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Influence of Weather Factors on the Incidence of Major Pests and its Predators of Cotton

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A B S T R A C T

Field experiments was conducted during *kharif* season 2014-2015 to study the influence of meteorological factors on the incidence of major pests of cotton. Incidence of aphids was initiated in 32nd MW (35.0/ leaf) and aphid population was lowest in 42nd and 43rd MW (0.2/ leaf). 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. Incidence of leaf hoppers was initiated in 34th Mw (0.2/ leaf) and thereafter continued up to 42ndmw with disappearance in 43rdand 44th 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. Incidence of thrips was initiated in 33rdmw (0.2/leaf). 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. Incidence of whitefly was first observed in 32nd MW (5.8/ leaf). 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. Incidence of mite and mealy bug was not observed on cotton during the growing season. Predator activity was observed throughout the season form 32nd MW to 48th MW. Population of lady bird beetle 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. *Chrysopa* population was not observed on cotton during the growing season. Population of spider 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. Boll worm and red cotton bug damage was not observed on cotton during the growing season.

Introduction

The King of fibre Cotton (*Gossypium hirsutum L.*), is popularly known as White gold, an important cash crop in India. Among the various causes of low productivity of cotton in India, the insect pest is one of the major causes. In India, 200 species of insect pests have been reported to attack the cotton crop right from germination till the final harvesting of the crop.

The pests have the potential to reduce yield by 20 to 80 per cent. Few of them are considered as key pests causing huge damage to cotton crop all over the country. The major

pests attacking on cotton are aphid, jassid, thrips, whitefly, mealybug , mite , red cotton bug and bollworm complex. The population of spider feeding on insect pests of cotton was observed throughout the growth period of the crop, being maximum in the month of July. Chrysopa was observed from second fortnight of June to harvesting of the crop being maximum in November.

The incidence of coccinellids was recorded from the middle of August to middle of September and remained till harvesting of the crop being maximum in the first fortnight of November. A positive significant effect of maximum and minimum temperature on spider and negative significant effect on population of chrysoperla and coccinellids was recorded. Evening RH exerted positive significant effect on spider and negative significant effect on coccinellids. (Dhaka and Bhanwarlal, 2007). To achieve the satisfactory suppression of these destructive insects pests, manipulating the sowing time, testing and evaluation of newer insecticides knowledge of seasonal incidence helps in planning need based application of insecticides.

Materials and Methods

Cotton variety AKA-8 was raised at 60 x 15cm geometry during third week of July 2014 in plot size of 10m x 10m providing all agronomic practices at Agricultural Research Sub-Centre, Achalpur, Dr.Panjabrao Deshmukh Krishi Vidyapeeth, Akola. Weekly observation was recorded on 10 randomly selected plants. Aphids, leaf hoppers, thrips, whitefly and mite population count was recorded on top, middle and bottom canopy of each plant. Dropping shoots/ drying top shoots due to top shoot borer were also recorded on 10 randomly selected plants. Average number of aphids, leaf hoppers, thrips, whitefly, & mite were calculated per leaf per plant. Percent infestation of plants due to top shoot damaged by spotted bollworm.

Total No. of green fruiting bodies (square, buds, flowers, and green bolls.) and those infested by bollworms, (spotted, American, pink) were recorded at weekly interval and workout the percentage infestation of bollworm (Spotted, American & Pink bollworm). Mealy bug population count was also recorded on 5cm tender twigs of cotton on 10 randomly selected plants and average out observation on 5cm twig per plant. The data recorded on weekly incidence of major pest is presented in table No.1

Results and Discussion

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 ^{o}C and max. temp. of 33.59 ^{o}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 ^{o}C and max. temp. of 34.16 ^{o}C with morning 93.71 % and evening 68.57 % humidity along with 2.20 mm rainfall. Incidence of leaf hoppers was initiated in 34thMw (0.2/ leaf) and thereafter continued up to 42ndmw 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^{o}C and max. temp. of 33.27^{o}C with morning 96.71 % and evening 87.43 % humidity along with 60.60 mm rainfall, finding in lined with Kadam *et al.,* 2015.

Table.1 Incidence of major pest of cotton and their bioagents with meteorolgical parameters during 2014-15

Sr. No.	MW	Date of Observation	Av. No. Sucking pest / leaves / pl					M.B. per 5cm twig/pl	Av. No. of Bioagent / pl.			Weather Parameters				
			A	LH	T	WF	M		LBB	Ch	SPI	Min. Temp	Max Temp	Hum (M)	Hum(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	-	-	5.8	-	-	0.6	-	-	31.99	33.59	95.86	78.86	10.00
5	33	18.08.14	8.4	-	0.2	1.8	-	-	5.5	-	-	31.90	34.16	93.71	68.57	2.20
6	34	25.08.14	1.8	0.2	0.3	1.9	-	-	1.3	-	-	32.27	34.07	86.00	69.57	0.20
7	35	01.09.14	1.3	0.4	0.4	2.1	-	-	1.7	-	-	32.20	33.46	95.57	80.86	27.00
8	36	08.09.14	2.2	0.9	0.6	0.9	-	-	1.4	-	0.4	31.87	33.27	96.71	87.43	60.60
9	37	15.09.14	3.3	0.9	0.5	2.4	-	-	1.1	-	0.2	31.67	32.57	97.57	92.14	125.20
10	38	22.09.14	2.2	0.8	0.5	2.7	-	-	1.2	-	-	31.79	33.59	96.14	79.14	0.00
11	39	29.09.14	0.7	0.4	0.3	2.1	-	-	0.6	-	0.2	32.41	34.69	86.00	67.57	0.00
12	40	06.10.14	0.5	0.3	0.4	2.6	-	-	0.2	-	0.3	31.79	35.09	91.14	54.14	0.00
13	41	13.10.14	0.7	0.3	0.3	3.1	-	-	0.2	-	0.1	31.83	35.10	89.71	52.43	12.00
14	42	20.10.14	0.2	0.3	-	1.8	-	-	-	-	-	31.64	34.60	90.86	55.71	4.20
15	43	27.10.14	0.2	-	-	2.5	-	-	-	-	-	31.51	34.43	92.14	58.86	0.00
16	44	03.11.14	0.3	-	-	3.1	-	-	0.1	-	0.1	30.33	33.53	87.29	54.43	0.00
17	45	10.11.14	0.4	0.2	-	3.5	-	-	0.2	-	0.3	30.09	34.59	83.29	40.57	0.00
18	46	17.11.14	0.5	0.3	-	3.6	-	-	0.3	-	0.3	30.26	34.43	77.14	40.71	0.00
19	47	24.11.14	0.4	0.2	-	3.1	-	-	0.3	-	0.2	30.96	33.67	92.43	60.57	18.00
20	48	01.12.14	0.3	0.1	-	2.6	-	-	0.3	-	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

NB: Pest population is of respective weeks while weather parameters are of previous week

Incidence of thrips was initiated in 33rdmw (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. Incidence of whitefly was first observed in 32nd MW (5.8/ leaf) and continued slowly increase and decrease steadily up to 48thmw. It was at its peak during 32nd MW (5.8 Nymph/leaf). Similar finding for sucking pest reported by Harde *et al.,* 2018.

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. Incidence of mite and mealy bug was not observed on cotton during the growing season.Boll worm damage was not observed on cotton during the growing season. Red cotton bug damage was not observed on cotton during the growing season.

Predator activity was observed throughout the season form 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. *Chrysopa* population was not observed on cotton during the growing season. 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. Similar finding reported by Chauhan *et al.,* 2017.

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