FIRE IN THE JARRAH FOREST – A SILVICULTURAL APPRAISAL

by

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INTRODUCTION

Controlled burning in the Jarrah forest is regarded primarily as a fuel reduction measure aimed at decreasing the possibility of uncontrollable wildfires occurring. Although this aspect of burning is necessary for the survival of the forest, there are other aspects of fire worth taking into consideration and which may, in the long run, prove of great importance in forest management.

FIRE AND THE FOREST COMMUNITY

The association of the Jarrah forest with fire has been discussed in an article on fauna surveys in this issue. The plant community comprising the Jarrah forest exhibits all the classical adaptations which botanists quote as indicating resistance to fire for ground vegetation species, these include:–

1. The perennial life form. Probably 95% of the plant species in the Jarrah forest are perennials.

2. The presence of a caudex or lignotuber. This is a large subterranean rootstock, well endowed with dormant buds which shoot after a fire and replace the shoots destroyed by the fire. Very many of the dicotyledon plants in the Jarrah forest have this structure. The monocots (grass-like plants) although lacking a lignotuber are nevertheless protected from permanent fire damage by having their main shoots, and sometimes rhizomes, two or three inches below ground level. These, in turn, also reshoot when the surface parts of the plant are destroyed by fire.

3. Fruits that can only be opened by heat – for example, many Hakeas and Grevilleas.

4. Seeds that will only germinate after heat treatment; the acacias are well known in this category.

Jarrah itself has a number of characteristics which make it very resistant and hard to kill by fire. The main ones are:

1. The lignotuber.

2. Dormant buds on the stem or trunk. These form epicormic shoots when the crown is destroyed by fire.

3. A thick bark. McArthur (1968), describes Eucalyptus macrorhynca in the ACT, as having a thick bark and being very fire resistant. The bark of Jarrah is 30% to 50% thicker than that of E. macrorhynca and is a correspondingly better insulator against heat.

EFFECTS AND SILVICULTURAL USES OF FIRE.

1. Forest Composition.

Marri is generally estimated at comprising between 5% and 10% of the northern Jarrah forest. I suggest that this relatively low proportion of Marri is being maintained by burning. Peet (1965), in assessing the effects of the 1961 Dwellingup fire, found Marri to be far more susceptible than Jarrah. In severely damaged areas a very high proportion of the Marri component had been killed. My own work on regeneration suggests that Marri seedlings establish themselves more easily and they are more vigorous than Jarrah seedlings. In some areas Marri seedlings outnumber Jarrah. When the area is burnt, however, the situation is reversed due to the relatively high susceptibility of Marri to fire.

2. Growth Rates

Studies have been made by Loneragan (1961) comparing the growth rates of Jarrah poles in regularly burnt forest with those in unburnt forest. Those in burnt forest were found to grow slightly faster than the unburnt trees. The difference in growth rates was small but nevertheless detectable.

3. Soil Properties

No changes in the major nutritional values and properties were found by Hatch (1959) in the soils under regularly burnt forest stands.

4. Seedfall and Regeneration

Van Noort (1959) has determined that a mild controlled burn, involving no crown scorch, will open the capsules on Jarrah crowns, and bring the seed to the ground within two or three weeks. In another study on regeneration the same author (1960) attributed a massive increase in Jarrah seedlings on one of his study areas to the coincidence of a fire with a seed year. The application of controlled burning to regeneration is obvious. Not only does burning bring a lot of seed to the ground at one time, but it also reduces competition from the ground vegetation favouring survival of Jarrah seedlings.

A lack of fire appears to inhibit the development of advance growth. In a survey made in Amphion compartment 6, which has been protected from fire for 35 years, large Jarrah advance growth was found to be weak with very woody almost leafless shoots and rotting lignotubers. Similar sized plants in an adjacent regularly burnt compartment were found to be healthy and vigorous.

5. Crown Scorch

The effect of total crown scorch on growth rates depends on the season of scorching. Jarrah has an inherent growth cycle; new leaves are formed in summer, while wood increment (or increase in the size of the stem) is accrued in the two separate periods of spring, and late autumn/winter. Spring growth commences in September and accounts for approximately one third the total annual stem increment. The autumn/winter wood growth period lasts from late March to August and accounts for the other two thirds.

Trees which are scorched in autumn stop growing until a new crown is formed the following summer. Virtually one whole year's growth is lost. A scorch in spring, however, leaves the trees leafless only until the new flush occurs in the following January and February; wood growth

recommences the following autumn. Assuming that the scorch takes place in October or November, when half the spring wood growth has taken place, a loss of roughly one sixth the annual growth is realised. I suspect that this small loss of wood increment due to a spring scorch is likely to be more than compensated for by the extra vigorous growth resulting from the new, young crown which forms when the tree recovers. Experiments are in progress to determine this point.

Podger (1963), of the Forest Research Institute, has shown that greatly increased growth rates follow defoliation by more severe fires, so it seems a reasonable hypothesis that increased growth rates, perhaps to a lesser degree should follow crown scorching. If this proves to be so, we may well be burning to purposely achieve crown scorch in the future. Another aspect of this factor is discussed in the following section.

6. The Control of Flowering and Seeding

Research into the flowering and seeding habits of Jarrah poles has shown that the energy the tree expends on producing seed results in a 30% loss of wood increment. Jarrah seeds every five to seven years and during a rotation seed is produced far in excess of the quantity required to regenerate the forest under careful management. Thus if we can prevent the tree from seeding we have the prospect of increasing timber production quite significantly. The simplest way of achieving this appears to be by scorching the crowns when they are carrying flower buds in the spring. Again this is purely a suggestion at present, but research is being done on the subject and results should be forthcoming in a year or two.

It should be mentioned at this point that it has been established by local fire researchers that a fire intense enough to cause crown scorch does not damage the bole of the tree.

CONCLUSIONS

I have attempted to show that controlled burning as well as being a hazard reduction method, is unlikely to harm the Jarrah forest environment and may even be essential to its continued vigour and good health. It also seems very likely that fire can be adapted for use as a management tool, to ensure adequate regeneration and possibly to even give a marked increase in the productivity of the Jarrah forest.

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