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ORIGINAL ARTICLE

Influence of Abiotic Factors on Population Dynamics of Leafhopper *Amrasca biguttula biguttula* Ishida (Hemiptera: Cicadellidae) on Okra Crop

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ABSTRACT

The observations on the impact of abiotic factors vis-à-vis population dynamics of leafhopper Amrasca biguttula biguttula revealed that it attained highest number as 5.3 individuals per leaf during 40th standard weak coincided with the abiotic factors i.e., maximum temperature, minimum temperature and relative humidity during the course of investigation as 36.68ºC, 24.90ºC and 56%, respectively. The correlation analysis showed that maximum temperature was significantly correlated with the population of jassid, but minimum temperature showed non-significant correlation. In addition, relative humidity and rainfall showed a non-significant correlation with the jassid population. The population of jassid was comparatively less in vegetative phase than the maturity of the crop due to the thinner veins of early stage crop which further developed into thicker vein.

Key words: *Jassid, ladyfinger, relative humidity, sucking pest, temperature*

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INTRODUCTION

Okra, *Abelmoschus esulentus* Moench is a most common vegetable crop distributed in tropical and subtropical parts of world. It is originated in tropical Africa (Düzyaman, 2010). It fulfills the demand of vitamins, calcium, potassium and mineral of developing countries (Abd El-Kader, *et al.*, 2010). About 72 species of insects are found to damage okra crop (Srinivasa and Rajendran, 2003), of which, leafhopper, *Amrasca biguttula biguttula* (Ishida) is considered the most destructive sucking pest (Dhandapani, *et al.*, 2003), which cause damage up to 63.41 % in yield loss of okra (Sharma and Sharma, 2001).

The leaf hopper, *Amrasca biguttula biguttula* is belonging to family Cicadellidae. The family is distributed all over the world, and constitutes the second-largest hemipteran family, with at least 20,000 described species (Stiller, 2009). Leafhopper is common, minute insects that suck the plant sap. It is covered with hairs that facilitate the spreading of a secretion over their bodies and also acts as a water repellent and carrier of pheromones (Kumar and Bhat, 2012). Leafhoppers mainly are herbivores feed on variety of plants and also cause secondary infection by transmitting plant viruses (Singh, *et al.*, 2008). *Amrasca biguttula biguttula*, feed on cotton plants mainly but in absence of cotton it is find to be associated with okra for feeding.

Climatic factors play important role for the development, survival and reproduction of insect pests. In another way, pest population also governed by the influence of various

environmental factors. Among them, temperature, humidity and rainfall are considered to be the most important factors (Patel and Rote, 1995). Therefore, considering the seriousness of *Amrasca biguttula biguttula*, present research was carried out to study the impact of abiotic factors on the population of Jassid on okra.

METHODS AND MATERIALS

The find out the population fluctuation of jassid on okra, field experiment was carried out at Chandra Shekhar Azad Agriculture University, Kanpur, Uttar Pradesh. The observations were made on 5 randomly selected plants per plot, taking 5 leaves in ratio of 2:1:2 from upper, middle and lower surface of plant, respectively. The observations were made on weekly basis and side by side weather parameters of respective dates were also collected from Chandra Shekhar Azad Agriculture's Metrology Research Centre, Kanpur. The data collected were subjected for correlation analysis between Jassid population and weather parameters.

Table 1: Average population of leafhopper with respect to standard weeks

Standard Weeks	Average Jassid Population	
	1st Year	2nd Year
27	0	0
28	0.32	0.48
29	0.82	0.18
30	1.42	0.2
31	1.52	2.52
32	2.02	2.98
33	1.98	4.44
34	3.02	3.14
35	2.6	2.28
36	3.11	2.15
37	3.78	5.12
38	4.34	6.23
39	3.33	6.55
40	5.3	8.2
41	3.16	4.98
42	2.16	7.03
43	1.98	8.06
44	3.12	5.44
45	3.75	4.53

Table 2: Correlation coefficient between jassid population and abiotic factors

Weather Parameter	1st Year	2nd Year
Maximum temperature (ºC)	0.61**	09.49*
Minimum temperature (ºC)	0.20	0.41
Relative Humidity (%)	-0.50*	-0.19
Rainfall (mm)	0.34	- 0.20

* Significant t 5% level.
** Significant at 1% level.

RESULTS AND DISCUSSION

The observation on the population of jassid revealed that it attained maximum number as 5.3 per leaf during 40th weak in the first year. The weather parameters *i.e.*, maximum temperature, minimum temperature and relative humidity during the course of investigation was recorded as 36.68ºC, 24.90ºC and 56%, respectively (Table 1). Similarly, in second year, highest population of jassid was recorded as 8.2 per leaf again during 40th standard weak coincided with maximum temperature of 40.66ºC, minimum

temperature of 25.63ºC and relative humidity of 62% (Table 1). Sinha, *et al.*, (2007) and Ghosh and Chakraborty (2015) observed the peak incidence of this pest in the month of September and November and showing corroboration with present study.

As far as correlation analysis was concerned, the maximum temperature showed significantly positive correlation with the population of jassid, and maximum relative humidity exhibited negative correlated (Table 2). The present findings are well supported by the research of Patel, *et al.*, (1997), they observed significant positive correlation with maximum temperature. The work of Mahmood, *et al.*, (2002) also giving strengthen to present findings and observed positively correlation with maximum temperature, and minimum temperature was non-significantly correlated with jassid population in both the years. In addition, relative humidity showed a non-significant negative correlation with the jassid population. Moreover, rainfall was also found to be non-significant with the jassid population.

In the present investigation, the incidence of leafhopper increased with the advancement of the age of crop and population was comparatively less in vegetative phase than the maturity of the crop. This may be due to the thinner veins of early stage crop which further developed into thicker vein and thereby favoured more number of hoppers on leaves (Ragumoorthi and Kumar, 2000).

Therefore, present study accomplished that the population of *Amrasca biguttula biguttula* was found significantly higher during 40th standard week, and the maximum temperature was found to be favourable for multiplication of Jassid on okra during this period. However, with the help of present observations growers of under study area can make an effective management plant by avoiding multiplication period and may secure yield loss of okra by the attack of jassid.

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