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SEASONAL ABUNDANCE OF MAJOR SUCKING INSECT PESTS OF BRINJAL, *SOLANUM MELONGENA* L. AND THEIR NATURAL ENEMIES

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ABSTRACT

The study was carried out to find out the seasonal abundance of major sucking insect pests and their natural enemies in brinjal, *Solanum melongena* L. The population of jassid, *Amrasca biguttula biguttula* (Ishida) and whitefly, *Bemisia tabaci* (Gennadius.) on brinjal initiated in 33rd standard meteorological week, whereas *C. septempunctata* initiated in the 34rd standard meteorological week when maximum and minimum temperature was 31.9°C and 24.2°C, respectively with 76.5 per cent relative humidity. The population build up gradually and arrived at peak on 39th standard meteorological week 45.2 (jassids) and 52.4 (whiteflies) per three leaves. The correlation matrix indicated a significant correlation of jassid and whitefly with both the maximum (r = 0.83 and 0.81, respectively) and minimum temperature (r = 0.57 and 0.67, respectively) and both the whitefly and jassid population recorded a positive and significant association with the population of *C. septempunctata* (r = 0.68 and 0.67, respectively).

Key words : Brinjal, Sucking insect, Natural enemies, Seasonal incidence

INTRODUCTION

The brinjal, *Solanum melongena* L. also known as egg plant belongs to family Solanaceae. Due to its versatility in use in Indian food, brinjal is often described as the 'King of vegetables' (Choudhary and Gaur, 2009). Brinjal known for ayurvedic medicinal properties, especially white brinjal is said to be good for diabetic patients (Fageria *et al.,* 2003). It is an important vegetable crop grown throughout the world, especially in South-Asia and native of India. In production and productivity, India is second in the world after China. Among the various causes of low productivity of the brinjal, one of the most important factors is the damage inflicted by the insect pests. It is subjected to attack by number of insect pests right from nursery stage till harvesting (Regupathy *et al*., 1997). The important pests are shoot and fruit borer, *Leucinodes orbonalis* (L.) Guen.; jassid, *Amrasca biguttula biguttula* (Ishida); aphid, *Aphis gossypii* Glover; epilachna beetle, *Epilachna vigintioctopunctata* Fab.; whitefly, *Bemisia tabaci* (Gennadius.) and red spider mite, *Tetranychus telarius (L.) (*Borad *et al*., 2002*)*. Some of them remain active throughout the year with many overlapping generations (Atwal and Dhaliwal, 1976). Rosaih (2001) reported that the losses caused by brinjal insect pest complex were as high as 70-90 per cent. The study aimed in order to find out the correlation of jassid, *A. biguttula biguttula* and whitefly, *B. tabaci* and their natural enemies in brinjal ecosystem with the abiotic parameters. Suitable understanding of the seasonal incidence of sucking insect pests is important due to variation in the weather conditions and changing sucking insect pest scenario on the crop.

MATERIALS AND METHODS

The experiment was conducted at Horticulture Farm, S.K.N. College of Agriculture, Jobner (Rajasthan) on brinjal crop during *Kharif*, 2016. The brinjal seedlings of variety Pusa Purple Round were transplanted in separate plots of 3 m x 3 m size when it was about 10-12 cm heigh, keeping row to row and plant to plant distance of 60 and 50 cm, respectively. The populations of major sucking insect pests, *viz*., jassid, *A. biguttula biguttula* and whitefly, *B. tabaci* were recorded from three leaves, one each from top, middle and lower canopy on five tagged plants per plot visually or by using magnifying lens at weekly interval from their appearance to last picking of fruits. The populations of natural enemies were also recorded on the same plants. The simple correlation was work out between major sucking insect pests, their natural enemies and abiotic factors *viz*., maximum and minimum temperature, relative humidity, rainfall and sunshine hours.

The following formula was used for calculating correlation coefficient.

$$r = \frac{N\Sigma xy - (\Sigma x)(\Sigma y)}{\sqrt{N\Sigma x^2 - (\Sigma x)^2 \cdot N\Sigma y^2 - (\Sigma y)^2}}$$

Where,

r = Simple correlation coefficient
x = Independent variable *i.e.* abiotic component
y = Number of observations
N = Dependent variable *i.e.* pest

RESULTS AND DISCUSSION

It is evident from Table-1 that major sucking insect pests, *i.e*., jassid*, A. biguttula biguttula* and whitefly, *B. tabaci* on brinjal initiated in the 33rd standard meteorological week, whereas *C. septempunctata* initiated in the 34rd standard meteorological week. When maximum and minimum temperature was 31.9°C and 24.2°C, respectively with 76.5 per cent relative humidity. The population built up gradually and arrived at peak on 39th standard meteorological week 45.2 (jassids) and 52.4 (whiteflies) per three leaves, whereas the population of *C. septempunctata* gradually increased and reached to its maximum (3.6) on 41th standard meteorological week, when maximum temperature and minimum temperature was 37.1°C and 22.7°C with 59 per cent relative humidity. Thereafter, the population of these insect pests declined. These findings get support from those of Sunda *et al.* (2009) and Singh *et al*. (2010) who reported the similar activities of the major sucking insect pests. The present finding also get support from the finding of Singh *et al*., (2013) who recorded the coccinellids appearance in third week of September (1.00 coccinellid/leaf) and peaked at second week of October (2.51 mean coccinellid/leaf). The correlation matrix indicated a significant correlation of jassid and whitefly with both the maximum (r = 0.83 and 0.81, respectively) and minimum temperature (r = 0.57 and 0.67, respectively) and both the whitefly and jassid population recorded a positive and significant association with the population of *C. septempunctata* (r = 0.68 and 0.67, respectively). Patel *et al.* (2015) observed that the maximum temperature had significant correlation with the population of both the sucking pests of brinjal. On the contrary to this, Naik *et al*. (2009) reported that, the whitefly population showed non-significant relationship with abiotic factors but significant relationship with abundance of *C. septempunctata* predatory beetles and spiders. However, *C. septempunctata* showed significant positive correlation with maximum temperature (r = 0.79) and non-significant positive correlation with the minimum temperature (r = 0.28). Chandrakumar *et al.*

Table 1. Seasonal abundance of major sucking insect pests on brinjal in relation to environmental factors

Date of observation	Standard meteorological week	Mean Jassid Population/ 3 leaves	Mean whitefly Population/ 3 leaves	Mean *C.septem-punctata* Population/ 5 plant	Meteorological parameters			
					Temperature (°C)		Relative humidity (%)	Rainfall (mm)
					Maximum	Minimum		
13-08-2016	33	5.6	7.2	0.0	31.9	24.2	76.5	3.8
20-08-2016	34	12.4	15.4	0.2	30.5	24.4	83.5	17.4
27-08-2016	35	21.4	19.6	0.4	32.7	24.4	78.5	16.6
03-09-2016	36	32.2	35.8	0.6	32.3	22.5	65	0.0
10-09-2016	37	27.6	41.6	1.6	34.9	22.4	59	0.0
17-09-2016	38	39.2	46.2	1.8	37.9	23.3	56	0.0
24-09-2016	39	45.2	52.4	2.2	37.1	22.7	59	0.0
01-10-2016	40	37.6	44.2	2.4	34.3	23.6	72	13.2
08-10-2016	41	26.2	30.4	3.6	35.2	20.5	61	0.0
15-10-2016	42	24.2	27.8	2.7	35.3	15.5	47	0.0
22-10-2016	43	21.2	15.8	1.8	34.3	14.6	51	0.0
29-10-2016	44	17.6	8.2	0.7	33.0	11.0	55	0.0
05-11-2016	45	10.4	5.6	0.4	32.0	8.6	49	0.0
12-11-2016	46	7.4	3.6	0.1	30.0	8.7	53	0.0
19-11-2016	47	3.4	1.8	0.0	31.0	6.6	49	0.0
Correlation coefficient with mean jassid population (r)			0.68*	0.83*	0.57*	0.03	-0.03	
Correlation coefficient with mean whitefly population (r)			0.67*	0.81*	0.67*	0.11	0.00	
Correlation coefficient with mean *C. septempunctata* population (r)				0.79*	0.28	0.22	-0.20	

*Significant at 5 per cent level
NS: Non-significant

(2008) also reported the similar result. There was non-significant positive correlation of jassid and whitefly population with relative humidity (r = 0.03 and 0.11, respectively). The population of jassids and *C. septempunctata* showed non-significant negative correlation with rainfall (r = -0.03 and -0.20, respectively) and it is also observed that whitefly population had no correlation with rainfall. The results are in agreement with the findings of Dhamdhere *et al*. (1995) who reported average minimum temperature and maximum temperature of 27.3^{0}C and 28.2^{0}C, respectively and 43.5 and 72.5 per cent R.H. during summer and *Kharif*, respectively favourable for the development of pest population. Singh *et al*. (2005) recorded highest jassid density at 22.57^{0}C average temperature and 69 per cent relative humidity. The results are corroborated with the findings of Sunda *et al*. (2009) who reported that the population of jassids showed non-significant negative correlation with relative humidity, whereas average temperature showed positive correlation. These findings are also in partial agreement with Omprakash *et al*. (2013) who reported that, the major sucking insect pest incidence had a non-significant association with abiotic factors like maximum and minimum temperatures, relative humidity and rainfall whereas, the incidence of sucking pests showed a positive and significant correlation with biotic factors like *C. septempunctata* beetles as well as spiders. These results are also in conformity with the findings of Muthukumar and Kalyanasundaram (2003). Likewise, kumar *et al*. (2014) reported that the jassid incidence showed positive correlation with maximum temperature whereas, the *C. septempunctata* showed the significant positive correlation with the maximum and minimum temperature, relative humidity, rainfall and evaporation. On contrary to the present findings, Indirakumar *et al*. (2016), Chandrakumar *et al*. (2008), Dahatonde *et al.* (2014) and Anjali *et al*. (2012) found that both these insect pests showed a negative correlation with both maximum and minimum temperature while a positive correlation with mean relative humidity and rainfall.

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