

1234 Changing Scenario of Pink Bollworm, *Pectinophora gossypiella*(Saunders) Incidence on Cotton

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Rationale: Pink bollworm, *Pectinophora gossypiella* (Saunders) incidence is increasing season after season causing economic damage. No information is available on its seasonal incidence on cotton in Karnataka under irrigated conditions.

Objectives: To study the changing pest status scenario of pink bollworm incidence on irrigated cotton.

Methods: Sex pheromone trap catches of adult moths of PBW was undertaken from 1995 to 2004 season. Trap catch observations were made thrice a week and average of three traps per night per month was worked out. PBW larval incidence was recorded on 25 randomly selected plants for rosette flowers and locule damage and 100 bolls were cut open to record larval population.

Results: Present study revealed that the pheromone trap catches of pink bollworm (PBW) *Pectinophora gossypiella* (Saunders) moths and incidence in bolls increased steadily over the years. The peak trap catches of PBW was noticed from November to February during cropping season over ten years period. Mean trap catches of PBW was 56.12, 48.04, 44.50 and 26.26 moths/ trap during November, December, January and February, respectively. Maximum percent rosette flowers ranged from 21.12 per cent in 2001-02 season to 23.55 per cent during 2004-05 season with highest incidence of bolls to the tune of 38.75 to 54.45 per cent. This resulted in the increased locule damage, which ranged from maximum of 44.80 per cent during 2001-02 to 62.56 percent in 2004-05 season later part of the season indicating the status of major pest of cotton under irrigated conditions.

Conclusion: PBW, *Pectinophora gossypiella* (Saunders) incidence is increasing considerably late in the cotton season under irrigated conditions which needs immediate management strategy.

Key words: Pink bollworm, irrigated cotton, Raichur, trap catches, Incidence

Introduction

Cotton pest scenario has witnessed considerable changes in Thungabhadra irrigated project area (TBP) of Raichur district, Karnataka during the last one decade. Bollworms such as *Helicoverpa armigera* (Hub.), *Earias vittella* (F) and *Pectinophora gossypiella* (Saund.) cause major threat to cotton production in this area. Pink bollworm gained much importance due

to its progressive incidence over the seasons and in spite of its narrow host range, it has been noticed regularly on cotton. Seasonal incidence of pink bollworm was largely influenced by the weather factors (Jha and Bisen, 1994) and its activity can be monitored by pheromone traps which help to develop the strategies for management (Singh and Lather, 1989 and Suresh, 2001). Steady increase in its incidence in the later stage of the crop reduces the cotton yield to the extent of 4 to 5 q/ha leading to low quality lint. Pink bollworm incidence goes unnoticed to the farmers since young larvae enter the cotton boll in the developing stage and remains inside by feeding on seeds. Its damage will be seen only when bad opened bolls with damaged seeds were found at harvesting stage. Non removal of stubbles and discarded damaged bolls left over in the cotton fields for larger period narrowed the interval between two seasons and it could support pest survival in off season and form an important link in the carry over of the pest (Jayaswal, 1971 and Simwat and Sidhu, 1982). Another reason for build up of pink bollworm is that, emergence of pink bollworm adults from the seed cotton received regularly in the local cotton mills (Siddu and Dhawan, 1985). PBW larvae can also survive in infested seeds but they undergo diapause lasting from 73 to 310 days, which was broken when the larvae were exposed to high humidity or after the seeds were sown and irrigated (Beltran and Garcia, 1983).

Considering the emergence pattern of this pest, an attempt was made to monitor the pest by pheromone traps over a decade and to assess its impact on incidence level in cotton bolls during the last four seasons under irrigated conditions.

Material and Methods

The present study was carried out both at Regional Agricultural Research Station, (RARS) Raichur and near by villages includes Nelhal, Ashapur and Udamgal of Raichur district, Karnataka, India to know the seasonal incidence of pink bollworm. Pheromone traps were set up over large area in RARS and regular data was recorded from 1995 to 2004 and also from the different villages since 2001. Trap catch observations were made thrice in a week and at each observation moths of pink bollworms were counted and removed before taking next count. Pheromone lures were changed at 15 days interval and sticky papers as and when required. Pheromone traps were installed 30 cm above the crop canopy and increased its height as crop growth advanced. Pheromone trap catch data has been presented in the form of averages of three traps catch/night/month. For recording various observations due to pink bollworm incidence, 25 plants were selected randomly from each location to record total flowers and rosette flowers and expressed as average per cent rosette flowers. Similarly, 100 bolls from each location at fortnightly interval were selected for recording pink bollworm incidence and expressed as average percent incidence to bolls. Locule damage was also recorded on randomly selected 25 plants by observing the bad open bolls in each location and expressed as percent locule damage (table 2).

Results and discussion

In general, pink bollworm moth catches was quite high at the time of sowing i.e., August to September months and gradually increased till the end of January and there after started decreasing gradually till the end of season in April. During 1995, maximum moth catches of 49.05 per night were recorded in the month of September and came down to 29.94 moths per trap in next month and remained constant till the end of cropping season in April 1996. In the 1996-97 cropping season maximum trap catches of 22.69 moths/night was recorded in the month of October and more or less same population in December and January months. There was steady increase in the trap catches during 1997-98 and 1998-99 cropping season reaching its peak population of 106.73, 103.25 and 200.50 moths/night in

the month of November in the year 1997, 1998 and 1999, respectively. When compared to all the seasons 1999-2000 cropping season recorded highest trap catches of 200.50 moths/night in November and gradually decreased to 65.60 moth/night in February, 2000. Trap catches were recorded low in the year 2001 and steadily increased in 2002, 2003 and 2004 with two peak trap catches during December and January and remained high in the 2004-05 cropping season (Table-1). Over all average monthly mean trap catches over 10 years period indicated that, moth catches were maximum in January (44.53 moths/night) and gradually came down to 2.58 moths/night in June and there after again increased in adult catches to reach peak of 48.04 moths/night in December (Fig.1).

Seasonal incidence of pink bollworm was recorded over four seasons from 2001-02 to 2004-05. During 2001-02 season, maximum per cent rosette flowers of 21.12 recorded with highest boll incidence of 38.75 per cent which resulted in 44.63 per cent locule damage. Pink bollworm incidence was 34.48 and 36.24 per cent with locule damage of 32.65 and 37.18 per cent during 2002-03 and 2003-04 season. Again in 2004-05 cropping seasons there was peak incidence of pink bollworm with maximum of 23.55 per cent rosette flowers with highest incidence of 54.45 per cent boll damage which resulted in 62.56 per cent locule damage (Table-2). In all the four seasons, maximum incidence was recorded in the month of January and February. Among all the cropping year, 2004-05 season recorded highest incidence which showed increasing trend of pink bollworm incidence (Fig. 2).

Thus, it could be concluded that pink bollworm activity was seen throughout the year (Singh, 1989) with higher catches/night starting from September to till the end of season in April which is in accordance with Suresh (2001) who reported the moth activity during September to March and fluctuate in between high and low while that in the month of December to February as constantly high. Moth activity seen throughout the year may be due to cotton stubbles and damaged bolls left over in the field even after harvesting which narrowed the interval between two cropping seasons and incidence carried to next season. Similar observation was made by Simwat and Sidhu (1982) in Punjab that stalks of cotton stubbles were the major source for carryover of pink bollworm. Beltran and Garcia (1983) reported that the larvae can survive in stored field infested seeds but they undergo diapause lasting from 73 to 310 days which was broken when the larvae were exposed to high humidity or after the seeds were sown and irrigated. Weather factor is also one of the important factors for the build up of pink bollworm incidence. Jha and Bisen (1994) reported that maximum and minimum temperature of $35 \pm 1^{\circ}\text{C}$ and $25 \pm 1^{\circ}\text{C}$ respectively combined with high relative humidity of $72 \pm 5\%$ were favourable for its multiplication. Usually this kind of weather prevails in the month of August to December in Raichur and its vicinity villages.

It is concluded that, several factors are responsible for pink bollworm to reach key pest status in Raichur district under irrigated ecosystem. Its incidence is high during December to March and the following measures are suggested to avoid the progressive incidence of pink bollworm in this area. Cotton stalks and damaged bolls left over in the field should be removed and destroyed immediately after kapas harvest. Destruction of damaged kapas in ginning mills may bring down the pink bollworm advancement over season to season.

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Table: 1 Monthly average data of PBW, *Pectinophora gossypiella* adult moth trap catches/night over 10 years period

Month/Years	Trap catches/night*										Mean
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	
January	20.15	13.65	20.08	30.58	49.09	98.33	18.50	78.75	62.15	54.00	44.53
February	10.30	22.69	9.83	42.83	21.01	65.60	15.33	7.00	23.50	44.50	26.26
March	5.93	18.56	13.40	12.65	19.20	9.58	14.25	6.60	5.25	14.25	11.97
April	10.74	14.00	11.08	13.04	10.92	4.65	1.00	0.20	0.20	0.25	6.61
May	6.38	6.19	8.75	10.08	0.92	2.33	0.90	0.65	0.10	0.25	3.66
June	14.81	2.44	0.23	2.73	1.66	2.56	0.98	0.20	0.10	0.08	2.58
July	23.94	2.13	12.48	2.48	0.08	10.38	0.90	0.72	0.15	0.25	5.35
August	30.31	11.13	7.58	5.56	16.75	21.30	6.20	8.08	4.25	2.25	11.34
September	49.05	22.63	17.68	19.33	15.13	4.58	5.00	26.60	2.40	11.75	17.42
October	29.94	22.69	53.00	60.25	27.33	10.00	14.15	11.45	2.25	5.00	23.61
November	24.94	7.50	106.73	103.25	200.50	17.00	16.46	20.05	34.25	30.50	56.12
December	19.38	21.56	33.58	33.58	91.80	11.75	21.90	43.28	144.20	59.40	48.04

* Mean of three traps

Years/months	% rosette flowers*	% incidence in cotton bolls**	% locule damage*
2001-02 Nov	6.33	7.00	10.68
Dec	15.23	11.25	44.63
Jan	21.12	35.00	40.62

Feb	11.24	38.75	44.50
Average	13.48	23.00	35.11
2002-03 Nov	14.04	8.28	6.08
Dec	12.31	17.00	15.15
Jan	20.40	22.66	22.12
Feb	13.52	34.48	32.65
Average	15.07	20.61	19.00
2003-04 Nov	5.29	20.50	7.69
Dec	15.49	28.00	16.15
Jan	12.09	27.33	22.24
Feb	16.08	36.24	37.18
Average	12.24	28.02	20.82
2004-05 Nov	5.51	11.80	9.24
Dec	23.55	25.28	21.22
Jan	15.28	52.22	38.40
Feb	6.12	54.45	62.56
Average	12.62	35.94	32.86
*Mean of 25 plants observation ** Mean of 100 bolls			

Table: 2 Seasonal incidence of pink bollworm on cotton under irrigated ecosystem

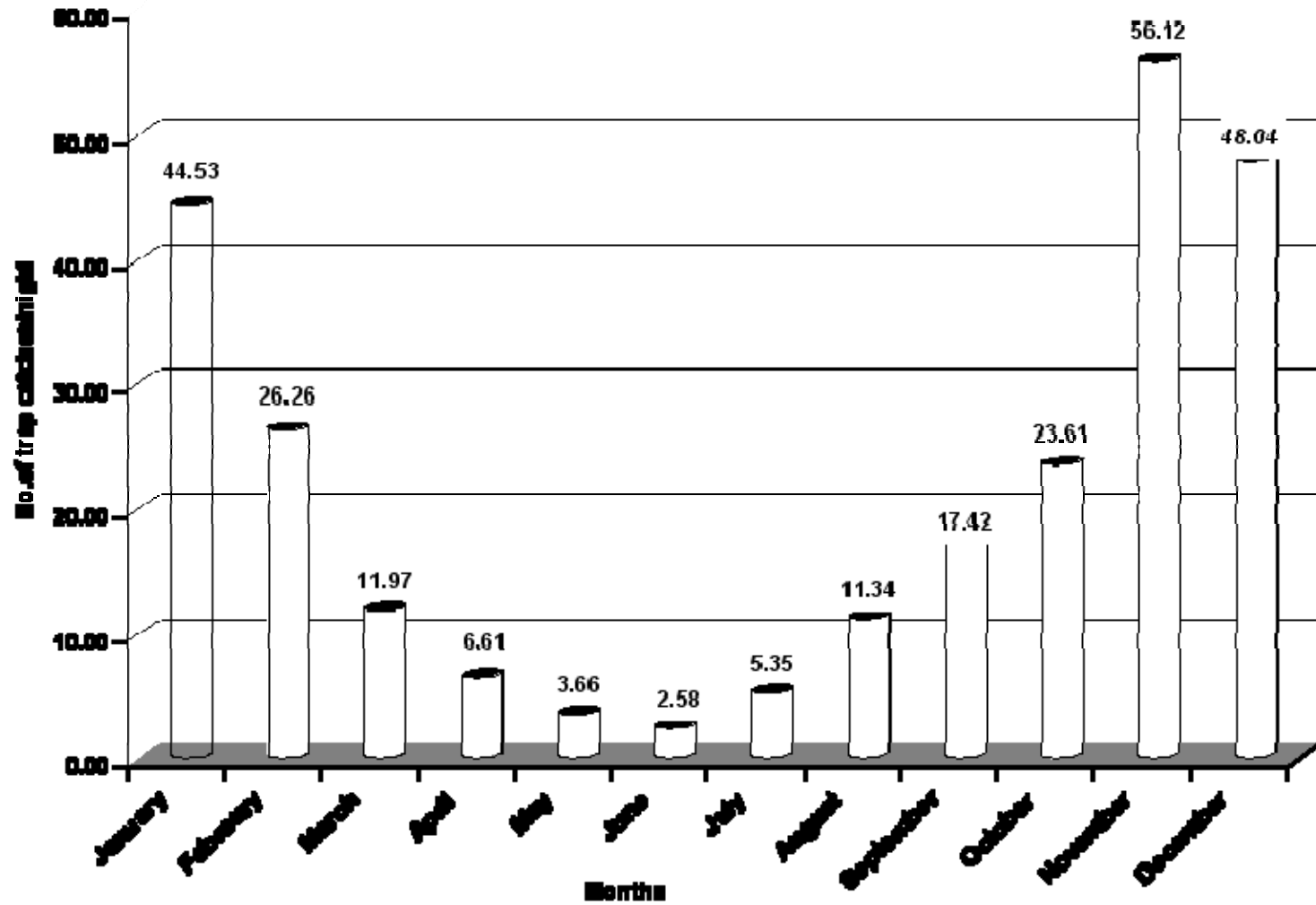


Fig. 1 Mean monthly pheromone trap catches of pink bollworm over 10 years period (1995-2004)

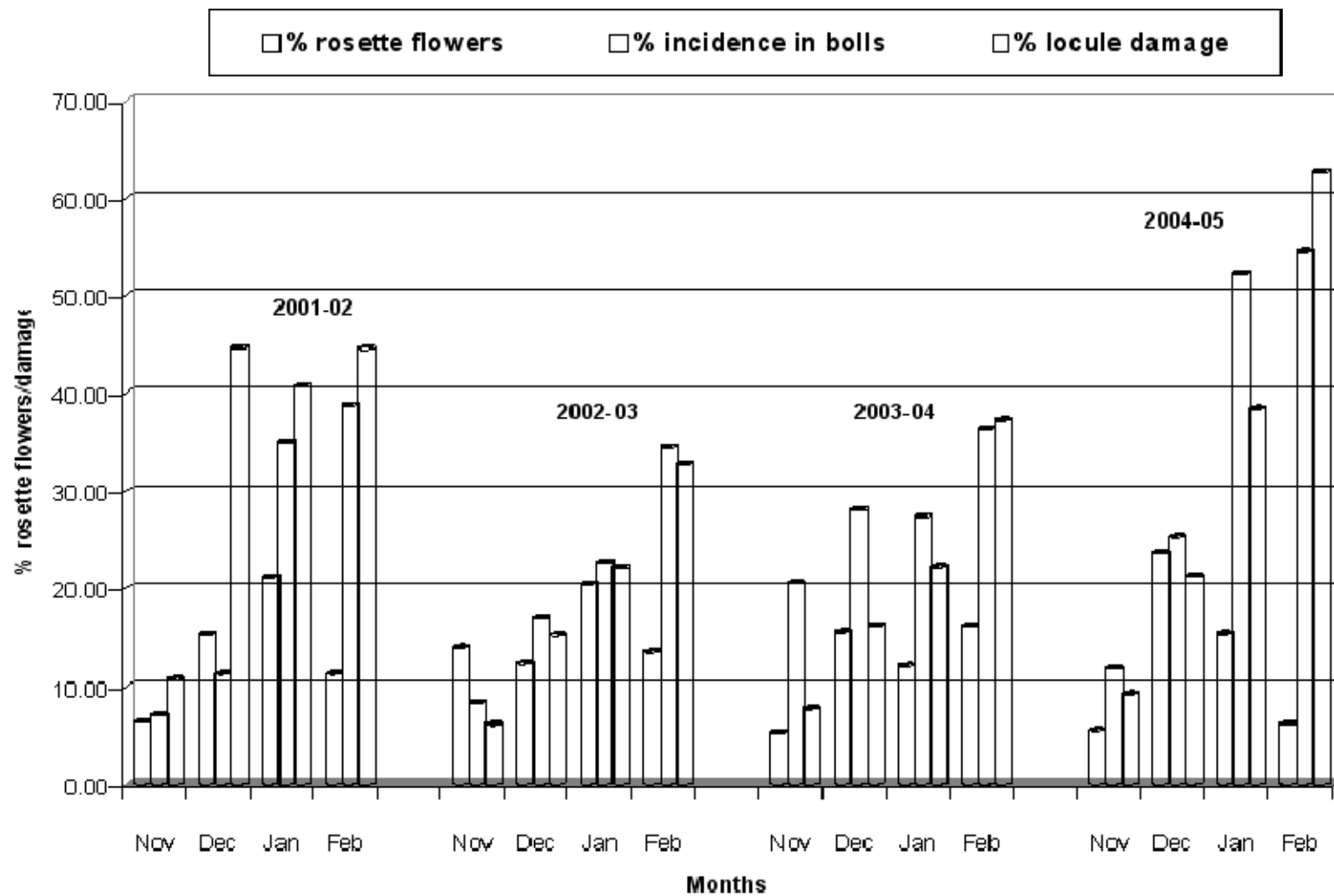


Fig.2 Seasonal incidence of pink bollworm on cotton under irrigated ecosystem