



SEASONAL INCIDENCE OF SUCKING PESTS AND THEIR NATURAL ENEMIES IN COTTON

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Abstract:

Field studies were undertaken at the Agricultural Research Sub-centre, Achalpur, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (MS) to study the seasonal incidence of sucking pests and their natural enemies on cotton during *Kharif* season of 2014-15. It was observed that cotton was affected by group of sucking pests viz., aphid, leaf hoppers, thrips, whitefly and their damage continued throughout the crop season. Aphid was observed throughout growing season up to 48th MW and attained initial peak during 32nd MW. Leaf hopper reached its peak during 36th MW whereas incidence of thrips was initiated in 33rd MW and continued up to 41th MW and attained initial peak during 36th MW. Incidence of whitefly was first observed and was at its peak during 32nd MW (5.8/ leaf). Predator activity was observed throughout the season from 32nd MW to 48th MW with disappearance in 42nd and 43rd MW.

Key Words: Seasonal Incidence, Sucking Pests, Natural Enemies & Cotton

Introduction:

Cotton (*Gossypium hirsutum* L.) as "King of the Fibre" is one of the most ancient and important cash crop in India and plays a significant role in the Indian national economy. It is grown on a large scale almost in all the tropical and sub-tropical countries like India, U.S.A., Mexico, Iran, Egypt, Pakistan, Turkey, Brazil, Sudan, Uganda and China. The major reason for the low productivity in cotton is damage caused by insect pests. In India, as many as 162 species of insect-pests are known to attack cotton from sowing to maturity which cause up to 50-60% loss (Agarwal *et al.*, 1984). Cotton pests can be primarily divided into bollworms and sucking pests. Among sucking pests, aphid *Aphis gossypii* (Glover), leafhoppers *Amrasca biguttula biguttula* (Ishida), thrips *Thrips tabaci* (Lind) and whiteflies *Bemisia tabaci* (Genn.) are of major importance. These sucking pests occur at all the stages of crop growth and responsible for indirect yield losses. A reduction of 22.85 percent in seed cotton yield due to sucking pests has been reported by Satpute *et al.* (1990). Therefore in present investigation on seasonal incidence of sucking pests and their natural enemies in cotton was studied at Agricultural Research station, Achalpur.

Material and Methods:

Present investigations on "Seasonal incidence of sucking pests and their natural enemies in cotton" was carried out at Agricultural Research Sub-centre, Achalpur, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (MS) during *kharif* season 2014-15. For recording the pest incidence the seeds of cotton variety AKA-8 were sown at 19th July, 2014 with 60 cm X 15 cm spacing in the plot measuring 10 X 10 m. All the recommended agronomical practices except plant protection were followed for raising the crop. The populations of sucking pests were recorded at standard week interval during morning hours, starting after germination till the maturity of the crop on 10 randomly selected plants. Aphids, leaf hoppers, thrips and whitefly population count was recorded on top, middle and bottom canopy of each plant. Average No. of aphids, leaf hoppers, thrips, & whitefly were calculated per leaf per plant. The population of ladybird beetles and spiders were recorded from randomly selected plants at weekly intervals. From this, the average populations of natural enemies per plant were worked out. At the end of season, the data obtained were subjected to proper statistical analysis.

Results and Discussion:

It is revealed from the incidence data presented in tables that during *kharif* season 2014, aphids, leaf hoppers, thrips, whitefly and predators viz. lady bird beetles and spider were observed on cotton.

1. Seasonal Incidence of Sucking Pests:

Incidence of aphids was initiated in 32nd MW (35.0/ leaf) and aphid population was decrease and increased with subsequent MW up to 48th MW and was lowest in 42nd and 43rd MW (0.2/ leaf). However it was observed throughout growing season up to 48th MW. It has attained its initial peak during 32nd MW (35.0/ leaf) which was favored by min. temp. of 31.99 °C and max. temp. of 33.59 °C with morning 95.86 % and evening 78.86 % humidity along with 10.0 mm rainfall and 33rd MW (8.4/ leaf) which was favored by min. temp. of 31.90 °C and max. temp. of 34.16 °C with morning 93.71 % and evening 68.57 % humidity along with 2.20 mm rainfall. Similar phenomenon has been observed by Vennila *et al.* (2004) and Raja *et al.* (2007).

Table 1: Incidence of *Aphid* on cotton crop as influenced by different weather parameters

S.No	MW	Date of Observ-ation	Average no of Aphid	Weather Parameters				
				Temp Min.	Temp Max	R.H (M)	R.H (E)	RF (mm)
1	29	-	-	32.53	34.11	87.29	73.57	8.20
2	30	-	-	31.97	33.09	95.71	85.29	107.80
3	31	-	-	31.27	32.17	99.14	92.86	262.40
4	32	11.08.14	35.0	31.99	33.59	95.86	78.86	10.00
5	33	18.08.14	8.4	31.90	34.16	93.71	68.57	2.20
6	34	25.08.14	1.8	32.27	34.07	86.00	69.57	0.20
7	35	01.09.14	1.3	32.20	33.46	95.57	80.86	27.00
8	36	08.09.14	2.2	31.87	33.27	96.71	87.43	60.60
9	37	15.09.14	3.3	31.67	32.57	97.57	92.14	125.20
10	38	22.09.14	2.2	31.79	33.59	96.14	79.14	0.00
11	39	29.09.14	0.7	32.41	34.69	86.00	67.57	0.00
12	40	06.10.14	0.5	31.79	35.09	91.14	54.14	0.00
13	41	13.10.14	0.7	31.83	35.10	89.71	52.43	12.00
14	42	20.10.14	0.2	31.64	34.60	90.86	55.71	4.20
15	43	27.10.14	0.2	31.51	34.43	92.14	58.86	0.00
16	44	03.11.14	0.3	30.33	33.53	87.29	54.43	0.00
17	45	10.11.14	0.4	30.09	34.59	83.29	40.57	0.00
18	46	17.11.14	0.5	30.26	34.43	77.14	40.71	0.00
19	47	24.11.14	0.4	30.96	33.67	92.43	60.57	18.00
20	48	01.12.14	0.3	29.10	33.81	80.00	37.57	0.00
21	49	-	-	28.91	33.94	84.14	37.71	0.00
22	50	-	-	28.36	33.64	79.86	30.86	0.00
R values				0.2149	-0.1069	0.2841	0.2511	-0.0738

*Significant at 0.05% level (Table value-0.413)

** Highly significant at 0.01% level (Table value-0.526)

Incidence of leaf hoppers was initiated in 34th MW (0.2/ leaf) and thereafter continued up to 42nd MW with disappearance in 43rd and 44th MW. Leaf hoppers population was reappearing in 45th MW and slowly increased and decrease with continued up to 48th MW. It reached its peak during 36th MW (0.9/ leaf) which was favored by min. temp. of 31.87 °C and max. temp. of 33.27 °C with morning 96.71 % and evening 87.43 % humidity along with 60.60 mm rainfall. The incidence pattern of leafhoppers revealed in present study is in close confirmation with reports of Bhute *et al.* (2012) and Neelima *et al.* (2012) who observed increased incidence in September and October months in hybrid cultivars of *G. hirsutum*.

Table2: Incidence of *Leaf hopper* on cotton crop as influenced by different weather parameters

S.No	MW	Date of Observ-ation	Average no of Leaf hopper	Weather parameters				
				Temp Min.	Temp Max	R.H (M)	R.H (E)	RF (mm)
1	29	-	-	32.53	34.11	87.29	73.57	8.20
2	30	-	-	31.97	33.09	95.71	85.29	107.80
3	31	-	-	31.27	32.17	99.14	92.86	262.40
4	32	11.08.14	-	31.99	33.59	95.86	78.86	10.00
5	33	18.08.14	-	31.90	34.16	93.71	68.57	2.20
6	34	25.08.14	0.2	32.27	34.07	86.00	69.57	0.20
7	35	01.09.14	0.4	32.20	33.46	95.57	80.86	27.00
8	36	08.09.14	0.9	31.87	33.27	96.71	87.43	60.60
9	37	15.09.14	0.9	31.67	32.57	97.57	92.14	125.20
10	38	22.09.14	0.8	31.79	33.59	96.14	79.14	0.00
11	39	29.09.14	0.4	32.41	34.69	86.00	67.57	0.00
12	40	06.10.14	0.3	31.79	35.09	91.14	54.14	0.00
13	41	13.10.14	0.3	31.83	35.10	89.71	52.43	12.00
14	42	20.10.14	0.3	31.64	34.60	90.86	55.71	4.20
15	43	27.10.14	-	31.51	34.43	92.14	58.86	0.00
16	44	03.11.14	-	30.33	33.53	87.29	54.43	0.00
17	45	10.11.14	0.2	30.09	34.59	83.29	40.57	0.00
18	46	17.11.14	0.3	30.26	34.43	77.14	40.71	0.00

19	47	24.11.14	0.2	30.96	33.67	92.43	60.57	18.00
20	48	01.12.14	0.1	29.10	33.81	80.00	37.57	0.00
21	49	-	-	28.91	33.94	84.14	37.71	0.00
22	50	-	-	28.36	33.64	79.86	30.86	0.00
R values				0.3106	-0.1363	0.3332	0.3957	0.0853

*Significant at 0.05% level (Table value-0.413)

** Highly significant at 0.01% level (Table value-0.526)

Incidence of thrips was initiated in 33rd MW (0.2/ leaf) and continued up to 41st MW. It was at its peak during 36th MW (0.6/leaf) which was favored by min. temp. of 31.87 °C and max. temp. of 33.27 °C with morning 96.71 % and evening 87.43 % humidity along with 60.60 mm rainfall followed by in 37th MW (0.5/leaf) which was favored by min. temp. of 31.67 °C and max. temp. of 32.57 °C with morning 97.57 % and evening 92.14 % humidity along with 125.20 mm rainfall. Thrips population recorded positive significant correlation with respect to minimum temperature, morning and evening humidity on cotton crop having R-value 0.4817, 0.4348 and 0.4780 respectively. Present results are in agreement with the reports of Udikeri *et al.* (2003) and Kengegowda (2003) who have observed equal level of thrips incidence at Dharwad and Raichur respectively. Bhute *et al.* (2012) and Chavan *et al.* (2010) also observed the peak incidence of thrips in Second week of September because of dry spell.

Table 3: Incidence of *Thrips* on cotton crop as influenced by different weather parameters

S.No	MW	Date of Observ-ation	Average no of Thrips	Weather parameters				
				Temp Min.	Temp Max	R.H (M)	R.H (E)	RF (mm)
1	29	-	-	32.53	34.11	87.29	73.57	8.20
2	30	-	-	31.97	33.09	95.71	85.29	107.80
3	31	-	-	31.27	32.17	99.14	92.86	262.40
4	32	11.08.14	-	31.99	33.59	95.86	78.86	10.00
5	33	18.08.14	0.2	31.90	34.16	93.71	68.57	2.20
6	34	25.08.14	0.3	32.27	34.07	86.00	69.57	0.20
7	35	01.09.14	0.4	32.20	33.46	95.57	80.86	27.00
8	36	08.09.14	0.6	31.87	33.27	96.71	87.43	60.60
9	37	15.09.14	0.5	31.67	32.57	97.57	92.14	125.20
10	38	22.09.14	0.5	31.79	33.59	96.14	79.14	0.00
11	39	29.09.14	0.3	32.41	34.69	86.00	67.57	0.00
12	40	06.10.14	0.4	31.79	35.09	91.14	54.14	0.00
13	41	13.10.14	0.3	31.83	35.10	89.71	52.43	12.00
14	42	20.10.14	-	31.64	34.60	90.86	55.71	4.20
15	43	27.10.14	-	31.51	34.43	92.14	58.86	0.00
16	44	03.11.14	-	30.33	33.53	87.29	54.43	0.00
17	45	10.11.14	-	30.09	34.59	83.29	40.57	0.00
18	46	17.11.14	-	30.26	34.43	77.14	40.71	0.00
19	47	24.11.14	-	30.96	33.67	92.43	60.57	18.00
20	48	01.12.14	-	29.10	33.81	80.00	37.57	0.00
21	49	-	-	28.91	33.94	84.14	37.71	0.00
22	50	-	-	28.36	33.64	79.86	30.86	0.00
R values				0.4817*	-0.0511	0.4348*	0.4780*	0.0446

* Significant at 0.05% level (Table value-0.413)

** Highly significant at 0.01% level (Table value-0.526)

Incidence of whitefly was first observed in 32nd MW (5.8/ leaf) and continued slowly increase and decrease steadily up to 48th MW. It was at its peak during 32nd MW (5.8 Nymph/leaf). The meteorological parameters were in range of min. temp. of 31.99 °C and max. temp. of 33.59 °C with morning 95.86 % and evening 78.86 % humidity along with 10.0 mm rainfall during 32nd MW. followed by in 46th MW (3.6/leaf) which was favored by min. temp. of 30.26 °C and max. temp. of 34.43 °C with morning 77.14 % and evening 40.71 % humidity along with no rainfall. The present findings are in close agreement with Udikeri *et al.* (2003) who observed population of whitefly through the growing season.

Table 4: Incidence of *White fly* on cotton crop as influenced by different weather parameters

S.No	MW	Date of Observ-ation	Average no of White fly	Weather parameters				
				Temp Min.	Temp Max	R.H (M)	R.H (E)	RF (mm)
1	29	-	-	32.53	34.11	87.29	73.57	8.20
2	30	-	-	31.97	33.09	95.71	85.29	107.80

3	31	-	-	31.27	32.17	99.14	92.86	262.40
4	32	11.08.14	5.8	31.99	33.59	95.86	78.86	10.00
5	33	18.08.14	1.8	31.90	34.16	93.71	68.57	2.20
6	34	25.08.14	1.9	32.27	34.07	86.00	69.57	0.20
7	35	01.09.14	2.1	32.20	33.46	95.57	80.86	27.00
8	36	08.09.14	0.9	31.87	33.27	96.71	87.43	60.60
9	37	15.09.14	2.4	31.67	32.57	97.57	92.14	125.20
10	38	22.09.14	2.7	31.79	33.59	96.14	79.14	0.00
11	39	29.09.14	2.1	32.41	34.69	86.00	67.57	0.00
12	40	06.10.14	2.6	31.79	35.09	91.14	54.14	0.00
13	41	13.10.14	3.1	31.83	35.10	89.71	52.43	12.00
14	42	20.10.14	1.8	31.64	34.60	90.86	55.71	4.20
15	43	27.10.14	2.5	31.51	34.43	92.14	58.86	0.00
16	44	03.11.14	3.1	30.33	33.53	87.29	54.43	0.00
17	45	10.11.14	3.5	30.09	34.59	83.29	40.57	0.00
18	46	17.11.14	3.6	30.26	34.43	77.14	40.71	0.00
19	47	24.11.14	3.1	30.96	33.67	92.43	60.57	18.00
20	48	01.12.14	2.6	29.10	33.81	80.00	37.57	0.00
21	49	-	-	28.91	33.94	84.14	37.71	0.00
22	50	-	-	28.36	33.64	79.86	30.86	0.00
R values				0.1126	0.3102	-0.0295	-0.1175	-0.3843

* Significant at 0.05% level (Table value-0.413)

** Highly significant at 0.01% level (Table value-0.526)

2. Seasonal incidence of Predators:

Predator activity was observed throughout the season from 32nd MW to 48th MW with disappearance in 42nd and 43rd MW. Low population of lady bird beetle (0.1 to 5.5/ Plant) was recorded. It was at its peak during 33rd MW (5.5/ plant) with meteorological parameters in the range of min. temp. of 31.90 °C and max. temp. of 34.16 °C with morning 93.71 % and evening 68.57 % humidity along with 2.2 mm rainfall. Followed by 35th MW (1.7/ plant) with meteorological parameters in the range of min. temp. of 32.20 °C and max. temp. of 33.46 °C with morning 95.57 % and evening 80.86 % humidity along with 27.0 mm rainfall. Population of spider was initiated in 36th MW (0.4/Plant) and continued up to 48th MW with disappearance in 38th, 42nd and 43rd MW. It was at its peak during 36th MW (0.4/Plant) during which meteorological parameters in the range of min. temp. 31.87 °C and max. temp. of 33.27 °C with morning 96.71 % and evening 87.43 % humidity along with 60.60 mm rainfall. Prasad and Rao (2008) have noticed abundant natural enemies such as spiders, coccinellids, green lacewings and some parasitoids in different Bt and non-Bt hybrids and reported that, population of natural enemies was observed throughout the crop growth. Rafee (2010) noticed the generalist predator coccinellids appearing during September which continued to prey on pests on desi cotton cultivars. Similar results were observed by Bhute *et al.* (2012) and Udikeri *et al.* (2012) on Bt and Non-Bt cotton.

Table 5: Incidence of *Lady bird beetles* on cotton crop as influenced by different weather parameters

S.No	MW	Date of Observ-ation	Average no of LBB	Weather Parameters				
				Temp Min.	Temp Max	R.H (M)	R.H (E)	RF (mm)
1	29	-	-	32.53	34.11	87.29	73.57	8.20
2	30	-	-	31.97	33.09	95.71	85.29	107.80
3	31	-	-	31.27	32.17	99.14	92.86	262.40
4	32	11.08.14	0.6	31.99	33.59	95.86	78.86	10.00
5	33	18.08.14	5.5	31.90	34.16	93.71	68.57	2.20
6	34	25.08.14	1.3	32.27	34.07	86.00	69.57	0.20
7	35	01.09.14	1.7	32.20	33.46	95.57	80.86	27.00
8	36	08.09.14	1.4	31.87	33.27	96.71	87.43	60.60
9	37	15.09.14	1.1	31.67	32.57	97.57	92.14	125.20
10	38	22.09.14	1.2	31.79	33.59	96.14	79.14	0.00
11	39	29.09.14	0.6	32.41	34.69	86.00	67.57	0.00
12	40	06.10.14	0.2	31.79	35.09	91.14	54.14	0.00
13	41	13.10.14	0.2	31.83	35.10	89.71	52.43	12.00
14	42	20.10.14	-	31.64	34.60	90.86	55.71	4.20
15	43	27.10.14	-	31.51	34.43	92.14	58.86	0.00
16	44	03.11.14	0.1	30.33	33.53	87.29	54.43	0.00

17	45	10.11.14	0.2	30.09	34.59	83.29	40.57	0.00
18	46	17.11.14	0.3	30.26	34.43	77.14	40.71	0.00
19	47	24.11.14	0.3	30.96	33.67	92.43	60.57	18.00
20	48	01.12.14	0.3	29.10	33.81	80.00	37.57	0.00
21	49	-	-	28.91	33.94	84.14	37.71	0.00
22	50	-	-	28.36	33.64	79.86	30.86	0.00
R values				0.3021	-0.0405	0.2809	0.2805	-0.0885

* Significant at 0.05% level (Table value-0.413)

** Highly significant at 0.01% level (Table value-0.526)

Table 6: Incidence of *Spider* on cotton crop as influenced by different weather parameters

S.No	MW	Date of Observ-ation	Average no of Spider	Weather parameters				
				Temp Min.	Temp Max	R.H (M)	R.H (E)	RF (mm)
1	29	-	-	32.53	34.11	87.29	73.57	8.20
2	30	-	-	31.97	33.09	95.71	85.29	107.80
3	31	-	-	31.27	32.17	99.14	92.86	262.40
4	32	11.08.14	-	31.99	33.59	95.86	78.86	10.00
5	33	18.08.14	-	31.90	34.16	93.71	68.57	2.20
6	34	25.08.14	-	32.27	34.07	86.00	69.57	0.20
7	35	01.09.14	-	32.20	33.46	95.57	80.86	27.00
8	36	08.09.14	0.4	31.87	33.27	96.71	87.43	60.60
9	37	15.09.14	0.2	31.67	32.57	97.57	92.14	125.20
10	38	22.09.14	-	31.79	33.59	96.14	79.14	0.00
11	39	29.09.14	0.2	32.41	34.69	86.00	67.57	0.00
12	40	06.10.14	0.3	31.79	35.09	91.14	54.14	0.00
13	41	13.10.14	0.1	31.83	35.10	89.71	52.43	12.00
14	42	20.10.14	-	31.64	34.60	90.86	55.71	4.20
15	43	27.10.14	-	31.51	34.43	92.14	58.86	0.00
16	44	03.11.14	0.1	30.33	33.53	87.29	54.43	0.00
17	45	10.11.14	0.3	30.09	34.59	83.29	40.57	0.00
18	46	17.11.14	0.3	30.26	34.43	77.14	40.71	0.00
19	47	24.11.14	0.2	30.96	33.67	92.43	60.57	18.00
20	48	01.12.14	0.2	29.10	33.81	80.00	37.57	0.00
21	49	-	-	28.91	33.94	84.14	37.71	0.00
22	50	-	-	28.36	33.64	79.86	30.86	0.00
R values				-0.1066	0.1946	-0.2099	-0.1602	-0.0720

* Significant at 0.05% level (Table value-0.413)

** Highly significant at 0.01% level (Table value-0.526)

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