



## Species Diversity Measure of Webless Spiders in Four Different Habitats of Barpeta District, Assam, India

### KEYWORDS

Spider, webless, diversity, habitats.

### Suruchi Singh

Assistant Professor, Department of Zoology,  
B.H.College, Howly, Barpeta, Assam.

### Aparajita Borkotoki

Retd. Professor, Department of Zoology, Gauhati  
University, Guwahati, Assam.

### ABSTRACT

The spider fauna of Assam has not been studied in a comprehensive manner. The objective of the study is to document the webless spiders of Barpeta District, Assam. Visual search sampling method was adopted in this study to sample the spider fauna. Specimens were identified in ZSI, Kolkata. After two years of collections, 32 species of web less spiders belonging to 22 genera of 09 families were documented. The Alpha, Beta and Gamma diversity estimates the webless spider species in different habitats of Barpeta District. Alpha diversity estimates that Jungle area is rich in webless spider species whereas Residential and Marshy area consist of least species. As no previous work on spiders has been conducted in this area, thus the present study represents new distribution records for all species recorded.

### INTRODUCTION:

Spiders are an ancient and successful group of invertebrate animals, found in all types of habitats (Turnbull, 1973). Though all spiders produce silk but many don't spin web. The webless spiders search out prey, wait for prey to come close to them and then ambush the prey. Though North-eastern India is often called India's forgotten corner but the remoteness of the area has helped preserve its biodiversity. But much of its diversity is being lost without any record. So, there is a paucity of exploration and research concerning the fauna of Northeast India. As spider species of Assam are poorly documented, thus in an attempt to assemble a comprehensive spider fauna list, the proposed study was carried out to document the webless spiders of Barpeta District, Assam and which will also fill the existing void of Arachnology literature for the state and apprise future investigators of the spider fauna of Assam.

### STUDY AREA:

Barpeta district of state Assam, India covers an area of 3245 square kilometers. The district lies between latitude 26°5' N to 26°49' N and longitude 90°39'E to 91°17'E and is bounded by Royal Province of Bhutan (Manas N.P) and Baksa District in North, Kamrup and Goalpara districts in south, Nalbari district in east and Bongaigaon and Chirang district in west. The elevation of district ranges from 18 to 200 m above mean sea level. The climate of Barpeta is sub tropical. The maximum and minimum temperatures recorded are 35°C and 7°C respectively. The area receives an average rainfall of 1715 mm. The humidity ranges from 60-85%. The tropical semi-evergreen and mixed deciduous forests covers the district.

### STUDY PERIOD:

The study was carried out during June 2008 to May 2010 in all the four seasons of the year. The sampling was made between 7 A.M. to 11 A.M. and 1 P.M. to 6 P.M. under suitable weather conditions for spider collection.

### SURVEY METHODS:

For the convenience of survey of spiders in Barpeta district of Assam, 30 plots were randomly selected. For each plot, four habitats – residential, agricultural, jungle and marshy were sampled. Therefore, total sites sampled were 120.

### SAMPLING METHOD:

Visual search sampling method (Robinson et al., 1974; Sebastian et al., 2005) was adopted in this study to sample the spider fauna from quadrates selected at random of selected study sites in all the four seasons. A total of 9 hours were spent in each site for each season, totaling 36 hours of sampling time across the four seasons. Collection was done from four quadrates (1m x 1m) placed in the respective corners of 10m x 10m area and all the vegetations were thoroughly examined from bottom to top.

### COLLECTION METHODS:

The collection methods (Coddington et al., 1991) adopted to carry out the sampling are Aerial hand collection, Ground hand collection and Beat sheet method.

#### 1. AERIAL HAND COLLECTION:

In this method, spiders were searched through vegetation above knee level to as high as above the head and for collection, a sweep net (net diameter 36 cm) was used to capture spiders seen high in the vegetation.

#### 2. GROUND HAND COLLECTION:

In this method, spiders were searched below knee level in the ground and lower vegetation or leaf litter. Spiders were searched on the surface of plants, tree stems, logs, rocks, and the ground surface etc.

#### 3. BEAT SHEET METHOD:

This method of collection was performed by stretching out a light-colored cloth under the tree branch or other low vegetation and grabbing the branch and shaking it vigorously. Spiders resting or nesting in this vegetation fall onto the cloth.

### PRESERVATION TECHNIQUE:

The spiders collected from each site were preserved in 70% ethyl alcohol (Sebastian et al., 2005). The specimens were photographed with Sony digital camera- DSC-S800 either in the field or as soon as they are brought to the laboratory and stored in dark dry place.

### IDENTIFICATION:

Specimens were identified in ZSI, Kolkata by Dr. B.K. Bis-

was, Retired Scientist and also using primary taxonomic literature- 'Handbook of spiders' by B.K Tikader, 1987 and 'Spiders of India' by P.A.Sebastian and K.V.Peter, 2009. The immature spiders were identified only to the generic level. The study was made using Advanced Binocular Research Microscope (Unilab) Model No. RH-85A UXL (Serial no. 35692).

**SPECIES DIVERSITY MEASURE OF WEBLESS SPIDERS IN BARPETA DISTRICT:**

The comparison of the family diversity of spiders from different habitats of Barpeta district was studied because abundance of families of spiders varies between habitats in different sites and may be exclusive to particular regions (Cardoso et al., 2011). According to Whittaker (1972), diversity measurement is of three types:-

1. Alpha diversity: Diversity within a particular area or ecosystem, usually expressed as species richness (i.e., number of species)
2. Beta diversity: When comparing different area or ecosystem, the total number of species unique to each area or ecosystem being compared.
3. Gamma diversity: The measure of overall diversity for different ecosystems within a region. It also refers to the species richness over a large region or area.

The Alpha, Beta and Gamma diversity estimates the webless spider species in different habitats of Barpeta District. The calculations are based on the hypothetical example given by Meffe et al., 2002.

**RESULTS:**

After two years of collections (June2008-May2010), 32 species belonging to 22 genera and 09 families were collected. The list is prepared alphabetically in Table 1.

**Table 1: Webless spiders collected from Barpeta District, Assam.**

Sl no.	Family	Species
I.	Hersiliidae Thorell, 1870	
1.		Hersilia savignyi
II.	Lycosidae Sundevall,1833	
2.		Lycosa mackenziei
3.		Lycosa tista
4.		Pardosa birmanica
5.		Pardosa pseudoannulata
6.		Pardosa sumatrana
III.	Oxyopidae Thorell,1870	
7.		Oxyopes birmanicus
8.		Oxyopes javanas
9.		Oxyopes lineatus
10.		Oxyopes shweta
11.		Oxyopes sunandae
IV.	Philodromidae Thorell,1870	
12.		Tibellus elongatus
V.	Pisauridae Simon,1890	
13.		Perenethis venusta
14.		Polyboea vulpina
15.		Thalassius albocinctus
VI.	Salticidae Blackwall, 1841	
16.		Asemonea tenuipes
17.		Carrhotus viduus
18.		Epeus tener
19.		Hasarius adansonii
20.		Hyllus semicupreus
21.		Menemerus bivittatus
22.		Phidippus yashodharae
23.		Plexippus paykulli
24.		Plexippus petersi
25.		Telamonia dimidiata
VII.	Sparassidae Bertkau 1872	

26.		Heteropoda leprosa
27.		Heteropoda nilgirina
28.		Heteropoda venatoria
29.		Olios milleti
VIII.		Theraphosidae Thorell,1870
30.		Ischnocolus khasiensis
IX.		Thomisidae Sundevall,1833
31.		Camaricus formosus
32.		Misumena chrysanthemi

**Table 2: Webless spider families and observed individuals in different habitats.**

Family	Total		Habitat				No. of observed individuals
	Gen- era	Spe- cies	resi- dential	agri- cul- tural	jun- gle	marshy	
Hersiliidae	1	1			2		2
Lycosidae	2	5	13	14	86	20	133
Oxyopidae	1	5		83	64		147
Philodromidae	1	1			4		4
Pisauridae	3	3	2	6	20	21	49
Salticidae	9	10	43	56	86	22	207
Sparassidae	2	4	28		23		51
Theraphosidae	1	1			3		3
Thomisidae	2	2	4				4
09	22	32	90	159	288	63	600

It is also observed that spiders are found in large scale in jungle than in other habitat and a few numbers of spiders are also found in marshy areas in the district (Table 2). The table shows that the spider family Hersiliidae being almost rare in the district and the **Salticidae** family is found abundantly in Barpeta district contributing 34.5% of the total webless spider family found in the district.

**Table 3: Alpha, Beta and Gamma diversity estimate the webless spider species in different habitats of Barpeta district.**

Diversity	HABITATS			
	RESI- DENTIAL	AGRICUL- TURAL	JUN- GLE	MARSHY
Alpha	15	19	28	13
Beta	Residential/ Agri- cultural	Agricul- tural/ Jungle	Jun- gle/ Marshy	Marshy/ Residential
Gamma	32			

The table 3 shows that Jungle area is rich in spider species with alpha diversity as 28 whereas the Residential and Marshy area consist of least spider species with alpha diversity calculated as 15 and 13 respectively.

The table 3 shows that the beta diversity is more when comparison is done between Residential and Agricultural i.e. 17 and least in Agricultural and Jungle area with 10.

Gamma diversity is the measure of overall diversity of the region i.e. the total number of web less spider species in

the Barpeta District of Assam is 32 (Table 3).

#### DISCUSSION:

During the extensive survey for a period of two years in the Barpeta District of Assam, 32 species of web less spiders belonging to 22 genera of 09 families were found. The family Hersilidae was almost rare and the Salticidae family is abundantly found in the district. As no previous work on spiders has been conducted in this area, thus the present study represents new distribution records for all species recorded.

In order to get good representation of all areas, study was conducted in diversity of habitats. During the study, distribution of spider is found more in jungle followed by agricultural area, moderate in residential area and lower in marshy area, which is clear from the Alpha diversity estimate in different habitats. This is possibly due to nearly 28% undisturbed forest covering the district. Species diversity would possibly be reported more in the agricultural area, if there is judicious use of pesticides and fertilizers in agricultural fields. The Beta diversity is more when compared between residential and agricultural area, which shows that the habitats have lots of unique species. But agricultural and jungle area records least beta diversity.

The present study brings out only a portion of the diversity of the spider wealth that remains concealed in the landscape of Assam (Barpeta district). The further prospective study will indeed raise the number of spider species exponentially. There is a need to realize the importance of our biological wealth and continue the research and document them. As an inhabitant of the Barpeta district, the study is done in the area of Barpeta district, but it is the representation of the state Assam and further research is needed to be planned in the other district of Assam.

#### REFERENCE

1. Cardoso, P., Pekar, S., Jocque, R. & Coddington, J.A. (2011). Global Patterns of Guild Composition and Functional Diversity of Spiders. *PLoS ONE* 6(6): e21710. | 2. Coddington, J.A., Griswold, C.E., Silva, D., Penaranda, D. & Larcher, S. (1991). Designing and testing sampling protocols to estimate biodiversity in tropical ecosystems. Pp. 44–60. In *The unity of evolutionary biology: Proceedings of the Fourth International Congress of Systematic and Evolutionary Biology*. (E.C. Dudley, ed.). Dioscorides Press, Portland, Oregon. | 3. Meffe, G.K., Nielsen, L.A., Knight, R.L. & Schenborn, D.A. (2002). *Ecosystem management: adaptive, community-based conservation*. Washington, D.C., U.S.A: Island Press. | 4. Sebastian P.A. & Peter K.V. (2009). *Spiders of India*. Universities press, India. | 5. Sebastian, P.A., Mathew. M. J. & Beevi, S.P. (2005). The spider fauna of the irrigated rice ecosystem in central Kerala, India across different elevational ranges. *The Journal of Arachnology* 33:247–255. | 6. Tikader, B. K. (1987). *Handbook of Indian Spiders, Zoological Survey of India, Calcutta, India*. | 7. Turnbull, A.L. (1973). Ecology of the true spiders (Araneomorphae). *Annual Review of Entomology* 18:305–348. | 8. Whittaker, R.H. (1972). Evolution and measurement of species diversity. *Taxon* 21:213-251. |