

Population dynamics of aphid, *Lipaphis erysimi* (Kalt.) and predators on cabbage

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ABSTRACT

The studies on population dynamics of aphid, *Lipaphis erysimi* (Kalt.) on cabbage indicated that the infestation of aphid, *L. erysimi* commenced in the 1st week of December with the population of 10.60 per plant. Thereafter, population increased gradually and reached to peak of 281.20 aphids per plant during 2nd week of February. The aphid population was gradually decreased towards the maturity of the crop. Correlation studies indicated that aphid population exhibited non-significant negative correlation with maximum temperature, wind velocity and mean bright sunshine hours. While minimum temperature, morning relative and evening relative humidity showed non-significant positive correlation with pest population. The population of aphids showed significant positive correlation with coccinellid beetles.

Key words : Cabbage, Aphid, *L. erysimi*, Predator and population

INTRODUCTION

Cabbage is one of the important cruciferous leafy vegetables and cultivated in all five continents including Asia. The crop is attacked by 375 species of insects (Oatman and Planter, 1969). Among these pests, the aphids cause qualitative as well as quantitative losses to the cabbage in Saurashtra region and have been observed as the most destructive and regularly occurring sucking pest throughout the World (Sharma and Bhalla, 1964). The estimated loss in yield due to aphid, *Lipaphis erysimi* (Kalt.) in cabbage crop was reported 47.1 to 96.0 per cent (Bakhetia, 1986 and Suri *et al.*, 1988).

MATERIALS AND METHODS

An experiment was conducted at College of Agriculture, Junagadh Agricultural University, Junagadh during *Rabi* season of 2006-07. The crop was transplanted in a block size of 18 m x 18 m keeping the spacing of 45 cm x 30 cm. The plot was divided into 10 equal quadrates and from each quadrate, five plants were selected randomly for recording the observations. The observations of aphid population were recorded starting from one week after transplanting till harvest of the crop. Population of aphids and natural enemies were recorded from 3 leaves *i.e.* top, middle and bottom at weekly interval on standard meteorological week basis. Finally, average population of pest and natural enemies per five plants was worked out. With a view to study the impact of weather parameters on the pest, a simple correlation between pest population and weather parameters was worked out.

RESULTS AND DISCUSSION

The results obtained from the present investigation

are summarized below :

Incidence of aphids :

The data presented in Table 1 revealed that the population of aphid ranged from 10.60 to 281.20 per plant. The incidence of aphids started from 49th standard week (1st week of December). The average population recorded was 10.60 aphids per plant of cabbage. The aphid population increased gradually and attained its peak of 281.20 per plant in 6th standard week (2nd week of February). Thus, the pest was active throughout the crop period.

Chandra and Kushwaha (1988) observed the highest incidence of *L. erysimi* from mid January to end of February on cabbage. Bhavani and Punnaiah (2006) reported the peak of aphid, *L. erysimi* (138.3 aphids/plant) during mid February on cabbage. Thus, the present findings are in accordance with earlier reports.

Population build-up of natural enemies :

During the present investigation, coccinellid beetles *viz.*, *Coccinella septempunctata*, *C. transversalis* and *Menochilus sexmaculatus* were observed. The data presented in Table 1 revealed that the population of coccinellid beetles ranged from 1.60 to 15.30 per five plants. The coccinellid beetles started from 1st standard week (1st week of January), with an average population of 1.60 beetles per five plants of cabbage and population increased gradually to the peak of 15.30 per five plants in 6th standard week (2nd week of February).

The population dynamics of coccinellid beetles indicated that its population increased gradually with the increase of aphid population and decreased gradually with the decrease in aphid population. In India, *C. septempunctata* has been reported as an important and one of the most effective predators of mustard aphid, *L.*

Table 1: Population dynamics of aphid, *L. erysimi* and their natural enemies on cabbage during Rabi, 2006-07

Month and week	Standard week	Date of observation	Mean no. of aphids/ plant	Average* no. of coccinellids/five plants
December - I	49	09-12-2006	10.60	0
December - II	50	16-12-2006	16.96	0
December - III	51	23-12-2006	22.18	0
December - IV	52	30-12-2006	30.34	0
January - I	1	06-01-2007	36.78	1.60
January - II	2	13-01-2007	60.30	2.10
January - III	3	20-01-2007	91.12	4.00
January - IV	4	27-01-2007	118.24	5.20
February - I	5	03-02-2007	145.24	9.10
February - II	6	10-02-2007	281.20	15.30
February - III	7	17-02-2007	175.36	11.20
February - IV	8	24-02-2007	108.94	8.20
March - I	9	03-03-2007	64.04	6.50
March - II	10	10-03-2007	31.80	4.10
March - III	11	17-03-2007	14.88	2.50

* = Consolidated population of *C. septempunctata*, *C. transversalis* and *M. sexmaculatus*

Table 2 : Correlation co-efficient between aphid population and biotic and abiotic factors (weather parameters) on cabbage (cv. GOLDEN ACRE) during Rabi, 2006-07

Biotic factor	Abiotic factors (Weather parameters)						
	Temperature ($^{\circ}$ C)		Relative humidity (%)		Wind velocity (km/hr)	Mean bright sunshine (hrs/day)	
	Maximum	Minimum	Morning (08:00)	Afternoon (14:00)			
Coccinellid beetles	X_1	X_2	X_3	X_4	X_5	X_6	
	X_0						
	0.8988*	-0.1010	0.1051	0.3878	0.0843	-0.2440	-0.3750

(n= 15)

erysimi and is abundant in February and March (Khurana, 1986; Atwal and Dhaliwal, 1999).

Correlation studies between aphid population and weather parameters :

The correlation coefficient values between aphid, *L. erysimi* population and abiotic factors *i.e.* various weather parameters are presented in Table 2. The data revealed that aphid population exhibited non-significant negative correlation with maximum temperature ($r=-0.1010$), wind velocity ($r=-0.2440$) and mean bright sunshine hours ($r=-0.3750$). While its correlation with minimum temperature ($r= 0.1051$), morning relative humidity ($r= 0.3878$) and afternoon relative humidity ($r= 0.0843$) was found positively non-significant. Roy (1975) concluded that population build-up of mustard aphid, *L. erysimi* was independent of the effect of abiotic factors. Similar observations were also reported by Saharia (1984) and Chandra and Kushwaha (1988).

Correlation studies between *L. erysimi* and coccinellid beetles :

The correlation coefficient values presented in Table

2 indicated that the populations of aphid showed significant positive correlation with coccinellid beetles ($r=0.8988$). Thus, it can be stated that the population of coccinellid beetles was increased with increased population of aphid. Chandra and Kushwaha (1988) and Kalra (1988) also observed a strong positive correlation between *C. septempunctata* and population of *L. erysimi*.

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