THINNING *EUCALYPTUS MICROCARPA* WOODLANDS

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ABSTRACT

Eucalyptus microcarpa (*grey box*) *trees* 45-65 *cm in circumference at the base were killed by injection between bark and wood with mixtures of picloram with* 2,4-*D or* 2,4,5-*T.*

Basal applications of 2 *ml of* 1 *per cent picloram as TORDON* 50-*D or TORDON* 105 *made with a tree injector at* 13 *cm intervals were consistent in their effects and killed a high percentage of treated trees. Injections* 1 *m from ground level were not as effective as at tree base, using equivalent methods and applying similar amounts of chemicals.*

One basal injection of an amount equal to that applied around a tree in several injections spaced at 13 *cm intervals gave results comparable to multiple injections* 1 *m from ground level. Applications made during late summer and early autumn seemed less effective than at other times.*

INTRODUCTION

Grey box (*Eucalyptus microcarpa* Maiden) is a dominant species on the lithosols and shallow solodics (traprock) soils of south-eastern Queensland. It commonly exceeds 400 individuals per ha and at such densities grass production is low. Problems of reducing densities of trees and shrubs and of controlling their regeneration on grazing lands have been discussed by Moore (1972).

Grey box is difficult to kill by ringbarking and only limited success has been achieved with arsenical tree poisons. This paper discusses alternative methods of thinning grey box woodlands and describes experiments in which the toxicity of 4-amino-3,5,6-trichloropicolinic acid (picloram), formulated in a 5 per cent solution as the propylamine salt and marketed in a mixture with 2,4-D as TORDON 50-D "Weedkiller"*, is assessed and compared with TORDON 105 "Treekiller"*, a similar picloram formulation with 2,4,5-T. The experiments also examine effects of season of application and of heights at which the chemicals are applied to the tree.

*Trademark of The Dow Chemical Company.

EXPERIMENTAL METHODS

The experimental area was at "Barongarook", near Karara in south-east Queensland at approximately 28°S latitude. Mean annual rainfall for the area is 650 mm. Rainfall during the year treatments were applied was 746 mm and during the two following years was 685 and 610 mm respectively.

Comparisons were made of the two Tordon compounds applied at the same concentration of picloram. Applications with a tree injector at tree bases were compared with others made at waist height (1 m from the ground) with an axe, the modified blade of which made a cut similar to that of a tree injector. In the waist-high treatments the chemical was applied between bark and wood with a vaccinator-syringe immediately the injection cuts were made. Concentrations quoted for the chemical compounds refer to their picloram content. Each month from July 1970 to June 1971 two groups of 40 trees were treated as shown in Table 1.

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TABLE 1

Eucalyptus microcarpa. Comparison of equivalent amounts of picloram as Tordon 50-D and Tordon 105 applied at tree base (low) by a tree injector, and at 1 m from base (high) by a modified axe. Multiple injections at 13 cm spacings. Means of two replicates (80 trees).

	Treatment	Percentage Mean Kills 12 Months After Applying in											
		July 1970	Aug.	Sept.	Oct.	Nov.	Dec.	Jan. 1971	Feb.	Mar.	Apr.	May	June	Mean
Multiple Injections	1·0% Tordon 50-D (low)	98·8	98·8	97·5	88·8	76·3	82·5	63·8	58·8	58·8	75·0	91·3	96·3	82·2
	1·0% Tordon 50-D (high)	68·8	60·0	82·5	37·5	50·0	23·8	7·5	15·0	52·5	30·0	26·5	53·8	42·3
	1·0% Tordon 105 (low)	100·0	95·0	96·3	95·0	90·0	90·0	87·5	90·0	88·8	87·5	90·0	98·8	92·4
	1·0% Tordon 105 (high)	80·0	66·3	85·0	47·5	52·5	40·0	16·3	28·8	58·8	45·0	25·0	67·5	51·1
	Means	86·9	80·0	90·3	67·2	67·2	59·1	43·8	48·1	64·7	59·4	58·2	79·1	67·0
Single Injection	1·0% Tordon 105 (low)	NA*	NA	90·0	90·0	57·5	60·0	17·5	60·0	35·0	32·5	60·0	85·0	58·8

* NA = Not applied.

TABLE 3

Eucalyptus microcarpa. Change in percentage kills on grazed and ungrazed plots following injection with Tordon compounds 1 m above ground level. Means of two formulations and two replications.

Injected	Not Grazed						Grazed					
	July 1970	August	September	October	November	December	January 1971	February	March	April	May	June
Counted	74·4	63·2	83·8	42·5	51·3	31·9	11·9	21·9	55·7	37·5	25·8	60·7
After 12 mths	80·7	73·2	89·4	59·4	64·4	90·0	85·7	93·8	90·0	90·0	89·4	96·3
After 24 mths												

Irrespective of height of application, the number of injections was determined by the basal circumference of the tree. Injections at tree base were at 13 cm intervals but because the circumference of the trees was less at waist height than at base the spacing interval in high applications was less, and on trees of small diameter the injection cuts were almost contiguous.

Within an experimental block all grey box trees other than saplings were individually tagged and included in the experiment. Some trees with twin-stems were encountered, but the majority had single stems between 45 and 65 cm in circumference at the base and received 4 or 5 injections at 13 cm intervals. Individual trees considered unsuitable for experimental use and those of other species present were killed to eliminate possible competitive effects.

Counts of dead and living trees were made in June 1973, that is 36 and 24 months respectively from the first and last application times.

To test the possibility of reducing labour costs involved in multiple injections, two groups of 40 trees were given single injections of Tordon 105 at monthly intervals from September 1970. The chemical was applied in one cut close to ground level, and the amount applied was the same as would have been given to a tree of similar size injected at base with 2 ml of 1 per cent solution at 13 cm intervals. Final counts of this treatment were made in August 1973.

RESULTS

Comparisons of effects of high and low applications of the two formulations 12 months after each individual treatment are shown in Table 1. The figures in the table suggest that both formulations are more effective when applied at tree base than at waist height ($P < 0.01$, chi square test). A comparison of Tordon 50-D with Tordon 105 each applied at tree base suggests that the latter is marginally better ($P < 0.05$).

There appears to be an effect of season of application but no adequate statistical test could be applied; treatments applied in winter or early spring (July, August or September) gave higher percentage kills than similar treatments in the summer and autumn.

A single injection of Tordon 105 at tree base, although not uniformly as good as an equal amount applied in several injections at tree base, gave good results in winter and early spring and was comparable in effect to multiple injections at waist height. Counts 24 months after each individual application date showed that, in comparison with those after 12 months, percentage kills had increased on plots injected at waist height. The counts are summarized and compared in Table 2.

TABLE 2

Eucalyptus microcarpa (grey box). *A comparison of percentage kills* 1 *and* 2 *years after multiple high and low injections with Tordon formulations. Means of two replications and twelve application times*

Formulation	Injection Height	Mean Percentage Kills After 12 Months	Mean Percentage Kills After 24 Months
Tordon 50-D	Low	82·2	94·7
	High	42·3	81·2
Tordon 105	Low	92·4	96·1
	High	51·1	85·9

In November 1970 kangaroos and sheep were seen to be cropping the new shoots of those trees resprouting near ground level after treatment at waist height. A fence was erected to protect these trees from further grazing but because of the nature of the area and the distribution of the plots trees on treatments applied during summer and autumn could not be fenced. Evidence that the death of trees in the second 12 months after treatment may be due principally to continual cropping of the stem sprouts rather than to a real effect of time is presented in Table 3.

Comparison of counts made 24 months after treatment with those after 12 months on plots in which trees were injected at tree base reveals that changes in numbers killed are relatively small.

DISCUSSION

The results show that both Tordon 50-D and Tordon 105 are effective formulations for thinning grey box woodlands.

Injection at tree base is more effective than at waist height, a finding at variance with that of Robertson and Moore (1972) who found that when equal amounts of picloram were applied to poplar box (*Eucalyptus populnea*) there was no significant difference between high and low applications. The same workers injected groups of poplar box trees at monthly intervals for 12 months but found no differences in seasonal responses. Robertson (1974) obtained similar results from summer and winter injections of five eucalypt species in the Townsville region. These findings would seem at variance with those of the present experiment if counts taken after 12 months are considered more reliable for treatment comparisons than those after 24 months and the intervention of grazing. Robertson and Moore (1972) and Robertson and Pedersen (1973) suggested that season of application may be significant for eucalypts when dosage levels are marginal. There were indications in some of their experiments that low dosages were more effective in winter than in summer. The effect of season warrants further study but from a practical viewpoint it would not seem important if trees are injected at ground level with a sufficiently high dose of either Tordon compound; for grey box this dose is 2 ml of 1 per cent picloram.

Further studies are being made of single injections because of the saving of labour that could be effected if the number of injections per tree are reduced without great loss of efficiency.

It appears that browsing by sheep may usefully supplement injection with chemicals when thinning grey box woodlands.

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