WEED CONTROL IN NEWLY PLANTED RASPBERRIES

M.J. HARTLEY and D.L. LOADER

MAF, Hastings Horticultural Research Station, P.O. Box 85, Hastings

SUMMARY

Herbicides were applied over the top of newly planted dormant raspberry (*Rubus idaeus*) canes on two soil types in Hawkes Bay. Five varieties of raspberry were used and cane growth and yield recorded. Good weed control was given by terbacil (2 kg ai/ha), simazine (3 kg ai/ha) and terbumeton + terbuthylazine (3 + 3 kg ai/ha). On clay soil, the highest yield followed treatment by terbacil (2 kg ai/ha). On pumice soil, the best growth followed simazine (3 kg ai/ha) while terbumeton + terbuthylazine was damaging. A watering trial showed terbumeton + terbuthylazine leached and damaged the raspberries while simazine, oxyfluorfen and oxadiazon did not.

INTRODUCTION

There is a lack of information on herbicides to use on newly planted raspberries, a stage at which they may be most vulnerable to weed competition. A few herbicides are recommended for use on young canes at reduced rates while others specify application only to established canes (Fryer and Makepeace 1978). Reduced rates however, may not control weeds sufficiently to prevent reduction in cane growth.

In Hawkes Bay some raspberry crops have been planted into light soil. Some residual herbicides leach rapidly through light soils so there is a reluctance to use even standard herbicides on such areas.

This paper reports 2 years' trials with a number of herbicides on two soil types.

Trials were conducted at the Hastings Horticultural Research Station (HHRs) on Hastings clay loam and at Paki Paki on coarse sandy loam on pumice sand.

METHOD

Raspberries were established from dormant rooted suckers planted 20 cm apart in rows 3 m apart. Plots were single rows 2 m long with 1 m gap between plots. Canes were cut back after planting to a uniform height in each trial, of between 20 and 40 cm. Planting and treatment dates are shown in the relevant tables.

Herbicides were applied in 220 litres/ha at 230 kPa from a 1.5 m boom centred over the rows giving spray coverage to the entire cane. The main trial (Table 1) was continued through a second season to obtain fruit yield. There were six replicates over four raspberry varieties, two each on Heritage and Nootka, one each on Skeena and Marcy. Canes were thinned and tied in the autumn according to standard practice. Plants were retreated with the same herbicides sprayed to each side of the row in their second August. Dinoseb (Caldron 50 EC) was also applied twice to all plots in the second spring for de-suckering. A second trial (Table 2) with three replicates using Haida was conducted on light pumice soil at Paki Paki.

Weed control was assessed at intervals by visual estimates and weed counts. The effect on raspberry growth was recorded by visual assessments, cane height and diameter measurements and fruit yields.

To test the effect of heavy rain and possible danger to raspberries of herbicides leaching to the root zone a watering trial was conducted on both clay and pumice soils. Four canes were planted in a 20 cm square plot. Forty cm deep rings cut from 200 litre drums, were placed over the plots and driven 20 cm into the ground. Water was applied through a watering can rose to the plot within the ring. All plots were exposed to rain and supplemented where necessary (Table 3). On clay soil there were four replicates using Marcy and on pumice soil three replicates of Haida. New canes were counted, measured and fresh weights, cut to ground level, were taken in April.

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The effect of oxyfluorfen (Goal) and oxadiazon (Ronstar) applied over the canes at bud burst was measured in another trial. Canes were left uncovered, covered entirely or covered top half only with paper cylinders before herbicide application. Covers were removed immediately after treatment. There were three replicates using the variety Haida.

RESULTS

HHRS Site

On the clay soil all treatments reduced weed cover (mainly black nightshade (*Solanum nigrum*), fathen (*Chenopodium album* agg) and *Amaranthus* species). Treatments showing significantly better weed control than simazine (Simazol 4A) (2 kg ai/ha) are indicated on Table 1. A third assessment in late April confirmed the January result except for an increase in weeds in the terbuthylazine (Gardoprim) treatments. Terbacil (Sinbar) gave the best weed control throughout.

Best raspberry growth and yield followed treatment with terbacil (2 kg ai/ha) and the lower two rates of terbumeton + terbuthylazine (Caragard), while terbuthylazine alone also gave good results. Atrazine (Actazine) depressed fruit yield and gave significantly less cane diameter than the better treatments.

TABLE 1: Effect of herbicides on weed control, raspberry cane growth and fruit yield on clay soil, HHRS.

Treatment	Rate (kg ai/ha)	% Weed cover		Cane growth 1st yr		Fruit yield (t/ha)
		29.11.83	18.1.84	ht (cm)	diameter (mm)	
untreated		83	98	143	11.4	4.1
simazine	2.0	21	45	145	12.2	5.0
simazine	3.0	4	33	154	12.7	5.8
simazine	4.0	8	21†	149	13.0*	5.7
terbacil	1.0	3	12†	158	12.7	5.5
terbacil	2.0	1†	2†	162*	13.9*	6.6*
terbacil	3.0	0†	1†	156	12.7	4.7
terbumeton +	2 + 2	3	13†	154	12.8*	6.7*
terbuthylazine	3 + 3	2†	5†	161*	13.2*	5.8
terbuthylazine	4 + 4	5	17†	154	12.0	5.0
terbuthylazine	3.0	1†	2†	155	13.1*	6.2
terbuthylazine	6.0	5	7†	162*	13.7*	6.0
atrazine	1.5	7	29	150	11.2	3.2
atrazine	3.0	2†	10†	156	11.8	3.4
LSD 5%				18	1.4	2.2

Raspberries planted 6 – 8.7.83

Simazine, terbacil and terbumeton + terbuthylazine applied 28.7.83; — irrigated 5.8.83
Terbutylazine applied 1.9.83; Atrazine applied 7.10.83

*significantly different from untreated at 5% level; † significantly different from simazine (2.0 at 5% level on arcsin transformed data, actual data shown).

Paki Paki Site

On pumice soil the primary weed problem, nettle (*Urtica urens*) was well controlled by all treatments. At 8 weeks after application most treatments except oxadiazon were still giving satisfactory weed control (Table 2) but by 15 weeks the oxyfluorfen and oxadiazon plots were overrun by chickweed (*Stellaria media*) and speedwell (*Veronica sp*). Regrowth Scotch thistle (*Cirsium vulgare*) occurred in all treatments except the high rate of terbumeton + terbuthylazine. White clover (*Trifolium repens*) also occurred on all plots with best control given by terbacil and terbumeton + terbuthylazine. The high rate of simazine resulted in the best cane growth. Terbumeton + terbuthylazine at the high rate, was very damaging to cane growth. The lack of cane vigour following

TABLE 2: Effect of herbicides on weed control and raspberry cane growth on pumice soil at Paki Paki.

Treatment	Rate (kg ai/ha)	% Weed Cover		Old cane† 10.10.83 Vigour	New Cane 21.3.84†		
		10.10.83	30.11.83		No.	Ht (cm)	Vigour
untreated		90	100	5.7	11	75	4.7
simazine	1.5	23	38	6.0	17	73	5.3
simazine	3.0	20	1	4.7	18	102*	8.3*
terbacil	1.0	17	30	6.0	19	85	6.3
terbacil	2.0	4	3	5.7	17	88	7.3
terbumeton + terbuthylazine	1.5 + 1.5	8	27	4.3	17	70	4.8
terbumeton + terbuthylazine	3.0 + 3.0	7	17	3.7*	2	50	1.2*
oxyfluorfen	0.75	17	87	5.0	15	80	4.7
oxyfluorfen	1.5	15	97	5.0	12	68	3.7
oxadiazon	1.0	55	93	5.7	13	82	4.5
oxadiazon	2.0	43	100	4.7	10	75	4.3
LSD 5%				1.6	9	27	3.5

Raspberries planted 17.8.83, treated 18.8.83

† vigour 0-10 scale; 0 = dead; 10 = vigorous; No. = No. primary canes/2 m plt

* significantly different from untreated at 5% level

TABLE 3: Effect of herbicides and watering regimes on raspberry cane growth.

Treatment (kg ai/ha)	Water Regime	New Cane Growth					
		No./Plot		Mean Ht. (cm)		Wgt. (g)/plot	
		Site 1	Site 2	Site 1	Site 2	Site 1	Site 2
Simazine (3.0)	L	5.0	9.3	87	59	423	477
	M	6.3		72		385	
	H	5.0	11.7	89	65	445	680
Terbacil (2.0)	L	6.3	9.7	100	65	783	487
	M	5.5		93		578*	
	H	6.5	8.7	82*	61	545*	500
Terbumeton + Terbuthylazine (3.0 + 3.0)	L	7.3	7.7	88	41	590	217
	M	5.3		88		463	
	H	5.5	3.7	73	17*	355*	47*
Oxyfluorfen (1.5)	L	13.5	12.3	56	45	485	273
	M	15.3		60		618	
	H	13.8	12.7	56	52	483	353
Oxadiazon (2.0)	L		8.3		58		350
	H		9.7		61		460
LSD 5%		2.9	6.4	18	16	195	321

Site 1

Four replicates of Marcy on clay soil.

L = basic rain/irrigation from planting (5.8.83) to 2.12.83 = 211 mm

M = additional 105 mm in 6 applications (weekly)

H = additional 180 mm in 2 applications (monthly)

Site 2

Three replicates of Haida on pumice soil.

L = basic rain/irrigation from planting (17.8.83) to 2.12.83 = 195 mm

H = additional 185 mm in 4 applications (2 weekly)

oxyfluorfen and oxadiazon was probably due to poor weed control. Terbacil was consistently good.

Watering Trial

Additional water on clay soil had some effect on the activity of terbacil (cane height and weight) and terbumeton + terbuthylazine (cane weight). Though high watering reduced cane height within the terbacil treatment, the least cane growth from terbacil was still as good as that from simazine and terbumeton + terbuthylazine (Table 3). On the pumice soil terbumeton + terbuthylazine was very damaging especially under the high water regime. Oxyfluorfen increased the cane number but reduced cane height relative to other treatments.

The trial with oxyfluorfen and oxadiazon at bud burst showed no lasting effect from the herbicides applied to the buds. Initial observations showed some distortion of the buds actually contacted by herbicide but fruit yields and subsequent new cane growth was not affected.

DISCUSSION

Good weed control in the first year of planting had a significant effect on cane development and subsequent fruiting. Newly planted raspberries showed good tolerance to quite high rates of simazine and terbacil on both clay and pumice soils even under a high watering regime. Terbumeton + terbuthylazine was damaging on pumice soil and the company will not be recommending its use on raspberries (T.M. Patterson pers. comm.). Terbuthylazine alone may be safe on light soils since it is not as readily leached as terbumeton (Anon. 1975).

The high LSD values for cane growth and yield data on the main trial (Table 1) resulted from inconsistent varietal responses to different herbicides and indicate that there may be varietal-herbicide interactions. This needs further investigation.

Oxyfluorfen and oxadiazon were tested because they are reported to remain on the soil surface (Dolby 1982; Paulo *et al* 1979) and might reduce the problem of leaching of herbicides in light soils. However, on the Paki Paki site they did not control the weeds present (mainly chickweed, speedwell, white clover and Scotch thistle). Raspberry tolerance to oxadiazon appeared satisfactory but oxyfluorfen increased the number of new canes (an undesirable factor) and reduced cane height.

Atrazine is recommended in UK (Fryer and Makepeace 1978) on newly planted raspberries as being more effective than simazine under dry conditions and having better post-emergent activity on weeds. In this trial it proved too damaging to the raspberries but in an attempt to test post-emergent activity on weeds it was applied too late for raspberry tolerance.

This work indicates that raspberries in Hawkes Bay can tolerate simazine up to 3 kg ai/ha and terbacil to 2 kg/ha. Weed control was more reliable from terbacil but simazine may be considered more cost efficient.

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