

## Carryover mechanism of pink bollworm *Pectinophora gossypiella* (Saunders) in Andhra Pradesh

S.V.C. GOPALA SWAMY AND N.H.P. RAO

Regional Agricultural Research Station, Lam, Guntur - 522 034. Andhra Pradesh

**Abstract :** Investigations on the carryover mechanism of pink bollworm from season to season were undertaken during 1998-99 at the Regional Agricultural Research Station, Lam, Guntur, Andhra Pradesh. The studies revealed that pink bollworm adults were continuously emerging in the local ginning mills from the seed cotton received regularly from different regions of the state. The damaged and discarded kapas, lint and seed in ginning mills were found as the major sources for regular build up of pink bollworm on cotton in this region. Further, the pink bollworm damage was very high in unpickable and discarded bolls present on the cotton stubbles and about 1/3<sup>rd</sup> of the damaged bolls harboured live larvae indicating that the cotton stubbles even after harvesting supported high larval population and formed an important link in the carryover of the pest. (**Key Words :** Pink boll worm, Cotton stubbles).

Cotton is one of the most important commercial crops of India cultivated over an area of 9 million hectares producing about 170 lakh bales with a productivity of 320 kg lint per hectare. Andhra Pradesh enjoyed a unique position in cotton production occupying second or third rank in the country with a cotton area of 10 lakh ha and production of around 25 lakh bales. During the last decade the state witnessed instability in of cotton production and at times even crop failures due to epidemic out breaks of insect pests. The pink bollworm inspite of narrow host range has been noticed regularly occurring on cotton in Andhra Pradesh specifically for a brief period from January till the end of the season in April. In Andhra Pradesh the pest incidence has been identified from the middle of the crop season seriously damaging the kapas in the late pickings. Under Northern Indian conditions ratooning of cotton (Sharma and Mohindra. 1948), late uprooting of cotton stubbles (Kulkarni *et al.* 1958) and stacking of cotton stubbles for long period (Simwat and Sidhu. 1982) were identified as major reasons for the survival and carryover of the pink bollworm accounting for more than 85 per cent of pest population on the new crop.

Though this insect has been extensively studied in other regions the information on carryover of the insect from season to season under south Indian conditions is scanty, warranting the present investigations.

### Material and Methods

The investigations were undertaken in farmers fields and other areas in the vicinity of the Regional Agricultural Research Station, Lam, Guntur, Andhra Pradesh during 1998-99. In the absence of tangible information on pest survival during the remaining part of the season from May to December elaborate

investigations were undertaken to understand the insect behaviour and intricacies of carryover from season to season. In this study the major emphasis however was on pheromone monitoring of adult populations in the local ginning mill and sampling for larval incidence in unpickable and discarded cotton bolls present on cotton stubbles in stacks near field and houses in the nearby villages besides surveying for alternate hosts. The information collected through these studies is primarily intended to understand the likely carryover mechanism of pink bollworm in Andhra Pradesh.

### Monitoring in ginning mill

To understand the sources of spread of pink bollworm, regular pheromone monitoring of seed cotton arrivals and discarded, damaged cotton in a nearby ginning mill (M/s. Ragavendra Ginning Mills, Guntur) was taken up from 20th November, 1998 to 13th May, 1999 for pink bollworm presence. The trap catches were pooled standard weekwise and analysed for interpretation.

### Incidence in cotton stubbles

For this study, cotton stubbles stacked in fields in the nearby village, Lam were selected. Field sampling of unopened intact bolls was done from the stacked cotton stubbles at regular interval. At each time unopened bolls present on the stubbles were collected into a paper bag and observed for pink bollworm damage and larval presence in the laboratory by cutting open the bolls with the help of a knife. Finally, the percentage of damaged boll and the total number of larvae per hundred bolls were worked out.

### Incidence on alternate hosts

To identify the alternate hosts that are

sustaining the pink bollworm in this region, periodical survey of seasonal and off-seasonal vegetable crops and weeds in the nearby villages was taken up. The fruiting bodies of different vegetables crops and weeds were collected into paper bags and observed in the laboratory for pink bollworm damage and larval incidence.

## Results and Discussion

### *Monitoring in ginning mill*

The adult moth catch was recorded regularly from the pheromone trap erected in M/s. Raghavendra Ginning Mills, Guntur from 12<sup>th</sup> November, 1998 to 13<sup>th</sup> May, 1999. The moth catches recorded at 2 days interval were pooled and presented standard weekwise. On perusal of trap catch data it was clear that the pink bollworm adults were continuously emerging from the seed cotton received in the mill regularly from different regions as indicated in Table 1.

It appeared that the kapas arrivals during November and December months were mostly from Telangana districts of Andhra Pradesh. In the months of January the seed cotton in ginning mill was received from a mixed source of coastal districts, Telangana besides Orissa state. On the other hand the cotton arrivals in local mills from February onwards were mostly from local areas around Guntur. During the period of observation as many as 1432 adult moths were collected in the pheromone trap at the ginning mill (Table 2). The weekly catches varied from the minimum of 3 in the 19<sup>th</sup> standard week (7<sup>th</sup> - 13<sup>th</sup> May, 1999) to the maximum of 248 in the 12<sup>th</sup> standard week (19<sup>th</sup> - 25<sup>th</sup> March 1999). Until January weekly catches varied from 7 to 68 per trap while the catches were 19 - 110 from January till the beginning of March. Thereafter the trap catches varied from 3 to 248 per trap thereby indicating that damaged kapas in ginning mills and discarded damaged seed are the major sources contributing for regular build up of pink bollworm on cotton in this region.

The study revealed that pink bollworm adults were continuously emerging in ginning mills from seed cotton regularly received in local mills from different regions. As early as 1971 itself Jayaswal identified cotton seed as source of spread of pink bollworm adults populations in the local ginning mill and sampling for larval incidence in unpickable and discarded cotton bolls present on cotton stubbles in stacks near fields and houses in the nearby village besides surveying for alternator hosts. The information collected through these studies is primarily intended to understand the likely carryover mechanism of pink bollworm in Andhra Pradesh.

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### *Incidence on alternate hosts*

To identify the alternate hosts that are sustaining the pink bollworm in this region periodical survey of seasonal and offseasonal vegetable crops and weeds in the nearby villages was taken up. The fruiting bodies of different vegetables crops and weeds were collected into paper bags and observed in the laboratory for pink bollworm damage and larval incidence from region to region. It appears that the seed cotton arriving in this area from far off Telangana district where cotton crop comes to harvesting much early in the season may be an important source for initial brood development. The damaged seed and lint that is normally separated and discarded in the ginning mills seems to have contributed to adult emergence and further development of pink bollworm on cotton crop. These findings are in line with the earlier observations of Sidhu and Dhawan (1985) who reported that cotton gin trash supported large population of pink bollworm.

### *Incidence in cotton stubbles*

The pink bollworm incidence occurred mostly from November and increased as the season advances. This insect can remain alive even in intact unopened bolls and inside seeds even after harvest of cotton and removal of crop from the fields. Thus regular random sampling of unopened and discarded bolls present on cotton stubbles that were stacked near various cotton fields and houses, was done from 20<sup>th</sup> March 1999 till utilisation as firewood i.e. 20<sup>th</sup> June 1999 at weekly interval. The pink bollworm damage in bolls and larvae present inside was assessed by cutting open the unopened bolls. A total of 573

unopened bolls were observed during the sampling period and as high as 77.83 per cent bolls were found damaged by pink bollworm. The pink bollworm damage was found to be very high in unopened discarded bolls recorded at different periods after harvesting of crop and the damage varied from 52.17 per cent (21<sup>st</sup> May 1999) to the maximum of 93.15 per cent (3<sup>rd</sup> April 1999). Further as many as 205 live larvae were recorded from 573 unopened bolls accounting to 35.77 larvae per hundred bolls (Table 3). The number of larvae per hundred boll varied from 11.91 (17<sup>th</sup> May 1999) to 79.45 (3<sup>rd</sup> April 1999) indicating that the cotton stubbles soon after harvesting supported high larvae population which gradually declined thereafter may be due to various reasons.

Thus it could be inferred that cotton stubbles supported high pest populations and formed an important link in the carryover of pink bollworm. The present findings are in accordance with the pest behaviour reported by earlier workers in North Indian conditions. The report that stacks of cotton stubbles were the major source for carryover of pink bollworm in Punjab (Simwat and Sidhu 1982) is amply testified the present observations. Also Nandal and Zile Singh (1985) observed that bigger stacks of cotton stubbles of 2m height resulted in more survival of pink bollworm larvae in stubbles.

#### Incidence on alternate hosts

As the pink bollworm is not active throughout the year it is realised that some other hosts must be supporting this pest through seasons. Since this pest has very narrow host range periodical observations were taken from vegetable crops and weeds belonging to Malvaceae family from the nearby villages during 1998-99 crop season and off season. Vegetable crop

bhendi *Abelmoschus esculentus* and mesta *Hibiscus cannabinus* and *H. sabdariffa* which were extensively cultivated for commercial purpose in this region. The survey revealed stray incidence on both mesta and bhendi in the first week of April 1999 by which time most of the cotton crop has been harvested. There was 6.25 per cent incidence of pink bollworm on mesta whereas on bhendi egg laying of pink bollworm could be observed on the under surface of the leaves in 2<sup>nd</sup> week of June 1999.

It is suggested that damaged kapas discarded in ginning mills and unpickable bolls on cotton stubbles are aiding in the carryover of pink bollworm in this region. The cotton stubbles preserved as source of firewood is unwittingly contributing to pest build up. The destroying of unpickable bolls by grazing of sheep followed by quick disposal of cotton stubbles and destroying of damaged kapas in ginning mills may help in containing the spread of pink bollworm from season to season.

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**Table 1.** Seed cotton arrival trends in ginning mill in Guntur district

Month	Sources of arrival
November	Nalgonda Devarakoda and other Telangana district
December	Kothagudem Nalgonda Warangal and Medak districts of A.P. and Orissa
January	Palnadu Krishna Warangal Khammam Medak and Coastal districts of A.P. and Orissa
February	Palnadu and local areas
March	Palnadu and local areas
April	Palnadu and local areas

**Table 2.** Pink bollworm adults in pheromone trap at ginning mill during 1998-99

Std. No.	Week From - to			No. of moths/trap
46	12	- 18	Nov	0
47	19	- 25		8
48	26	- 2	Dec	7
49	3	- 9		38
50	10	- 16		18
51	17	- 23		39
52	24	- 31		68
1	1	- 7	Jan	49
2	8	- 14		104
3	15	- 21		65
4	22	- 28		19
5	29	- 4	Feb	64
6	5	- 11		97
7	12	- 18		63
8	19	- 25		40
9	26	- 4	Mar	110
10	5	- 11		98
11	12	- 18		123
12	19	- 25		248
13	26	- 1	Apr	67
14	2	- 8		54
15	9	- 15		24
16	16	- 22		14
17	23	- 29		8
18	30	- 6	May	4
19	7	- 13		3
	Total			1432

**Table 3.** Pink bollworm incidence in cotton stubbles in stacks during 1998-99

Date	No. of bolls observed	No. of bolls damaged	Per cent damage	No. of larvae	No. of larvae per 100 bolls
20.3.99	91	74	81.31	69	75.82
03.4.99	73	68	93.15	58	79.45
05.5.99	38	27	71.05	13	34.21
10.5.99	49	43	87.75	14	28.57
17.5.99	42	38	90.47	5	11.91
21.5.99	46	24	52.17	6	13.04
29.5.99	50	29	58.00	1	2.00
04.6.99	63	43	68.25	8	12.69
12.6.99	68	56	82.35	14	20.58
20.6.99	53	44	83.01	7	13.20
Total	573	446	77.83	205	35.77

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