ESTABLISHMENT ON INDIGENOUS CUTOVER AT MINGINUI

P. W. HERRICK*

SYNOPSIS

Techniques have been evolved at Minginui for converting logged indigenous forest into exotics. Older practices have resulted in stands that are too poorly stocked to meet the requirements of tending. Current practices aim at overcoming this but several features of cutover sites make it unlikely that ideal crops can be established.

INTRODUCTION

This paper summarizes Minginui experiences to date in establishing exotic species on land formerly carrying indigenous forest. This type of cover is likely to be encountered on a large scale in the future and it is hoped that those faced with problems similar to Minginui's will not make the same mistakes.

The indigenous forest at Minginui consists mainly of rimu, matai, totara, kahikatea and an understorey of tawa, hinau, rewarewa and kamahi. The forest is highly variable, with available volumes ranging from 2,000 to 8,000 cu. ft/acre.

Logging of these stands by the Forest Service commenced in 1938. At present, about 300 acres are clearfelled each year to produce a million cubic feet. The early logging operations followed the heaviest stands but from 1960 a more systematic approach has been taken. Now preplanning is considered an essential step in the efficient conversion of land to exotic species. The main requirement at Minginui is that logging should facilitate subsequent establishment by proceeding through each block methodically in the direction that allows safe burning.

RESTOCKING THE LOGGED FOREST

Initially it was hoped to restock the forest with podocarp species, enriched in places by suitable shade-tolerant exotics. To this end podocarp seedlings were planted out after logging, but it is not known if any succeeded. Probably most were suppressed in the mass of scrub hardwood regrowth. Establishment of exotics was first attempted in 1939 by broadcast sowing of redwoods, but these also failed. In 1945, attempts to establish such species were abandoned and since then, with only minor exceptions, all plantings have been of Douglas fir or radiata pine.

*Forester, Forestry Training Centre, N.Z. Forest Service.

The first technique was spot planting of seedlings throughout logged stands without any site preparation. The shortcomings of this method are now obvious, the main fault being that the trees were not planted in lines and could not be located for blanking or releasing against the vigorous scrub hardwood regrowth. Other faults are that the parts of the original stand that were little disturbed by logging could not be planted and the high cover made effective supervision impossible. The high cover also probably encouraged animal damage. Up to 600 trees per acre were recorded as planted using this method but the stands that have resulted are at best very patchy and in cases complete failures. Costs are not available for this type of planting, which was used sporadically for 15 years. The cost was no doubt low in terms of area treated but on the results poorly justified. The only consistent successes occurred on ground that had been extensively disturbed, indicating that more thorough preparation could be worth while.

In 1960 mechanical clearing was introduced, using a rake blade or rootrake mounted on to a D8 tractor. With more complete clearing, systematic planting that allowed normal blanking and releasing was possible. The technique is to heap all slash, preferably pushing it into gullies. The slash piles, gullies and steep ground are left unstocked. These account for up to 40% of the total area on typical sites at Minginui. The rootrake is designed to move slash and allow the soil to fall back through the tines but often most of the topsoil is removed. The exposed compacted soil makes an ideal seedbed for toitoi: the likelihood of this weed and the fact that Douglas fir checks for about two years on these sites make the method suitable only for preparing land for the planting of radiata pine. Output ranges from three acres per eight hour tractor-day on ground where the tractor can work in both directions to one acre a day on steep ground where the tractor can work in only one direction. Output can be affected by the number of stumps the tractor has to work round. Rootraking is still used at Minginui to tidy up burnt areas and to clear old cutover where burning is not practicable. It is probably in this type of dense low cover that the method has application elsewhere, particularly if burning is not safe. The method is expensive but its most unattractive feature is the patchy nature of the resultant crop.

In 1963, fire was first used to clear the logging residue and this has proved to be the most successful method tried. The method is simple and effective, provided that burning is not delayed too long after logging. At Minginui, two years is the maximum time allowed, but in other places one year may give better results. Normally the residue is felled shortly after logging and burnt in the following summer. The same method has also been used on unlogged indigenous bush and scrub and should have application in many other places The main cost is in power-saw felling of the residue of unmerchantable tawa and other hardwoods with a few cull podocarps. Felling is at the rate of half to one acre per man-day. Felling of dense unlogged bush has been done at about half an acre a day.

There are several advantages in the use of this method. All areas can be completely planted and neither of the species used check after planting. The method is comparatively cheap and does not require expensive machinery. The main drawback is that one is committed to burning and therefore dependent on favourable weather. Failures have not occurred on a large scale at Minginui but may be likely in areas with wetter climates.

Weed growth is usually confined to annuals such as thistles, ragwort and fireweed for several years after burning at Minginui. These are generally considered to be beneficial, providing shelter to the planted stock from frosts and animals. Thistles appear to be increasing in frequency on successive burns and may become a problem. They form dense thickets up to three or more feet high which tend to collapse and bury the tree seedlings. Other weed problems are slight. Bracken patches have developed on some areas after two years but regrowth of scrub hardwoods has been negligible after five years.

PRESENT ESTABLISHMENT PROBLEMS

The objective at Minginui is, of course, to establish enough well distributed trees to allow an adequate selection during later tending. The main problems have arisen with radiata pine and only it will be considered. Experience on cutover sites is limited but it seems that about 1,000 trees per acre should be effectively established to give the required later selection.

Tending at Minginui is conventional, with an intended final crop of 80 trees per acre. This is the minimum number that should be high pruned, although suitable trees are well short of this number in the older stands. The oldest radiata at Minginui was established by spot planting in 1946. Between 200 and 400 stems per acre survived and of these about 30 an acre are good final crop trees. Younger stands that were fully stocked after planting on burnt fern and manuka now have about 60 suitable final crop trees, often distributed erratically. In both cases, malformation is a major reason for the low numbers of suitable trees. The main cause of malformation is dieback of the terminal leader following *Diplodia pinea* attack. This is most commonly associated with areas of poor air drainage and has affected up to half of the growing stock in parts. In the older stand, the position is aggravated by the patchy stocking arising from spot planting.

To overcome these shortcomings, the obvious objective should be to keep as high as possible the number of trees established. On cutover sites, there are several causes of mortality, which appear to be unavoidable apart from the normal losses due to poor tree stocks and animal damage. These factors make achievement of the objective unlikely. Present plantings of radiata pine aim at a stocking of 1,200 trees per acre. Because of the large stumps and unburnt logs present, usually only about 900 are actually planted, even with intensive supervision.

A cause of mortality that is likely to be of widespread importance on these sites is *Armillaria mellea*. Losses of 12%

of the growing stock, with the attack still continuing vigorously, have been recorded at Minginui on three-year-old radiata pine. The losses occur in groups and may cause patchy stands.

The final reason for many losses, common to all planting sites, is from lack of follow-up after planting. Lack of releasing in the spot-planted areas was a major reason for the failure of the method. Later methods are giving better results, but intensive inspections and timely action are essential to minimize losses from factors that can be controlled.