Madras Agric. J., 84(8): 481-483 August 1997
https://doi.org/10.29321/MAJ.10.A00901

PREY PREFERENCES OF COMMONLY ENCOUNTERED SPIDERS IN THE RICE AGRO- ECOSYSTEM

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ABSTRACT

The predatory potential and prey preferences of *Lycosa pseudoannulata, Tetragnatha javana, Eucta javana, Thomisus cherapunjeus,* and *Oxyopes javanus* were studied. Among the spider species tested, *L. pseudoannulata* was the most efficient predator and it had the highest predatory potential with BPH or WBPH. *L. pseudoannulata* preferred planthoppers to *Nephotettix virescens* whereas *T. cherapunjeus* and *O. javanus* preferred *N. virescens* to planthoppers.

KEY WORDS : Spiders, prey preferences, predatory potential, leaf- hopper, planthopper

A great deal has been written concerning the virtues of the classic natural enemy and, by allusion, of the best candidate natural enemy in a classical biological control programme. Foremost among these postulated traits has been specificity against the target pest, or at least an intense preference for it. In view of the majority of parasitoids being relatively (sometimes absolutely) host specific, whereas most predators are thought of as being polyphagous, it is customarily belived that predators are, with few outstanding exceptions, poor candidates in classical biological control. The present study was conducted, therefore, to estimate the predatory potential of certain commonly encountered spiders and their preferences for leaf- and planthoppers in rice so that they could be identified as candidate biocontrol agents.

MATERIALS AND METHODS

Predatory potential of spiders

The predatory potential of *Lycosa pseudoannulata* Boes. et Str., (Lycosidae : Araneae) *Oxyopes javanus* Thorell (Oxyopidae:Araneae), *Tetragnatha javana* (Thorell) (Tetragnathidae:Araneae), *Thomisus cherapunjeus* Tikader (Thomisidae:Araneae) and *Eucta javana* Thorell (Tetragnathidae:Araneae) adults was studied following the method of Kamal *et al.* (1992). The adults were starved for 24 h before the start of the experiment and then caged individually with known numbers of nymphs and adults of either the brown planthopper, *Nilaparvata lugens* Stal., white backed planthopper, *Sogatella furcifera* Horvath or the green leafhopper, *Nephotettix virescens* Distant. The experiment was done in a factorial completely randomised design with three replications and with three adult spiders per replication.

Prey preference of spiders when offered a mixed population of hoppers

The adult females of each of the above mentioned species of spiders were caged individually with five adults each of *N.lugens, S.furcifera* and *N.virescens*. Totally there were 15 hoppers per cage. Observations were taken daily on the number of dead individuals and the dead hoppers were replenished daily. The experiment was continued over a period of seven days.

RESULTS AND DISCUSSION

Predatory potential of some spiders occurring in the rice ecosystem

The predatory potential of five common spiders occurring in the rice ecosystem over a period of five days is summarised in table 1. Among the species tested, *L.pseudoannulata* was the most efficient predator as it consumed significantly higher number of hoppers (37.22) followed by *O.javanus*. The predatory potential of *T.javana, T.cherapunjeus* and *E.javana* was significantly lower as compared to the other species. When *N.lugens* was offered as prey, *L.pseudoannulata* had the highest predatory

Table 1. Predatory potential of spiders occurring in the rice ecosystem

Predator	Prey consumed by 3 spiders (No.)*			
	Prey			Mean
	BPH	WBPH	GLH**	
Lycosa pseudoannulata	48.00 A	46.00 A	17.67 B	37.22
	(6.88)a	(6.81)a	(4.25)a	(5.98)a
Tetragnatha javana	11.67 A	7.00 AB	5.33 B	8.00
	(3.48)b	(2.73)b	(2.39)c	(2.87)c
Thomisus cherapunjeus	6.00 AB	5.67 B	10.67 A	7.44
	(2.54)c	(2.43)b	(3.33)b	(2.77)c
Eucta javana	5.00 B	6.67 AB	10.33 A	7.33
	(2.34)c	(2.66)b	(3.28)b	(2.76)c
Oxyopes javanus	7.00 B	7.33 B	23.00 A	12.44
	(2.72)bc	(2.78)b	(4.80)a	(3.43)b
Mean	15.53	14.53	13.40	
	(3.59)A	(3.48)A	(3.61)A	

In a column means followed by the same letter (lower case) and in a row means followed by the same letter (upper case) are not significantly different (P=0.05; Duncan's (1951) multiple range test).
* Mean of three replications
Figures in parentheses are $(\sqrt{x+0.5})$ transformed values

potential. The same phenomenon was also observed with *S.furcifera*. However, with *N.virescens*, the predatory potential of both *O.javanus* and *L.pseudoannulata* were statistically on par but significantly superior to the other species. This finding is in accordance with that of earlier workers (Nirmala, 1990; Kamal *et al.*, 1992; Boonprapitak, 1987; Luong-Minh-Chau, 1987). The predatory potential of *T.javana*, *T.cherapunjeus* and *E.javana* were comparatively lower and it agrees with the finding of Kamal *et al.* (1992).

Prey preference of spiders when offered a mixed population of hoppers

The prey preference of five spider species is summarised in table 2. When a mixed population of *N. lugens*, *S.furcifera* and *N. virescens* was offered as prey, *L.pseudoannulata* consumed 25.87 per cent hoppers over a period of seven days and it was

Table 2. Prey preference of spiders when offered a mixed population of hoppers.

Predator	Prey consumed in seven days (%)*			
	Prey			Mean
	BPH	WBPH	GLH	
Lycosa pseudoannulata	37.62 A	28.17 B	11.82 B	25.87
	(37.60)a	(31.80)a	(20.08)b	(29.83)a
Tetragnatha javana	6.98 B	10.48 AB	16.03 A	11.16
	(15.27)b	(18.63)c	(23.57)b	(19.15)c
Thomisus cherapunjeus	10.32 B	11.03 B	30.56 A	17.30
	(18.69)b	(19.37)bc	(33.43)a	(23.83)b
Ecuta javana	10.24 AB	13.26 A	5.48 B	9.66
	(18.60)b	(21.26)bc	(13.45)c	(17.77)c
Oxyopes javanus	13.17 B	18.73 B	39.37 A	23.76
	(21.17)b	(25.49)b	(38.84)a	(28.50)a
Mean	15.67	16.33	20.65	
	(22.27)B	(23.31)AB	(25.87)A	

In a column means followed by the same letter (lower case) and in a row means followed by the same letter (upper case) are not significantly different (P=0.05; Duncan's (1951) multiple range test).
* Mean of three replications
Figures in parentheses are $(\sqrt{x+0.5})$ transformed values.

statistically on par with *O.javanus* but significantly superior to the rest. *L. pseudoannulata* preferred planthoppers to *N. virescens* whereas *T.cherapunjeus* and *O.javanus* preferred *N.virescens* to planthoppers (Table 2). The present finding contradicts Savory's (1928) claim that spiders had no discriminatory reaction and consumed whatever prey was offered. However, Bristowe (1941) has reported that spiders do have preferences indicated by disagreeable odours and tastes, which cause them to reject many potential animals. Kalode *et al.* (1990) have also reported that *L.pseudoannulata* had a distinct preference for *N.lugens* than *N.virescens* or *S.furcifera*. This could be attributed to the habitat of the spiders. *L.pseudoannulata* inhabits the lower parts of the rice plants and that might explain why it preys on planthoppers (Chiu, 1979). The lynx spider, *O.javanus* and the crab spider *T.cherapunjeus* inhabit the upper canopy and this would account for their preference for *N.virescens*. Turnbull (1960, 1962) hypothesised that spider food preferences are based on morphological and seasonal factors in prey that cross species, genus, family and even order boundaries and incorporate large number of diverse animals which vary as their abundance varies seasonally. He found evidence that spiders preferred prey with which it had previous experience. Peck and Whitcomb (1970) have reported that the readiness with which a spider takes food is apparently based on several factors other than preference i.e., its physiological state of hunger, strength, rate of growth, proximity to ecdysis, etc. The present investigations prove beyond doubt that spiders too, exhibit prey preferences which would play an important role in the development of mass culturing and augmentation strategies of spiders in rice fields. However, no given spider species, no matter how abundant, can hold a prey population in check, since its population does not track the density of the pest population. Thus, community diversity must be maintained to maximise the number of predators that will encounter the pest species.

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(Received : September 1996 Revised : October 1996)