THE CONTROL OF BLACKBERRY (*RUBUS FRUTICOSUS* AGG.) USING HERBICIDES APPLIED BY C.D.A.

F.N. IRVINE

Keith Turnbull Research Institute
Department of Crown Lands and Survey
P.O. Box 48
Frankston Vic. 3199

Summary. The efficiacy of a range of herbicides against blackberry (*Rubus fruticosus* agg.) when applied using controlled droplet application (C.D.A.) together with a water-based marking agent and emulsifiable oil was examined. Amitrole at 4.7 kg ha^{-1}, fosamine at 7.8 kg ha^{-1}, glyphosate at 3.7 kg ha^{-1}, hexazinone at 4.9 kg ha^{-1}, triclopyr at 1.9 kg ha^{-1} and 2,4,5-T at 1.6 kg ha^{-1} all gave an acceptable degree of control when applied as low volume sprays at 15 to 20 L ha^{-1}.

INTRODUCTION

Blackberry grows prolifically in high rainfall areas in Victoria, particularly in neglected pastures and disturbed bushland. It has been estimated (Amor and Harris 1979) that in 1975 there were 663 000 ha of infested land of which 43% was inaccessible to conventional ground spraying equipment.

An assessment of the spraying equipment suitable for such situations suggests that hand held controlled droplet applicators could be used because of the minimal spray volume required, combined with the light weight of the equipment.

Combellack and Harris (1978) have shown that there was no difference in the control of blackberry with a laboratory prepared formulation of 2,4,5-T applied using C.D.A. or a high volume spot spray. However, the current controversy surrounding 2,4,5-T and the problems associated with its use near susceptible crops makes it necessary that substitute herbicides be available. Of the recommended alternatives (Anon 1977), amitrole is safe to use near susceptible crops, and whilst picloram is more effective it is environmentally less acceptable. The recently developed herbicides fosamine (Campion 1978), glyphosate (Thompson 1977), hexazinone (Rochecouste 1975) and triclopyr (Watson 1978) have been shown to be effective for the control of blackberry when applied as high volume sprays.

The trials reported here were initiated to determine the effectiveness of these herbicides against blackberry when applied with C.D.A. equipment.

MATERIALS AND METHODS

Screening trials on blackberry were conducted in February/March 1980 at Beech Forest, Hill End, Kangaroo Ground and Mansfield in Victoria.

Low volume (15 to 20 L ha^{-1}) application treatments were applied using an applicator[1] which consisted of a toothed atomizer disc approximately 80 mm in diameter driven by a 6v D.C. motor mounted in a plastic housing

[1] Trade name "C.D.A. Bushranger".

attached to a 1.9 m extendable handle. The disc operated at a speed of 2150 rpm and the herbicide was gravity fed to the disc by a feed tube and nozzle. The rotary atomizer was moved at 1 m sec^{-1} at a distance of 25 to 50 cm over the canopy face with successive passes being made at 1.2 m intervals. The high volume (2000 to 3000 L ha^{-1}) treatment was applied using a handgun fitted with a Spraying Systems D6 nozzle at a pressure of 1000 kPa.

Chemicals and rates of application are given in Table 1. A water-based white titanium dioxide pigment paste used in the manufacture of paints and printing inks was added to the 2,4,5-T and triclopyr mixtures to act as a marking agent. The 2,4,5-T kerosene formulation was based on that developed by Shaw and Combellack (1978) and consisted of 2,4,5-T iso-octyl ester in deodorized kerosene plus titanium dioxide as a marking agent. All other treatments were based on the commercial product applied either undiluted or diluted with water. A non phytotoxic emulsifiable paraffinic oil was evaluated for use with fosamine and 2,4,5-T.

Table 1. Chemicals used and application rates.

Formulation	Active ingredient spray mix (%)	Flow rate (mL sec^{-1})	Rate[1] (kg ha^{-1})
Amitrole + ammonium thiocyanate	25%	2.25	4.7
Fosamine	36%	2.60	7.8
Fosamine + 25% v/v emulsifiable oil	36%	2.60	7.8
Glyphosate	18%	2.45	3.7
Hexazinone	25%	2.36	4.9
Triclopyr ester + 2% v/v marking agent	12%	1.93	1.9
2,4,5-T iso-octyl ester	10%	1.93	1.6
2,4,5-T ester + 2% v/v marking agent	10%	1.93	1.6
2,4,5-T ester + 25% v/v emulsifiable oil	10%	1.90	1.6
2,4,5-T ester in kerosene	10%	1.80	1.6
2,4,5-T ester to run off	0.067%	-	

[1] kg ha^{-1} based on a forward speed of 1 m sec^{-1} and a swath of 1.2 m.

Treatments were arranged in randomised complete blocks and replicated three times. Each plot consisted of a discreet thicket of well developed bushes 2 to 5 m^2 in size.

The control of blackberry, based on foliage reduction and regrowth (100% = complete defoliation, no regrowth) was assessed visually at regular intervals over twelve months.

RESULTS

The results are summarised in Table 2. The density of live canes was reduced with all treatments and only at Kangaroo Ground were any treatments (fosamine and hexazinone) significantly ($P = 0.05$) less effective than high volume application of 2,4,5-T.

Table 2. Effect of various treatments on blackberry.

Treatment	Control (%)			
Site:	Hill End	Kangaroo Ground	Mansfield	Beech Forest
Sprayed:	Feb 6 1980	Feb 12 1980	Feb 20 1980	Mar 25 1980
Assessed:	Jan 21 1981	Jan 21 1981	Jan 15 1981	Jan 29 1981
Amitrole	42 a[1]	80 ab	63 ab	82 bc
Fosamine	63 a	40 cd	63 ab	87 bc
Fosamine + oil	48 a	33 d	50 b	87 bc
Glyphosate	57 a	90 a	87 a	95 ab
Hexazinone	57 a	42 cd	50 b	98 a
Triclopyr + marker	63 a	87 a	72 ab	85 bc
2,4,5-T	77 a	-	52 b	78 c
2,4,5-T + marker	62 a	60 bc	52 b	80 c
2,4,5-T + oil	67 a	-	63 ab	78 c
2,4,5-T + kerosene	48 a	70 ab	68 ab	73 c
2,4,5-T high volume	57 a	77 ab	63 ab	78 c

[1] Means followed by different letters are significantly different ($P = 0.05$) as determined by Duncan's Multiple Range Test on arcsin $\sqrt{x}$ transformed data (comparisons within columns only).

The addition of either kerosene, emulsifiable oil or marker had no significant effect on the performance of 2,4,5-T. The only treatments that were significantly ($P < 0.05$) better than 2,4,5-T applied as either a low or high volume spray were glyphosate and hexazinone at the Beech Forest site.

The effects with glyphosate were slow to develop with many canes still alive eight months after application, although regrowth was severely deformed. By summer, crown regrowth was minimal.

An early assessment of the triclopyr plots indicated a very rapid necrosis with very little refoliation eight to nine months after application; however, twelve months after spraying regrowth from the crown was evident and control was not significantly better than with 2,4,5-T.

The emulsions formed when 2,4,5-T and triclopyr were diluted 1 to 3 with water remained stable for at least 24 hours and were unaffected by the addition of either the marking agent or emulsifiable oil.

The marking agent was not compatible with the other herbicides due to agglomeration of the pigment which occurred with varying rapidity, although it could be used with glyphosate provided the mixture was used within a few hours.

DISCUSSION

The results from these trials show that a wide range of herbicides applied at low volumes using a controlled droplet applicator will control blackberry. With the exception of fosamine and hexazinone at Kangaroo Ground the results obtained were comparable to or better than those obtained with high volume applications of 2,4,5-T.

The poor results with fosamine may be due to early application; the optimum time reported for spraying blackberry with fosamine is from mid March to mid April (Shaw and Bruzzese 1979). In the trials reported here, the best result was obtained at the Beech Forest site which was sprayed in late March.

Results with hexazinone were variable, with control ranging from poor at Kangaroo Ground to excellent at Beech Forest. This variability may be due to the necessity for rainfall after application to give good root absorption (Proude 1979). Soil moisture at Beech Forest was high, with 209 mm of rain falling in the month following spraying compared with only 20 mm at Kangaroo Ground.

The addition of the marking agent had no significant effect on the phytotoxicity of the herbicides with which it was used. It did enable the operator to see which areas had been treated, thus preventing waste due to overspraying and eliminating the necessity for later spraying of areas missed when a marking agent is not incorporated.

The use of ultra low and low volume spraying opens the possibility for considerable manipulation of the formulation. Further work is required to determine the effect of various carriers and adjuvants on the effectiveness of herbicides applied using controlled droplet application.

LITERATURE CITED

Amor, R.L. and R.V. Harris. 1979. J. Aust. Inst. Agric. Sci. 45: 260-263.

Anon. 1977. Recommendations for the control of noxious weeds in Victoria: Bulletin No. 3E V.N.W.D.B., Department of Crown Lands and Survey, Victoria.

Campion, J.G. 1978. Proc. 1st Conf. Council Aust. Weed Sci. Soc., Melbourne p. 57-63.

Combellack, J.H. and R.V. Harris. 1978. Proc. 1st Conf. Council Aust. Weed Sci. Soc., Melbourne. p. 39-50.

Proude, C.K. 1979. Proc. 7th Asian-Pacific Weed Sci. Soc. Conf., Sydney. p. 181-183.

Rochecouste, E. 1975. Proc. 5th Asian-Pacific Weed Sci. Sco. Conf., Tokyo. p. 116-120.

Shaw, K. and J.H. Combellack. 1978. Proc. 1st Conf. Council Aust. Weed Sci. Soc., Melbourne. p. 33-38.

Shaw, K. and E. Bruzzese. 1979. Proc. 7th Asian-Pacific Weed Sci. Soc. Conf., Sydney. p. 189-192.

Thompson, A. 1977. Proc. 30th N.Z. Weed and Pest Control Conf. p. 76-79.

Watson, K.A. 1978. Proc. 1st Conf. Council Aust. Weed Sci. Soc., Melbourne. p. 67-70.