can also be recommended for the effective management of carmine spider mite on Bhendi.

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PREY POTENTIAL AND PREFERENCE OF THREE RICE DWELLING SPIDERS

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ABSTRACT

Laboratory experiments conducted at Soil and Water Management Research Institute, (TNAU), Thanjavur to assess the prey potential and preference of three common rice dwelling spiders on rice pests showed that *Pardosa* sp was the most efficient predator and it had the highest predatory potential with BPH (14.31) followed by WBPH (10.96). *Tetragnatha* and *Oxyopes* sp consumed more of GLH 5.69 and 7.29 and their potential against WBPH and WBPH and BPH was almost equal. *Pardosa* preferred plant hoppers (BPH and WBPH) to leaf hopper (GLH). *Tetragnatha* and *Oxyopes* preferred more of GLH than WBPH and BPH. The three spiders behaved differently on the preference of moths of leaf folder, stem borer and caseworm.

KEY WORDS : RICE-SPIDERS-PREY-POTENTIAL-PREFERENCE

Agricultural entomologists have acknowledged the importance of spider species as a major factor in regulating pest populations of crops. Spiders as obligate suctorial carnivores often constitute a large part of the predatory arthropod fauna of rice agro ecosystem and prey on many insect pests (Barrion and Litsinger, 1980). Becuase of their ability to build up high populations densities and their insectivorous feeding behaviour, it is suspected that under favourable habitats spiders may play a significant role as mortality agents of insect populations (Kiritani, 1972). Preliminary estimates of prey biomass consumed by wolf spiders vary substantially between 0.5 kg/ha/yr fresh weight in cereal crops (Nyffeler 1982 a), to 50 kg/ha/yr in undisturbed grassland (Van Hook, 1971), with an intermediate value of 3-9 kg/ha/yr found in forests (Nyffeler, 1982 b). Despite their importance highlighted by several workers, the role they play in regulation of pest populations has received scant attention in India and few workers have attempted on prey predator relationship and faunistic survey (Nirmala, 1990 and Ganesh kumar, 1994). Hence to assess the prey potential and preference of three importance rice dwelling spiders viz., *Pardosa, Oxyopes* and *Tetragnatha* on rice insect pests, studies were conducted and results presented.

MATERIALS AND METHODS

1. Predatory potential : The predatory potential of *Pardosa* sp., *Oxyopes* sp and *Tetragnatha* sp adults was studied in the laboratory. The adult spiders were collected from pesticide unsprayed rice fields, sorted to uniform size and starved for 24 hours. Spiders were caged in tube pots containing 30 day old rice seedlings separately with adults of ten numbers of green leafhopper (GLH = *Nephotettix virescens* Distant), brown plant hopper (BPH = *Nilaparvata lugens Stal.* and while backed plant hopper (WBPH = *Sogatella furcuifera Horvath.*). Observations were taken

daily on the number of individuals fed and the prey insects were replenished daily. The experiment was replicated four times and the cumulative number of prey consumed over 5 days was calculated.

2. Prey preference

A. Prey preference over a mixed population of rice hoppers

The adult female spiders of above were caged individually with ten adults of each of BPH, WBPH and GLH. A total of 10 each of respective prey hoppers were let into a cage. Observations were taken daily on the number of individuals fed and the prey hoppers were replenished daily. The experiment was continued over a period of seven days and replicated four times. The cumulative percentage mortality over 7 days was calculated.

B. Prey preference over a mixed population of rice lepidopteran moths

The adult female spiders of each of *Pardosa* sp, *Tetragnatha* and *Oxyopes* sp were caged individually with ten adult moths of rice stem borer, leaf folder and case worm. Totally there were thirty moths per cage. Observations were taken daily on the number of individuals fed and the prey moths were replenished daily. The experiment was continued over a period of seven days and replicated four times. Cumulative percentage mortality over 7 days was calculated.

RESULTS AND DISCUSSION

1. Predatory Potential : The results of predatory potential of three common rice spiders over a period of five days are summarised in the Table 1. Among the three spiders, *Pardosa* was significantly superior and it could prey upon twice the number of plant and leafhoppers as that of *Tetragnatha* and *Oxyopes*. This finding is in accordance with that of earlier workers Kamal *et al.*, (1992) and Ganeshkumar, (1994). *Pardosa* consumed 10.33 hoppers over a period of five days and other two consumed 4.81 hoppers each. Of the three preys, *N. lugens* was preyed more (14.31) followed by *S. furcifera* (10.96) and *N. virescens* (5.73) by *Pardosa*. *Tetragnatha* and *Oxyopes* spiders consumed more of *N. virescens* 5.69 and 7.27 respectively and their prey potential against *S.furcifera* and *N. lugens* was almost equal (3.78 to 4.53).

2. Prey preference

A. Prey preference over a mixed population of rice hoppers

Prey preference of spiders on plant and leaf hoppers of rice is presented in Table 2. *Pardosa* preferred *N. lugens* (41.04%) to *S.furcifera* (30.79%) and *N. virescens* (14.05%). Nirmala (1990) and Ganeshkumar (1994) have also reported that *Pardosa* had a distinct preference for *N. lugens* than *S. furcifera* or *N. virescens*. *Tetragnatha* preferred significantly more *M. virescens* (16.81%) to *S. furcifera* (11.08%) and *N. lugens* (10.44%) while *Oxyopes* had a greater preference for *N. virescens* (39.23%) followed by *S. furcifera* (19.19%) and *N.lugens* (14.40%). *Tetragnatha* though preferred more of *N. virescens* than the plant hoppers, the number of insects preyed upon by it was not as high as that of *Pardosa* and *Oxyopes*. This could be attributed to the habit of the spiders. *Pardosa* inhabits the lower parts of the rice plants and that might explain why it preys on planthoppers (Chiu, 1979). The lynx spider *Oxyopes* and *Tetragnatha* inhabit the upper canopy and this would account for their preference for *N. virescens*.

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

	Prey consumed by a spider (Nos.)*			
Spider	BPH	WBPH	GLH	Mean
Pardosa	14.31 aA	10.96 aB	5.73 bC	10.33 A
Tetragnatha	4.53 bB	4.22 bB	5.69 bA	4.81 B
Oxyopes	3.40 cB	3.78 bB	7.27 aA	4.81 B
Mean	7.41 a	6.32 b	6.23 b	

In a column, (lower case) and in a row (upper case) means followed by the same letter denotes statistical parity under DMRT (P=0.05)

* Mean of four replications

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

	Prey consumed in seven days (%)*			
Spider	BPH	WBPH	GLH	Mean
Pardosa	41.04 aA	30.79 aB	14.05 bC	28.62 A
Tetragnatha	10.44 cB	11.08 cB	16.81 bA	12.78 C
Oxyopes	14.40 bC	19.19 bB	39.23 aA	24.27 B
Mean	21.96 b	20.35 c	23.36 a	

In a column, (lower case) and in a row (upper case) means followed by the same letter denotes statistical parity under DMRT (P=0.05)

* Mean of four replications

Table 3. Prey preference of spiders to moths

Spider	Prey consumed in seven days (%)*			
	Stem borer	Leaf folder	Case worm	Mean
Pardosa	34.60 aB	37.24 aA	29.70 bC	33.85 a
Tetragnatha	29.60 bA	29.07 bA	24.65 cB	27.77 b
Oxyopes	19.51 cC	29.72 bA	35.17 aA	28.13 b
Mean	27.90 C	32.01 A	29.84 A	

In a column, (lower case) and in a row (upper case) means followed by the same letter denotes statistical parity under DMRT (P=0.05)
*Mean of four replications.

B. Prey preference over a mixed population of rice lepidopteran moths

The preference of spiders over a mixed population of moths viz., yellow stem borer, leaf folder and case worm is presented in Table 3. *Pardosa* preferred significantly more leaf folders (37.24%), followed by stem borer (34.60%) and case worm (29.70%). *Tetragnatha* preferred stem borer (29.60%) and leaf folder (29.07%). *Oxyopes* preferred more of caseworm (35.17%) followed by leaf folder (29.72%) and showed a lesser preference to stem borer moths (19.51%). Similar to plant and leafhoppers, *Pardosa* (33.85%) accounted for significant extermination of the prey moths followed by *Oxyopes* (28.13%) and *Tetragnatha* (27.77%). The difference may also be due to the habit of the spiders. *Pardosa* and *Oxyopes* are hunters while *Tetragnatha* is web builder.

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PREDICTING RICE LEAFFOLDER DAMAGE AND YIELD LOSS IN IR 50 RICE BY MATHEMATICAL MODELLING

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ABSTRACT

The predicted damage and yield loss caused by rice leaffolders, *Cnaphalocrocis medinalis* (Guence) and *Marasmia patnalis* (Bradley) in microplot experiment during *kharif* 1996 showed that the yield loss was higher at the initial infestation by leaffolder larvae at 40 DAS than the infestation at 30 DAS. There was no proportionate increase in yield loss with increasing larval populations. The rate of yield loss due to an increment of one percent damage was more pronounced at 10 percent base level damage i.e., 10 to 11 percent than at higher base level damage of 20, 30 to 90 percent.

KEY WORDS : Rice, leaffolder, damage, yield loss and modelling

INTRODUCTION

In recent past, some of the rice pests, hither to recorded as minor pests have assumed major status under the changed rice ecosystem. The rice leaffolders, *Cnaphalocrosis medinalis* (Guenee) and *Marasmia patnalis* (Bradlely) which were