

Use of a rope-wick applicator to apply glyphosate for controlling Chinese scrub (*Cassinia arcuata* R. Br.)

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Summary

The effectiveness of a rope-wick applicator for controlling Chinese scrub with glyphosate was investigated in north-central Victoria.

The herbicide was applied in both one and two directions. Plants were assessed as partially killed, completely killed or not damaged.

One-way application was unsatisfactory as fewer than half the plants were completely killed. The two-way application was more effective with 78% of plants being classed as completely killed. This is considered to be a satisfactory level of control. Mortality was higher among the larger plants.

Introduction

Chinese scrub, also known as biddy bush (*Cassinia arcuata* R. Br.), is an erect, perennial, woody shrub and is considered a weed in pastures of south-eastern Australia (Parsons 1973). It is unpalatable to sheep and cattle and, when not controlled, causes pastures to deteriorate through competition for light and water.

There is no registered herbicide that will selectively control Chinese scrub in pastures. However, it can be controlled by selectively applying a non-selective herbicide. An experiment was established to assess the effectiveness of control of Chinese scrub by means of a rope-wick applicator to apply the herbicide glyphosate (as Roundup, 36% glyphosate) to target plants.

Chinese scrub generally occurs as single-stemmed plants, though some have many erect branches of different length. The number of plants per unit area can vary greatly. In dense stands it is unlikely that all plants would receive sufficient herbicide from a rope-wick applicator moving in one direction because tall and dense plants would tend to protect other plants. To test this, the relative effectiveness of wiping in both one and two directions was evaluated, as well as the level of

control obtained among plants of different heights (taller or shorter than 0.45 m).

Materials and methods

Age and condition of target plants

The experiment was located 10 km east of Tooborac in central Victoria. The area had been sown to pasture in May 1981 and none of the Chinese scrub was more than 3 years old when the herbicide was applied in April 1984. At that time, the stand was healthy and growing vigorously. Some plants had commenced flowering for the first time.

Plant density ranged from c. 10 to 100 plants m^{-2} , averaging 20 plants m^{-2} . Plant height varied from 0.1 m to c. 0.7 m. The pasture consisted of phalaris (*Phalaris aquatica* syn. *Phalaris tuberosa* (L.)), cocksfoot (*Dactylis*

glomerata (L.)) and subterranean clover (*Trifolium subterraneum* (L.)) and had been grazed prior to treatment with the herbicide.

Treatments and experimental design

The experimental design consisted of a randomized block with a control and two treatments, and six replications. The two treatments consisted of one-way (one passage of the rope-wick applicator along the plot) and two-way (passages in opposite directions along the plot) application of herbicide. Control plots were untreated. Plots were 3 m by 25 m.

A Silvan 'boom wick' with pistachio wicks fitted in a 'boot-lace' arrangement was mounted directly to the front of a tractor and operated at 0.3 m above ground level, i.e. well above the pasture. Owing to debris, rocks and uneven ground the boom could not be maintained at an even height. The tractor operated at a constant speed (c. 5 $km\ h^{-1}$).

The chemical was applied to the plots in a random sequence with the two runs on the two-way treatment timed so that the chemical deposited during the first run had dried on the plants before the second run was made. A mixture of one part Roundup to two parts water was used.

Assessment

Effectiveness of treatments was assessed in July 1984 by three indepen-

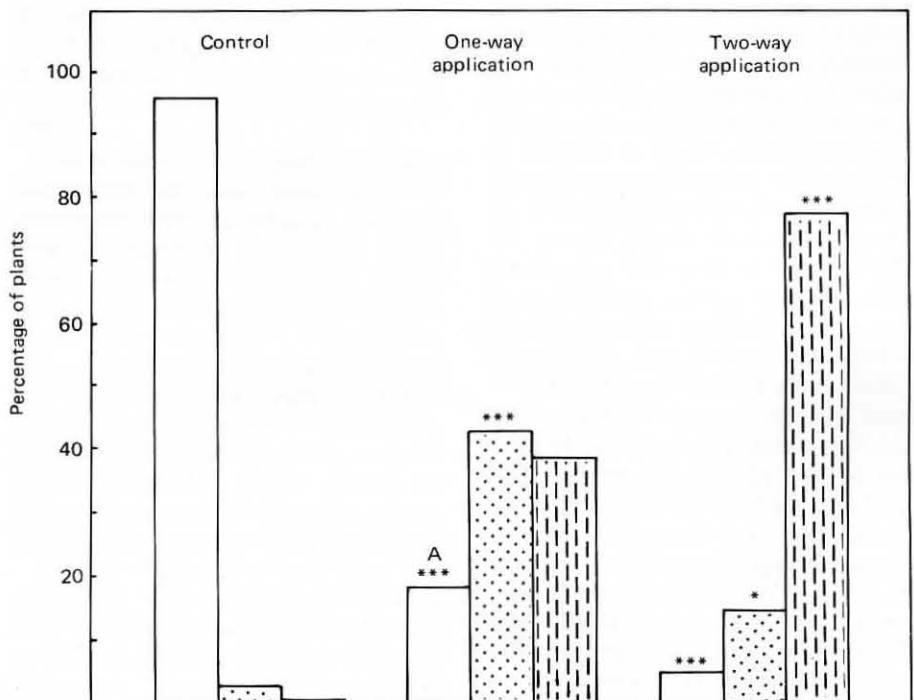


Figure 1 The percentage of plants classed as not damaged (open column), partially killed (dots) and completely killed (dashes) by glyphosate on the control and the two treatments. A (Significance of the difference between each treatment and the control for each class of effect. * $P < |0.05$, *** $P < |0.001$ following an arcsine transformation of data.)

Table 1 The influence of height of target plants and method of application of herbicide on the control of Chinese scrub, expressed as a percentage of the total number of plants in each category

Height of target plants (m)	Treatment		Two-way	
	One-way part. killed	comp. killed	part. killed	comp. killed
> 0.45	45	42	15	84
0.15-0.45	35	27	19	54
<i>Levels of significance^A:</i>	<i>Partially killed</i>		<i>Completely killed</i>	
Height	**		**	
Treatment	***		ns	
Height and treatment	**		**	

** $P < 0.01$;
*** $P < 0.001$;
ns not significant at $P < 0.05$.

^A Arcsine transformation carried out on data prior to analysis.

dent observers on six pre-determined, but randomly selected, subplots of 1 m². Plants were categorized according to the following scale: completely killed, partially killed, not damaged. Plants with both damaged and non-damaged branches were classed as partially killed. Assessments were made of plants at three heights: those < 0.15 m, plants ranging from 0.15 to 0.45 m and plants taller than 0.45 m. Counts were also made of control plots.

Results and discussion

Eighty-two per cent of plants were partially or completely killed by a one-way application (Figure 1), compared with

95% by the two-way application. With the one-way application, 39% of plants were completely killed compared with 78% for the two-way application. Fewer than 4% of plants on the control were classed as completely or partially killed. Hence, most of the damage on the treated areas was caused by the herbicide.

The proportion of plants taller than 0.45 m that were completely killed by both the one-way and two-way treatments was greater than the proportion completely killed in either of the other two ranges of plant heights for the respective treatments. This was probably because the taller plants received more herbicide, and protected the shorter plants. Further investigation of

means by which the proportion of plants in the range 0.15-0.45 m could be killed appears to be warranted.

One-way application with a rope-wick did not provide satisfactory control. The partially killed plants, — c. 50% of those affected by herbicide — appeared capable of recovery. On average, fewer than five plants m⁻² remained either undamaged or partially killed as a result of the two-way application. This is considered to be a satisfactory level of control.

Alternative methods of applying the herbicide, such as the multi-rope applicator may be more effective than the rope-wick when used in one direction. However, a multi-rope unit could not have been used at this particular site where rocks and debris would probably have fouled the ropes. Besides, the woody nature of the shrub may dislodge the ropes from the unit. Such conditions are common throughout north-central Victoria where Chinese scrub is a problem weed. Pastures were not damaged by the herbicide or any of the treatments.

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References

- Parsons, W. T. (1973). 'Noxious Weeds of Victoria'. (Inkata Press: Melbourne)