

Weekly Publication of



**Cotton
Association
of India**

COTTON STATISTICS & NEWS

Edited & Published by Amar Singh

2020-21 • No. 23 • 17th November, 2020 Published every Tuesday

Cotton Exchange Building, 2nd Floor, Cotton Green, Mumbai - 400 033
Phone: 3006 3400 Fax: 2370 0337 Email: cai@caionline.in
www.caionline.in

Is Bt Cotton in North Cotton Zone of India Under Threat from Pink Bollworm?

Dr. Monga is a Plant Pathologist by profession. He worked as Head of Regional Station, Sirsa, Haryana of ICAR-Central Institute for Cotton Research for more than two decades. He also worked as Principal Investigator of Plant Pathology under All India Coordinated Research Project on Cotton for over a decade. He contributed significantly in strengthening the research and development network for cotton crop in the North Zone.



GUEST COLUMN

Dr. Dilip Monga
*Ex-Head, ICAR-Central Institute for Cotton
Research, Regional Station, Haryana*

protected from American, spotted and pink bollworms.

However, during 2015, severe damage to BG II cotton by pink bollworm and yield losses were observed in many regions of Gujrat and some parts of AP, Maharashtra and Telangana.

Studies conducted at ICAR-CICR showed that pink bollworm had developed resistance to two Cry toxins deployed in BG II. (Kranthi, 2015).

After the introduction of single (Cry1Ac) gene transgenic cotton in Central and South Zone in 2002 and in North Zone of India in 2005 and subsequent approval of dual gene (Cry1Ac + Cry2Ac BG II) hybrids in 2006, cotton crop was

Again in 2017-18, Maharashtra state witnessed unprecedented attack and losses due to pink bollworm infestation in cotton. However, in North cotton zone, BG II cotton hybrids continued to remain effective against pink bollworm whereas the pest used to cause damage (Table 1) in non Bt

Table-1 Pink Bollworm Larval recovery (%) from green bolls in non Bt cotton crop at 160 days from different locations of the North Zone

S.N	Locations	2016-17	2017-2018	2018-19	2019-20
1.	RRS, Bathinda*, Punjab	15.4-18.7	4.0-7.1	5.0-11.3	10.0-18.0
2.	RRS, Faridkot*, Punjab	12.2-18.0	4.7-8.2	6.0-8.3	4.0-8.0
3.	ARS, Sriganaganagar**	15.6-22.5	3.6-7.6	6.0-6.3	6.0-14.0
4.	CICR, RS, Sirsa	10.2-13.6	4.0-6.9	4.7-6.7	4.0-16.0
5.	CCS HAU, Hisar	10.2-18.6	6.3-9.6	6.3-8.7	4.0-14

*Regional Research Station of Punjab Agricultural University, **Agricultural Research Station of Swami Keshwanand Rajasthan Agricultural University, Bikaner

especially desi cottons (*G arboreum*) that is grown in a small area (Rishi, personal communication).

Pink Boll Worm on BG II Cotton Hybrids

Pink bollworm infestation was noted on BG II at two locations (Jind in Haryana and Bhatinda in Punjab) during 2018-19, but this was restricted near the ginning factories –cum –oil extraction units. However, this created anxiety among the scientists of regional station of ICAR-Central Institute for Cotton Research (ICAR-CICR) located at Sirsa and forced further investigation regarding the cause of its occurrence.

During investigation, it was found that to keep the mills in operation round the year and to earn higher profit, many of the ginners in the North Zone were procuring cotton seeds from central and south Indian states like Gujarat, Andhra Pradesh and Telangana. The main reason

for this was that the quality of cotton cake as well as the oil extraction percentage from procured seeds was superior and fetched better price compared to local cotton seeds. It was further observed that when such procured seeds were heaped in the open, the cotton fields in the vicinity showed highest infestation. The infestation levels decreased in fields away from the unit.

During 2019-20, the infestation was again observed at three locations in Haryana and it further increased to five locations during the current year till date. However, the data recording was still in progress at the time of writing this article. In Punjab, around 100 acres of cotton crop has come under the attack of pink bollworm in Jodhpur Romana village in Bhatinda district this year. Aggrieved farmers under the banner of Bhartiya Kisan Union gheraoed the officials who visited the affected fields. (Tribune news service,

Fig 1: Damage due to Pink Bollworm in BG II Hybrids in North Zone



1-Rosette flower 2-PBW exit hole 3-Larva in green boll 4-Damaged open boll

Table 2: Pink Bollworm incidence on BG II hybrids from North Zone

State	Districts	No of villages and Incidence (%)					
		2018		2019		2020	
		No	Incidence	No	Incidence	No	Incidence
Haryana	Jind	1	100	3	1.25-58.52	5	0.5-10(up to August, 2020 and data in Progress)
Punjab	Bathinda	1	5.53-27.76	1	0-30	1	Upto 30% (data in progress)
Rajasthan	----	- No report So far from BG-II cotton					

Bhatinda, September 3,2020). A farmer Sukhwant Singh of the village informed that 80-90 % of his crop has been damaged by pink bollworm (Fig. 1 and Table 2).

Bioecology and Resistance Monitoring

Studies were conducted on larvae collected from pink bollworm infested bolls in farmer fields. The larvae collected from another area from non-Bt cotton were kept as controls for comparison. The results of the study revealed that the larval duration was short in case of larvae collected from BG II surviving population (no larval diapauses/hibernation), whereas it was very long (larval diapauses) in the control population. It is well known that the population of North Zone shows natural larval diapauses as the cotton season is followed by wheat.

This gave indications that larval population collected from BG II infested bolls was different from North Zone population and might have been brought along with seed transported from Central and South Zone which had acquired resistance against BG II were responsible for this damage and the native population of North Zone did not cause any damage to BG II hybrids. (Rishi et al. 2020).

Possibility of Spread of Pink Bollworm Resistant to BG II In North Zone

The information generated during the past three years including the current season, clearly indicates the spread of pink bollworm slowly from the initially observed areas. In Punjab, there are around 40 factories dealing with ginning and oil extraction. In Haryana, there are about 200 units and in Rajasthan around 75 units. Around

25 million tons of cotton seed brought from Central and South Zone is used by various mills for oil extraction (personal communication with Shri. Mahesh Sharda, President, Indian Cotton Association Limited, Bhatinda and Shri. Kailash Garg, Kailash Cotton Factory, Bhatinda).

The seed is stored sometimes in open spaces also before crushing. The adults may emerge from resistant pink bollworm larvae present in such seed and cause damage to the cotton crop in nearby fields.

A detailed study of year-round cotton seed trade from outside the zone needs to be conducted urgently to make a clear assessment of trade. There also is a distinct possibility of development of new focal points arising from the resistant larvae being brought along with the transported cotton seed from Central and South Zone by the ginning and oil extraction units around the different cotton growing areas of North Zone. The infestation can then further spread to adjoining areas around the newly developed focal points.

In addition to that, seed cotton is also transported from outside the zone (personal communication with Shri. Kailash Garg, Kailash Cotton Factory, Bhatinda) for which exact information needs to be generated as this can also become a source for spread of resistant pink bollworm larvae in the zone thereby causing losses to the cotton crop.

Steps Initiated

An advisory based on the developing situation was issued by the Regional Station

of ICAR-Central Institute for Cotton Research, located at Sirsa, to three state agricultural universities and state departments of agriculture in the region in 2019, to gear up their resources and prepare strategies for pink bollworm management. A project on IRM: Dissemination of pink bollworm management strategies from Department of Agriculture Cooperation and Farmers Welfare, Government of India already in operation in Central and South Zone, was extended to North Zone and started operating from ICAR-CICR, Sirsa Regional Station from 2019-20. Awareness meets for ginning cum oil extraction unit operators and farmers were organised regularly.

Management Strategies to be Followed

- Avoid movement of cotton seed from the states of Central and South Zone, where incidence of bollworms on BG-II cotton is already prevalent, to North Zone.
- If seed is being transported, then install pheromone traps in such units for mass trapping of adults. Trapped adults should be destroyed/killed.
- Ensure proper cleaning of mills in April and fumigation of such seed left uncrushed in the mills. Fumigation using Celphos/Phostoxin/Delicia @ one 3-g tablet per cubic metre space should be done by exposure for 48 hours. In case of 24 hours exposure use, two tablets each of 3g can be used.
- Installation of pheromone traps @ 5/ha, after 45 days of sowing for monitoring moth activity of pink bollworm in fields located around ginning factories cum oil extraction units.
- Such farmers should inspect the crop at squaring and flowering stage. Rosette flowers suspected for the presence of pink bollworm larvae should be removed and destroyed.
- At boll formation stage, these farmers are advised to inspect for presence and damage of pink bollworm larvae within bolls.
- Recommended chemical control measure should be initiated when pest crosses

Economic Threshold Level (ETL) i.e. 10 % damaged bolls (at least two bolls out of 20 having white or pink larvae or exit holes) or 8 moths catch per pheromone trap per night for consecutive 3 days.

- Picking of clean and infested cotton may be carried out separately. Clean cotton may be stored or marketed. Infested cotton should be destroyed.
- After the last picking, allow sheep, goats and other farm animals into cotton fields to feed on plant debris and un-opened bolls. Destroy residual stalk and partially opened bolls.
- Do not stack the cotton sticks under shade or in the field. Beat the sticks on ground to dislodge the pink bollworm larvae surviving the unopened bolls. Stack the cotton bales vertically.
- Prevent the movement of the cotton stalk from the infested areas to the new areas.

Acknowledgement

I acknowledge with thanks for the help provided by Dr. Rishi Kumar, Principal Scientist, (Agricultural Entomology), CICR, Regional Station, Sirsa; Shri. Mahesh Sharda, President, Indian Cotton Association Limited, Bhatinda and Shri. Kailash Garg of Kailash cotton factory, Bhatinda for sharing information.

References

K. R. Kranthi (2015). *Pink bollworm strikes Bt cotton*. *Cotton Statistics and News*. No 35 1-5

Rishi Kumar, D Monga, V. Chinna Babu Naik, Param Jeet Singh and V.N. Waghmare (2020). *Incipient infestations and threat of pink bollworm Pectinophora gossypiella (Saunders) on Bollguard II cotton on northern cotton growing zone of India*. *Current Science*, Vol 118, No. 9, 1454-1456.

(The views expressed in this column are of the author and not that of Cotton Association of India)
