

## Comparative prey preference and predatory potential of three major spiders in rice ecosystem

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**ABSTRACT:** The prey preference of three major spiders of rice, viz., *Lycosa pseudoannulata* (Boesberger and Strand), *Oxyopes javanus* (Thorell) and *Tetragnatha javana* (Thorell) was evaluated against sucking pests. *L. pseudoannulata*, *O. javanus* and *T. javana* showed greater preference to *Nilaparvata lugens* (Stål) than *Sogatella furcifera* (Horvath) and *Nephotettix virescens* (Distant). *L. pseudoannulata* was an efficient predator followed by *T. javana* and *O. javanus*. Between sexes of spiders, female was found to be more efficient than male.

**KEY WORDS:** Predatory potential, prey preference, rice spiders

Spiders are obligate carnivores making up a considerable portion of animal life in agroecosystems. The importance of spiders as suppressant of the rice pests like *Nilaparvata lugens* (Stål), *Sogatella furcifera* (Horvath), *Nephotettix virescens* (Distant) (Rajendran, 1987; Nirmala, 1990), *Scirpophaga incertulas* (Walker) (Bastistas *et al.*, 1993) have been well recognized. Spiders have higher host finding ability and capacity to consume greater number of prey than other paddy field inhabiting predators (Kamal *et al.*, 1990). Qualitative analysis of the food of spiders showed that they liked soft bodied, immature stages with more of fluid material, especially homopteran insects (Prashad, 1985). In this study, the prey preference and predatory potential of three major spiders, viz., *Lycosa pseudoannulata* (Boesberger and Strand), *Oxyopes javanus* (Thorell), *Tetragnatha javana* (Thorell) in mixed population of prey was studied and compared.

The methodology described by Kamal *et al.* (1990) was followed in this study. The experiment was conducted in completely randomized block design with four replications. The three spider species collected from rice field were brought to the greenhouse where each spider was caged separately with second and third instar nymphs and adults of prey insects, *N. lugens*, *S. furcifera* and *N. virescens* (10 number each) on ADT 36 rice plants. The numbers of insects preyed upon were recorded 24 h after their release and continued for 7 days. The daily per cent predation by each spider was worked out and averaged for 7 days. One female and male adults of *L. pseudoannulata*, *O. javanus* and *T. javana* were caged separately with second and third instar nymphs and adults of prey insects, *N. lugens*, *S. furcifera* and *N. virescens* (10 number each) on ADT 36 rice plants. Each day for 5 days, the predators and preys were counted. Dead individuals were replaced. The normal survival of *N. lugens*, *S. furcifera* and *N. virescens* provided with and without spiders and caged under the same

conditions were compared. The cumulative mortality over 5 days was calculated and the mortality in the treatments compared statistically.

All the three dominant spiders tested indicated their highest prey preference to *N. lugens* followed by *S. furcifera* and *N. virescens* as indicated from consumption of 36.8, 14.6 and 11.8 per cent predation of *N. lugens* by *L. pseudoannulata*, *O. javanus* and *T. javana*, respectively. The consumption of *S. furcifera* was 30.0, 12.8 and 9.2 per cent and that of *N. virescens* was 13.0, 9.4 and 6.8 per cent by these spiders, respectively (Table 1).

*Lycosa pseudoannulata* preferred planthoppers (*N. lugens* and *S. furcifera*) to leafhopper (*N. virescens*). This is in conformity with the observation made by Nirmala (1990) and Ganesh Kumar (1994). This might be due to the habit of the planthopper, prey and predators which inhabitate the lower parts of rice plants (Chiu, 1979). The lynx spider, *O. javanus* and long jawed spider, *T. javana* also preferred *N. lugens* and *S. furcifera* to *N. virescens*. However, Samiayyan (1996) observed these spider preferred *N. virescens* to *N. lugens* and *S. furcifera* and the reason attributed was that these spiders and leafhopper prey inhabitate the upper canopy of rice plant.

Among the three species of spiders evaluated, the predatory potential of *L. pseudoannulata* was the maximum followed by *T. javana* and *O. javanus* (Table 2). The predatory potential of female was more than male; 1.2, 1.3 and 1.2 times in *L. pseudoannulata*, 1.8, 1.9 and 1.91 times in *O. javanus* and 1.3, 1.3 and 1.5 times in *T. javana* on *N. lugens*, *N. virescens* and *S. furcifera*, respectively.

Among the three spiders, *L. pseudoannulata* was the most effective predator on *N. lugens*. This is in conformity with the previous findings of Sellammal and Chelliah (1982), Rajendran (1987) and Kamal *et al.* (1990). This spider being a h hunter is able to reach the destination of the prey so as to effect predation compared to the other spiders. Between the sexes, females devoured more number of preys than males. This reaffirms the findings from International Rice Research Institute, Philippines (IRRI, 1980). The daily predation rate of female of *L. pseudoannulata* was apparently greater than that of male. Female spiders are reported to have the ability to store large amount of fats as reserve food and fat was the main source of energy for embryonic development and this could be the possible reason for more consumption.

**Table 1. Prey preference of spiders to mixed pest populations on rice**

Spider	Mean predation (%) per day*			Mean
	<i>N. lugens</i>	<i>S. furcifera</i>	<i>N. virescens</i>	
<i>L. pseudoannulata</i>	36.8 (37.34)	30.0 (33.20)	13.0 (21.11)	26.6 (30.55)a
<i>O. javanus</i>	14.6 (22.45)	12.8 (20.96)	9.4 (17.83)	12.2 (20.41)b
<i>T. javana</i>	11.8 (20.08)	9.2 (17.64)	6.8 (15.09)	9.2 (17.61)c
Mean	15.8 (20.0)	13.0 (18.01)a	7.3 (13.57)b	

• Means of seven observations

In a row and column means followed by same letter are not significantly different by DMRT (P=0.05).

Figures in parentheses are arcsine values of percentages.

**Table 2. Predatory potential of spiders on rice**

Spiders	*Mean consumption per day					
	<i>N. lugens</i>	Mean	<i>S. furcifera</i>	Mean	<i>N. virescens</i>	Mean
<i>L. pseudoannulata</i>						
Male	6.6(2.66)	7.4	6.2(2.59)	6.9	5.1(2.37)	6.0
Female	8.3(2.98)		7.7(2.86)		6.9(2.73)	
<i>O. javanus</i>						
Male	3.4(1.99)	4.8	3.2(1.93)	4.7	2.4(1.70)	3.5
Female	6.3(2.61)		6.2(2.56)		4.6(2.27)	
<i>T. javana</i>						
Male	5.2(2.39)	6.2	5.0(2.36)	5.9	4.1(2.15)	5.2
Female	7.2(2.79)		6.8(2.70)		6.4(2.64)	
Untreated check	0.0(0.002)		0.0(0.002)		0.0(0.002)	
CD (P=0.05)						
Species X Spiders	0.03		0.04		0.02	
Sexes X Spiders	0.02		0.03		0.02	
Species X Spiders X Sexes	0.05		0.06		0.03	

Figures in parentheses are  $\sqrt{x}$  transformed values.

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