

STUDIES ON THE SPIDER FAUNA OF RICE ECOSYSTEM IN GUJARAT

PATEL, M. L., PATEL, K. G. AND JETHVA, D. M. *

COLLEGE OF AGRICULTURE, DEPARTMENT OF ENTOMOLOGY
JUNAGADH AGRICULTURAL UNIVERSITY
JUNAGADH - 362 001, GUJARAT, INDIA

**E-mail: dr_dharmraj@yahoo.co.in*

ABSTRACT

Survey was conducted in NARP farm, Navsari Agricultural University, Navsari,, Gujarat revealed that the occurrence of 37 species of spiders belonging to 21 genera and 10 families of Araneae in the rice ecosystem. Of these, the dominant species of spiders belonging to Tetragnathidae and Lycosidae family. Among them, web building spiders were observed as dominant in the rice field followed by hunting spiders. Pardosa birmanica Simon was found as numerically dominant followed by Tetragnatha Sp., Tetragnatha mandibulata, Pardosa sumatrana, Eucta javana and Neoscona Sp.

KEY WORDS: *Ecosystem, rice, spider fauna*

INTRODUCTION

Rice (*Oryza sativa* L.) is the world's second most important cereal crop and is consumed by more than 60 per cent of the world population. The total area of the India under rice cultivation is 44.10 lakh hectares, with production of 15.57 tonnes (Anonymous, 2011) and the total area of the Gujarat under rice cultivation is 7.22 lakh hectares with production of 12.26 lakh million tonnes in 2008-2009 (Anonymous, 2009). Most of the rice pests have been controlled by a complex and rich web of generalist and specialist predators and parasitoids that live in or on the rice plants, paddy water or soil. Therefore, in rice the natural enemies especially the predators play an important role in suppressing the population of these pests. Predators, the most important group of biological control organisms in rice, consume much prey during its life time. They occur in almost every

part of the rice environment. The most common are spiders, lady beetles, water bugs, plant bugs, ear wings, etc.

Amongst several biological control agents identified, spiders have a unique position as a predator of insect pests. They are obligate carnivores and hold the unique position of being the only large class of arthropods, which are entirely predatory in nature (Riechert and Lockley, 1984). They possess all the important attributes of an effective natural enemy. The searching capacity of spiders is high and is the most important and also the most difficult to measure or evaluate. They are ferocious predators equipped with a pair of jaws (Chelicerae) and venom glands (except for one family). Spiders are divided into two principal groups of forages: "Web-weavers" that spin a catching web and "Hunters" that seize prey without the use of a web (Nyffeler *et al.*, 1994).

Order Araneae (Comprising > 30000 species) ranks seventh in global diversity after the five largest insect orders (Coleoptera, Hymenoptera, Lepidoptera, Diptera and Hemiptera) and the arachnid sp. order Acari (Coddington and Levi, 1991). Very little information is available on the spider fauna of rice ecosystem in Gujarat state. Hence, present study was planned.

MATERIALS AND METHODS

Field survey on the occurrence of natural enemies in the rice ecosystem was undertaken at the National Agricultural Research Project farm, Navsari Agricultural University, Navsari during *khari* 2002. The field selected for study was having 534.6 m² area. Normal agronomic practices were followed and no insecticide was applied.

Collection by quadrat method

The population dynamics of different species of spiders was studied by making collections of spiders from 10 quadrates each of 1 m x 1 m area from periphery and similar number of quadrates from core of the selected field. For this purpose, the paddy field was kept untreated. Collections were made at weekly interval in the morning hours commencing from 1st week of August to 1st week of November after transplanting. Spiders were easily collected by leading them into plastic tubes (2.30 cm radius x 9.00 cm height) from the ground stratum and the terminals of plants or by picking them with hand. All the collected specimens were preserved in 70 per cent ethyl alcohol with proper labeling of locality, date and area of the field (core/periphery). The specimens were identified by Dr. B. H. Patel, Retired Professor of Zoology, Bhavnagar University, Bhavnagar, Gujarat, India.

RESULTS AND DISCUSSION

Surveys conducted in Gujarat,

India revealed the occurrence of 37 species from 21 genera belonging to 10 families (Table 1 and Plate I to XXVII). The dominant species of spiders belonging to Tetragnathidae and Lycosidae (2 genera and 6 species) followed by Salticidae (4 genera and 5 species), Araneidae (3 genera and 5 species), Thomisidae (3 genera and 5 species), Clubionidae (2 genera and 4 species), Heteropodidae (2 genera and 2 species), Oxyopidae (1 genera and 2 species) and other two families were represented by 1 genera and 1 species. These results are in concurrence with the findings of Gupta *et al.* (1986) from Andhra Pradesh; Bhardwaj and Pawar (1987) from Madhya Pradesh; Anbalagan and Narayanasamy (1999) from Tamil Nadu; Sebastian *et al.* (2005) from Kerala; and Jayakumar and Sankari (2010) from Tamil Nadu; where they also found that Tetragnathidae was most predominant family among all other families of spiders. *Pardosa birmanica* Simon was found as numerically dominant followed by *Tetragnatha* Sp., *Tetragnatha mandibulata*, *Pardosa sumatrana*, *Eucta javana* and *Neoscona* Sp. Chatterjee and Datta (1979), Kamal *et al.* (1992), Sebastian *et al.* (2005) and Jayakumar and Sankari (2010) also reported that species of *Tetragnatha* were maximum in rice fields. The present finding is almost in agreement with the above observations.

CONCLUSION

From the survey, it can be seen that *Pardosa birmanica* Simon was found as numerically dominant followed by *Tetragnatha* Sp., *Tetragnatha mandibulata*, *Pardosa sumatrana*, *Eucta javana* and *Neoscona* Sp. in the rice ecosystem of Gujarat.

REFERENCES

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- Anbalagan, G. and Narayanasamy, P. (1999). Population fluctuation of spiders in the rice ecosystem of Tamil Nadu. *Entomon.*, **24** (1) : 91-95.
- Anonymous (2009). Agriculture and Co-operative Department, Government of Gujarat.
- Anonymous (2011). FAOSTAT.
- Bhardwaj, D. and Pawar, A. D. (1987). Spiders in Madhya Pradesh, India. *IRRN*, **12**(5): 28.
- Chatterjee, P. B. and Dutta, S. (1979). Some predatory spiders on brown plant hopper and other rice pests. *IRRN*, **4**(5) : 20.
- Coddington, J. A. and Levi, H. W. (1991). Systematics and evaluation of spiders (Araneae). *Plant Prot. Bull.*, **44** (3-4) : 11-13.
- Gupta, M., Rao, P. and Pawar, A. D. (1986). Survey of the predatory spider fauna from rice agro-ecosystem. *Indian J. Pl. Prot.*, **14** : 19-21.
- Kamal, N. Q., Begum, A. and Biswas, V. (1992). Studies on the abundance of spiders in rice ecosystem. *J. Insect. Sci.*, **5**(1) : 30-32.
- Nyffeler, M., sterling, W. L. and Dean, D. A. (1994). Insectivorous activities of spiders in United States field crops. *J. Appl. Ent.*, **118**: 113-128.
- Riechert, S. E. and Lockley, T. (1984). Spiders as biological control agents. *Ann. Rev. Ent.*, **29**: 299-320.
- Sebastian, P. A., Mathew, M. J., Pathummal Beevi, S., Joseph John and Biju, C. R. (2005). The spider fauna of the irrigated rice ecosystem in central Kerala, India across different elevational ranges. *J. Arach.*, **33**(2):247-255.
- Jayakumar, S. and Sankari, A. (2010). Spider population and their predatory efficiency in different rice establishment techniques in Aduthurai, Tamil Nadu. *J. Biopest.*, **3**(1 Special Issue) 020 - 027.

Table 1: Families, genera and species of spiders collected from rice crop during kharif season

Families	No. of Genera	No. of Species	Sr. No.	Species of Spiders
1. Araneidae	3	5	1	<i>Argiope anasuja</i> Thorell
			2	<i>Larinia</i> sp.
			3	<i>Neoscona elliptica</i> Tikader Bal
			4	<i>N. theisi</i> Walckenaer
			5	<i>Neoscona</i> sp.
2. Clubionidae	2	4	6	<i>Chiracanthium melanostoma</i> (Thorell)
			7	<i>Chiracanthium</i> sp.
			8	<i>Clubiona pashabhaiti</i> Patel & Patel
			9	<i>Clubiona</i> sp.
3. Heteropodidae	2	2	10	<i>Heteropoda</i> sp.
			11	<i>Olios</i> sp.
4. Lycosidae	2	6	12	<i>Lycosa prolifica</i> Pocock
			13	<i>Lycosa</i> sp.
			14	<i>Pardosa annandalei</i> (Gravely)
			15	<i>Pardosa birmanica</i> Simon
			16	<i>Pardosa sumatrana</i> (Thorell)
			17	<i>Pardosa</i> sp.
5. Oxyopidae	1	2	18	<i>Oxyopes wroughtoni</i> Pocock
			19	<i>Oxyopes</i> sp.
6. Salticidae	4	5	20	<i>Marpissa</i> sp.
			21	<i>Phidippus pateli</i> Tikader
			22	<i>Phidippus</i> sp.
			23	<i>Plexippus paykullii</i> (Savigny & Andouin)
			24	<i>Salticus</i> sp.
7. Scytodidae	1	1	25	<i>Scytodes thoracica</i> (Latr.)
8. Tetragnathidae	2	6	26	<i>Eucta javana</i> Thorell
			27	<i>Tetragnatha mandibulata</i> Walckenaer
			28	<i>T. maxillosa</i> Thorell
			29	<i>T. moulmeinensis</i> Gravely
			30	<i>T. sutherlandi</i> Gravely
			31	<i>Tetragnatha</i> sp.
9. Theridiidae	1	1	32	<i>Theridion</i> sp.
10. Thomisidae	3	5	33	<i>Thanatus dhakuricus</i> Tikader
			34	<i>Thanatus</i> sp.
			35	<i>Thomisus cherapunjeus</i> Tikader
			36	<i>Thomisus</i> sp.
			37	<i>Xysticus</i> sp.



Plate- I : *Pardosa birmanica* (Family : Lycosidae)



Plate-II : *Tetragnatha* sp. (Family : Tetragnathidae)



Plate-III : *Tetragnatha mandibulata* (Family : Tetragnathidae)



Plate-IV : *Pardosa sumatrana* (Family : Lycosidae)



Plate-V : *Clubiona* sp. (Family : Clubionidae)

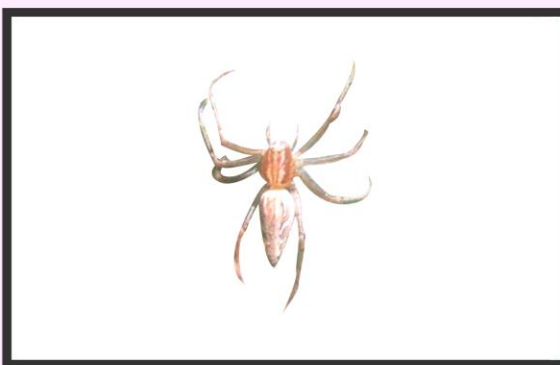


Plate-VI : *Oxyopes wroughtoni* (Family : Oxyopidae)



Plate- VII : *Salticus* sp. (Family : Salticidae)



Plate-VIII : *Argiope anasuja* (Family : Araneidae)



Plate-IX : *Tetragnatha maxillosa* (Family : Tetragnathidae)



Plate-X : *Larinia* sp. (Family : Araneidae)

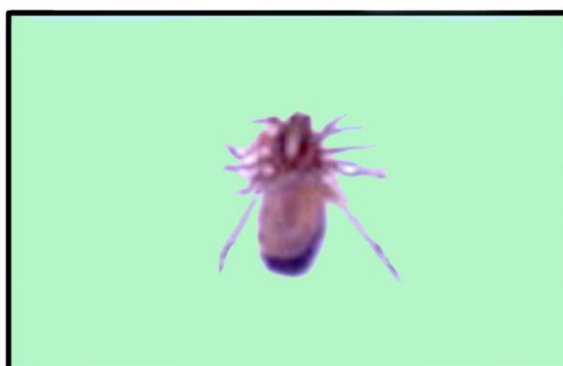


Plate-XI : *Lycosa* sp. (Family : Lycosidae)

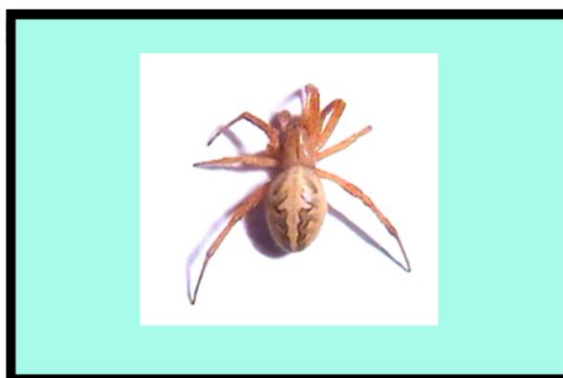


Plate-XII : *Neoscona theisi* (Family : Araneidae)



Plate-XIII : *Pardosa* sp. (Family : Lycosidae)

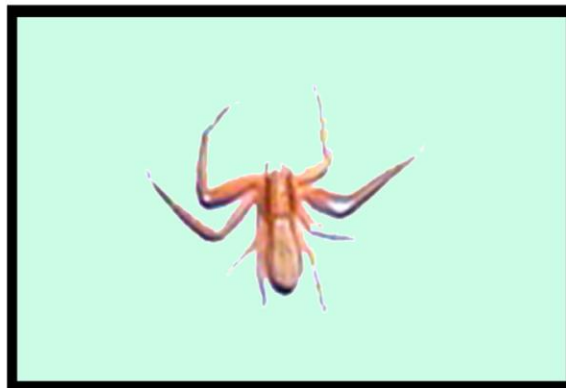


Plate-XIV : *Thomisus cherapunjeus* (Family : Thomisidae)



Plate-XV : *Neoscona elliptica* (Family : Araneidae)

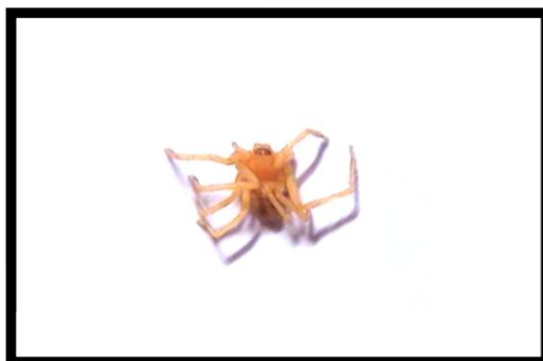


Plate-XVI: *Olios* sp. (Family : Heteropodidae)



Plate-XVII: *Clubiona pashabhaii* (Family : Clubionidae)



Plate-XVIII: *Thanatus* sp. (Family : Thomisidae)



Plate-XIX : *Marpissa* sp. (Family : Salticidae)



Plate-XX : *Phidippus pateli* (Family : Salticidae)



Plate-XXI : *Tetragnatha sutherlandi* (Family : Tetragnathidae)

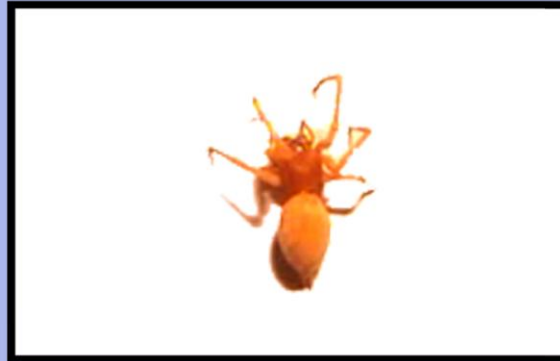


Plate-XXII : *Chiracanthium melanostoma* (Family : Clubionidae)



Plate-XXIII : *Lycosa prolifica* (Family : Lycosidae)



Plate-XXIV : *Phidippus* sp. (Family : Salticidae)



Plate-XXV : *Scytodes thoracica* (Family : Scytodidae)



Plate-XXVI : *Tetragnatha moulmeinensis* (Family : Tetragnathidae)

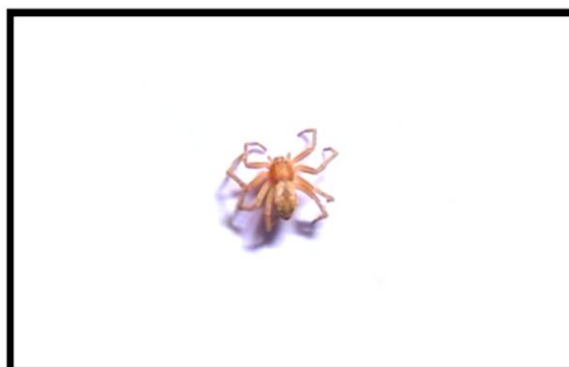


Plate-XXVII : *Thanatus dhakuricus* (Family : Thomisidae)

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