

Seasonal incidence of the sucking pest and lady bird beetle on Bt cotton

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ABSTRACT

Seasonal incidence of sucking pests in *Kharif* 2016 at College of Agriculture, Dhule revealed that, the leafhopper incidence reached its peak activity during the second week of October (6.64 leafhoppers/3 leaves/plant), whereas, the peak incidence of aphids was noticed in the third week of October (8.82 aphids/3 leaves/plant). The peak incidence of the whiteflies was recorded during the fourth week of October (8.02 whiteflies/3 leaves/plant). The peak incidence of the thrips was recorded during the third week of October (6.76 thrips/3 leaves/plant). The activity of predator lady bird beetle was at its peak during first week of October (2.94 lady bird beetles/plant), which is directly related with the activity of the sucking pest in field. The correlation between incidence of leaf hoppers ($r = 0.205$), aphids ($r = 0.174$), whiteflies ($r = 0.206$), thrips ($r = 0.167$), was positively non-significant with maximum temperature (T_{max}). The minimum temperature (T_{min}) showed negative significant correlation with whiteflies ($r = -0.640^{**}$), thrips ($r = -0.464^*$) and negative non-significant correlation with leafhoppers ($r = -0.411$) and aphids ($r = -0.3111$). The morning relative humidity (MRH) showed negative significant correlation with occurrence of whiteflies ($r = -0.440^*$) and negative non significant correlation with occurrence of the leafhoppers ($r = -0.123$), aphids ($r = -0.101$) and thrips ($r = -0.184$). Similarly, the evening humidity (ERH) showed negative non significant correlation with the pests such as leafhoppers ($r = -0.038$), aphids ($r = -0.021$), whiteflies ($r = -0.166$) and thrips ($r = -0.085$) during *Kharif* 2016 season. The rainfall had negatively non significant effect at 5 per cent level of significance with leafhoppers, aphids, whitefly and thrips.

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INTRODUCTION

Cotton is popularly known as 'White gold' is one of

the most important commercial crop also referred as 'King of fibre', which belongs to family Malvaceae and

genus *Gossypium*. Origin of cotton is India. The area and production in India is 105.00 lakh ha and 351.00 lakh bales, respectively, and in Maharashtra it is 38.00 lakh ha and 89.00 lakh bales, respectively (Anonymous, 2016).

There are near about 40 species of cotton, out of the mainly 4 species are cultivated *i.e.* *Gossypium arboreum*, *G. herbaceum*, *G. hirsutum* and *G. barbadense*. Cotton the important fibre crop is ravaged by an array of insect pests. Among them a number of sucking pests such as jassids, whiteflies, aphids and thrips are associated with American cotton (*Gossypium hirsutum* L.).

MATERIAL AND METHODS

The experiment was conducted on Bt cotton crop with RCH-659 BG II variety at field of Entomology Section, College of Agriculture, Dhule during *Kharif* 2016. Sowing of Bt cotton RCH 659 BGII was done by hand dibbling method in experimental plot by making cross marking of 90cm x 90cm between rows and plants, respectively. Three leaves from top, middle, bottom of plant were selected and tagged. The observations on the incidence of sucking pest (aphids, jassids, thrips and whiteflies) and natural enemies (lady beetle, grubs and adults) were recorded at weekly interval on 5 plant selected at random in each experimental plot. The weather data was recorded daily and weekly averages were worked out. The population of sucking pests with natural enemies was correlated with meteorological parameter.

RESULTS AND DISCUSSION

Seasonal incidence of pests, predators and the influence of thermo-hygro parameters *viz.*, temperature (maximum and minimum), relative humidity (morning and evening), and rainfall on population of sucking pests along with predators was assessed and presented in Table 1.

Jassids (Leaf hoppers) (*A. biguttula biguttula* Ishida):

It is evident from the data that the occurrence of leafhoppers commenced from 27th SMW and continued till 47th SMW which ranged from 0.32 to 6.64 leafhoppers/3 leaves/plant. The population was above ETL (2.26 nymph/leaf) during 34th SMW onwards. The

incidence of leafhoppers was gradually increased from third week of September (4.32 leafhoppers/3 leaves/plant) to second week of October (6.64 leafhoppers/3 leaves/plant). Present results more or less in confirmatory with work conducted by Purohit *et al.* (2006) observed that highest population of leaf hopper recorded during fourth week of September. Similar results were also obtained by Desai *et al.* (2009).

Aphids (*Aphis gossypi* Glover):

The aphid population was commenced from 27th SMW and continued till 47th SMW which ranged from 2.03 to 8.82 aphids/3 leaves/plant. However, the highest peak activity (8.82 aphids/3 leaves) was recorded in 42nd SMW coinciding with the third week of October. There was a gradual decreased in aphid population up to third week of November and subsidized next two weeks. More *et al.* (2009) studied the population dynamics of sucking pests on Bt cotton hybrid under rainfed condition and observed that the incidence of aphid was started in first week of July and reached of its peak of 52.20 per three leaves during first week of September. Second peak of aphid was observed during last week of October recording 51.80 aphids per three leaves. These results are approaching with present investigation.

Whitefly (*Bemisia tabaci* Gennadius):

The pest commenced from first week of July (0.28 whiteflies/3 leaves) and peak incidence was recorded in 43rd SMW (8.02 whiteflies/3 leaves) coinciding with the last week of October. There was a gradual decreased in population in first week of November and subsidized next two weeks. Purohit *et al.* (2006) recorded incidence of whitefly which started in first fortnight of July during 2003-04 and 2004-05 and attained its peak in second week of August and third week of September during respective years. These findings are matched with present study. The peak incidence of whiteflies was observed from the 44th to 48th SMW (November) in Andhra Pradesh India (Prasad *et al.*, 2008).

Thrips (*Thrips tabaci*):

The pest commenced from first week of July 0.17 thrips/3 leaves/plant and gradually increased up to third week of October (*i.e.* 6.76 thrips/3 leaves/plant). There was a gradual decreased in population in last week of November and subsidized next two weeks.

Table 1 : Seasonal incidence of the sucking pest on cotton during Kharif 2016-17

Month	SMW	Average number of sucking pests and predator					Temperature (°C)		Relative humidity (%)		Rainfall (mm)
		Leaf hoppers/ 3 leaves /plant	Aphids/ 3 leaves /plant	Whitefly /3 leaves /plant	Thrips/ 3 leaves /plant	Lady bird beetle/ Plant	Max.	Min.	Morning	Evening	
July 2016	27	0.32	2.03	0.28	0.17	0.0	31.8	23.5	82.3	69.1	031.00
	28	0.47	2.16	0.32	0.58	0.18	29.4	22.1	85.4	76.6	070.30
	29	0.92	2.47	0.44	0.73	0.22	31.5	22.3	82.4	57	013.40
	30	0.98	2.66	0.78	0.88	0.47	31.5	23.2	83.9	64	033.60
	31	1.16	2.78	0.92	0.97	0.91	30.7	22.6	79.7	70.1	011.40
Aug. 2016	32	1.32	2.92	0.98	1.58	1.22	30.7	22.1	88.6	70.6	17.6
	33	1.98	3.25	1.21	1.73	1.63	24.2	22.6	81.3	42.7	00.00
	34	2.26	3.27	1.52	1.98	1.84	31.3	21.3	86.9	63	7.20
	35	2.67	4.42	1.73	2.16	1.98	32.1	22.1	90.1	63.9	79.80
Sept. 2016	36	3.17	4.92	1.81	2.68	2.26	31.3	18.9	86.3	56.3	0.30
	37	3.67	5.16	2.65	3.07	2.45	33.3	22.8	82.6	55.3	9.40
	38	4.32	6.27	2.78	3.87	2.63	30.9	22.2	88.7	66.6	34.00
	39	5.88	6.68	3.26	4.85	2.78	32.9	21.5	84	54	23.00
Oct. 2016	40	6.08	7.42	4.76	5.71	2.94	30.5	20.9	90	76.3	46.60
	41	6.64	7.92	7.12	5.96	2.68	31.4	19.1	91.9	51.7	0.40
	42	6.28	8.82	7.78	6.76	2.26	29.5	17.5	75.7	25.6	00.00
	43	5.02	6.75	8.02	5.12	2.06	32.9	15.8	74.3	27.3	00.00
Nov. 2016	44	4.78	6.08	6.87	4.78	1.78	31.9	12.3	69.4	22.7	00.00
	45	4.22	5.52	5.57	3.92	1.63	31.9	11.9	60.3	16.9	00.00
	46	3.52	4.32	4.32	3.28	1.16	31.2	11.5	75.6	26.9	00.00
	47	3.16	3.58	3.38	3.16	0.78	31.9	10.1	79.1	25.6	00.00

*SMW= Standard Meteorological Week

The work of More *et al.* (2009) are in line with present findings who observed that the incidence of thrips recorded highest population 40.80 per three leaves during fourth week of August and reached its peak during first week of October.

Lady bird beetle:

Population of lady bird beetle was noticed during second week of July then it gradually increased from second week of July (0.18 lady bird beetle/plant) to first week of October (2.94 lady bird beetle/3 plant). Then after first week of October it subsidized up to next two week. The population of lady bird beetle was directly dependent upon the incidence level of aphid, leafhoppers and whitefly in field.

Parsai and Shashtry (2009) observed the population of predators (coccinellids and chrysoperla) from 30th to 50th SMW on cotton. It means that predators were present all the time when there was incidence of sucking pests. The results are in confirmation with present finding.

Correlation of weather parameters with sucking pests of cotton:

The data on average population of aphids, leafhoppers, whiteflies and thrips recorded under field conditions were correlated with meteorological parameters such as maximum temperature, minimum temperature, relative humidity, rainfall and also Pearson correlation co-efficient values (r) were computed and are presented in Table 2. The correlation between incidence of leaf hoppers (r = 0.205), aphids (r = 0.174), whiteflies (r = 0.206), thrips (r = 0.167), were positively non significant with maximum temperature (T_{max}). The minimum temperature (T_{min}) showed negative significant correlation with whiteflies (r = -0.640**), thrips (r = -0.464*) and negative non-significant correlation with leafhoppers (r = -0.411), aphids (r = -0.3111).

The morning relative humidity (MRH) showed negative significant correlation with occurrence of whiteflies (r = -0.440*) and negative non-significant correlation with occurrence of the leafhoppers (r = -

Pests	Correlation coefficient values (r)				
	Temperature (°C)		Relative humidity (%)		Rainfall (mm)
	Maximum	Minimum	Morning	Evening	
Leaf hoppers	0.205	-0.411	-0.123	-0.038	-0.294
Aphids	0.174	-0.311	-0.101	-0.021	-0.234
Whiteflies	0.206	-0.640**	-0.440*	-0.166	-0.438
Thrips	0.167	-0.464*	-0.184	-0.085	-0.323

* and ** indicate significance of values at P=0.05 and 0.01, respectively

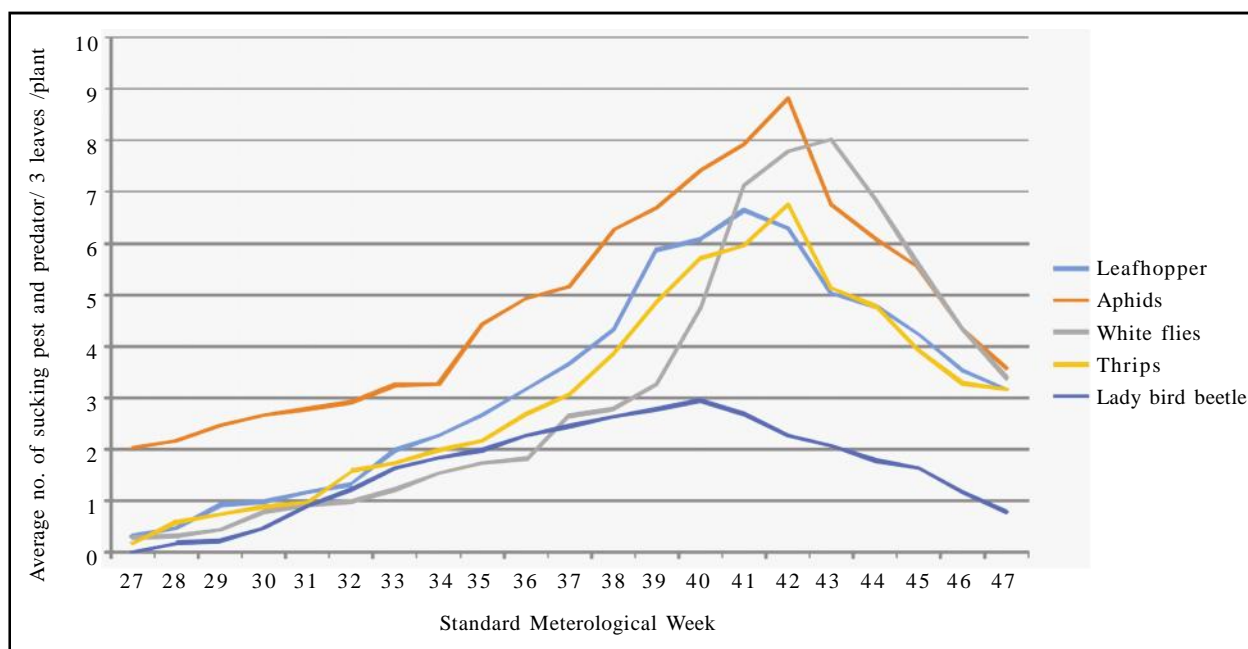


Fig. 1 : Seasonal incidence of sucking pests and their natural enemies on Bt cotton during Kharif 2016

0.123), aphids ($r = -0.101$), and thrips ($r = -0.184$). Similarly, the evening humidity (ERH) showed negative non significant correlation with the pests such as leafhoppers ($r = -0.038$), aphids ($r = -0.021$), whiteflies ($r = -0.166$) and thrips ($r = -0.085$) during Kharif 2016 season. The rainfall had negative non-significant effect on leaf hoppers ($r = -0.294$), aphids ($r = -0.234$), whiteflies ($r = -0.438$) and thrips ($r = -0.323$) at 5 per cent level of significance and 1 per cent level of significance.

Dhaka and Pareek (2008) found that maximum temperature had positive significant and evening RH exerted negative significant effect on whitefly population in cotton cv. RST-9 at Tonk, Rajasthan. Prasad *et al.* (2008) reported the incidence of aphid had significant negative association with maximum temperature, minimum temperature, evening relative humidity and

rainfall. The total influence of all the weather parameters was low and non-significant on aphid population. Mohapatra (2008) reported that temperature showed a positive correlation with *A. gossypii* while effect of rainfall was adverse (which are in confirmation of present investigation).

Bhede (2003) reported negatively significant correlation of thrips population with evening relative humidity and rainfall. Present results are almost in confirmation with above findings.

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