

AN EVALUATION OF FIVE HERBICIDES AND APPLICATION METHODS
FOR CONTROL OF BLACKBERRY

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Summary. The control of blackberry (*Rubus fruticosus* agg.) by fosamine, glyphosate, triclopyr and 2,4,5-T was evaluated in a field experiment of four years' duration. Fosamine and glyphosate were slower to produce visible effects on the bushes than 2,4,5-T and triclopyr. After more than 2 years most regrowth was observed on the 2,4,5-T treated plants. There was no difference in regrowth between fosamine, glyphosate and triclopyr and all performed better than 2,4,5-T.

Application methods were evaluated in a second trial. The techniques were spraying foliage to half and full saturation using the same herbicide concentration, and misting foliage with small volumes of a 10 x more concentrated herbicide solution. Identical amounts of herbicide were applied using both techniques with the exception that one lower rate misting treatment was made. Results after one year showed that efficacy was not changed either by application technique or, with the exception of amitrole plus ammonium thiocyanate, by halving the maximum amount of herbicide applied. However, a drift problem was evident with the mist applications.

INTRODUCTION

Blackberry is a widespread weed on both agricultural and non-agricultural land in New South Wales infesting an estimated 4 million ha (A. Mears, personal communication). It is most widespread in the south-eastern parts of the State but occurs in the highland areas as far north as the Queensland border.

Dense pastures are rarely invaded by blackberry, so one of the best methods of control is to maintain a dense cover of useful plants which prevent establishment of blackberry seedlings. However the weed flourishes in high rainfall areas, in forests, on waste places, roadsides, creek banks, fencelines, railway verges and vacant or derelict agricultural holdings. In these situations the most commonly used method of control has been to spray with 2,4,5-T during the flowering to fruiting stage of growth, but because of public concern there is some doubt about its future availability. Several repeat sprayings are also necessary and there is a need for more effective or alternative chemicals for control.

Several new herbicides show promise for control of blackberry and trials were initiated to test their efficacy and also application techniques.

MATERIALS AND METHODS

A neglected grazing property near Sydney on which blackberry occurred as individual scattered bushes varying from 1 to 3 m high and from 10 to 40 m² in area was selected as the trial site.

In trial 1 four herbicides (fosamine, glyphosate, triclopyr and 2,4,5-T) were applied at two times (March and April 1978) and at two rates. Two years later (in March 1980), the herbicides were reapplied to the regrowth in the plots at one rate of each herbicide, selected as being the most economical and effective rate from the previous results.

The treatments were applied by a hand held spray gun from a piston pump. The volume of spray solution needed to thoroughly wet individual bushes was recorded and averaged 14 L per bush for the initial treatments and 27 L per bush for the retreatment.

In trial 2 (treated in March 1980), four herbicides (fosamine, glyphosate, triclopyr and amitrole plus ammonium thiocyanate) were applied using different methods of application - high volume spraying thoroughly wetting the bushes to point of run off, half of the high volume spray using the same concentration (half volume/half rate), and misting the bushes at a full, half and quarter concentration. The full rate applied by mister was equivalent to that applied by the high volume method except that it was applied at a 10 fold concentration. Bushes of approximately equal size were selected for each replicate in these trials and the volumes used on individual bushes were recorded. All trials consisted of four replicates.

Visual assessments were made of the bushes using a score of 1 to 10 where 1 equals 10% or less control and 10 equals 100% control.

Weather conditions during the trials were fairly dry, especially in 1980; adequate rain fell in early 1981 so that considerable growth was evident on untreated bushes in February 1981.

The plots were assessed in March 1981 using infra red photography from a helicopter (Barrett and Leggett 1979) but the results are not yet available.

RESULTS AND DISCUSSIONS

Trial 1. Triclopyr and 2,4,5-T acted rapidly so that at the first assessment there was no difference in control between treatments applied 8 and 4 weeks earlier (Table 1). Glyphosate and fosamine were slower acting so that control after 8 weeks was higher than after 4 weeks; this difference had disappeared by January 1979 (9 to 10 months after treatment).

In January 1979, 9 and 10 months after spraying, the glyphosate treatment was the most effective; some regrowth was already apparent on the 2,4,5-T and triclopyr treatments. Twenty four months after the initial spraying there was considerable regrowth in all treatments. The most regrowth was on 2,4,5-T treated bushes which were 2 to 3 times the size of the original bushes. The practical implication of this is that the respraying treatment should be carried out in the following season and not 2 years later. However, this experiment was designed to observe the long term effect of herbicides on blackberry bushes.

Table 1. Effect of time of application on the control of blackberry 8 and 4 weeks after treatment in March and April respectively.

Herbicide	Concn g L ⁻¹	Control rating ¹ (arc sin transformed)	
		Treatment date (1978)	
		March	April
Fosamine	3.6	33	22
	4.8	42	24
Glyphosate	3.6	52	36
	7.2	79	31
Triclopyr	0.6	87	83
	1.2	86	87
2,4,5-T	0.4	81	73
	0.8	87	83

¹ Values are transformed from a scale of 1 to 10; 1 = 10% or less control, 10 = 100% control.

Fosamine, glyphosate and triclopyr were equally effective and gave significantly better control than 2,4,5-T on resprayed bushes (Table 2).

Table 2. Effect of four herbicides on blackberry treated in March/April 1978 and retreated in March 1980 (Trial 1).

Herbicide	Control rating ¹ (arc sin transformed)			
	Assessment date			
	Jan. 1979	Mar. 1980	Nov. 1980	Feb. 1981
	Months after treatment in 1978		Months after retreatment in March 1980	
	9 to 10	23 to 24	8	11
Fosamine	49	40	80	75
Glyphosate	76	57	86	82
Triclopyr	68	46	82	78
2,4,5-T	45	27	53	41
Standard error	4	5	2	3

¹ Values are transformed from a scale of 1 to 10; values from assessments in January 1979 and March 1980 are means of two rates and the two application times.

It was observed that where bushes were under water for approximately 6 weeks in a wet period in 1979, excellent results were obtained even where 2,4,5-T was used. Also, two bushes side by side which were accidentally burnt showed big

Table 3. Effect of application method and rate on the control of blackberry with four herbicides (Trial 2) (mean values from assessments 8 and 11 months after treatment).

Application method	Application volume (average) (L per bush)	Herbicide							
		Fosamine		Glyphosate		Triclopyr		Amitrole plus ammonium thiocyanate	
		Concn (g L ⁻¹)	Control rating ¹	Concn (g L ⁻¹)	Control rating ¹	Concn (g L ⁻¹)	Control rating ¹	Concn (g L ⁻¹)	Control rating ¹
High volume application:									
High volume	26	4.8	78	3.6	75	1.0	53	9.4	66
Half volume/half rate	13	4.8	74	3.6	76	1.0	62	9.4	42
Mister application:									
Full rate	2.1	48.0	75	36.0	78	10.0	58	94.0	61
Half rate	2.1	24.0	78	18.0	78	5.0	53	47.0	68
Quarter rate	2.2	12.0	62	9.0	70	2.5	67	23.5	48

¹ Values are arc sin transformed from a scale of 1 to 10.

differences in regrowth; that treated with 2,4,5-T having 75% regrowth and that treated with triclopyr only 15% regrowth.

Trial 2. Eight to 11 months after treatment there was no difference between the application techniques using equivalent amounts of herbicide (high volume and mister, full rate (Table 3)). There was also no difference between the high volume and half volume/half rate, except with amitrole where the half rate was less effective. With the mister treatments there was no difference between the full and half rate, but at the quarter rate decreases in effectiveness were observed for fosamine and amitrole plus ammonium thiocyanate.

In general, the results indicate that the mister method of application was as effective as the high and half volume/half rate spraying method, but a drift problem existed with this method of application. This was particularly evident with the amitrole plus ammonium thiocyanate and glyphosate treatments.

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