

**STUDIES ON SPIDER FAUNA OF COASTAL REGION OF INDIA :
OBSERVATIONS ON POPULATION FLUCTUATION OF SPIDERS
AND THEIR ROLE IN BIOLOGICAL CONTROL OF INSECT PESTS
ON PADDY FIELDS OF SUNDARBAN COASTAL REGION,
WEST BENGAL (PART–2)**

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INTRODUCTION

Reports on population fluctuation of spiders in Indian coastal regions are very scanty. In Indian sub-continent, various workers *viz.*, Chatterjee & Dutta (1979), Alam *et al.* (1981), Choudhury & Pal (1984), Biswas (1990), Kamal *et al.* 1990, Majumder & Tikader (1991), Kamal *et al.* (1992), Biswas *et al.* (1993) and Biswas *et al.* (1995) worked on the population density of spiders only in the paddy fields.

With a view to enhancing our existing knowledge this field study was undertaken in Sundarban coastal eco-system during 1998 to 1999. Collection and observation of insect pests and spider population were carried out in different eco-systems of Sundarban coastal region.

The present paper deals with the population fluctuation of 30 species of spiders in Sundarban coastal eco-system *viz.*, T. Aman-paddy fields, wild bushes, mangrove vegetation and river beds in relation to their predation on the insect pests in the surrounding areas. Probable impact of the present observations towards biological control of insect pests in T. Aman-paddyfields has been discussed.

MATERIAL AND METHODS

The spider population and their abundance were studied in the paddy fields (T. Aman) associated with wild bushes, mangrove vegetation and river beds of Canning, Gosaba, Basanti and Sagar Island (The study area includes a total of four areas having different host plants and adjacent river beds).

Spiders were collected from the selected four areas from different host plants simultaneously by hand picking and by standard hand sweeping net (129 cm in diameter). The random sampling was done by making 100 sweeps in each sampling site at bimonthly intervals from 6 A.M. to 9 A.M. during June 1998 to May 1999.

The collected spider specimens were anaesthetised, killed in a killing jar and finally were preserved in Oudman's preservative (90 parts 70% ethyl alcohol, 5 parts glycerine and 5 parts glacial acetic acid) in glass vials. The specimens were identified placing them in a petri dish containing ethyl alcohol under a binocular microscope. Each specimen was preserved in a single vial. The preserved specimens of spiders were identified upto species level.

OBSERVATIONS, RESULTS AND DISCUSSION

The present study includes a total of 30 species available in different hosts/habitats viz., paddy fields, adjacent wild bushes, mangrove vegetation and river beds of Sundarban coastal region. The occurrence of spiders of 574 examples of 16 species were recorded in paddy fields, 394 examples of 16 species on adjacent wild bushes, 194 examples of 11 species on mangrove vegetation and 42 examples of 5 species on adjacent river beds during June, 1998 to December, 1998 (Table 1).

In the further study during January 1999 to May 1999, the collection represented 300 examples of 17 species in paddy fields (ratoon), 438 examples of 19 species in adjacent wild bushes, 189 examples of 18 species in mangrove vegetation and 20 examples of 3 species in river beds (Table 2).

The species viz., *Leucauge decorata* (Blackwall), *Pardosa sumatrana* Thorell, *Neoscona mukerjei* Tikadar, *Marpissa mondali* Tikader, *Cheiracanthium himalayensis* Gravely were higher in number in the paddy fields from June 1998 to December 1998 than in the other habitats like adjacent wild bushes, mangrove vegetation and river beds (Table 1). Thereafter, the population gradually decreased in the paddy fields from January 1999 to May 1999 but again increased in the wild bushes and mangrove vegetation (Table 2). The species viz., *Lycosa chaperi* Simon, *Lycosa choudhuryi* Tikader *Pardosa annandelei* Gravely, *Pardosa sumatrana* Thorell and *P. birmanica* Simon were found in the river beds but their occurrence was never found in the mangrove vegetation from June 1998 to December 1998 (Table 1).

The spider population belonging to the genera viz., *Argiope*, *Neoscona*, *Leucauge*, *Larinia*, *Cyrtophora*, *Tetragnatha*, *Oxyopes*, *Marpissa*, *Zygoballus*, *Phidippus* and *Cheiracanthium* were never found in the river beds from June 1998 to May 1999 (Figure 1 and Table 2). The species *Pardosa sumatrana* Thorell was found in good number in paddy fields (rice plants and ratoon) from June 1998 to May 1999 (Table 1 and Table 2). *Marpissa bengalensis* Tikader and *Neoscona elliptica* Tikader and Ball were abundant in wild bushes from June 1998 to December 1998, but scarce in the wild bushes during January 1999 to May 1999 (Table 1 and Table 2).

Table 1. List of the Spiders and their abundance in different host/habitats in Sundarban coastal eco-system during the month of June, 1998 to December, 1998.

Name of the species	Family	Paddy field (Rice plants)	Border weeds/wild bushes	Adjacent mangrove vegetation	River beds
<i>Argiope pulchella</i> Thorell	Araneidae	12	4	3	0
<i>Argiope</i> sp.	"	18	8	2	0
<i>Neoscona muckerjei</i> Tikader	"	15	10	2	0
<i>Neoscona</i> sp.	"	20	15	17	0
<i>Leucauge decorata</i> (Blackwall)	"	25	5	1	0
<i>L. tessellata</i> (Thorell)	"	5	3	1	0
<i>Leucauge</i> sp.	"	7	4	0	0
<i>Cyrtophora cicatrosa</i> (Stoliczka)	"	12	5	1	0
<i>C. bidenta</i> Tikader	"	10	4	2	0
<i>Cyrtophora</i> sp.	"	21	12	7	0
<i>Larinia</i> sp.	"	10	13	9	0
<i>Tetragnatha</i> sp.	Tetragnathidae	15	12	5	0
<i>Lycosa chaperi</i> Simon	Lycosidae	5	2	0	8
<i>L. choudhuryi</i> Tikader & Malhotra	"	2	1	1	4
<i>Lycosa</i> sp.	"	15	10	2	5
<i>Hippasa</i> sp.	"	11	15	9	2
<i>Pardosa annandalei</i>	"	2	1	0	4
Gravelly					
<i>P. birmanica</i> Simon	"	12	1	0	2
<i>P. sumatrana</i> Thorell	"	20	2	0	4
<i>Pardosa</i> sp.	"	40	20	5	10
<i>Arctosa</i> sp.	"	31	17	12	3
<i>Oxyopes shweta</i> Tikader	Oxyopidae	10	6	2	0
<i>O. sunandae</i> Tikader	"	11	5	2	0
<i>Oxyopes</i> sp.	"	45	27	15	0

Table 1. (Cont'd.).

<i>Marpissa bengalensis</i> Tikader	Salticidae	10	6	2	0
<i>M. mondali</i> Tikader	"	12	5	2	0
<i>Marpissa</i> sp.	"	41	32	10	0
<i>Plexippus</i> sp.	"	32	27	5	0
<i>Phidippus</i> sp.	"	28	30	13	0
<i>Zygoballus</i> sp.	"	35	21	16	0
<i>Cheiracanthium himalayensis</i> Gravelly	Clubionidae	10	4	1	0
<i>Cheiracanthium</i> sp.	"	29	25	8	0
Number of Examples		571	352	154	42
Number of species		16	16	11	5

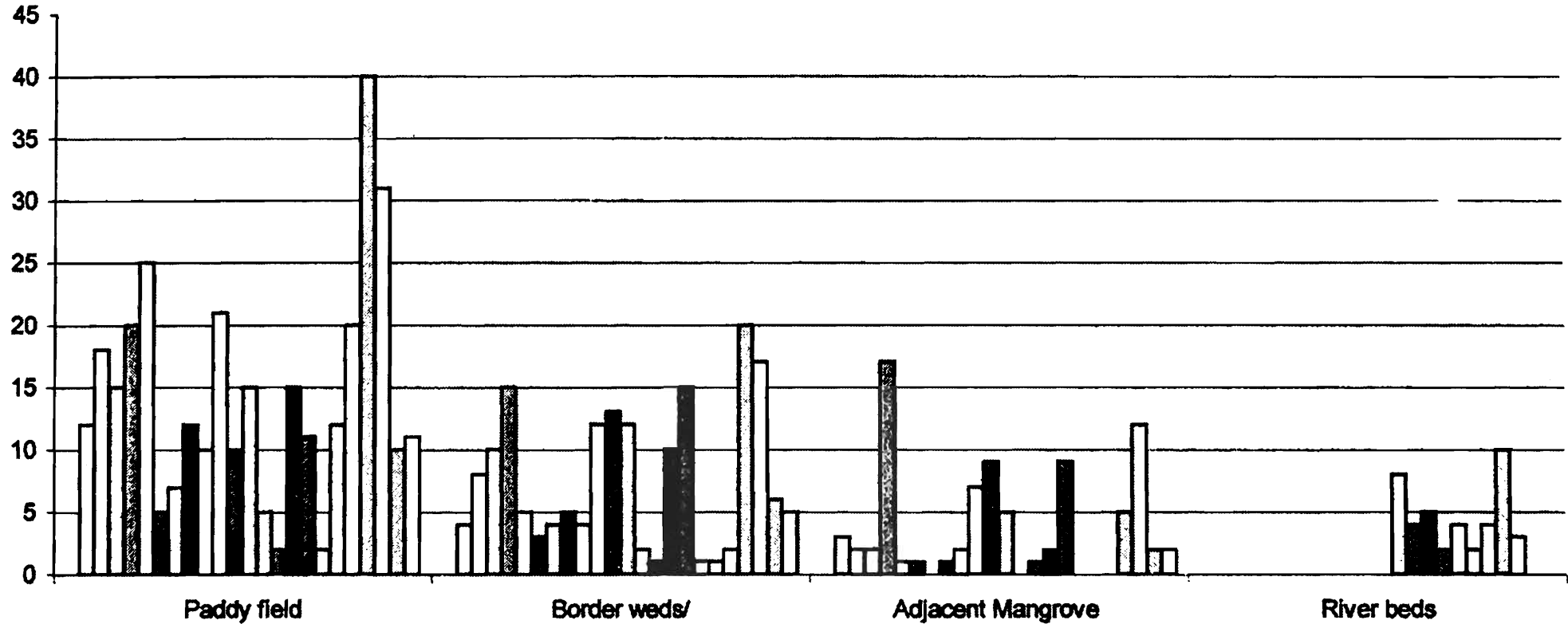
Table 2. List of the spiders and their abundance in different host/habitats in Sundarban coastal eco-system during the month of January 1999 to May 1999.

Name of the species	Family	Paddy field (Rice plants)	Border weeds/ wild bushes	Adjacent mangrove vegetation	River beds
<i>Argiope pulchella</i> Thorell	Araneidae	0	14	8	0
<i>A. shillongensis</i> Tikader	"	0	12	9	0
<i>A. anasuja</i> Thorell	"	0	10	0	0
<i>Neoscona rumpfi</i> (Thorell)	"	1	13	7	0
<i>N. elliptica</i> Tikader & Bal	"	0	15	10	0
<i>N. mukerjei</i> Tikader	"	0	12	8	0
<i>Neoscona</i> sp.	"	20	25	19	0
<i>Leucauge decorata</i> (Blackwall)	"	6	9	4	0
<i>Leucauge</i> sp.	"	0	12	8	0
<i>Larinia phtisica</i> (L. Koch)	"	0	10	7	0
<i>Larinia</i> sp.	"	0	15	9	0
<i>Cyrtophora cicatrosa</i> (Stoliczka)	"	0	11	6	0
<i>C. bidenta</i> Tikader	"	0	17	7	0
<i>Zygeilla melanocrania</i> (Thorell)	"	0	12	8	0
<i>Zygeilla</i> sp.	"	1	15	10	8

Table 2. (Cont'd.).

<i>Lycosa himalayensis</i> Gravely	Lycosidae	15	3	0	0
<i>L.mackenziei</i> Gravely	"	12	4	0	1
<i>L. chaperi</i> Simon	"	10	5	0	0
<i>L.choudhuryi</i> Tikader & Malhotra	"	8	2	0	1
<i>Arctosa indica</i> Tikader & Malhotra	"	13	5	0	0
<i>A.himalayensis</i> Tikader & Malhotra	"	14	0	0	0
<i>A. khudiensis</i> (Sinha)	"	9	0	0	0
<i>Hippasa holmerae</i> Thorell	"	11	0	0	0
<i>P. kupupa</i> (Tikader)	"	13	0	0	0
<i>P. oakleyi</i> Gravely	"	8	0	0	0
<i>Pardosa sumatrana</i> Thorell	"	25	11	7	2
<i>P. birmanica</i> Simon	"	15	12	2	0
<i>P. annandalei</i> Gravely	"	10	7	0	0
<i>Oxyopes sitae</i> Tikader	Oxyopidae	0	13	2	0
<i>O. sunandae</i> Tikader	"	0	10	0	0
<i>O. shweta</i> Tikader	"	0	9	0	0
<i>O. ratnae</i> Tikader	"	0	12	0	0
<i>O. sakuntalae</i> Tikader	"	0	11	0	0
<i>Oxyopes</i> sp.	"	10	25	11	0
<i>Marpissa bengalensis</i> Tikader	Satticidae	0	10	4	0
<i>Marpissa</i> sp.	"	10	15	3	0
<i>Phidippus indicus</i> Tikader	"	0	12	4	0
<i>P. bengalensis</i> Tikader	"	0	15	2	0
<i>Marpissa dhakuriensis</i> Tikader	"	0	10	3	0
<i>Tetragnatha andamanensis</i> Tikader	Tetragnathidae	0	13	4	0
<i>Cheiracanthium melanostoma</i> Thorell	Clubionidae	0	6	1	0
<i>C. himalayensis</i> Gravely	"	0	3	0	0
<i>C. trivialis</i> Thorell	"	0	2	0	0
Number of examples		216	414	168	4
Number of species		17	19	18	3

Table-1. List of the spiders and their abundance in different host/habitats in Sunderban coastal eco-system during the month of June ,1998to Dec,1998.



■ Name of the species Family	□ Argiope pulchella Thorell Araneidae	□ Argiope sp. Araneidae
□ Neoscona mukherjei Tikader Araneidae	■ Neoscona sp. Araneidae	□ Leucauge decorata (Blackwall) Araneidae
■ Leucauge tessellata(Threll) Araneidae	□ Leucauge sp. Araneidae	■ Cyrtophorasa cicutrosa(Stoliczka) Araneidae
□ Cyrtophorasa bidentata Tikader Araneidae	□ Cyrtophora sp. Araneidae	■ Larinia sp. Tetragnathidae
□ Tetragnatha sp. Lycosidae	□ Lycosa chaperi Simon Lycosidae	■ L.Choudhuryi Tikader&Malhotra Lycosidae
■ Lycosa sp. Lycosidae	■ Hippasa sp. Lycosidae	□ Pardosa annandalei Gravely Lycosidae
□ P.birmanica Simon Lycosidae	□ P.sumatrana Thorell Lycosidae	■ Pardosa sp. Lycosidae
□ Arctosa sp. Lycosidae	■ Oxyopes shweta Tikader Oxyopidae	□ O.sunandae Tikader Oxyopidae

FOOD AND FEEDING HABIT

During the present investigation a number of insect pests were recorded from the fields. Of those *Scirpophaga insertulus*, *Nilaparvata lugens*, *Nephotetix virescens*, *Leptocorisa acuta* and *Orseolia oryzae* were found in the paddy fields during August to October 1998. From this study it was found that the *Lycosa chaperi* Simon fed upon on immature larvae of *Nilaparvata lugens* at the rate of 5 to 15 pest specimens per day. The species *Cheiracanthium himalayensis* Gravely could built nest by rolling up paddy leaves within which they retreated (Majumder & Tikader, 1991).

Table 3. List of the Insect pests available in the paddy fields in the Sundarban coastal region during the year June 1998 to May 1999.

Sl. No. & Scientific name/common name/local name	Systematic position	Number of insect pests present (from June 1998 to August 1998)	Number of insect pests present (from August 1998 to October 1998)	Number of insect pests (from November 1998 to December 1998)	Insect pests- Nil From January, 1999 to may 1999
1. <i>Nilaparvata lugens</i> (Brown plant hoper) Local name : Badami poka	Order : Hemiptera Family : Delphacidae	+	+++	++	0
2. <i>Nephotetix virescens</i> (Green leaf hoper) Local name : Shyama poka	Order : Hemiptera Family : Cicadellidae	+	++	+++	0
3. <i>Scirpophaga insertulus</i> (White leaf hoper) Local name : Mazra poka	Order : Lepidoptera Family : Pyralidae	+	+++	++	0
4. <i>Leptocorisa acuta</i> (Rice bug) Local Name : Gandhi poka	Order : Hemiptera Family : Athyridae	++	+++	++	0
5. <i>Orseolia oryzae</i> (paddy gall) Local Name : Chungi poka	Order : Diptera Family : Cecidomyiidae	-	++	+++	0

+++ = Maximum; ++ = Optimum; + = Minimum; 0 = Nil.

These spiders were nocturnal in habit and after coming out from the nests they devoured lepidopteran pests at the rate of 5 to 12 prey per day. Observations made in the present study confirmed with those made by Biswas *et al.* (1995). The jumping spiders played an important role in controlling the insect pests in the fields. They consumed 6 to 12 dipteran pests per day and captured the prey by jumping upon them. *Leucauge decorata* Blackwall captured lepidopteran, hemipteran, dipteran and orthopteran pests by trapping them in their beautifully built webs (Biswas *et al.* 1995).

Table 3 indicates that the occurrence of insect pests *viz.*, *Nilaparvata lugens*, *Scirpophaga incertulus* and *Leptocorisa acuta* were found during August to October 1998. The species *viz.*, *Nephotettix virescens* and *Orseolia oryzae* were found maximum from the month of November to December 1998. No insect pest was found from January 1999 to May 1999.

SUMMARY

In the present study, a total of 30 spider species in 17 genera under 6 families were observed in different hosts/habitats in coastal eco-system of Sundarban *viz.*, paddy fields-plants and ratoon, wild bushes, mangrove vegetation and river beds. Among these species, 587 examples of 30 species were observed in the paddy fields from June 1998 to May 1999; The spider population was rich in wild bushes as evident from the fact that 766 examples of 30 species could be recorded there. The population was lesser in mangrove vegetation and river beds than in the paddy field and wild bushes. A total of 322 examples in 15 species was found in mangrove vegetation and 46 examples in 10 species in river beds. This study also recorded a total of 5 insect pests belonging to Diptera (Cecidomyiidae) Hemiptera (Delphacidae, Cicadellidae) and Lepidoptera (Pyralidae) which were captured and devoured by the spider species indicating that the spiders have a good potentiality as biocontrolling agent in paddy fields of the Sundarban coastal ecosystem.

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