WEED CONTROL IN SQUASH AND WATER-MELONS IN HAWKE'S BAY

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SUMMARY

Herbicide trials were conducted on squash (*Cucurbita maxima*) and water-melons (*Citrullus vulgaris*) in Hawke's Bay. Best treatments for squash were cyanazine, cyanazine + trifluralin, cyanazine + napropamide and napropamide. Combinations involving alachlor were damaging to squash although they gave the best weed control. No treatment gave adequate weed control in water-melons. Best initial water-melon growth followed treatment with trifluralin + alachlor or trifluralin + cyanazine. Irrigation immediately before or after herbicide application did not affect sensitivity of squash to any herbicide tested but did affect water-melons. Both squash and water-melons showed some differential varietal sensitivity to herbicides.

INTRODUCTION

Squash is an important export vegetable, with Japan as the main market. Most export squash are grown in the Pukekohe area but there is increasing interest in Hawke's Bay which produced about 10% of the national total last year. Water-melons and rock-melons (*Cucumis melo*) also have a potential for export.

All these crops are sensitive to weed competition and weed control presents a major problem to the grower. Most weed control research has been done in the north and west of New Zealand (Cox 1982; Rahman *et al* 1985; Scheffer and Wood 1985; Wilson 1979) where climate and soils are different from those in Hawke's Bay.

Preliminary work at the Hawke's Bay Agricultural Research Centre (HBARC) in 1984 confirmed work by Rahman *et al* (1985) which showed that single herbicides such as alachlor or chloramben were unable to provide adequate, safe weed control for squash. It also indicated a marked difference in the sensitivity of water-melons to alachlor depending on whether application was to wet ground or to dry ground followed by irrigation. There also appeared to be a difference in sensitivity to chloramben between varieties of water-melons.

This paper reports work at HBARC which tested combination herbicide treatments on squash and water-melon, as used by Rahman *et al* (1985) and Scheffer and Wood (1985) as well as the New South Wales Department of Agriculture recommendation of napropamide. Another trial was also conducted to investigate the effect of irrigation before or after herbicide application on squash, water-melons and rock-melons.

METHODS

Trial 1 tested the herbicides shown in Table 1 on two varieties of squash, Delica and Golden Debut, with green and orange fruit respectively. Ten seeds per plot were planted in pairs 50 cm apart, in rows 1.5 m apart. Later, pairs were singled by cutting the smaller of each pair at ground level and weighing the plant. Each herbicide plot was 7 m long extending over two plots, one of each variety of squash, with a 1 m space between plots. There were five replicates. Varieties were planted alternately so that each variety was flanked at either end and either side by the other coloured variety. This assisted sorting the fruit at harvest.

Trial 2, similar in design to Trial 1, used three varieties of water-melons. However since the fruit were not easily distinguishable, the three varieties, Sugar Baby, Sugarich and Klondyke were planted in a random order in each plot.

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TABLE 1: Effect of herbicide treatments on weed control and yield of two varieties of squash.

Treatment kg ai/ha	Rate (kg ai/ha)	% weed control visual rating	Plant green wt (g) 13.12.85		Squash yield/plot			
			Delica	Golden Debut	Delica No.	kg	Golden Debut No.	kg
hand weeded once	11.12.85	—‡	32	38	8.4	14.5	8.0	11.3
cyanazine	0.75	0	24	33	5.8	9.4*	5.4*	6.8*
cyanazine	1.50	62	38	39	8.0	12.8	7.2	10.2
napropamide	2.0 ppsi ¹	22	35	40	7.6	13.2	6.8	9.8
trifluralin	0.5 ppsi	86	9*	15*	5.4*	7.8*	6.2	7.6*
+ alachlor	2.0							
trifluralin	0.5 ppsi	44	36	43	8.4	13.7	7.4	10.5
+ cyanazine	0.75							
cyanazine	0.75	10	39	35	7.0	11.9	7.0	9.8
+ napropamide	1.0							
alachlor	2.0	66	20	13*	6.4	10.9	6.0*	7.6*
+ chloramben	4.0							
alachlor +	2.0	98	9*	5*	6.2	9.4*	5.0*	5.2*
chlormethazole	2.0							
alachlor	2.0	86	15*	8*	6.4	9.7	4.4*	5.8*
+ cyanazine	0.75							
alachlor	2.0	72	9*	16*	4.8*	7.7*	5.6*	7.0*
+ napropamide	1.0							
LSD 5%			14.1	13.8	2.67	5.06	1.94	3.03

‡ weed No./m² untreated 145 black nightshade (*Solanum nigrum*), 28 redroot (*Amaranthus powelli*), 12 fathen (*Chenopodium album*).

* significantly different from hand weeded ppsi¹ = pre-plant soil incorporated
Products used:— alachlor, Shell Alachlor; chloramben, Amiben; chlormethazole, Probe; cyanazine, Bladex; napropamide, Devrinol; trifluralin, Treflan.

Trials 1 and 2 were treated on 12.11.85 except for pre-plant soil incorporated treatments which were applied 7.11.85. Squash was planted on 8.11.85 and water-melons on 11.11.85. Eight mm of rain fell on 13.11.85.

Trial 3 was designed to test the effect of irrigation before or after herbicide application. Ten seeds each of squash (Delica) rock-melon (Hales PMR) and water-melon (Sugar Baby) were planted on 22.11.85 in small plots defined by two rings cut from 200 litre drums. Each ring, 40 cm deep, was driven 20 cm into the ground. A pair constituted a herbicide plot with 2 m between plots. Plots were in six short rows and covered by polythene tunnels to exclude rain. On 25.11.85, 30 mm of irrigation was applied to one ring of each paired plot. Herbicides (Table 3) were then sprayed over the plots followed by 30 mm irrigation to the second ring of each pair. Two weeks later all plots were given 10 mm irrigation and a week later the covers were removed.

There were four replicates of each herbicide treatment. Seedling emergence was recorded and plants were harvested for green weight on 20.12.85 for squash and 20.1.86 for melons.

All herbicides were applied by precision sprayer in 220 litres/ha at 230 kPa.

RESULTS AND DISCUSSION

Best weed control in Trial 1 was given by alachlor + chlormethazole, with reasonable control given by trifluralin + alachlor, alachlor + cyanazine followed by alachlor + napropamide, alachlor + chloramben and trifluralin + cyanazine (Table 1). However, all treatments involving alachlor significantly depressed squash yield. This

TABLE 2: Effect of herbicides on seedling number and mean green weight (G.W.) on 6.1.86 of three varieties of water melon.

Treatment	% weed control visual rating 17.12.85	Sugar Baby		Sugarich		Klondyke		Mean all varieties	
		No.*	G.W.	No.	G.W.	No.	G.W.	No.	G.
untreated	‡	5.0	127	2.0	15	2.4	95	3.1	79
cyanazine 0.75	40	8.2	40	3.6	96	4.4	61	5.4	66
cyanazine 1.50	42	3.8	69	1.6	86	3.6	51	3.0	69
napropamide 2.0 ppsi	40	3.4	39	2.8	78	4.2	30	3.5	49
trifluralin 0.5 ppsi + alachlor 2.0	89	4.2	150	2.2	224	5.2	178	3.9	184
trifluralin 0.5 ppsi + cyanazine 0.75	81	6.4	132	2.8	153	6.2	175	5.1	153
cyanazine 0.75 + napropamide 1.0	44	5.4	67	2.4	73	5.2	110	4.3	83
alachlor 2.0 + chloramben 4.0	81	1.4	40	2.0	30	1.4	76	1.6	48
alachlor 2.0 + chlormethazole 2.0	96	3.2	69	2.0	51	2.4	70	2.5	63
alachlor 2.0 + cyanazine 0.75	86	5.0	96	1.6	71	4.0	140	3.5	102
alachlor 2.0 + napropamide 1.0	76	4.6	118	2.2	15	5.4	105	4.1	79
LSD 5%								2.3	69.5

*No. of plants from 10 seeds

‡Weeds No./m² untreated 124 black nightshade, 210 redroot, 23 fathen.

is in contrast to results from Pukekohe (Scheffer and Wood 1985), Waikato (Rahman *et al* 1985) and Levin (Cox and Ingle 1984) where alachlor was considered the safest, and the best basis for combination treatments. Golden Debut was more sensitive than Delica.

The best squash yields resulted from a single hand weeding, trifluralin + cyanazine, cyanazine at 1.5 kg ai/ha, napropamide, and cyanazine + napropamide treatments. The green weight of the thinned-out plants showed the same response as final fruit yield to all treatments except cyanazine 0.75 kg ai/ha in which fruit yield was depressed. This was probably due to poor weed control which had not been a serious problem at time of thinning.

Some treatments gave good initial weed control on the water-melon trial (Table 2). However, lack of competition from water-melons allowed surviving weeds to dominate and the trial was abandoned on 6.1.86 after harvesting the plants and recording their green weights. Germination was unreliable, especially for Sugarich and untreated Klondyke. Best germination followed treatment with cyanazine (low rate), trifluralin + cyanazine, cyanazine + napropamide and alachlor + napropamide. The mean green weights indicate relatively good tolerance to trifluralin + alachlor and trifluralin + cyanazine with a significantly increased green weight over untreated. Sugar Baby and Klondyke gave similar responses to all treatments but Sugarich was more variable and its germination was significantly lower than the other two varieties.

Weed control in water-melons is more difficult than in squash because the plants are less vigorous and are unable to take advantage of the degree of weed control given. The good initial growth following moderate weed control obtained with trifluralin + alachlor or trifluralin + cyanazine showed promise. Had these treatments had the assistance of a single hoeing they may have produced a crop.

TABLE 3: Effect of irrigation before or after herbicide application on green weight per plot after 30 days (squash) and 60 days (melons).

Herbicide	Rate (kg ai/ha)	Squash		Water melon		Rock melon‡	
		Pre- watered	Post- watered	Pre- watered	Post- watered	Pre- watered	Post- watered
untreated		94	94	229	133	19	27
alachlor	2.0	89	102	146*	293	20	36
chloramben	5.0	115	151	377	171*	80	82
chlormethazole	2.0	152	154	673	473*	47	88
napropamide	2.0	127	142	258	281	45	37
cyanazine	1.5	126	129	392	386	52	74
LSD 5% between Pre- and post-watering		44.4		100			
LSD 5% between herbicides		53.5		145			

‡Green weight/plant

*Significantly affected by watering time

In the irrigation trial (Trial 3) no herbicide whether watered before or after application, had any significant effect on germination of squash or water-melons. Rock-melon germination was very low and variable so little can be concluded from these results.

Squash green weight was not affected by time of watering or depressed by any of the herbicide treatments (Table 3). Chlormethazole gave highest green weights in squash and water-melon. Water-melon green weight was significantly affected by time of watering when treated with alachlor, chloramben and chlormethazole. Green weight was reduced by the latter two when watered after application compared with pre-treatment irrigation, and by alachlor applied to wet soil. Napropamide and cyanazine were unaffected by watering.

CONCLUSION

Weed control is still a major problem in growing squash and melons. The climate and soil conditions in Hawke's Bay appear to differ from Pukekohe and Waikato so recommendations cannot be extrapolated from one area to the other. For Hawke's Bay, treatments based on combinations of trifluralin, cyanazine and napropamide show promise for squash. The greater sensitivity shown by Golden Debut than the standard Delica means new varieties may need individual testing.

Chemical weed control is still unsatisfactory for direct seeded melons. Trifluralin + alachlor or trifluralin + cyanazine were of some use and may be satisfactory in conjunction with a hand weeding. The erratic germination made trial work very difficult and is a problem needing further investigation.

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REFERENCES

- Cox, T.I., 1982. Herbicides in commercial vegetable crops Aglink HPP 78, Media Services, MAF, Wellington.
- Cox, T.I. and Ingle, A., 1984. Developing herbicide treatments for squash. *Proc. 37th N.Z. Weed and Pest Control Conf.*: 175-178.
- Rahman, A., James, T.K. and Mortimer, J., 1985. Control of weeds in squash. *Proc. 38th N.Z. Weed and Pest Control Conf.*: 135-138.
- Scheffer, J.J.C. and Wood, R.J., 1985. Re-evaluation of three pre-emergence herbicides for buttercup squash at Pukekohe. *Proc. 38th N.Z. Weed and Pest Control Conf.*: 139-141.
- Wilson, G.J., 1979. Weed control and crop tolerance in cucurbits. *Proc. 32nd N.Z. Weed and Pest Control Conf.*: 123-127.