Indian Journal of Entomology 84(4): 903-905 (2022) DoI No.: 10.55446/IJE.2022.161

MANAGEMENT OF PINK BOLLWORM *PECTINOPHORA GOSSYPIELLA* (SAUNDERS) IN COTTON

Lakshmi Narayanamma* V, Ratnakar[1] V and Veeranna G[2]

Krishi Vigyan Kendra, Bhadradri Kothagudem, Professor Jayashankar
Telangana State Agricultural University (PJTSAU), Rajendranagar, Hyderabad 500030, Telangana, India
[1]Department of Entomology, College of Agriculture, PJTSAU, Jagtial 505529, Telangana, India
[2]District Agricultural Advisory and Transfer of Technology Center (DAATC),
PJTSAU, Mudhole 504102, Telangana, India
*Email: lakshmipalem9@yahoo.com (corresponding author)

ABSTRACT

Demonstrations were conducted to assess the damage potential caused by the pink bollworm *Pectinophora gossypiella* (Saunders) and its management strategies were worked out through technology demonstration and check (farmer's practice). Results revealed that >10% rosette flowers were observed, starting from 36th standard meteorological week (SMW) up to 2nd SMW except during 49th to 52nd SMW. In contrast, in control, maximum incidence was during October Ist fortnight (25.92%). Incidence of larvae on green bolls of Bt cotton was noticed from first fortnight of September (36th SMW) (8.4 larvae/ 50 bolls) with a peak during the second fortnight of December (51st and 52nd SMW) (19.2 larvae /50 bolls); the green boll damage ranged from 8.9 to 18.4 with a mean of 14.72% in treatment and 12.6 to 20.8 with a mean of 28.38% in control, respectively. Significantly higher income was obtained with the technology demonstrated plots, with high benefit cost ratio.

Key words: *Pectinophora gossypiella*, cotton, damage, incidence, assessment, rosette flower,, seasonal incidence, management, gross income, net returns, cost benefits

The insect pest's spectrum of cotton is quite complex and as many as 1326 species of insect pests have been reported, and 130 of these occur in India. Among these, the boll worms viz., *Helicoverpa armigera* (Hubner)- the American boll worm, *Earias vitella* (F.)- the spotted boll worm and *Pectinophora gossypiella* (Saunders)- pink boll worm pose greater threats to cotton production (Agarwal et al., 1984). Among these the pink boll worm has assumed major pest status (Ghosh, 2001), causing serious losses (Patil, 2002; Narayanan, 1962; Agarwal and Katiyar, 1979). It has become a major threat to *Bt* Cotton in the last 2 years and is causing considerable loss to cotton in terms of yields. *Pectinophora gossypiella*, once a serious problem for non *Bt* cotton especially in later stage of the crop has now become a major problem in *Bt* cotton hybrids appearing from the flowering stage inflicting damage. Thus, it is a major problem, primarily because of long duration varieties and absence of any potent control measures. The simplest way to overcome the problem is to take up timely sowing and cultivate early maturing varieties of about 150 days duration. In Bhadradri Kothagudem district, cotton is the predominant crop grown by tribals. These tribals are unable to diagnose the pest and assess its damage potential. Hence, the present study to assess the damage caused by *P. gossypiella* in cotton and on its management strategies.

MATERIALS AND METHODS

The present study was undertaken at farmers' fields of Bhadradri Kothagudem district of Telangana in medium black soils with cropping pattern of cotton followed by summer pulses with two treatments viz., technology demonstration and check (farmers practice). Technology demonstration treatment included installation of pheromone traps @ 20/ ha from 45 DAS and continue them till the last picking/ end of the crop period. Lures of traps were changed at 21 days interval. If trap catches exceed 8/ day for 3 consecutive days/ if 10% rosette flowers or 10% damaged green bolls are observed then the schedule of sprays as below followed rotating the chemicals on need basis- a) azadirachtin 1500 ppm @ 5ml/ l with surf (1g); b) quinalphos @ 2ml/ l or emamectin benzoate 0.5 g/ l; c) thiodicarb @ 1.5 g/ l; d) spinosad @ 0.35 ml/ l; e) cypermethrin 1ml/ l or lambda cyhalothrin @ 1 ml/ l (1 or 2 times in later stages of the crop; followed by collection and destruction of rosette flowers. Farmer's practice includes spraying

of insecticides like acephate 1.5 g/ l, chlorantraniliprole 0.3 ml/ l, and lambda cyhalothrin 0.5 ml/ l.

The experiment was conducted for three years i.e. during kharif 2018-19, 2019-20 and 2020-21. Mahyco Bt cotton hybrid was the crop following row to row and plant to plant spacing of 90 x 60 cm. The crops were grown following all the agronomic practices.

The following observations were made to monitor the moth activity. Gossyplure pheromone baited traps were installed in the ten farmer fields @ 20/ ha. The septa with Pectino-lure (cis-7 hexadecen-1-ol acetate) were changed at 21 days intervals; trap catches largely reflected the larval population density and infestation levels. A weekly collection of moths from each trap was made and the total number pooled separately for every standard week and the mean number of catches/ standard meteorological week (SMW) was calculated. If pheromone trap catches exceeds 8/ day for 3 consecutive days or if 10% rosette flowers or 10% damaged green bolls are observed, then sprays were followed rotating the chemicals on need basis as follows- quinalphos @ 2 ml/ l or emamectin benzoate 0.5 g/ l or thiodicarb @1.5 g/ l or spinosad @ 0.3 ml/ l at 15 days interval. Only one spray of cypermethrin 1ml/ l or lambda cyhalothrin @ 1ml/ l was taken up by the farmers during flowering stage. The observations on rosette flowers were recorded from 60 DAS in fortnightly intervals on 50 randomly selected plants. Later, the total number of flowers and rosette flowers were counted and the % worked out. The observation on the occurrence in green bolls was recorded at fortnightly intervals. The total number of larvae/ 50 green bolls was worked out. During larval counts, the number of bolls damaged was expressed in terms of % green boll damage.

RESULTS AND DISCUSSION

The incidence of *P. gossypiella* observed in terms of rosette flowers on 50 randomly selected plants revealed that it was >10% starting from 36th up to 2nd SMW except during 49th to 52nd SMW in the treatments (Table 1). The incidence was noticed from the first fortnight of September and increased gradually reaching its peak during the second fortnight of September (17.02%), and then declined gradually up to December II fortnight (6.32%) due to the formation of bolls. Remarkably, rosette flowers increased during January I fortnight (1st and 2nd SMW) to 12.65%, reason being, the farmers who are having the irrigation facility wanted to prolong the crop duration, as a result, due to the availability

Table 1. Incidence of *P. gossypiella* in cotton (Pooled data, 2018-19, 2019-20 and 2020-21)

Particulars	Treatment plots			Control plots		
	Rosette flower (%)	No. of larvae/ 50 bolls	Green boll damage (%)	Rosette flower (%)	No. of larvae/ 50 bolls	Green boll damage (%)
September I FN (36 & 37th SMW)	14.89	8.4	8.9	18.01	18.4	13.9
September II FN (38 & 39th SMW)	17.02	9.6	10.6	19.29	15.6	12.6
October I FN (40 & 41st SMW)	16.12	15.6	16.4	21.12	25.6	19.4
October I FN 42 & 43rd	15.92	18.8	17.8	25.92	22.8	19.8
November I FN 44, 45 and 46th	12.84	14.2	12.8	16.84	22.2	20.8
November II FN 47 & 48th	13.92	12.6	18.4	15.92	21.6	19.4
December I FN 49 & 50th	6.96	18.6	16.2	8.96	19.6	18.2
December II FN 51 & 52nd	6.32	19.2	17.8	10.32	21.2	16.8
January I FN 1 & 2nd SMW	12.65	15.8	13.6	13.65	16.8	14.6
Mean	12.96	14.76	14.72	16.67	20.42	28.38
SD±	6.02	13.02	10.96	8.02	15.01	14.96

SMW = Standard meteorological week; SD± Standard deviation

Table 2. Economics and net returns in cotton (pooled data, 2018-19, 2019-20 and 2020-21)

Particulars	2018-19		2019-20		2020-21	
	Treatment	Control	Treatment	Control	Treatment	Control
Mean yield (kg/ ha)	1865	1707	1955	1808	2015	1825
Gross income (Rs./ ha)	96047	87936	98962	94894	84,630	71,650
Total cost of cultivation (Rs./ ha)	54950	62960	55050	62960	45,835	46,750
Net returns (Rs./ ha)	41,097	24,976	43,912	31,934	38,795	24,900
Benefit: cost ratio	1.75:1	1.40:1	1.81:1	1.50:1	1.85:1	1.53:1

of fresh flowers, damage increased, and ranged from 6.32 to 17.02, as against during October I fortnight with a maximum of 25.92% in untreated control. The present results corroborate with Patil (2002), Verma et al. (2017). And Muttappa Yalawar and Patil (2019). The incidence in green bolls was noticed from the first fortnight of September (34th SMW) with peak being during the second fortnight of December (48th SMW).

The incidence of larvae on green bolls of Bt cotton was noticed from first fortnight of September (36th SMW) (8.4 larvae/ 50 bolls) and increased gradually to reach its peak during the second fortnight of December (51st and 52nd SMW-19.2 larvae/ 50 bolls), and thereafter, it declined. Significantly more larvae were observed in control (15.6 to 25.6 larvae/ 50 bolls), though were observed until harvest. These results corroborate with those of Patil (2002), Verma et al. (2017) and Muttappa Yalawar and Patil (2019). In treatment, the green boll damage was noticed from the first fortnight of September (36th and 37th SMW- 8.9 %), and increased up to November second fortnight (47th and 48th SMW); thereafter, it declined with maturity of bolls. The green boll damage was 14.72% in treatment aa against 28.38% in control. Kranthi (2015) on BG-II observed it as significantly higher during 2012, 2013 and 2014. X Babu and Meghwal (2014) recorded 2.50 to 47.79 and 0.05 to 1.90% at Vadodara and Kheda districts, respectively. Rath Badiger et al. (2011) observed 1.19 larvae/ 20 green bolls in MRC-7918 BG-II hybrid. Significantly more income was obtained in the technology demonstrated plots, and it was Rs. 98,962 and 94,894/- in the treatment and control, respectively during 2019-20 (Table 2). But, the highest cost benefit ratio of 1.85:1 from the technology demonstrated plot was during 2020-21; this ratio was high in treatment compared to control plot during all three years. Thus, technology provided was effective for the farmers.

REFERENCES

Agarwal R A, Katiyar K N. 1979. An estimate of losses of kapas seed due to boll worms on cotton in India. Indian Journal of Entomology 41(4): 143-148.

Agarwal R A, Gupta G P Grag D O. 1984. Cotton pest management in India. Research Publication, Azad Nagar, Delhi. 191 pp.

Babu R S, Meghwal M L. 2014. Population dynamics and monitoring of sucking pests and bollworms on Bt cotton in humid zone of Southern Rajasthan. The Bioscan 9(2): 629-632.

Badiger H K, Patil S B, Udikeri S S, Biradar D P, Chattannavar S N, Mallapur C P, Patil B R. 2011. Comparative efficacy of inter-specific cotton hybrids containing single and stacked Bt genes against pink boll worm, *P. gossypiella* (Saund.) and tobacco caterpillar, *S. litura* (Fab.). Karnataka Journal of Agricultural Sciences 24(3): 320-324.

Ghosh P K. 2001. ISCI Silver jubilee lecture series-lecture. Genetically modified crops in India with special references to Bt-cotton. Journal of Indian Society for Cotton Improvement 18(4): 106-107.

Kranthi K R. 2015. Pink bollworm strikes Bt cotton. Cotton Statistics News 35(1): 1-6.

Muttappa Yalawar, Patil S B. 2019. Seasonal incidence of pink boll worm *Pectinophora gossypiella* (Saunders) on Bt cotton. International Journal of Current Microbiology and Applied Sciences 8(12): 351-360.

Narayanan E S. 1962. Biology and method of control of some important insect pests of cotton in India. Indian Central Cotton Committee Publication, Bombay. 44 pp.

Patil S B. 2002. Studies on management of cotton pink bollworm *Pectionophora gossypiella* (Saunders) (Lepidoptera: Gelechidae). Ph D Thesis, University of Agricultural Sciences, Dharwad. pp. 43-61.

Verma S K, Singh D R, Jeewesh S, Saurabh S, Nirvesh Yadav. 2017. Population dynamics of pink boll worm, *P. gossypiella* (Saunders) in cotton crop. International Journal of Pure and Applied Bioscience 5(2): 801-806.

(Manuscript Received: May, 2021; Revised: December, 2021;
Accepted: December, 2021; Online Published: February, 2022)
Online First in www.entosocindia.org and indianentomology.org Ref. No. e21137