CHEMICAL CONTROL OF WOODY WEEDS ON RANGELANDS

B.M. ALCHIN

Western Lands Commission
Box 4351 G.P.O.
Sydney N.S.W. 2001

Summary. Results from trials with hexazinone applied using point application techniques indicate it may have potential as a method for control of woody weeds on rangelands. Application to the soil surface of a liquid concentrate with a specially designed applicator or a pellet formulation appears feasible over a large area. Hexazinone application may eventually be incorporated into integrated programmes for woody weed control.

INTRODUCTION

The spread of inedible woody weeds is one of the most serious factors causing reduced productivity in Australian rangelands. Trials have been carried out in the Western Division of New South Wales to determine the potential of hexazinone as a method of control.

MATERIALS AND METHODS

Hexazinone formulations used were a liquid[1] and elliptically-shaped pellets[2] weighing 2 g. The liquid formulation was applied with a specially designed liquid applicator[3] which injected undiluted hexazinone into the soil. This formulation was also applied by misting a 1% or 4% hexazinone solution.

Individual plants were treated with point-application of the liquid or pellet by placement at the drip-line. Point application was applied on a grid pattern in dense stands (at 1.4 by 1.4 m or 1.4 x 2.1 m intervals).

RESULTS

Results are presented as the number of plants expressed as a percentage in the following categories: dead - 100% defoliated with no further regrowth, splitting of the bark and dead wood; probably die - greater than 50% defoliation with all remaining leaves (including regrowth) necrotic or severly abnormal; probably live - less than 50% defoliation and/or some form of recovery; unaffected - no evidence of response to chemical.

Comparison of rates and time of treatment with point application techniques. Coolibah (*Eucalyptus microtheca*) saplings 2 to 3 m high and less than 30 cm apart in unreplicated plots of 0.04 ha were treated. Plots were treated on a grid pattern in May or September 1978. Results were recorded in November 1980 (30 or 26 months after treatment). There was less than average rainfall over the period of the trial.

[1] Trade name Velpar L
[2] Trade name Velpar Gridball Brush Killer
[3] Trade name Spotgun

Table 1. Effect of formulation, rate and time of application with point-application of hexazinone on coolibah saplings.

Treatment time and formulation	Hexazinone rate (g/point)	Hexazinone rate (kg ha^{-1})	Application pattern	Proportion of trees per assessment category[1] (%)			
				Dead	Probably die	Probably live	Unaffected
Control	0	0	-	13	1	0	86
May							
liquid	0.50	2.6	1.4 m sq	93	4	3	0
pellet	0.20	1.0	1.4 m sq	93	3	1	3
September							
liquid	0.50	2.6	1.4 m sq	95	3	2	0
liquid	0.25	1.3	1.4 m sq	90	6	2	2
pellet	0.20	1.0	1.4 m sq	75	17	7	1
pellet	0.20	0.7	1.4 x 2.1 m	74	13	13	0

[1] 26 to 30 months after treatment.

It was observed that the liquid formulation killed coolibah quicker than did the pellet formulation. The first four treatments were good (greater than 90% of the trees were dead). The last two treatments gave an acceptable result.

Comparison of application techniques. Poplar box (*E. populnea*) regrowth 1 to 3 m high in unreplicated 0.04 ha plots was treated. The trial was established in May 1978.

Assessments were made in October 1980, 29 months after treatment. There was average rainfall over the trial period.

Table 2. Effect of formulation and rate of application in point and misting application of hexazinone on poplar box regrowth.

Formulation	Hexazinone rate (g/plant)	Hexazinone rate (kg ha^{-1})	Application pattern	Proportion of trees per assessment category (%)			
				Dead	Probably die	Probably live	Unaffected
Control	0	0	-	0	0	0	100
misting (1%)	2.5	2.5	-	5	0	95	0
liquid	0.5	0.5	1 point/plant	65	23	12	0
liquid	1.0	1.0	2 points/plant	67	33	0	0
liquid	1.5	1.5	3 points/plant	48	40	12	0
pellet	-	1.0	0.2g/1.4 m sq	79	19	2	0

For rates of hexazinone per hectare in Table 2 a population density of 1000 ha^{-1} is assumed. The pellet formulation was more effective than point-application of the liquid formulation (Table 2) although it was slower to cause damage to the poplar box. The point-application of 0.5 and 1.0 g $plant^{-1}$ as liquid was more effective than 1.5 g $plant^{-1}$. Misting caused rapid defoliation but regrowth was high.

Comparison of application techniques and time of application. The trial was carried out on mallee (*Eucalyptus dumosa, E. socialis, E. gracilis*) regrowth on a previously cleared fire trial. The liquid applicator was modified with an extended nozzle to allow placement of hexazinone beneath the soil surface. Replicated plots of 200 by 30 m (0.6 ha) were used. Assessments were made in October 1980 (25.5 and 23.5 months after treatment). The rate of liquid application was 1, 2 or 4 g hexazinone for less than 1, 1 to 2, or greater than 2 m high plants respectively. The pellets were applied at 0.2, 0.4 or 0.8 g hexazinone for less than 1, 1 to 2, or greater than 2 m high plants respectively.

Table 3. Effect of formulation and time of application in point and misting application of hexazinone on mallee regrowth.

Treatment time and formulation	Hexazinone rate (g/point)	Proportion of trees per assessment category[1] (%)			
		Dead	Probably die	Probably live	Unaffected
September					
liquid - on surface	1.0	72	12	7	9
liquid - below surface	1.0	70	8	14	8
pellet	0.2	72	12	9	7
misting (4%)	-	54	20	11	15
November					
liquid - on surface	1.0	94	6	0	0
liquid - below surface	1.0	79	0	21	0

[1] 23.5 to 25.5 months after treatment.

There was no difference in response to the point-application of liquid and pellet formulations in September. Misting was less effective. There was no difference between on-surface or below-surface point-application of liquid in the September application, but in November, point-application of liquid on the surface was more effective.

DISCUSSION

Hexazinone was effective on some of the major problem species in western New South Wales rangelands. Grid pattern application was effective with point-application of either liquid or pellet formulation.

Point-application of liquid was generally effective, often with only limited rainfall. The pellet formulation was usually more effective than the point-application of liquid, particularly with favourable rainfall. However, the pellet effected response at a slower rate than the liquid application. This

may be due to the pellet remaining relatively intact until significant rain falls to release the chemical and move it downwards into the root zone. This would coincide with optimum moisture uptake and hence chemical uptake, by the plant.

For the mallee trial (Table 3) application to the soil surface with the liquid was more effective with the November treatment but there was no difference with the September treatment. The reason for the difference between the times of treatment is not obvious.

The point-application of liquid and pellet formulations of hexazinone may play a significant role in woody weed control in rangelands. The technique will probably be used alone, as well as in an integrated programme involving other control methods. The techniques appear to be very acceptable to land managers and further research is required to ensure that application takes advantage of all the factors affecting response.

ACKNOWLEDGEMENTS

The author acknowledges the supply of materials by Du Pont (Australia) Ltd. and assistance with the trials by Du Pont and field officers of the Western Lands Commission.