

RESEARCH PAPER

Seasonal incidence of sucking pests of okra along with natural enemies in Khandesh region of Maharashtra

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Studies on seasonal incidence of sucking pests of okra along with natural enemies were undertaken at research farm of Department of Agricultural Entomology, College of Agriculture, Dhule during *Kharif* 2015. A study on seasonal incidence of sucking pests was undertaken on *Kharif* crop, revealed that leafhoppers incidence reached its peak activity during the second week of September (23 leafhoppers/3 leaves/plant) whereas the peak incidence of aphids was noticed in the first week of September (43.3 aphids/3 leaves/plant). The peak incidence of the whiteflies was recorded during the second week of September (21 whiteflies/3 leaves/plant), whereas peak activity of predator lady bird beetle was reported during second week of September (26 lady bird beetle/plant), when the population of sucking pests was at its peak. The incidence of aphids ($r = 0.170$), whiteflies ($r = 0.287$) and leafhoppers ($r = -0.060$) do not show any significant correlation with maximum temperature. The minimum temperature showed positive non-significant correlation with leafhoppers ($r = 0.131$) and positive significant correlation with aphids ($r = 0.644^*$). The morning relative humidity showed positive non significant correlation with occurrence of the leafhoppers ($r = 0.454$), aphids ($r = 0.458$), whitefly ($r = 0.313$). Similarly, the evening humidity showed negative non-significant correlation with the pests such as leafhoppers ($r = -0.100$), aphids ($r = -0.223$) and whiteflies ($r = -0.339$) during *Kharif* 2015 season. The rainfall had non-significant effect at 5 per cent and 1 per cent level with whitefly, aphid and leafhopper.

Key words : Okra, Seasonal incidence, *Kharif*

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INTRODUCTION

Okra [*Abelmoschus esculentus* (L.) Moench] commercial vegetable crop, commonly known as okra in India. Vegetables form an essential component of human diet for maintenance of good health. India occupies an area of 533.00 thousand hectares with a production of 6346.00 thousand tones and productivity of 11.90 mt/ha. (Anonymous, 2015). In Maharashtra, okra is grown throughout the year providing continuous and good source of income to the farmers. Okra plants are attacked by twenty insect pests during different growth stages. The problems of pests in okra is more or less similar to that of

cotton crop. The major pests of okra are shoot and fruit borer and sucking pests. The sucking pests usually attack right from early seedling stage to last fruit harvesting. The important pests are aphid (*Aphis gossypii* Glover), leaf hopper (*Amrasca biguttula biguttula* Ishida) and whitefly (*Bemisia tabaci* Gennadius). Leafhopper attack causes the leaves to curl upward along the tip and margins and develop necrotic areas which extend over entire surface resulting in hopper burn. Nymphs and adults of aphids and whiteflies suck the cell sap causes reduction in vigour and photosynthesis of plants. Heavy infestation of sucking pests in young stage results in stunted growth and gradual death of the plants. Krishnaiah (1980)

reported that losses in okra due to leaf hopper (*Amrasca biguttula biguttula* Ishida) and fruit borer (*Earias vittella*) were 50-56 per cent and 49-74 per cent, respectively. Seasonal incidence is the study of growth and structure of population together with the factors that regulate their size and cause fluctuations in their density, abiotic factors (temperature, rainfall, relative humidity, light period and intensity etc.) are most important environment resistance factors that affects plant pests. Thus studies on population dynamics give us an idea of the environmental factors that regulate cyclic occurrence of the pest. The population dynamics helps in planning need based application of insecticides as it clearly reveals the peak activity as well as insect free periods during crop growth.

Okra and its pest complex forms “okra ecosystem” which also includes natural enemies living on these pests. The predatory insects like lady bird beetle, spider and aphid lion or green lacewing feeds on aphid and other soft bodied insects, which helps to control pests which feed on okra.

RESEARCH METHODOLOGY

The research work was carried out in *Kharif* season of 2015 at the experimental farm of Entomology Section, College of Agriculture, Dhule (Maharashtra). The experiment on seasonal incidence of sucking pest was

laid in Complete Randomized Block Design. The gross plot size was 4.00 m x 3.00 m. and replicated thrice. Spacing was adopted 45 cm x 30 cm. Okra seed of variety Hybrid NS-858 was sown by dibbling 2 to 3 seeds/hill. The sowing was done on 6th July 2015. The crop was grown under protective irrigation. To know the occurrence of various sucking pest on okra top, middle and bottom leaves were used on five tagged plots in each plot and for population density of natural enemies *viz.*, lady bird beetle (grubs and adults) made on plant basis on five randomly selected plants in each plot every week after germination of the crop in the field.

RESEARCH FINDINGS AND ANALYSIS

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Seasonal incidences of pests of okra :

Seasonal incidences 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 and predators was assessed and presented in Table 1.

Leafhopper (*Amrasca biguttula biguttula* ishida) :

The data on population of leafhopper presented in

Month	SMW	Aphid/3 leaves/plant	Leafhopper/3 leaves/plant	Whitefly /3 leaves/plant	Lady bird beetle/plant	Temperature (°C)		Relative humidity (%)		Rainfall (mm)
						Maximum	Minimum	Morning	evening	
July	27	00	00	00	00	36.7	26.6	67.1	36.4	0
	28	0.6	00	00	00	36.1	25.7	62.6	39.3	0
	29	2.1	1.8	1.0	00	33.7	20.2	73.1	55	2.6
	30	5.0	2.8	2.5	1.3	33.7	22.2	81.3	60.6	22.8
	31	5.2	3.5	3.23	2.3	32.1	23.1	75.6	57.6	51
Aug	32	15.2	9.5	6.1	4.5	31.3	23	88	59.6	18.6
	33	25.3	10.1	6.3	5.4	31.7	23.2	83.6	59.6	68.4
	34	32.0	11.0	8.32	8.0	33.7	21.6	82.6	47.9	0.4
	35	38.0	13.2	10.2	16.0	34.1	22.9	80	43.8	6.2
Sept	36	43.3	16.0	12.3	20.0	34.6	23.6	78.6	43.3	10.8
	37	38.2	23.0	21.0	26.0	33.9	23.6	82.7	51.9	39.8
	38	20.0	9.5	6.5	15.0	31.7	22.5	82.6	62.6	137.6
Oct	39	13.0	6.23	7.6	8.12	33.5	22	80	39.4	0
	40	4.56	6.5	6.0	4.5	35.2	22.2	80.3	39.9	5.4

*SMW= standard meteorological week

(The pest population is of respective week while weather parameters are of previous week)

Table 1. It is evident from the data that the occurrence of leafhopper commenced from 29th SMW and continued till 40th SMW which ranged from 1.8 to 23 leafhoppers/3 leaves/plant. The population was above ETL (2 nymph/leaf) during 30th SMW onwards. The incidence of leafhopper was gradually increased from third week of July 2015 (1.8 leafhoppers/3 leaves/plant) to second week of September (23 leafhoppers/3 leaves/plant). The population was decreased in next three week from 23 leafhoppers/3 leaves/plant to 6.5 leafhoppers/3 leaves/plant, due to the higher rainfall and maturity of crop. The present findings are in a conformation with that of Anitha (2007) who reported peak incidence in Sept- Oct. Senapathi and Khan (1978) also obtain similar results.

Aphid (*Aphis gossypii glover*) :

The data on population of aphids is presented in Table 1. It indicates that aphid population was commenced from 28th SMW and continued till 40th SMW which ranged from 0.6 to 43.3 aphids/3 leaves/plant and exist in the field with 4.56 aphids/3 leaves/plant during 40th SMW. However, the highest peak activity (43.3 aphids/3 leaves/plant) was recorded in 36th SMW coinciding with the second week of September. There was a gradual decreased in aphid population upto third week of September and subsidized next two weeks. Anitha (2007) studied the seasonal incidences of pests of okra and observed that the incidence of aphid was highest in October and these results are in confirmation with present investigation.

Whitefly (*Bemisia tabaci Gennadius*) :

The data on population of whiteflies are presented in Table 1 revealed that the pest commenced from third week of July 1.00 whiteflies/3 leaves/plant and gradually increased upto second week of September (*i.e.* 21 whiteflies/3 leaves/plant). There was a gradual decrease in population in third week of September and subsidized next two weeks. The existed maximum and minimum

temperature, morning and evening relative humidity and rainfall are 33.9 and 23.6 (°C), 82.7 and 51.5 (%) and 39.8 (mm), respectively in 37th SMW. Kumavat *et al.* (2000) reported that the whitefly infestation started in last week of July and reached its peak in 2nd week of September. Present results are in confirmation with their findings. Similar results are also reported by Meena *et al.* (2010 a and b).

Seasonal incidence of natural enemy :

The data on population of lady bird beetle per plant are presented in Table 1. The population of lady bird beetle was noticed during fourth week of July then it gradually increased from fourth week of July (1.3 lady bird beetle/plant) to second week of September (26 lady bird beetle/plant). Then after third week of Sept. to subsidized next two week. The population of lady bird beetle was directly dependent upon the incidence level of aphid, leafhoppers and whitefly in field. Present findings are very close to that of Anitha and Nandihalli (2008).

Correlation of weather parameters with sucking pests of okra :

The data on average population of aphids, leafhoppers and whiteflies 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. These are narrated in Table 2. The correlation between incidence of aphids (*r* = 0.170) and whiteflies (*r* = 0.287), were positively non-significant with maximum temperature (T max). The incidence of leafhoppers (*r* = -0.060), was negatively non significant correlated with maximum temperature.

The minimum temperature showed positive non-significant correlation with leafhoppers (*r* = 0.131) and positive significant correlation with aphids (*r* = 0.644*).

The morning relative humidity showed positive non-significant correlation with occurrence of the leafhoppers

Pests	Correlation co-efficient values (r)				
	Temperature (°C)		Relative humidity (%)		Rainfall (mm)
	Maximum	Minimum	Morning	Evening	
Leafhoppers	-0.060	0.131	0.454	-0.100	0.087
Aphids	0.170	0.644*	0.458	-0.223	0.076
Whiteflies	0.287	0.595*	0.313	-0.339	-0.012

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

($r = 0.454$), aphids ($r = 0.458$), whitefly ($r = 0.313$). Similarly, the evening humidity (ERH) showed negative non-significant correlation with the pests such as leafhoppers ($r = -0.100$), aphids ($r = -0.223$) and whiteflies

($r = -0.339$) during *Kharif* 2015 season. The rainfall had non-significant effect at 5 per cent and 1 per cent level with whitefly, aphid and leafhopper.

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