



SEASONAL INCIDENCE OF SUCKING INSECT PESTS OF COTTON

NARENDER KUMAR, U. S. SHARMA, ANIL MEENA AND MUKESH

Department of Entomology, Rajasthan College of Agriculture (MPUAT), Udaipur, Rajasthan, 313001

Email- narendrarcampuat@gmail.com

ABSTRACT

A study on the seasonal incidence of sap feeding insect pests of cotton was conducted during *kharif* 2013 at the Instructional Farm, RCA, MPUAT, Udaipur. The major pests recorded on cotton included the aphids (*Myzus persicae* (Sulzer); *Aphis gossypii* Glover), jassids (*Amrasca biguttula biguttula* Ishida, *Empoasca* sp.), whitefly (*Bemisia tabaci* Genn.) and thrips (*Thrips tabaci* Linn.). The sucking pest infestation began in 28th SMW and the peak population of aphids (48.20 aphids/plant) and thrips (40.63 thrips/plant) was in 44th and 36th SMW, respectively; whereas, the population of jassids and whitefly reached the peak with mean 24.40 jassids/plant and 34.66 whiteflies/ plant during the 36th SMW, respectively.

Key words: Aphids, Jassids, Whitefly, Thrips, Incidence, Cotton

INTRODUCTION

Cotton (*Gossypium* spp.) is an important commercial crop in Indian agriculture and economy. It is cultivated under varied agro-climatic conditions across nine major states of India covering 12.19 m ha with the production of 34.70 m bales and productivity of 484 kg per hectare, respectively. In Rajasthan, this crop occupies 5.30 lakh hectare area with production and productivity of 17.10 lakh bales and 548 kg per hectare, respectively. Among the sucking pests, jassids, *A. biguttula biguttula* (Ishida); thrips, *Thrips tabaci* (Linn.); aphids, *A. gossypii* (Glover); and whiteflies, *B. tabaci* (Genn.) are the important from seedling stage and cause heavy losses to the tune of 21.20 to 22.86 per cent (Kulkarani *et al.*, 2003; Dhawan *et al.*, 1988 and Satpute *et al.*, 1990); besides, acting as vectors for a number of viral diseases (Serader *et al.*, 1999). The yield loss in *Gossypium hirsutum* cotton due to sucking pests, bollworms and both has been recorded up to 8.45, 16.55 and 17.35 quintal per hectare, respectively (Satpute *et al.*, 1990).

MATERIALS AND METHODS

The experiment to study the seasonal incidence of insect pests on cotton was conducted during *kharif* 2013 at the Instructional Farm of Rajasthan College of Agriculture, Udaipur, Rajasthan. The experiment was laid out in uniformly sized plots measuring 5m × 5m and replicated four times. Variety GH-8 was grown under natural conditions in untreated plots with a row to row spacing of 90 cm and plant to plant distance of 90 cm. Five plants per

plot were selected randomly and tagged to record the population of sap sucking insect pests throughout the experimental period. A record of each insect pest was maintained with a view to observe the following: a) First appearance of insect pests (b) Peak period of infestation c) Lowest period of incidence

Observation. Population of jassids, thrips, white flies and aphids were recorded after 30 days of germination at weekly intervals from the 5 tagged plants selected at random during morning hours between 6:30 a.m. to 8:00 a.m., when they were less active.

(i) Jassids, thrips and white flies. The population of jassids, thrips and whiteflies was recorded on three leaves, selecting one each from the basal, middle and upper portion of the 5 tagged untreated plants. The population was estimated by gently holding the leaf between the halves of petriplate (10 cm diameter) and then counting adults and nymphs within the petriplate. However, direct counting of the nymphs was done with the help of a magnifying lens.

(ii) Aphids. The counting of aphids was done on three leaves taken from the top, middle and bottom of each plant. For the purpose of recording the aphid population marked leaf was grasped at the petiole by thumb and four fingers and turned until the entire under surface of leaf was clearly visible; wherever required, a magnifying lens was used.

Statistical analysis. Population data of different insect pests thus obtained were subjected to statistical analyses to find out the coefficient of correlation and regression line with average temperature (X_1), relative humidity (X_2)

and rainfall (X_3) which were obtained from the Meteorological Observatory, Rajasthan College of Agriculture, Udaipur. Following formula was used for calculating correlation coefficient:

$$r_{xy} = \frac{\sum XY - \frac{\sum X \sum Y}{n}}{\sqrt{\left[\sum X^2 - \frac{(\sum X)^2}{n} \right] \left[\sum Y^2 - \frac{(\sum Y)^2}{n} \right]}}$$

Where,

- r_{xy} = Simple correlation coefficient
 X = Variable *i.e.* abiotic component.
 (Average temperature, relative humidity and rainfall etc.)

Y = Variable *i.e.* mean number of insect pests

n = Number of paired observations

The correlation coefficient (r) values were subjected to the test of significance using t-test

$$t = \frac{r}{\sqrt{1-r^2}} \times \sqrt{n-2}$$

The calculated t-value obtained was compared with tabulated t-value at 5% level of significance.

RESULTS AND DISCUSSION

During the crop season, aphids, [*Aphis gossypii* Glover and *Myzus persicae* (Sulzer), Aphididae: Hemiptera], jassids, [*Amrasca biguttula biguttula* Ishida and *Empoasca* sp., Jassidae: Hemiptera], whitefly, [*Bemisia tabaci* Gennadius, Aleyrodidae: Hemiptera] and the thrips

Table 1. Seasonal incidence of sap sucking insect pests on cotton during *kharif*, 2013

Standard Meteorological Weeks (SMW)	Abiotic Factors			Insect Pest Population (No/Plant)			
	Mean Temp. (°C)	Mean R.H. (%)	Total Rainfall (mm)	Aphids	Jassids	Whitefly	Thrips
28	27.4	75.6	73.4	4.8	2.4	2.2	2.43
29	26.9	78.5	83.8	18.8	6.2	8.8	10.33
30	27.1	82.7	134	20.4	8.4	14.44	28.8
31	26.1	84.9	63.6	32.4	13.6	26.2	30.2
32	26.0	82.1	85.2	34.4	16.6	24.2	32.2
33	26.2	81.8	25.6	35.6	19.4	28.4	33.66
34	26.9	75.5	16.8	38.4	20.4	31.6	36.4
35	26.3	71.1	0	40.2	21.2	33.36	38.75
36	26.7	63.5	0	43.6	24.4	34.66	40.63
37	28.4	65.5	51.2	40.4	16.6	28.6	36.6
38	27.9	70.3	17.2	44.8	18.8	30.2	38.66
39	24.3	87.5	95.6	42.2	12.6	24.22	36.43
40	26.3	73.5	6.2	44.6	16.8	26.32	26.8
41	25.9	75.8	70.6	42.2	13.6	24.83	24.8
42	25.8	59.0	0.0	46.4	11.2	12.33	32.6
43	22.7	55.4	0.0	48	8.2	6.44	36.43
44	22.3	55.2	0.0	48.2	6.4	4.0	28.63
45	21.4	61.3	0.8	44.2	4.8	2.73	16.43
46	18.0	54.4	0.0	28	2	2.33	14.57
47	18.5	49.2	0.0	18.4	1.6	1.87	12.6
48	19.1	53.4	0.0	10.2	1.4	1.33	8.5
49	18.2	55.6	0.0	4.6	0.6	1.23	6.2
Coefficient of correlation (r) for population and atm. temperature	0.35	0.73*	0.73*	0.56			
Coefficient of correlation (r) for population and relative humidity	0.08	0.49*	0.59*	0.32*			
Coefficient of correlation (r) for population and total rainfall	-0.22	0.04	0.17	0.01			

* Significant ($p=0.05$)

[*Thrips tabaci* Linnman, Thripidae: Thysanoptera] were recorded as the major sap sucking pests of cotton.

1. Aphids. The aphids were first recorded in the 28th SMW (4.80 aphids/ plant) that reached the peak (48.20 aphids/ plant) during the 44th SMW when the mean atmospheric temperature was 22.3 °C, relative humidity 55.20 per cent with no rainfall; however, the population decreased gradually and reached a minimum level of 4.60 aphids/ plant in 49th SMW. The population exhibited a mild positive correlation with mean temperature and mean relative humidity while negative correlation with average rainfall.

2. Jassids. The jassids were first noticed during the 28th SMW (2.40 jassids/ plant) that increased gradually and touched the peak (24.40 jassids/ plant) in the 36th SMW when the mean atmospheric temperature, relative humidity and total rainfall during the peak period of incidence were 26.70 °C, 63.50 per cent with no rainfall, respectively. Thereafter, the population decreased gradually and reached to a minimum level of 0.6 jassids/ plant during 49th SMW. The results obtained in the present investigation are similar to the earlier reports of Shitole and Patel (2009) who observed higher incidence of jassids during last week of August. The pest had a positive and significant correlation with temperature ($r_1 = 0.73$) as well as with relative humidity ($r_2 = 0.49$).

3. Whiteflies. Whiteflies were first recorded in the 28th SMW (2.20 whiteflies/plant); thereafter, their population increased gradually and touched a peak (34.66 whiteflies/ plant) in the 36 SMW when the mean atmospheric temperature was 26.70 °C, relative humidity 63.50 per cent with no rainfall; later, the population decreased gradually and reached a minimum level of 1.23 whiteflies/ plant in the 49th SMW. Shanab and Awad-Allah (1982) observed that the pest reached a peak during July to October, when the weekly mean temperature varied from 20.86 to 27.58^E°C and relative humidity varied from 58.30 to 66.66 per cent. The whitefly population had a positively significant correlation with temperature ($r_1 = 0.73$) and relative humidity ($r_2 = 0.59$).

4. Thrips. Thrips were first noticed in the 28th SMW ((2.47 thrips/ plant) that increased gradually and touched the

peak (40.63 thrips/ plant) in the 36 SMW when the mean atmospheric temperature was 26.70 °C, relative humidity 63.50 per cent and no total rainfall; thereafter, the population decreased gradually and reached a minimum level of 6.20 thrips/ plant in the 49th SMW. The pest exhibited significant positive correlation with relative humidity ($r_2 = 0.32$)

Of the major sap feeding insect pests, the population of jassids, whiteflies and thrips increased with the rise in temperature and relative humidity; whereas, aphids were not affected by the abiotic factors significantly.

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