CONTROL OF APHIDS IN TOMATOES AND BRASSICAS WITH PYMETROZINE

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SUMMARY

Two trials were carried out in tomatoes and brassicas for the control of aphids (*Myzus persicae*, *Macrosiphum euphorbiae* and *Brevicoryne brassicae*) with pymetrozine. In tomatoes pymetrozine was applied at 50, 75 and 100 g/ha and compared with taufluvalinate at 37.5 g/ha. In brassicas pymetrozine was applied at 100, 200 and 300 g/ha and compared with pirimicarb at 125 g/ha. Neither pymetrozine at the rates tested nor the standard demonstrated any significant efficacy against alate aphids on either crop. In tomatoes pymetrozine applied at 100 g/ha on a 14-21 day interval gave control of apterous aphids comparable with the standard. In the brassica trial pymetrozine at all rates was comparable with the standard insecticide.

Keywords: aphids, pymetrozine, tomatoes, brassicas

INTRODUCTION

Aphids are a pest in tomato and brassica crops, with their ability to act as vectors for viruses elevating their importance. Current control practices are based on the use of either synthetic pyrethroids or organophosphate insecticides. The current move towards Integrated Pest Management (IPM) programmes in vegetable crops necessitate the use of more selective chemicals that allow the naturally occurring and introduced biological control agents to survive. Pymetrozine (CGA 215944) was first reported in New Zealand by Follas (1993) for the control of green peach aphid (*Myzus persicae*) in stonefruit. Pymetrozine is a selective compound with activity specifically against homopterous pests. Flückiger *et al.* (1992) reported that pymetrozine is harmless to natural enemies and therefore especially useful in combination with biological control agents in IPM programmes. Pymetrozine is rated as a Class 1 pesticide i.e. harmless according to the International Organisation for Biological and Integrated Control scale (Sechser 1993).

This paper reports on two trials carried out to evaluate the efficacy of pymetrozine against aphid pests in tomatoes and brassicas.

METHODS

Tomatoes

The trial was carried out in the Hawkes Bay region on the process tomato variety Morse when the plants were 15 cm high, with six leaves/stem and aphids were present in sufficient and evenly distributed numbers. A randomised complete block design of four replicates with plots of 3 x 10 m (three beds) was used. Two applications were made 14 days apart using a CO₂ pressurised backpack precision sprayer in the equivalent of 500 litres of water/ha at 204 kPa. Pymetrozine (Chess 25 WP) was evaluated at three rates viz. 50, 75 and 100 g/ha and compared with a standard treatment of taufluvalinate (Mavrik Aquaflow) at 37.5 g/ha and an untreated control. Applications were made on 10 November and 24 November 1993. Assessments for efficacy were made by counting the number of alate and apterous aphids/leaf pre-application and 7, 14 and 21 days after the second application. Five leaves/plant were taken pre-application and 15 leaves/plant at 7, 14 and 21 days after treatment on a total of 10 plants/plot. Aphid numbers and species composition were determined. The

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results were analysed using ANOVA with mean separation by Duncan's multiple range test.

Brassicas

The trial was carried out in the Pukekohe region, on the cabbage variety Gourmet. The trial was a randomised complete block design of four replicates and a plot size of 3 x 5 m. Pymetrozine was applied at 100, 200 and 300 g/ha and compared with the standard pirimicarb (Pirimor 50) at 125 g/ha and an untreated control. A total of two applications were made, the first on 28 December and the second 13 days later on 10 January 1994. Applications were made using a CO₂ pressured backpack precision sprayer in the equivalent of 800 litres of water/ha at 300 kPa. The trial commenced at the first sign of aphid presence when the plants had 6 to 8 true leaves. Assessments were made on the number of alate and apterous aphids/plant pre-application and at 7 day intervals after the second application for a total of three assessments (21 days). At each assessment visual counts and identification of the aphids were made *in situ* on five plants/plot. The results were analysed using ANOVA with mean separation by Duncan's multiple range test.

RESULTS

Tomatoes

Two aphid species were identified in this trial, green peach aphids (*Myzus persicae* Sulzer) and potato aphid (*Macrosiphum euphorbiae* Thomas). There was no difference in the efficacy of the insecticides against the two species.

All insecticide treatments significantly reduced the apterous aphid population (Table 1) at all assessments compared with the untreated ($P < 0.01$). There was no significant difference between the three rates of pymetrozine until the final assessment 21 days after treatment when the greater residual activity at the high rate gave better control than the lower rates. Pymetrozine applied at 100 g/ha gave equivalent control to the standard taufluvalinate at all assessments. Alate aphid numbers were also counted at each assessment. No insecticide treatment significantly reduced the number of alate aphids at any assessment compared with the untreated plots. This indicates a lack of repellency from either the pymetrozine or taufluvalinate treatment on the mobile stages of the aphid life cycle.

TABLE 1: Mean percentage control of apterous aphids on tomatoes determined at weekly intervals after the second of two applications.

Treatment	Rate (g ai/ha)	DAT	% control of aphids				
			7	14		21	
pymetrozine	50		95 A ¹	80 A		59 cC	
pymetrozine	75		96 A	85 A		73 bB	
pymetrozine	100		96 A	81 A		87 aA	
taufluvalinate	37.5		95 A	87 A		87 aA	
untreated			0 B	0 B		0 dD	
(No. aphids/leaf)			(3.1)	(2.2)		(2.0)	

¹Any two means in a column followed by the same letter are not significantly different $P < 0.05$ (lower case), $P < 0.01$ (capitals).

Pymetrozine applied at 100 g/ha on a 14-21 day interval will give a high level of aphid control comparable with the standard synthetic pyrethroid.

Brassicas

The aphid species present in the brassica trial was the cabbage aphid (*Brevicoryne brassicae* (L.)).

All insecticide treatments reduced the apterous aphid numbers/plant at all assessments compared with the untreated ($P < 0.01$). There was no significant difference between the three rates of pymetrozine at any assessment although the lowest rate of pymetrozine (100 g) had noticeably higher aphid numbers and lower levels of control at the last assessment. All three rates of pymetrozine gave levels of control which were comparable to the standard aphicide pirimicarb. No insecticide treatment significantly reduced the alate aphid number/plant compared with the untreated plots. As in the tomato trial this was due to the high mobility of the pest and lack of repellency effect from the compounds tested.

TABLE 2: Mean percentage control of apterous cabbage aphid on brassicas determined at weekly intervals after the second of two applications.

Treatment	Rate (g ai/ha)	DAT	% control of aphids			
			7	14	21	
pymetrozine	100		100 A	98 abA	84 A	
pymetrozine	200		100 A	98 abA	99 A	
pymetrozine	300		100 A	97 bA	95 A	
pirimicarb	125		100 A	100 aA	98 A	
untreated	-		0 B	0 cB	0 B	
(No. aphids/plant)			(25)	(69)	(82)	

Pymetrozine applied at 200 g/ha when aphids are present will give a high level of control and good residual activity comparable with the standard pirimicarb.

CONCLUSIONS

Pymetrozine applied to brassica and tomato field crops for control of aphids will give a high and acceptable level of control which is comparable to the current standard insecticides. This high level of efficacy, along with its harmlessness to beneficials, makes it an ideal compound for inclusion in both standard spray programmes and developing integrated pest management programmes in vegetables.

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