

QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES

DIVISION OF PLANT INDUSTRY BULLETIN No. 849

**Insecticidal control of the pink-spotted bollworm  
(*Pectinophora scutigera* (Holdaway)) on cotton in central  
Queensland**

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**Summary**

Seven organic insecticides were tested against the pink-spotted bollworm (*Pectinophora scutigera* (Holdaway)). The synthetic pyrethroids fenvalerate and permethrin applied at 80 g ha<sup>-1</sup> were both more effective than the existing standard treatment—DDT at 1 100 g ha<sup>-1</sup> plus endosulfan at 750 g ha<sup>-1</sup>. The insecticides endosulfan at 750 g ha<sup>-1</sup>, methomyl at 240 g ha<sup>-1</sup>, monocrotophos at 550 g ha<sup>-1</sup> and profenofos\* at 750 g ha<sup>-1</sup> were generally ineffective.

**1. Introduction**

The pink-spotted bollworm (*Pectinophora scutigera* (Holdaway)) has been a major pest of cotton in central Queensland for many years (Passlow and Sabine 1963). DDT has been the recommended insecticide for control of this pest (Passlow 1967). The widespread use of DDT for control of *Heliothis* spp. in the 1960s, together with early removal and burial of crop residues, resulted in excellent control of this pest (Sabine 1969). In recent years, however, *P. scutigera* has caused considerable losses in many crops where DDT has been replaced by endosulfan. Endosulfan does not give satisfactory control of *P. scutigera* (Page, unpublished data).

A general policy toward the phasing out of DDT in Australia, coupled with the development of resistance to this insecticide in *Heliothis armiger* (Hübner), has highlighted the need for an alternative insecticide for the control of the pink-spotted bollworm. The trials reported here were designed to test a number of chemicals for efficacy against the pest.

\* proposed common name for:  
O-(4 bromo-2-chlorophenyl)  
O-ethyl S-propyl phosphorothioate

## 2. Methods

Details of the insecticides used are presented with the tabulation of results.

Two trials were conducted in irrigated cotton at the Biloela Research Station. The variety Deltapine 16 was planted on 28 November 1977 and 22 November 1978. The cotton was unsprayed prior to the start of trial 1, so the numbers of bolls were low because of earlier infestations by *Heliothis* spp. In trial 2, four carefully timed applications of endosulphan at 750 g a.i. ha<sup>-1</sup> were used for the control of *Heliothis* spp. to ensure a good set of green bolls. The test treatments were superimposed when a low level of infestation by *P. scutigera* had established.

Both trial layouts were randomized blocks with four replications and a plot size of eight rows (each 1 m apart) x 23.5 m. Plots were separated by two guard rows and 2-m-wide laneways at the ends of each. Sprays were applied with an eight row 'Hahn Hi-Boy' high clearance sprayer at approximately 520 kPa using 290 L ha<sup>-1</sup> in trial 1 and 500 L ha<sup>-1</sup> in trial 2, each on 17 and 29 March and 7, 14 and 21 April in trial 1 and on 28 February, 14 and 21 March and 2 April 1979 in trial 2.

In trial 1, effectiveness of treatments was assessed by recording the numbers of *P. scutigera* larvae and of freshly damaged bolls after dissection of 100 large green bolls (>25 mm diam.) sampled at random from the central four rows of each plot. Damage was defined as fresh if the boll contained mines with living larvae or fresh frass. Assessments in trial 2 were based on numbers of living larvae in 100 large green bolls selected as in trial 1. Assessments were made on 16 March and 26 April in trial 1 and on 28 February, 21 March and 2 and 17 April in trial 2. Analysis of variance was used to test the effect of treatments; treatment means were compared using the protected LSD procedure at the 5% level of significance.

## 3. Results and discussion

Results are presented in tables 1 and 2.

Trial 1 data indicate that the pyrethroids, fenvalerate and permethrin may give better control of *P. scutigera* than the standard DDT (plus endosulfan) treatment. Endosulfan and monocrotophos, at the rates employed, were shown to be ineffective.

Trial 2 data confirmed the superiority of pyrethroids shown in trial 1. Methomyl and profenofos as used were ineffective and fenvalerate at 80 g ha<sup>-1</sup> is suggested as the economically most effective dosage.

## 4. Acknowledgements

Members of the staff of the Biloela Research Station, particularly Mr J. J. Galloway, assisted with the trials. Statistical analyses were carried out by the Biometry Branch, Queensland Department of Primary Industries. I gratefully acknowledge this assistance.

Table 1. Trial 1: *Pectinophora scutigera* control

Treatment	Mean number bolls with fresh damage (out of 100 bolls per plot)				Mean number larvae per 100 bolls per plot							
	At pre-treatment 16 March 1978		At post-treatment 26 April 1978		At pre-treatment 16 March 1978				At post-treatment 26 April 1978			
	Trans mean*	Equiv. mean	Trans mean*	Equiv. mean	Larvae <5mm length		Total larvae		Larvae <5 mm length		Total larvae	
					Trans mean†	Equiv. mean	Trans mean†	Equiv. mean	Trans mean†	Equiv. mean	Trans mean†	Equiv. mean
fenvalerate 200 g L <sup>-1</sup> em. conc. —80 g ha <sup>-1</sup> .. .. .	0.414	16.2	0.152 <sup>cd‡</sup>	2.3	2.27	4.6	4.48	19.6	0.84	0.2	1.68 <sup>d</sup>	2.3
permethrin 500 g L <sup>-1</sup> (40–60 cis- trans isomers) em. conc.—240 g ha <sup>-1</sup> .. .. .	0.398	15.0	0.140 <sup>d</sup>	1.9	2.71	6.8	4.34	18.3	1.06	0.6	1.70 <sup>cd</sup>	2.4
monocrotophos 400 g L <sup>-1</sup> water miscible conc. 550 g ha <sup>-1</sup> .. .. .	0.478	21.1	0.370 <sup>a</sup>	13.1	2.68	6.7	5.30	27.6	1.41	1.5	3.91 <sup>a</sup>	14.8
endosulfan 350 g L <sup>-1</sup> em. conc. —750 g ha <sup>-1</sup> .. .. .	0.396	14.9	0.385 <sup>a</sup>	14.1	2.15	4.1	3.85	14.4	1.47	1.6	4.22 <sup>a</sup>	17.3
DDT 250 g L <sup>-1</sup> em. conc. †endosulfan 350 g L <sup>-1</sup> em conc.—1 100 + 750 g ha <sup>-1</sup> .. .. .	0.358	12.3	0.261 <sup>bc</sup>	6.7	2.93	8.1	4.28	17.8	1.41	1.5	2.76 <sup>bc</sup>	7.1
No treatment .. .. .	0.407	15.7	0.373 <sup>a</sup>	13.3	3.10	9.1	4.36	18.5	1.88	3.0	3.82 <sup>ab</sup>	14.1
Necessary difference for signi- ficance (P=0.05) .. .. .	0.105	..	0.121	..	1.16	..	1.31	..	0.64	..	1.08	..

\* Inverse sine transformation.

†  $\sqrt{x + \frac{1}{2}}$  transformation.

‡ where superscripted : means not having a common letter are significantly different at the 5% level.

Table 2. Trial 2: *Pectinophora scutigera* control

Treatment	Mean numbers of larvae per 100 bolls							
	At pre-treatment		At post-treatment					
	28 February 1979		21 March 1979		2 April 1979		17 April 1979	
	Trans mean*	Equiv. mean	Trans mean*	Equiv. mean	Trans mean*	Equiv. mean	Trans mean*	Equiv. mean
fenvalerate 200 g L <sup>-1</sup> em. conc.—40 g ha <sup>-1</sup> .. .. .	1.92	3.2	0.84 <sup>c†</sup>	0.2	0.84	0.2	1.95 <sup>c</sup>	3.3
fenvalerate as above—80 g ha <sup>-1</sup> .. .. .	1.19	0.9	1.10 <sup>b,c</sup>	0.7	1.10	0.7	0.71 <sup>d</sup>	0.0
permethrin 500 g L <sup>-1</sup> (40–60 cistrans isomers)—40 g ha <sup>-1</sup>	1.48	1.7	1.54 <sup>b,c</sup>	1.9	2.15	4.1	2.87 <sup>b,c</sup>	7.7
permethrin as above—80 g ha <sup>-1</sup> .. .. .	1.80	2.7	0.97 <sup>b,c</sup>	0.4	1.54	1.9	2.37 <sup>c</sup>	5.1
DDT 250 g L <sup>-1</sup> em. conc.+endosulfan 350 g L <sup>-1</sup> em. conc.—1 100+750 g ha <sup>-1</sup> .. .. .	1.92	3.2	1.63 <sup>b</sup>	2.1	1.92	3.2	2.69 <sup>b,c</sup>	6.8
profenofos 500 g L <sup>-1</sup> em. conc.—750 g ha <sup>-1</sup> .. .. .	2.13	4.1	1.41 <sup>b,c</sup>	1.5	1.71	2.4	3.53 <sup>ab</sup>	11.9
methomyl 225 g L <sup>-1</sup> water misc. conc. 240 g ha <sup>-1</sup> .. .. .	1.51	1.8	2.63 <sup>a</sup>	6.4	1.82	2.8	4.45 <sup>a</sup>	19.3
No treatment .. .. .	1.40	1.5	2.47 <sup>a</sup>	5.6	1.98	3.4	3.37 <sup>b</sup>	10.9
Necessary differences for significance (P=0.05) .. .. .	0.69	..	0.73	..	0.94	..	0.94	..

\*  $\sqrt{x + \frac{1}{2}}$  transformation.

† where superscripted : means not having a common letter are significantly different at the 5% level.

## References

- Passlow, T. and Sabine, B.N.E. (1963), Two pink bollworms of cotton, *Queensland Agricultural Journal* 89, 354.
- Passlow, T. (1967), Insect pests of cotton, *Queensland Agricultural Journal* 93, 518.
- Sabine, B.N.E. (1969), Effect of burial on overwintering populations of pink-spotted bollworm *Pectinophora scutigera* (Holdaway), *Queensland Journal of Agricultural and Animal Sciences* 26, 619.

(Received for publication 16 November 1979)

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