GAU Res. J. 1995. 21 (1) : 193-196

Population Dynamics of Aphid (*Aphis gossypii* Glover) on Coriander in Relation to Ecological and Biological Parameters

L. V. Ghetiya and P. G. Butani

Department of Entomology, College of Agriculture, Gujarat Agricultural University, Junagadh Campus, Junagadh-362 001

Coriander (*Coriandrum sativm* Linnaeus) commonly known as *Dhania* is an important spice crop. The entire young plant is used in preparing of chutney whereas, the leaves are used for flavouring the curries, sauces and soups. Dry fruits are extensively used in the preparation of curry powder, pickling spices, sausages, seasoning and *dhanadal*. Among the insect pests, aphid is the most predominant one and reduces the yield of coriander fruits to a tune of 5.30 q/ha (Mittal and Butani, 1989). The ecological approach to the pest managerment suggests the use of pesticides only when and where necessary. It has become therefore, absolutely imperative that a fresh approach to pest management be undertaken by studying its population fluctuations in relation to ecological factors.

In order to determine the population fluctuations of aphids, the crop was seeded in November, 1990 at the College Farm, College of Agriculture, Junagadh. Five quadrates of 2 x 2 square meter were randomly fixed in coriander field. Absolute population of aphids was recorded from 25 randomly selected and tagged plants from each quadrate. The population of aphids was recorded till the harvest of the crop. The population of aphids was estimated by adopting zero to four grade through the observations made on leaves, twigs and umbels. The following indices were fixed for estimation of population :

Indices	Description
0	Plant free from aphids.
1	Aphids present but colonies did not build up. No injury due to pest apparent on the plant.
2	Small colonies of aphids were present.
3	Large colonies of aphids were present on tender parts, in colonies where counts of aphids were possible and tender plant parts showed the damage symptoms dut to aphids.
4	Entire plants were covered by aphids. Counts of aphids in colonies were impossible and plants showed the damage symptoms due to aphids.

The average aphid grade was worked out by adopting the following formula :

TABLE 1

Effect of abiotic and biotic factors on population of *A. gossypii.*

Standard week	*Date of observation*	*Av. aphid population (Grade/Plant)*	*Av. population of adults and larvae of cocoinellid predators+ (No./Sqm)*	*Temperature (C°)*		*Relative humidity (%)*		*Sunshine (hrs)*
				Min.	*Max.*	*Min.*	*Max.*	
49.	09-12-1990	0.08	00.00	15.9	32.8	36	74	8.3
50	16-12-1990	0.20	00.00	10.3	31.0	23	75	9.2
51	23-12-1990	0.52	00.00	12.9	29.6	26	63	9.3
52	30-12-1990	1.16	00.20	11.6	29.4	28	71	8.5
1	06-01-1991	1.40	02.60	5.0	24.7	17	64	9.2
2	13-01-1991	1.92	07.00	9.8	16.4	26	55	9.5
3	20-01-1991	2.08	12.00	10.0	28.1	13	40	9.7
4	27-01-1991	2.56	16.40	12.6	34.5	19	69	9.7
5	03-02-1991	2.12	18.20	18.6	31.0	25	77	9.5
6	10-02-1991	1.76	18.00	13.6	33.5	25	71	9.7
7	17-02-1991	1.76	08.80	12.4	28.2	18	43	8.5
8	24-02-1991	0.08	00.00	13.0	31.3	23	65	8.7
9	03-03-1991	0.00	00.00	15.5	32.6	21	66	9.9
Correlation			0.8486**	-0.1474	-0.1465	-0.3918	0.2340	0.4496

** Significant at 1 per cent level.

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

$$\text{Average aphid grade per plant} = \frac{0N + 1N + 2N + 3N + 4N}{\text{Total number of plants observed}}$$

Where 0 1 2 3 4 are the aphid indices

N : Number of plants showing respective aphid index.

The population of coccinellid predators was also recorded. The weather parameters viz., temperature, relative humidity and sunshine hours were also recorded.

Seasonal abundance and population fluctuations of aphids on coriander crop from 25 randomly selected plants of coriander field (Table 1) revealed that the infestation of aphids on coriander commenced in the second week of December and the population increased up to the last week of January. The highest population was observed during the month of January and February. The pest population assumed its peak from quite a few to 2.56 grade/plant on 27th January, 1991 and thereafter it continued to decline up to the crop harvesting time.

The coccinellid predators viz., *Coccinella septempunctata*. Linnaeus *C. transversalis*, Fabricius and *Menochilus sexmaculatus*, Fabricius appeared on the crop in the last week of December and maintained their increasing trend up to the first week of February. Thereafter the population of coccinellid predators declined and the decreasing trend continued up to the last week of February, where coccinellids totally disappeared.

Ecological parameters

The results (Table 1/Figure 1) revealed that the pest was able to multiply rapidly even at the low temperature. The results clearly indicated that among the different weather

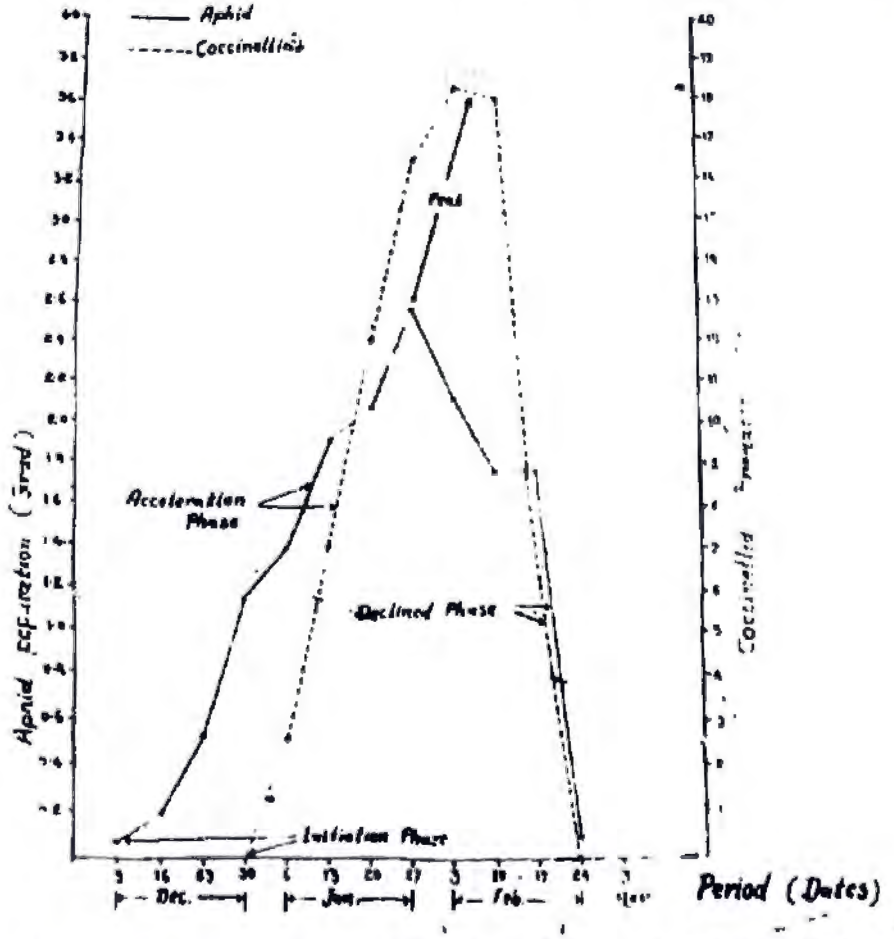

Fig. 1. : Population fluctuation of aphids in relation to biological parameters.

parameters, the maximum and minimum temperature and minimum relative humidity had negative effect on the population of aphids. The maximum relative humidity and sunshine hours had positive effect on population of aphids. The correlation studies have clearly indicated that the aphid population was found to increase with decrease in minimum temperature. The increasing trend of mixmum temperature had shown the decreasing trend of population of aphids from the last week of January to the last week of February. The other weather parameters have no marked effect on the population. The correlation study between aphid population and physical factors indicated the nonsignificant effect on population of the aphids. Becquer and Ferrandiz (1983) reported that the population of aphids in bean was found to be negatively correlated with relative humidity. Araujo and Sales (1985) claimed that the population dynamics of *A. gossypii* on cotton were not affected by the minimum, maximum or mean temperature. They also reported that the increase in population has been favoured by sunshine. Thus, the present findings are more or less similar to that of earlier workers.

Biological parameters

An attempt was also made to understand the role of coccinellid predators on population fluctuation of the aphids on coriander crop. The coccinellid predators were found to appear after three weeks from the incidence of *A. gossypii* on coriander crop. The study clearly indicated that the population of coccinellid predators had positive effect on the population of aphids. The correlation studies have clearly indicated that the population of coccinellid predators was found to increase with the increased population of aphids initially. Thenafter, the population of aphids decreased suddenly from 2.56 aphid grade. The highest population of aphids was observed in the last week of January, while the highest population of coccinellid predators was recorded in the first week of February. Thereafter, the population of both predators as well as their host declined. The population of coccinellid predators and aphids showed the highly significant positive correlation. Gravena *et al.*, (1976) also reported that the population of coccinellid predators was positively correlated with the aphids. Chandra and Kushwaha (1987) reported that the predators *C. septempunctata* and *M. Sexmaculatus* actively suppressed the pest population after two to four weeks of their incidence. Thus, the present findings are more of less similar to that of earlier workers.

(Received on 6th April, 1994)

REFERENCES

Araujo, P. A. C. and Sales, F. J. M. (1985). Influence of climate and phenology of cotton on aphid population dynamics. *Fitossanidae* **619** : 57-72.

Becquer, H. A. and Ferrandiz, P. R. (1983). Population dynamics of aphid population in fields of beans (*Phaseolus vulgaris* L.) *Ciencias de la Agriculture Cuba* **8** : 23-28.

Chandra, S. and Kushwaha, K. S. (1987). Impact of environmental resistance on aphid complex of cruciferous crops under the agro climatic-conditions of Udaipur, II : Biotic components. *Indian J. Ent.*, **49** (1) : 86-113.

*Gravena, S. Rocha, A. D., Da and Marconant, A. R. (1976). Influence of application methods of insecticides on the population of predacious coccinellids and on the control of some cotton pests, *Cientifica* **4** (3) : 231-235.

Mittal, V. P. and Butani, P. G. (1989). Evaluation of some insecticides against coriander aphid (*Hyadaphis coriandari* Das) Abstract : First National Seminar on Seed Spices, Jaipur, 24–25th October, 1989, pp. 41-42.

* Original nor seen.