CONTROL OF EUROPEAN RED MITE IN APPLE ORCHARDS

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Summary

During the 1976-1978 seasons 17 acaricides were tested against European red mite (*Panonychus ulmi*) (ERM) in six trials on apples at Levin HRC. When applied during spring amitraz, ZR-856, cyhexatin, dialifos, fenvalerate, GCP-5126, PP-199, propargite, triazophos and azocyclotin gave significant control for 6 weeks whereas azinphos-methyl and RE-20996 failed. Single summer applications of benzoximate, cyhexatin, dialifos, dinobuton, fenvalerate, methamidophos, oxamyl, PP-199, propargite and azocyclotin all gave good control of ERM while benzoximate, dialifos, methamidophos, omethoate, and propargite were superior to cyhexatin as late season sprays on 'Sturmers'.

INTRODUCTION

A recent survey of Nelson orchardists has shown that mite control is still one of the major problems in apple orchards and a considerable cost is incurred in keeping mite populations down (Penman and Ferro 1977). An attempt to reduce costs of mite control is evident in the recent trend towards integrated control (Wearing 1976), but in spite of this chemicals will play an important role for many years. At present the integrated control approach depends on the success of one chemical, cyhexatin, and should this fail to give control for any reason the integrated control system could be jeopardized. There are at present a number of new acaricides, some of which could be incorporated into integrated control programmes if necessary. This paper describes six field trials designed to test the efficacy of 17 acaricides against ERM at Levin HRC. Of these acaricides 12 did not have full registration at the time the trials took place.

METHODS

All trials were carried out on three-tree plots and acaricides were applied by hand lance to run-off, with no other chemicals being applied before or during the trials. Assessment of mite damage was made either by leaf counts (trials 1-5) or by fruit examinations (trials 4-6). For leaf counts 10 leaves were taken at random from the central tree of each plot and mite indices assessed according to the following scale:- 0 = no mites; 1 = one mite per leaf; 2 = 2-3 mites per leaf; 3 = 4-7 mites per leaf; 4 = 8-15 mites per leaf; 5 = 16-31 mites per leaf; 6 = 32-63 mites per leaf; 7 = 64+ mites per leaf. For fruit examinations 100 apples were picked from the central tree of each plot and the number of apples with mobile mites recorded.

Trials 1-3 were designed to test the effectiveness of materials applied during late spring; trials 4 and 5 had a single summer application; trial 6 had a late summer clean-up spray. The materials used and application dates are shown in Tables. Trials 1, 3 and 4 were on cv 'Red Delicious', trials 2 and 5 on 'Cox's Orange Pippin' and trial 6 on 'Sturmer'. In each trial a randomized block design with six replications of each treatment was used.

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TABLE 1: Effect of spring applications of acaricides.

Chemical	Rate g/100 litres	Mean mite index per leaf								
		Trial 1			Trial 2			Trial 3		
		3 weeks	6 weeks	9 weeks	3 weeks	6 weeks	9 weeks	3 weeks	6 weeks	9 weeks
amitraz	50	0.1 b	0.7 b	0.7 b				6.3 a	5.8 a	6.7 a
azinphos- methyl	50									
ZR-856	50				0.05 bc	0.1 b	0.1 c			
cyhexatin	20	0.1 b	0.0 b	0.3 b	0.02 c	0.03 b	0.2 c	1.7 b	0.5 b	0.0 c
dialifos	60				0.3 bc	1.0 b	1.6 bc			
fenvalerate	10	0.2 b	0.9 b	1.8 ab						
GCP-5126	45				0.02 c	0.05 b	0.4 c			
PP-199	25	0.04 b	0.06 b	0.3 b				0.7 b	0.0 b	0.0 c
propargite	60							1.7 b	1.0 b	0.0 c
RE-20996	50				0.7 b	1.9 a	2.9 ab			
triazophos	60				0.0 c	0.02 b	0.3 c			
azocyclotin	25				0.2 bc	0.02 b	0.6 c			
untreated		1.5 a	3.1 a	3.1 a	1.3 a	2.2 a	3.2 a	6.3 a	5.3 a	2.0 b

Trials 1 and 2 sprayed on 29.11.76 and 8.12.76.

Trial 3 sprayed on 17.11.77, 29.11.77 and 13.12.77.

* weeks after last spraying. Blank space indicates no application.

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RESULTS AND DISCUSSION

The results of spring applications of acaricides are shown in Table 1. For trials 1 and 2 the pre-treatment mite indices were low (0.7 and 0.8 respectively) and all materials gave adequate control for 6 weeks with the exception of RE-20996. Nine weeks after spraying mite numbers on fenvalerate and dialifos treatments were approximately double the pre-treatment figures but on cyhexatin, ZR-856, GCP-5126, PP-199, triazophos and azocyclotin treated plots the mite indices remained below the pre-treatment figures. Trial 3 had a high overall mite index (2.9) before the spray applications. Cyhexatin, PP-199 and propargite all gave excellent control whereas azinphos-methyl failed completely, due to resistance, and also because this chemical killed off the predatory ladybirds (*Stethorus bifidus*) which invaded the orchard during late January and early February. The recovery of untreated controls after very high mite infestations had caused leaf-bronzing resulted from the presence of large numbers of predatory ladybirds. Ladybirds were not found on the successful acaricide treatments, presumably because there was insufficient prey for them.

The effect of single summer applications are shown in table 2. All treatments reduced the mite index significantly after 3 weeks but at harvest, 6 weeks after spraying, dinobuton and amitraz failed to prevent significant mite infestation of fruit. Excellent control was obtained with benzoximate, cyhexatin, dialifos, fenvalerate, methamidophos, PP-199, propargite (trial 4 only) and azocyclotin, with treated trees yielding over 90% mite-free fruit.

TABLE 2: Effect of single summer application of acaricides on 2.2.77.

Chemical	Rate g/100 litres	Trial 4		Trial 5	
		3 weeks*	6 weeks**	3 weeks*	6 weeks**
amitraz	50			0.7 b	71 c
benzoximate	36	0.4 b	94 a		
cyhexatin	20			0.04 c	98 a
dialifos	60			0.08 c	92 ab
dinobuton	60	0.1 b	54 b		
fenvalerate	10			0.2 bc	95 ab
methamidophos	60	0.3 b	91 a		
oxamyl	24			0.5 bc	82 abc
PP-199	25			0.02 c	97 a
propargite	60	0.1 b	95 a	0.0 c	89 abc
azocyclotin	25			0.1 bc	99 a
untreated		2.5 a	44 b	1.3 a	76 bc

* mite index per leaf three weeks after spraying.

** % mite-free fruit at harvest, six weeks after spraying.

Note: Mean pre-treatment mite indices:- trial 4 1.6; trial 5 1.0.

Blank space indicates no application.

Table 3 shows the effect of single late season application of acaricides. The block had received no sprays at all during the season and at the time of spraying only 38% of the fruit was mite-free. All treatments gave some reduction in mite numbers on fruit after 2 weeks but after 4 weeks amitraz, cyhexatin, and dinobuton were not significantly better

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than the untreated control. Omethoate, propargite, methamidophos, dialifos and benzoximate all performed well.

TABLE 3: Effect of single late summer spray of acaricides on 14.3.77.

Chemical	Rate g/100	% decrease in No. of fruits with mites after	
		2 weeks	4 weeks
amitraz	50	86.0 a	88.0 abc
benzoximate	36	99.0 a	94.4 ab
cyhexatin	20	70.9 b	68.2 c
dialifos	60	98.2 a	94.7 ab
dinobuton	60	92.8 a	71.8 bc
methamidophos	60	98.3 a	94.9 ab
omethoate	58	100.0 a	99.4 a
propargite	60	98.0 a	99.0 a
untreated		48.5 c	64.5 c

CONCLUSION

The trials showed that a number of new acaricides are available which will give satisfactory control of ERM in apple orchards. The standard material, cyhexatin, gave very good results throughout, except as a late season spray, and should not be replaced by newer materials until definite signs of resistance occur. The trials also demonstrated that mite control is possible for at least 9 weeks with only two or three spring applications and at least 6 weeks with a single summer application if the initial mite numbers are low.

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REFERENCES

- Penman, D. R. and Ferro, D. N., 1977. Orchard pest control: A survey of Nelson pip-fruit orchardists. Lincoln University College of Agriculture Press, 42 pp.
- Wearing, C. H., 1976. A familiar problem and a novel solution. *N.Z. J. Agric.* 133 (2): 47-48.