RESPONSE OF POTATOES, GRAPES AND KIWIFRUIT TO LOW RATES OF SIX COMMERCIALY AVAILABLE PASTURE AND BRUSHWEED HERBICIDES

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SUMMARY

The pasture herbicides 2,4-D and clopyralid/MCPB and the brushweed herbicides 2,4,5-T, picloram/2,4,5-T, picloram/triclopyr and amitrole-T were applied to potatoes, grapes and kiwifruit at 1/10, 1/100 and 1/1000 of the standard commercial rates. Neither of the pasture herbicides affected potatoes but clopyralid/MCPB was better tolerated by both grapes and kiwifruit than 2,4-D. All auxin-type brushweed herbicides reduced yields of potatoes at the 1/10 rate but picloram/triclopyr was better tolerated by both grapes and kiwifruit than 2,4,5-T or picloram/2,4,5-T. Amitrole-T was well tolerated by the grapes and kiwifruit but severely affected potatoes.

INTRODUCTION

Spray drift containing herbicides, used for pasture and brushweed control can potentially damage broad-leaf crops growing in the near vicinity (Smith and Geronimo 1977). To date very little published information is available on the sensitivity of crops to specific herbicides. This knowledge could be used to minimise hazards to neighbouring crops by allowing the most appropriate herbicide and the most suitable application technique to be chosen. This research note summarises the results of a trial in which the commercially available formulations of the pasture herbicides 2,4-D and clopyralid/MCPB and the brushweed herbicides 2,4,5-T, picloram/2,4,5-T, picloram/triclopyr and amitrole-T were applied to potatoes, grapes and kiwifruit.

METHOD

The trial consisted of 60 plots, each containing ten rooted 'Grey Riesling' grape cuttings, four rooted 'Bruno' kiwifruit cuttings and a five metre row of Ilam Hardy potatoes. All crops were planted 9 weeks before application. At application on the 22nd October the potatoes had fully emerged and were up to 300 mm high, the grapes had 4-6 fully expanded leaves and the kiwifruit had 200-400 mm of new growth.

A precision plot sprayer fitted with a 2 m boom containing five Teejet 730154 nozzles at 380 mm spacings was used and treatments were applied in 200 litres/ha at 200 kPa pressure and 1.1 m/sec walking speed.

Each treatment was replicated three times within a randomised block design. A polymer drift control agent was added to all treatments to minimise drift onto adjacent plots. Five commercially available auxin-type herbicide products and amitrole-T were applied at 1/10th, 1/100th and 1/1000th of their normally used label broadcast rate. A visual assessment of crop tolerance was made by two independent observers 1 week and 8 weeks after application using a 0-5 scale.

Quantitative data was obtained for all crops. The potatoes were dug 8 weeks after application and yield in t/ha obtained; the heights of the grapes were measured at 16 weeks after application, and the kiwifruit were cut off 300 mm above ground 20 weeks after application, weighed, and the growth increment expressed as mean weight per plant.

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TABLE 1: Summary of results

Elapsed time (weeks)	Treatment	g/ha	Potatoes			Grapes			Kiwifruit		
			visual score	yield t/ha		visual score	height cm		visual score	fresh weight g	
			1†	8	8	1	8	16	1	8	20
	clpyralid/MCPB ¹	0.021/0.75	0	0.6	20	0.3	0	79	0.2	0	193
	clpyralid/MCPB ¹	0.21/7.5	0.3	1.0	21	2.8	0.5	76	0	0.5	230
	clpyralid/MCPB ¹	2.1/75.0	0.3	0.3	23	4.2	1.4	60*	2.5	0.8	190
	2,4-D butyl ester ²	1.44	0	0.1	19	0.8	0.1	82	0.3	0	356
	2,4-D butyl ester ²	14.4	0	0.5	16	3.0	1.9	57*	1.7	1.1	217
	2,4-D butyl ester ²	144.0	1.0	0.3	21	4.5	2.5	43*	4.2	2.7	60*
	picloram/2,4,5-T ³	1/4	0.3	0.6	17	1.8	0	80	0.2	0	263
	picloram/2,4,5-T ³	10/40	0.5	1.6	18	4.0	0.8	61*	4.0	1.8	71*
	picloram/2,4,5-T ³	100/400	2.2	2.4	14*	5.0	3.4	23*	4.7	5.0	0*
	2,4,5-T butyl ester ⁴	7.92	0	0.8	19	3.0	0.2	73	1.5	0	132
	2,4,5-T butyl ester ⁴	79.2	0.8	1.0	18	4.5	1.7	52*	4.2	1.5	99*
	2,4,5-T butyl ester ⁴	792.0	3.2	2.5	15*	5.0	3.4	25*	4.8	4.2	2*
	picloram/triclopyr ⁵	1/4	0.3	0.8	20	2.0	0	84	0.8	0	364
	picloram/triclopyr ⁵	10/40	0.7	1.6	16	4.3	0.2	74	4.0	1.2	181
	picloram/triclopyr ⁵	100/400	2.2	2.0	14*	5.0	3.6	20*	4.8	4.0	11*
	amitrole ⁶ -T	8	0.2	0.5	19	0.2	0	79	0	0	152
	amitrole ⁶ -T	80	1.5	1.2	15*	0.3	0	83	0	0	460
	amitrole ⁶ -T	800	1.7	3.8	5*	1.0	0	73	0	0	292
	untreated	-	0	0	21	0	0	84	0	0	275
	LSD 5%				5			18			165

* Significantly different from untreated at the 5% significance level

† weeks after treatment

Visual Scale - auxin type 0 = no effect 5 = complete distortion or stunting of growth

amitrole-T 0 = no effect 5 = complete chlorosis or stunting of growth

¹ Lontrel Pasture⁴ Hi-Ester 2,4,5-T² Hi-Ester 2,4-D⁵ Garlon 520³ Tordon Brushkiller DS⁶ Weedazol 4L

RESULTS AND DISCUSSION

Potatoes

Although initial auxin-type symptoms were present on most plots within 24 h of spraying only the higher rates of the 2,4,5-T or triclopyr treatments were still showing strong symptoms after 1 week. Severe chlorosis from amitrole-T was also present after 1 week. After 8 weeks, although auxin-type symptoms were still apparent in all treated plots only the high rates of picloram/2,4,5-T, 2,4,5-T, picloram/triclopyr and the higher two rates of amitrole-T had decreased yields.

Grapes

Initially grapes were very sensitive to the auxin-type treatments with strong symptoms present 1 week after spraying. Chlorosis from amitrole-T at this stage was slight at the two low rates but more definite at the high rates.

At 8 weeks after application symptoms were still present on the higher rates of all the auxin-type treatments resulting in significantly decreased growth at the high rate of all treatments and the middle rate of the 2,4-D and 2,4,5-T treatments. Amitrole-T symptoms had disappeared completely after 8 weeks at all rates.

Kiwifruit

Moderate to severe auxin-type symptoms were present 1 week after application of all treatments except for all low rates and the middle rate of the clopyralid/MCPB and 2,4-D treatments. Amitrole-T at this time was showing no effect.

At 8 weeks, symptoms from the auxin-type treatments were still severe at the higher rates except for the clopyralid/MCPB treatment. Fresh weights were significantly decreased by the high rate of all auxin-type treatments except for clopyralid/MCPB. The middle rates of the treatments containing 2,4,5-T also significantly decreased fresh weights. Amitrole-T showed no visual effect at 8 weeks or any decrease in fresh weight at 20 weeks. The high LSD on the kiwifruit was due to a reduction in vigour across the trial block away from good shelter and increased exposure to the prevailing westerly wind.

CONCLUSION

The two pasture herbicides 2,4-D and clopyralid/MCPB caused auxin-type symptoms but had not affected potato yield 8 weeks after application. Grapes tolerated clopyralid/MCPB better than 2,4-D and fresh weight of kiwifruit was not reduced by clopyralid/MCPB at any of the rates tested. Thus clopyralid/MCPB appears to be a safer product than 2,4-D for pasture weed control in the vicinity of grapes or kiwifruit.

Of the brushweed herbicide combinations tested picloram/triclopyr was better tolerated by grapes and kiwifruit than treatments containing 2,4,5-T. All brushweed herbicide combinations behaved similarly on potatoes with only the 1/10th commercial rate affecting yields. Amitrole-T drift seems unlikely to be a problem to grapes or kiwifruit but surprisingly could be quite damaging to potatoes.

Overall, although symptoms from auxin-type herbicides were readily seen on leaves even at the low rates it requires surprisingly high rates to affect yield or plant growth. Thus with careful application and correct choice of chemical, it should be possible to control pasture weeds and brushweeds in the vicinity of potatoes, grapes and kiwifruit. More work with other chemicals and other crops is required, along with drift studies from ground and air, before a risk factor for a particular herbicide on a particular crop can be reliably predicted.

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