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CONTROL OF CODLING MOTH IN THE STANTHORPE DISTRICT OF QUEENSLAND

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SUMMARY

During the 1963-64 to 1965-66 seasons three spray trials were carried out to determine the value of new insecticides for the control of codling moth (*Cydia pomonella* (L.)) in apple orchards in the Stanthorpe district.

Materials tested were applied according to a commercial spray programme. Those tested were aminocarb, azinphos-methyl, Cidial, Carbamult, fenitrothion, lythidathion, methidathion, methiocarb, phosalone and Union Carbide 10854.

Azinphos-methyl, methidathion and phosalone were the better treatments and have been recommended for codling moth control in the Stanthorpe district. Methiocarb substantially thinned Granny Smith apples.

I. INTRODUCTION

From results of previous investigations (Bengston 1965), several materials are available for effective control of the codling moth (*Cydia pomonella* (L.)) in the Stanthorpe district of Queensland. Problems associated with the use of some of these and the possibility of development of resistance indicated that further testing of new materials was warranted. The work currently reported was carried out during the 1963-64 to 1965-66 seasons.

II. MATERIALS AND METHODS

The materials used and the percentages of active constituents in the prepared sprays were as follows:—

Aminocarb.—A wettable powder containing 80% w/w active constituent; used at 0·08%.

Azinphos-methyl.—A wettable powder containing 25% w/w active constituent; 0·05%.

"Carbamult".—A wettable powder containing 50% w/w of 3-methyl-5-isopropylphenyl N-methylcarbamate as active constituent; 0·075%.

"Cidial".—An emulsifiable concentrate containing 50% w/v dimethyl 5-phenylethoxycarbamoyl methyl phosphorothiolothionate as active constituent; 0·05%.

Fenitrothion.—An emulsifiable concentrate containing 50% w/v active constituent; 0·05%.

Lythidathion.—A wettable powder containing 25% w/w active constituent; 0·05%.

Methidathion.—A wettable powder containing 40% w/w active constituent; 0·05%.

Methiocarb.—A wettable powder containing 50% w/w active constituent; 0·1%.

Phosalone.—An emulsifiable concentrate containing 35% w/v active constituent; 0·077 and 0·056%.

"Union Carbide 10854".—A wettable powder containing 75% w/w of 3-isopropylphenyl N-methylcarbamate as active constituent; 0·1%.

Randomized blocks with single-tree plots were used in all experiments. Treatments were applied at a pressure of 250-300 lb/sq in., using a small power spray with a hand-operated lance. Complete tree cover was aimed at.

All fruit from plot trees, including windfalls, were examined for larval damage by codling moth. A fruit was recorded as sound if there were no signs of codling moth damage. Once damage was evident the fruit was recorded as stung. Stung fruit were subdivided into blind stings if larvae failed to develop and as wormy if larvae developed to maturity or were present in fruit and alive at the time of examination.

Trial 1 (1963-64) and trial 3 (1965-66) each consisted of a 5 x 5 layout on the variety Granny Smith and trial 2 (1964-65) of a 7 x 4 layout on the variety Dunns. Treatments in the three trials are given respectively in Tables 1, 3 and 4. These were applied on the following dates:

Trial 1: October 8, November 12 and 28, January 7, February 7 and 24;

Trial 2: October 24, November 6, December 2 and 22, January 13, February 4 and 25;

Trial 3: November 5 and 26, December 21, January 19 and February 9.

III. RESULTS

Summarized data on fruit damage, yields and other results for the three trials are given in Tables 1-4.

TABLE 1

FRUIT DAMAGE: TRIAL 1, 1963–64

Treatment	Percentage Stung Fruit	
	Transformed Mean*	Equivalent Mean
1. Azinphos-methyl 0·05%	0·10	0·9
2. Methiocarb 0·1% ..	0·10	1·1
3. Cidial 0·05%	0·16	2·4
4. Fenitrothion 0·05% ..	0·18	3·1
5. Untreated	0·27	7·2
Necessary differences for significance .. 5%	0·10	..
Necessary differences for significance .. 1%	0·14	..
	1, 2≪5; 3<5.	

* Inverse sine transformation.

TABLE 2

TREE YIELDS: TRIAL 1, 1963–64

Treatment	Tree Girth, 1963 (cm)	Mean Weight of Fruit, 1962+1963 (lb)	Mean No. of Fruit, 1964	Adjusted Mean No. of Fruit, 1964	Mean Weight of Fruit, 1964 (lb)	Adjusted Mean Weight of Fruit, 1964 (lb)
1. Azinphos-methyl 0·05%	45·84	356·2	559·0	580·9	251·8	254·27
2. Methiocarb 0·1% ..	49·42	362·8	274·8	189·7	110·0	109·16
3. Cidial 0·05%	46·78	356·2	818·0	811·8	287·6	290·07
4. Fenitrothion 0·05% ..	48·16	453·0	641·0	593·5	246·2	205·05
5. Untreated	42·66	287·4	577·0	693·9	218·0	255·05
Necessary differences for significance 5%	8·666	190·04	332·5	221·8*	120·61	78·29*
Necessary differences for significance 1%	11·940	261·84	458·1	306·6*	166·18	108·24*
	N.S.D.	N.S.D.	3≫2; 4>2.	3>1, 4; 1,3,4,5≫2.	1, 4>2; 3≫2.	3>4; 1,3,5≫2; 4>2.

* Average.

TABLE 3

FRUIT DAMAGE: TRIAL 2, 1964–65

Treatment	Percentage Wormy Fruit		Percentage Stung Fruit	
	Transformed Mean*	Equivalent Mean	Transformed Mean*	Equivalent Mean
1. Phosalone 0·077%	0·028	0·1	0·050	0·3
2. Methidathion 0·05%	0·030	0·1	0·115	1·3
3. Azinphos-methyl 0·05%	0·103	1·1	0·160	2·5
4. Lythidathion 0·05%	0·189	3·5	0·306	9·1
5. Aminocarb 0·08%	0·344	11·4	0·394	14·8
6. Union Carbide 10854 0·1%	0·382	13·9	0·468	20·3
7. Untreated	1·030	73·5	1·043	74·7
Necessary differences for significance 5%	0·106		0·113	
Necessary differences for significance 1%	0·146		0·155	
	1,2≪4; 1,2,3,4≪6; 5≪7.		1,2≪4; 1,2,3≪5; 1,2,3,4≪6; 1,2,3,4,5,6≪7; 3<4.	

* Arc sine transformation.

TABLE 4

FRUIT DAMAGE: TRIAL 3, 1965–66

Treatment	Percentage Wormy Fruit		Percentage Stung Fruit	
	Transformed Mean*	Equivalent Mean	Transformed Mean*	Equivalent Mean
1. Phosalone 0·056%	0·096	0·9	0·201	4·0
2. Methidathion 0·05%	0·136	1·8	0·224	4·9
3. Azinphos-methyl 0·05%	0·169	2·8	0·215	4·5
4. Carbamult 0·075%	0·279	7·6	0·307	9·1
5. No treatment	0·402	15·3	0·422	16·8
Necessary differences for significance 5%	0·124		0·126	
Necessary differences for significance 1%	0·171		0·174	
	1,2,3≪5; 1≪4; 2<4.		1,2,3≪5.	

* Arc sine transformation.

In trial 1, azinphos-methyl and methiocarb were the better treatments and gave satisfactory control under the conditions of the trial. Methiocarb substantially reduced both the number and weight of fruit produced.

In trial 2, azinphos-methyl, methidathion and phosalone were the better treatments and gave results statistically superior to lythidathion, aminocarb and Union Carbide 10854. All materials nevertheless effected a significant reduction in fruit damage.

In trial 3, azinphos-methyl, methidathion and phosalone were again the better treatments and gave satisfactory control. Carbamult tended to be less effective.

IV. DISCUSSION

The experimental blocks were selected because of a known high level of codling moth infestation. The level of fruit damage in untreated trees in this work, however, ranged from 7 to 75%, reflecting differences in severity of infestations in different orchards during the several years. Spray programmes used, although more intensive than average commercial practice (Bengston 1960), were nevertheless minimal for these special conditions. This is reflected in the sometimes relatively high percentage of damage in the best treatments.

Of the materials tested, azinphos-methyl, methidathion, methiocarb and phosalone proved effective against codling moth. Methiocarb, however, substantially thinned fruit of the Granny Smith variety. This effect is well established for certain other carbamates (Batjer and Thompson 1961; Westwood 1965), where it appears to be restricted to applications made during the month after full bloom.

Any material to be used on apples must be considered firstly with regard to its efficacy against codling moth but also with regard to other members of the pest complex. Based on these considerations, together with the results of the current and earlier trials, Bengston in 1965 (in a cyclostyled Departmental extension circular) recommended a spray programme involving azinphos-methyl, carbaryl, methidathion and phosalone as alternatives under appropriate circumstances.

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