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Evaluation of brinjal accessions for resistance against shoot and fruit borer, *Leucinodes orbonalis* G. (Lepidoptera: Pyralidae) under *Rabi* season

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Abstract
In a field condition, 100 brinjal accessions were screened at Sivapuri village, Tamil Nadu, India in *Rabi* 2021 to observe their resistance potential to brinjal shoot and fruit borer, *L. orbonalis.* The results acquired during the *Rabi* 2021 field screening, revealed that shoot and fruit damage differed notably across brinjal accessions. It was observed that IC-136546 had the lowest shoot and fruit damage followed by IC-136451, while Manapaarai Local had the highest shoot and fruit damage, followed by IC-089847. Based on per cent fruit damage, 9 accessions were highly resistant, 14 were moderately resistant, 25 were tolerant, 31 were susceptible and 21 were highly susceptible and none of the accession was showed immune response to brinjal shoot and fruit borer. As a result, accessions that categorized under the resistance were chosen for further evaluation in order to develop promising varieties.

Keywords: brinjal, field screening, resistance and *L. orbanalis*

Introduction
Brinjal (*Solanum melongina* L.) is a well-known solanaceous vegetable native of India and which is highly prized by small-scale growers and low-income customers in South Asia, where it represents for about 60 per cent of global area and 53 per cent of global output (Shashank *et al.*, 2015) [10]. It's also known as the "King of Vegetables" because of its comprehensive use in everyday life and Indian cuisine. India is the world's second largest brinjal grower, after China, with an annual output of roughly 12.87 million tonnes from an area of 0.74 million hectares with an average yield of 17.2 tonnes/ha (Indiastat, 2021) [4]. However, its production is thwarted by variety of pests and diseases. Brinjal shoot and fruit borer, *L. orbonalis* is the most problematic pest, infesting throughout the year and Tamil Nadu alone it causes a loss is about 20-60 per cent (Raja *et al.*, 1999) [9] and possibly it may cause yield loss about 100 per cent if we do not implement any control measures (Rahman, 2007) [8].
L. orbonalis attacks the crop at all stages of growth and development. During the early stages, the damage is restricted to the shoot and during the later stages, when the fruit is bearing, the damage is confined to the fruits. Fruit bearing ability and market quality are both reduced as a result of this damage. Even though numerous insecticides are utilised to manage this pest, they are unable to provide effective control because the pest dwells inside the shoot and fruit, making it hard for insecticide to reach the pests. Moreover, there are various brinjal varieties present in our county. But none have been shown to be significantly resistant to the *L. orbonalis* (Alam *et al.*, 2003) [1]. Thus, Host plant resistance is an important component and play a promising role in an integrated pest management system, and it is considered to be the best choice to deal with pest problems through using resistant cultivars. Therefore, keeping this in mind, the present study was planned to screen the brinjal accessions for identifying reliable resistance source to *L. orbonalis.*

Materials and Methods
The study was conducted at a farmer's field in Sivapuri village, Tamil Nadu, India during *Rabi* 2021. For this field screening, 100 brinjal accessions were obtained from various institutions and farmers. Each accession was sowed in a single row of five metres length with 90X60 cm spacing. The experimental fields were prepared using standard agronomic procedures, and no pesticides were applied throughout the crop season.
The incidence of *L. orbonalis* was observed at weekly intervals on five randomly selected plants during the morning hours. For assessment of fruit damage healthy and damaged fruits were recorded at each harvest, and the per cent damage was calculated by using following formula.

$$\text{Percent fruit damage} = \frac{\text{Number of damaged fruits}}{\text{Total number of fruits}} \times 100$$

Mishra *et al.* (1988) [6] proposed categorising accessions into six groups based on mean per cent fruit damage.

Table 1: Fruit infestation and resistant category details

S. No.	Fruit infestation (%)	Resistant category
1	0	Immune
2	1-10	Highly resistant
3	11-20	Moderately resistant
4	21-30	Tolerant
5	31-40	Susceptible
6	Above 40	Highly susceptible

Table 2: Field screening of brinjal accessions against *L. orbonalis* incidence during *Rabi* 2021

S. No.	% Fruit infestation	Resistant category	Range of % fruit damage	Number of accessions	Name of the accessions
11	0%	Immune	0	Nil	Nil
22	1-10%	Highly Resistant	5.88-9.05	9	IC – 136546, IC – 136451, IC – 136296, IC – 546016, Namakal mull kathari-Local, IC – 136297, IC – 154571, IC – 136302, IC – 136177
33	11-20%	Moderately Resistant	11.51-20.20	14	IC – 136302, IC – 316297, IC – 136299, Neeta bavani kathari, IC – 089905, IC – 136290, IC – 136176, IC – 136250, PLR – 2, IC – 203589, IC – 136177, Danishpet Local, Vathalmalai Local, IC – 136260
44	21-30%	Tolerant	21.03-30.10	25	IC – 136182, PLR – 1, IC – 12859, IC – 144518, IC – 215021, Kall gundu-Bommidi Local, IC – 112991, IC – 90982, Kaveripattinam Local, IC – 112351, IC – 136293, Annamalai Brinjal, CO-2, Theerthamalai Local, Uuthu kathari – Local, IC – 89910, IC – 089875, Rajapalayam Local, Naai mulli – kadathur Local, Kulasai kathari –Local, IC – 089876, IC – 136188, IC – 316275, Vellai mull kathari- Local, Gundu bavani kathari – Local
55	31-40%	Susceptible	31.06-39.06	31	IC – 089964, IC – 136231, IC – 136318, IC – 12859, Kundarapalli Local, Yercaud Local, IC – 136017, Kambainallur Local, Kavaramalai Local, Vandavasi Local, Uduthalai samba Local, Mullivadikanvai Local, Valliyur Local, Surapattu Local, IC – 144518, Malliyavanam Local, Ujala brinjal – Local, IC – 393239, IC – 136450, Salem Local, Medium bavani kathari – Local, IC – 446654, Karimangalam Local, IC – 112950, Palacode Local, IC – 136245, Kollampatti kathari – Local, Yanaimaduvu Local, Naanguneri Local, IC – 089888, IC – 112341
66	Above 40%	Highly Susceptible	40.64-61.83	21	IC – 136296, IC – 545854, Jalakandapuram Local, IC – 136249, IC – 136189, Namakal Karnataka kathari – Local, IC – 136300, Maduranthakam Local, Mathavidupatti Local, Kudikadu Local, Kutty pachai mull kathari – Local, Perumugai local, Vellai kathari –Local, Pachai kathari – Local, Kalanchipatti Local, Gangaleri Local, IC – 383099, IC – 136309, IC – 127023, IC – 089847, Manapaarai Local

Result and Discussion

The data collected during the field screening of brinjal accessions against shoot and fruit borer demonstrated that fruit damage among the brinjal accessions were notably different during Rabi 2021. Fruit infection began at 56 DAT and lasted till harvest. On 84 DAT, the percentage of fruit damage reaches its highest. After then, when crops reach physiological maturity, the percentage of fruit damaged begins to diminish. These findings are consistent with the findings of Hossain *et al.* (2002) [3], who discovered that the infestation differed considerably between cultivars and that the shoot and fruit borer infection fluctuate with plant age, with the rate of infestation increasing with plant age and subsequently decreasing.

Among the accessions the percentage of fruit infestation ranged from 5.88 to 61.83. The lowest fruit damage was found on IC-136546 (5.88 %) followed by IC-136451 (7.71 %), while the maximum fruit damage was reported on Manapaarai Local (61.83 %), followed by IC-089847 (56.49 %). These findings are in accordance with the findings of Elanchezhyan *et al.* (2008) [2], who reported that fruit damage ranged from 8.7 to 51.9 % with the

lowest fruit damage on IC136347 and the highest on susceptible check IC136564. Similarly, Shaukat *et al.* (2020) [11], who noted that the minimum fruit infestation on Eggplant Black Boy 706 while both shoot and fruit infestation was found to be maximum in a variety Eggplant F1 Chaya 704.

The accessions were divided into six groups based on the per cent fruit damage *viz*., Immune, Highly Resistant, Moderately Resistant, Tolerant, Susceptible, and Highly Susceptible as shown in Table 2. Among these, 9 accessions were Highly Resistant, 14 were Moderately Resistant, 25 were Tolerant, 31 were Susceptible, and 21 were Highly Susceptible and none of the accession was showed Immune response to *L. orbonalis*. In a similar study, Praveen *et al.* (2020) [7] evaluated 14 brinjal accessions, of which, 6 were found to be tolerant, 6 were susceptible and rest of 2 were found highly susceptible to *L. orbonalis* and also none of the accessions showed immune, resistance and moderately resistance under field condition. Furthermore, Mandal *et al.* (2005) [5] examined 31 brinjal cultivars and found that none of them were resistant to the *L. orbonalis*.

Conclusion

It is concluded that brinjal accessions with minimum fruit damage should be chosen for further research on mechanisms of resistance and factors governing resistance to *L. orbonalis*, in order to, promising accessions were chosen and recommended for large-scale cultivation.

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