Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

J E Z S Journal of Entomology and Zoology Studies

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2021; 9(1): 1653-1657

Received: 30-10-2020
Accepted: 28-12-2020

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Screening of brinjal genotypes for resistant reaction against brinjal shoot and fruit borer (BSFB) *Leucinodes orbonalis* Guenee

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Abstract
The field experiment on screening of 22 desirable genotypes/varieties of brinjal was carried out to evaluate their comparative performance against brinjal shoot and fruit borer *Leucinodes orbonalis*, during *Kharif* 2017-2018with 22 treatments replicated three times, in Randomized Block Design. The significantly lowest shoot infestation of 0.89% was recorded in the cultivar, Susa local, followed by genotypes AKB-46, AKB-62, and Jayant which manifested shoot infestation of 1.92% 1.99%, and 2.04% respectively. The lowest fruit infestation on a weight basis of 4.89 per cent was manifested in local cultivar Susa Local, on par with genotype AKB-46 (8.07%). While lowest number basis fruit infestation of 4.52% reported in local cultivar Susa Local, par with Pune Kateri (8.38%). These genotypes would be of immense use in the breeding program for the development of resistant variety against *L. orbonalis*.

Keywords: screening, genotypes, varieties, brinjal shoot and fruit borer, *Leucinodes orbonalis*

1. Introduction
Vegetables are an integral part of our daily diet and consumed by almost all strata of society. Among all vegetables, brinjal is the most popular vegetable crop which is also known as eggplant (*Solanum melongena* Linn.) (2n =24) or aubergine or guinea squash, belongs to the nightshade family Solanaceae, and principally regarded as "King of the Vegetable". It occupies a significant share in the Indian diet. Because of high nutritive and medicinal value, it has a broad spectrum of use for maintaining human health and primarily a source for building economic trading of farmers.

Scores of biotic factors threaten the lucrative production of brinjalmainly includes insects' pests [5, 8]. Among insect pests, brinjal shoot and fruit borer, *Leucinodes orbonalis* (Guenée) (Pyraustidae: Lepidoptera) is one of the most important, severe brinjal pests which is a primaryconstraint in brinjal production. This pest damages the brinjal crop throughout the year with the yield loss up to 60-80 per cent [7, 6] or can even cause 100% damage if no control measures are applied [10].

Despite the importance of brinjal and the severity of the *L. orbonalis* problem, the management practices to combat this pest are still limited to frequent sprays of toxic insecticides [4]. This reliance on chemical pesticides leads to a tremendous misuse of pesticides, insecticide resistance, increased production costs, higher insecticide residues, elimination of natural enemies, and harmful effects on consumer health. Hence there is an urgent need to look at alternate & safer methods.

In this context, Host–plant resistance is one of the cornerstones of environmentally benign pest management systems. This includes the development of resistant varieties against the target pests. The IPM system, along with host plant resistance, is yielding promising and encouraging results. The insect-resistant varieties have become a crucial element in the success of any ongoing IPM program. Breeders generally consider the varietal development for yield and appearance for consumer preference and neglect its tolerance to borer attack. In view to generate tolerant or resistant variety, screening of the plant material is a fundamental requirement. Therefore, in the present study, different brinjal genotypes have been assessed for their comparative response to the infestation of *L. orbonalis* based on level of infestation.

2. Materials and Methods

2.1 Research Area

The comparative infestation of *Leucinodes orbonalis* on twenty-two brinjal genotypes/cultivars (Table 1) was studied at Chilli and Vegetable Research Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, during *Kharif* 2017-2018 in Randomized Block Design with 22 treatments replicated thrice. The site selected was uniform with typical light, medium black cotton soil having fairly good drainage.

2.2 Plant material used and raising of seedlings

Twenty-two brinjal genotypes comprised thirteen genotypes of the university, eight hybrids, and one local cultivar were assessed for their relative infestation against shoot and fruit borer *L. orbonalis*.Seeds of different cultivars were collected from different sources and raised as seedling at Nursery of Chili and Vegetable Research Unit, Dr PDKV, Akola.

2.3 Transplanting of brinjal seedlings

The crop was transplanted at 60 x 60 cm spacing. After transplanting the intercultural operations as well as fertilizer application was done as per university recommendations. Protective irrigations were given after cessation of rains. Due care was taken to maintain the proper growth of the crop. No pesticidal spraying was given.

2.4 Method of Recording Observations

After transplanting field screening of various genotypes was carried out under natural conditions in three different phases *viz.*, the seedling, vegetative and fruiting phase at an interval of 10 days. The incidence of *Leucinodes orbonalis* in the shoot was recorded from five randomly selected plants in each treatment and fruit damage recorded as a number of infested fruits as against the total number of fruits collected from five randomly selected plant in each plot. Both the observations were converted into per cent infestation. The mean per cent shoot infestation of each genotype was calculated using the formula given by Rahman *et al.* [9] and categorized them in different grades as per the infestation level adopted by Subbratnam and Butani [11].

Table 1: Genotypes/varieties used during present investigation

Treatment	Genotypes	Treatment	Genotypes	Treatment	Genotype
V_1	AKB-31	V_9	AKB-17-01	V_{17}	Arka Anand
V_2	AKB-46	V_{10}	AKB-17-3	V_{18}	Arka Keshav
V_3	AKB-56	V_{11}	AKB-17-5	V_{19}	Krishna
V_4	AKB-62	V_{12}	AKB-18-2	V_{20}	Phule Arjun
V_5	AKB-74	V_{13}	AKB-18-3	V_{21}	Swetha
V_6	AKB-77	V_{14}	Jayant	V_{22}	Pune Kateri
V_7	AKB-83	V_{15}	Samrat		
V_8	AKLB-9	V_{16}	Susa Local		

3. Results

3.1 Shoot infestation by *L. orbonalis*Guen.

Shoot and fruit of all the brinjal screened entries, were more or less prone to the attack by *L. orbonalis,* during different stages of crop growth (Table 2)

3.1.1 At seedling stage

No infestation of *L. orbonalis* was observed on seedlings of all genotypes during the present investigation.

3.1.2 At Vegetative phase

The significant variation was observed among tested 22 genotypes/varieties of brinjal in terms of shoot infestation by *L. orbonalis.* The mean per cent shoot infestation recorded in tested genotypes of brinjal ranged from 0.89 to 30.75. However, none of the varieties/genotypes including commonly grown local cultivar was immune to the borer damage.

Among tested 22 genotypes, significantly lowest shoot infestation of 0.89 per cent was recorded in the genotype Susa local; likewise, it was less preferred by shoot and fruit borer showing a highly resistant reaction. It was statistically different from all other genotypes/varieties followed by AKB-46, AKB-62 and Jayant, which contributed 1.92, 1.99 and 2.04 per cent shoot infestation respectively by giving a resistant reaction.

On the other hand, genotype AKB-18-2, was highly preferred by *L. orbonalis* (30.75 per cent) recorded significantly highest shoot infestation among all tested genotypes. (Table 2)(Fig. 1)

3.1.3 At Fruiting Phase

3.1.3.1 Fruit Fruit infestation (Weight basis)

In the present study commonly grown local cultivar, Susa local showed fruit infestation of 4.89 per cent which was statistically on par with AKB-46 having 8.07 per cent fruit infestation noticed responding resistance reaction against *L. orbonalis* and are significantly superior to remaining tested genotypes. It was followed by the genotype AKB-31 (13.11 per cent), Jayant (14.24 per cent) and AKB-62 (14.94), which showed resistance reaction to BSFB. (Fig. 2)

3.1.3.2 Fruit infestation (Number basis)

The present result revealed that out of tested 22 genotypes, Susa local recorded significantly lowest fruit infestation of 4.52 per cent, which was at par with Pune Kateri (8.38 per cent), and genotype AKB-46, Jayant followed it, and AKB-31 recording fruit infestation of 10.37, 10.86 and 13.42 per cent respectively gives resistance response.

While the highly susceptible response was given by genotype Swetha recording 41.99 per cent fruit infestation on number basis against *L. orbonalis.* It was statistically on par with Arka Anand (40.78 per cent), AKB-83 (35.77 per cent) and AKB-18-3 (35.28 per cent) followed by 33.46 per cent fruit infestation noticed in genotype AKB-17-5. Moreover, the rest one genotypes give moderate response against fruit infestation by *L. orbonalis.* (Fig. 3)

Table 2: Relative response of different genotypes/varieties of brinjal against L. orbonalis during Kharif 2017-2018

Sr. No.	Treatments	Genotypes	Per cent shoot infestation	Per cent fruit infestation (weight basis)	Per cent fruit infestation (number basis)
1.	V1	AKB-31	2.01 (8.15)	13.11 (21.18)	13.42 (21.33)
2.	V2	AKB-46	1.92 (7.81)	8.07 (16.35)	10.37 (18.67)
3.	V3	AKB-56	5.05 (12.96)	22.35 (28.14)	28.31 (32.04)
4.	V4	AKB-62	1.99 (8.08)	14.94 (22.70)	15.03 (22.69)
5.	V5	AKB-74	11.56 (19.80)	26.03 (30.56)	31.29 (33.94)
6.	V6	AKB-77	4.97 (12.82)	24.35 (29.49)	29.07 (32.60)
7.	V7	AKB-83	20.31 (26.77)	24.18 (29.41)	35.77 (36.69)
8.	V8	AKLB-9	2.37 (8.76)	15.64 (23.24)	14.17 (21.99)
9.	V9	AKB-17-01	2.99 (9.96)	19.05 (25.83)	15.62 (23.14)
10.	V10	AKB-17-3	18.01 (25.08)	28.89 (32.47)	25.03 (29.98)
11.	V11	AKB-17-5	19.34 (26.07)	31.44 (34.06)	33.46 (35.30)
12.	V12	AKB-18-2	30.75 (33.64)	32.70 (34.82)	31.04 (33.83)
13.	V13	AKB-18-3	20.93 (27.19)	33.08 (35.04)	35.28 (36.38)
14.	V14	Jayant	2.04 (8.10)	14.24 (22.09)	10.86 (19.11)
15.	V15	Samrat	2.86 (9.68)	21.39 (27.37)	20.37 (26.70)
16.	V16	Susa Local	0.90 (4.41)	4.89 (12.75)	4.52 (12.12)
17.	V17	Arka Anand	12.23 (20.42)	37.95 (37.99)	40.78 (39.66)
18.	V18	Arka Keshav	2.89 (9.72)	15.50 (23.12)	17.40 (24.59)
19.	V19	Krishna	5.04 (12.78)	26.78 (31.08)	27.81 (31.80)
20.	V20	Phule Arjun	7.88 (16.21)	24.55 (29.63)	27.56 (31.63)
21.	V21	Swetha	17.84 (24.94)	44.68 (41.91)	41.99 (40.36)
22.	V22	Pune Kateri	2.94 (9.67)	16.46 (23.83)	8.38 (16.69)
		'F' test	*	*	*
		SE + m	0.955	1.577	1.635
		CD at 5%	2.735	4.516	4.681
		CV	10.607	9.801	10.025

4. Discussion

The present findings of screening are conformity with the results of many researchers such as Choudhary *et al.* [1] who investigated the relative response of different varieties against *L. orbonalis* under field conditions and found the infestation ranged in between 1.62 to 47.28 per cent, while the variety Krishna recorded infestation of 5.34 per cent, however, Pune Kateri and Phule Haritha recording 18.89 and 25.71 per cent damage respectively by shoot and fruit borer.

The infestation range of 8 to 28.60 per cent and hybrid Swetha recorded infestation of 8.70 per cent and highest fruit damage in Bejo Sheetal (48.4%) revealed by Elanchezhyan *et al.* [3] which partially in line with present findings however cultivar Swetha was more infested during present investigation. Arka Keshav variety manifested mean fruit infestation of 37.14 per cent as reported by Umamahesh *et al.* [12], which partially in conformity with the result of the present investigation.

The present findings also get supports from the findings of Devi *et al.* [2] observed minimum mean infestation in fruits of the genotype, Panjab Sadabahar (7.18%), 2010/BRLVAR-3 (9.54%), 2010/BRLVAR-1 (5.20%), 2010/BRLVAR-4 (5.28%), while maximum mean infestation in fruits (weight basis) recorded in Swarna mani (35.58%).

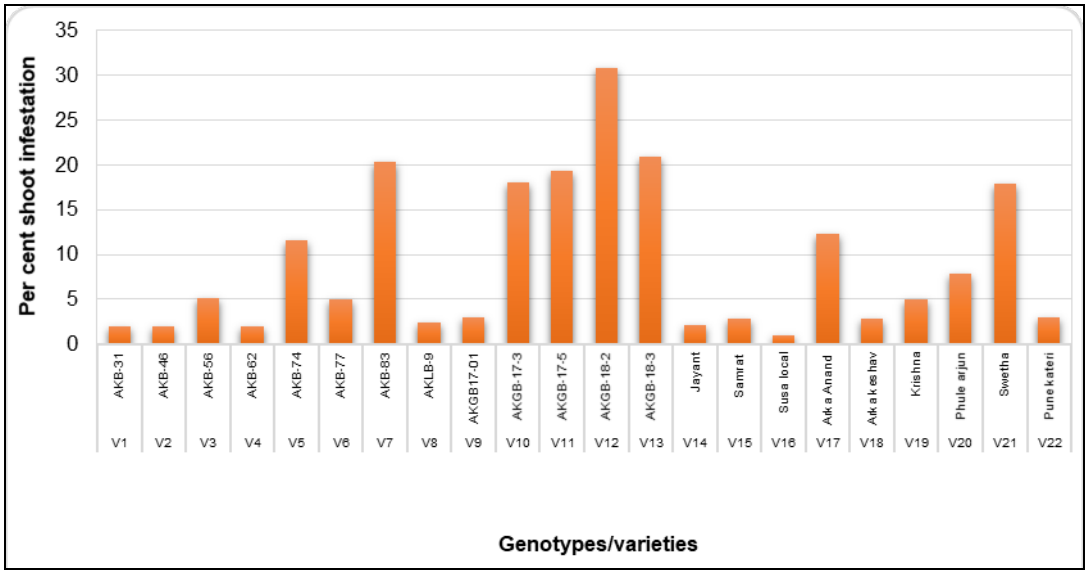

Fig 1: Relative response of different genotypes of brinjal against shoot infestation by *L. orbonalis* during *Kharif* 2017-2018

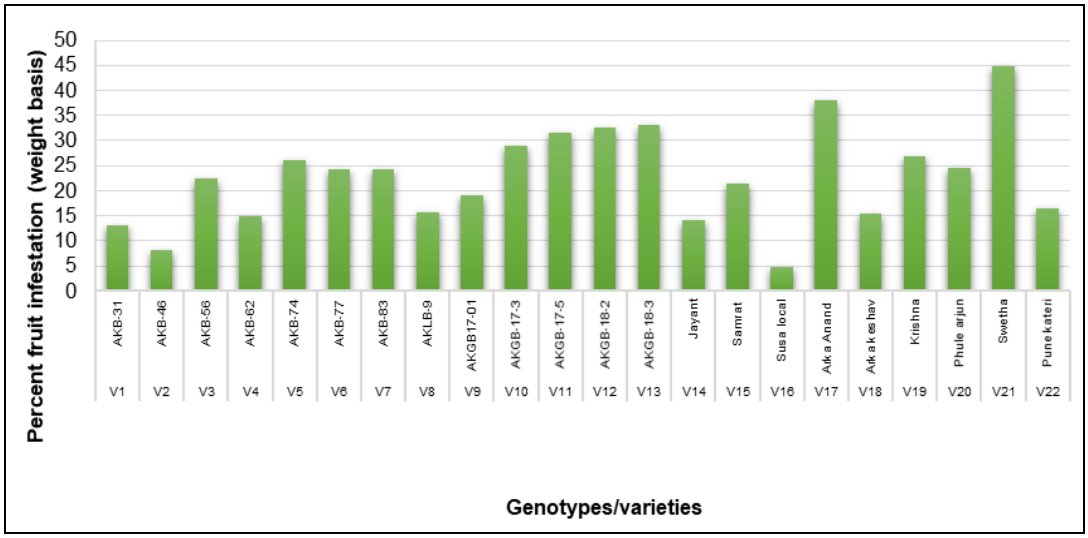

Fig 2: Relative response of different genotypes of brinjal against fruit infestation (weight basis) by *L. orbonalis* during *Kharif* 2017-2018

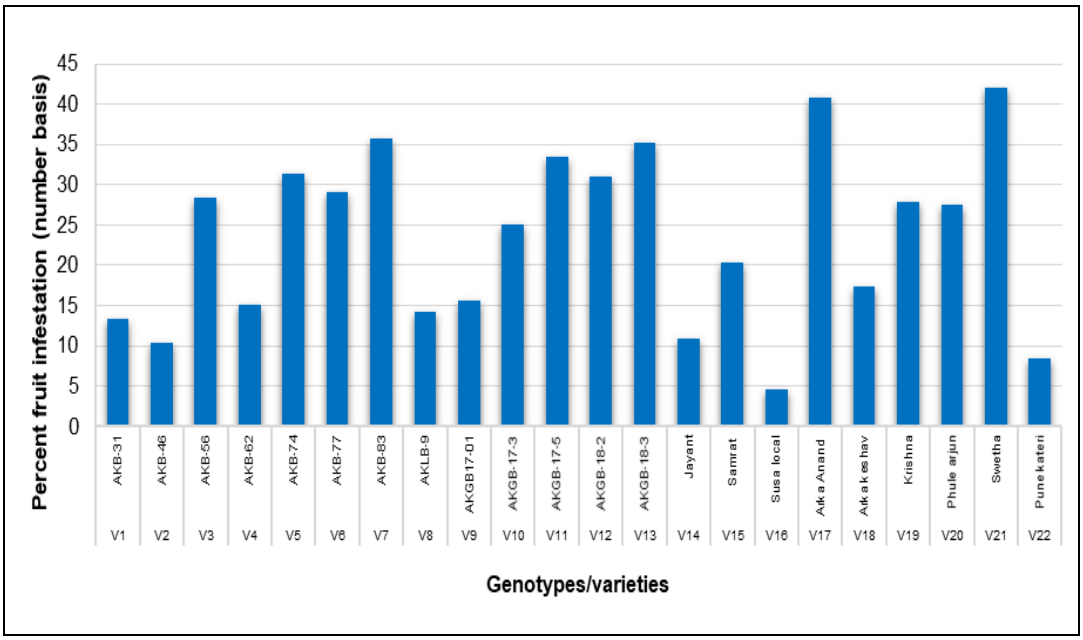

Fig 3: Relative response of different genotypes of brinjal against fruit infestation (number basis) by *L. orbonalis* during *Kharif* 2017-2018

5. Conclusion

The present findings conclude that Susa local as highly resistant, AKB-46, AKB-62, Jayant and AKB-31 as resistant genotype, while Pune Kateri as moderately resistant genotype against *L. orbonalis*. The identified genotypes in the present investigation would be of immense use in the breeding program for the development of resistant variety against *L. orbonalis*

6. Acknowledgements

The first author is thankful to the University Grant Commission (UGC), India, for providing financial assistance in the form of National fellowship during Ph.D. program. The authors are also thankful to Chilli and Vegetable Research Unit to provide the field for carrying out this investigation.

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