

Seasonal abundance of aphids and their natural enemies on lucerne

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Studies on seasonal abundance of aphids and their natural enemies in relation to the climatic factors were undertaken on lucerne crop during 2002-03. Average number of lucerne aphids and predators per tiller showed increasing trend from September 2002 with its maximum level at the middle of January 2003. Thereafter, decreasing trend was noticed. The aphid population was negatively correlated with maximum and minimum temperature and positively correlated with lady bird beetles and *Chrysopa* larval population. The abundance of lady bird beetles and *Chrysopa* larval population was found at its maximum level during January, 2003, then after it started declining.

Key words : Lucerne, Aphids, Predators, Lady bird beetles, *Chrysopa*.

INTRODUCTION

Lucerne (*Medicago sativa* L.) called as alfalfa is a cultivated fodder crop. It is originated in South Western Asia and presently grown all over the world (Martin and Leonard, 1976). In India, it was introduced in 1900's and in Maharashtra, it is known as *lasun ghas*. Lucerne is the highest in feeding and contains 5 times as much protein as sorghum fodder and ample quantity of vitamin 'A'. It is also high in mineral content and contains at least 10 different vitamins. Lucerne green fodder contains 20.2 % crude protein, 16.2 % digestible crude protein, 30.1% crude fibre, 1240 g calcium/100 kg, 350 g phosphorous /100 kg and metabolic energy 2.17 M cal/kg (Banerjee, 1978). Due to its herbaceous nature and favourable temperature and humidity, the pests have enormous scope to perpetuate and build up their population on it. Lucerne suffers damage both qualitatively and quantitatively by aphids (*Acyrtosiphon pisum* Harris, *Acyrtosiphon kondoi* Shinjii and *Therioaphis trifolii* F. (Martin and Leonard, 1976). The quantitative losses recorded in India are about 37.7 % due to insect pests in lucerne (Shri Ram and Gupta, 1989).

Various natural enemies occur on lucerne aphid. The most important are Coccinellid predators including *Coccinella septempunctata* L., Syrphids, *Coccinella* sp. and *Chrysoperla carnea* Steph. (Kesten, 1975). No work seems to have been done on any aspect of pests infesting lucerne in Maharashtra. Therefore, it was felt necessary to study population fluctuation of aphids in relation to meteorological parameters and predators.

MATERIALS AND METHODS

The experiment was conducted on the farm of All India Coordinated Research on Forage Crops Project, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar, Maharashtra from January, 2002 to February, 2003 on perennial lucerne variety RL-88. The crop was one year old. Ten tillers of lucerne were randomly selected for recording observations on seasonal fluctuation of aphids and their predator population on lucerne. From the observations of tagged tillers, average population per tiller was calculated. The observations were taken at early in the morning at an interval of 15 days. Fortnightly meteorological data were obtained from the Meteorological Observatory located at Central Campus, M.P.K.V. Rahuri. The data of the seasonal fluctuation of aphids and their predators were statistically analysed for studying the correlation of number of aphids with meteorological parameters such as maximum and minimum temperature, morning and evening relative humidity, rainfall and predators viz., lady bird beetles and *Chrysopa* larvae.

RESULTS AND DISCUSSION

The data pertaining to the average number of aphids and their predators per plant from January, 2002 to February 2003 are given in Table 1. It is revealed that the aphid population was in increasing trend from the beginning of observation (0.8 aphid/tiller) to the middle of February, 2002, (2.2 aphids/ tiller). Thereafter, very less aphid population per plant was recorded up to the beginning of September 2002. During this period, population of predators was recorded very less. The infestation of

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Table 1: Population fluctuation of pests and their natural enemies on Lucerne in relation to climatic and biotic factors

Date	No. of aphids/ tiller	Natural enemies/ tiller		Weather data				
		Lady bird beetles	<i>Chrysopa</i> larvae	Temperature		Humidity		Rain fall (mm)
				Max. ($^{\circ}$ C)	Min. ($^{\circ}$ C)	Morn. (%)	Even. (%)	
01.01.02	0.8	0.1	-	27.1	8.6	87.0	36.0	-
16.01.02	1.1	0.2	-	28.2	7.3	85.0	35.0	-
01.02.02	2.2	0.4	-	29.5	10.8	86.0	36.0	8.7
16.02.02	0.7	0.2	-	33.5	12.8	82.0	33.0	-
01.03.02	0.2	0.1	-	34.0	14.2	59.0	25.0	-
16.03.02	0.3	0.0	-	35.2	19.1	56.0	20.0	-
01.04.02	1.5	0.3	-	36.9	21.3	56.5	21.0	24.0
16.04.02	5.4	0.8	-	38.3	23.7	50.0	24.0	-
01.05.02	1.0	0.2	-	39.6	23.0	67.5	35.0	1.8
16.05.02	0.0	0.0	-	37.5	22.2	84.0	51.0	4.5
01.06.02	0.0	0.0	-	35.5	21.1	88.0	54.0	86.8
16.06.02	0.0	0.0	-	30.1	14.6	83.0	65.0	81.7
01.07.02	0.0	0.0	-	32.0	19.4	80.0	49.0	-
16.07.02	0.8	0.1	-	30.2	21.9	84.0	60.0	11.2
01.08.02	3.2	0.8	-	29.2	22.0	89.0	67.0	105.1
16.08.02	3.2	0.8	-	29.2	21.0	90.0	62.0	43.9
01.09.02	2.8	0.6	-	30.6	20.2	90.0	57.0	35.5
16.09.02	5.8	1.7	-	31.9	19.8	92.0	51.0	43.0
01.10.02	6.7	1.9	-	33.9	19.5	87.0	43.0	-
16.10.02	14.4	2.3	0.9	32.1	14.5	86.0	33.0	-
01.11.02	20.4	2.5	1.2	31.0	12.4	83.0	30.0	-
16.11.02	26.2	3.2	1.6	30.9	10.9	70.0	31.0	-
01.12.02	72.6	4.7	2.3	30.8	11.0	75.0	35.0	-
16.12.02	92.6	6.2	2.0	30.3	9.2	84.0	31.0	-
01.01.03	143.7	10.9	2.8	28.8	12.2	89.0	37.0	-
16.01.03	223.6	11.1	3.7	30.9	10.9	78.0	33.5	-
01.02.03	90.2	5.2	1.3	31.6	13.3	82.0	35.0	-
16.02.03	20.3	2.3	0.0	33.0	15.2	83.0	37.0	-

aphids from middle of September, 2002 (5.8 aphids/ tiller) onwards increased steadily and continuously upto the middle of November, 2002 (26.2 aphids/ tiller). Thereafter, the aphid population started increasing at very fast rate and the infestation reached at its peak in the middle of January, 2003 (223.6 aphids/ tiller). The population of lady bird beetles and *Chrysopa* larvae also increased gradually from the middle of September, 2002 and reached at their

peak in middle of January, 2003. Thereafter, the population of aphids and their predators showed decreasing trend.

The correlation studies of aphid population with meteorological parameters and predators (Table 2) revealed that the infestation of aphids was negatively and significantly correlated with minimum temperature and positively correlated with morning relative humidity. Also, it was highly significant and positively correlated with both

Table 2 : Relationship of various weather parameters with abundance of aphids, Coccinellid predators and *C. carnea* larvae

Variable	Aphids	Lady bird beetles	<i>C. carnea</i>	Temp. Max. (°C)	Temp. Min. (°C)	Hum. Morn. (%)	Hum. Even. (%)	Rain fall (mm)
Aphids	-	+0.965**	+0.948**	-0.250	-0.43*	+0.084	-0.22	-0.257
Lady bird beetles	+0.965**	-	-	-0.292	-0.449*	+0.144	-0.230	-0.275
<i>Chrysoperla carnea</i>	+0.948**	-	-	-0.290	-0.514**	+0.076	-0.274	-0.298

* Significant at 5 % level (p= 0.05)

** Significant at 1 % level (p= 0.01)

predators viz., lady bird beetles (+ 0.965**) and *Chrysopa* larval population (+0.948**). Hence, with decrease in minimum temperature and increase in morning relative humidity, there was a corresponding increase in the aphid population. This increase in aphid population resulted in the increase of their predators.

Various research workers carried out the work on seasonal infestation of lucerne aphids. Kushwaha and Sharma (1968) reported that the temperature and humidity play an important role in the seasonal infestation of lucerne aphids. It was observed by Upadhaya *et al.* (1981) that the low temperature and high relative humidity in the month of January and February favoured the high build up of aphids and their predators on safflower. Sharma and Yadava (1994) reported that the population of bean aphid (*A. craccivora*) reacted sharply to changing factors like temperature and relative humidity. Corvalho *et al.* (1996) found that the population of *T. trifolii* was greatest at about 25°C while *Acyrtosiphon* spp. occurred at about 18°C. The present results are partially in corroboration with those of above workers.

REFERENCES

Banerjee, G.C. (1978). Principles of animal nutrition and feeding practices. Chpt., *Animal Feed stuffs.*, 1-20.

Carvalho, A.R., Bueno, V.H.P. and Mendes, S. (1996). Influence of climatic factors and cutting plants on aphid population in lucerne. *Pesquisa Agropecuaria Brasileira.*, **31 (5)** : 317-324.

Kesten, L.A. (1975). Insect enemies of the lucerne aphid. *Zashchita Rastenii*, **11**: 287.

Kushwaha, K.S. and Sharma, I.C. (1968). Studies on seasonal incidence of insect population in lucerne and effect of insecticides. *Madras agric. J.*, **55 (6)** : 265-270.

Martin, J.H. and Leonard, W.H. (1976). Principles of field crop production. Chpt. Legume MacMillan Publ., New York : 577-644.

Sharma, R.P. and Yadav, R.P. (1994). Population dynamics of bean aphid (*Aphis craccivora* Koch.) and its predatory coccinellid complex in relation to crop type and weather conditions. *Indian J. Ent. Res.*, **18 (1)** : 25-36.

Shri Ram, and Gupta, M.P. (1989). Integrated Pest Management in Forage Crop. Nat. Symp. on Strategy for Forage Production and Improvement by 2000 A.D. Sept. 21-23, 1989 held at KAU Trivendrum, pp. 113-116.

Upadhyay, V.R., Kaul, C. L. and Talati, G.M. (1981). Seasonal incidence of safflower aphid and coccinellids in relation to weather conditions. *Indian J. Pl. Prot.*, **8 (2)** : 117-121.

