TOLERANCE OF TREE SPECIES TO HALOXYFOP AND CLOPYRALID APPLIED IN EARLY SUMMER

B.J. COSSLETT

Forest Research Institute, Christchurch

Eucalypts and cypresses are sensitive to many of the herbicides commonly used in forestry, but otherwise little is known about the tolerance of special purpose species to post-planting release sprays, especially herbicides that have only recently become available.

Of herbicides previously tested at Rangiora, haloxyfop and clopyralid were the only two that resulted in an almost weed-free site during drought conditions in 1984/85 so these were tested over the species listed in Table 1 in the summer of 1985/86.

A screening trial was established with two replicates of each treatment and one untreated control with five trees in each plot.

The seedlings were planted in cultivated soil in August 1985 and by October were producing new growth, indicating that the trees were established.

Clopyralid (Versatill) and haloxyfop (Dowco-453) at 2.5 and 4.0 kg ai/ha respectively, were applied both separately and in combination on 22.10.85 using a knapsack sprayer at a pressure of 103 kPa. Walking speed was 1 m/sec. A 50 cm swath was sprayed each side of the trees using a flat fan Tee-jet (model 11005) held 20 cm off the ground, without attempting to avoid the lower tree foliage. Weed cover was predominantly herbaceous plants and flatweeds.

The trees and weeds were suffering moisture stress at the time of spraying. However, 109 mm rain fell in the 38 days between spraying and assessment. This application of the herbicides did not adversely affect any of the tree species.

To further test tree tolerance, the two herbicides were reapplied on 10.12.85 over the tops of the trees using a tractor-mounted boom. The same rates and treatments were applied, using both single and double passes (i.e., clopyralid at 2.5 and 5.0 kg ai/ha and haloxyfop at 4.0 and 8.0 kg ai/ha; 1 replicate each).

On 2.2.86, 54 days after spraying, height growth and the degree of herbicide-related malformation were assessed. Abnormality of growth was shown by comparing (by species) height growth within sprayed plots with that of the untreated control. Rainfall was 139 mm in the period from spraying to assessment.

Results of this trial are in Table 1.

The eucalypts had been affected by leaf roller caterpillars to various degrees, although *E. gomphocephala* seemed to be naturally resistant. In general, the sprayed eucalypts were less affected than the untreated controls. Some untreated tree species were so damaged they could not be used as a base for testing height growth abnormality. Where this occurred comparison between rates was used.

Clopyralid at 5 kg ai/ha caused abnormal height growth in the eucalypts and pines. Clopyralid at 2.5 kg ai/ha had little effect on the eucalypts with the possible exception of *E. regnans*, while haloxyfop had little effect except possibly with the *E. gomphocephala*. Both rates of clopyralid severely retarded the growth of *Ch. lawsoniana*. Clopyralid, as expected, killed the *Ac. melonaxylon*.

At 2.5 kg ai/ha clopyralid caused severe malformation in *Ch. lawsoniana* and *P. nigra* and sinuosity in *E. nitens*, *E. ovata*, and *E. regnans*. Haloxyfop affected only the cypresses, causing sinuosity in both species.

In most cases, the damaging effects of clopyralid seem to have been reduced when used in mixture with haloxyfop. The most tolerant species was *Cas. cunninghamiana* followed by *E. camaldulensis*, *E. gomphocephala*, then *P. radiata*. The tolerance of the two eucalypts is in line with their tolerance to other adverse site factors, e.g., salt, high pH, and drought. Other eucalypts with similar characteristics may therefore show similar tolerance to these herbicides.

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TABLE 1: Effect of herbicides on height growth given as height increment of treatment:height increase of control or for figures in parentheses, height increase of trees in higher application rate:that in lower rate.

Herbicide	clopyralid		haloxyfop + clopyralid		haloxyfop		untreated
kg ai/ha	5	2.5	8/4	4/2.5	8	4	ht increase%
(Eucalyptus sp.)							
<i>E. delegatensis</i>	(2.1)*		(2.1)		(2.1)		
<i>E. fastigata</i>	(1.6)		(2.5)		(1.4)		
<i>E. pauciflora</i>	-		(1.2)		(1.2)		
<i>E. regnans</i>	2.2	2.0	2.3	0.7	1.9	0.5	48
<i>E. nitens</i>	1.5	0.7	2.4	1.6	1.0	1.4	78
<i>E. ovata</i>	(2.4)		(2.3)		(4.9)		
<i>E. rodwayii</i>	2.5	0.5	1.0	0.3	0.8	0.6	139
<i>E. viminalis</i>	2.9	1.2	2.6	0.7	1.0	1.0	45
<i>E. camaldulensis</i>	1.4	1.0	1.3	0.3	1.1	0.5	83
<i>E. gomphocephala</i>	2.3	1.4	1.3	0.9	3.9	1.5	60
(Pinus sp.)							
<i>P. radiata</i>	1.6	1.1	1.3	1.1	1.0	1.2	54
<i>P. nigra</i>	1.2	1.2	1.3	1.1	1.2	1.4	85
<i>Cupressus macrocarpa</i>	0.9	0.4	0.8	0.6	0.9	0.7	98
<i>Chamaecyparis lawsoniana</i>	0.4	0.4	0.4	0.3	0.9	0.6	80
<i>Acacia melanoxylon</i>	---	dead	---	---	healthy		
<i>Pseudotsuga menziesii</i>	1.1	1.3	1.0	0.8	1.2	0.8	66
<i>Casuarina cunninghamiana</i> *							

* died back at transplanting, regrew from stems so no height measurements taken

Weed growth in the untreated controls comprised dandelion (*Taraxacum officinale*), Californian thistle (*Cirsium arvense*), Scotch thistle (*C. vulgare*), red clover (*Trifolium pratense*), white clover (*T. repens*), sheep's sorrell (*Rumex acetosella*), wireweed (*Polygonum aviculare*) and fathen (*Chenopodium album*) and a few plants of couch (*Elytrigia repens*) and prairie grass (*Bromus willdenowii*).

On the plots sprayed with clopyralid, composites and legumes were absent and the herbaceous plants were obviously debilitated, but the grasses were unaffected. Grasses were absent in the plots sprayed with haloxyfop.

It is not recommended that either of these herbicides be sprayed over the trees tested, but this trial has shown that, with the exception of the cypresses, haloxyfop is reasonably safe to spray around the trees tested either during a drought or during a period of sufficient soil moisture.