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**DAMAGE TO YOUNG *E. nitens* AND  
*E. fastigata* FOLLOWING APPLICATION  
OF RESIDUAL HERBICIDES**

by

Arthur Vanner, Heather McKenzie  
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**Note:**

Confidential to members of the Management of Eucalypts Cooperative.  
This material is unpublished and must not be cited as a literature reference.

# FOREST RESEARCH/INDUSTRY RESEARCH COOPERATIVES

## Executive Summary

*Eucalyptus nitens* and *E. fastigata* are being planted on former pasture sites to produce pulp wood. Weed control is accepted as mandatory for successful eucalypt establishment in pasture but there is limited knowledge on the effect of weed management regimes on the growth, both in the short term and also long term productivity. A trial was established to quantify the effect on tree growth of maintaining different levels and duration of weed control using a mixture of the residual herbicides terbuthylazine (Gardoprim), clopyralid (Versatill) and haloxyfop (Gallant), or the non-residual herbicide glyphosate compared with no weed control treatments. Damage caused by a February post-plant application of residual herbicides led to high mortality of *E. fastigata* and damage to *E. nitens* and the trial was abandoned. Damage to *E. nitens* was assessed. Survival of *E. nitens* was significantly lower in the treatment where complete weed control was maintained with residual herbicides, compared to where weed control was maintained in smaller spots around the trees or where total weed control was maintained with non residual herbicides. Where residual herbicide was used, tree growth was significantly less than with non residual herbicide usage. A leaf "Scorch Factor" calculated on a scale of 0 for no damage and 2000 for total mortality, was minimal for plots with non-residual herbicides but progressively increased with the area of application of residual herbicide to reach 974 for total weed control. The herbicides were never applied over the foliage so the phytotoxic effect was as a result of root uptake of the residual herbicide. The results of this trial indicate that the use of a mixture of terbuthylazine, clopyralid and haloxyfop at label rates for post-plant weed control in *Eucalyptus nitens* and *E. fastigata* trees in February two to three months after planting may cause severe damage or death. Possible reasons for the root uptake and consequent damage are discussed. A new trial is required to quantify growth without the use of residual herbicides to control weeds.

**Keywords:** *Eucalyptus nitens*, *Eucalyptus fastigata*, establishment, weed control, herbicides, tree growth, phytotoxicity

## INTRODUCTION

There is a continued expansion of the area planted with exotic non pine species, particularly *Eucalyptus nitens* and *E. fastigata* in the central North Island and *E. nitens* in Southland. These species are being promoted for diversification into superior quality, high recovery pulp wood, as well as for other end uses. Much of the planting of these species is currently being undertaken on former pasture sites.

On most sites there is a need to manage the growth of competing vegetation to maximise the growth of tree crops (Richardson 1991). There is a limited but increasing knowledge base on the effect of weed management regimes on the growth of exotic crop species on different sites (Richardson *et al.* 1996). It has been reported (Nicholas *et al.* 1991) that a weed free area of 1 metre diameter around Eucalyptus seedlings, maintained for one year, resulted in increased height growth. The effect on volume growth of Eucalyptus species, through increasing the area and duration of weed control around individual trees, needs to be further quantified. Not only does the effect of different weed control procedures on survival and early growth need to be investigated, but also, there is a need to determine their effect on long term productivity, so that an economic evaluation can be made of the cost benefits of weed control. The significance of initial weed control may vary through time, as canopy closure causes a suppression of competing vegetation. As there are differences in growth rates between species, and a change from juvenile to mature foliage in some species, eg *E. nitens*, the suppression of weeds by the crop due to shading may vary with crop species and with tree age.

A trial was established to investigate the optimal duration of weed control, the minimum weed free area required around newly planted Eucalyptus seedlings to maximise tree growth and the maximum productivity over a 10 year rotation, using the commonly used residual herbicides terbuthylazine (Gardoprim), clopyralid (Versatill) and haloxyfop (Gallant), to maintain long term control of competing vegetation in the weed free areas.

Post-plant application of the herbicides terbuthylazine, clopyralid and haloxyfop around *E. nitens* and *E. fastigata* seedlings on this site in late summer of 1997 resulted in significant mortality, leaf loss, and a reduction in tree growth. This report covers the establishment of the original trial and an analysis of the damage caused by the February application of residual herbicides around the trees.

## METHOD

### Site:

A fertile pasture site, typical of the sites currently being established in eucalypts, was selected for the trial at Tasman Forest Industries Matawhaura Block, Rotoehu Road, north east of Rotorua. The location of the trial area is shown in Appendix 1. The predominant vegetation on the site consisted of improved pasture grasses and clover, with a latent understorey of thistles, yarrow, sorrel and broadleaf weeds.

### Tree establishment

Bare-rooted *E. nitens* seedlings were planted on 9 November 1996 and container-raised *E. fastigata* seedlings on 3 December 1996. Seedlings were sourced from Te Teko Nursery. Fertiliser was applied in the week 9-15 December.

### Trial Layout

Treatment plots 17 x 21 metres in size were laid out in a randomised block design. Each treatment was replicated five times for each species receiving that treatment. The layout of the plots is shown in Appendix 2. Forty two planting spots were marked in each plot, in 6 rows of 7, at a spacing of 2.8 x 3 metres (1190 spots per hectare). One tree was planted at each planting spot. Separate trials were laid out for each tree species.

### Treatments:

The treatments consisted of different weed free areas maintained for different periods of time. The treatment regimes are listed in Table 1. All treatment regimes were established in the *E. nitens* trial. Treatments 1, 2 and 9 were not included in the *E. fastigata* trial due to shortage of space. In order to be assured that the herbicide regime used to maintain weed free plots was not having an effect on tree growth, one treatment was duplicated using non residual herbicides (Treatment 9).

**TABLE 1: Weed Free Area Maintained Around Seedlings, And Duration Of Weed Control From Time Of Planting**

Treatment No	Year 1	Year 2	Years 3-10
1	nil	nil	nil
2	1m <sup>2</sup>	nil	nil
3	1m	1m <sup>2</sup>	nil
4	2.25m <sup>2</sup>	nil	nil
5	2.25m <sup>2</sup>	2.25m <sup>2</sup>	nil
6	4m <sup>2</sup>	nil	nil
7	4m <sup>2</sup>	4m <sup>2</sup>	nil
8	4m <sup>2</sup>	8.4 <sup>2</sup> m	nil
9*	8.4m <sup>2</sup>	8.4 <sup>2</sup> m	8.4 <sup>2</sup> m
10	8.4m <sup>2</sup>	8.4 <sup>2</sup> m	8.4m <sup>2</sup>

\* No residual herbicides used

Note; 8.4m<sup>2</sup> is equivalent to complete weed control over the whole plot