

## DIRECTIONAL OCCURRENCE OF COCCINELLID PREDATORS IN RELATION TO THE DISTRIBUTION OF APHIDS IN BRINJAL

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**Abstract :** Two field experiments were conducted at the Annamalai University Experimental Farm, Annamalainagar to determine the directional occurrence of coccinellid predators in relation to its prey aphid and growth stage of the host plant in an undisturbed brinjal eco-system. With regard to directional occurrence, the west located plots harboured the maximum number of coccinellids in all the growth stages of the host plants corresponding with maximum aphid population.

**Key words :** Aphid, brinjal, coccinellids.

### INTRODUCTION

The distribution and directional occurrence of entomophagous insects are of great importance to integrated control programme, both in terms of the efficiency of predation and parasitism, and of avoiding the predators and parasites during pesticidal applications. Studies on such distribution helps to determine the time and place of application of chemicals in order not to affect the concentration of predatory species in an agro-ecosystem (Ewert and Chiang, 1966). Hence, experiments were conducted to determine the directional occurrence and microhabitat distribution of certain coccinellids in relation to aphid population in brinjal eco-system under undisturbed conditions. The present paper deals with data obtained in the above experiments.

### MATERIALS AND METHODS

The occurrence and the microhabitat distribution of four coccinellid predators, viz., *Coccinella transversalis* Fabr., *Menochilus sexmaculatus* Fabr., *Coccinella septempunctata* Linn. and *Micraspis discolor* Fabr on the four directions and at the centre of the field and on different parts of the plants were studied. The last row of five plants in each plot was tagged for the study.

Two field experiments were conducted in the University Orchard during October, 1982 to May 1983 and March 1984 to October 1984. The crop was grown as a monocrop with the popular var. Panruti Local. In each trial, the experimental field was equally divided into 20

plots of 3 m x 3 m size. Forty five day old seedlings were planted in the main field following the usual spacing of 60 cm x 45 cm. N, K<sub>2</sub>O and P<sub>2</sub>O<sub>5</sub> were applied the rate of 60, 80 and 120 kg ha<sup>-1</sup> respectively. As the plants started establishing, the observations were taken every time during the fixed period between 7.00 a.m. and 9.00 a.m. The identity of the aphid and coccinellids was established through the Commonwealth Institute of Entomology, London.

The total number of grubs and adult coccinellids and aphids present on different parts of the tagged plants (25) were counted at weekly intervals and given as total number of insects per 25 plants.

For testing the homogeneity of proportion of coccinellid and aphid population in all directions and also in different stages of plant growth, chi-square test was performed.

### RESULTS AND DISCUSSION

The pattern of occurrence of coccinellid predators in relation to distribution of aphids on the four directions and the centre of the experimental field was determined. The data collected at weekly intervals were pooled under three growth stages of plants such as preflowering (seedling and vegetative), flowering (flowering and bearing) and senescent, statistically analysed using the chisquare test and the results are given in Table 1. The coccinellid population was maximum (483/25 plants) during the flowering stage followed by pre-flowering (85/25 plants) and senescent

Table 1. Directional occurrence of aphid and coccinellid predators (in numbers) during October 1982 to April 1983 (I) and March 1984 to October, 1984 (II)

Growth stage of the plant		Positions of plots					Total
		East	West	North	South	Centre	
Preflowering	I	246 (22)	310 (10)	350 (21)	433 (5)	400 (31)	1739 (85)
	II	4021 (95)	4228 (124)	3998 (78)	3428 (54)	4120 (41)	19795 (392)
Flowering	I	3010 (172)	2998 (71)	3450 (76)	2619 (24)	3025 (140)	15102 (483)
	II	6328 (108)	7018 (196)	5019 (168)	9004 (69)	4222 (38)	31591 (579)
Senescence	I	1605 (11)	2110 (24)	2580 (8)	810 (20)	910 (8)	8015 (71)
	II	30 (5)	32 (9)	21 (7)	18 (8)	9 (6)	110 (36)
Total	I	4861 (205)	5418 (105)	6380 (105)	3862 (49)	4335 (179)	24856 (643)
	II	10379 (208)	11279 (329)	9038 (253)	12450 (131)	8351 (85)	51497 (1006)

Figures in parentheses are the coccinellid population.

$\chi^2 = 82.1503$  (I)

$\chi^2 = 23.6539$  (II)

stage (71/25 plants) of the crop. The directional occurrence of coccinellids was found to vary with the growth stage of the plant.

Accordingly, maximum population (31/25 plants) was observed during the pre-flowering stage at the central plots followed by plots situated towards east (22/25 plants) and north (21/25 plants) but during the flowering stage it was noted on east placed plots (172/25 plants) followed by that of centre, north, west and south. During senescence, the maximum population was found on western plots (24/25 plants).

The directional distribution of aphids was dependent of the growth stage of the plant. In different growth stages, varied proportion of aphid population was found in all directions. The population was found to be maximum (15102/25 plants) during the flowering stage followed by senescence (8015/25 plants) and

pre-flowering stage (1739/25 plants) similar to that shown by coccinellids. With regard to directional distribution, plots situated towards north harboured maximum number of aphids during flowering (3450/25 plants) and senescence (2580/25 plants) and southern plots during the preflowering stage (433/25 plants).

In the second field trial, maximum number of coccinellids was found during the flowering stage (579/25 plants) followed by preflowering (392/25 plants) and senescence (36/25 plants) stages. The plots situated towards western side harboured the maximum number of coccinellids in all the growth stages. Regarding aphids the population was almost equal in all plots in every direction. There was a slight increase in the west placed plots followed by that of centre, east, north and south during the preflowering stage but during the flowering and senescence, the population was maximum in northern and western plots respectively.

From the above data, no set pattern could be visualised for the coccinellids. While the pre-flowering stage had the population in the central plots, during the flowering stage it shifted to east and west placed plots. During the second trial, a different pattern of occurrence could be seen. The west located plots harboured maximum number of coccinellids in all the three growth stages corresponding with the occurrence of maximum aphid population during pre-flowering, flowering and senescent stages indicating the attractiveness of aphids to coccinellids. But, the pattern of occurrence of aphids observed at different stages, during the first trial did not appear to hinder the activity of the coccinellids as they readily moved from plant to plant in search of their prey which was not readily available. Increased congregation of coccinellids on the periphery of the field was already reported in crop eco-system (Luis, 1961; Ewert and Chiang, 1966; Galeka,

1966; Van Emden, 1966).

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