FEEDING POTENTIAL OF SPIDERS PREDACEOUS ON INSECT PESTS OF RICE

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ABSTRACT

Spiders collected from rice ecosystem in Navsari region, Gujarat comprised thirty seven species. Among them, biological potential of a female spider Tetragnatha mandibulata Walckenaer on three pests of rice was studied in the laboratory during summer 2002. It preyed an average of 1.59 adult of green leaf hopper (GLH), 1.72 full grown larvae of rice leaf folder (LF) and 1.02 full grown larvae of rice blue beetle per day.

KEY WORDS: Feeding potential, Tetragnatha mandibulata, rice.

INTRODUCTION

Spiders, amongst the predators, are the most familiar and ubiquitous obligatory carnivores, which feed on different types of prey. Earlier, several workers reported predatory potential of spiders against the pests of rice in India and abroad (Nath and Sarkar, 1978; Kiritani, 1979; Ghode *et al*, 1985).The classical example for the control of green leaf hopper and leaf folder through conservation and augmentation in rice ecosystem has been well documented in recent past. Further, the crop having more insect or insect visitors always had more spiders (Bhatnagar *et al.*, 1982; Peter, 1988). These considerations led to study the feeding potential of spiders collected from the rice ecosystems of Gujarat, India to evolve an Integrated Pest Management programme for rice insect pests attacking different growth stages of the crop.

The recent trend towards Integrated Pest Management (IPM) should not obscure the paramount importance of biological control. Any integrated management programme should definitely include active biological control agents as a component. The utilization of naturally occurring predaceous arthropods as a major component of the IPM had not been widely studied. It is generally accepted that predaceous arthropods voluntarily enter the crop field at no cost to the producer and when sufficient numbers are present can maintain the pest at a level where they are unable to cause unacceptable or economic losses. The present study was conducted, therefore, to estimate the predatory potential of certain commonly encountered spiders in rice ecosystem so that they could be identified as candidate bio-control agents.

MATERIALS AND METHODS

Field survey on the occurrence of natural enemies in the rice

ecosystem was undertaken during *summer* 2002 at the National Agricultural Research Project farm, Navsari Agricultural University, Navsari, Gujarat. For collection of adequate number of spiders, two techniques were adopted, *viz*; (i) sweep-net and (ii) vial tapping or hand picking method. In sweep-net method, spiders were collected by making ten successive double stroke sweeps per field once in a week in each site using an insect sweep net of 30 cm width with 75 cm long handle. In vial tapping method, vials of size 2.5 x 10 cm were used. The vials were placed beneath the leaf blades and spiders were then trapped loosely with fingers. The specimen thus collected was brought to the laboratory and it was used for this study.

Feeding potential

Predatory potential of dominant species of spiders was evaluated in the laboratory to know the feeding capacity at adult stage on three common insect pests as prey. Species of spider selected for study was *Tetragnatha mandibulata* Walckenaer. Prey insects were (i) adults of green leaf hopper (GLH), *Nephotettix virescens* (Hemiptera: Cicadellidae) (ii) full grown larvae of rice leaf folder (LF), *Cnaphalocrosis medinalis* Guen (Lepidoptera: Noctuidae) and (iii) full grown larvae of rice blue beetle, *Leptispa pygmaea* Baly (Coleoptera: Chrysomelidae).

Feeding potential was worked out for one species of spider i.e. *T. mandibulata* collected from untreated field. *T. mandibulata* was kept in a glass jar (20 cm x 15 cm) without food for 24 hours for starvation. Adults of green leaf hopper (GLH) were collected from the rice fields with the help of sweep net. After collection of GLH, 25 numbers of adults were kept in the same glass jar as food for *T. mandibulata*. Fresh leaves of paddy were kept in the glass jar as food for GLH. The glass jar was covered with muslin cloth and kept in wooden cage for 24 hours without any disturbance and live GLH were counted up to 24 hours to judge the feeding potential. The number of GLH was maintained after each observation in the same glass jar. This process was continued up to one week. The same process was carried out for full grown larvae of rice leaf folder and full grown larvae of rice blue beetle in which full grown larvae of LF and rice blue beetle were collected from the rice fields by hand.

RESULTS AND DISCUSION

The mean number of adult green leaf hopper (GLH), full grown larvae of rice leaf folder and full grown larvae of rice blue beetle consumed by a female *T. mandibulata* per day for 7 successive days are given in Table 1. It showed that a female *T. mandibulata* consumed on an average 1.59 adult GLH, 1.72 full grown larvae of rice leaf folder and 1.02 full grown larvae of rice blue beetle per day. The range of GLH, larvae of rice leaf folder and larvae of rice blue beetle consumed by a female *T. mandibulata* was 1.33 to 1.99, 1.22 to 2.21 and 0.77 to 1.33, respectively. The highest feeding efficiency was found with full grown larvae of rice leaf folder. The high feeding efficiency may be utilized in selection of spiders' species for conservation, multiplication and release under IPM programme.

Earlier, Wipada (1988) found that the male of the spiders *T. mandibulata, T. javana, T. virescens* and *T. maxillosa* consumed on an average 1.40, 1.08, 1.33 and 1.14 adults of green leafhopper (GLH) per day, respectively, whereas females consumed on an average 1.50, 1.42, 1.33 and 1.47 adults of green leaf hopper (GLH) per day, respectively.

Further, Gupta and Pawar (1992) found that the spiders of the species *Oxyopes*, *Argiope* and *Tetragnatha* killed about 1 adult of leaf and plant hoppers per day. *Tetragnatha* sp. consumed on an average 2.60 GLH nymphs per day and 1.16 LF larvae per day in laboratory condition (Anonymous, 1994). Singh and Singh (2001) who reported that *P. pseudoannulata* was an efficient predatory spider with on an average feeding rate of 3.93 GLH adults per 24 hours, while the *O. javanus*, *A. inustus* and *T. mandibulata* were next in the order for their feeding efficiency.

CONCLUSION

Tetragnatha mandibulata Walckenaer preyed an average of 1.59 adult of green leaf hopper (GLH), 1.72 full grown larvae of rice leaf folder (LF) and 1.02 full grown larvae of rice blue beetle per day.

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Table 1 : Feeding potential of female *T. mandibulata* on different insect pests of rice

Days After Caging	Mean Number of Insect Pests Consumed / Spider/ Day[1]		
	Adult Green Leaf Hopper, *Nephotettix virescens*	Larvae of Leaf Folder *Cnaphalocrosis medinalis* Guenee	Larvae of Rice Blue Beetle *Leptispa pygmaea* Baly
1	1.55	1.77	1.11
2	1.33	1.66	1.10
3	1.33	1.55	1.33
4	1.66	2.21	0.88
5	1.77	1.22	0.77
6	1.55	1.88	0.99
7	1.99	1.77	0.99
Total	11.18	12.06	7.17
Mean	1.59	1.72	1.02

Note : [1]Averages of three replications; each comprising 25 insect per spider

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