduction

Although generally regarded as a slow growing species in Western Australia, the diameter growth of jarrah *(Eucalyptus marginata),* with thinning, would be regarded as fast in many other parts of the world. With proper management, future production of high quality wood from the western jarrah forest is an attractive proposition.

The impact of the cinnamon fungus and bauxite mining have caused some doubts about future supplies of jarrah timber. There is, however, mounting evidence that the best jarrah forest does not easily succumb to the disease, and with careful management there is cause for optimism. The progression of bauxite mining has also become more predictable and it is now considered worthwhile to make investments in forest improvement in areas not subject to mining for 20 years.

This leaflet describes the ways in which jarrah forest can be treated to increase wood production, and refers mainly to forest occurring in the 900 mm plus rainfall zone. In areas drier than this, growth is much slower and unlikely to repay investment in forest improvement. The forest treatment methods outlined below are a synthesis of 50 years of research and measurement, and bring together current knowledge of silviculture, fire ecology and forest site classification.

Forest Structural Types

The treatment to be accorded to any area of forest depends on the forest structure, usually a reflection of its past treatment. There are three broad forest structure categories (described below) although all three may exist in any particular stand.

1. Regrowth Forest

Regrowth forest consists primarily of second growth trees which require thinning to promote growth on selected trees. Further regeneration is not required at this stage and is discouraged. Figure 1 shows a diagrammatic representation of crowns in a regrowth forest. This structural type has the greatest potential for improved yield in the medium term, say 20 to 50 years.

2. Grouped Forest

Grouped forest, as the name suggests, consists of groups of old growth and groups of second growth in patches of 0·1 hectares or more. Such stands are usually the result of past regeneration treatment or deliberate group fellings (see Figure 2).

REPRESENTATION OF FOREST STRUCTURAL TYPES

FIGURE 1 EVEN AGED REGROWTH

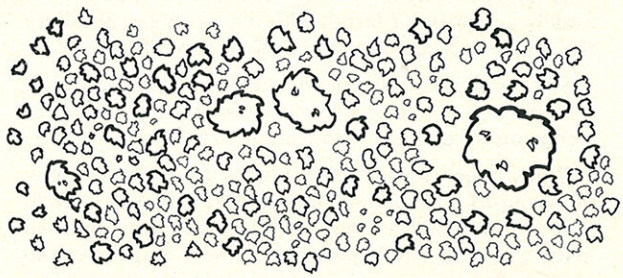


FIGURE 2 GROUPED FOREST

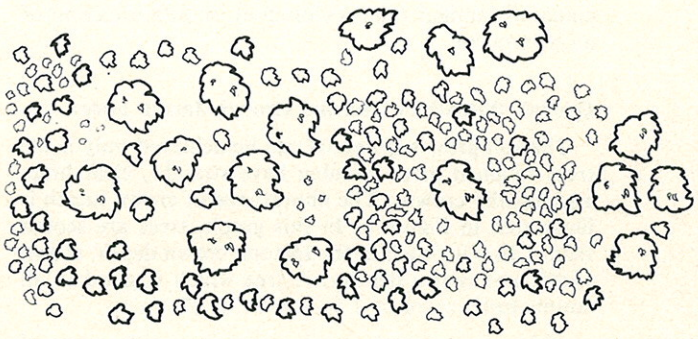
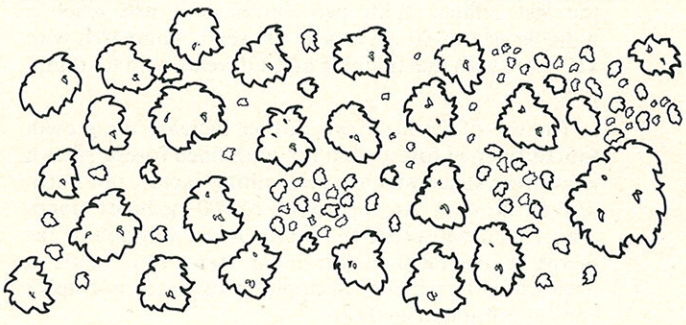


FIGURE 3 MATURE FOREST



Silvicultural treatment of grouped forest is more complex. It requires the thinning of the regrowth groups, the discouragement of further coppice from stumps or fresh seedling regeneration and the felling of the mature groups with treatment to promote regeneration. The introduction of regeneration brings with it a commitment for complete fire protection until the regeneration is old enough to withstand a fire—usually about 10 years.

3. Mature Forest

Mature forest consists predominantly of mature trees which, when removed, will create gaps requiring regeneration and subsequent protection from fire. Such stands (Figure 3) may be virgin forest or forest which has been lightly cut-over on a selection basis.

Regrowth makes up a small proportion of the stand and its protection during logging is very difficult. The aim should be to produce large groups of even-aged stands for ease of future management. Where worthwhile groups of regrowth exist they should be preserved and thinned.

Forest Species Mixtures

What we loosely refer to as jarrah forest is, of course, usually a mixture of jarrah with one or more subsidiary species, particularly marri *(Eucalyptus calophylla).*

Since marri is more quickly established than jarrah, it is important to ensure that treatment, especially for regeneration, does not allow marri to take over the site.

When large trees are felled to procure regeneration in the grouped and mature stand types, it is necessary to remove the marri as well as the jarrah. Any retained marri will provide a large source of seed and the consequent regeneration will be dominated by marri. This problem is greatest in jarrah forests south of the Blackwood River.

It is also important to keep the population of *Banksia grandis* as low as possible. This species provides one of the prime avenues for the movement and build-up of the cinnamon fungus (dieback disease), should infection of an area occur.

Growth Potential of Second Growth Jarrah Forest

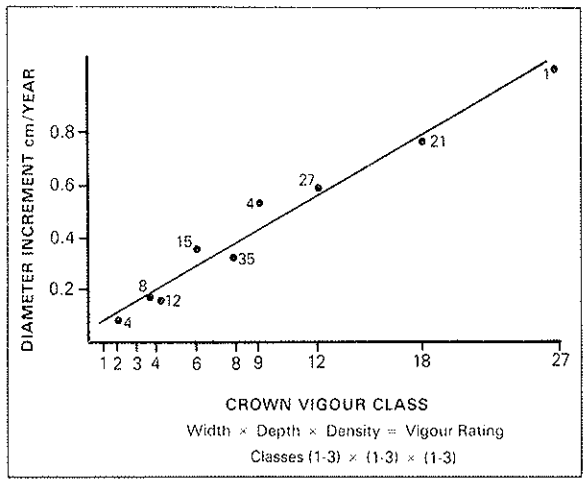
The full growth potential can be achieved only if the trees retained after thinning have straight, clear boles and healthy crowns. The importance of crown health is illustrated in Figure 4. In this graph, trees are scored from 1 to 3 for each of the factors: crown depth, crown width and crown density. A tree which is good in all counts has a score of 3 × 3 × 3, or 27.

Although regrowth stands occur in a wide range of average sizes and densities, an indication of the magnitude of the response to thinning can be seen in Figure 5. A stand of jarrah with an average diameter at breast height of 30 cm is aged about 60 years, from the date of the last felling. With two thinnings it will reach a millable size of 50 cm at age 100 years, compared with 110 years with one thinning and 170 years with no thinning.

The use of fertilizer can further increase the growth rate of thinned forest—but not unthinned forest, since it is growing space which is the limiting factor, not nutrition in this case. An application of 800 kg/ha of mono-ammonium phosphate to thinned forest will double the diameter increment of jarrah for about four years. A decision as to whether to apply fertilizer or not needs careful economic analysis.

FIGURE 4

CROWN VIGOUR *V.* INCREMENT



Selection of Stands for Intensive Management

There is great variation in the quality of jarrah forest and it is clear that investments in intensive management should only be made in good quality stands. Factors which must be considered in the selection of stands for intensive management are:

1. Site Type Classification

Site type has an important influence on growth potential, susceptibility to cinnamon fungus and ease of regeneration. Site types are classified according to a vegetation association system developed by Havel (1975). The only types which should be considered for intensive treatment are Havel types, T, S, O and P.

2. Presence of Dieback Disease

The impact of dieback disease is least on T types and on red soil types along major streams. In other types the disease can have a serious impact on jarrah forest. Areas known to have sheet laterite at shallow depth should be particularly avoided, as they are highly susceptible to disease intensification.

Forest lying downslope of dieback disease should not be treated.

3. Fire Protection

Thinning of regrowth stands is quite compatible with periodic fuel reduction burning, provided care is taken to remove accumulations of debris from around the base of retained trees. This avoids stem damage from fire.

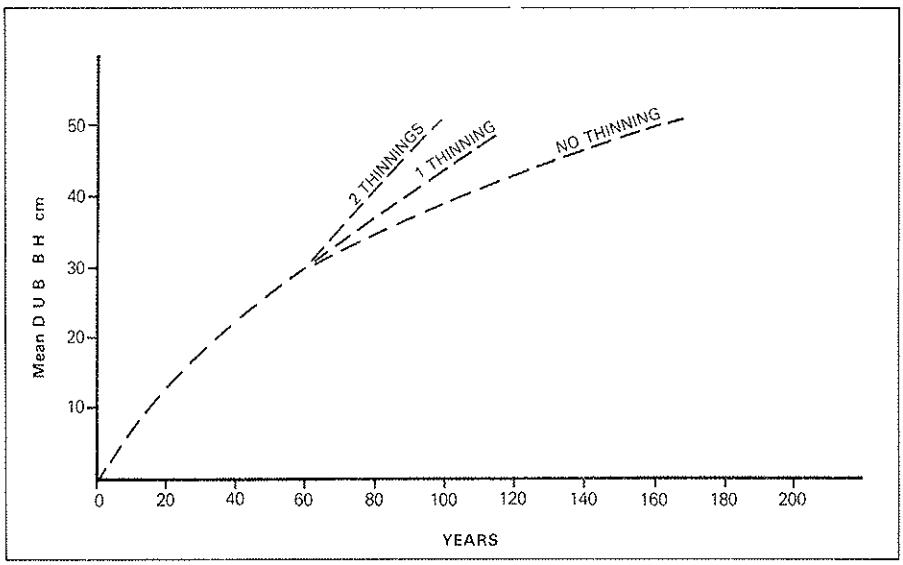
When treatment is for the purpose of regeneration, however, it is necessary to exclude fire for at least 10 years.

4. Age of Regrowth

Early benefit will be obtained by thinning where the average tree diameter at breast height is 30-40 cm, that is 60-80 years after regeneration. Stands in which marri constitutes more that 20 per cent of the stocking should be thinned as early as 20 years, in order to prevent marri suppressing the more valuable jarrah.

FIGURE 5

EFFECT OF FREQUENCY OF THINNING ON THE DIAMETER OF REGROWTH JARRAH



Guide-lines for Thinning Regrowth (Mean diameter about 30 cm)

1. Intensity of Thinning

Thin to retain 150 stems per hectare.

2. Crop Tree Selection

Retain only trees with good crowns which are level with or above the general level of the forest canopy. Crop trees should have at least 3 m of bole free of any defect. Even spacing of crop trees is not critical, within reasonable limits.

In areas affected by jarrah leaf miner insect, all stems which show signs of resistance to the insect should be retained, regardless of tree size or quality.

3. Thinning Operation

Carry out a fuel reduction burn through the area to be treated if it has not been burnt in the previous three years.

The first stems to be felled should be those which provide saleable material, e.g. poles and rails. Next, all trees which are not saleable are felled or poisoned standing. Final crop trees must be treated with extreme care during felling, extraction of produce and subsequent burning. All felling debris must be moved at least two metres away from the base of a crop tree and the debris should be burnt under very mild weather conditions, e.g. early spring or at night in late spring.

It is very important that all coppice is treated with herbicide to prevent its regrowth.

Guide-lines for Treatment of Grouped Forest

Within the groups of regrowth, the treatment should be as for regrowth forest. The treatment of the remainder of the area requires careful consideration.

Sometimes the remaining forest groups will consist of over-mature or non-marketable trees which are not making a useful contribution to wood production. Non-marketable old trees are best poisoned standing as they often contribute excessive amounts of debris to the forest floor. After a few years standing dead they may be a valuable firewood resource. Marketable trees should be removed, taking great care not to damage trees in the regrowth groups.

If the remaining forest groups consist of nearly matured trees, they may benefit from a thinning or the removal of marri or non-marketable jarrah.

Where it is intended to largely fell the older parts of a grouped forest, it is essential to ensure that the jarrah regeneration is already in existence in the form of ground coppice or advanced growth. If the regeneration is not already present, it is necessary to carry out a partial, selective cut of the mature trees; wait until a good crop of seed is present on the trees and then burn the area when the capsules are mature. It may then take 20 years for the seedlings to develop to the stage where they are able to develop into saplings. The remaining mature trees may be removed at that time.

Guide-lines for Treatment of Mature Forest

The guide-lines for the treatment of mature forest are much the same as those for the older component of grouped forest, namely, fell and regenerate if advanced growth is present; establish advanced growth before felling if it is not already present.

Forest Disease Management

The forest manager must always aim to minimize the opportunities for infection by dieback disease by restricting the movement of heavy machinery in wet soil conditions; minimizing access to the forest by heavy machinery; and ensuring the wash-down of any machinery which must be used in the forest, before it arrives and before it leaves.