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Incidence of shoot and fruit borer, *Leucinodes orbonalis* (Guenee) on brinjal in relation to weather factors in Western U.P

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Abstract
An experiment was carried out to investigate the incidence of shoot and fruit borer (*Leucinodes orbonalis* Guenee) in relation to weather factors in brinjal during *kharif* 2017-18 of Western UP. The results showed that the incidence of shoot and fruit borer on shoot infestation started from first week of August whereas, fruit infestation started from first week of September. The highest percent of shoot infestation recorded in the fourth week of September and the highest percent of fruit infestation of shoot and fruit borer was recorded on the fourth week of October during *Kharif* 2017-18. The shoot and fruit borer was active throughout the cropping season. Among the weather parameters maximum temperature and morning relative humidity showed positive correlation but minimum temperature, evening relative humidity and rainfall showed negative correlation on the incidence of both shoot and fruit infestation by the pest. The management of shoot and fruit borer during Kharif sown brinjal should therefore be initiated from August onwards using an integrated approach.

Keywords: Brinjal crop shoot, infestation, *Leucinodes orbonalis* Guenee, incidence

Introduction
Brinjal (*Solanum melongena* Linnaeus) belongs to the family "Solanaceae" having chromosome no. 2n=24 also known as eggplant is referred as "King of vegetables", originated from Indian sub-continent, with as the probable centre of origin. It is called brinjal in India and *Aubergine* in Europe. The name eggplant derives from the shape of the fruit of some varieties, which are white and shape very close to chicken eggs, (Gleddie *et al.*, 1986 and Omprakash and Raju, 2014) [4, 13]. The damage due to insect pests in India is one of the major reasons for the low productivity in brinjal. Brinjal crop is attacked with a plethora of insect-pests right from seedling stage to physiological maturity. It harbours more than 140 species of insect-pests (Prempong and Bauhim, 1977 and Sohi, 1996, Butani and Verma, 1976 and Nayar *et al.*, 1976) [15, 17, 3, 12] have however, listed only 36 and 53 insects, respectively on this crop. The brinjal shoot and fruit borer (BSFB), *Leucinodes orbonalis* Guenee (Lepidoptera: Pyralidae) is the most obnoxious, detrimental and ubiquitous pest of brinjal and damage both, vegetative as well as reproductive stages. The larvae in early instars bore into petioles, midribs of large leaves and tender shoots, resulting in dead heart and dropping of plants is the typical symptom produced. Later they bore into developing fruits which become unmarketable. One larva damages four to six fruits during its complete larval development. A full grown larva before going for pupation comes out from the fruit by making exit hole. Pupation take place in boat shaped silken cocoon in the fallen leaves or soil. It is estimated that the economic injury level equals to 6 percent infestation of shoot and fruit in India (Alam *et al.*, 2003) [1]. The apparent yield loss varying from 20-90 percent in various parts of the country (Raju *et al.*, 2007) [16], 85–90 percent have been reported by (Patnaik, 2000; Misra, 2008 and Jagginavar *et al*., 2009) [14, 10, 5]. Farmers are currently using wide variety of toxic chemicals and applying these more frequently with an aim to control the brinjal shoot and fruit borer. Due to the frequent pickings, the use of chemicals for management of this pest started proving to be detrimental to the health of consumers owing to the residue of the chemicals in the produce and also posed other problems like environmental pollution, disruption of natural enemies, resistance development and resurgence of pests (Mehrotra, 1990) [9]. But the new generation biorational pesticide molecules have been claimed to be effective as well as safer for non-target organisms (Sontakke *et al*., 2007; Misra, 2008) [10, 18].

With a view on the climate change projections for India, an attempt has been made here to study the impact of the likely changes in weather factors in relation to shoot and fruit borer on brinjal crop under Western UP agroclimatic conditions.

2. Materials and Methods

The seasonal variation in the incidence of brinjal shoot and fruit borer was studied from the unprotected control plots at Chirori farm, Crop Research Center (CRC), of Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh during *Kharif* 2017. Thirty days old seedlings of brinjal variety BR-112 were transplanted on 20th July in a plot size of 5 X 3 m^2 and the standard agronomic package of practices were followed to raise and maintain a healthy crop. Weekly incidence of brinjal shoot and fruit borer from total shoots and fruits were recorded as percentage shoot and fruit infestation from a total of 5 randomly selected plants from the initiation of damage. The data on weather parameters like maximum temperature, minimum temperature, rainfall and relative humidity (morning and evening) have been collected from the meteorological observatory of Department of Soil Science, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut and correlated with the incidence of shoot and fruit borer of brinjal with the help of SPSS 16 software.

3. Result and Discussion

3.1 Incidence of shoot and fruit borer (*Leucinodes orbonalis*)

The data on shoot infestation of brinjal shoot and fruit borer was recorded at weekly intervals from 21st July to 31ts December (29th to 52nd Standard Week), 2017 of the crop season. It is evident from table -1 that the shoot infestation (0.40%) of the pest occurred first time during first week of August and attained its peak (38.40%) in all control plots during the fourth week of September (39th standard week). While, the fruit damage was first time noticed (2.43%) during the first week of September (36th standard week) and attained its peak (39.20%) in all control plots during fourth week of October (43rd standard week). Thus after the initiation of fruits, infestation on shoots gradually shifted to fruit thereafter continually decreasing on shoots.

Similar results were also found by Jat *et al.*, (2002) [6] reported that the infestation of shoot borer on shoots started from fourth week of August and reached to its peak in the last week of September. The pest started damaging the fruits from first week of October, peaked in the fourth week of October and continued up to the second week of December. Bharadiya and Patel (2005) [2] also reported that the damage by the shoot and fruit borer, on shoots was highest during the fourth week of September however, on fruits during the third week of November. Similar results were also found by Kumar and Singh (2013) [8] where peak pest infestation on shoots observed during 3rd week of September and on fruits during 2nd week of October. Whereas, Kantipudi *et al*., (2017) [7] were also in agreement of present findings who reported that the shoot infestation started from first week of August whereas, fruit infestation started from third week of September. The highest percent shoot infestation was recorded in second week of September and the highest percent fruit infestation of shoot and fruit borer was recorded on third week of October.

3.2 Influence of weather parameters on shoot and fruit borer

Correlation coefficient between different weather parameters and percent shoot and fruit infestation of shoot and fruit borer during *Kharif* 2017-18 of experimentation revealed that, maximum temperature and morning relative humidity recorded positive correlation with a correlation coefficient r = 0.140, 0.073 for maximum temperature and r = 0.126, 0.080, for morning relative humidity (Table 2), whereas, r = 0.286, 0.313 for minimum temperature, evening relative humidity and rainfall showed negative correlation r = -0.349, -0.298, for relative humidity, r =-0.326, -0.477 for rainfall (Table 2) for shoot and fruit infestation, respectively.

These findings clearly indicated that none of the weather parameters had either positive or negative significant influence on the incidence of brinjal shoot and fruit borer. Earlier reports suggest that there is a positive association of pest population with maximum temperature and negative association with minimum temperature by Nandi *et al.*, (2017) [11] and positive association with a maximum temperature by Kantipudi *et al*., (2017) [7], morning relative humidity positively correlated and evening relative humidity negatively by Kumar and Singh (2013) [8] and rainfall negative correlation by Yadav *et al.*, (2015) [19]. The findings of above workers are in line with the present findings. Hence the knowledge of incidence is helpful at what stage the management practices should be initiated to reduce shoot and fruit borer infestation which cause heavy losses to farmers.

Table 1: Influence of weather factors on incidence of shoot and fruit borer, *L. orbonalis* during Kharif, 2017-18

S.W.	Month and Date	Weather parameters						Rainfall (mm)	Mean % Shoot Infestation	Mean% Fruit Infestation
		Temperature (^{0}C)			Relative Humidity (%)					
		Max.	Min.	Mean.	Mor.	Even.	Mean.			
29	17-Jul- 23-Jul	33.2	25.2	29.2	86.2	71.4	78.8	55.0	00	00
30	24-Jul-30-Jul	32.8	24.8	28.8	94.4	73.0	83.7	20.0	00	00
31	31-Jul-06-Aug	31.8	25.1	28.5	96.5	79.9	88.2	47.0	0.40	00
32	07-Aug-13-Aug	32.1	25.0	28.6	92.4	71.1	81.8	30.7	1.20	00
33	14-Aug-20-Aug	31.1	25.0	28.1	87.1	73.6	80.4	38.0	4.60	00
34	21-Aug-27-Aug	32.5	25.1	28.8	91.2	73.8	82.5	27.0	8.63	00
35	28-Aug-03-Sep	29.5	23.4	26.5	94.4	73.7	84.1	208.0	14.77	0.00
36	04-Sep-10-Sep	32.1	21.8	27.0	95.8	71.9	83.9	19.0	19.33	2.43
37	11-Sep-17-Sep	33.8	22.4	28.1	90.4	68.3	79.4	0.0	23.10	5.63
38	18-Sep-24-Sep	30.8	21.3	26.1	92.7	72.3	82.5	57.0	32.40	9.10
39	25-Sep-01-Oct	33.4	21.0	27.2	98.7	58.9	78.8	0.0	38.40	16.70
40	02-Oct-08-Oct	33.3	19.5	26.4	97.7	52.4	75.1	0.0	36.90	23.83
41	09-Oct-15-Oct-	32.5	18.2	25.4	97.4	48.7	73.1	0.0	34.27	30.10
42	16-Oct-22-Oct	32.7	14.4	23.6	95.5	44.8	70.2	0.0	33.13	35.13

43	23-Oct-29-Oct	30.6	13.3	22.0	96.8	53.3	75.1	0.0	31.27	39.20
44	30-Oct-05-Nov	28.2	9.7	19.0	93.8	55.0	74.4	0.0	28.77	33.67
45	06-Nov-12-Nov	26.0	10.7	18.4	96.8	69.0	82.9	0.0	27.27	28.10
46	13-Nov-19-Nov	27.7	13.1	20.4	94.8	52.7	73.8	0.0	25.20	25.67
47	20-Nov-26-Nov	25.1	6.7	15.9	57.9	28.1	43.0	0.0	24.60	22.90
48	27-Nov-03-Dec	24.9	6.1	15.5	95.7	28.4	62.1	0.0	22.30	19.80
49	04-Dec-10-Dec	24.3	7.9	16.1	87.7	28.6	58.2	0.0	19.80	18.40
50	11-Dec-17-Dec	20.0	8.4	14.2	90.9	52.1	71.5	10.0	17.57	10.60
51	18-Dec-24-Dec	23.3	7.9	15.6	96.3	38.1	67.2	0.0	16.10	19.20
52	25-Dec-31-Dec	23.0	6.4	14.7	94.3	41.9	68.1	0.0	13.90	17.10

Table 2: Correlation coefficient (r) of *L. orbonalis* on brinjal with prevailing weather parameters

Season	Weather parameter	Correlation coefficient (r)	
		Shoot infestation (%)	Fruit infestation (%)
Kharif-2017-18	Max. Temp (ºC)	0.140902	0.073136
	Min. Temp (ºC)	-0.28616	-0.31301
	Morning R. H. (%)	0.126615	0.080184
	Evening R. H. (%)	-0.34903	-0.2986
	Rainfall (mm)	-0.32616	-0.47752

4. References

1. Alam SN, Rashid MA, Rouf FMA, Jhala RC, Patel JR, Satpathy S, *et al*. Development of an integrated pest management strategy for eggplant fruit and shoot borer in South Asia, Technical Bulettin TB28, AVRDC - The World Vegetable Center, Shanhua, Taiwan, 2003, 66.
2. Bharadiya AM, Patel BR. Succession of insect pests of brinjal in North Gujarat. Pest Management and Economic Zoology. 2005; 13(1):59-161.
3. Butani DK, Verma S. Pests of vegetables and their control in brinjal. Pesticides. 1976; 10(2):32-35.
4. Gleddie S, Keller WA, Setterfield G. Somatic embryogenesis and plant regeneration from cell suspension derived protoplasts of Solanum melongena. Canadian Journal of Botany. 1986; 64:355-361.
5. Jagginavar SB, Sunitha ND, Biradar AP. Bioefficacy of flubendiamide 480SC against brinjal fruit and shoot borer, *Leucinodes orbonalis* Guen. Karnataka Journal of Agricultural Sciences. 2009; 22(3):712-713.
6. Jat KL, Pareek BL, Singh S. Seasonal incidence of shoot and fruit borer (*Leucinodes orbonalis* Guen.) on eggplant (*Solanum melongena* L.) in Rajasthan. Annual Biology. 2002; 18(2):165-169.
7. Kumar, Rajesh Kantipudi, Singh NN, Raju SVS, Mishra, Vijay Kumar. Influence of Abiotic Factors on Seasonal Incidence of Brinjal Shoot and Fruit Borer. International ournal of Current Microbiology Applied Sciences. 2017; 6(4):1513-1518.
8. Kumar S, Singh D. Seasonal incidence and economic losses of brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee. Agricultural Science Digest. 2013; 33(2):98-103.
9. Mehrotra KN. Pyrethroids resistance in pest management. Indian Exp. Pesticides Research Journal. 1990; 2:44-52.
10. Misra HP. New promising insecticides for the management of brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee. Pest Manage. Horticultural. Ecosystems. 2008; 14(2):140-147
11. Nandi, Gangadhar, Chetan, Narabenchi, Sanjeev, Prafulkumar, Jakatimath MV. Seasonal incidence of brinjal shoot and fruit borer, during *rabi* season. Journal of Experimental Zoology. 2017; 20(2):1025-1027.
12. Nayar KK, Ananthcakrishanan TN, Devid BV. Lepidoptera; In General and Applied Entomology Tata Mc Grow Hill Publishing Co. Ltd. New Delhi, 1976, 509.
13. Omprakash S, Raju SVS. A brief review on abundance and management of major insect pests of Brinjal (*Solanum melongena* L.). International Journal Biology & pharmaceutical Technology. 2014; 5(1):228-234.
14. Patnaik HP. Flower and fruit infestation by brinjal fruit and shoot borer, *Leucinodes orbonalis* Guenee – damage potential vs. weather. Vegetable Science. 2000; 27(1):82–83.
15. Prempong K, Bauhim. Studies on the insect-pests of eggplant, *Solanum melongena* Lin. in China. Bulletin the Institute Fundamental de Affrique Neire seria A. 1977; 39(3):627-641.
16. Raju SVS, Bar UK, Shanker U, Kumar S. Scenario of infestation and management of egg plant shoot and fruit borer, *L. orbonalis* Guen. in India. Resit. Pest Mangt. Newsletter. 2007; 16(2):14-16.
17. Sohi AS. Studies on brinjal little leaf virus and its vector, M.Sc. Thesis Punjab Agricultural University, Ludhiana, Punjab (India), 1996.
18. Sontakke BK, Das N, Panda PK, Swain LK. Bio-efficacy of emamectin benzoate 5% SG against fruit and shoot borer in okra. Journal of Plant Protection and Environment. 2007; 4(2):30-33.
19. Yadav Amit, Chaudhary, Sandeep. Impact of abiotic factors on population dynamics of fruit and shoot borer in brinjal, Journal of Experimental Zoology. 2015; 18(2):765-768.