Research Article
Open Access
CrossMark

Studies on percent shoot infestation by *Leucinodes orbonalis* (guen) in Bt and non Bt brinjal hybrids

Abstract

The average damage of shoots in transgenics(MHB 80 Bt-0.15% to MHB 39 Bt- 0.59 %) which was much less than the non Btbrinjal hybrids (MHB 4 non Bt-12.14 % to MHB J 99 non Bt-13.81% created) and the national check Pusa hybrid No. 6 (13.81%). The dada revealed that larval population during shoot infestation in Btbrinjal ranged from 0.05 to 0.25/plant and in non Btbrinjal from 1.05 to 3.85/plant. Maximum gross (589.02 q/ha) and marketable (554.57 q/ha) yield was recorded in MHBJ 99 Bt variety. It was concluded that percent shoot infestation was very less in Btbrinjal hybrids than non Bt hybrids. All Bt hybrids were significantly lower in number of BSFB observed per cent damage to shoots and fruits were significantly lower for the Bt groups as compared to non Bt hybrids.

Keywords: Brinjal, Bacillus thuringiences, shoot damage, larval count, *Leucinodesorbonalis*

Volume 9 Issue 1 - 2019

Motaphale AA, Shivpuje PR, Aglave BA
VasantraoNaikMarathwada Agricultural University, India

Correspondence: Shivpuje PR, VasantraoNaikMarathwada Agricultural University, Vasmat Road, Kali Kaman, Parbhani, MS 431402, India, Email dr.ashvini24@gmail.com

Received: September 25, 2018 | **Published:** January 07, 2019

Introduction

One of the major constraints in increasing vegetable production is loss caused by vegetable production is caused by vegetable pests.[1] Shoot and fruit borer (BSFB), *Leucidonesorbonalis* Guen, is one of the major constraints contributing up to 70% loss in marketable yield. The apparent loss of fruits has been reported to be varying from 20.70 to 88.89% in various parts of the country. A critical stage of infestation shifting to the flowers and fruits follows after that, with 33.33% infestation on shoots and 66.66% on initial fruits.[2] Several integrated pest management strategies are used to control insect pest of brinjal. Btbrinjal is a transgenic created out of infesting a gene (Cry 1 AC) from the soil bacterium *Bacillus thuringensis.* It is reported that upon ingestion of the Bt toxin by the insect the Bt protein gets activate din the mid gut and the activated molecules bind themselves to certain receptors present on the gut membrane and this result in pore formation, cell lysis, causing destruction of the gut lining. This leads to paralysis of the insect gut as a result the insect stop feeding.

The affected larvae die after day or two.[3] The Bt crop will drastically reduce the use of chemical pesticides having the way for eco-friendly agriculture.[4] The degree of such differences in BSFB feeding damage between Bt hybrids and non Bt hybrids was significant. It was presented that the average shoot damage between Bt hybrids and non Bt hybrids was significant. It was presented that the average shoot damage in Bt brinjal hybrids ranged from 2.5 to 20% in Bt, entries as compared with 24 to 58 % in non –Bt counterparts. Number of larvae in Bt-entries per plant ranged from 0 to 20 as compared with 3.5 to 80 larvae in non-Bt entries and significant yield increase in Bt brinjal hybrids as compared to evaluated percent shoot damage with larval count in Bt and non Bt hybrids caused by BSFB.

Material and methods

An experiment was conducted during Kharif season at vegetable research scheme, Marathwada Agriculture University, Parbhani (M.S.) to study the percent shoot damage in Bt and non Btbrinjal hybrids by Brinjal shoot and fruit borer (*LeucinodesorbonalisGeun*). The experiment was laid out in Randomized Block Design with 15 treatments each replicated 2 times. The Bt hybrids MHB-4Bt, MHB-9Bt, MHB-10Bt, MHB-11Bt, MHB-39Bt, MHB-80Bt and MHB-99Bt with their non bt hybrids and a national check Pusa hybrid No. 6 were planted at 90X60cm spacing. The observations were recorded on shoot damage at weekly intervals. Larval populations were also recorded during shoot infestations. The gross yield and total marketable yield were recorded. The mean data thus collected were subjected to suitable statistical analysis[5] using angular transformation.

Results and discussion

Cumulative average per cent shoot damage due to *LeucinodesorbonalisGuen* on different Bt and non Bt brinjal hybrids were recorded. The data presented in Table 1 revealed that percent shoot infestation ranged from 0.15 to 13.81 per cent. Among the Bt hybrids percent shoot damage recorded from 0.15 to 0.59 percent. Lowest shoot infestation was found on MHB-80Bt (0.15 per cent) followed by MHB-9Bt (0.27 per cent), MHB-99 Bt (0.29 per cent) and maximum on MHB-99 non Bt (13.81 per cent) followed by MHB-80 non Bt (13.52 per cent). MHB-80 Bt (0.15 per cent) hybrids was significantly superior over all non Bt brinjal hybrids and Pusa hybrids No.6 and at par with all Bt brinjal hybrids. The average shoots infestation in Bt transgenic, non- transgenic and check brinjal lines were 0.38 per cent, 13.08 per cent and 13.38 per cent respectively. Singh et al.,[6] reported that in some genetically transformed hybrids egg plant viz., MHB-10; Navikaran, MHB-9, MHB-99, MHB-80 and MHB-4, shown resistance against pest MHB 4 was free shoot borer infestation and other were at par with this in terms of shoot infestation. Higher shoot infestation in non-transgenic hybrids (0.33-4.21%) was recorded in comparison to the transgenic (1.78 per cent).

Anonymous 2005[7] revealed that the mean shoot infestation of Bt transgenic lines was 4.21 per cent , which was much less compared to non-transgenic (33.38 per cent) with respect to shoot damage irrespective of locations also Bt transgenic brinjal performed better over non- transgenic and check lines. Population of fruit and shot borer larvae (*Leucinodesorbonalis*) were counted on twenty randomly selected plants in each plot at 15 days interval starting from 30 days after transplanting. Cumulative average larval population of *Leucinodesorbonalis* on Bt and Non Bt brinjal hybrids recorded during shoot infestation. The data recorded on cumulative average larval population of *Leucinodesorbonalis* on Bt and non Bt brinjal hybrids during shoot and fruit infestation are presented in Table 1.The data from table three revealed that larval population during shoot

infestation in Bt brinjal ranged from 0.05 to 0.25/plant and in non Bt brinjal from 1.05 to 3.85/plant. Minimum number of larvae was recorded in MHB 9 Bt (0.05/plant) and MHB 80 Bt (0.05/plant) which were at par with all Bt brinjal hybrids and significantly superior over all non Bt brinjal hybrids. Maximum number of larvae was recorded on MHB 99 non Bt (3.85/plant) followed by Pusa Hybrid (3.50/plant).

Table 1 Percent shoot damage and larval population of *Leucinodesorbonlis* on Bt and non Bt brinjal varieties

Treatments	Shoot damage in Bt and non Bt (Mean of 17 obs.)	Larval population
T1(MHB 4Bt	0.32	0.15
	(3.12)	(0.80)
T2(MHB 4 Non(Bt	12.14	1.05
	(20.39)	(1.23)
T3(MHB 9Bt	0.27	0.05
	(2.98)	(0.74)
T1(MHB 9 Non(Bt	13.34	3.25
	(21.42)	(1.93)
T1(MHB 10Bt	0.44	0.15
	(3.79)	(0.81)
T1(MHB 10 Non(Bt	12.95	1.25
	(21.06)	(1.32)
T1(MHB 11Bt	0.58	0.2
	(4.28)	(0.84)
T1(MHB 11Bt Non(Bt	13.1	3.15
	(21.21)	(1.91)
T1(MHB 39Bt	0.59	0.25
	(4.39)	(0.87)
T1(MHB 39Bt Non(Bt	12.74	1.65
	(20.86)	(1.46)
T1(MHB 80Bt	0.15	0.05
	(2.21)	(0.74
T1(MHB 80Bt Non(Bt	13.52	3
	(21.53)	(91.87)
T1(MHBJ 99Bt	0.29	0.09
	(2.99)	(0.76)
T1(MHBJ 99 non Bt	13.81	3.85
	(21.78)	(2
T15(Pusa Hybrid No.6	13.38	3.5)
	(21.45)	(1.98)
SE +	0.9	0.14
CD at 5%	2.74	0.43

Three Bt hybrids viz., MHB Bt 11, MHB Bt 39 and MHB Bt 112 along with corresponding non Bt hybrids and Pusa Hybrid 6 and Mohini as susceptible check. The results indicated that the per cent shoot infestation was found to be low on Bt lines compared to corresponding non Bt and susceptible check. The maximum damage was in MHB Bt 39 (25.97 and 28.81 per cent) observed on number and weight basis as compared to other Bt lines as well as non Bt lines and susceptible check. The MHB Bt 112 line recorded significantly low infestation on number as well as weight basis reported by AICRP, 2006.

Yield (q/ha) in different Bt and non Bt brinjal hybrid

The yield of test hybrids were considered as gross and marketable yield, which indicated the potentially yield of the hybrids and the economic yield after withstanding the pressure of shoot and fruit infestation. The data are presented in Table 2. The data recorded on gross yield (mean of yield obtained from 15 pickings) are presented in Table 2.The data revealed that yield of Bt brinjals ranged from 308.78 to 589.02 q/ha and in non Bt brinjal it ranged from 288.67 to 466.31 q/ha and from susceptible check Pusa Hybrid No. 6 (274.49 q/ha). Maximum gross yield (589.02 q/ha) was recorded in MHBJ-99 Bt variety which was significantly superior over all Bt and non Bt brinjal hybrids. Minimum yield obtained from MHB 9 non Bt was 288.67 q/ha. The data from Table 2 revealed that yield of Bt brinjal ranged from 298.87 to 554.57 q/ha and in non Bt hybrids it ranged from 206.21 to 282.33 q/ha and from susceptible check Pusa hybrid No. 6 (210.99 q/ha). Maximum marketable yield (554.57 q/ha) was recorded in MHBJ 99 Bt which was significantly superior over all Bt and non Bt brinjal hybrids.

Table 2 Cumulative average yield obtained from Bt and non Bt brinjal varieties

Treatments	Yield (q/ha)	
	Gross	Marketable
T1- MHB 4Bt	308.78	298.87
T2- MHB 4 Non-Bt	294	227.02
T3- MHB 9Bt	312.84	302.3
T1- MHB 9 Non-Bt	288.67	242
T1- MHB 10Bt	365.81	353.02
T1- MHB 10 Non-Bt	338.31	269.8
T1- MHB 11Bt	336.75	319.65
T1- MHB 11Bt Non-Bt	295.77	232.68
T1- MHB 39Bt	379.28	359.53
T1- MHB 39Bt Non-Bt	297.23	252.45
T1- MHB 80Bt	341.53	322.81
T1- MHB 80Bt Non-Bt	289.9	206.21
T1- MHBJ 99Bt	589.02	554.57
T1- MHBJ 99 non Bt	466.31	282.33
T15- Pusa Hybrid No.6	274.49	210.99
SE ±	13.28	15.53
CD at 5%	40.21	47.05

Minimum yield obtained from MHB 80non Bt was 206.21 q/ha. Anonymous[7] reported mean yield across all the centers indicated that Bt transgenic brinjal have 50 q/ha more yield over the non transgenic and check lines. Average marketable yield in Bt transgenic MHB 11 Bt, MHB 39 Bt and MHB 112 Bt was 223.39 q/ha and from non transgenic 199.36 q/ha. Average marketable yield in Bt transgenic

Citation: Motaphale AA, Shivpuje PR, Aglave BA. Studies on percent shoot infestation by *Leucinodes orbonalis* (guen) in Bt and non Bt brinjal hybrids. *Adv Plants Agric Res.* 2019;9(1):53–55. DOI: 10.15406/apar.2019.09.00410

MHB 11 Bt, MHB 39 Bt and MHB 112 Bt was 223.39 q/ha and that from non transgenic 199.36 q/ha. AICRP[8] reported mean gross yield was ranged from 198.45 to 359.59 q/ha in Bt brinjal and 117.10 to 280 q/ha in non Bt brinjal and from Pusa hybrid -6 250.36 q/ha. The difference in marketable yield between Bt transgenic and non transgenic was much prominent. For Brinjal shoot and fruit borer related observations, significant differences were detected between hybrids based on presence or absence of Bt gene. All Bt hybrids were significantly lower in number of BSFB observed per cent damage to shoots were significantly lower for the Bt groups as compared to non Bt hybrids. The degree of such differences in Brinjal shoot and fruit borer feeding damage between Bt hybrids and non Bt hybrids was significant.

Acknowledgments

None.

Conflicts of interest

The authors declared there is no conflict of interest.

References

1. Deepali Tewari. GBPUAT, Promotion of in Vegetable: Need of the Hour: 2009.
2. Spring. *Resistant Pest Management Newsletter*. 2007;16(2).
3. Ranga Rao GV, Rupela OP, Rameshwar Rao V, et al.. Biopesticides in crop production. *Indian J Pl Prot*. 200735(1).
4. Shelton AM, Zhao JZ, Roush RT. Economic ecological, food safety and social consequences of the development of Bt transgenic plants. *Annu Rev Entomol*. 2002;47:845-881.
5. Panse VG, Sukhatme PV. Statistical Methods for Agricultural workers, ICAR publications, New Delhi: 1967.
6. Singh SV, Singh KS, Malik YP. Seasonal abundance and economic losses of shoot and fruit borer, *Leucindoesorbonalis* onbrinjal. *Indian Journal of Entomology*. 2000;62:247-252.
7. Anonymous. *Annual Reoprt 2006*. Indian Institute of Vegetable Research, XXIV: 2005.
8. AICRP. *Annual Report 2005-06*. Indian Institute of Vegetable Research, XXIV: 2006.

Citation: Motaphale AA, Shivpuje PR, Aglave BA. Studies on percent shoot infestation by *Leucinodes orbonalis* (guen) in Bt and non Bt brinjal hybrids. *Adv Plants Agric Res*. 2019;9(1):53‒55. DOI: 10.15406/apar.2019.09.00410