

SEASONAL INCIDENCE OF LEAFHOPPER IN OKRA UNDER NORTH GUJARAT CONDITIONS

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ABSTRACT

*Field trial was carried out during kharif 2014-15 for evaluating the incidence of the okra leafhopper; *Amrasca biguttula biguttula* (Ishida) at Horticulture Instructional Farm of C. P. College of Agriculture, S. D. Agricultural University, Sardarkrushinagar, Gujarat. The results revealed that the leafhopper in okra started about two week after sowing and remained active through the crop season with peak level of population were observed during the 9th and 10th week after sowing. Leafhopper populations exhibited statistically significant and negative correlations with maximum temperature ($r = -0.629$) and wind velocity ($r = -0.587$) and a statistically significant and positive correlation with evening relative humidity ($r = 0.566$).*

KEY WORDS: Abiotic factors, *Amrasca biguttula biguttula*, correlation

INTRODUCTION

Okra, *Abelmoschus esculentus* L. Moench (Malvaceae) is an important annual crop grown mainly as a fruit and leafy vegetable in the tropics (Tiamiyu *et al.*, 2012). Okra is one of the popular and commercially cultivated vegetable crops, commonly known as *Bhindi* or *ladies finger*. It is a potential foreign exchange earner, accounting for 60 per cent of export of fresh vegetables (Sharman and Arora, 1993). Okra is a rich source of carbohydrate, protein, fats, vitamins and minerals (Akintoye *et al.*, 2011). Apart from its popular use as vegetable, it has also been used for several purposes such as coffee additive and paper making (Moekchantuk and Kumar, 2004). In

the world, okra is cultivated in 20.41 lakh hectares with a production of 134.15 lakh tonnes and a productivity of 6.57 tonnes/ha. India contributes 72.00 per cent (63.46 lakh tonnes) of the total production and ranks 1st followed by Nigeria (11.00 lakh tonnes) and Sudan, 2.63 lakh tonnes (Anonymous, 2015a). In India, it is cultivated in 5.33 lakh hectares with an annual production of 63.46 lakh tonnes and a productivity 11.90 tonnes/ha (Anonymous, 2015b). Major okra growing states are Gujarat, Bihar, West Bengal, Andhra Pradesh, Assam and Orissa.

Incidence of insect pests is one of the prime factors in lowering production of okra. The major insect pests infesting okra are leafhopper:

Amrasca biguttula biguttula (Ishida); Aphid: *Aphis gossypii* (Glover); Thrips: *Thrips tabaci* (Lindeman); Whitefly: *Bemisia tabaci* (Gennadius); Shoot and fruit borer: *Earias vittella* (Fabricius), *Earias insulana* (Boisduval); Fruit borer: *Helicoverpa armigera* (Hubner) Hardwick; Semilooper: *Anomis flava* (Fabricius); Mealybug: *Ferrisia virgata* (Cockrell); Scale insect: *Saissetia coffeae* (Walker) and Red spider mite: *Tetranychus cinnabarinus* (Boisduval). In recent years, okra leafhopper has become an increasingly severe pest of vegetables, as well as of other agronomic crops, and ornamental plants. This pest, *A. biguttula biguttula* is one of the most important sucking insects that attack okra crop (Dhandapani *et al.*, 2003). Although this leafhopper was thought to be primarily a seedling pest, its activity has expanded throughout the cropping period resulting in higher yield loss. In this study, the seasonal abundance of okra leafhopper was investigated to identify the peak abundance period and timely management measures against this and other pests of okra.

MATERIALS AND METHODS

A field experiment was carried out to study the population dynamics of *A. biguttula biguttula* and to correlate these data with weather parameters during *kharif*, 2014-15. The study was done at the Horticulture Instructional Farm of C. P. College of Agriculture, S. D. Agricultural University, Sardarkrushinagar. The okra crop was grown in an isolated 15 × 10 meter field with 60 × 30 cm spacing. This field was kept unsprayed throughout crop season. In field ten quadrates each measuring 1.0 x 1.0 meter were made and from each quadrate five plants were selected and tagged. The population of leafhoppers (nymphs and adults) was recorded at

weekly intervals starting from first week of germination until crop harvest. These observations were recorded from three leaves, selecting one leaf from top (excluding 2 top most leaves), middle (medium maturity) and bottom (leaving one or two bottom most leaves) on main shoot of each selected plants of five tagged plants from each quadrate. From this the average population per leaf was worked out. The weekly meteorological observation of maximum and minimum temperatures, morning and evening relative humidity, wind velocity, sunshine hours and rainfall during the course of investigation were obtained from the meteorological observatory of Agronomy Instructional Farm of C. P. College of Agriculture, S. D. Agricultural University, Sardarkrushinagar. Simple correlation between periodic mean values of leafhopper with various weather parameters was computed.

RESULTS AND DISCUSSION

The periodic mean population of okra leafhopper during *kharif* 2014-15 is given in Table 1. The results revealed significant differences in the incidence of leafhopper at different periods of crop growth. The incidence of *A. biguttula biguttula* on okra commenced the second week after sowing (i.e., second week of July) with an average population 0.88 leafhopper per leaf. However, the population increased steadily and reached peak levels during the 10th week (5.96 leafhopper per leaf) after sowing (i.e., the first week of September). Thereafter, the leafhopper population gradually declined and remained low (0.78 leafhopper per leaf) after 16th weeks (i.e., the third week of October). Similar fluctuations of leafhopper population have been observed in New Delhi by Mohanasundaram and Sharma (2011), Nath *et al.* (2011) at

Meerut, Dhaka (2013) at Rajasthan and Wagan and Wagan (2015) at Tandojam.

Correlation of leafhopper population with weather parameters:

In nature, the population of leafhopper is never truly stable. The rise and fall of population density of any organisms depends on abiotic factors, like temperature and humidity, and on biotic factors, like the host plant and natural enemies. To know the effect of various weather parameters on the population fluctuation of leafhoppers on okra, simple correlations was calculated between periodic mean incidence of leafhopper and weekly mean values of different weather parameters. The correlations between leafhopper populations and morning relative humidity ($r = 0.460$), rainfall ($r = 0.481$), minimum temperature ($r = -0.629$), and bright sunshine ($r = -0.261$) were non-significant (Table 2). However, leafhopper populations exhibited statistically significant and negative correlations with maximum temperature ($r = -0.629$) and wind velocity ($r = -0.587$) and a statistically significant and positive correlation with evening relative humidity ($r = 0.566$) (Table 2). Thus, leafhopper populations increased with decreased in temperature and wind velocity and increased with evening relative humidity. Our finding of a positive effect of temperature on leafhopper populations is similar to the results of Kalkal *et al.* (2013).

CONCLUSION

Based on the results and discussion, it can be concluded that leafhopper in okra started about two week after sowing and remained active through the crop season with peak level of population were observed during the 9th and 10th week after sowing. Leafhopper populations

increased with decreased in temperature and wind velocity and increased with evening relative humidity.

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Table 1: Population of *A. biguttula biguttula* with weather parameters on okra

WAS	Date of Observations	Mean Number of Leafhopper Per Leaf	Weather Parameters						
			Temperature (°C)		Relative Humidity (%)		Mean Bright Sunshine Hours	Wind Velocity (km/hr)	Rain-fall (mm)
			Max $\bar{X}_1$	Min. X_2	Morn. X_3	Eve. X_4			
1	02-07-2014	0.00	37.6	27.0	83.1	46.0	7.5	32.0	0.0
2	09-07-2014	0.88	37.2	27.4	80.8	51.1	6.4	30.1	0.0
3	16-07-2014	1.16	33.5	26.5	85.8	61.8	2.7	23.0	68.2
4	23-07-2014	1.80	34.1	25.7	87.2	63.5	2.5	13.6	45.8
5	30-07-2014	2.78	33.2	25.1	90.9	73.7	2.4	12.3	118.8
6	06-08-2014	3.14	31.1	24.6	84.0	70.0	1.9	14.9	18.3
7	13-08-2014	3.78	32.3	24.6	86.2	65.4	2.1	7.5	3.2
8	20-08-2014	4.64	34.2	24.6	79.9	53.1	4.2	6.6	12.3
9	27-08-2014	5.36	35.3	24.8	81.5	62.0	6.5	14.0	86.1
10	03-09-2014	5.96	31.0	25.1	90.5	76.8	2.8	5.5	214.5
11	10-09-2014	5.14	31.0	25.4	94.2	84.0	2.7	5.7	55.7
12	17-09-2014	4.18	33.0	24.9	84.5	52.7	9.5	6.2	0.0
13	24-09-2014	3.88	28.0	24.2	80.3	46.8	10.1	2.2	0.0
14	01-10-2014	2.76	36.6	24.7	80.4	37.2	10.0	4.7	0.0
15	08-10-2014	1.36	37.8	23.6	73.5	37.0	9.3	4.5	0.0
16	15-10-2014	0.78	36.2	21.0	64.4	28.1	10.0	5.9	0.0

WAS: Weeks After Sowing

Table 2: Correlation coefficient between *A. biguttula biguttula* and weather parameters

Particular	Weather Parameters						
	Temperature (°C)		Relative Humidity (%)		Mean Bright Sunshine Hours	Wind Velocity (km/hr)	Rain-fall (mm)
	Maximum	Minimum	Morning	Evening			
Leafhopper	-0.629**	-0.116	0.460	0.566*	-0.261	-0.587*	0.481

* Significant @ 5 % level

** Significant @ 1 % level

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