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Screening of Brinjal Genotypes against Shoot and Fruit Borer, *Leucinodes orbonalis* (Guenee.) Infestation using Augmented Block Design

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A B S T R A C T

The present investigations were carried out at college of Horticulture, Venkataramannagudem during rabi 2016-17 to evaluate the response of 60 brinjal genotypes and 3 check varieties against shoot and fruit borer, *Leucinodes orbonalis* (Guenee). The experiment was laid in Augmented Block Design with eight blocks. Results revealed that significant differences among tested genotypes and the check cultivars with regard to mean per cent shoot infestation. The mean per cent shoot infestation ranged from 8.84 to 33.71. The genotype IC 136061 recorded the lowest shoot infestation (8.84 %) whereas Dommeru Local (Susceptible check-1) registered highest shoot infestation (33.71 %) among the screened genotypes.

Introduction

Vegetables play an important role in human diet throughout the world. Vegetables are rapidly becoming an important source of income for the rural population. Brinjal (*Solanum melongena* L.) belongs to the *Solanaceae* family and is a popular vegetable in Indian subcontinent. It is one of the major and principle vegetable crops widely grown in both temperate and tropical regions of the globe mainly for its immature fruits as vegetable (Rai *et al.*, 1995). Brinjal is infested by more than 70 insect pests (Kalawate and Dethe, 2012) of which shoot and fruit borer, *Leucinodes orbonalis* (Guenee) is one of the important pests. During the past two decades, this crop has been increasingly ravaged by brinjal shoot and fruit borer. The yield loss in India ranges from 30 to 70 per cent and up to 70 per cent in Andhra Pradesh in particular (Sasikala *et al.*, 1999).

Though different pest management strategies are available for this pest, farmers are mainly depending on chemical control measures. The over reliance on chemicals and their indiscriminate use has resulted in hazardous effects causing serious problems like pest resistance, secondary pest outbreak, pesticide residue, pest resurgence and environmental pollution. In view of this, the present investigation was undertaken to identify resistant/tolerant brinjal genotype against shoot and fruit borer so as to reduce the reliance on insecticides for its management.

Materials and Methods

The present study was conducted during 2016-17 rabi season at the college of Horticulture, Venkataramannagudem to evaluate the response in brinjal genotypes against shoot infestation in 60 brinajal genotypes and 3 checks (One resistant, two susceptible checks). The experiment was laid in Augmented Block Design with eight blocks (Federer, 1956).

The seedlings were transplanted in the main field at 35-40 DAS in a single row of 5m length with a spacing of 70 cm between rows and 60 cm between plants. The checks were planted in a randomized manner after every eight test genotypes in each block. Recommended agronomic package of practices were adopted for raising the crop excluding the plant protection measures.

Five plants were tagged in each genotype and checks at random. The shoot infestation was recorded by counting the healthy as well as infested shoots (withered tender shoots) from randomly tagged plants of each genotype and checks at fortnightly intervals from 15 days after transplantation to final harvest. The damaged shoots were clipped off above the point of damage without destroying the larva inside after each observation. Mean per cent shoot infestation of each genotype was calculated following the formula suggested by Wakil *et al.,* (2009).

$$\text{Per cent shoot infestation} = \frac{\text{Number of infested shoots}}{\text{Total number of shoots}} \times 100$$

Statistical analysis

Statistical analysis after appropriate transformation of data was undertaken as per Gomez and Gomez (1976). Data was analyzed through statistical analysis software for Augmented design developed by Rathore *et al.,* (2004) using the mean values of all genotype characters.

Analysis of variance (ANOVA)

Augmented design analysis was carried out according to the procedure outlined by Federer (1956). The following definitions and relations hold:

c = Number of check varieties = 3

v = Number of tested genotypes = 60

b = Number of blocks = 8

n = v / b = Number of tested genotypes per block = 8

p = c + n = Number of plots per block = 11

N = bc + v = b (c + n) = total number of plots in the experiment = 88

The total number of blocks is determined by the need to have at least 10 degrees of freedom for error in the analysis of data on various parameters. This, in turn, is determined by the number of check varieties (c) used in the trial. In the analysis of variance of check varieties, the experimental error has

(b-1) (c-1) degrees of freedom. The first step of the analysis is to construct a two- way ANOVA using the data of check varieties across blocks, consequently, the resulted mean square error is used to adjust the tested genotypes mean for the block effect.

Also, the resulted mean square error is used to estimate four orders of least significant differences LSD as follows:

LSD to compare between two check variety means = t 0.05 (2 MSE / b) 0.5 (ci-cj)

LSD to compare between adjusted yield mean of two tested genotypes in the same block = t 0.05 (2 MSE) 0.5 (BiVi-BiVj).

LSD to compare between adjusted yield mean of two tested genotypes in different blocks = t 0.05 (2 MSE (c + 1)/c) 0.5 (Vi-Vj).

LSD to compare between adjusted yield mean of tested genotype and a check variety mean = t 0.05 (MSE (b+1) (c+1)/ bc) 0.5 (Vi-Vj)

Where, for all LSD values, tabulated t value has (b1) (c-1) degrees of freedom (df)

Results and Discussion

Observations recorded on response in brinjal genotypes against shoot and fruit borer *L.orbonalis* with particular reference to shoot infestation at 15 days interval during rabi 2016-17 are presented in Table 1. The mean per cent shoot infestation ranged from 8.84 to 33.71. The genotype IC 136061 recorded the lowest shoot infestation (8.84 %) which was on par with IC 136148 (10.10 %), IC 135912 (11.10 %), IC 136299 (12.78%), IC 136096 (13.30%), IC 136041(13.47%) and A.Nidhi (13.63%) whereas Dommeru Local (Susceptible check-1) has registered highest shoot infestation (33.71 %) which is on par with Tadepalligudem Local (30.13%).

None of the genotypes under the present investigation were found completely free from the attack of shoot and fruit borer with particular reference to shoot infestation. Among the tested genotypes, only one genotype IC 136061 (8.84%) recorded with shoot infestation in the range of 1.00 to 10.00 per cent.

IC 136296 (14.29%), IC 203589(14.68%), IC 154517(14.80%) IC 144525 (15.35%), JB-07 (15.38%), JB-07 (15.38%), BLR-24 (15.55%), IC 137751(15.85%), S.Pratibh (16.19%), IC 136231(16.33%), Bhagyamathi (Resistant check) (16.38%), Aryana (16.77%), IC 144515 (16.95%), JB-03-06 (17.12%), IC 089888 (17.39%), IC 136189(17.41%), IC 136451(17.53%), IC 136017 (17.86%), IC 136096 (18.30%), Jaware Brinjal (18.42%). IC 136292 (18.94%), IC 136306 (19.12%), Pb.Shree (19.46%), Swarnamani (19.72%), IC 136292 (19.72%) and IC 136307 (19.93%) were registered with shoot infestation in the range from 14.00 to 20.00 per cent. The tested genotypes *viz.*, IC 136309 (20.07%), JB-02 (20.74%), DRNKV-02-104 (21.02%), IC 136308 (21.19%), IC 136249 (21.23%), IC 213564 (21.54%), IC 136290 (21.82%), KS 331(22.21%), BH-02 (22.67%), IC 136251(22.81%), IC 136258 (22.99%), JB-15 (23.14%), JB-64 (23.64%), IC 136589 (24.07%), BVB-71-1 (24.37%), DBR-08 (24.52%), JB-64 (23.64%), IC 136538 (24.07%), Anamalika (24.84%), IC 136222 (24.82%), IC 136455(25.02%), P.Bindu (25.26%), IC 136260 (25.32%), A.Abhilamb (26.29%), DRNKV-104-43 (26.34%), AB-02 (26.42%), A.Kurmakar (25.80%), IVBL-116-131(26.40%), IC 215021 (26.43%), IC 136293 (26.58%), IC 136311 (26.63%), VR-02 (26.93%) and Green long (27.32%) were recorded with shoot infestation in the range between 20.00 to 30.00 per cent.

The mean per cent shoot infestation of 60 tested genotypes and three check cultivars are

presented in Table 1. There are four LSD values to compare the significant differences among tested genotypes and three check cultivars allowing all possible comparisons to be made to select the elite entries for further crop improvement programme.

Comparison among the three checks cultivar

The results showed that among the check cultivars, Dommeru Local had highest overall mean per cent shoot infestation (33.71) followed by Tadepalligudem Local (30.13) and Bhagyamathi (16.38).

Pair wise comparison for the response in check cultivars, Dommeru Local and Tadepalligudem Local are on par to each other in shoot infestation and differed significantly with Bhagyamathi.

Comparison among the tested genotypes in the same block

The results revealed that Pb.Shree (19.46%) showed significant difference with IC 136148 (10.71%), IC 135912 (11.10%), and IC 136299 (12.78%) and on par with other genotypes in the first block.

In the second block out of the eight genotypes, IC 136455 (25.02%) with high mean per cent shoot infestation showed significantly high variation with IC 136041(13.47%), IC 136296 (14.29%), IC 144525 (15.35%,), IC 136451 (17.53%), IC 136231(16.33%) and significant difference with Swarnamani (19.72%) and IC 136308(21.19%).

JB 02 with low shoot infestation (20.74%) differed significantly with other genotypes in the third block.

In the fourth block, Aryana (16.77%) and JB 03-06 (17.12%) with low shoot infestation differed greatly with other genotypes in the block.

In pair wise comparison among the genotypes in the fifth block, IC 154517(14.80%), IC 137751(15.85%) and IC 203589(14.68%) showed highly significant difference with IC 215021(26.43%) and were on par with other genotypes.

Results with the sixth block genotypes indicated that IC 136292 (18.94%) and IC136189 (17.41%) showed significantly high variation in the response with IC 136293(26.58%), JB 15(23.14%) and IC 136222(24.82%) while on par with other genotypes.

Highly significant variation was observed in pair wise comparison of mean per cent shoot infestation of

IC 136061 (8.84%) with rest other genotypes in the block.

Considering the eighth block genotypes DRNKV-02-104 (21.02%) showed significant difference in mean per cent shoot infestation with A.Abhilamb (26.29%) and IC 136311(26.63%).

Comparison among the tested genotypes in different blocks

Comparison of tested genotypes belongs to different blocks showed significant variation in response against shoot borer infestation. Highly significant variations were observed between IC 136148 (10.71%) -IC 136311 (26.63%, IC 144525 (15.35%)-IC 136222 (24.82%), IC 203589 (14.68%)-JB 15(23.14%), IC 136189 (17.41%),-IC 215021(26.43%), IC 136061(8.84%)-BH 02(22.67%), JB 03-06(17.12%)-AB 02(26.42%) and IC 136041(13.47%)- Pb. Shree(19.46%).

Table.1 Response of brinjal genotypes against shoot and fruit borer, *Leucinodes orbonalis* during rabi 2016-17

S. No	Block number	Genotype	Per cent shoot infestation at 15 days interval										Overall mean
			15 DAT	30 DAT	45 DAT	60 DAT	75 DAT	90 DAT	105 DAT	120 DAT	135 DAT	150 DAT	
1	1	IC 136148	30.00 (33.21)	14.50 (22.38)	10.50 (18.9)	14.10 (22.05)	7.20 (15.56)	6.40 (14.65)	5.50 (13.56)	5.30 (13.3)	4.00 (11.53)	3.50 (10.78)	10.71 (18.53)
2	1	IC 135912	30.00 (33.21)	31.70 (34.26)	13.50 (21.55)	8.10 (16.53)	5.50 (13.56)	5.20 (13.18)	4.70 (12.52)	4.40 (12.1)	4.30 (11.96)	3.60 (10.93)	11.10 (19.46)
3	1	IC 136299	30.00 (33.21)	23.30 (28.86)	16.30 (23.81)	15.70 (23.34)	13.00 (21.13)	10.8 (19.18)	5.40 (13.43)	5.50 (13.56)	4.80 (12.65)	3.00 (9.97)	12.78 (20.94)
4	1	Pb.Shree	50.00 (45.00)	40.70 (39.64)	20.30 (26.77)	20.20 (26.7)	14.90 (22.7)	17.00 (24.35)	12.60 (20.79)	8.70 (17.15)	6.30 (14.53)	3.90 (11.38)	19.46 (26.17)
5	1	IC 136096	40.00 (39.23)	38.30 (38.23)	32.60 (34.81)	25.30 (30.19)	21.30 (27.48)	1.20 (6.28)	9.30 (17.75)	6.40 (14.65)	5.30 (13.3)	3.30 (10.46)	18.30 (25.32)
6	1	IC 136017	40.00 (39.23)	33.30 (35.24)	26.70 (31.11)	29.30 (32.77)	19.80 (26.42)	8.70 (17.15)	8.40 (16.84)	7.10 (15.45)	4.20 (11.82)	1.10 (6.02)	17.86 (24.99)
7	1	IC 089888	20.00 (26.56)	24.70 (29.8)	31.70 (34.26)	24.20 (29.46)	21.80 (27.83)	19.50 (26.2)	13.10 (21.21)	10.10 (18.53)	4.90 (12.78)	3.90 (11.38)	17.39 (24.64)
8	1	IC 144515	40.00 (39.23)	48.8 (44.31)	19.90 (26.49)	12.50 (20.7)	16.20 (23.73)	9.50 (17.95)	7.90 (16.32)	5.70 (13.81)	5.90 (14.05)	3.10 (10.14)	16.95 (24.31)
9	2	IC 136231	20.00 (26.56)	26.70 (31.11)	22.60 (28.38)	22.70 (28.45)	21.30 (27.48)	17.30 (24.57)	12.80 (20.96)	8.70 (17.15)	7.80 (16.21)	3.40 (10.62)	16.33 (23.83)
10	2	IC 136451	40.00 (39.23)	36.70 (37.28)	31.90 (34.38)	27.50 (31.62)	11.30 (19.64)	10.60 (19.00)	6.10 (14.29)	3.80 (11.24)	4.40 (12.10)	3.00 (9.97)	17.53 (24.75)
11	2	IC 144525	20.00 (26.56)	36.00 (36.86)	33.30 (35.24)	18.60 (25.54)	11.60 (19.91)	12.30 (20.53)	8.30 (16.74)	6.90 (15.22)	3.80 (11.24)	2.70 (9.45)	15.35 (23.06)
12	2	Swarnamani	40.00 (39.23)	36.70 (37.28)	30.50 (33.52)	23.60 (29.06)	18.00 (25.1)	19.50 (26.2)	12.30 (20.53)	8.40 (16.84)	5.10 (13.05)	3.10 (10.14)	19.72 (26.36)
13	2	IC 136455	50.00 (45.00)	40.00 (39.23)	39.10 (38.7)	26.6 (31.04)	23.00 (28.65)	20.1 (26.63)	20.00 (26.56)	13.8 (21.80)	11.00 (19.36)	6.60 (14.88)	25.02 (30.01)

14	2	IC 136308	40.00 (39.23)	33.00 (35.06)	31.40 (34.08)	29.00 (32.58)	22.60 (28.38)	19.80 (26.42)	13.90 (21.89)	10.4 (18.81)	8.00 (16.42)	3.80 (11.24)	21.19 (27.4)
15	2	IC 136296	20.00 (26.56)	36.70 (37.28)	35.70 (36.69)	22.60 (28.38)	9.40 (17.85)	4.80 (12.65)	4.70 (12.52)	3.90 (11.38)	2.40 (8.91)	2.70 (9.45)	14.29 (22.21)
16	2	IC 136041	20.00 (26.56)	30.00 (33.21)	21.00 (27.27)	16.70 (24.12)	12.80 (20.96)	7.60 (16.00)	8.50 (16.95)	8.20 (16.63)	6.60 (14.88)	3.30 (10.46)	13.47 (21.53)
17	3	IC 136290	40.00 (39.23)	31.70 (34.26)	35.20 (36.39)	30.40 (33.46)	20.00 (26.56)	16.00 (23.57)	15.10 (22.86)	11.09 (20.17)	10.30 (18.71)	7.60 (16.00)	21.82 (27.84)
18	3	Anamalika	50.00 (45.00)	40.00 (39.23)	40.00 (39.23)	33.80 (35.54)	21.70 (27.76)	17.00 (24.35)	16.10 (23.65)	13.00 (21.13)	10.80 (19.18)	6.00 (14.17)	24.84 (29.89)
19	3	DBR-08	60.00 (50.76)	43.30 (41.14)	34.70 (36.09)	24.90 (29.93)	23.20 (28.79)	18.40 (25.4)	13.00 (21.13)	14.10 (22.05)	10.00 (18.43)	3.60 (10.93)	24.52 (29.68)
20	3	BVB-71-1	50.00 (45.00)	50.00 (45.00)	34.50 (35.97)	29.30 (32.77)	20.50 (26.92)	21.00 (27.27)	13.40 (21.47)	12.40 (20.61)	8.90 (17.35)	3.70 (11.09)	24.37 (29.58)
21	3	P.Bindu	60.00 (50.76)	51.70 (45.97)	35.50 (36.57)	28.80 (32.45)	21.50 (27.62)	16.40 (23.88)	15.40 (23.1)	11.30 (19.64)	7.90 (16.32)	4.10 (11.68)	25.26 (30.17)
22	3	JB-02	30.00 (33.21)	36.70 (37.28)	29.40 (32.83)	30.40 (33.46)	20.00 (26.56)	16.00 (23.57)	15.10 (22.86)	11.90 (20.17)	10.30 (18.71)	7.60 (16.00)	20.74 (27.09)
23	3	AB-02	56.70 (48.85)	51.50 (45.85)	39.60 (38.99)	21.00 (27.27)	19.80 (26.42)	24.20 (29.46)	21.10 (27.34)	13.60 (21.64)	11.00 (19.36)	5.70 (13.81)	26.42 (30.93)
24	3	A.Kurmakar	50.00 (45.00)	50.00 (45.00)	35.10 (36.33)	37.60 (37.82)	19.10 (25.91)	20.90 (27.2)	14.80 (22.62)	12.80 (20.96)	12.50 (20.7)	5.20 (13.18)	25.8 (30.52)
25	4	KS 331	50.00 (45.00)	46.70 (43.1)	33.80 (35.54)	25.90 (30.59)	19.40 (26.13)	13.70 (21.72)	9.40 (17.85)	9.00 (17.45)	10.00 (18.43)	4.20 (11.82)	22.21 (28.11)
26	4	Aryana	30.00 (33.21)	41.70 (40.22)	39.80 (39.11)	17.20 (24.5)	12.00 (20.26)	7.10 (15.45)	7.60 (16.00)	6.60 (14.88)	3.00 (9.97)	2.70 (9.45)	16.77 (24.17)
27	4	DRNKV-104-43	40.00 (39.23)	40.00 (39.23)	42.00 (40.39)	35.70 (36.69)	30.50 (33.52)	21.50 (27.62)	18.30 (25.32)	17.60 (24.8)	13.10 (21.21)	4.70 (12.52)	26.34 (30.87)
28	4	Green long	50.00 (45.00)	40.00 (39.23)	41.30 (39.98)	38.80 (38.52)	30.60 (33.58)	23.20 (28.79)	15.00 (22.78)	16.30 (23.81)	11.30 (19.64)	6.70 (15.00)	27.32 (31.51)
29	4	IVBL-116-131	50.00 (45.00)	40.00 (39.23)	30.70 (33.64)	45.50 (42.41)	31.20 (33.95)	19.00 (25.84)	16.20 (23.73)	14.20 (22.13)	11.50 (19.82)	5.70 (13.81)	26.4 (30.91)

30	4	VR-02	56.70 (48.85)	55.30 (48.04)	41.40 (40.04)	29.80 (33.08)	26.00 (30.65)	19.10 (25.91)	13.60 (21.64)	12.70 (20.87)	9.70 (18.14)	5.00 (12.92)	26.93 (31.26)
31	4	JB-03-06	40.00 (39.23)	33.00 (35.06)	35.60 (36.63)	18.50 (25.47)	16.00 (23.57)	10.50 (18.90)	9.40 (17.85)	4.00 (11.53)	2.50 (9.09)	1.70 (7.49)	17.12 (24.44)
32	4	IC 136260	60.00 (50.76)	46.00 (42.7)	42.30 (40.57)	26.00 (30.65)	20.00 (26.56)	18.80 (25.69)	12.20 (20.44)	12.20 (20.44)	9.80 (18.24)	5.90 (14.05)	25.32 (30.21)
33	5	JB-64	50.00 (45.00)	43.10 (41.03)	34.50 (35.97)	25.70 (30.46)	18.00 (25.1)	18.30 (25.32)	14.30 (22.21)	16.70 (24.12)	10.00 (18.43)	5.80 (13.93)	23.64 (29.09)
34	5	IC 136309	50.00 (45.00)	36.00 (36.86)	34.10 (35.72)	25.10 (30.06)	13.50 (21.55)	15.40 (23.10)	8.60 (17.05)	7.10 (15.45)	6.60 (14.88)	4.30 (11.96)	20.07 (26.61)
35	5	BH-02	53.30 (46.89)	50.00 (45)	33.50 (35.36)	22.30 (28.17)	22.80 (28.52)	20.40 (26.85)	11.90 (20.17)	5.60 (13.68)	4.20 (11.82)	2.70 (9.45)	22.67 (28.43)
36	5	IC 136306	30.00 (33.21)	30.00 (33.21)	40.00 (39.23)	32.40 (34.69)	16.00 (23.57)	9.20 (17.65)	13.90 (21.89)	10.50 (18.9)	6.00 (14.17)	3.20 (10.3)	19.12 (25.92)
37	5	IC 203589	30.00 (33.21)	36.90 (37.4)	22.30 (28.17)	14.10 (22.05)	9.50 (17.95)	6.90 (15.22)	8.30 (16.74)	8.00 (16.42)	6.70 (15.00)	4.10 (11.68)	14.68 (22.52)
38	5	IC 215021	60.00 (50.76)	50.00 (45.00)	39.40 (38.88)	25.90 (30.59)	22.70 (28.45)	21.90 (27.9)	16.60 (24.04)	13.10 (21.21)	9.70 (18.14)	5.00 (12.92)	26.43 (30.93)
39	5	IC 137751	20.00 (26.56)	36.70 (37.28)	35.90 (36.81)	20.40 (26.85)	10.90 (19.27)	9.40 (17.85)	8.80 (17.25)	6.40 (14.65)	7.20 (15.56)	2.80 (9.63)	15.85 (23.46)
40	5	IC 154517	20.00 (26.56)	32.00 (34.44)	27.70 (31.75)	23.10 (28.72)	14.90 (22.7)	9.40 (17.85)	7.10 (15.45)	6.90 (15.22)	4.50 (12.24)	2.40 (8.91)	14.80 (22.62)
41	6	IC 136292	40.00 (39.23)	34.70 (36.09)	35.70 (36.69)	15.30 (23.02)	17.70 (24.87)	16.30 (23.81)	10.80 (19.18)	9.30 (17.75)	6.20 (14.41)	3.40 (10.62)	18.94 (25.79)
42	6	IC 213564	60.00 (50.76)	48.00 (43.85)	29.00 (32.58)	17.80 (24.95)	16.30 (23.81)	14.20 (22.13)	8.10 (16.53)	8.40 (16.84)	8.50 (16.95)	5.10 (13.05)	21.54 (27.65)
43	6	JB-15	50.00 (45.00)	46.1 (42.76)	35.10 (36.33)	26.20 (30.78)	22.70 (28.45)	20.40 (26.85)	11.10 (19.46)	9.60 (18.04)	6.70 (15.00)	3.50 (10.78)	23.14 (28.75)
44	6	IC 136258	40.00 (39.23)	36.70 (37.28)	41.90 (40.33)	30.40 (33.46)	20.00 (26.56)	16.00 (23.57)	15.10 (22.86)	11.9 (20.17)	10.30 (18.71)	7.60 (16.00)	22.99 (28.65)
45	6	IC 136222	53.30 (46.89)	43.70 (41.38)	38.90 (38.58)	25.40 (30.26)	23.80 (29.19)	22.80 (28.52)	15.50 (23.18)	13.50 (21.55)	7.60 (16.00)	3.70 (11.09)	24.82 (29.88)

46	6	IC 136189	33.30 (35.24)	37.00 (37.46)	26.60 (31.04)	20.30 (26.77)	14.40 (22.3)	12.30 (20.53)	12.40 (20.61)	7.70 (16.11)	7.80 (16.21)	2.30 (8.72)	17.41 (24.66)
47	6	IC 136249	40.00 (39.23)	33.30 (35.24)	36.00 (36.86)	32.40 (34.69)	18.90 (25.76)	14.20 (22.13)	11.50 (19.82)	13.50 (21.55)	7.70 (16.11)	4.80 (12.65)	21.23 (27.43)
48	6	IC136293	60.00 (50.76)	48.00 (43.85)	41.30 (39.98)	26.00 (30.65)	21.00 (27.27)	19.20 (25.98)	16.80 (24.19)	15.90 (23.49)	11.40 (19.73)	6.20 (14.41)	26.58 (31.03)
49	7	IC 136251	40.00 (39.23)	46.70 (43.10)	37.70 (37.87)	26.60 (31.04)	18.90 (25.76)	17.90 (25.02)	17.10 (24.42)	10.30 (18.71)	8.10 (16.53)	4.80 (12.65)	22.81 (28.52)
50	7	A.Nidhi	20.00 (26.56)	23.30 (28.86)	21.70 (27.76)	26.70 (31.11)	12.60 (20.79)	10.90 (19.27)	6.40 (14.65)	4.20 (11.82)	6.80 (15.11)	3.70 (11.09)	13.63 (21.66)
51	7	Jaware Brinjal	30.00 (33.21)	30.00 (33.21)	32.10 (34.51)	23.10 (28.72)	18.50 (25.47)	17.00 (24.35)	10.40 (18.81)	15.10 (22.86)	5.40 (13.43)	2.60 (9.27)	18.42 (25.41)
52	7	IC 136307	40.00 (39.23)	32.00 (34.44)	27.40 (31.56)	23.50 (28.99)	18.00 (25.1)	18.80 (25.69)	14.80 (22.62)	13.40 (21.47)	7.50 (15.89)	3.90 (11.38)	19.93 (26.51)
53	7	BLR-24	20.00 (26.56)	22.70 (28.45)	26.40 (30.91)	27.30 (31.49)	21.50 (27.62)	14.80 (22.62)	8.20 (16.63)	5.60 (13.68)	4.90 (12.78)	4.10 (11.68)	15.55 (23.22)
54	7	S.Pratibh	20.00 (26.56)	40.00 (39.23)	38.00 (38.05)	28.10 (32.01)	12.10 (20.35)	6.30 (14.53)	6.30 (14.53)	5.30 (13.3)	3.80 (11.24)	2.00 (8.13)	16.19 (23.72)
55	7	JB-07	20.00 (26.56)	28.30 (32.13)	17.60 (24.8)	25.40 (30.26)	21.50 (27.62)	15.00 (22.78)	9.30 (17.75)	7.90 (16.32)	5.50 (13.56)	3.30 (10.46)	15.38 (23.08)
56	7	IC 136061	13.33 (21.41)	13.21 (21.31)	12.43 (20.64)	12.88 (21.03)	8.70 (17.15)	8.56 (17.01)	6.72 (15.02)	4.51 (12.26)	4.67 (12.48)	3.48 (10.75)	8.84 (17.3)
57	8	DRNKV-02-104	50.00 (45.00)	30.00 (33.21)	18.00 (25.1)	28.70 (32.39)	17.80 (24.95)	18.30 (25.32)	12.40 (20.61)	15.50 (23.18)	12.60 (20.79)	6.90 (15.22)	21.02 (27.28)
58	8	IC 136589	60.00 (50.76)	37.70 (37.87)	34.80 (36.15)	24.20 (29.46)	19.00 (25.84)	18.40 (25.4)	16.30 (23.81)	13.60 (21.64)	11.00 (19.36)	5.70 (13.81)	24.07 (29.38)
59	8	A.Abhilamb	40.00 (39.23)	40.00 (39.23)	43.70 (41.38)	32.20 (34.57)	26.60 (31.04)	21.90 (27.9)	21.00 (27.27)	18.20 (25.25)	14.20 (22.13)	5.10 (13.05)	26.29 (30.84)
60	8	IC 136311	40.00 (39.23)	40.00 (39.23)	42.00 (40.39)	38.70 (38.46)	30.70 (33.64)	22.90 (28.59)	18.40 (25.4)	14.40 (22.3)	13.50 (21.55)	5.70 (13.81)	26.63 (31.06)
		Check cultivars											
61		Dommeru	54.35	43.2	42.35	40.42	38.9	34.26	28.18	30.35	18.74	6.35	33.71

		Local-SC-1	(47.49)	(41.09)	(40.59)	(39.47)	(38.58)	(35.82)	(32.06)	(33.42)	(25.65)	(14.59)	(35.49)
62		Tadepalli gudem Local-SC-2	50.00 (45.00)	45.65 (42.5)	40.28 (39.39)	34.55 (36)	30.74 (33.67)	34.65 (36.06)	29.80 (33.08)	16.50 (23.96)	12.45 (20.66)	6.70 (15.00)	30.13 (33.29)
63		Bhagyamathi -RC	20.00 (26.56)	18.74 (25.65)	24.55 (29.7)	20.80 (27.13)	23.15 (28.76)	16.74 (24.15)	18.95 (25.8)	10.45 (18.86)	7.20 (15.56)	3.25 (10.38)	16.38 (23.87)
Mean			39.26	37.81	35.06	31.30	27.20	24.84	22.14	19.69	16.57	12.11	27.67
Ci-Cj		CD (P=0.05)	1.9	2.9	4.6	1.7	2.9	3.2	3.4	4.1	3.1	1.2	1.7
		SEM±	0.63	0.91	1.55	1.48	0.99	1.06	1.13	1.34	1.06	0.41	1.58
BiVi-BiVj		CD (P=0.05)	5.4	8.1	13.0	4.7	8.2	9.2	9.6	11.5	8.9	3.5	4.9
		SEM±	1.76	2.68	4.38	4.10	2.75	3.04	3.18	3.81	2.97	1.17	1.63
Vi-Vj		CD (P=0.05)	6.2	9.3	15.1	5.7	9.5	10.6	11.1	13.2	10.2	4.1	5.7
		SEM±	2.05	3.11	5.02	4.73	3.18	3.53	3.67	4.38	3.39	1.35	1.88
Ci-Vj		CD (P=0.05)	4.5	6.8	11.0	4.1	6.9	7.7	8.1	9.6	7.5	3.0	4.1
		SEM±	1.48	2.26	3.67	3.46	2.33	2.54	2.68	3.18	2.47	0.99	1.37

Figures in parentheses are arc sin transformed values.
CD- Critical difference SEM-Standard Error of mean
DAT-Days after planting
Ci – Cj (Critical difference between two control treatments), BiVi – BiVj (Critical difference between two augmented treatments in the same block), Vi – Vj (Critical difference between two augmented treatments in different blocks), Ci – Vj (Critical difference between control treatment and augmented treatment)

Non-significant difference among the genotypes belonging to different blocks was observed between IC 136017(17.86%) - IC 136231(16.33%), IC 136290(21.82%)-JB - 64(23.64%), IC 136292(18.94%)-IC 154517(14.80%) and A.Nidhi (13.63%) - IC 154517(14.80%).

Comparison among the tested genotypes and check cultivars

Results indicated that the tested genotypes are superior to check cultivars in the response against shoot infestation. The tested genotypes Aryana (16.77%), IC 144515 (16.95%), JB-03-06 (17.12%), IC 089888 (17.39%), IC 136189(17.41%), IC 136451(17.53%), IC 136017 (17.86%), IC 136096 (18.30%), Jaware Brinjal (18.42%). IC 136292 (18.94%), IC 136306 (19.12%), Pb.Shree (19.46%), Swarnamani (19.72%), IC 136292 (19.72%), IC 136307 (19.93%) and IC 136309 (20.07%) were found on par with resistant check Bhagyamathi while Dommeru Local and Tadepalligudem Local are significantly differed in per cent shoot infestation with test genotypes.

The results showed that seven out of 60 tested genotypes exhibited significant variability among genotypes and with check cultivars. IC 136061(8.84%) IC 136148 (10.10 %), IC 135912 (11.10 %), IC 136299 (12.78%), IC 136096 (13.30%), IC 136041(13.47%), A.Nidhi (13.63%) recorded with significantly less mean per cent shoot infestation indicated that these genotypes can be exploited in future course of action for crop improvement programme. The very low shoot infestation may be attributed due to morphological and biochemical factors of the genotypes like IC 136061, IC 136148 and IC 135912.

The results in the present study are in agreement with the findings of Wagh *et al.*, (2012) who revealed that the mean per cent shoot infestation ranged from 1.38 to 9.96 per cent. Significantly, minimum per cent shoot infestation (1.38 %) was registered in genotype RHRB-60. It was at par with that recorded in genotypes RHRB-20 (1.78 %), RHRB-12 (1.99 %) and RHRB-79 (2.00%). Brinjal genotype RHRB-73 recorded maximum (9.96%) per cent shoot infestation.

Similar findings were reported by Rameash *et al.*, (2015) who observed that the per cent shoot infestation was ranged from 1.92 per cent (IC 136347) to 39.51 per cent (IC 136364). The local checks were recorded with an infestation of 14.70, 15.48, 13.11 and 34.79 per cent for Bhagyamathi, Pusa Purple Long, Pusa Shyamala and IC 136564.Seventeen accessions (IC 136347, IC 013332, IC 111077, IC 127021, IC 089510, IC 304974, IC 138024, IC 089867, IC 090788, IC 136343, IC 144013, IC 136617, IC 096932, IC 136359, IC 126721 and IC 136380) recorded a shoot infestation level of less than 10 per cent.

Niranjana *et al.*, (2015) reported that the mean number of shoots infested in 35 genotypes of brinjal ranged 2.97 - 16.42 per cent. Genotype Kallakurichi recorded the maximum shoot infestation (16.42%) and the lowest infestation of 2.97 % was registered in Sm 143, which was not significantly different to Samrat, Sm 101, Sm 30, Sm 120, Rituraj, Sm 60, Sm 79, Sm 21, Sm 131, Sm 166, Sm 109, Sm 104, Nagarkoil local, Sm 84, Sm 26, Sm 10, Sm 136 and Sm 87. Javed *et al.*, (2017) reported that among the thirty genotypes, IC 136299 recoded significantly lowest infestation (6.60%) and it was less preferred by brinjal shoot and fruit borer while genotype IC 345271 (34.66 %), IC 545919 (36.62 %) were highly preferred by the pest and recorded significantly more damage.

Nisha Rani *et al.*, (2018) reported that out of thirty six genotypes screened against shoot

and fruit borer, Pusa Purple Cluster recorded with lowest shoot infestation (10.43%) whereas the highest shoot infestation was found in the genotype EC 382524 (32.46%).

On the basis of present investigation, none of the cultivars was found to be free from the infestation of the brinjal shoot and fruit borer but considerable variation of infestation was recorded among different genotypes. IC 136061recorded minimum shoot infestation among the 60 genotypes. Therefore, exploitation of resistant character existed naturally in the genotypes may reduce the reliance on chemical insecticides, in turn cost of cultivation and environmental pollution.

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