



## Status of Pink Bollworm Infestation in Prevailing Transgenic Cotton in Southern Maharashtra

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### ABSTRACT

A field investigation was conducted to assess the incidence of pink bollworm in cotton-growing areas of Fulambri block, Chhatrapati Sambhajinagar district, Maharashtra. Ten cotton farmers cultivating different cotton genotypes across seven villages were selected for the study. Observations were recorded on boll damage, locule damage, and larval population of pink bollworm under field conditions. The results indicated considerable variation in infestation levels among the selected fields. Boll damage caused by pink bollworm ranged from 20 to 60 per cent, with an average infestation of 40 per cent. Similarly, locule damage varied between 5 and 60 per cent, recording an average of 19.75 per cent. Presence of pink bollworm larvae was also observed in several fields, with an average larval population of 0.30 larvae per 20 bolls. The findings revealed that pink bollworm infestation remains a serious threat to cotton cultivation in the region, causing substantial damage to developing bolls and locules, ultimately affecting yield and fibre quality. Variations in infestation among different genotypes and villages suggest the possible influence of crop management practices, varietal susceptibility, and environmental conditions. Continuous monitoring and adoption of integrated pest management strategies are essential for effective management of pink bollworm in cotton ecosystems of Maharashtra.

**Keywords:** Pink Bollworm; Cotton; Boll Damage; Locule Damage; Maharashtra.

### INTRODUCTION

Over a decade, introduction of transgenic cotton in Southern Maharashtra has brought a sea of changes in economic condition of farmers' apart from bringing down dependence on chemical pesticides to manage key insect pest's bollworm (*Helicoverpa armigera* Huber). The technology was so

much successful and easy to adopt by farmers that majority of seed companies transformed their cotton varieties to transgenic by incorporating cry-1Ac (Bollgard) in 2002 and cry-1Ac and cry-2Ab genes in 2006 (Bollgard II); and as on now more than 2000 transgenic cotton varieties are available for commercial cultivation (Anonymous, 2017a).

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Introduction of transgenic has cut down around 70% use of chemical pesticides for bollworms (Kranthi, 2012), thereby resulting in savings in terms of production. During pre-Bt era, farmers' use to get on an average cotton yield of 207 kg lint/ha, which increased to 418 kg lint/ha (Kranthi, 2012). However, this increasing trend has started downward trend because of pest co-evolving with the level of toxins. This has resulted in up-urge of lesser important insect pests like sucking pests whiteflies (*Bemisia tabaci*) jassids (*Amrasca devastans*) and pink bollworm (*Pectinophora gossypiella*). Yield stagnation status can be due to most of the long duration hybrids (180-200 days) not suited for rainfed condition leading to moisture stress during critical phase of boll formation. Also, many hybrids show greater incidence of sap-sucking insects, leaf-curl virus and leaf reddening, adding to input costs (Bhosle et al. 2010). In view of increasing incidence, farmers have started using spray of insecticides (e.g., Monocrotophos + acephate) to manage pink bollworm (Kranthi, 2015). This trend is doing away with all the benefits incurred to beneficials as well as economics by use of Bt. Since, there was a uncertainty among farmers, roving field survey was conducted on regular basis to document reaction of released genotypes against key pests and to monitor variability in pest population under farmer's field conditions during 2016-17 since 29 SMW onwards till second picking 52 SMW in Fulambri block (26135 ha) of Aurangabad district with an area of 380680 ha (Anonymous, 2017b) under cotton to monitor the infestation of pink bollworm.

#### MATERIALS AND METHODS

Seven villages from Fulambri block of Chh. Sambhajinagar district (M.S.) were selected and from these villages 10 farmers growing cotton with different genotypes were selected. Observations were recorded during each meteorological week from 29 SMW till 52 SMW. For this, during each meteorological week, randomly 20 bolls were picked from each farmer's field as a destructive sampling and were dissected for knowing infestation level of pink bollworm. The observations were

recorded on percent boll and locule damage as well as presence of larvae.

#### RESULTS AND DISCUSSION

The results presented in Table-1 revealed that the incidence of pink bollworm, *Pectinophora gossypiella* Saunders, caused considerable damage to cotton bolls and locules in the surveyed fields. The boll damage due to pink bollworm ranged from 20 to 60 per cent, with an average infestation of 40 per cent. Such a high level of boll infestation clearly indicates the serious threat posed by pink bollworm to cotton production. The pest feeds internally within developing bolls, resulting in damaged seeds, reduced lint quality, premature boll opening, and substantial yield reduction. Variability in boll damage among different fields may be attributed to differences in sowing time, crop stage, varietal susceptibility, climatic conditions, and management practices adopted by farmers.

The locule damage was observed in the range of 5 to 60 per cent, with an average locule damage of 19.75 per cent. Locule damage is considered one of the most important indicators of pink bollworm severity because larvae feed inside the locules and remain concealed, making management difficult. Higher locule infestation adversely affects seed development and lint formation, ultimately lowering both yield and market value of cotton produce. In addition, pink bollworm larvae were recorded in some of the sampled fields, with an average larval population of 0.30 larvae per 20 bolls. The presence of larvae inside bolls confirmed the active infestation and reproductive success of the pest in the study area.

The present findings are in close agreement with earlier reports on pink bollworm incidence in cotton ecosystems. Kranthi (2015) reported severe pink bollworm infestation in Gujarat, with boll damage reaching up to 80 per cent during 2014 and 67 per cent during 2015. Similarly, Verma et al. (2017) observed 28.88 per cent open boll damage during 2012 and 29.99 per cent during kharif 2013. Compared to these studies, the

current investigation also demonstrated substantial pest damage, indicating that pink bollworm continues to remain a major constraint in sustainable cotton production. The increasing incidence of the pest may be associated with continuous cotton cultivation, delayed crop termination, development of

resistance against Bt cotton, and unfavorable management practices. Therefore, timely monitoring and adoption of integrated pest management strategies are essential to minimize economic losses caused by pink bollworm in cotton cultivation.

**Table 1: Status of pink bollworm on Bt Cotton (Bollguard-II) in Tq. Fulambri Dist. Chh. Sambhajinagar (M.S.)**

Sr No	Village	Cotton Area (ha)	Variety	Damage (%)		PBW Larva (Nos)
				Boll	Locule	
1	Dongargaon (Kawad)	02.00	Cv. Deltapine	50	38	0
2	Dongargaon (Kawad)	01.50	Cv. Bahubali	60	60	0
3	Dongargaon (Kawad)	02.00	Cv. Mallika	50	18	1
4	Bhoygaon	01.00	Cv. Bahubali	30	08	0
5	Pimoalgaon (Gangdev)	01.50	Cv. Mallika	20	10	0
6	Aadgaon	01.00	Cv. Sardar	40	10	1
7	Pirbawda	02.00	Cv. Deltapine	30	15	0
8	Narla	02.00	Cv. Mallika	50	18	1
9	Narla	01.00	Cv. Viththal	20	05	0
10	Waghalgaon	02.00	Cv. Bahubali	50	18	0
AVERAGE				40	19.75	0.30

## CONCLUSION

The present findings clearly indicate that pink bollworm remains a serious threat to cotton production, causing considerable economic losses through extensive boll and locule damage. The study revealed that boll damage ranged from 20 to 60%, with an average infestation of 40%, demonstrating the severe impact of the pest on cotton yield and quality. Similarly, locule damage varied between 5 and 60%, with an average of 19.75%, indicating substantial deterioration of seed and fibre quality. The occurrence of pink bollworm larvae in several surveyed fields, with an average population of 0.30 larvae per 20 bolls, further confirms the active presence and establishment of the pest in cotton-growing areas.

The variability in infestation levels among fields may be attributed to differences in sowing time, crop stage, climatic conditions, and pest management practices adopted by farmers. Continuous infestation by pink bollworm can significantly reduce market value and productivity of cotton if timely

management measures are not implemented. Therefore, regular field monitoring, installation of pheromone traps, destruction of crop residues, timely sowing, and adoption of integrated pest management (IPM) strategies are essential for effective suppression of the pest population. The use of resistant or tolerant varieties along with judicious insecticide application can further help in minimizing crop losses. Overall, sustainable and integrated management practices are necessary to reduce pink bollworm incidence and ensure profitable cotton cultivation.

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## Conflict of Interest:

The authors declare no competing interests.

**Author Contributions:**

Conceptualization, writing, and revision were performed by all authors. All authors approved the final manuscript.

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