INSECTICIDAL CONTROL OF SPOTTED ALFALFA APHID

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SUMMARY

Eight insecticides were tested at various rates against spotted alfalfa aphid (*Therioaphis trifolii* f. *maculata*) on lucerne in three trials conducted at Te Puke and Huntly during 1983 and 1984. Acephate (95 g ai/ha), chlorpyrifos (75 g ai/ha), deltamethrin (1.5 g ai/ha), demeton-S-methyl (25 g ai/ha), dimethoate (30 g ai/ha), fenvalerate (12.5 g ai/ha), maldison (500 g ai/ha) and pirimicarb (65 g ai/ha) gave significant control for 1 month. Acephate, demeton-S-methyl, and pirimicarb had a quicker action than chlorpyrifos, dimethoate and maldison whilst, deltamethrin and fenvalerate had a delayed effect relative to the other insecticides.

INTRODUCTION

Spotted alfalfa aphid (SAA) was discovered near Auckland in April 1982. It has extended its range southeastwards as far as Edgecumbe and Rotorua. It has not yet established in any of the major lucerne growing areas of New Zealand (Rohitha *et al* 1983).

Seven biotypes of SAA have been identified in USA. Biotypes differ in their response to both insecticides and cultivars of lucerne (Nielson *et al* 1970, Nielson and Kuehl 1982). The biotype(s) present in New Zealand such as the central North Island, although such information is highly pertinent to development of controls against SAA.

Several lucerne growing areas in New Zealand such as the central North Island, Hawkes Bay, Marlborough and Canterbury have the necessary environmental conditions for a rapid population build-up (authors' unpublished information). The screening trials reported in this paper were undertaken because insecticidal controls for SAA have not been evaluated under New Zealand conditions, and there is a need to have sound recommendations available when this pest reaches the major lucerne growing areas. Insecticidal control of SAA has been well investigated in Australia (Brownlee *et al* 1979, Broadley *et al* 1980, Turner and Franzman 1981). The provisional rates recommended by Manson (1981) to use against SAA if it established in New Zealand are considerably above the rates required to give good control in Australia with chemicals such as demeton-S-methyl, dimethoate, pirimicarb and thiometon. Generally the rates recommended by Manson (1981) for SAA control are within the range established for bluegreen aphid (*Acyrtosiphon kondoi*) (BGA) in New Zealand (Anonymous 1977).

Insecticides from a range of chemical groups known to be effective against either BGA in New Zealand or SAA in Australia were chosen for evaluation.

METHODS

The experiments were conducted as three field trials at Te Puke in April 1983 and Huntly in March and April 1984. Eight insecticides were screened in each trial (Tables 1, 2 and 3). The treatments were applied to 10 x 2.5 m plots, arranged in randomised blocks on SAA infested lucerne. Trials 1 and 2 included three replicates while Trial 3 had four. All of the chemicals were applied with a hand held sprayer, fitted with Spraying Systems flat fan nozzles (No. 730134) on a 2.4 m boom, at 210 kPa in 300 litres/ha. The aphids were sampled with a 210 mm diameter suction sampler. Five random samples were taken within each plot and the contents bulked. The samples were examined in the laboratory with the aid of a binocular microscope and all aphids identified and natural enemies counted.

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Two or three rates of each chemical were evaluated in Trials 1 and 2 (Tables 1 and 2). The most promising insecticides revealed in the first two trials were evaluated at lower rates in Trial 3 (Table 3). Maldison was included at the original rates as a standard for purposes of comparison. All counts were transformed ($\log_e (x + 1)$) for statistical analyses.

RESULTS AND DISCUSSION

The results for Trials 1 and 2 are presented in Tables 1 and 2. All of the insecticides evaluated gave acceptable control of SAA for up to 4 weeks. Although the results varied between the two trials, consistent trends were evident. The occasional variation in significance between chemicals and rates in the two trials may be due to sampling error. Most of the lower rates evaluated were significantly different from the controls. All of the chemicals other than the synthetic pyrethroids, deltamethrin and fenvalerate, were effective within a day of when treatments were applied. The effect of pyrethroids was not noticeable until 3 days after spraying (Tables 1 and 2).

The results of the third trial are presented in Table 3. With the exception of pirimicarb, all of the lower rates used for the other chemicals gave effective control for at least 31 days. There was a trend for the lower rates of the insecticides evaluated to give lower levels of control.

In summary, the following treatments gave effective control of SAA at the levels of infestation encountered: acephate (95 g ai/ha), chlorpyrifos (75 g ai/ha), deltamethrin (1.5 g ai/ha), demeton-S-methyl (25 g ai/ha), dimethoate (30 g ai/ha), fenvalerate (12.5 g ai/ha), maldison (500 g ai/ha) and pirimicarb (65 g ai/ha). Most of the chemicals were effective for 4 weeks. These rates are comparable to those used in Australia.

TABLE 1: Trial 1. Comparison of insecticides applied at various rates for control of spotted alfalfa aphid[†] (No./m²) at Te Puke.

Insecticide	Rate g ai/ha	Days after treatment				
		1	3	7	14	28
acephate	190	403	26	7	2	1
(Orthene 75)	380	189	18	6	2	1
chlorpyrifos	150	62	42	1	2	4
(Lorsban 40 EC)	300	110	59	6	2	3
deltamethrin	3	206	180	70	11	1
(Decis 2.5 EC)	6	358	166	56	5	2
demeton-S-methyl	50	55	16	3	5	12
(Metasystox (i))	100	49	8	2	2	4
"	200	75	15	4	2	4
dimethoate	60	139	35	3	4	3
(Roger E)	120	457	22	3	6	4
"	240	162	6	4	2	3
fenvalerate	25	289	237	37	22	1
(Sumicidin 10)	50	322	183	23	3	2
maldison	250	365	54	19	10	33
(Yates Maldison 50)	500	91	26	7	4	9
pirimicarb	65	63	13	4	4	2
(Pirimor 50)	130	83	16	4	3	4
"	260	57	9	2	3	3
Untreated	-	492	299	181	137	116
LSR 5%		3.01	3.45	5.20	5.69	4.98
1%		4.38	5.24	9.05	10.20	8.53

[†] Backtransformed means

Although not documented in this paper, BGA was controlled well by all of the above chemicals at the same rates effective against SAA. Unfortunately pea aphid numbers were too low to allow assessments to be made. The same recommendations should be used for both BGA and SAA. It should be noted however, that these conclusions are based on trials with low levels of infestation. If insecticides were applied to lucerne heavily infested with aphids higher rates may be necessary.

The effects of the insecticides applied at different rates on the survival of natural enemies was not clear in these trials, due to the low numbers of predators and parasites present.

TABLE 2: Trial 2. Comparison of insecticides applied at various rates for control of spotted alfalfa aphid[†] (No./m²) at Huntly.

Insecticide	Rate g ai/ha	Days after treatment				
		1	3	7	13	27
acephate	190	57	13	19	32	19
„	380	134	19	19	19	19
chlorpyrifos	150	185	32	13	57	229
„	300	248	19	19	51	64
deltamethrin	3	344	57	32	70	38
„	6	127	32	25	58	153
demeton-S-methyl	50	76	51	32	102	178
„	100	102	13	19	57	95
„	200	89	25	19	57	76
dimethoate	60	38	19	13	32	102
„	120	108	13	25	25	140
„	240	45	13	25	32	64
fenvalerate	25	331	159	197	38	102
„	50	586	64	51	45	64
maldison	250	95	13	38	95	166
„	500	83	25	19	76	64
pirimicarb	65	185	19	38	102	108
„	130	57	25	19	51	76
„	260	89	13	13	25	51
Untreated	-	1108	579	751	172	497
LSR 5%		3.80	3.58	4.69	2.89	2.44
1%		6.07	5.65	8.06	4.18	3.33

[†] Backtransformed means

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TABLE 3: Trial 3. Effect of lower rates of insecticides on spotted alfalfa aphid[†] (No./m²).

Insecticide	Rate g ai/ha	Days after treatment				
		3	10	17	24	31
acephate	95	28	19	13	13	13
"	190	32	13	13	25	19
chlorpyrifos	75	25	25	19	25	46
"	150	19	32	2	46	32
deltamethrin	1.5	159	140	25	57	13
"	3.0	159	45	19	13	13
demeton-S-methyl	25	70	108	64	76	57
"	50	45	76	57	83	57
dimethoate	30	64	32	38	64	32
"	60	25	57	32	25	57
fenvalerate	12.5	57	32	25	25	19
"	25.0	70	45	19	19	19
maldison	250	51	70	25	57	83
"	500	32	25	6	13	25
pirimicarb	32.5	19	19	19	19	64
"	65.0	19	19	19	19	19
Untreated	-	382	828	331	204	172
LSR 5%		2.75	2.75	2.56	2.77	2.87
1%		3.92	3.92	3.56	3.96	4.16

[†] Backtransformed means**REFERENCES**

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