



Biocontrol potential of *Oxyopes chittrae* Tikader (Araneae: Oxyopidae) on three lepidopteran pests of cotton

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ABSTRACT: Biocontrol potential of *Oxyopes chittrae* Tikader (Araneae: Oxyopidae) on three lepidopteran pests of cotton was studied in the laboratory during the years 1999-2001. Early instars of insect pests were only taken to assess the feeding potential. The rate of predation was found varying among the life stages and sexes. Adult females consumed more prey than any other stage. It consumed an average of 19.08 ± 11.01 , 4.61 ± 1.03 and 4.08 ± 0.9 numbers of bollworms, borers, and loopers. The different life stages of *Oxyopes chittrae* showed a high degree of variation in feeding potential and maximum variation was with bollworm and minimum with looper. The prey preference was in the order bollworm > borer > looper.

KEY WORDS: Biocontrol, cotton, lepidopteran pest, *Oxyopes chittrae*

Spiders form one of the ubiquitous groups of predacious organisms in the animal kingdom. They are abundant in agricultural fields and if they can be conserved or augmented, can regulate many insect pests. As a group they are highly resilient in agroecosystems, long lived and readily seek out new fields after harvest (Andow and Rosset, 1990). They feed almost exclusively on insects, but little attention has been paid to their possible use in insect pest suppression.

The potential of spiders as natural control agents and one of the major factors in regulating destructive insects have been acknowledged by a number of economic entomologists. Yamanaka *et al.* (1973) found that the presence of Linyphiids in experimental plots resulted in significantly less leaf damage by the tobacco cutworm, *Spodoptera litura* than was observed in plots from where spiders were

removed. Mansour *et al.* (1980) found that the larval populations of apple pests did not develop to damaging proportions on the trees occupied by spiders. The importance of spiders in preventing crop loss was estimated by relating the abundance of spiders feeding on *Helicoverpa* sp. to boll damage levels in unsprayed cotton fields in Southeastern Queensland, Australia (Bishop and Blood, 1981). The suppression of major cotton pests such as aphids, bollworms, and spider mites by spiders was observed by Wu *et al.* (1981) in Nanyang region, China. The objective of the present study was to evaluate the feeding potential of one dominant spider on three lepidopteran pests of cotton.

The spider, *Oxyopes chittrae* Tikader was collected from cotton fields of northern region of Gujarat ($21^{\circ} 58' - 24^{\circ} 30' N$, $71^{\circ} 16' - 73^{\circ} 25' E$)

during the year 1999-2001. Field collected and laboratory reared 3rd and 4th instar spiderlings, subadult and adult males and females were taken to study the feeding potential in the laboratory at 25-30° C. The relative humidity was maintained from 60-80 per cent throughout the period by keeping a moistened wad of cotton in the jar. A definite number of larvae of cotton bollworm, *Helicoverpa armigera* (Hübner), capsule borer, *Dichocrocis punctiferalis* (Guenée) and semilooper, *Achaea janata* Linn. were placed as prey on twigs of cotton plants with 2-4 leaves and covered with bell jars. The cut end of the twig was kept immersed in a beaker containing water. The test spider was starved for 24 hours prior to the experiment and was placed individually on a cotton twig. The addition of prey was made at such a frequency that the prey density remained constant throughout the trial. Prey number consumed or killed by the spiders was counted at 6 hours interval for 3 days for each trial.

The spider was found to prey on all the life stages of prey available within its reach. Table 1 shows the average number of prey consumed by *O. chittrae* on three lepidopteran pests of cotton. Adult female stage of all test spiders consumed more number of preys than any other stage. The prey preference was in the order bollworm > borer > looper. The adult female *O. chittrae* consumed more number of preys than other life stages. The 3rd instar consumed 7.4, 3.6 and 3.1

bollworm, borer and looper, respectively. The different life stages of this spider showed a high degree of variation in feeding potential and maximum variation was with bollworms and minimum with loopers. It consumed an average of 19.08±11.01, 4.61±1.03 and 4.08± 0.90 prey of bollworm, borer and looper, respectively.

The studies of Hsich and Dyck (1975) indicated the reduction of leafhoppers in paddy fields due to predation by spiders. Field experiments by Mansour *et al.* (1981) revealed that spider activity was responsible for 98 per cent reduction of larval density in cotton fields. The results of laboratory experiments on the feeding potential of *O. chittrae* on three major lepidopteran pests of cotton showed that this spider preys on almost all pests. The rate of predation was found varying among the life stages and sexes. Females showed higher rates of predation due to their high metabolic activity and also their greater size. The males after attaining maturity were found less active in feeding and consumed less number of preys than 3rd and 4th instars and subadult stages.

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Table 1. Feeding potential of *Oxyopes chittrae* on three lepidopteran pests of cotton

Pest	Number of pests consumed during 24 hours (average of 10 replicates)							CV (%)
	III rd instar	IV th instar	Sub-adult male	Sub-adult female	Adult male	Adult female	Mean ± SEM	
Bollworm (<i>Helicoverpa armigera</i>)	07.4	11.3	19.6	23.7	14.3	38.2	19.08±3.48	57.70
Borer (<i>Dichocrocis punctiferalis</i>)	03.6	03.8	04.6	04.8	04.4	06.5	04.61±0.33	22.34
Looper (<i>Achaea janata</i>)	03.1	03.4	04.1	04.3	03.9	05.7	04.08±0.28	22.05

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