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Impact of shoot and fruit borer, *Leucinodes orbonalis* infestation on marketable yield of different brinjal varieties

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Abstract
The study was carried out at Horticulture Farm, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan during *kharif* 2014-15 and 2015-16 under natural field conditions to find out the impact of *Leucinodes orbonalis* infestation on marketable yield of different brinjal varieties *viz*., Kavach, Pant Rituraj, MHB-80, Pant Samrat, Manjarigota, BR-112, Pant brinjal-5 and Pusa Purple long. Results showed that maximum marketable fruit yield of 34.01 kg/plot and 33.20 kg/ plot was recorded in brinjal variety Pant Samrat whereas, minimum marketable fruit yield 24.83 kg/plot and 23.84 kg/plot was recorded in brinjal variety Kavach during *kharif* 2014-15 and 2015-16 respectively.

Keywords: Shoot & fruit borer, infestation, brinjal, marketable yield

Introduction
Brinjal, *solanum melongena* L. also known as eggplant, belongs to family solanaceae, is an important vegetable crop grown throughout the world, especially in south Asia and is known to be native of India. in production and productivity, India stands second in the world after china. It is grown in the states of Rajasthan, west bengal, Orissa, Bihar, Gujarat, Maharashtra, Andhra Pradesh and Karnataka in India. The total area under brinjal cultivation is 0.72 million hectares with an annual production of 12.68 million tons (NHB 2018-19) [3]. in the state of Rajasthan, it is mainly grown in Alwar, Jaipur, Ajmer, Bharatpur, Bundi, Baran and Kota districts during summer and rainy seasons. It is importance due to its nutritional, medicinal, as well as commercial value, 100gm edible portion of brinjal supplies 40 gm carbohydrates, 1.40gm of proteins, 0.30gm of mineral and vitamins A, B and C (Niranjan and Raina, 2017-18) [6].

Brinjal crop is attacked by a large number of insect-pests right from germination till harvest *viz*., jassid (*Amrasca biguttula biguttula* Ishida), shoot and fruit borer (*Leucinodes orbonalis* Guen.), whitefly (*Bemisia tabaci* Gen.), aphid (*Aphis gossypii* Glover), lacewing bug (*urentius echinus* Distant), epilachna beetle (*Epilachna vigintioctopunctata* Fab.) and stem borer (*Euzophera perticella* Ragonot). Certain other insect-pests include grasshopper (Agarwal, 1955) [1], termite (Peswani and Katiyar, 1972) [7] and plume moth (Ayyar, 1963) [2] that have been reported infesting brinjal. Among these insect pests, the shoot and fruit borer, *L. orbonalis* is a major constraint in achieving potential yield. The pest remains active throughout the year with many overlapping generations. The crop losses have been reported to a tune of 20-89 per cent from various parts of country (Raju *et al.*, 2007) [9]. The larvae bore into tender shoots resulting in the withering of infested shoots and tender leaves (Lall, 1964 and Singh and Guram, 1967) [4, 11]. The larvae bore into petiole and midribs of the large leaves or young growing shoots, close the opening with their frass and feed within. In the later stages, it bores into flowers, buds and fruits entering from under the calyx having no visible sign of infestation and feed inside the fruits. The infested fruits loose their market value and finally complete loss occurs. The infested flower buds are shed, while fruits become unfit for human consumption. Hence, it is imperative to screen commonly grown varieties against the pest, so that promising varieties that as less preferred/ infested could be identified.

Materials and Methods
Raising of Seedlings
The seeds of different varieties of brinjal were sown in well prepared nursery bed during third

week of June, 2014-15 and 2015-16 in the shed net house of Horticulture Farm, Rajasthan College of Agriculture, Udaipur. The seedlings were raised by following recommended horticultural operations. The seedlings were finally ready for transplanting in the experimental field after they attained a height of about 15 cm with 3-4 leaves.

Preparation of field and transplanting

The experimental field was prepared by ploughing with the help of disc plough followed by cross harrowing and planking. A well pulverized field was thus obtained for transplanting of seedlings. The transplanting of seedlings was done during the second week of July, 2014-15 and 2015-16. Prior to this, the seedlings were uprooted from the nursery carefully; those with damaged roots and unhealthy appearance were discarded. The commonly grown eight varieties of brinjal *viz*: Kavach, Pant rituraj, MHB-80, Pant samrat, Manjarigota, BR-112, Pant brinjal-5 and Pusa purple long were screened against brinjal shoot and fruit borer infestation under natural conditions in randomized block design with three replications. Plot size each measuring 3.0 × 4.5 m. and spacing row to row and plant to plant spacing of 60 × 50 cm, respectively.

Observations

The observation on marketable fruit yield was recorded at each picking and the weight of brinjal fruits was recorded by using electronic balance to determine yielding ability of varieties.

Result and Discussion

Impact of shoot and fruit borer, *L. orbonalis* infestation on marketable fruit yield of brinjal varieties was studied. The data presented in Table-1 reveal that marketable fruit yield of different brinjal varieties screened against *L. orbonalis* infestation. The maximum marketable fruit yield of 34.01 kg/plot was recorded in brinjal variety Pant Samrat followed by Pant Rituraj which yielded 33.29 kg/plot and Pusa purple long which yielded 29.55 kg/plot, whereas minimum fruit yield was noticed in brinjal variety Kavach which yielded 24.83 kg/plot followed by MHB-80 which yielded 27.17 kg/plot during *Kharif* 2014-15. The data presented in Table- 2 show that the maximum marketable fruit yield of 33.20 kg/ plot was recorded in brinjal variety Pant Samrat followed by Pant Rituraj which yielded 32.12 kg/plot and and Pusa purple long which yielded 28.74 kg/plot; whereas, minimum fruit yield was noticed in brinjal variety Kavach which yielded 23.84 kg/plot followed by MHB-80 which yielded 24.97 kg/plot *Kharif* 2015-16. From the available literature, Tripura *et al.* (2017) [12] who evaluated some biorational pesticides against brinjal shoot and fruit borer under field condition. The treatments *viz.* chlorantraniliprole 18.5 SC (0.4 ml/l), spinosad 45 SC (0.5 ml/l), chlorfenapyr 10 SC (2 ml/l), indoxacarb 14.5 SC (1ml/l), *Bacillus thuringiensis* (*Bt*) (2g/l), azadirachtin 0.03EC (5ml/l), *Metarhizium anisoplae* (2.5 g/l), *Beauveria bassiana* (2.5 g/l), chlorpyriphos 20EC (2.5 ml/l) were applied thrice at fifteen days' interval starting from initiation of BSFB infestation. Mean shoot infestation was minimum in chlorantraniliprole treated plots (6.32%) followed by spinosad, chlorfenapyr, indoxacarb. Among bio-pesticides, *Beauveria* and *Bt* were found effective treatments in reducing shoot infestation. Chlorantraniliprole recorded lowest fruit infestation (8.25%) and highest marketable fruit yield (250.30 q/ha) followed by spinosad and chlorfenapyr. The present investigation findings are in partial supported with Singh *et al.* (2009) [10] found that profenophos @ 0.1 per cent and spinosad @ 0.01 per cent were most effective in reducing the infestation of shoot by *L. orbonalis* besides recording higher brinjal fruit yield. Among the nine treatments evaluated, profenophos was the most effective followed by spinosad individually and in combinations with novaluron in reducing the larval population as well as in giving higher yield. Similar results were found by Mainali *et al.* (2015) [5] showed that the Chlorantraniliprole treated plot recorded the maximum marketable yield (32.03 mt/ha) followed by Spinosad (30.93 mt/ha) with 34.39 percent and 29.77 percent increase in marketable fruit yield over untreated check, respectively.

Table 1: Marketable yield of different brinjal varieties screened against *L. orbonalis* infestation during *kharif* 2014-15.

Varieties	Yield (kg/plot)	Yield (q/ha)
Kavach	24.83	183.77
Pant Rituraj	33.29	246.32
MHB 80	27.17	201.08
Pant Samrat	34.01	251.65
Manjarigota	28.07	207.72
BR 112	27.53	203.75
Pant brinjal- 5	28.47	210.70
Pusa purple long	29.55	218.67
S.Em.±	0.52	

Table 2: Marketable yield of different brinjal varieties screened against *L. orbonalis* infestation during *kharif* 2015-16.

Varieties	Yield (kg/plot)	Yield (q/ha)
Kavach	23.84	176.44
Pant Rituraj	32.12	237.66
MHB 80	24.97	184.78
Pant Samrat	33.20	245.66
Manjarigota	26.90	199.08
BR 112	26.32	194.74
Pant brinjal- 5	27.40	202.74
Pusa purple long	28.74	212.70
S.Em.±	0.38	
C.D (p=0.05)	1.17	

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