CONTROL OF FRUIT PESTS WITH CARBOFURAN

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Summary

Carbofuran was assessed for the control of pests on pears and grapes. Sixteen g/100 litres carbofuran gave control of mealy bug (*Pseudococcus* sp) equivalent to parathion and generally better than aminocarb, diazinon, acephate and chlorpyrifos. Good control of light brown apple moth (*Epiphyas postvittana*) and leafcurling midge (*Dasyneura pyri*) was also obtained. European red mite was suppressed substantially but not entirely controlled. No phytotoxicity was observed.

INTRODUCTION

Mealy bugs (*Phenacoccus* spp. and *Pseudococcus* spp.) have been recognised as a pest of fruit tree crops almost since the beginning of fruitgrowing in this country.

The tolerance for mealy bug in export fruit is nil, hence it is important that a grower attain a high level of control. Resurgence of the pest in both Hawkes Bay and Nelson occurred around 1960 and again in the season just ended. This paper summarises the results of insecticide evaluation on pears and grapes over several seasons.

EXPERIMENTAL METHOD

All experiments were replicated using single tree plots for pears or a short length of row for grapes, usually between posts. Applications were made using a handgun operating at about 1000 kPa, and spraying the plots to the point of run-off. Guard rows were used as a precaution against drift from the grower's block. The trial areas were chosen because of their previous history, so that there was some certainty of infestation.

Pears 1969-70

Replicated six times on a block of William bon Chretien in Hastings, treatments were randomised within blocks. Applications were made on 11, 18 November; 9, 24 December; 7 January. Two cases of fruit were harvested on 5 and 16 February and each fruit was examined for the presence of mealy bug and for leafroller (light brown apple moth, *Epiphyas postvittana*).

During January ten leaves were collected from each tree and the number of adult female European red mite (*Panonychus ulmi*) were counted. Also, new extension shoots at shoulder height were examined and the number of leaves rolled by the pear leaf-curling midge (*Dasyneura pyri*) was recorded together with the total number of leaves present on the shoots.

1970-71

This test was run in a block adjacent to the previous test with the same layout. Treatments were applied on 21 September; 3, 17 November; 3, 17, 31 December. Fruit assessment for mealy bug and leafroller was made on two cases harvested on each of 1 and 9 February.

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1972-73

This test was run on an area adjacent to the earlier tests but was only replicated four times. Treatments were applied on 19 September; 17 October; 6, 15 November; 4, 18 December and 5 January. Fruit was assessed by picking 100 fruits at random from each tree on 31 January and again on 8 February. European red mite was assessed as in 1969-70.

A second experiment was conducted on a block comprising the varieties William bon Chretien (WBC), Winter Cole (WC) and Louise bonne de Jersey (LBJ). There were sufficient trees for four replications in the WBC and LBJ varieties, but for only two replications in the Winter Coles of aminocarb and untreated, with one tree only treated with carbofuran in this variety.

Applications were made on 17, 31 October; 13, 27 November; 11, 23 December and 11 January.

Assessments for pear leaf-curling midge and European red mite were made in the same manner as for the other trial. Assessment of mealy bug and leafroller was made on WBC on 31 January and 8 February using a random sample of 200 fruits at the first pick, then 100 at the second. On LBJ 100 fruits per tree were examined on 6 and 19 February and on WC 100 fruits per tree were examined on 1 and 15 March.

Grapes 1971-72

This trial was conducted in Auckland on var. Tintara. Four replicates were used, each plot being 6 metres in length. Treatments were applied on 8, 26 October and 5, 20 January.

At harvest time on 13 March an assessment of mealy bug was made. Ten leaves were picked from each of the top and bottom wires in each plot. These were divided into three groups:—

- (a) those having no mealy bugs on them;
- (b) those with one to five individuals present;
- (c) those with more than five present.

1972-73

A block of Pinot Meunier in Hastings was used for this test. Applications were made on 26 September; 18 October; 14 November; 19 December; 9, 30 January. Plots were 6 metres long and replicated four times.

On 20 February ten bunches were harvested from each plot and cut open so that the presence of mealy bug could be noted. Each bunch was scored on the following basis:—

- 0 = no mealy bug present;
- 1 = 1-5 mealy bug present;
- 2 = 6-10 mealy bug present.
- 3 = 11 + mealy bug present.

On 16 March, 20 leaves were picked at random from each plot and inspected for the presence of mealy bug.

Following this assessment, two whole replicates were sprayed with carbofuran at a rate of 16 g/100 litres, then after six days, 20 leaves were picked from each plot and inspected for the presence of mealy bug again.

RESULTS

The figures obtained for mealy bug control are shown in Table 1, and those for other pests in Table 2.

In the "clean-up" test, the carbofuran treated block had a pre-treatment level of 19% infested leaves, whilst the untreated block had

TABLE 1: MEAN PERCENT OF FRUIT OR BUNCHES INFECTED BY MEALY BUG

Treatment	Rate g/100 litres	Pears					Grapes		
		1969-70	1970-71	1972-73			1969-70	1972-73	Score*
				WBC	WBC	LBJ			
carbofuran	16		0.3 c	7.5	1.0	13.5	5.7 bc	3	1
carbofuran	32	0.9	0.3 c						
parathion	40	1.5	0.6 bc	6.4					
aminocarb	75		4.9 b				2.8 c	38	18
aminocarb	93				22.5	41.1			
aminocarb	112			10.9					
diazinon	50		2.0 bc				20.7 b		
acephate	75			11.5			2.4 c	15	6
acephate	112		2.2 bc						
chlorpyrifos	18			12.1				18	
untreated	—	33.0	17.7 a	65.4	62.2	48.6	68.9 a	100	108

* = total score per bunch (0-120).

TABLE 2: INCIDENCE OF LEAFROLLER, LEAF-CURL MIDGE AND MITES

Treatment Rate g/100 litres	% Leafroller			Leaf-curl midge						Mite (c)					
	1969-70	1970-71	1972-73			1969-70 (a)	1972-73 (b)			1972-73					
			WBC	LBJ	WC		WBC	WBC	LBJ	WC	WBC	WBC	LBJ	WC	
carbofuran 16		0.2	2.0	1.2	2.0		39	5	0	0		105	27	57	1
carbofuran 32	1.6	0				9.8					11				
parathion 40	1.0	0				16.3	32				117	404			
aminocarb 75		0													
aminocarb 75															
aminocarb 93			1.8	4.1	1.0		36	0	0			78	136		0
aminocarb 112							41				33				
diazinon 50		0													
acephate		0					66				15				
chlorpyrifos							79				23				
untreated	7.8	2.0	18.8	17.1	14.7	30.7	100	36	11	0	146	591	447	625	49

a = % leaves infested.

b = total number of leaves infested per 10 shoots per tree.

c = total number adult females per 10 leaves per tree.

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34% infested leaves. When reassessed six days after application, 1% of leaves were infested in the treated block and 45% in the untreated block.

During the progress of the 1970-71 test on pears the leaves of the trees treated with acephate developed a marginal necrotic spotting which was judged an undesirable feature. At the lower rate in the following year the same thing occurred.

No other side effects were noted for any of the other products tested in any season.

DISCUSSION

For the control of mealy bug in pears, carbofuran gave results comparable to parathion and better than aminocarb. It is interesting to note the difference in levels of infestation between the three varieties in the 1972-73 test. LBJ shows a lower susceptibility than the other two varieties and also a poorer degree of control with both carbofuran and aminocarb. This is probably due to the manner in which the foliage droops on the tree and the large amount of bark flaking which occurs on this variety.

Congdon and Morrison (1959) and Congdon (1960) commented on the importance of cultural practices and good application technique in obtaining thorough coverage and recommended that growers in bad areas should spray at regular intervals from early November until 14 days before harvest. All the pear tests had an interval of at least 20 days and up to 40 days between last application and harvest. Despite this, in 1972-73 some 7.5% of fruits were infested, a level which is too high to ensure that all infested fruits are removed during grading and a level which would make grading very slow.

On grapes carbofuran was equal to aminocarb in one test and better in another, and gave an excellent clean-up of the infestation when applied post harvest.

With regard to other pests on pear trees, carbofuran also gave good results. It was comparable to parathion and aminocarb for control of leafroller and gave a useful reduction in the levels of infestation of pear leaf-curling midge and European red mite. Subsequent experience in commercial blocks has shown that the mite control is such that one or more miticide applications may be omitted during the season.

At no stage was codling moth (*Cydia pomonella*) ever observed in any of the experiments, however Ramer and Kurtz (1969) report that carbofuran is very effective for this pest.

CONCLUSION

Carbofuran is an effective alternative for the control of mealy bug in horticultural crops, having useful effects on other pests as well.

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REFERENCES

- Congdon N. B. and Morrison L. G., 1959. Mealy bug resurgence in Hawkes Bay. *N.Z. J. Agric.* 99:481-7.
Congdon N. B., 1960. Control of mealy bug. *Orchard.* N.Z. 33:237-9.
Ramer I.A., and Kurtz E. A., 1969. Codling moth control with carbofuran. *J. econ. Ent.* 62 (2) :356-7.
Proc. 27th N.Z. Weed and Pest Control Conf.