THE PLACE OF FIRE IN THE SILVICULTURE AND MANAGEMENT OF SOUTHERN FORESTS

by

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Every year the South West of Western Australia undergoes a prolonged summer drought, in which periods of extreme fire danger occur with absolute certainty. Add to this the further absolute certainty that ignition will take place, with or without the agency of man, then a situation must exist in which fire can be ignored or belittled only at the peril of the operation and personnel involved.

The Forests Department of Western Australia bases its fire protection on a policy of fuel reduction by controlled burning. Experience has shown that any policy of fire exclusion is doomed to failure. Ignition cannot be eliminated, and progressive fuel accumulation makes a mockery of suppression under these circumstances.

The use of fire to provide protection from fire – inoculation by a minor dosage, as it were – is only one aspect of fire usage in today's forest activity. Present knowledge and skill allows us to use fire to achieve any or all of the following three objectives:–

(1) Promotion of regeneration
(2) Protection
(3) Waste disposal

The action of all fires in forest is the same: – ground fuel in the form of dead leaves, bark, twigs and larger dead slash is consumed. Depending upon meteorological conditions and fuel quantity, fuel can also include the living parts of trees and scrub. Controlled fires are seldom designed to include the latter as fuel. Though the action of all fires is similar, the objectives sought by their deliberate use differ.

Regeneration burning of Karri is perhaps the simplest example of use of fire to promote regeneration. Logging slash is burnt to create overall ashbed free of scrub competition, and to promote seedfall thereupon from seed trees left for this purpose. Disposal of waste, in the form of slash, is desirable also, but it is subsidiary to the principal aim of regeneration. Likewise, the fire affords protection to the young regeneration for the following 4-5 years. A Karri regeneration burn is one of the few in which crown scorch is unimportant. Jarrah and Marri, being lignotuberous with the capacity to exist in shrub form beneath full canopy, require a different approach. A regeneration burn as such is unnecessary because advance growth exists ready for release. However, advance growth should be replenished between cutting cycles, and judicious burning coincident with seed supply is perhaps one way of encouraging its formation. The benefit of ashbed to all forms of regeneration is well known and worth seeking.

Widespread fuel reduction burns, aerial and otherwise, are familiar protection measures which are discussed at greater length in other articles. Their place in Silviculture and Management is vital in that they secure the investment. All cultural measures – regeneration, thinning, etc., assume that the stand will reach financial maturity, and their justification depends upon this premise. Without protection, measures to improve stand growth and value become risky. Unless the expected gain is spectacular they are not worth attempting. Regular controlled burning in mid-cycle justifies

a more sophisticated approach to Silviculture and Management. Pinus radiata plantations must be considered as calculated risks, wherein the spectacular growth rates justify the risk of destruction by fire. Silvicultural measures such as thinning, which reduce rotation length, must also reduce the risk of loss by fire by reducing time of exposure to risk. Should controlled burning of P. radiata become effective and feasible, the position changes.

The simplest waste disposal burn done is the removal of bulldozed windrows prior to planting with exotics. The whole objective is waste disposal with perhaps ashbed effects the only other benefit to be gained. Top disposal burns in Jarrah forest aim to dispose of heavy logging slash. Primarily this is a protection measure, to avoid the massive accumulation of fuel within a young regenerated stand. Its removal also has practical advantages for later access, and hence waste disposal is also involved. No doubt the burn has also a stimulating effect on the development of advance growth into dynamic saplings. It has been suggested (ref. 1) that in eucalypt forests, fire is an essential agent in the disposal of plant wastes in the form of bark, twigs, leaves and plant exudates,, and that waste disposal is essential to the health and vigour of the growing tree. Be that as it may, it is difficult to conceive how else other than by fire, durable heartwoods such as Jarrah and Marri could be disposed of. The rate of decomposition by biological activity alone would appear to be below the production rate. All burns, whatever their primary objective, can be considered waste disposal burns.

It becomes obvious that fire is one of our most important Silvicultural tools. Perhaps the best way to appreciate its use is to consider alternatives, should we be debarred from using it. It would not be impossible to regenerate Karri naturally without fire. One can visualize scrub control by sprays, plowing to expose the mineral soil, and fertilizing to promote growth. Costs however, would be much greater, and the hundreds of tons of slash per acre would be a continual nightmare. Less would be required for advance growth to become dynamic in Jarrah forest, but the nightmare of heavy slash accumulation would remain. Having established a crop, its protection then becomes the problem. History has shown that fire exclusion does not work. Any Silvicultural improvement measures would be unjustified. One could know with practical certainty that one day a wildfire will remove this slash accumulation, and the existing crop would suffer commensurately. Failure is guaranteed.

The policy of fire use rather than fire avoidance has entailed 10 years' research into its behaviour. One can visualize that the need to investigate further will be continual. Use of aircraft in fuel reduction would not have been feasible without a solid background of fire behaviour studies. In future its use as a Silvicultural and management tool will undoubtedly increase with greater knowledge of its behaviour. By selecting different times and intensities it is possible that the scrub composition can be manipulated. A host of possibilities of use arise:– from promoting wildflower displays, to increasing scrub density to keep soil temperatures down. Such a measure may create an effective barrier to the spread of phytophthora. It appears that crown scorch in Jarrah has minor injurious effect provided that it is done in spring and the leaves have been scorched, not defoliated. If techniques can be refined to a degree where the precise amount of scorch is achieved, interesting possibilities arise. Leaf growth can perhaps be stimulated following thinning. A heavy bud crop could be removed if not required, so that growth can go into wood production rather than seed production, (ref. 2). Control of leaf eating insects such as leaf miner may be a possibility by this means. The conception of new hypotheses for fire use, their test by experiment, and perhaps eventual adoption in practice, make an exciting field of endeavour.

Of course, as conservationists, care must be taken not to "go overboard" on controlled burning (ref. 3). The long term ecological significance of regular burning should be studied along

with the possibilities for its positive use. The effect on smaller mammals, and the provision of refuge areas should not be forgotten.

REFERENCES

1. Mount, A.B. (1968).– The Effect of Plant Wastes on Forest Productivity. I.F.A. 5th Conference, Perth. Oct. 1968.

2. Kimber, P.C. (1970). – Silviculture I and II Jarrah, Lectures: (unpublished).

3. Aust. Conservation Foundation. – Viewpoint Series No. 5 (1970). Bushfire Control and Conservation.