MONITORING PINKSPOTTED BOLLWORM, *PECTINOPHORA SCUTIGERA*, POPULATIONS WITH SEX ATTRACTANTS

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INTRODUCTION

Traps baited with sex attractants ('pheromone' traps) are presently being used by a number of farmers in Central Queensland to monitor *P. scutigera* populations and for timing insecticide sprays. However, there is conflicting evidence in the published literature as to the best type of attractant to use. Rothschild (1975) concluded that the Z,Z isomer of 7, 11-hexadecadien acetate (7, 11-16:Ac) was adequate for monitoring purposes and was used in subsequent experiments (Rothschild 1983). In contrast, Flint and Stone (1985) found that traps baited with a 9:1 ratio of Z,Z to Z,E isomers caught significantly more moths than Z,Z only baited traps.

Furthermore, despite the use of pheromone traps to time insecticide sprays against *P. scutigera*, there is little evidence to suggest that trap catch is consistently related with boll damage (Rothschild 1983). Page *et al.* (1984) found that pheromone traps may be of some value in alerting the insect scout to the possible need for insecticide spray. Wider experience with other pests, eg. *Pectinophora gossypiella* in the U.S. and *Heliothis* spp. in Australia, has also shown a lack of correlation between pheromone trap capture and crop damage (Flint *et al.* 1980, Fitt

et al. 1984).

In order to further evaluate the potential and reliability of pheromone traps for monitoring P. scutigera populations, a number of experiments were initiated in the 1984/85 cotton season. Herein are reported some of the results of these ongoing experiments.

METHODS

A) Bait comparison

Baits containing Z,Z isomer only and a 9:1 ratio of Z,Z to Z,E isomers were obtained from Dr Rothschild, CSIRO, Canberra and Dr Flint, USDA, Arizona. Baits from their respective sources are abbreviated to: RZZ, RZZ:ZE, FZZ and FZZ:ZE. All baits contained 1 mg of the appropiate isomer diluted in methylene chloride and dispensed in rubber sleeve stoppers. A total of 12 replicates of each bait were set out over 6 cotton fields around Biloela. In 3 cotton fields 3 replicates of each bait were arranged in randomised blocks with 50-100 m spacing between traps. In another 3 cotton fields single lines of traps, containing one of each bait, were set out and spaced 50, 100 or 200 m apart. All traps were checked daily for 12 nights during March, 1986. Trap positions were rotated each day to overcome any bias in trap catch.

B) Pheromone trap catch versus light trap catch

While conducting the bait comparison experiment outlined above a light trap was simultaneously operated alongside the pheromone

traps in an unsprayed cotton field. The light trap was positioned ca. 100 m from the pheromone traps. Numbers of males and female P. scutigera caught in the light trap was recorded daily over a period of 10 nights and compared to pheromone trap catches.

C) Pheromone trap catch versus boll infestation

Pheromone traps, baited with FZZ:ZE, were set out in 1 unsprayed and 3 sprayed cotton fields and monitored throughout 2 growing seasons. Weekly samples of 100-200 green bolls were taken from each field to determine P. scutigera infestations.

In all experiments Delta traps (Sandia Die and Cartridge, Albuquerque, New Mexico) were used and placed at crop height. Traps were replaced when necessary. Data from section A) were subjected to analysis of variance and Duncan's 5% multiple range tests. Correlation coefficients were calculated to determine the relationship between pheromone and light trap catches.

RESULTS AND DISCUSSION

Table 1 presents the mean and total numbers of moths caught by each bait over 12 nights trapping. FZZ:ZE caught significantly more moths than FZZ ($p<0.05$). However, RZZ:ZE only caught slightly more moths than RZZ and the difference was not significant. The results were similar in all trap sites, whether traps were arranged in randomised blocks or as single lines and regardless of trap spacing. This discrepancy between the 2 sources of attractant may be due to the purity of the Z,Z isomer. Flint's source of Z,Z isomer was stated as being 98.8% pure with a known 1.2% of Z,E as a contaminant (Flint and Stone 1985). However, Rothschild (1983) reported that his Z,Z isomer was 95%

pure with 5% of unknown contaminants. It is possible that Rothschild's Z,Z isomer contained enough Z,E isomer (up to 5%) as a contaminant to render it artificially attractive to male P. scutigera.

Therefore, it appears essential that sex attractants for monitoring P. scutigera should contain the Z,E isomer.

Correlation between the number of males caught in pheromone traps with the number of males or females caught in a light trap was very poor for all baits except FZZ:ZE (Table 2). Again in the case of Flint's attractants, this suggests that the addition of Z,E isomer is very important. Why both of Rothschild's baits gave such poor correlations with light trap catch is not known. Perhaps the correct balance in the ratio of Z,Z and Z,E isomers is much more critical than previously thought. However, these results must be treated with caution as trapping was conducted over a very short period (10 nights). Many independant factors may influence pheromone and light trap catches. It may be fortuitous that FZZ:ZE baited traps gave the best correlation with light trap catch.

Although much detailed data has been accumulated from 4 cotton fields over 2 seasons, the relationship between pheromone trap catch and boll infestation is still unclear. In unsprayed cotton, peaks in pheromone trap catch often preceded increases in boll infestation. However, as Rothschild (1983) found, this relationship was confused by considerable daily fluctuations in pheromone trap catch which could not be correlated with any environmental factors. While local movement of males between

cotton crops may be responsible (Rothschild 1983) this seems unlikely.

In sprayed cotton fields high trap catches often did not result in any increase in larval infestations during periods when no insecticides were applied. This may have been due to the residual effects of past insecticide sprays on eggs and larvae or due to inadequate boll sampling. While pheromone traps appear to be highly sensitive in detecting the presence of male P. scutigera, inadequacies in boll sampling may have failed to detect the presence of low larval infestations. Larval infestations are often very patchy and localised within a single field.

Reliance on pheromone trap captures to time insecticide sprays may lead to the application of unnecessary treatments. Pheromone trap data should be used with caution and in conjunction with boll counts.

ACKNOWLEDGEMENTS

We thank Drs Flint and Rothschild for supplying attractants and DPI, Biloela for use of their facilities.

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Table 1. Numbers of P. scutigera caught in pheromone traps baited with FZZ:ZE, FZZ, RZZ:ZE and RZZ (see text for explaination of abbreviations), Biloela, March, 1986.

Site	Trap arrangement	Mean no. moths/trap/night FZZ:ZE	FZZ	RZZ:ZE	RZZ
1	3X4 grid 50m spacing	60.3	7.2	33.1	20.8
2	3X4 grid 100m spacing	163.5	50.9	134.2	105.4
3	3X4 grid 50m spacing	54.8	7.2	17.6	25.5
4-6	3 single lines	93.4	37.8	78.1	69.2
TOTAL		372.0	103.1	263.0	220.9

Table 2. Correlation between P. scutigera pheromone and light trap captures over a 10 night period, Biloela, March, 1986.

Values of r		Pheromone trap bait FZZ:ZE	FZZ	RZZ:ZE	RZZ
Light trap	Male	0.533	0.022	-0.079	-0.031
	Female	0.720	0.105	0.316	-0.214