

RELATIONSHIP BETWEEN PEST AND PREDATORS ON SAFFLOWER IN WEST BENGAL

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Three groups of predators like coccinellids, syrphids, spiders and two groups of insect pests i.e. safflower aphid, *Dactynotus carthami* HRL. and lepidopteran larvae were recorded from four varieties of safflower for two consecutive years 1990-91 and 1991-92. The incidence of three groups of predators on four varieties of safflower viz. A₁, A₂₀₀, A₃₀₀ and Veema revealed that A₂₀₀ harboured the highest population of syrphids, coccinellids and spiders. The lowest population of syrphids was recorded on Veema and A₃₀₀ in 1990-91 and 1991-92 respectively. The least population of coccinellid was recorded on Veema in 1991-92. The lowest population of spider was recorded on Veema in 1990-91 and A₃₀₀ in 1991-92.

INTRODUCTION

Safflower is an important oil seed crop in West Bengal. This crop is infested by many insect pests among this *Dactynotus carthami* HRL. and lepidopteran larvae viz. *Heliothis armigera* Hubn., *Trichoplusia orichalcea* Fab. and *Perigea capensis* Guen. have been considered as major pests (Nair, 1975; Bhumannavar & Thontadarya, 1979; Deokar *et al.*, 1984; Mhase *et al.*, 1986; Ghule *et al.*, 1987). Safflower aphid has been found to be preyed upon by two groups of predators i.e. coccinellids and syrphids and a general predator like spider. The coccinellids predator prey upon aphid (Upadhyay *et al.*, 1981; Choudhury *et al.*, 1983). *Brumus suturalis* F., a coccinellid predator, consumed 11 aphids per day (Vasantharaj & Janagarajan, 1966). Rathore (1983) found that the safflower aphid was predated upon by five species of coccinellids, a chrysophid and syrphid. The present work deals with the observations and relationship of predators and pests on this crop.

MATERIALS AND METHODS

The field experiment was conducted at Krishi Viswavidyalaya Farm, Kalyani (Nadia), West Bengal. Four varieties of Safflower i.e. A₁, A₂₀₀, A₃₀₀ and Veema were sown on November 15 during two consecutive years 1990-91 and 1991-92 in *rabi* season. The experiment was laid out in randomised block design with four replications and the plot size was 3m × 3m. The crop was raised by following usual package of practices. Observations of the predators and spider population was recorded from 15 plants in each replication of four varieties. The aphid population was recorded by scoring to find out their distribution and dispersion. The score was determined on the basis of their infestation i.e. 0, 1, 2, 3, and 4 which indicates no infestation, negligible infestation, slight infestation, moderate infestation and severe infestation respectively. Total of mean intensity scores of aphid and each group of predators of all observations from each of the plots on each variety were worked out and subjected to statistical analysis.

RESULTS AND DISCUSSION

Observation on population of syrphids and coccinellids, each of two year has been presented in Table I. The population of syrphid larvae during 1990-91 differed significantly but the same of 1991-92 did not. During 1990-91 the population of syrphid larva was significantly higher on

var. A₂₀₀ than that on varieties A₁, A₃₀₀ and Veema which were not mutually different at 5% level.

Population of coccinellid predators was significantly higher on variety A₂₀₀ during both the years. Veema recorded significantly low population during 1990-91 but it was statistically at par in 1991-92.

Simple correlation between two groups of predators revealed that there was direct and significant correlation between aphid infestation intensity and coccinellid predators during both the years of study. But this between aphid infestation intensity and syrphid predators had direct correlation only during 1990-91.

Variation in spider population : Variety A₂₀₀ harboured significantly higher population of spiders during both the years. The lowest population was recorded on Veema in 1990-91 and on A₃₀₀ in 1991-92. (Table II).

It is well known that spiders are general predators. As such its variation in level of population on different varieties may be related to availability of all insect hosts that are amenable to its preying.

Table I : Mean aphid score and population of syrphid, coccinellid and spider on different varieties of safflower.

Variety	Aphids		Syrphids		Coccinellids		Spiders	
	1990-91	1991-92	1990-91	1991-92	1990-91	1991-92	1990-91	1991-92
A ₁	1.801	2.11	0.892	0.802	1.024	0.774	1.242	1.800
A ₃₀₀	2.088	2.23	0.904	0.772	1.473	0.826	1.293	1.432
Veema	1.151	1.70	0.729	0.835	0.862	0.751	1.204	1.468
A ₂₀₀	9.497	9.59	1.283	0.853	2.317	0.855	1.744	2.500
Sem ±	0.6232	0.222	0.094	NS	0.1587	0.0217	0.107	0.2087
CD at 5%	1.357	0.484	0.204		0.345	0.0517	0.234	0.454
CD at 1%	1.903	0.678	0.287		0.486	0.072	0.327	0.637

Table II : Intensity of insect (host/ prey) and spider population on safflower varieties.

Variety	1990-1991				1991-1992			
	Spider Predator population	Aphid score	Larval population	Total prey population value	Spider predator population	Aphid score	Larval pest population	Total population value
	(a)	(b)	(c)	(d)=(b+c)	(a)	(b)	(c)	(d)=(b+c)
A ₁	1.24	1.80	5.76	7.56	1.80	2.11	5.12	7.23
A ₃₀₀	1.29	2.08	3.84	5.94	1.43	2.23	2.85	5.08
Veema	1.20	1.15	4.09	5.29	1.46	1.70	4.49	6.19
A ₂₀₀	1.74	9.49	9.55	19.05	2.50	9.59	8.66	14.61

The total of mean population of aphid, and of mean population of larval pests and taking the aforesaid two values for each variety as intensity value of prey-insect incidence have been furnished in Table II against the spider population recorded on each variety. From the Table it is apparent that spider population on varieties during 1990-91 did not follow similar gradation as aphid score, larval pest population or total prey population intensity. But during 1991-92 the gradation followed that of prey population. Correlation between dependent factor (spider population) and the independent variables [(b), (c) and (d) of Table II] which formed prey intensity of individual group and all groups taken together were positive. The correlation coefficient ("r") for independent variables (b), (c) and (d) were 0.75, 0.96 and 0.91. The values of the later year were higher though correlation were quite strong during each year. As the prey-insect (aphids and lepidopteran larvae) population showed little variation in intensity levels as regards their preference to particular variety of safflower it is difficult here to state which group of prey intensity influenced population of predatory spiders.

Spiders are omnipresent on all the crops but coccinellids and syrphid usually occur on crops infested by soft bodied hemipteran pest and most commonly on crops that have aphids as persistent pests. Availability of predators of pests is usually related to the availability of their prey organisms on the crops. However, plant and weather factors play their role on the abundance of natural enemies as could be observed for coccinellids on safflower (Upadhyay *et al.*, 1981). It may be mentioned here that that all the four varieties considered here were spiny. Bhumannavar & Thontadarya (1979) and Jagtap *et al.*, (1985) reported that spineless varieties were preferred by aphid for infestation. But in the present investigation appreciable variation in mean level of infestation could be observed even in all the varieties studied here and all were spiny. The plant character like spiny or non-spiny, does not hold good with regard to aphid infestation has been conclusively indicated by Basavangoud *et al.* (1980) and some biochemical factors determine the variation of level of aphid infestation on safflower. This has been corroborated by the present study.

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