Seasonal Incidence and Relation to Weather Parameters of Aphid and their Natural Enemies on Okra

Nisha Shukla

Department of Zoology, Govt. T. R. S. College, Rewa (M. P.)

Abstract- The periodic incidence of different sucking pests on okra during the crop season was significant at different period of crop growth. The period mean revealed that the aphid population was reached to its peak level (27.17 aphids / 3 leaves) during 14th weeks after sowing (first week of July). The aphids were considered as sucking insect pests. The population of aphids was more abundant on the crop during June and July 2011. Results revealed that maximum activity was recorded during July and the correlation studies were made between the incidence of major sucking insect pests and select weather parameters. Aphids showed positive correlation with rainfall (r = 0.261) and negative correlation with both maximum and minimum temperature. Aphids showed positive correlation with relative humidity.

Index Terms- Aphids, Okra, and Sucking Pests.

I. INTRODUCTION

Agriculture is the backbone of the Indian economy because 75% of India's population depends on agriculture or agroindustries for livelihood. However, it is disheartening to know that India's economic growth is not keeping up with the expectations because its agricultural growth is lagging behind .The major crops of India are categorized into Cereals, Oilseeds, Pulses, Vegetables and Fruits (Dhaliwal, *et al.,* 2010).

Bhindi [*Abelmoschus esculentus* (L) *Moench*] is one of the popular vegetable of common man, cultivated in India for its immature fruits. It is noted for its rich iron content and nutritive value. Okra is attacked by number of insect pests and mites, during different growth stages and seasons. The major pests of okra include aphid, Coccinellids and Chrysoperla. Among these, aphids, *Aphis gossypii* is a polyphagous sucking pest and also found damaging okra all over India. It also acts as vector of virus and transmits mosaic, leaf curl etc. (Butani and Verma, 1976).
In this paper we can study the seasonal incidence and relation to weather parameters of aphid and their natural enemies on okra ecosystem.

II. MATERIALS AND METHODS

Field trial was conducted at Rewa Madhya Pradesh during 2011. The experiment was laid out in randomized block design in four replications with a plot size of 3.6 m x 3.6 m. Observations on the pest activity were recorded in weekly interval. To record the observation of sucking pest populations, five plants per plot were randomly selected and from each randomly selected plant three leaves each from the top, middle and lower part were observed. The data was statistically analyzed by correlation analysis between weather parameters and sucking pests.

III. RESULTS AND DISCUSSION

Okra plays a vital role in the daily intake of our food. It has good nutritional value particularly high content of calcium (90 mg/100 g) and vitamin C (30 mg/100 g). There is a need to increase its production to eliminate disorders caused by dietary deficiencies prevalent among poor masses of our country. One of the limiting factors in production of okra is the damage caused by insect pests. (Salim, 1999)
The experimental results of the investigations carried out on seasonal incidence of sucking aphid of okra and their natural enemies.

Seasonal incidence of aphid (*Aphis gossypii*)
The activity of aphids on okra crop sown during fourth week of March 11 (summer crop) started in the first week of April 11 (6.01 aphids / 3 leaves). There was a gradual increase in aphid population and reached a peak during first week of July 11 (27.17 aphids / 3 leaves). Again from sixteenth week of sowing population started declining and reached to a lowest population of 1.21 aphids / 3 leaves at last week of July 11. (Table 1)
Dugger and Richter, 1998 reported that peak incidence of aphids were noticed in 21 st July on cotton crop in California. The results are in line that reported by Dhamdhere *et al.,* 1984, as he reported peak population of A. gossypii in last week of June.

Influence of weather parameters on sucking aphids and natural enemies
Correlation coefficient between different weather parameters and population of sucking aphids and their natural enemies revealed that, maximum temperature recorded. Maximum temperature showed significant negative correlation with population of aphid, correlation coefficient of r = -0.456. Minimum temperature showed a significant negative correlation with population of aphid (r = -0.250). Maximum and minimum temperature showed significant negative correlation with population of *Coccinellids,* correlation coefficient of r = -0.322 and -0.449 respectively, and Maximum and minimum temperature showed significant negative correlation with population of *Chrysoperla*, correlation coefficient of r = 0.147 and -0.530 respectively. (Table 2)
Observation between population of aphids and their natural enemies (*Coccinellids* and *Chrysoperla)* related to humidity in morning +0.295, -0.043 and 0.462 and afternoon +0.401, -0.099, -0.281 respectively.

Sarvendra, *et al.,* 2005 reported that temperature and relative humidity had a role in seasonal fluctuation of aphids and their natural enemies on brinjal.

Table 1- Number of Aphids / 3 leaves

Months/Year	Standard weeks	Crop	Leaf	Aphids
Summer Crop April 2011	14 15 16 17 18	2 3 4 5 6	3.11 3.17 3.13 3.69 3.77	6.01 9.11 10.13 10.01 10.11
May 2011	19 20 21 22	7 8 9 10	3.96 5.49 9.71 9.13	12.37 11.41 17.56 19.43
June 2011	23 24 25 26	11 12 13 14	9.81 14.13 16.69 16.99	19.41 19.91 20.16 27.09
July 2011	27 28 29 30 31	15 16 17 18 19	16.94 16.17 13.13 9.61 4.13	27.17 14.11 6.13 3.12 1.21

Table 2 – Relationship of weather parameters with sucking pest of Okra and their natural Enemies

Sucking pest / natural enemies	Correlation coefficient values (r)					R^2	Regression equation
	Temperature °C		Relative Humidity (%)		Rainfall (mm) (X5)		
	Max. (X1)	Min. (X2)	Morning (X3)	Afternoon (X4)			
Aphids	-0.456[**]	-0.250	+0.295[*]	+0.401[**]	+0.261[*]	0.263[*]	Y=40.31-5.49 X1-8.54 X2 - 7.40X3+3.81 X4 + 3.55 X5
Coccinellids	-0.322[*]	-0.449	-0.043	-0.099[*]	+0.212	0.318[**]	Y=9.21-1.39 X1-9.01 X2-1.15 X3-1.18 X4 - 3.22 X5
Chrysoperla	+ 0.147	-0.530[**]	-0.462[**]	-0.281[*]	+0.382[**]	0.402[**]	Y=2.83+3.07 X1-5.08 X2-1.79 X3+1.82 X4 - 4.29 X5

N = 52

** - Significant at 1 %

* - Significant at 5 %

IV. CONCLUSION

Investigations were carried out to study the seasonal incidence of sucking aphid complex on okra and their natural enemies. Seasonal incidence of sucking aphid on okra revealed that on summer crop peak aphid populations were recorded during first week of July. Correlation coefficient between different weather parameters and population of sucking aphid revealed that, maximum temperature recorded significant negative correlation with population of aphid. Correlation coefficient of minimum temperature with population of aphid and *Chrysoperla* was negative and significant. Morning relative humidity had significant positive correlation with aphid and where as significant negative correlation with *Chrysoperla*. Aphid and *Chrysoperla* showed positive correlation and negative correlation with afternoon relative humidity respectively.

REFERENCES

[1] Butani, D. K. and Verma, S. 1976. Insect-pests of vegetables and their control-3: Lady's finger. *Pesticides*. 10(7): 31-37.

[2] Dhaliwal, G.S., Jindal, V. and Dhawan, A.K. 2010. Insect Pest Problems and Crop Losses: Changing Trends. *Indian J. Ecol*. 37(1): 1-7.

[3] Dhamdhere, S. V., Bahudur, J. and Misra, U. S. 1984. Studies on occurrence and succession of pests of okra at Gwalior. *Indian J. Pl. Prot*. 12(1): 9-12.

[4] Dugger, S. B. and Richer, D. 1998. Mid season cotton aphids infection in California, effect on cotton yield. Proceeding of beltwise cottan conference. 1056-1058.

[5] Salim, M. 1999. Diversity: Role in integrated pest management. *Sci. Tech. Dev*. 18(4): 26 31.

[6] Sarvendra S. Akhilesh K. and Awasthi, B. K. 2005. Study of Sucking and leaf feeding insect in relation to weather parameters on the brinjal crops. *Veg. Sci*. 32(2): 210-212.

AUTHORS

First Author – Nisha Shukla, M.Phil., Department of Zoology, Govt. T. R. S. College, Rewa- nishatusha07@gmail.com

Correspondence Author – Nisha Shukla, email- nishatusha07@gmail.com, jayse25@gmail.com, +919424982602