# THE PINK SPOTTED BOLLWORM - ITS SPREAD AND CONTROL

F.D. Page, Department of Primary Industries, Biloela, Q.
M.P. Modini, Department of Primary Industries, Biloela, Q.
D.A.H. Murray, Department of Primary Industries, Emerald, Q.

## INTRODUCTION

The pink spotted bollworm (*Pectinophora scutigera*) has been an important pest of cotton since 1924 in coastal, and sub-coastal Dawson-Callide regions of central Queensland. Its distribution has been described as coastal Queensland, extending to the north coast of N.S.W., New Guinea, and other Pacific Islands. Despite its establishment in the Emerald Irrigation Area, where it was first recorded in 1980, it has not become an important pest there. It is not a pest of cotton in southern Queensland or N.S.W.

It is a difficult pest to control as the moths are small and nocturnal, their eggs being impossible to detect with the naked eye. Once a larva enters a boll it may tunnel throughout it, feeding on the lint and seeds. Its preferred entry points at the base of the boll and less frequently at the tip of the boll allow ready entry for boll rot organisms during wet weather which is common during late summer.

In the 1950's and 1960's, control of this pest relied heavily on regular applications of D.D.T. The regular use of D.D.T. and D.D.T. mixtures for the control of *Heliothis* spp. together with the adoption of cultural control methods of slashing and ploughing in cotton residues by early August, achieved excellent control of pink spotted bollworm.

With the phasing out of D.D.T. in the 1970's, alternative insecticides were tested for control of pink spotted bollworm. The synthetic pyrethroids proved superior to other insecticides tested, probably because of their long residual life. However, several applications were required to control established infestations. Until recently, scouting to detect infestations of pink spotted bollworms depended on boll sampling and dissection. This method was not very satisfactory as it was slow and tiny larvae were easily missed. Also field infestations are patchy.

The use of artificial pheromone trap catches of male pink spotted bollworm moths as a means of predicting the likelihood of subsequent larval infestation was investigated. This approach assumes that populations of males and females fluctuate in a similar manner and that ovipositional activity is related to moth numbers. Similar attractant traps with a different bait mixture are widely used to monitor populations of the closely related pink bollworm in the U.S.A. and Israel. The capture threshold for moths for deciding when to apply an insecticide treatment is a mean of 12-15 moths per trap in western U.S.A. and 5-8 moths per trap in Israel.

## Distribution of the Pink Spotted Bollworm

This work was a continuation of the survey commenced in 1980-1982. As the widespread distribution of the pink spotted bollworm in central Queensland was confirmed, interest then centred on the extent of its distribution between central and southern Queensland. It was of some concern that the main native host of the pink spotted bollworm - *Hibiscus tiliaceous* has been planted as an ornamental tree in many districts. As moth numbers taken in previous surveys are highest during spring, when moths are emerging and dispersing following winter, intensive trap surveys on a circuit Biloela, Taroom, Dalby, Kingaroy, Maroochydore, Gympie, Mundubbera, Biloela were conducted at monthly intervals from mid-September to mid-December. Lowood and Brisbane areas were trapped by co-operating entomologists. Baits for attractant traps were provided by Dr G.H.L. Rothschild of C.S.I.R.O. Mr B. Cantrell, D.P.I., Brisbane, confirmed the identifications of the moths trapped.

Records of the distribution of pink spotted bollworm obtained from attractant trapping are shown (Fig. 1). It was recorded for the first time at Taroom-Wandoan and one moth was also trapped near Macalister on the Darling Downs. One moth was also trapped at Nanango. This was not unexpected, as numerous moths were trapped in the Brisbane-Sunshine Coast region.

The importance of these survey results with respect to the future spread of the pink spotted bollworm is not known. Widespread trapping has not been conducted previously on a regular basis and the few moths taken could indicate long distance dispersal of low numbers of moths into a less

favourable environment. The detection of low numbers of pink spotted bollworm moths at 5 trap sites in the Emerald Irrigation Area in 1983-84 has not been associated with economically damaging larval infestations, although larvae have been recorded there. Trap catches for the whole year ranged from 1 to 36 per site. At Biloela, trap catches of several hundred moths per night have been recorded at a few sites each year.

It would be unwise for growers to become complacent about the possible spread of the pink spotted bollworm into other regions as new biotypes may develop and extend its geographical range. Every effort should be made to ensure that infested seed cotton or machinery harbouring infested trash or seed cotton is not transported to southern Queensland or N.S.W. Cotton seed does not require treatment as the ginning process destroys the larvae.

## The Use of Artificial Pheromone Traps for Determining When to Apply Insecticides for Control of Pink Spotted Bollworms

Although this method of deciding when to apply insecticides for the pest was very convenient, its reliability was not proven. Previous studies by Dr G.H.L. Rothschild of C.S.I.R.O. had cast doubt on the use of traps for this purpose.

During three cotton seasons 1981-82, 1982-83, 1983-84, the usefulness of artificial pheromone traps for monitoring populations of pink spotted bollworm moths, as a means of predicting larval infestations, was investigated. One site was in nil - insecticide treated cotton at Biloela Research Station and at least two commercial, insecticide treated sites were monitored each season.

The sticky traps were placed at a height of 1 m just outside the cotton crops at each site. Whenever possible traps were serviced daily and moth numbers recorded. Random samples of 200 bolls (> 2 cm diameter) per site were taken weekly and dissected to determine numbers and size of larvae. Usually only one larva per boll was present but several larvae per boll were common at high levels of infestation. Results are presented in Figures 2 and 3.

Nil Insecticide Treated Site

In the 1981-82 season, numbers of moths were quite high during the spring and early summer. Some moths were taken every night and catches often exceeded 10 per night (Fig. 2a). A severe infestation of 12 larvae per 100 bolls was present when boll sampling commenced on 30 December. However, the boll population was very low (less than one per metre) as a result of infestation by *Heliothis* spp.

In contrast, moth numbers remained low in spring and early summer of 1982-83 (Fig. 2b). Damage by *Heliothis* spp. was low, and a good boll set occurred (Fig. 2b). A sharp increase in moth activity occurred during February with a peak of 49 moths per night on 13 February and remaining above 10 per night until the end of February, when boll opening was occurring. A correspondingly large increase in numbers of larvae occurred during the 16 days following the peak moth catch.

In the 1983-84 season, moth numbers were generally low in December and in early to mid-January, except for a brief peak of 18, 26 moths on 4, 5 January (Fig. 3a). From 20 January onward numbers of moths increased, remaining above 20 per night from 9-15 February. The general increase in moth capture was reflected in an increase in larval infestation from 3% on 25 January to 4% on 8 February and 16.5% on 23 February.

Insecticide Treated Sites

During three seasons, nil to several pink spotted bollworm moths per night were trapped at the commercial sites at Biloela and larval infestation was almost undetectable. At two commercial sites at Theodore in 1984, moth numbers remained low and the level of larval infestation did not exceed 2% (Fig. 3b). Moth numbers above 10 were recorded on two nights at site 2. These results are typical of those obtained at other commercial sites.

Sustained trap catches of 10-20 moths per night were associated with subsequent, economically damaging infestations. The results confirm the value of pheromone trap catches as an alarm - if moth numbers exceed a preset threshold, the insect scout is alerted to the possible need for insecticide spraying.

With the development of pyrethroid resistance in *Heliothis armiger* and the implementation of the pyrethroid strategy it has become even more important to minimize the use of the pyrethroids for control of the pink spotted bollworm. Alternative insecticides will be screened as a matter of urgency. In the long term, the management of this pest should involve the use of resistant cultivars and improved cultural control.

Fig.1 Pink - Spotted Bollworm Pheromone Trap Capture Locacations : 1983

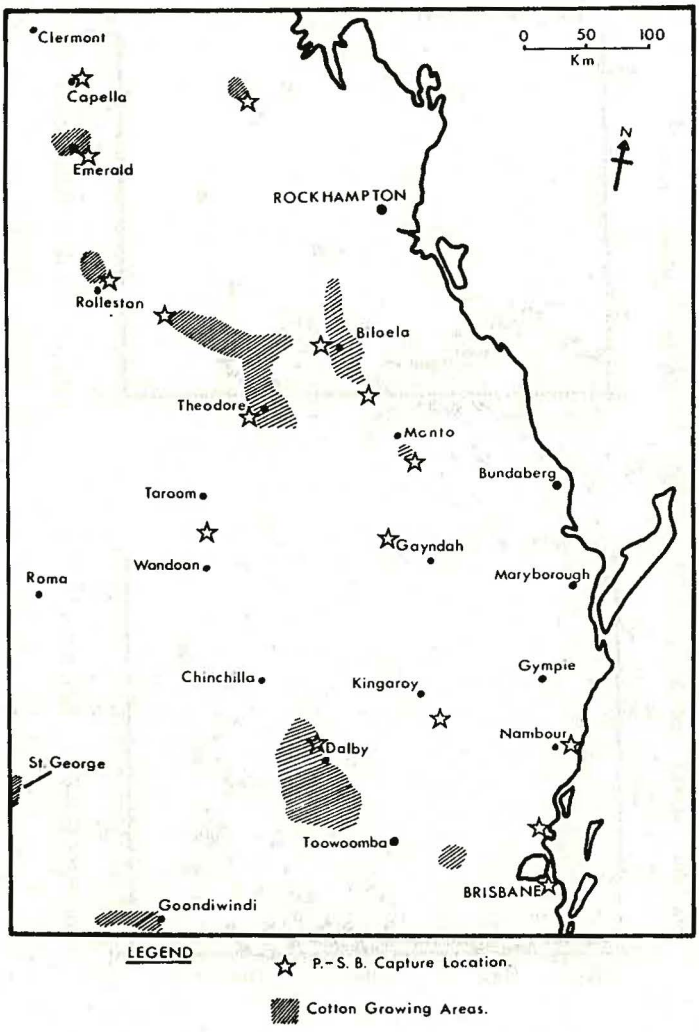


Fig 2a

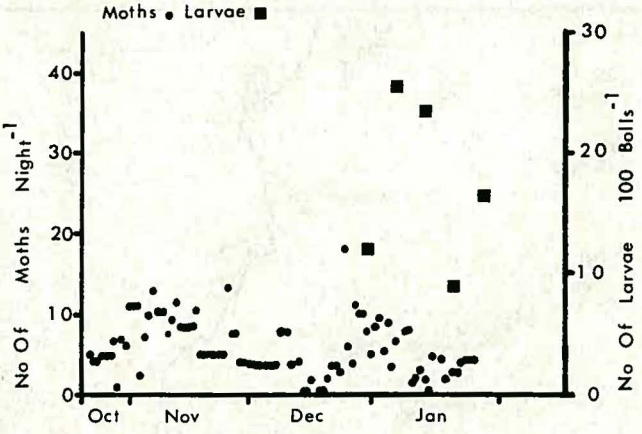

Moths • Larvae ■
No Of Moths Night$^{-1}$
No Of Larvae 100 Bolls$^{-1}$
0
10
20
30
40
0
10
20
30
Oct
Nov
Dec
Jan

Fig 2b

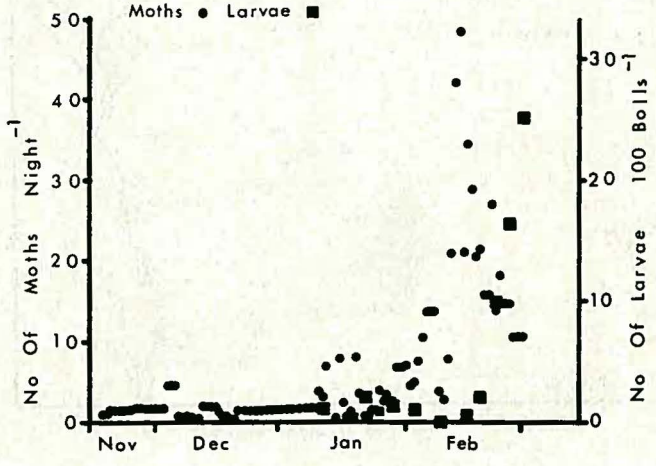

Moths • Larvae ■
No Of Moths Night$^{-1}$
No Of Larvae 100 Bolls$^{-1}$
0
10
20
30
40
50
0
10
20
30
Nov
Dec
Jan
Feb

Fig 3a

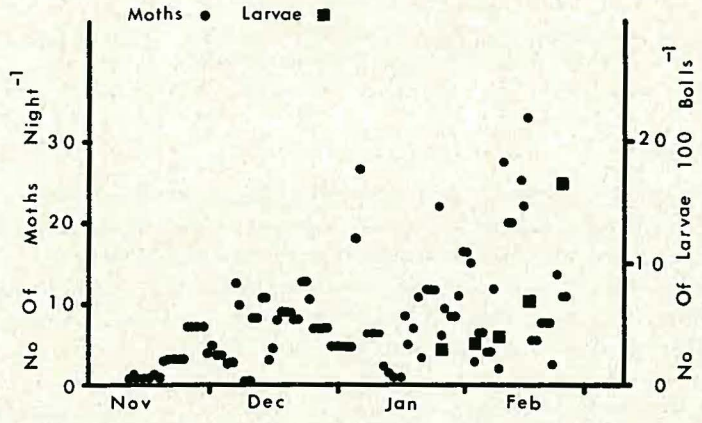
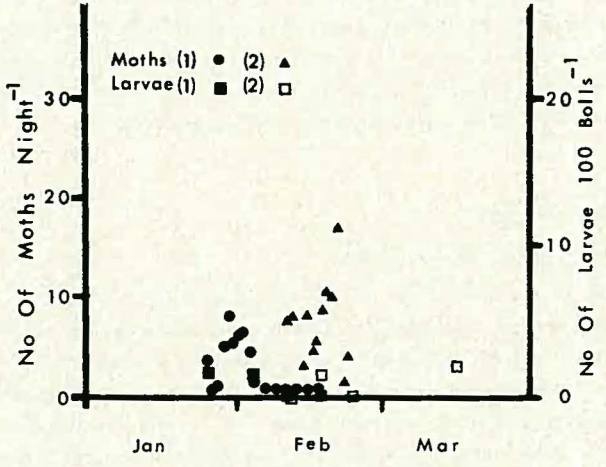

Moths ● Larvae ■
No Of Moths Night⁻¹
No Of Larvae 100 Bolls⁻¹
0
10
20
30
Nov
Dec
Jan
Feb

Fig 3b


Moths (1) ● (2) ▲
Larvae (1) ■ (2) □
No Of Moths Night⁻¹
No Of Larvae 100 Bolls⁻¹
0
10
20
30
Jan
Feb
Mar