BLACKBERRY CONTROL WITH TRICLOPYR ALONE AND IN COMBINATION WITH PICLORAM

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Summary. Results of high volume foliage spray trials on blackberry, *Rubus fruticosus* L. *agg.* from 22 locations covering N.S.W., Victoria and Tasmania between 1979-1983 showed that 0.1% a.i.(w/v) triclopyr butoxyethanol ester gave considerably better control than 0.1% (w/v) 2,4,5-T butyl ester. Triclopyr 0.1-0.15% + picloram 0.033-0.05% (w/v) gave the best and most consistent control and regrowth suppression of blackberry. Triclopyr and triclopyr+picloram gave more consistent control of blackberry than glyphosate or fosamine and caused less persistent damage to pasture grasses than glyphosate. Low volume foliage spray trials (100-150 L/ha) with higher concentrations of triclopyr (0.16%) and triclopyr+picloram at concentrations of 0.15+0.05% to 0.075+0.025% applied with various drench guns or sprinkler sprayer have produced good control and regrowth suppression of blackberry.

INTRODUCTION

Blackberry is an aggregate of several closely related species and probably includes hybrids. It has been estimated that 663,000 ha was infested with blackberry in Victoria in 1975 (3) and 1.4 m ha had moderate to dense infestation in N.S.W. in 1983 (9). Potential production losses and control costs due to blackberry are significant.

Prior to 1981 2,4,5-T was the main herbicide used to control blackberry in Australia. Triclopyr formulated as the butoxyethanol ester and the tri-ethyl amine salt was investigated in field trials from 1976 and triclopyr (Garlon^{R} 480 containing 480g/L triclopyr as butoxyethanol ester) was first registered in Australia as a high volume foliage spray at 0.1% (w/v) on blackberry in January, 1981 and at 0.5% in Tasmania only in 1984.

Early work on blackberry in New Zealand (1) and Australia (5) showed that triclopyr was much more active than 2,4,5-T and a mixture of triclopyr + picloram further improved the control. Subsequent work in N.Z. comparing triclopy+picloram, triclopyr, glyphosate, fosamine and 2,4,5-T (2) showed that triclopy+picloram gave a high and consistent level of control from applications made between November and May and was especially superior to fosamine and 2,4,5-T. Results from more recent high volume spray trials over four years in N.S.W. (7) showed that despite varying speed of action, in the long-term, fosamine, glyphosate and triclopyr gave similar control and produced significantly less regrowth than 2,4,5-T. Trials over three seasons in W.A. (4) comparing glyphosate, triclopyr, triclopyr+picloram and 2,4,5-T showed that the latter was inferior to other treatments and that triclopyr+ picloram completely controlled 62% of bushes after two years of spraying, and that no other treatment achieved total control of a blackberry bush in that time.

In comparison to high volume spraying it has been shown that ultra-low volume spraying with 15-30 L/ha with Micron Herbi^{R} C.D.A. was effective on blackberry (3). Triclopyr at 10% and triclopyr+picloram as undiluted Grazon^{R} (150+50 g a.i./L) are registered for use in Australia by C.D.A. Results of low (100-150 L/ha) volume spraying trials with fosamine, glyphosate and triclopyr using a gas powered gun were found to be similar to high volume spraying and it was also found that reduced herbicide rates were effective on blackberry (8). More recent high and low volume spray results are presented

in this paper.

METHODS

Formulations included triclopyr as butoxyethanol ester 480 g/L, triclopyr butoxyethanol ester 150 g/L/picloram tri-isopropanol amine 50 g/L, 2,4,5-T butyl ester 800 g/L and commercial formulations of fosamine and glyphosate.

Conventional high volume spraying with trigger control GunJet^{R} spray gun at 750 to 1500 kPa with TeeJet^{R} D6 or D7 orifice disc, wet foliage to the point of run-off (100-200 L was applied to tagged and measured blackberry). Spraying was carried out during the summer-autumn growing period over a range of climatic conditions. Over several sites spray volume was fairly consistent. (Table 1). Reduced spray volumes with equivalent and higher use rates of herbicide were evaluated.

Table 1. Volume of spray applied to blackberry bushes of differenct heights

Mean height (m)	Spray volume (L/ha)
1.0	1900 $\pm$ 100
1.5	2500 $\pm$ 100
1.8	3400 $\pm$ 200
2.0	4000 $\pm$ 200
2.5	5000 $\pm$ 500

Fine droplet, low volume spraying with a range of concentrations of triclopyr and triclopyr + picloram was done with: (a) modified 15 mL capacity Phillips drench gun and Spraying Systems FullJet^{R} GG 2.0 nozzle and (b) the gas powered (AG-MURF^{R}) gun with Spraying Systems 8003B nozzle, and (c) coarse droplet low volume spraying with sprinkler sprayer (9) with round green rotor and a 1.5 mm jet at 100 kPa were compared to high volume spraying at three locations in N.S.W. Low volume (100-150 L/ha) spraying was carried out applying 1-1.5L of spray solution containing a water-based white titanium dioxide pigment (1.0% v/v) as a marking agent to 100 m^{2} foliage. Blackberry was visually rated for brown-out and regrowth the following season. Pasture growth and effect on other weeds in the sprayed areas was also evaluated.

RESULTS AND DISCUSSION

Table 2 is a summary of results from a large number of single application high volume trials carried out by Dow in N.S.W., Victoria and Tasmania from 1979-1983. Triclopyr 1.0% (w/v) was considerably better than a similar rate of 2,4,5-T. Triclopyr/picloram at 0.1/0.33% to 0.15/0.05% (w/v) gave the best and most consistent control and suppression of blackberry regrowth over a number of different times of treatment. All the treatments were selective on pasture grasses.

Registered use rates of glyphosate and fosamine were compared at several sites with the treatments listed in Table 2. Both these herbicides effected variable control and their optimum time of application was more restricted. This was particularly so, with fosamine where control from autumn spraying was more consistent than summer application. Glyphosate was variable on individual bushes in the treated area and autumn applications were less

effective than summer applications and this confirms earlier reports (4). Glyphosate caused the most persistent damage to pasture and burning was not always possible when attempted six months after spraying. With high volume application spray volume could not be reduced to a significant extent with the treatments shown in Table 2 and control with glyphosate was variable with both conventional high volumes spraying and with lower (25-50%) spray volume.

Table 2. Summary of blackberry control in trials in N.S.W., Victoria and Tasmania 1979-1983.[a]

Herbicides	Concentration (% w/v)	No. of trials	Regrowth[f] (%)
Triclopyr[b]	0.1	37	11.8 (10.8)
Triclopyr + Picloram[c]	0.075/0.025	8	10.0 (8.0)
Triclopyr + Picloram	0.1/0.033	28	3.9 (3.8)
Triclopyr + Picloram	0.1/0.05	11	5.9 (6.0)
Triclopyr + Picloram	0.15/0.05	26	2.8 (3.3)
2,4,5-T[d]	0.08/0.1	24	47.2 (24.2)
2,4,5-T[e] + Picloram	0.2/0.05	16	167.3 (6.1)

[a]Mean time post spraying 10.5 months.
[b]Triclopyr butoxyethanol ester
[c]Picloram tri-isopropanol amine
[d]2,4,5-T butyl ester
[e]2,4,5-T isooctyl ester
[f]Standard deviation included in parenthesis

No treatment gave complete suppression of regrowth from a single spraying, nor did any treatment give complete suppression when regrowth was sprayed in the following season whether the earlier treated bushes were undisturbed, burnt or slashed. There was always some regrowth in the treated area although it was generally low at 1-2% with triclopyr/picloram and around 5% with triclopyr. The quantity of spray used when treating regrowth was proportional to the level of regrowth plus 10-30% more depending on where the regrowth was in the bush and the density of pasture and weed competition.

Australian blackthorn, *Bursaria spinosa*, sweet briar, *Rosa rubiginosa*, lantana *Lantana camara*, English broom, *Sarothamnus scoparius*, seedling hawthorn *Crataegus spp.* and St. John's wort, *Hypericum spp.* were also controlled in areas sprayed with triclopyr/picloram and St. John's wort and broom were well controlled with triclopyr alone at the rates given in Table 2.

Trials comparing high and low volume spraying were carried out during the summer/autumns of 1984-86 at Kurmond and Lithgow, N.S.W. The results from

five trials near Lithgow with high volumes of 0.1% triclopyr showed an average blackberry regrowth of 14.9% ±2.5% twelve months after spraying. The regrowth after triclopyr was applied with a gas powered gun was 7.3% ±2.3% with 1.6% triclopyr, 14.2% with 2.4% triclopyr, and 15.9% with 0.96% triclopyr. The regrowth after triclopyr was applied with a sprinkler sprayer was 14.7% ±1.8% with 1.6% triclopyr, 17.5% with 2.4% triclopyr and 25.8% with 0.96% triclopyr. Results suggest that the highest concentration of triclopyr applied with the gas powered gun was antagonistic.

The average blackberry regrowth from high volumes of triclopyr/picloram (0.15/0.05%) was 4% ±1.7% and was 7.1% ±2.2% with triclopyr/picloram at 0.1/0.033%. The regrowth after triclopyr/picloram was applied with a gas powered gun was 3.8% ±0.8% with triclopyr/picloram at 1.5/0.5%, and was 4.1% ±1.4% with triclopyr/picloram at 0.75/0.25% w/v. The regrowth after triclopyr/picloram was applied with a sprinkler sprayer was 5.8% ±4.8% with triclopyr/picloram at 1.5/0.5% and was 8.0% ±3.5% with triclopyr/picloram 0.75/0.25%.

These results and those reported elsewhere (8) show that effective control of blackberry can be obtained with the gas powered gun or the sprinkler sprayer. At low spray volumes (125 L/ha) lower rates of triclopyr (20% less) and triclopyr/picloram (25-60% less) are just as effective on 1.5 m bushes as higher rates applied by high volume spraying (2500 L/ha). It is suggested that the gas powered gun in particular has great practical application for small to medium size blackberry and for follow-up spraying of regrowth.

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