International Journal of Enhanced Research in Science, Technology & Engineering
ISSN: 2319-7463, Vol. 6 Issue 6, June-2017, Impact Factor: 4.059

Seasonal incidence of Leucinodes orbonalis and Amrasca biguttula biguttula on Solanum melongena (brinjal)

Shalini[1], Veena Maurya[2], SP Yadav[3]

[1,2]Department of Zoology, Baba Mastnath University, Asthal Bohar Rohtak. (124021) Hr., India
[3]Assistant Scientist CCS HAU (Hisar)

ABSTRACT

The maximum population of in brinjal was recorded 5.50 / 3 fruit in 40 SW at a temperature ranged between 26-35^{0}C and R.H. 49-78% in 2014and 5.20 / 3 fruit in 41 SW when temperature ranged between 24-34^{0}C and R.H. 41-78% in season 2015. In another field the maximum population of was recorded at 40SW or fourth week of September in during both season 23.7 / 3 leaves in 2014 and 22.8 / 3 leaves in 2015 at a temperature range of 26-35^{0}C and R.H. 49-78% in season 2014 and 26-35^{0}C and RH 48-81% in season 2015. The population of L. orbonalis and A. biguttula biguttula showed positive significant correlation with maximum temperature (r=0.641 and 0.544) and (r= 0.619 and 458) during both the season. L. orbonalis showed negative non-significant correlation with R.H.$_{morng}$ (r=1.131 and 1.319) and R.H.$_{evng}$ (r=0.503 and 0.435) and negative non-significant correlation with minimum temperature (r= -0.324 and -0.226) during both the season. Wind speed showed positive non significant correlation (r= 0.394) with fruit borer in 2014 and negative non significant correlation (r= -0.260) in 2015. Whereas rainfall showed negative non significant correlation (r= -0.435 and -0.346) during both the season. A. biguttula biguttula showed negative significant correlation with R.H.$_{morng}$ (r=-1.101 and -1.260) and minimum temperature (-0.258 and -0.216), R.H.$_{evng}$ (-.801 and 0.185), rainfall (-0.346 and -0.264) and wind speed (r= -0.836 and 0.768) were found to be non-significant correlation with the population of leaf hopper.

Key words: abiotic factor, brinjal, shoot and fruit borer, Leucinodes orbonalis leaf hopper, Amrasca bigutulla bigutulla,

INTRODUCTION

Brinjal is a stable vegetable in many tropical countries. It is grown more extensively in India, China and Japan and in Philipines. Brinjal is the most common, popular and principal vegetable crop grown widely in India for its various shape, size and colour of fruits. It is rich in bio-flavonoids that can prevent stomach cancer. Different insect pests viz., shoot and fruit borer (Leucinodes orbonalis), leaf hopper (Amrasca biguttula biguttula) attack on brinjal crop. L.orbonalis is the most serious pest of brinjal throughout the country. The larva initially attacks the terminal shoot and bore inside as a result of which the shoots wither drooping down and dried. A. biguttula biguttula is distributed all over India. It is a polyphagous pest attacking okra, brinjal, beans, castor, cucurbits, hollyhock, potato, sunflower and other malvaceous plants.

MATERIALS AND METHODS

Brinjal Cv. "H.L.B. 25"was sown in nursery plot at the local garden of "Sh. B. P. Jain" Delhi Road, Rohtak Haryana during Kharif season 2014 and 2015 replicated thrice. By providing agronomic practices followed throughout the season. No insecticides were applied at any stage of the crop growth. The incidence of shoot and fruit borer was recorded at weekly intervals, starting after the 30 days of transplanting and till the harvesting of the crop. The intensity and infestation of shoot and fruit borer on plant were recorded by counting infested and healthy shoots on randomly selected 10 plants from each replication. The data on population at different insect pests was correlated with the meteorological weather parameters such as temperature (maximum and minimum), RH (R.H.$_{morng}$ and R.H.$_{evng}$), rainfall (RF) and wind speed (WS). Data on weather parameter were obtained from Krishi Vigyan Kendra, Rohtak (Haryana).

RESULTS AND DISCUSSION

The results revealed that the incidence of fruit and shoot borer could be recorded at 34 SW in both the season at a temperature range of (27.02-32.48^{0}C) and RH (45.18-84.49%) at season 2014 and (27.02-32.10^{0}C) and RH (48.18-85.49%) at season 2014-2015. At this temperature range and RH the population of fruit and shoot borer were 0.04/ leaves and 0.28 / leaves during both the season. The population of fruit and shoot borer was continuously increasing till their harvesting. It became maximum at 40 SW or the fourth week of September in 2014 and 41 SW 1st week of October in 2015 at a temperature range of (26.20-35.45^{0}C) and RH (49.40-78.40%) in season 2014 and (26-35.22^{0}C) and RH (48.10-81.40%) in season 2015 (Table 1 and 2). At this temperature range and RH 5.50 / leaves in 2014 and 5.20 / leaves in 2015. Singh et al. (2009) reported that infestation of L. orbonalis on shoots during September to October. Borer infestation was 73.3% on the top shoot at the beginning of September and peaked intensity of 2.90 borers / plant which declined on initiation of flowering followed by fruiting and reached to zero level by the end of October. Singh et al. (2009) infestation was reported to be eliminated during November to December. Ishar et al. (2007) has been reported the peak L. orbonalis during 3rd week of August resumed in the month of September while the infestation of pest was noticed during third week of January at 15 days after transplantation and the damage of pest increased from 10.2 to 82.4 % of shoot during 12th February. Naik et al. (2008) has been reported the pest was found to be active during May and August and caused damage to the fruits.

Kumar et al. (2010) has been reported that minimum infestation started on the shoots in fourth week of August which reached at its peak of in third week of September and after that continuously declined on the shoots and disappeared at the end of October, with its shifting to the flowers and fruits on their initiation during 1st week of October at the peak on the basis of numerical counts and their weight in the second week of October. Bharadiya and Patel (2005) has been reported that the activity of shoot and fruit borer, L. orbonalis, on shoots started in the first week of September and reached to the maximum at fourth week of October. Singh et al. (2000) revealed that L. orbonalis infested the crop shoots during the end of August (73.33%), which peaked (86.66%) in the third week of September with an intensity of 2.09 per plant. Mathur et al., (2012) has been reported that the incidence of L. orbonalis commenced during Nov. – Dec. with peak shoot infestation during Feb. and the incidence of fruit borer was noticed during Dec. with peak infestation during Feb. Shukla and Khatri (2010) has been reported that population of L. orbonalis increased in the month of Oct. to Nov. and decreased in Dec. Bhusan et al.,(2011) reported that maximum shoot and fruit damage was recorded in third weeks of Dec. High humidity was found favorable for borers. Omprakash and Raju (2014) have been reported that when crop was planted during march to September recorded 3.4 – 10.62 % shoot infestation and 33.39 – 61.23 % fruit infestation. Singh et al., (2000) also reported that the infestation of L. orbonalis started at the end of Aug. and maximum in the third week of September.

The results revealed that the incidence of leaf hopper could be recorded at 33 SW in both the season at a temperature range of (27.04-33.80^{0}C) and RH (47-14.86.20%) at season 2014 and (26-33.64^{0}C) and RH (46-88.20%) at season 2015. At this temperature range and RH the population of fruit and shoot borer were 3.08 / leaves and 4.6/ leaves during both the season. The population of fruit and shoot borer was continuously increasing. It became maximum at 40SW or fourth week of September in during both the season at a temperature range of (26.20-35.45^{0}C) and RH (49.40-78.40%) in season 2014 and (26-35.22^{0}C) and RH (48.10-81.40%) in season 2015. At this temperature range and RH 23.7/ leaves in 2014 and 22.8 / leaves in 2015 (Table 1 and 2).

Table 1: Seasonal abundance of brinjal shoot and fruit borer in relation to weather parameters on brinjal during Kharif 2014

Standard week (SW)	Observation Date	Temperature T (^{0}C)		Relative Humidity (RH) (%)		Wind Speed (Km/hr)	Rainfall (mm)	Leucinodes orbonalis	Amrasca biguttula biguttula
		Max.	Min.	Max.	Min.				
33	09.08.2014	33.80	27.04	86.20	47.14	1.28	10.24	0.01	3.08
34	16.08.2014	32.48	27.02	84.49	45.18	2.14	1.08	0.04	6.2
35	23.08.2014	34.20	27.34	83.80	47.64	1.62	8.28	0.80	9.8
36	30.08.2014	34.10	26.40	88	50.10	1.84	12.80	1.10	10.7
37	06.09.2014	33.40	26.38	85.56	45.04	1.56	14.67	1.60	12.6
38	13.09.2014	34.32	26.08	93	55.80	2.24	15.20	2.20	14.4
39	20.09.2014	36.8	27.10	90.48	51.20	2.21	0	3.10	20.6
40	27.09.2014	35.45	26.20	78.40	49.40	1.81	0	5.50	23.7
41	04.10.2014	35.00	24.49	76.30	48.64	2.46	0	4.60	22.2
42	11.10.2014	34.90	22.70	80.89	50.80	3.20	0	4.20	8.4

43	18.10.2014	32.80	19.20	81.28	51.80	4.21	2.8	4.20	6.8
44	25.10.2014	33.50	16.20	84.80	45.80	4.68	0	4.00	6.2
45	01.11.2014	32.30	15.30	82.05	48.10	3.28	0	3.90	5.0
46	08.11.2014	29.40	19.02	82.56	40.04	4.80	0	2.20	3.2
47	15.11.2014	28.32	17.08	89	41.80	8.80	0	1.0	2.6
48	22.11.2014	28.10	16.10	90.48	32.20	12.60	0	0.6	1.4
49	29.11.2014	25.45	16.80	78.40	31.40	10.20	1.20	0.0	0.0

Table 2: Seasonal abundance of brinjal shoot and fruit borer in relation to weather parameters on brinjal during Kharif 2015

Standard week (SW)	Observation Date	Temperature T (^{0}C)		Relative Humidity (RH) (%)		Wind Speed (WS) (Km/hr)	Rainfall (RF) (mm)	Leucinodes orbonalis	Amrasca biguttula biguttula
		Max.	Min.	Max.	Min.				
33	08.08.2015	33.64	26	88.20	46	1.62	11.44	0.00	4.6
34	15.08.2015	32.10	27.02	85.49	48.18	2.20	1.62	0.28	6.8
35	22.08.2015	34	27.34	82.80	45.20	1.24	7.16	1.20	10.1
36	29.08.2015	34.50	26.40	86.01	46.10	1.76	10.24	1.34	11.4
37	05.09.2015	33.10	26.38	81.24	48	1.40	12.26	1.60	14.6
38	12.09.2015	34.12	26.08	91.24	55.28	2.40	13.24	2.80	16.8
39	19.09.2015	35	27.10	89.26	51.20	2.20	0	3.30	22.2
40	26.09.2015	35.22	26	81.40	48.10	2.80	0	4.60	22.8
41	03.10.2015	34.04	24.49	78.20	41.24	1.25	0	5.20	18.4
42	10.10.2015	34.80	22.70	79.24	45	2.46	0	4.60	7.8
43	17.10.2015	33.80	19.20	82.08	49.20	2.20	1.60	4.80	7.2
44	24.10.2015	33.40	16.20	81.20	46.40	3.40	0	4.20	8.2
45	30.11.2015	30.10	22.40	88	42.10	0.48	0	3.80	5.2
46	07.11.2015	31.40	20.20	85.56	43.04	1.20	0	2.10	3.7
47	14.11.2015	29.32	18.70	82	45.80	4.20	0	1.32	2.9
48	21.11.2015	28.80	17.10	84.48	40.20	10.80	0	0.40	1.8
49	29.11.2014	27.45	15.20	78.40	34.40	8.22	0	0.1	0.0

After that it went on decreasing and became negligible at 49 SW. Sinha et al. (2007) observed the peak incidence of insect pest from mid of September to November. Meena et al. (2010) has been reported that insect incidence was high during the second week of September. Singh et al., (2009) has been reported that shoot infestation occurred during 4th week of August, and the incidence had non-significant relationship with temperature, relative humidity and rainfall. The population of fruit and shoot borer was recorded by random observation on ten selected tagged plants which are used in further studies. The data on seasonal incidence of fruit and shoot borer were correlated with temperature (maximum and minimum), RH (maximum and minimum), rainfall and wind speed.

The fruit and shoot borer population exhibit the positive significant correlation with the maximum temperature (r=0.641 and 0.544) and RH_{morng} (r=1.131 and 1.319) and negative non-significant correlation with minimum temperature (r= -0.324 and -0.226) and RH_{evng} (r=-0.803 and 0.221) during both the season. Wind speed showed positive non significant correlation (r= 0.394) with fruit borer in 2014 and negative non significant correlation (r= -0.223) in 2015 (Table 3and 4). Whereas rainfall showed negative non significant correlation (r= -0.435 and -0.435) during both the season. Naik et al. (2008) reported the non-significant correlation between the shoot damage with weather parameters. Mathur et al., (2012) has been reported that positive correlation of brinjal shoot and fruit borer infestation with maximum temperature and whereas relative humidity showed non- significant correlation with the population of L. orbonalis.

During both the season correlation studies showed that the maximum temperature (r= 0.619 and 458) was highly positive significant correlation and RH_{morng} (r=1.101 and 1.260) was negative significant correlation with the population of leaf hopper. Minimum temperature (r=-0.258 and -0.216), RH_{evng} (r=-0.801 and 0.185), rainfall (-0.346 and -0.264) and wind speed (r= -0.836 and 0.768) were found to be non-significant correlation with the population of leaf hopper during both season (Table 3 and 4). Mahesh and Men (2007) found that the maximum and minimum temperature showed positive significant correlation with shoot and fruit borer.

Table 3: Correlation of insect pests of brinjal with the weather on brinjal crop of 2014

	T (0C) Max.	T (0C) Min.	RH_{morng}	RH_{evng}	Wind speed (Km/hr)	Rainfall RF (mm)
Leucinodes orbonalis	0.641	-0.324	1.131	-0.803	0.394	-0.435
Amrasca biguttula biguttula	0.619	-0.258	1.101	-0.801	-0.836	-0.346

Table 4: Correlation of fruit and shoot borer (Leucinodes orbonalis) with the weather on brinjal crop of 2015

	T (0C) Max.	T (0C) Min.	RH_{morng}	RH_{evng}	Wind speed (Km/hr)	Rainfall RF (mm)
Leucinodes orbonalis	0.544	-0.226	1.319	0.221	0.223	-0.435
Amrasca biguttula biguttula	0.458	-0.216	1.260	0.185	0.768	-0.264

ACKNOWLEDGEMENT

The authors are grateful to the Dean, Faculty of Sciences, Baba Mastnath University for providing necessary facilities for carrying out this research work.

REFERENCES

[1]. Bhushan, S., Chaurasia, H. K. and Shanker, Ravi (2011) Efficacy and economics of pest management modules against Brinjal shoot and fruit borer (Leucinodes orbonalis), The Bioscan, 6(4): 639-642.
[2]. Dhandapani, N., Shlkar, U.R., and Murugan M. (2003). Bio-intensive pest management (BIPM) in major vegetables crops. An perspective Food, Agriculture & environment, 1 (2): 333-339.
[3]. Kumar, Rakesh, S. Ali and Umesh Chandra (2010). Population dynamics of flower feeder in sesame and correlated with abiotic factor. Ann. of Pl. Protec. Sci. 18:70-76.
[4]. Ishar, A. K. R. M. Bhagat, A. K. Arora and MdMonobrullah (2007). Effect of abiotic factor on Leucinode orbonalis in brinjal. Ann. Pl. Protec. Sci. 15: 483-484
[5]. Mahesh, P. and U. B Men (2007). Seasonal incidence of Leucinodes orbonalis on brinjal. Ann. of Pl. Protec. Sci. 15:498-499.
[6]. Meena, N. K. B. L. Meena and P. M. Kanwat (2010). Seasonal occurrence of shoot and fruit borer on okra in semi arid region of Rajasthan. Ann. Pl. Protec. Sci. 18:504-506..
[7]. Mathur A.,Singh N.P., M. Meena and Singh Swaroop (2012) seasonal incidence and effect of abiotic factors on population dynamics of major insect pests on brinjal crop. J. Environ. Res. Develop. 7 : 431-435
[8]. Naik, V. B., A. P. Rao, P. V. Krishnavya and V. S. Rao (2008). Seasonal incidence and management of Leucinodes orbonalis Guence on brinjal. Ann. Pl. Protec. Sci. 16:329-332.
[9]. Om prakash, S. and Raju S. V. S. (2014). A breife review on abundance and management of major insect pest of brinjal (Solanum melongena L.) International Journal of Applied Biology and Pharmaceutical Technology, 5 (1): 228-234.
[10]. Shukla, A., and Khatri, S.N. (2010). Incidence and abundance of brinjal shoot and fruit borer Leucinodes orbonalis (G.) The bioscane, 5 (2): 305-308Singh, R.K., P. Devjani and T.K. Singh, (2009). Population dynamics of Leucinodes orbonalis. Ann. Pl. Protec. Sci. 17: 486-487.
[11]. Singh, D. K., Singh, R., Datta, S. D., Singh, S. K. (2000) Seasonal incidence and insecticidal management of shoot and fruit borer Leucinodes orbonalis (Guenee) in brinjal. Annals of Horticulture, 2 (2): 187-190.