



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(1): 1337-1341
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www.thepharmajournal.com

Received: 15-10-2021

Accepted: 22-12-2021

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To screen some brinjal cultivars against shoot and fruit borer, *Leucinodes orbonalis*

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Abstract

The present studies were undertaken at Vegetable Improvement Scheme, CES, Wakawali, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist: Ratnagiri (M.S.) during *rabi* 2016-17. The present research was carried out to study the seasonal incidence, screening of cultivars and management of Brinjal shoot and fruit borer *Leucinodes orbonalis* Guenee infesting brinjal.

Studies on screening of some brinjal cultivars for varietal resistance indicated that, among the 15 brinjal cultivars screened against brinjal shoot and fruit borer, the cultivar Kali Rawai, Singnath, CHES-249 and Arka Nilkanth were found to be promising against shoot and fruit borer with 1 to 10 per cent fruit infestation and have been rated as highly resistant. Besides, PPC, Bholanath, BB 54 and ArkaNidhi were also found promising against shoot and fruit borer and rated as fairly resistant. Out of the remaining cultivars, four were rated as fairly resistant and three were rated under less susceptible.

Keywords: Shoot and fruit borer, *Leucinodes orbonalis*, screen and cultivars

Introduction

Brinjal (*Solanum melongena* Linn.) also known as egg plant is an important solanaceous vegetable crop which is of Indian origin. In India it is most commonly used vegetable in almost every kitchen either whole or mixed with other vegetables. Also it has special significance among vegetables as it can be grown throughout the year and available in all seasons.

Being a vegetable, brinjal is quite rich in certain nutritive elements like 4.0 per cent carbohydrate, 1.4 per cent protein, 0.3 per cent fat, 0.047 per cent phosphorus, 0.018 per cent calcium, 0.009 per cent iron and many other vitamins with 92.7 per cent moisture (Aykroyd, 1963).

In India it is grown over an area of 7,11,306 ha with annual production of 15.55 lakh metric tonnes and productivity of brinjal is 19.1 MT/ha (NHB, 2014). In Maharashtra state occupies over 26,000 ha area with annual production of 5,78,000 MT of fruits and productivity of 22.23 MT per ha (MOFPI 2012-13) [1].

The crop is attacked by number of pests. Butani and Verma (1976) recorded 29 insect and non insect pests on brinjal, out of which shoot and fruit borer, *Leucinodes orbonalis* Guenee; stem borer, *Euzophera perticella* Ragonots; jassid *Amarasca biguttula biguttula* Ishida; Hadda beetle, *Epilachna spp.*; lace wing bug, *Urentius echinus* (Distant); Leaf roller, *Antoba olivacea* (Walker); aphid *Myzus persicae* (Sulzer) and *Aphis gossypii* Glov.; whitefly, *Bemisia tabaci* Gennadius and brinjal mealy bug, *Centroccocus insolitus* (Green) are considered as major pests. Similarly, leaf miners and red spider mites are also found occasionally infesting the brinjal crop in severe proportions. Among the major insect pests, brinjal shoot and fruit borer (BSFB) is the most destructive pest of brinjal in India (Tewari and Sandana, 1990) [20].

Among all these pests damaging the brinjal crop, brinjal shoot and fruit borer *Leucinodes orbonalis* Guenee (Lepidoptera: Pyralidae) is the most destructive, regular pest, causing considerable loss in crop yield and also responsible for deterioration of fruit quality which ultimately affect the market value of the fruits.

The larvae bore into the tender shoots and feed on the internal contents. As a result, the infested shoots drop down and finally dry up. The growth of plant remains stunted. During the reproductive phase of the plant, the larvae bore into the buds and fruits from under the calyces leaving no visible signs of infestation. The infested buds later drop down. The damaged fruits show large circular exit holes.

The affected fruits render unfit for consumption and fetch less price in market (Singh and Singh, 2002).

As high as 20.7 per cent loss in yield was reported by Peshwani and Lal (1964) under Delhi conditions whereas, under Maharashtra conditions, the damage intensity was 67.11, 48.32 and 32.93 per cent during *kharif*, *summer* and *rabi* season, respectively (Mote, 1976) ^[11]. The maximum intensity of damage to the extent of 88.89 per cent was reported from Haryana by Naresh *et al.* (1986) ^[13] and 85.8 per cent from Orissa, by Patnaik (2000).

Considering the damage potential of the *L. orbonalis*, the effective pest management practices are badly needed. Due to poor natural enemy complex, insecticides have been used extensively for its control. In spite of the several ill effects of the pesticides the use of the pesticides cannot be ignored in pest management strategies. Several pesticides have already been suggested for the management of brinjal shoot and fruit borer. However, with the space and time, new molecules of the pesticides are introduced in market, which are supposed to be comparatively safer than older pesticides.

Therefore, it was thought essential to study the efficacy of some newer insecticides to find out the effective, economic and best suited insecticides to control the shoot and fruit borer under agroclimatic conditions of Konkan region.

The losses caused by pest vary from season to season because moderate temperature and high humidity favour the population build-up of brinjal shoot and fruit borer (Shukla and Khatri, 2010). Screening of brinjal cultivars against insect pests has been attempted by several workers elsewhere in India. However, the cultivars available in particular region need to be screened and efforts were made to determine the biochemical basis of resistance in selected brinjal entries against shoot and fruit borer, *Leucinodes orbonalis* Guen.

It is well known that meteorological factors play an important role in the seasonal incidence of the insects. Hence, it was decided to study the seasonal incidence and its relations with weather parameters, which will be forecasting the insect attack.

Material and Methods

Investigations were carried out on seasonal incidence, screening of cultivars and management of shoot and fruit borer *Leucinodes orbonalis* Guenee infesting brinjal at Vegetable Improvement Scheme, Central Experimental Station, Wakawali, Dapoli during rabi 2016-17. The materials and methodologies adopted for the studies are described hereafter.

The promising cultivars available at Vegetable Improvement Scheme, Central Experiment Station, Wakawali, Dapoli, Dist -Ratnagiri were screened against brinjal shoot and fruit borer.

Experimental Details

Location: VIS, Central Experimental Station, Wakawali

Size of plot: 60 m²

Method of planting: On ridges and furrows

Spacing: 60 cm × 60 cm

No. of cultivars: 15

Date of sowing: 20th October 2016

Date of transplanting: 1st December 2016

Cultivars

1. Swarn Pratibha
2. Bholanath

3. PPC
4. BB 60 C
5. BB-54
6. Kali rawai
7. Arka Nilkanth
8. BGTP-2
9. RCMB-3
10. Sushivare local
11. Arka Nidhi
12. CHES-249
13. Lanja local
14. Singnath
15. Asond local

Method of recording the observations

The experimental plot was kept unsprayed throughout the crop season. The observations were recorded as soon as the incidence is noticed. Observations on the number of healthy and infested fruits due to the pest were recorded at each picking.

Per cent fruit infestation was calculated by the following formula,

$$\text{Per cent fruit infestation} = \frac{\text{No. of infested fruits}}{\text{Total no. of fruits}} \times 100$$

Results and Discussion

The present investigations were undertaken to study the screening of cultivars. The results are discussed under the following heading.

Screening of brinjal cultivars against shoot and fruit borer, *Leucinodes orbonalis*.

A field experiment was carried out at Central Experimental Station, Wakawali during rabi season 2016-17 to screen some brinjal cultivars against *L. orbonalis*.

Shoot and fruit borer of all the entries of brinjal screened were prone to attack by *L. orbonalis*. Among 15 cultivars of brinjal tested, none of them was immune to shoot and fruit borer (Table 5).

The fruit infestation was noticed on various cultivars tested during the present studies and the data on mean per cent fruit infestation recorded at 75, 80, 85, 90, 95 and 100 days after transplanting are given in Table 4.

The observations on per cent fruit infestation recorded at 75 days after transplanting revealed that the lowest mean per cent fruit infestation was recorded in the Kali rawai (2.50) which was significantly less than the rest of the cultivars, except the cultivar Arka Nilkanth (3.55 mean fruit infestation). The mean per cent fruit infestation ranged from 2.50 to 21.42.

The data on per cent fruit infestation recorded at 80 days after transplanting revealed that cultivar Arka Nilkanth (2.35) showed the lowest per cent fruit infestation which was significantly less than the rest of the cultivars, except the CHES-249 (5.65 per cent fruit infestation). The mean per cent fruit infestation ranged from 2.35 to 25.00 per cent.

The observations on mean per cent fruit infestation recorded 85 days after transplanting indicated that the cultivar Singnath (6.18) showed the lowest mean per cent fruit infestation which was significantly less than rest of the cultivars, except the cultivars *viz.*, CHES-249, Bholanath, Kali rawai, BB54, (7.14, 8.33, 8.33, 9.09 mean per cent fruit infestation respectively). The mean per cent fruit infestation ranged from 6.18 to 27.27 per cent.

The observations on mean per cent fruit infestation recorded at 90 days after transplanting revealed that the lowest per cent fruit infestation was observed in the CHES-249 (8.33) and cultivars *viz.*, Singnath, Bholanath, PPC and Kali rawai, (8.88, 9.09, 9.12 and 10.00 per cent fruit infestation respectively). The mean per cent fruit infestation ranged between 8.33 to 30.00 per cent.

The data on mean per cent fruit infestation recorded 95 days after transplanting revealed that the lowest mean fruit infestation recorded in the Singnath (10.62) which was significantly less than the rest of the cultivars, except CHES-249, PPC, BB 54, Arka Nilkanth and Kali rawai (11.11, 11.20, 11.76, 12.50 and 12.63, mean per cent fruit infestation, respectively). The mean per cent fruit infestation is ranged between 10.62 to 30.00 per cent.

The data on mean per cent fruit infestation recorded at 100 days after transplanting indicated that the lowest mean per cent fruit infestation was recorded in the cultivar Kali rawai (13.13), Arka Nidhi (13.45), Arka Nilkanth (14.38), Singnath (14.50), PPC (15.10) and BB 60 C (15.36) which is significantly less than the cultivars *viz.*, Swarn Pratibha, Bholanath, BGTP-2, Sushivare Local, Lanja Local and Asond Local (28.66, 25.00, 30.00, 25.00, 23.18 and 33.33 mean per cent fruit infestation respectively). The mean per cent fruit infestation ranged between 13.13 to 33.33 per cent.

The data on mean per cent fruit infestation from 75 to 100 days after transplanting (6 observations) were averaged out, presented and graphically shown in figure 2. Results revealed that considering the overall reaction of the cultivars tested to shoot and fruit borer infestation during the present investigation, the lowest mean per cent fruit infestation of 8.87 per cent was recorded in the Kali rawai which was significantly less than the rest of the cultivars, except the cultivars *viz.*, Singnath, CHES-249 and Arka Nilkanth (8.90, 9.82 and 9.91 mean per cent fruit infestation respectively). The mean fruit infestation of remaining cultivars ranged from 12.06 to 22.56 and their order of susceptibility was BGTP-2,

RCMB-3, BB 60C, Swarn Pratibha, Lanja Local, asond Local and Sushivare Local.

Table 1: Screening of brinjal cultivars against brinjal shoot and fruit borer *L. orbonalis*.

Sr. No.	Cultivars	Mean per cent fruit infestation						Mean
		Days after transplanting						
		75	80	85	90	95	100	
1	Swarn Pratibha	13.76	15.52	17.40	20.00	18.46	28.66	18.97
2	Bholanath	6.12	7.14	8.33	9.09	16.66	25.00	12.06
3	PPC	6.15	6.66	12.50	9.12	11.20	15.10	10.12
4	BB 60 C	19.16	16.34	26.45	21.39	15.34	15.36	19.01
5	BB 54	8.00	10.00	9.09	14.38	11.76	20.00	12.21
6	Kali rawai	2.50	6.63	8.33	10.00	12.63	13.13	8.87
7	Arka Nilkanth	3.55	2.35	12.50	14.20	12.50	14.38	9.91
8	BGTP-2	10.00	10.00	15.38	14.28	14.28	30.00	15.66
9	RCMB-3	16.16	25.00	16.66	12.75	23.07	18.18	18.64
10	Sushivare Local	14.28	18.18	27.27	30.00	30.00	25.00	24.12
11	Arka Nidhi	16.12	12.50	12.10	14.28	14.65	13.45	13.85
12	CHES-249	6.66	5.65	7.14	8.33	11.11	20.00	9.82
13	Lanja Local	10.00	16.66	24.39	25.00	26.31	23.18	20.92
14	Singnath	5.55	7.69	6.18	8.88	10.62	14.50	8.90
15	Asond Local	21.42	23.57	25.00	15.38	16.66	33.33	22.56
	SD±	8.99	7.00	6.95	6.86	5.96	6.46	5.30

*Mean of six observations.

SD±: Standard Deviation

From the present study, it was seen that out of 15 cultivars screened against brinjal shoot and fruit borer, the cultivar Kali rawai and the cultivars *viz.*, Singnath, CHES-249 and Arka Nilkanth were found to be promising as far as the pest infestation was concerned.

Based on the 0 to 40 scale, 15 brinjal cultivars screened against shoot and fruit borer during present studies, were categorized into immune, highly resistant, fairly resistant, tolerant, susceptible and highly susceptible as per the criteria given by Lal *et al.* (1976) and the data are presented in Table 2. Results revealed that,

Table 2: Categorization of brinjal cultivars based on the mean fruit infestation

Sr. No.	Reaction	Per cent fruit infestation	Cultivars
1	Immune	0	-
2	Highly resistant	1-10	Kali rawai, Arka Nilkanth, CHES-249, Singnath
3	Fairly resistant	11-20	Swarn Pratibha, PPC, Bholanath, BB60C, BB54, BGTP-2, RCMB-3, Arka Nidhi
4	Less susceptible or tolerant	21-30	Sushivare Local, Asond Local, Lanja Local
5	Susceptible	31-40	-
6	Highly susceptible	Above 40	-

None of the cultivar was free from fruit borer infestation. The Kali rawai and the cultivars *viz.*, Singnath, CHES-249 and Arka Nilkanth were categorized as highly resistant whereas the cultivar Swarn Pratibha, PPC, Bholanath, BB 60 C, BB 54, BGTP-2, RCMB-3 and Arka Nidhi were categorized as fairly resistant. The cultivars Lanja Local, Asond Local and Sushivare Local were categorized as less susceptible or tolerant.

The results of present study are similar with the findings of following workers.

Kabir *et al.* (1984) [6] found that the variety Singnath showed lowest shoot and fruit infestation.

Singh and Singh (2001) screened 29 aubergine cultivars for resistance to *L. orbonalis* under field conditions. None of the cultivars was resistant to the pest. However, No. 3, 5 and 8

cultivars were highly tolerant, tolerant and moderately tolerant, respectively, No. 11 and No. 2 cultivars were susceptible and highly susceptible.

Sridhar *et al.* (2001) [19] observed that out of 54 brinjal germplasms screened against *L. orbonalis*, none of the cultivated/wild species of brinjal was found resistant to the pest.

Yield

The yield data of different brinjal cultivars are presented in table 6 and shown graphically in fig.3. Results indicated that there were significant differences in yield of marketable fruits among various cultivars. The highest marketable fruit yield of 298.90 quintals per hectare was recorded in the cultivar Arka Nidhi which was followed by the cultivar BB 54 (2754

(274.50 q/ha) and Singnath (200 q/ha). The cultivars viz., RCMB-3, CHES-249, Swarn Pratibha, PPC and Bholanath (marketable fruit yield of 197.60, 180.70, 170.40, 168.28 and 165.50 q/ha, respectively) give moderate marketable fruit yield. The yield in the Lanja Local and other 6 cultivars ranged from 47.50 to 144.20 q/ha which was significantly less than all other cultivars. The decreasing order of the Lanja local and 6 cultivars in respect of yield (q/ha) was Lanja local, Kali rawai, BB 60 C, BGTP-2, Asond local, Arka Nilkanth and Sushivare local.

The present findings are in conformity with Kabir *et al.* (1984) [6] found that the variety Singnath showed highest yield.

Table 3: Screening of brinjal cultivars against brinjal shoot and fruit borer *L. orbonalis* yield of marketable fruits (q/ha).

Sr. No.	Cultivars	Yield of marketable fruits (q/ha)
1.	Swarn Pratibha	170.40
2.	Bholanath	165.50
3.	PPC	168.28
4.	BB 60 C	110.80
5.	BB 54	274.50
6.	Kali rawai	108.20
7.	Arka Nilkanth	140.60
8.	BGTP-2	134.50
9.	RCMB-3	197.60
10.	Sushivare Local	144.20
11.	Arka Nidhi	298.90
12.	CHES-249	180.70
13.	Lanja Local	47.50
14.	Singnath	200.00
15.	Asond Local	138.90
	SD±	62.74

SD±: Standard Deviation

Conclusion

Brinjal (egg-plant) *Solanum melongena* Linnaeus is an important solanaceous vegetable crop. Among the several insect pests infesting brinjal, the brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee (Lepidoptera: Pyralidae) is the most destructive pest causing considerable loss in crop yield and also responsible for deterioration of fruit quality which ultimately affect the market value of the fruits.

In view of the seriousness of the pest, the present investigation entitled, screening of cultivars was undertaken with objective viz., screening of some brinjal cultivars.

Studies on screening of some brinjal cultivars for varietal resistance indicated that, among the 15 brinjal cultivars screened against brinjal shoot and fruit borer, the cultivar Kali rawai and the cultivars viz., Singnath, CHES-249 and Arka Nilkanth were found to be promising against shoot and fruit borer with 1 to 10 per cent fruit infestation and have been rated as highly resistant. Besides, PPC, Bholanath, BB 54 and Arka Nidhi were also found promising against shoot and fruit borer and rated as fairly resistant. Out of the remaining cultivars, four were rated as fairly resistant and three were rated under less susceptible.

References

- Anonymous. Area, Production and Productivity of brinjal in Maharashtra. MOFPI Govt. of India, 2012. <http://agropedia.iitk.ac.in>.
- Ashok Kumar, Shukla A. Varietal preference of fruit and shoot borer, *Leucinodes orbonalis* Guenee on brinjal.

Insect Env. 2002;8(1):49.

- Darekar KS, Gaikwad BP, Chavan UD. Screening of brinjal cultivars for resistance to shoot and fruit borer. J. Maharashtra Agric. Univ. 1991;16(32):366-369.
- Gangopadhyay C, Maity TK, Mangal SK. Screening of brinjal germplasms against fruit and shoot borer, *Leucinodes orbonalis* Guen. Environment and Ecology. 1996;14(4):834-836.
- Jat KL, Swaroop Singh, Maurya RP, Singh S. Screening of Brinjal varieties for resistance to shoot and fruit borer, *Leucinodes orbonalis* (Guen.). Haryana J Hort. Sci. 2003;32(1-2):152-153.
- Kabir MH, Mia MD, Azim L, Begum RA, Ahmad A. Field screening of twelve brinjal varieties against shoot and fruit borer, *Leucinodes orbonalis* Guen. (Lepidoptera: Pyralidae) Bangladesh J of Zoology. 1984;12(1):47-48.
- Krishna TM, Lal OP, Srivastava YN. Extent of losses caused by shoot and fruit borer, *Leucinodes orbonalis* Guen to promising varieties of brinjal, *Solanum melongena* L. J. Ent. Res. 2001;25(3):205-212.
- Kumar NKK, Sadashiva AT. *Solanum macrocarpon*: A wild species of brinjal resistant to brinjal shoot and fruit borer, (*Leucinodes orbonalis* Guen.). Insect Envi. 1996;2(2):41-42.
- Mandal SMA, Dash D, Mishra PR. Performance of brinjal cultivars against fruit and shoot borer, *Leucinodes orbonalis* Guen. J. Appl. Zoo Res. 2005;16(2):195-197.
- Manoj Kumar, Ram HH, Singh YU. Screening and breeding for resistance to shoot and fruit borer in brinjal. Recent Hort. 1997;4:152-155.
- Mote UN. Varietal resistance in eggplant to *Leucinodes orbonalis* Guenee. I: Screening under field conditions. Indian J. Ent. 1981;43(1):112-115.
- Mukhopadhyay A, Mandal A. Screening of brinjal (*Solanum melongena* L.) for resistance to major insect pests. Indian J. Agric. Sci. 1994;64 (11):798-803.
- Naresh Balu, Venkataswarly P, Verma RC, Baby N. Performance of selected brinjal lines in Nagaland. Indian Jour. Hill Farming. 2001;14(2):29-33.
- Patel NC, Jayanti DB, Ratanpara HC, Patel HR, Bored BK. Varietal resistance in brinjal to insects pests and disease. Gujrat Res. J. 1995;21(1):50-63.
- Pawar DB, Mote UN, Kale PN, Ajri DS. Promising resistance sources for jassids and fruit borer in brinjal. Curr. Res. Report. 1986;3(10):81-84.
- Sah SSP, Gupta SC, Yazdani SS. Relative resistance of brinjal cultivars to *Leucinodes orbonalis* Guen. J. Insect Sci. 1995;8(2):194-195.
- Sharma Lal VR, Choudhary A. Screening of brinjal (*Solanum* spp.) germplasm against shoot and fruit borer, *Leucinodes orbonalis* Guen. Insect Envi. 2001;7(3):126-127.
- Singh YP, Singh PP. Screening of brinjal (*Solanum melongena* L.) cultivars against shoot and fruit borer (*Leucinodes orbonalis* Guen.) at medium high altitude hill of Meghalaya. Indian J. Plant Prot. 2001;29(1-2):34-38.
- Sridhar V, Vijay OP, Naik G. Field evaluation of brinjal (*Solanum* spp.) germplasm against shoot and fruit borer, *Leucinodes orbonalis* Guen. Insect Envi. 2001;6(4):155-156.
- Tewari GC, Moorthy PNK. Field response of eggplant

- varieties to infestation by shoot and fruit borer. *Indian J Agri. Sci.* 1986;53(2):82-84.
21. Thanki KV, Patel JR. Field evaluation of brinjal varieties for resistance to insect pests and diseases in north Gujarat conditions. *Guj. Agric. Univ. Res. J.* 1991;16(2):94-97.
 22. Yadav DS, Sharma MM. Evaluation of brinjal varieties for their resistance against fruit and shoot borer. *Leucinodes orbonalis* Guen. *Indian J Ent.* 2005;67(2):129-132.
 23. Yadav LN, Sharma JK, Sharma SK. Varietal screening of brinjal against brinjal shoot and fruit borer, *Leucinodes orbonalis* Guen. *Annals Agri. Bio. Res.* 2003;8(1):77-80.