FOREST ESTABLISHMENT ON GORSE-COVERED MOUTERE HILL LAND

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SYNOPSIS

Reverted farm land covered with gorse and bracken fern is now being established with exotic forest and more land is likely to become available. Early attempts to establish radiata pine were only partially successful, and various techniques have been developed to improve initial stocking. The most promising advances have been made with mechanical land preparation. These are described and scope for future improvements discussed.

INTRODUCTION

Figures submitted to the recent Forest Research Institute symposium on land clearing indicated that some 58,000 acres (12%) of de novo plantings throughout New Zealand during the next decade will be on gorse country and that in some areas gorse could represent a major establishment problem.

The area discussed in this paper is located on the Moutere gravels within the Waimea County. This soil type lies in a broad band from Motueka to Nelson and extends inland for some 36 miles.

Although the problem is common to both state and company activity in the district, the background material for this paper is based on the methods developed to establish radiata pine by H. Baigent & Sons Ltd.

Land available for future forest expansion will include some 50% of reverted farm land now covered with gorse. The land is otherwise well suited for forestry, being generally on rolling country under 1,500 ft elevation and lying close to existing forests and port.

THE GORSE PROBLEM

Gorse was introduced a century ago for hedgerows. It has spread gradually over fern country and native grassland, especially where grazing pressure was low. It had been considered a low value sheep fodder and spread was encouraged by hand seeding in this district as recently as 1950. The gorse farming technique required frequent burns which spread the plant still further and lowered soil fertility. The use of river shingle for roading has also assisted in spreading the weed.

Attempts to bring back this land into full agricultural production have so far proved uneconomic.

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The weed is difficult to eradicate. It flowers twice annually and the seed is viable for 70 years. It regenerates through seed or coppice and regrowth can reach 24 in. to 36 in. in height in the first year. Older gorse can reach 14 ft in height and 4 in. diameter butts are common. Repeated burning spreads and thickens the sward. Control in a forest is difficult. Hormone sprays can be used only in low concentrations to check growth once a forest is planted, owing to their effect on planted stock, and so far attempts at biological control have been unsuccessful.

Past Techniques. Prior to 1952, planting had been on fern country and had met with few problems. A crop could be established following a good burn, and little release cutting was needed. At first it was thought that a normal burn-and-plant sequence in gorse would suffice, but weed competition was too vigorous. The tangled mass of unburnt stick led to irregular planting lines and efficient hand-releasing was impossible.

Multiple burns were tried in an attempt to modify the gorse cover, but the regrowth proved even more impenetrable.

From 1960, various hormone spray trials were conducted. These were designed to test effectiveness of release sprays after planting. Rates of application varied from 1 qt to 1 gal per acre in from 12 to 100 gal of carrier. The most effective com-
promise was 1 qt of 2,4,5-T in 25 gal of water per acre applied in one helicopter pass.

Pre-burn sprays did not prove effective, but a concentration of one gallon of 2,4,5-T per acre on short continuous gorse has shown some promise and further trials along these lines are planned with more recent formulations. The release sprays were of assistance in containing gorse but had little effect on bracken which was still proving difficult to release cut because of erratic planting spacing and the residual gorse tangle.

CURRENT PRACTICE

_Burning._ Burns are conducted during March. The weather is reliable, the high hazard period is over, there should be no autumn growth of fern, and there is time for gorse seedlings to germinate. Provided that the area has not been burnt during the previous four years, there are no particular problems in burning gorse. If there are significant areas of bracken fern, the area is burnt during the afternoon. Older continuous gorse can be burnt satisfactorily during periods of lower hazard and quite often are lit between 6 p.m. and 10 p.m. for safety reasons.

_Land Preparation._ The site is left 4 to 6 weeks to allow seedling gorse to germinate. All possible slopes (maximum 27°) are contour giant-disced. The discs are 6-a-side, 30 in. weighted, hydraulically controlled, and towed by a D6 class machine. The discing rips out both seedling and coppice regrowth and inhibits fern competition by breaking up the rhizome layer. After weathering, the area is “track harrowed”, using a very heavy set of harrows to break up large clods and consolidate the soil before planting.

Most of the balance is cleared by V-blades. These have been in general use since 1964, and, as the operators have become skilled, slopes of up to 40° are now cleared, leaving a mere 10% of the plantable area that cannot be covered by machines. The only limiting factor is a steep gorge or bluff. The tool has a snow-plough action and effectively line-cuts the area, shearing off the burnt stick and sweeping the regrowth to either side. Machines are paired for safety and mutual assistance, one being equipped with a winch. To date there have been no accidents on this operation, and the final decision in dealing with an awkward area is left to the operator’s judgement. There is no advantage in using a heavy machine, a tractor in the 50 to 70 hp range being adequate. Normal planting spacing on the forest is 9 ft × 9 ft (540 per acre). In V-bladed areas, the row centres may vary between 10 ft and 12 ft, depending on the amount of debris to be removed. Therefore, typical spacings under these conditions are 11 ft × 7 ft or 12 ft × 6 ft. Early competition is eliminated and any subsequent operations are simplified by the regular row pattern. There have been no erosion problems.

_Planting._ Normal planting methods are used, with strong emphasis placed on seedling selection, handling and storage. Hardy, well wrenched stock 10 to 14 in. high with a fibrous
root system is used. Trees are transported in light wooden, polythene-lined boxes, and held in sensible locations at the planting site. Planting is restricted to shady faces during dry spells or may cease temporarily. Adequate strikes are regularly achieved. Any blanking is done at the end of the current planting season. The location of suspect areas is known and it is preferred to blank immediately.

**Releasing.** Some releasing is required on steep shady areas, also on lower slopes and gullies. The first operation, described locally as "fronding", takes place in the spring following planting. Areas where fern competition is expected are worked over before the fronds unfurl. A light, bill-hooked slasher is used to clear a 3 ft circle around each tree. No time is lost finding the seedlings, as they are clearly visible at this stage. This is a cheap operation, with output approaching 3 acres per man-day (*i.e.*, $4 to $5 per acre).

Further releasing may be required at 12 and 24 months after planting on shady slopes. Fern growth varies seasonally, so no area can be classed as established until the crop is clearly ahead of competing vegetation. Steep shady areas need to be closely watched for up to three years following planting.

Hormone sprays are also used on shady slopes — 2 months after planting on areas not machine cleared, and 12 months later on V-bladed slopes. The standard rate is 1 qt 2,4,5-T in 25 gal of water, applied in one helicopter pass. Helicopters are used because they are competitive, available and efficient.
There are numerous small areas to be sprayed and there is a lack of convenient airstrips for fixed-wing aircraft.

**Summary.** Current techniques have been developed over a number of years, and refinements are being introduced each season. Other organizations have followed suit and now most gorse areas within the district are established by these methods, including a substantial acreage planted under the Farm Forestry Encouragement Loans Scheme. Without mechanical preparation, results are likely to be poor with stocking ranging from nil to perhaps 50%. If current techniques are used, including timely releasing, stocking will improve to be 80% to 90% effective.

**Costs.** The following is a list of current average costs and output.

1. Discing (double cut): $8 to $12 per acre; 0.6 acres per tractor-hour.
2. Track harrowing: $2 per acre; 3.0 acres per tractor-hour.
3. V-blading: $10 to $14 per acre; 0.5 acres per tractor-hour.
4. Planting: $0.80 to $1.10 per 100; 2.0 acres per man-day.
5. Fronding: $4 to $5 per acre; 3.0 acres per man-day.
(6) Normal release cutting $10 per acre; 1.0 acre per man-day.

(7) Post-planting sprays: $5 per acre (includes flying and hormone).

(N.B.: Direct costs only quoted.)

FUTURE DEVELOPMENT

So far it has been demonstrated that, where gorse country can be handled by machinery, techniques are available for successful establishment. However, there is still scope for development, especially on steep and rocky country.

The techniques described can establish the forest, but do nothing to assist access for tending operations, nor to lessen the fire hazard. Any thinning or clearfelling is closely followed by gorse seedling germination.

In the long term, it would seem that the optimum control should be a biological approach. The alternative would be complete chemical control at reasonable cost of both fern and gorse on all sites. These may be regarded as hopes for the future, but in the interim there are some possibilities that require further study or wider application.

(1) The use of fertilizers applied by hand to individual trees as a growth boost at a critical stage.

(2) Local trials in conjunction with chemical manufacturers to check all available chemicals thoroughly.

(3) The use of summer planted seedlings, or rooted cuttings to keep growth ahead of competing weeds.

(4) Variations of existing methods with the aim of keeping burning and resultant seed spread to a minimum — e.g., a burn, spray and plant regime with no concern about soil residues.

(5) A wider exchange of information between all interested parties.

SUMMARY

The control of gorse will continue to be of significance in forest establishment and tending. At present there are techniques available to handle moderately steep slopes, but it would be desirable to control gorse over all forest sites, with the eventual aim of eradicating the weed completely.