



POPULATION DYNAMICS OF PREDATORS IN CASHEW

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ABSTRACT

Populations dynamics of three major insect pest predators was analysed in an organic cashew orchard at the Regional Fruit Research Station, Vengurle, during 2017. Amongst the predators, only spiders were observed throughout the year, with 0.05 to 1.40 spiders and spiderlings/ shoot; maximum population was observed during first meteorological week with maximum and minimum temperature being 33.56 and 14.81 °C, respectively, while the morning and evening relative humidity was 85.71 and 55.71%, respectively. The chrysopids and coccinellids were not observed throughout the year but occurred more or less regularly during 1st MW to 15th MW, their maximum larval population was during 5th MW i.e., 0.40 and 0.15/ shoot, respectively. Maximum number of egg/egg masses of chrysopids (0.35/ shoot) and coccinellids (0.15/ shoot) was observed during 1st and 2nd MW. Adult chrysopids were observed during 11th and 13th MW, and coccinellids adults were observed irregularly from 2nd MW to 22nd MW and from 47th MW to 52nd MW. Correlation coefficients of the population of predators with weather parameters were statistically non-significant.

Key words: Cashew, spiders, chrysopids, coccinellids, population dynamics, larvae, adults, correlation coefficients

Cashew (*Anacardium occidentale* L.) a tropical evergreen tree has multifaceted uses. IPM requires ecological engineering with habitat manipulation to enhance the biological control (Gurr et. al, 2004). In such IPM for decision making pest-defender ratio is taken into account. For this thorough analysis of agroecosystem is very essential. Cashew has a strong potential for arthropod dependent protection from pests (Rickson and Rickson, 1998). Sundararaju (2003) gave a list of arthropod predatory fauna recorded from cashew panicle. Present study analyses the population levels of important predators in cashew agroecosystem, their active period and correlation with weather parameters.

MATERIALS AND METHODS

Present study was carried out at an organic cashew orchard at the Regional Fruit Research Station, Vengurle, District Sindhudurg, Maharashtra during 2017. Population dynamics of three predators viz., spiders, chrysopids and coccinellids were observed at weekly interval. Twenty shoots were randomly selected from plants from fixed plots and life stages like egg and/or egg masses, young ones, pupae and adults were observed. In case of spider, only live egg masses were counted while in case of chrysopids single egg as well as egg masses were counted. Population of life stages of predators/ shoot was computed and used for statistical analysis. Meteorological data was obtained

from observatory at the Regional Fruit Research Station, Vengurle. Correlation coefficients of the predator populations with the weather factors were worked out.

RESULTS AND DISCUSSION

Data on spider population revealed that, amongst the three predators only spiders were observed throughout the year. Their population ranged between 0.05 to 1.40 spiders and spiderlings/ shoot with many peaks, the least of the population was during 24th to 25th Meteorological Week (MW) (i.e., 11th June to 24th June). It was at peak during 1st MW, when maximum temperature was 33.56°C and minimum temperature 14.81°C, morning relative humidity 85.71% and evening relative humidity 55.71%. The peak population corresponds to flowering stage. Live egg masses were observed intermittently throughout the year, with peak numbers being 0.20/ shoot during 46th MW (i.e., during 12th to 18th November). Correlation coefficients with weather factors were statistically non-significant effect (Fig. 1; Table 1)

Population of life stages of chrysopids viz., egg, larva, pupa and adult depicted in Fig. 1 reveal that maximum egg masses i.e., 0.35/ shoot was observed during 1st and 2nd MW, whereas, maximum of larval population i.e., 0.40/ shoot was during 5th MW; pupal counts were maximum of 0.15/ shoot during 10th MW.

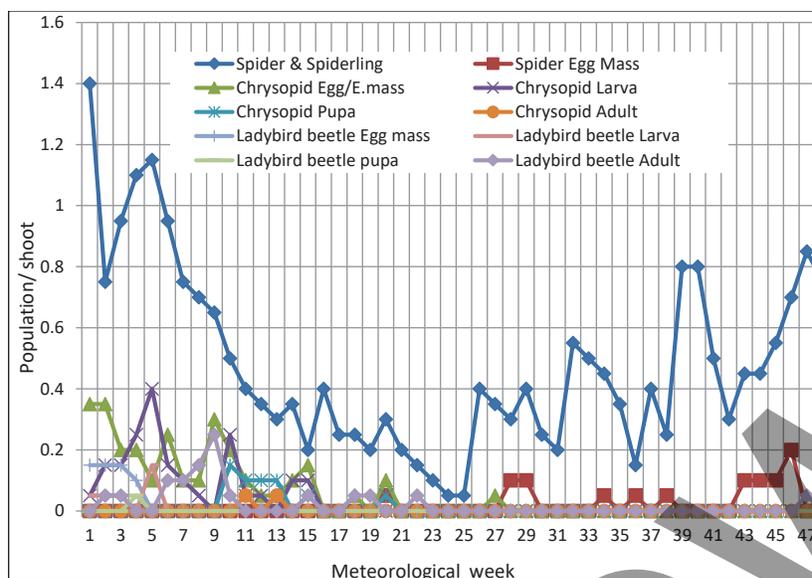


Fig. 1. Population dynamics of predators in cashew

Table 1. Correlation coefficients- weather factors vs. population of predators in cashew

Predators	Weather factors				
	Temperature maximum	Temperature Minimum	Relative humidity (Morning) RH-I	Relative humidity (Evening) (RH-II)	Rainfall
Spiders	0.048	-0.132	-0.189	0.104	-0.179
Chrysopids	-0.391	-0.473	-0.292	-0.147	-
Coccinellids	-0.075	0.379	0.146	-0.294	-

'r' value for spiders at $p=0.05$ - 0.273; for chrysopids and coccinellids- 0.514

(5th -11th March); and adults were observed only during 11th and 13th MW i.e., 0.05/ shoot. The correlation coefficients with weather factors remained non-significant (Table 1).

Egg masses and grubs of coccinellids were observed during 1st to 5th MW, with peak being 0.15/ shoot during 1st to 3rd MW; the grubs peaked during 5th MW i.e. 0.15/ shoot whereas pupae were observed only during 4th MW; and adults occurred during beginning of the year i.e., from 2nd to 22nd MW and during end of the year from 47th to 52nd MW at indefinite intervals, totally absent otherwise. Maximum population of adults (0.25/ shoot) was observed during 9th MW (i.e., 26th to 4th March) corresponding to maturity stage of the crop. Correlation coefficients with weather parameters remained non-significant (Fig. 1; Table 1).

Thus the most active period for predators is from 1st to 15th MW which corresponds to flowering and nut development stages. Further, the period during 5th MW was the most crucial with peaks in the

population of predatory stage (i.e., larval stage) of chrysopids/ coccinellids and spiders/ spiderlings. With study on ecology and management of tea mosquito bug on cashew, Thirumalaraju (2002) observed peak in population of spiders during February and the least during rainy season at Chintamani, Karnataka. Bhat et al. (2013) observed maximum species richness of spiders during monsoon and winter in cashew ecosystem in Karnataka. Pathummal Beevi and Mahapatro (2008) observed positive correlation between spider population with different crop phenophases -flushing, flowering and fruiting. Jayakumar and Sankari (2010) observed positive correlation between spider population and rice pests. John-Ho Lee and Seung-Tie Kim (2016) observed many peaks in the annual fluctuations of spider population in rice field in Korea. Souza and Carvalho (2002) observed a lone peak in the population of *Chrysoperla externa* in September in a citrus orchard in Southern Brazil. Maruthurai and Singh (2017) observed the population of ahidophagous predator coccinellids from December with peak in February in cashew in Goa.

Jat et al. (2017) observed that coccinellids had negative non-significant correlation while chrysopids had positive non-significant correlation with mean temperature in cabbage ecosystem. Ramya et al. (2017) observed a negative correlation of spider population with maximum temperature and rainfall in floriculture. Rakshita Mouly et al. (2018) observed a maximum density of spider *Oxyopes kohaensis* at 29.27 to 33.50 °C in mango.

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