GROWTH OF *EUCALYPTUS NITENS* AFTER APPLICATION OF HERBICIDE TO CONTROL PARSLEY DROPWORT

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ABSTRACT

Problems in establishing eucalypt trials on some Northland sites were caused by severe competition from parsley dropwort (*Oenanthe pimpinelloides*). In a trial *Eucalyptus nitens* seedlings grew well with the application of a herbicide, dichlobenil, which controlled parsley dropwort and other weeds at rates of 0.74 g/m² and 1.15 g/m². The seedlings grew poorly in the absence of herbicide. Bare-rooted seedlings and smaller container-grown seedlings were included and the bare-rooted seedlings remained larger after one growing season, which would be an advantage in competing with weeds the following season.

Keywords: *Eucalyptus nitens*, *Oenanthe pimpinelloides*, dichlobenil, forest establishment.

INTRODUCTION

Parsley dropwort (*Oenanthe pimpinelloides*), known locally as "carrot weed", grew rapidly in a Forest Research eucalypt trial planted in 1992, on an ex-pasture site near Whangarei. The vigorous growth of parsley dropwort was unexpected as it had been previously grazed by sheep. Application of terbuthylazine combined with haloxyfop to release the trees was unsuccessful and the trees required repeated, time-consuming, hand-releasing. Chemical control of parsley dropwort was also unsuccessful on two different cultivated ex-pasture sites planted in eucalypts and *Pinus radiata* by Carter Holt Harvey Forests Ltd, Whangarei, necessitating hand-releasing (A. Hewitt, pers. comm.). The Kaitia Community, Business and Environment Centre Nursery also resorted to hand-releasing eucalypt plantings because they had been unable to identify effective herbicides to control both parsley dropwort and kikuyu grass (*Pennisetum clandestinum*) (T. Gray, pers. comm.).

O. pimpinelloides, a member of the Apiaceae family, is an aggressive and persistent weed which invades pasture and is common from Coromandel and Auckland City northwards (Webb *et al.* 1988). It is a perennial with a large tuber-like root, which sustains the plant for a long period. As it is eaten by sheep, parsley dropwort does not become obvious until the sheep are removed.

Dichlobenil is a soil-acting herbicide effective against a wide range of broadleaf and grass weeds and can provide up to six months control. It is best applied in late afternoon, followed by heavy overnight dew and should be applied in the cooler months (ie. April - September) because it volatilises in warm conditions. In a preliminary experiment (unpublished), dichlobenil was applied at a high rate of 1.15 g/m² to two separate patches of parsley dropwort in early August 1995. Although two weeks after application there was no discernible effect from dichlobenil, shortly afterwards some yellowing of parsley dropwort was observed and by mid-September the parsley dropwort was dead, but some grasses were still present.

The effect of dichlobenil on eucalypts was unknown, so in a second preliminary experiment (unpublished), dichlobenil at the recommended rate (0.74 g/m²) was applied in early August 1995 to *E. nitens* seedlings planted at Forest Research, Rotorua. Because seedlings in containers, grown on a nutritionally starved regime (Forest Research Institute 1987), may have been more tolerant of dichlobenil, they

were tested in addition to bare-rooted seedlings. Seedlings were checked weekly for one month for signs of chemical damage but none was observed.

Trials were conducted to assess growth of *E. nitens* after application of herbicides for control of parsley dropwort.

METHOD

Dichlobenil (Prefix D, containing 67.5 g/kg dichlobenil as a pellet) was tested as a releasing chemical at rates of 0.74 and 1.15 g/m². Two types of seedlings were planted: bare-rooted and container-grown *E. nitens*.

Trial site

A site where parsley dropwort was the predominant weed was located adjacent to eucalypt plots established by Carter Holt Harvey Forests Ltd on the Galilee farm, south of Kaikohe. The entire site was sprayed with glyphosate and deep ripped before the eucalypt plots were planted in 1991. In spring 1992, parsley dropwort grew vigorously necessitating repeated hand-cutting to prevent overtopping of the eucalypts. The soil varied with both fertile, friable volcanic and infertile, heavy clay soil types present. The site was periodically grazed by sheep from 1994 to July 1995.

Trial design and establishment

Three blocks were established, one on volcanic soil and two on clay soil. Each comprised six row plots of nine seedlings planted at 1.2 m spacing with 3 m between plots. The treatments (two seedling types combined with two herbicide rates and a control) were applied randomly to the plots in each block.

The bare-rooted seedlings were raised from seed sown in nursery beds in November 1994 at the Forest Research Nursery, Rotorua. The container-grown seedlings were sown in August 1994, fertilised to produce unchecked growth until November, and then maintained with water only, until planting in the field. In mid-September 1995, each seedling was planted into a spade-cultivated spot, with fertiliser (5 g MagAmp) mixed with the soil. Weed clearing around the seedlings was unnecessary because the parsley dropwort had grown very little.

Immediately after planting, dichlobenil was applied to a circular area of one square metre around each tree. An improvised shaker was used to apply the herbicide evenly over the area, but not in direct contact with the stem, to avoid burning the seedlings. Some rain fell the following night.

Assessment

Tree height and basal stem diameter were measured at planting and again in May 1996. In November 1995 parsley dropwort, the main weed present, was assessed by dividing each treatment area into quarters, and measuring the height of the tallest parsley dropwort per quarter. A value of zero was recorded where no parsley dropwort was present. In May 1996, the assessment of parsley dropwort alone was impractical because of the intermixing of other weeds, so all vegetation was visually assessed in a 1-4 scale where 1 = bare ground and 4 = complete weed cover.

Analysis

Analyses were performed using the general linear models procedure (GLM) in SAS (SAS Institute Inc. 1994). Tree volume was calculated as the equivalent of a cone derived from the tree basal stem diameter and height. An analysis of covariance was undertaken for tree volume, testing block and treatment (seedling type, dichlobenil rate, and seedling type x dichlobenil rate) with initial volume as covariate. A log transformation was used to reduce difference in the standard deviation between treatment groups.

The effect of dichlobenil on weed growth for both assessments was analysed using a two factor analysis of variance testing block and dichlobenil treatment. A log transformation was used to reduce the difference in variance between dichlobenil treatments.

RESULTS

Tree size

The size of the *E. nitens* varied significantly between the three blocks in May 1996 ($P=0.0001$). The trees grew significantly more with dichlobenil application ($P=0.001$);

however, there was no significant difference between the rates of dichlobenil (Table 1). The interaction between seedling type and dichlobenil level was not significant.

TABLE 1: *E. nitens* tree volume (cm³) after treatment with dichlobenil.

Rate of dichlobenil	Tree Volume ¹
0	28.6 a ²
0.74 g ai/m ²	92.2 b
1.15 g ai/m ²	86.6 b

¹ Mean for both seedling types, adjusted for initial size.

² Means with the same letter are not significantly different (P<0.05).

At planting, in September 1995, the bare-rooted seedling mean tree volume was significantly larger than the container-grown seedling mean tree volume (3.32 cm³ compared with 0.54 cm³; P=0.0001) and they were still significantly larger in May 1996 (109.1 cm³, height 133 cm compared with 35.0 cm³, height 86 cm; P=0.0001).

Weed growth

There was no significant difference in weed growth between blocks in either November 1995 or May 1996. In November 1995, the regrowth of parsley dropwort was significantly affected by the application of dichlobenil (P=0.006) and the higher rate led to a reduction in parsley dropwort growth (Table 2). In May, weed growth was significantly reduced by dichlobenil (P=0.0218) but there was no significant difference associated with the rate of herbicide applied (Table 2).

TABLE 2: Mean height of parsley dropwort in November 1995 and suppression of weed growth in May 1996, after treatment with dichlobenil.

Rate of dichlobenil	Mean parsley dropwort height (cm) - Nov 1995	Weed rating ¹ May 1996
0	36.4 a ²	3.81 a ²
0.74 g ai/m ²	6.7 b	2.33 b
1.15 g ai/m ²	3.8 c	1.97 b

¹ 1 = no weeds 4= complete weed cover.

² Means with the same letter are not significantly different (P>0.05).

The composition of weeds in the plots varied in May. Block 3 contained more grass than parsley dropwort in most plots. Other blocks had a mixture of parsley dropwort and grass with a little clover and another legume, probably a lotus species. Where no dichlobenil was applied, grass dominated in two plots, while in the remaining four plots, there was dense parsley dropwort. Where dichlobenil had been applied, grass was the main reinfesting weed, however there was some parsley dropwort present in four of the 12 treated plots.

DISCUSSION

The presence of grass in control plots indicates that parsley dropwort was not the only problem weed for the establishment of trees on the site. Although dichlobenil is effective against a range of grass and broadleaved weeds (Anon. 1995), it was only partially effective against grasses in this situation. The results from the November 1995 and May 1996 assessments are not directly comparable. It is possible that parsley dropwort growth in May was affected by application rate but the mix of weeds present made it impractical to assess parsley dropwort.

Trees grown from nutritionally starved container-grown seedlings did not grow as large as trees grown from bare-rooted seedlings. The taller trees would have an advantage in competing with weeds the following season. Dichlobenil can be applied

by a Weed-a-metre (Davenhill and Hall 1988) in small planting blocks to release trees including *Acacia*, *Cupressus*, *Pinus* and *Picea* species and *Juglans nigra* (Anon. 1995). Eucalypt species vary in their tolerance of herbicides so the use of dichlobenil on any other eucalypt species should be tested before using it on a large scale.

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