Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(4): 1773-1776

Received: 22-05-2020
Accepted: 24-06-2020

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Screening of some brinjal germplasm lines for resistance against brinjal shoot and fruit borer, *Leucinodes orbonalis* guenee

Lipsa Dash and Ladu Kishore Rath

Abstract
Field screening of 101 brinjal (*Solanum melongena L.*) germplasms was carried out to ascertain their reaction to the shoot and fruit borer, *Leucinodes orbonalis* Guenee. Among the genotypes screened, minimum infeststion (4.08% fruit damage) was recorded in the resistant check CHES-WS-1 while maximum infestation (82.71% fruit damage) was observed in Badakutuna Local. Out of rest of the germplasms screened, five germplasms viz., BBSR-117-1, BBSR-114, BBSR-145-1, BBSR-09-11, Selection from BBSR-192-1 were rated as resistant category showing 10-20% fruit damage whereas, six entries fell under moderately resistant category with 20-30% fruit damage; three fell under susceptible category showing 30-40% fruit damage. Eighty six germplasms were graded as highly susceptible with more than 40% fruit damage.

Keywords: Brinjal germplasm lines, brinjal shoot, *Leucinodes orbonalis* Guenee

Introduction
Brinjal, also known as eggplant belonging to the family "Solanaceae", is one of the common and popular vegetables grown throughout the world. In India, brinjal occupies over 8.14% of total vegetable area and 9% of total vegetable production [1] However, several biotic (Diseases and pests) and abiotic (environmental) factors are responsible for the declining yield of brinjal. The brinjal shoot and fruit borer (BSFB), *L. orbonalis* is distributed throughout the vegetable growing regions of India and in Odisha, the fruit damage up to 52% due to BSFB was reported by [2] Though the indiscriminate application of pesticides to control this pest has posed problems of high residues in fruits; destruction of natural enemies and development of resistance to multiple classes of insecticide [3] yet, has been adapted by the farmers throughout the globe. However, cultivars having inherent resistance property can be a sustainable alternative component to manage this pest with increasing economic returns and environmental safety. Though several screening trials have been attempted for identifying resistance sources to *L. orbonalis* [4, 5] still there exists a huge scope for screening the germplasms against this devastating pest. Therefore, the present study was undertaken with an objective of screening certain brinjal germplasms in two successive rabi seasons to ascertain the level of resistance in the test germplasms.

Materials and Methods
Two supervised field experiments were conducted to screen 101 brinjal germplasms (including one resistant and one susceptible check each) for their reaction to brinjal shoot and fruit borer (*L. orbonalis*) at AICRP on vegetable crops, Bhubaneshwar during the rabi, 2016-17 and 2017-18. The seedlings were transplanted after 30 days of sowing into two rows of 5m length for every accession with a spacing of 90 cm between rows and 50 cm between plants. Recommended agronomic package of practices were adopted for raising the crop excluding the plant protection measures.
Five plants were tagged at random and observed for the incidence of shoot and fruit borer in each brinjal genotype from transplanting to harvest. Damaged and undamaged fruits from five tagged plants, in each genotype were counted in all pickings. On the basis of mean fruit damage percentage, all genotypes were categorized based on the damage rating suggested by [6] (Table 1)

Table 1: Damage rating of brinjal accessions

Sl. No	Fruit infestation (%)	Resistance category
1	0	Immune
2	1-10	Highly Resistant
3	10-20	Resistant
4	20-30	Moderate resistant
5	30-40	Susceptible
6	>40	Highly Susceptible

Results and Discussion

The pooled data on infestation by shoot and fruit borer in brinjal genotypes has been presented in Table 2. It was observed from the Table 2 that that the average infestation by BSFB ranged from 4.08-84.13%. Lowest mean infestation among the germplasms was found in CHES WS-1(4.08%) while maximum mean infestation in fruits was recorded in Badakutuna Local (84.13%). The screening trials conducted by earlier workers also witnessed a wider range of shoot infestation by *L. orbonalis* at different places (4.79 to 42.04% by [7] 8.00 to 88.60% by [8] We derived ample support from the observations of above workers.

Among 101 brinjal genotypes tested, none of them was rated immune to shoot and fruit borer. Similar results were also obtained by [9] where no germplasm showed immune response. In the present study only resistant check i.e. CHES WS-1 was rated under highly resistant category and 4.95 percent of total genotypes namely BBSR-117-1, BBSR-114, BBSR-145-1, BBSR-09-11, Selection from BBSR-192-1 were categorized as resistant.

It was revealed from the present study that 5.94 per cent of total genotypes (6 no.) were moderately resistant to *L. orbonalis* which exhibited 20 to 30% infestation whereas 2.97% of total genotypes (3 no.) were susceptible to *L. orbonalis* with 30-40 percent infestation (Table 3). Our findings are almost similar with the observations made by [5] who recorded around 3.45% of the total germplasms screened fell under 30-40 percent infeststion category.

Rest of the germplasms (86 no.) comprising 85.14 percent of total germplasms were rated as highly susceptible category with more than 40 percent infestation. This finding is also supported by the observations made by [10, 5]

Conclusion

From the two seasons pooled data, it was observed that the germplasms exhibited differential preference to BSFB. While none of the genotypes recorded a 0 damage rating, only five germplasms viz., BBSR-117-1, BBSR-114, BBSR-145-1, BBSR-09-11, Selection from BBSR-192-1 were reported to be resistant category. These resistant lines can be considered as parent materials for resistance breeding programmes.

Table 2: Mean per cent infestation by shoot and fruit borer in different genotypes

Sl. No	Name of the genotypes	Fruit infestation by BSFB (%)
1	BBSR-218	65.06
2	BBSR-202	47.37
3	BBSR-195-1	46.32
4	BBSR-192	31.57
5	BBSR-203	43.07
6	BBSR-195-3	26.80
7	BBSR-09-8-1	46.31
8	BBSR-117-1	12.49
9	BBSR-114	16.42
10	BBSR-145-1	15.12
11	BBSR-192-1	28.15
12	BBSR-200	27.64
13	BBSR-195-2	46.18
14	BBSR-08-2	61.34
15	IC-99376	75.97
16	BBSR-11-2	64.13
17	IC-90126	48.35
18	BBSR-243-6-7	52.93
19	IC-90113	47.21
20	IIHR-7	38.29
21	SM-6-6	39.39
22	UtkalTarini	74.75
23	BB-13	61.69
24	BB-44	25.38
25	BB-45	26.30
26	Arka Nidhi	44.70
27	428	24.64
28	Hajari Local	53.80
29	BB-67	59.73
30	BB-55	45.58
31	BB-54	66.48
32	BBSR-09-4	84.13
33	BBSR-09-5	57.45
34	BBSR-09-6	82.31
35	BBSR-09-8	77.37
36	BBSR-09-13	75.94
37	BBSR-09-14	69.03
38	BBSR-09-15	72.04

39	BBSR-09-18	83.93
40	BBSR-09-22	76.64
41	BBSR-11-3	58.49
42	BB-26	66.80
43	BB-85	77.62
44	BBSR-09-11	15.67
45	BBSR-09-19	66.27
46	BBSR-10-1	57.13
47	BBSR-10-7	62.14
48	BBSR-10-8	69.78
49	BBSR-10-11	67.40
50	BBSR-10-15	62.31
51	BBSR-10-18	68.13
52	BBSR-10-16	72.65
53	BBSR-10-21	75.43
54	BBSR-10-23	72.85
55	BBSR-10-24	57.91
56	BBSR-10-25	67.57
57	BBSR-10-26	63.80
58	BBSR-10-27	73.71
59	BBSR-11-4	70.11
60	BBSR-10-31	66.62
61	BBSR-10-33	69.86
62	Selection from BBSR-09-11	72.03
63	Selection from Hazari Local	79.32
64	Selection from BB-45	77.57
65	Selection from UtkalTarini	78.47
66	Selection from BBSR-192-1	15.98
67	Selection from BBSR-145-1	78.47
68	Selection from BBSR-192	67.54
69	Dhenkanal Local	66.44
70	Bhadrak Local	69.23
71	Badagocha Local-1	72.77
72	Badagocha Local-2	64.88
73	Nayagarh spiny brinjal	69.61
74	Keonjhar Local -1	66.73
75	Badakutuna Local	82.75
76	Keonjhar Local- 2	69.65
77	Jamusahi Local	58.99
78	2016/ BRR HYB-1	69.42
79	2016/ BRR HYB-2	58.29
80	2016/ BRR HYB-3	72.58
81	2016/ BRR HYB-4	63.02
82	2016/ BRR HYB-5	76.07
83	2016/ BRR HYB-6	57.94
84	2016/ BRR HYB-7	52.24
85	2016/ BRR HYB-8	61.94
86	UtkalKeshari	68.72
87	2016/ BRL-VAR-1	65.16
88	2016/ BRL-VAR-2	50.89
89	2016/ BRL-VAR-3	59.43
90	2016/ BRL-VAR-4	67.57
91	2016/ BRL-VAR-5	56.37
92	2016/ BRL-VAR-6	70.46
93	2015/ BRL-VAR-1	71.33
94	2015/ BRL-VAR-2	59.54
95	2015/ BRL-VAR-3	66.11
96	2015/ BRL-VAR-4	65.38
97	2015/ BRL-VAR-5	48.11
98	Punjab Sadabahar	65.06
99	Kashi Taru	46.5
100	BB-26	67.98
101	CHES-WS-1	4.08
	C.D. at 5%	2.34
	CV (%)	4.28

Table 3: Composition of genotypes based on the damage rating for BSFB

Fruit infeststion (%)	Resistance Category	Genotypes	No of Genotypes	% of total genotypes
0	Immune		0	0
1-10	HR	CHES WS-1	1	1
10-20	R	BBSR-117-1, BBSR-114, BBSR-145-1, BBSR-09-11, Selection from BBSR-192-1	5	4.95
20-30	MR	BBSR-192, BBSR-195-3, BBSR-200, BB-44, BB-45, 428	6	5.94
30-40	S	BBSR-192-1, IC-90126, BB-55	3	2.97
>40	HS	BBSR-203, BB-26, BBSR-218, BBSR-202, BBSR-195-1, BBSR-09-8-1, BBSR-195-2, BBSR-08-2, BBSR-11-2, BBSR-243-6-7,IC-90113, IIHR-7, SM-6-6, Utkal Tarini,BB-13, Arka Nidhi, Hajari Local, BB-67, BB-54, BBSR-09-4, BBSR-09-5, BBSR-09-6,BBSR-09-8, BBSR-09-14, BBSR-09-15, BBSR-09-18, BBSR-11-3, BB-26, BB-85, BBSR-09-19, BBSR-10-1, BBSR-10-7, BBSR-10-8, BBSR-10-11, BBSR-10-15, BBSR-10-18, BBSR-10-16, BBSR-10-21, BBSR-10-23, BBSR-10-24, BBSR-10-25, BBSR-10-26, BBSR-10-27, BBSR-11-4, BBSR-10-31, BBSR-10-33, Selection from BBSR-09-11, Selection from Hazari Local, Selection from BB-45, Selection from Utkal Tarini, Selection from BBSR-09-11, Selectionfrom BBSR-192, Dhenkanal local, Bhadrak local, Badagocha local-1, Badagocha local-2, Nayagarh spiny brinjal, Keonjhar local, Badakuntha local, Keonjhar local-2, Jamusahi local, 2016/ BRR HYB-1, 2016/ BRR HYB-2, 2016/ BRR HYB-3, 2016/ BRR HYB-4, 2016/ BRR HYB-5,2016/ BRR HYB-6, 2016/ BRR HYB-8, Utkal Keshari, 2016/ BRL-VAR-1, 2016/ BRL-VAR-2, 2016/ BRL-VAR-3, 2016/ BRL-VAR-4, 2016/ BRL-VAR-5, 2016/ BRL-VAR-6, 2015/ BRL-VAR-1, 2015/ BRL-VAR-2, 2015/ BRL-VAR-3, 2015/ BRL-VAR-4, 2016/ BRL-VAR-6, 2015/ BRL-VAR-1, 2015/ BRL-VAR-2, 2015/ BRL-VAR-3, 2015/ BRL-VAR-4, 2015/ BRL-VAR-5, Punjab Sadabahar, Kasi Taru	86	85.14

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