REPORT

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SLASH TREATMENT TRIALS -RESULTS AT AGE 4

PETER HALL

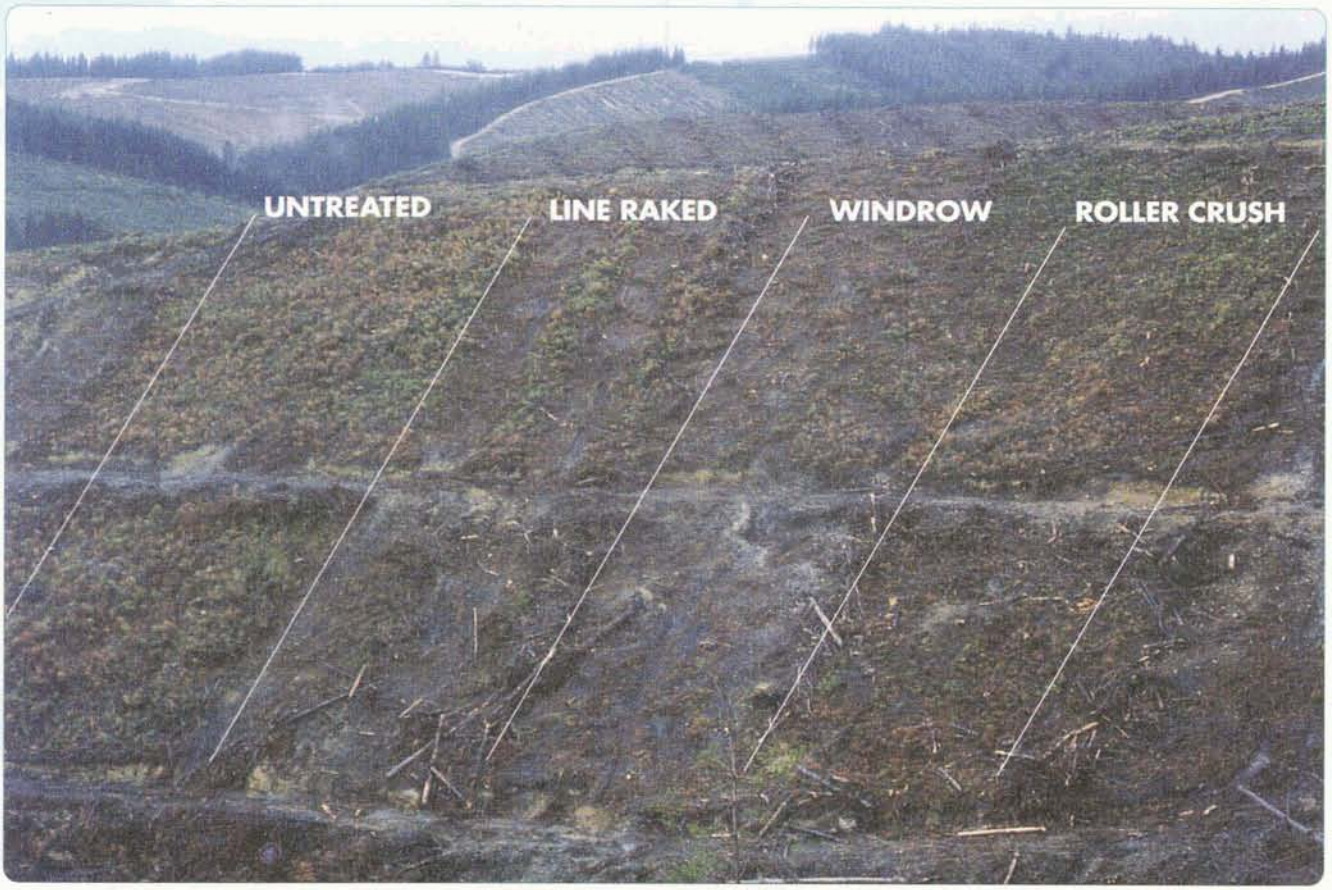

Figure 1 - Section of site preparation trial, Golden Downs Forest, showing (left to right) untreated, line raked, excavator windrowed and roller crushed cutover

Summary

In 1992, Liro Limited established tree growth trials in Berwick, Omataroa and Golden Downs Forests to measure the effects of various mechanical slash treatments. At age four, the three trials were measured and the data analysed.

- In the Omataroa trial, roller crushing of the slash significantly ($P<0.05$) increased mean DBH relative to no slash treatment.

- For the Berwick trial where tree growth in untreated slash was compared with excavator windrowing and bulldozer line blading, no significant differences in height and diameter growth were found. Survivals in the untreated plots were significantly lower than in the other two treatments.

- In the Golden Downs trial, where all four treatments were compared, there were no significant differences between treatments.

Liro limited

PO BOX 2244, ROTORUA, NEW ZEALAND
TELEPHONE: 07 348 7168 FAX: 07 346 2886
Email: peter@liro.fri.cri.nz

Introduction

On many re-establishment sites in New Zealand plantation forests, the amount of slash (logging residue) on the cutover is of such a volume that some treatment of it is desirable in order to facilitate restocking. Heavy slash can cause problems with planter access, planting spacing and releasing. In some cases, the slash may persist for several years and cause access problems at first thinning and pruning.

In 1992, Liro Limited established three growth trials that were designed to measure the impact of different mechanical logging residue (site preparation) treatments on tree growth *(Pinus radiata)*. Production data for the slash treatments and the planting were collected. These trials are now four years old. The results of the most recent (1996) measurement are presented in this report.

The long-term goal of the trials is to monitor the growth in the various treatments until first thinning and then model growth to age 30. The results from estimated final crop volumes will allow cost (of treatment and establishment) benefit (growth and yield) analysis on the various operations to determine the most cost effective treatments.

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Methods

Three management trials were established, each in a different forest, to evaluate the slash treatment options appropriate to each forest.

The trial designs are all different (Table 1) and comparisons between trials are not possible.

Table 1- Trial treatment and size

	Omataroa Forest (Bay of Plenty)	Berwick Forest (Otago)	Golden Downs Forest (Nelson)
Untreated slash	*	*	*
Roller crush	*		*
Excavator windrow		*	*
Line rake		*	*
Replications	10	10	10
Trees per plot	24	21	32
Stocking	833	833	833
Design	Randomised block	Strip treatments/plots	Randomised block

Measurements were collected for survivals, height and diameter (DBH). Basal areas were calculated from diameter and survival data.

The trees were also assessed for health and form. The scales used were:

Health, 1 to 5, with:

1 = very healthy

2 = healthy

3 = unhealthy

4 = very unhealthy

5 = dead

Form, 1 to 5, with:

1 = single straight leader

2 = straight stem, double leader

3 = multi leader

4 = butt-swept single leader

5 = butt-swept multi leader

Data were analysed by analysis of variance, followed by a least significant difference test.

Weed control in all trials and plots has been the standard treatment practised in the block surrounding each trial. Weed control treatments varied from forest to forest, and were appropriate to the problem weeds on the trial sites. The Berwick trial also received an oversowing of grass and legumes.

Results

In Tables 2 to 4 the letter after the data denotes statistical differences. Data in a row with different letters are statistically different ($P \leq 0.05$), data with the same letter are not. For health and form scores, the lower score indicates superior performance.

Omataroa Forest

The trees in the roller crushed plots (Table 2) had a slightly but not significantly greater average height. The DBH of the trees in the untreated plots was significantly smaller than that of the trees in the roller crushed plots. There were no differences in health and form between the two treatments. The trees in the roller crushed plots had higher, but not significantly better, survivals.

When the data for average DBH and survival are converted into basal area, the difference is substantial (23%) but not statistically significant.

Table 2 - Results from Omataroa Forest roller crushing trial

	Untreated Slash	Roller Crushed
Height (m)	3.8a	4.0a
Diameter (DBH,mm)	56b	62a
Health (average score)	1.5a	1.5a
Form (average score)	1.5a	1.6a
Survival (%)	75a	86a
Basal area (m^2/hectare)	1.7a	2.1a

The difference in stocking due to differences in survival may be eliminated after the first thinning. However, having the choice of trees reduced in the untreated plots will impact on the uniformity of the spacing after thinning and possibly on the health and form of the trees.

Berwick Forest

There were no significant differences in height, diameter, health or form in the Berwick trial (Table 3). The untreated plots had a significantly lower survival than the other two treatments.

When the data for average DBH and survival are combined into basal area, the excavator windrowed plots gave a slightly but not significantly higher figure than the untreated site.

Table 3 - Results from Berwick windrowing and line blading trial

	Untreated Slash	Excavator Windrow	Bulldozer Line Blade
Height (m)	2.9a	2.8a	2.8a
Diameter (DBH,mm)	36a	35a	33a
Health (average score)	1a	1a	1a
Form (average score)	1.6a	1.5a	1.5a
Survival (%)	87b	95a	97a
Basal area (m^2/hectare)	0.87a	0.92a	0.81a

Golden Downs Forest

There were no significant differences by treatment for any of the variables measured or assessed in the Golden Downs trial (Table 4).

Table 4 - Results from Golden Downs site preparation trial

	Untreated Slash	Excavator Windrow	Bulldozer Line Rake	Roller crush
Height (m)	2.8a	2.8a	2.8a	2.9a
Diameter (DBH,mm)	34a	34a	37a	37a
Health (average score)	1.6a	1.5a	1.6a	1.6a
Form (average score)	1.1a	1.2a	1.1a	1.1a
Survival (%)	88b	94a	91a	93a
Basal area (m^2/hectare)	0.7a	0.7a	0.7a	0.7a

Discussion

Slash treatment increased survival, although in some cases these increases were small.

The retention of slash on site near the trees is regarded as beneficial to the trees due to the release of nutrients in the decay process (Ballard 1977, Balneaves, 1990). However, the results here suggest that the slash treatment may be necessary to give improved levels of survival where crop uniformity has been identified as an issue.

References

Ballard R. (1977): Effect of slash and soil removal on the productivity of second rotation radiata pine on a pumice soil. N. Z. J. For. Sci. Vol. 8, No. 2

Balneaves J. M. (1990): Maintaining site productivity in second rotation crops - Canterbury Plains. In: Impact of intensive harvesting on forest site productivity. F. R. I. Bulletin No. 159.