

VH - Mulcher Cultivation Trial - Otago Coast Forest

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Figure 1 – VH-Mulcher creating spot mounds in cutover

Introduction

The VH-Mulcher (Figure 1) is a hydraulically powered spot cultivator, mounted on an excavator used for site preparation (Hall, 1997). It clears slash from the spot to be cultivated and then creates a small mound of loose soil (Figure 2).

A trial designed to determine the effects of the VH-Mulcher on early tree growth was established in 1997 in Otago Coast forest on a poorly drained site.

The standard establishment treatment on this site would have been windrowing of the heavy cover of logging slash. The VH-Mulcher achieves a partial windrowing of the slash as it clears the spots prior to cultivation.

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Methods

To compare the VH-Mulcher against standard windrowing practices, four treatments were included in the trial:

- Windrow (control) (W)
- Windrow + fertilise (DAP + Boron, 70kg/ha) (WF)
- VH-Mulcher (VH)
- VH-Mulcher + fertilise (DAP + Boron, 70kg/ha) (VHF)

There were nine replications of the four treatments installed, each plot consisted of three rows of 15 trees, with the outer rows and ends of the middle row considered to be buffer trees. There were 13 measured trees in each plot. The trial was measured annually (June) with height, diameter, survival, health and form, being assessed. Health and Form scores, these scores were based on a subjective assessment of each tree on a scale of 1 to 5, with 1 being an optimum score and 5 being the lowest. A lower average score for a treatment indicates a superior result.

Destructive sampling to analyse root development was carried out at age one. Total seedling root mass was collected and oven dried at 80° C.

Ten mounds were measured for cultivation depth and mound profile and the average of these is presented.

Results

The mounds created by the VH-Mulcher were assessed for both height and cultivation profile (Figure 2).

The height of the mounds created averaged 25 cm. This was sufficient to allow the tree to be planted in cultivated soil above the existing ground level and water table.

VH-Mulcher treatments with or without fertiliser had significantly larger root masses than the windrowed treatments, at age one (Table 1).

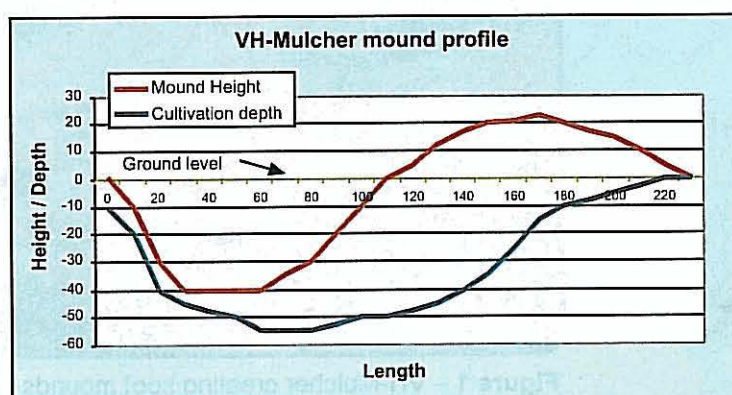


Figure 2 – VH-Mulcher cultivated mound profile (longitudinal)

Table 1 – Root Mass at age 1, g/oven dry (95% confidence limit)

Windrow	Windrow + fert	VH Mulcher	VH Mulcher + fert
6.3 b (1.0)	6.7 b (1.3)	10.1 a (3.3)	10.8 a (3.3)

Table 2 – Annual measurement results - 2000

	RC Diameter Inc	RC Diam. (mm)	DBH (mm)	Height Inc	Height (m)	Health	Form	Survival (%)	Stocking (s/ha)
Windrow	21 b	39 c	10 c	0.6 c	1.5 c	1.5 b	1.5 a	90 a	750 a
Windrow + fert	28 a	48 b	13 b	0.8 ab	1.8 b	1.3 a	1.5 a	92 a	766 a
VH Mulcher	27 a	51 ab	16 ab	0.7 b	1.8 ab	1.1 a	1.6 a	94 a	783 a
VH Mulcher + fert	30 a	55 a	20 a	0.8 a	2.0 a	1.1 a	1.4 a	93 a	775 a

Table 2 continued – Annual measurement results - 2000

	Basal area (m ² /ha)	Volume (m ³ /ha)
Windrow	0.90 c	0.45 c
Windrow +fert	1.39 bc	0.83 bc
VH Mulch	1.60 ab	0.96 ab
VH Mulch + fert	1.84 a	1.23 a

Note: results in a column followed by the same letter are not significantly different, results in a column followed by different letters are significantly different ($P < 0.05$). Health and Form scores: these scores are based on a subjective assessment of each tree on a scale of 1 to 5, with 1 being an optimum score and 5 being the lowest. A lower average score for a treatment indicates a superior result.

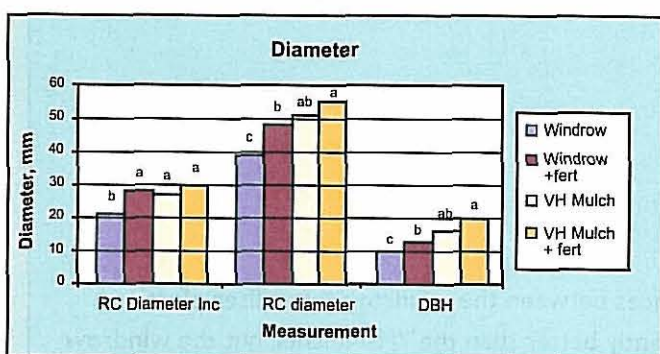


Figure 3 – Diameter and Diameter Increment

There were significant differences in all diameter measurements (Figure 3). A clear hierarchy of treatments can be seen. For the DBH measurement, the VH-Mulcher + fertiliser (VHF) was giving significantly better growth than windrow + fertiliser (WF) and windrow (W). The VH-Mulcher (VH) treatment was also giving better growth than the windrow treatment. The same pattern of results can be seen in the root collar diameter measurements.

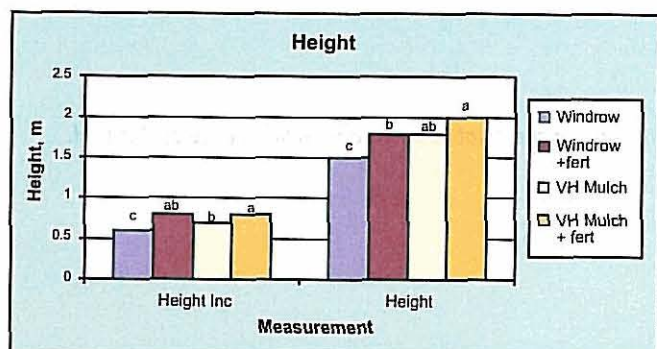


Figure 4 – Height and Height Increment

The same pattern of significant results found for DBH can be seen in the height results (Figure 4), with VHF giving the best result, and W the worst. If the fertilising was not a factor, then there is still a significant difference between W and VH.

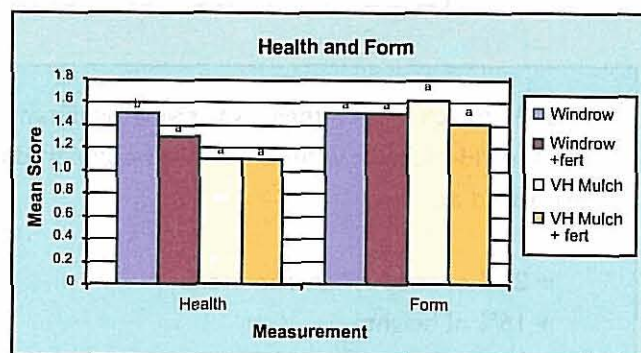


Figure 5 – Health and Form

Windrowing gave a significantly worse health score than the other treatments (Figure 5), which were not significantly different to each other. A lower health score is an indicator that less growth is likely in the next year. There were no significant differences in tree form.

There were no significant differences for survival and subsequently stocking.

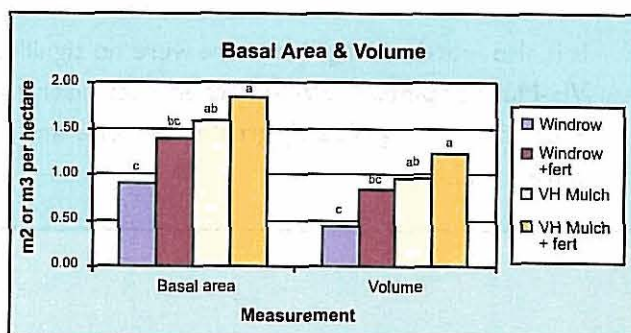


Figure 6 – Basal Area and Volume

For both basal area and volume, there were significant treatment differences (Figure 6). The same pattern of results applied to both measurements. The VHF treatment had significantly better growth than WF and W, but not VH. The VH treatment was giving better growth than the W treatment.

Conclusions

The VH-Mulching treatment was giving significant growth benefits, with and without fertiliser.

For the VH-Mulcher without fertiliser compared to windrowing without fertiliser these effects can be expressed as;

- + 23% of root collar diameter
 - + 16% of height
 - + 43% of basal area
 - + 53% of volume
- in favour of the VH-Mulcher treatment.

For the VHF compared to the WF treatment, the differences were:

- + 12% of root collar diameter
 - + 10% of height
 - + 24% of basal area
 - + 32% of volume
- in favour of the VH-Mulcher with fertiliser treatment.

It is also worth noting that there were no significant differences between the windrow + fertiliser plots and VH-Mulcher plots. The VH-Mulcher + fertiliser is not significantly better than the VH-Mulcher but the windrow + fertiliser has significantly greater diameter and height than the windrow. This would suggest that the fertilising is having an effect.

References

Hall P (1997): The VH-Mulcher, spot cultivator - moulder for site preparation. Liro Report Vol. 22, No. 4

Acknowledgements

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