



# A preliminary study on spider diversity and distribution in Goalpara district of Assam, India

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## ABSTRACT

A preliminary study was conducted to document spider diversity in Goalpara District, Assam state in India. The study was conducted from January to May 2018. A total of 37 species of spiders belonging to 12 families were identified from the study area. The species were identified using keys for Indian spiders from Tikader 1987; Platnick 2011. The spiders impose natural check on insect pest populations. Methodology included active searching at all layers from ground level to tree canopy layer accessible easily for hand collecting and visual surveys. Randomly selected study sites and have taken 10 political areas and in each area's 3 plots were selected. Amongst the families, the Araneidae was the most abundant (14 species) with orb weavers being the dominant guild type. A guild structure analysis of the spiders revealed eight feeding guilds such as Orb weavers, Ground hunters, Ambusheus, Ground runners, Stalkers, Space web builders, Branch dwellers, Foliage hunters.

**Keywords:** Spider, species diversity, guild structure, Goalpara District, Assam, India

## INTRODUCTION

Spiders are an ancient and functionally important invertebrate, resides in all types of habitats. Spiders included in class Arachnida, order Araneae under Phylum Arthropoda, are an ancient and successful group of invertebrate animals. The members of the class Arachnida are generally characterised by two body regions, the cephalothorax having four pairs of segmented legs attached to it, and the abdomen. The abdomen is soft while the cephalothorax is harder. Most arachnids are carnivorous, typically preying on insects and other terrestrial organisms. Spiders have helped in biological control of insects; without spiders some insects would have reached pest proportions. Spiders can only consume liquids, as they lack chewing mouthparts. They use chelicerae, pointed appendages at the front of the cephalothorax, to grasp prey and inject venom.

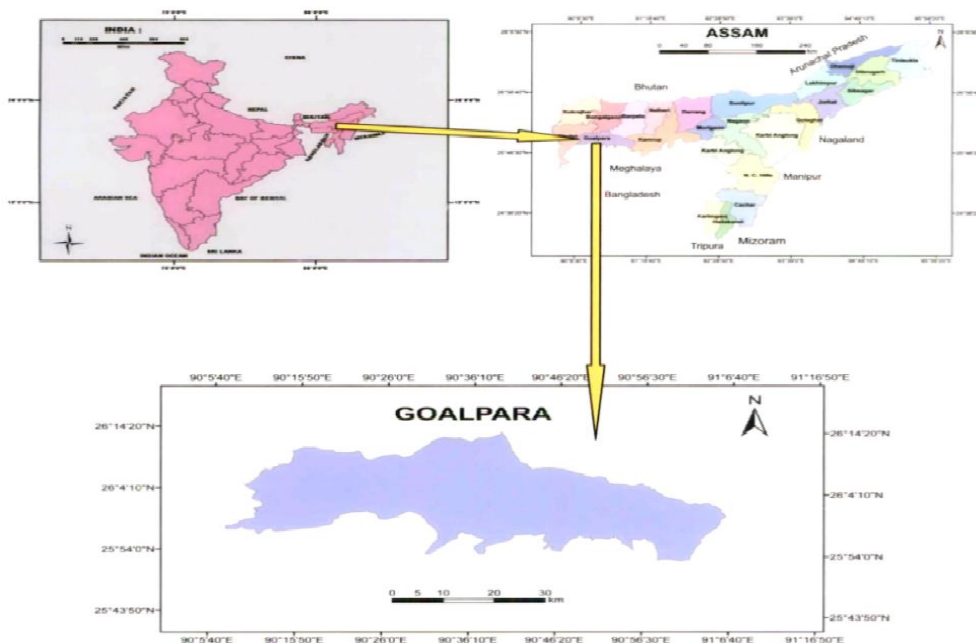
Among animals spiders represent 18% of diversity. The order Araneae ranks seventh in total species diversity among all other groups of organisms. Spiders can play a very important role in regulating the terrestrial arthropod populations. All spiders make silk which is squirted out of the spinnerets. Spiders have six spinnerets that make up to seven different kinds of silk (Candelas and Cintron, 1981). Silk is secreted in fluid form which solidifies as it comes in contact with air into strands of silken line. Silk is made up of a protein fiber which is the strongest natural made substance in the World (Gosline et al., 1999). Spiders use silk in many ways: for draglines, for webs, for egg cases, for holding prey, for building nurseries, for transportation, as in ballooning, and for snaring prey (Tkader, 1987). All spiders have poison glands but few of them are dangerous to man (Gajbe, 2004d). All spiders are venomous but only a few species are venomous enough to harm humans. There are some spiders which could be dangerous like the Black widow spider. The venom of brown recluse spider is harmful to humans. Spider venoms are very diverse in chemical composition and modes of action (McCrone, 1969; Adams and Olivera, 1994). Spider venom is mainly two types. Some spider venom is neurotoxic, i.e. it affects the human nervous system. The black widow venom is neurotoxic and other spider venom is necrotic and causes skin sores, ulcers etc. The venom of brown recluse spiders is necrotic.

The most characteristic features of spiders is their ability to produce silken threads. All spiders possess spinning glands which they use not only for making egg sacs (Cocoons) and draglines but also building traps and webs. In order to familiarize the spider systematic and ecology the following natural history of some spider families funnel web spiders (Agelenidae), orb-web spiders (Lycosidae), crab spiders (Thomisidae) jumping spiders (Salticidae) in brief will serve as an introduction to the succeeding chapters.

**MATERIAL AND METHODS**

**Study area**

The present study has been carried out in Goalpara District, Assam (India). The study was carried out during January 2017 to December 2017. Goalpara district of Assam is located between 25°33' and 26°12' North latitude and 90°07' and 91°15' East longitude. The district covers an area of 1,832 sq.km. It is bounded by West and East Garo Hill districts of Meghalaya on the South and Kamrup district on the East, Dhubri district on the West and mighty river Brahmaputra all along the North. The district is in the south western part of the state bordering National boundary between Assam and Meghalaya and adjacent to international boundary between India and Bangladesh in the west.



**Figure 1:** Study area Goalpara District of Assam State.

**Study area map:**

Location: 25° 53'- 26° 30 N and 90° 07'- 91° 05' E

**Methods :** Visiting to the field and lines transect will used to search the spider in different components. Transect will choose in random with semi quantitative sampling method to record the spider. Spiders were identifying in different compartment and photos were taken. No spider will be collected.

**Study Period:** The study was carried out during January 2018 to May 2018. The year was divided into four seasons: winter (December to February), summer (March to May), monsoon (June to September) and post monsoon (October to November). The sampling was made between 9 A.M. to 6 P.M. under suitable weather conditions for spider collection, temperature between 15 – 38°C.

**Sampling:** Visual search sampling method used by Sebastian et al. (2005) was adopted in this study to sample the spider fauna from quadrants selected at random of selected study sites. The advantage of visual search sampling method is that spiders remain undisturbed and can be censused repeatedly (Lubin, 1978). Random sampling was done from the same selected study sites in all four seasons. A total of 36 hours was spent in each site across the four seasons. We have taken all 10 political areas and in each area's 3 plots were selected. As a whole, we have divided whole area in 30 different plots. Each plot is again divided into 4 different types of habitat i.e. Grassland cum bushy, Marshy, Residential and agricultural area.

Spiders were taken photographed in field as much as possible to document the natural history. Taxonomic identification of the specimen were done with the help of available literature – 'Handbook of Spiders' by Tikader, 1987 and 'Spiders of India' by Sebastian and Peter, 2009.

**RESULTS AND DISCUSSION**

The present study, conducted in Goalpara District of Assam, has made a significant contribution towards increasing knowledge of spider species distribution in this area. During the survey for 6 month in Goalpara District of Assam 37 species of spiders belonging to 12 families were found in the study area. No previous research on spiders has been carry out in this area, so the study represents new distribution records for all species recorded. The difference in quantity and quality of spider fauna is related to the collection time, sampling method and other geographic features of the area.

During the study period a total 37 species belonging to 12 families of spiders were identified. Out of which highest number of species belonging to family Araneidae (14 species) followed by Tetragnathidae (5 species), Pholcidae (4 species), Salticidae (3 species), Thomisidae (2 species), Sparassidae (2 species), Nephilidae (2 species), Corinnidae (1 species), Hersiliidae (1 species), Lycosidae (1 species), Oxyopidae (1 species), Uloboridae (1 species).

**Table 1: ???**

Family	Species	No. of Individuals	Guild type
Araneidae Simon, 1895	<i>Araneus mitificus</i> Simon, 1886	27	Orb weavers
	<i>Argiope aemula</i> Walckenaer, 1842	35	Orb weavers
	<i>Argiope anasuja</i> Thorell, 1887	38	Orb weavers
	<i>Argiope catenulate</i> Doleschall, 1859	25	Orb weavers
	<i>Argiope pulchella</i> Thorell, 1881	55	Orb weavers
	<i>Cyclosa bifida</i> Doleschall, 1859	16	Orb weavers
	<i>Cyclosa confragata</i> Thorell, 1892	24	Orb weavers
	<i>Cyrtophora cicatorosa</i> Stoliczka, 1869	22	Orb weavers
	<i>Cyrtophora citricola</i> Forsskal, 1775	24	Orb weavers
	<i>Gasteracantha hasselti</i> CL Koch, 1837	11	Orb weavers
	<i>Neoscona mukerjei</i> Tikader, 1980	28	Orb weavers
	<i>Neoscona nautical</i> L Koch, 1875	31	Orb weavers
	<i>Neoscona theisi</i> Walckenaer, 1841	9	Orb weavers
	<i>Parawixia dehaani</i> Doleschall, 1859	19	Orb weavers

**Table 1: continued...**

Family	Species	No. of Individuals	Guild type
Corinnidae Karsch, 1880	Castianeira zetes Simon, 1897	29	Ground hunters
Hersiliidae Thorell 1870	Hersilia savignyi Lucas, 1836	30	Ambushers
Lycosidae Sundevall, 1833	Lycosa mackenziei Gravely, 1924	43	Ground runners
Nephilidae Simon 1894	Nephila kuhlii Doleschall, 1859	27	Orb weavers
	Nephila pilipes Fabricius, 1793	25	Orb weavers
Oxyopidae Thorell 1870	Oxyopes shweta Tikader, 1970	33	Stalkers
Pholcidae CL Koch, 1851	Artema atlanta Walckenaer, 1837	46	Space web builders
	Crossopriza lyoni Blackwall, 1867	39	Space web builders
	Pholcus phalangioides Fuesslin, 1775	32	Space web builders
	Smeringopus pallidus Blackwall, 1858	40	Space web builders
Salticidae Blackwall 1841	Hasarius adansonii Audouin, 1826	21	Stalkers
	Plexippus paykulli Audouin, 1826	29	Branch dwellers
	Plexippus petersi Karsch, 1878	21	Stalkers
Sparassidae Bertkau, 1872	Heteropoda nilgirina Pocock, 1901	56	Foliage hunters
	Heteropoda venatoria Linnaeus, 1767	61	Foliage runners
Tetragnathidae Menge, 1866	Leucauge decorate Blackwall, 1864	43	Orb weavers
	Leucauge pondae Tikader, 1970	12	Orb weavers
	Leucauge tessellate Thorell, 1887	33	Orb web weavers
	Opadometa fastigata Simon, 1877	20	Orb weavers
	Tetragnatha mandibulata Walckenaer, 1842	7	Orb web weavers
Thomisidae Sundevall, 1833	Camarius fornicates Thorell, 1890	17	Ambushers
	Oxytate virens Thorell, 1891	11	Ambushers
Uloboridae Thorell, 1869	Zosis geniculata Olivier, 1789	7	Orb weavers
Not Available	Unknown species	49	

**Table 2: Total species of spiders**

Sl. No	Families	Total no. of species
1	Araneidae Simon, 1895	364
2	Corinnidae Karsch, 1880	29
3	Hersiliidae Thorell, 1870	30
4	Lycosidae Sundevall, 1833	43
5	Nephilidae Simon, 1894	52
6	Oxyopidae Thorell, 1870	33
7	Pholcidae CL Koch, 1851	157
8	Salticidae Blackwall, 1841	71
9	Sparassidae Bertkau, 1872	117
10	Tetragnathidae Menge, 1866	115
11	Thomisidae Sundevall, 1833	28
12	Uloboridae Thorell, 1869	7
13	Unknown species	49

Out of the ten sites of the study area, majority of spiders were recorded from semi-manipulated ecosystem where both garden and forest spiders were found. From the results and data, a preliminary status of spiders in Goalpara district is much clear. The study documented the highest of Araneidae family. The largest individuals

collected were in summer season. The spider weaving orb webs are in majority among web weavers. There is an urgent need for updating the database. Exploration of species diversity understanding the habitat ecology, behavior, etc. culminating into a database for the Assam is an imperative.

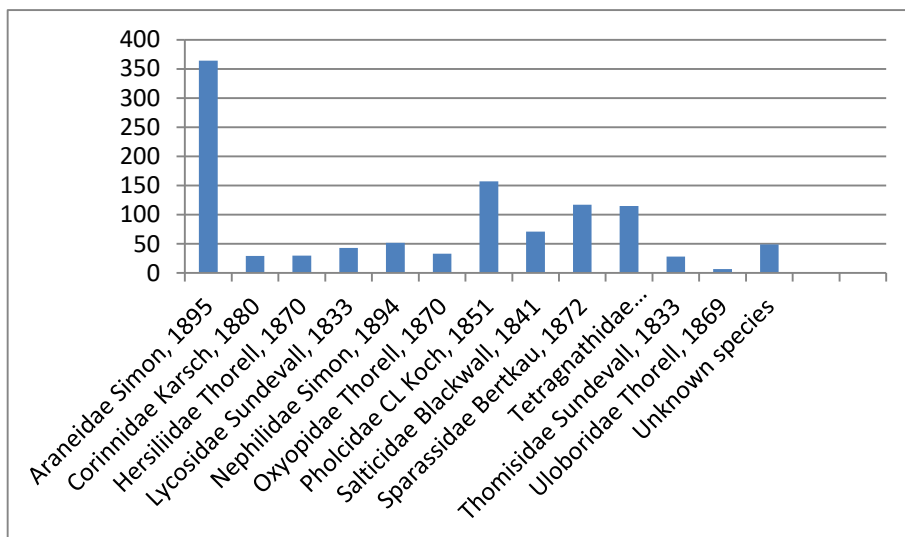


Figure 2: Graph of spiders and their numbers recorded during the study.

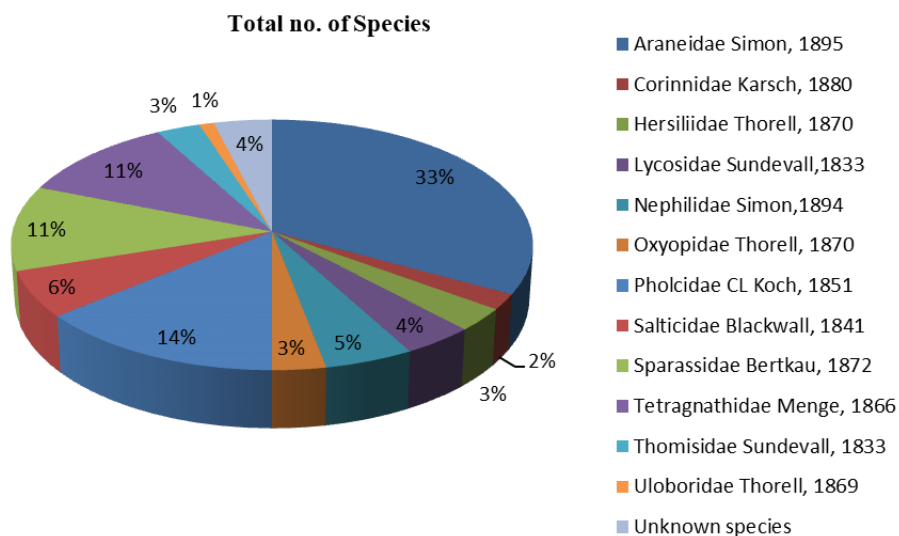


Figure 3: Comparative density (percentage) of spiders recorded during the study.



Image 1: *Araneus mitificus*



Image 2: *Argiope aemula*



**Image 3:** *Argioppe anasuja*



**Image 4:** *Argioppe catenulata*



**Image 5:** *Argioppe pulchella*



**Image 6:** *Cyclosa bifida*



**Image 7:** *Cyclosa confragra*



**Image 8:** *Cyrtophora cicatorosa*



**Image 9:** *Cyrtophora citricola*



**Image 10:** *Gasteracantha hasselti*



**Image 11:** *Neoscona muckerjei*



**Image 12:** *Neoscona nautica*



**Image 13:** *Neoscona theisi*



**Image 14:** *Parawixia dehaani*



**Image 15:** *Castianeira zetes*



**Image 16:** *Hersilia savignyi*



**Image 17:** *Lycosa mackenziei*



**Image 18:** *Nephila kuhlii*



**Image 19:** *Nephila pilipes*



**Image 20:** *Oxyopes shweta*



**Image 21:** *Artema atlanta*



**Image 22:** *Crossopriza lyoni*



**Image 23:** *Pholcus phalangioides*



**Image 24:** *Smeringopus pallidus*



**Image 25:** *Hasarius adansoni*



**Image 26:** *Plexippus paykulli*





**Image 27:** *Plexippus petersi*



**Image 28:** *Heteropoda nilgirina*



**Image 29:** *Heteropoda venatoria*



**Image 30:** *Leucauge decorata*



**Image 31:** *Leucauge pondae*



**Image 32:** *Leucauge tessellata*



**Image 33:** *Opadometa fastigata*



**Image 34:** *Tetragnatha mandibulata*



Image 35: *Camaricus formosus*



Image 36: *Oxytate virens*



Image 37: *Zosis geniculata*

From the Figure 1 (bar diagram) shown below we have observed that wild spiders are found in large scale than domestic spiders and a few number of marshy spiders are found in the district. From the study we have found that Aerial collecting method of spider is more significant than all other trapping techniques. By Aerial method, we have collected more than half of the sample spiders in our study. From the survey, we found that maximum families and species were abundant during the summer season and least during monsoon and winter. Thus, clarifies that they are more active during summer. Thus, the study shows unique diversity of spiders in Northeast India. Also, it reveals the importance of spiders in an ecosystem for its prevalence.

## CONCLUSION

In the study it was found that orb weaver spider diversity is moderated in agro ecosystem of the area. . The fauna of farmland is significantly poorer than of natural habitats because of frequent human impact as observed by Wolak (2002). Surveys of Thomas (1990, 1997) had shown that after insecticide application,

spiders densities in the sprayed field were significantly lower than the unsprayed field.

Vegetation structure is one of the essential factors for spiders. The growth of weeds promotes the migration of spiders from nearby habituated (Van Den Bosh & Tefford, 1964), which we have observed. Variations in species composition can be explained by the habitat preferences resulting from behavioral and morphological characteristics of the spiders.

All spiders are predators, feeding almost entirely on others arthropods, especially insects. Some spiders are active hunters that chase and overpower their prey. These typically have a well-developed sense of touch or sight. Other spiders instead weave silk snares, or webs, to capture prey. Webs are instinctively constructed and effectively trap flying insects. Many spiders inject venom into their prey to kill it quickly, whereas others first use silk wrappings to immobilize their victims. In conservation efforts, often "charismatic" species like birds and mammals draw most attention and Ecological significant groups like spiders are often neglected. Ironically, the spider diversity in Assam is still not fully

explored or understood (Manoranjan Barman ,1975, 1979) has done a work on spider of Khasi and Jantia hills of Meghalaya, N.E. region in seventies of last century. B.K.Tikader (Tikader,1970) and B.K. Biswas (Biswas,2000a,b,2003,2004,2006,2007) also collected some information on diversity of spiders of Northeastern states like Tripura, Meghalaya, Sikkim , Manipur, Arunachal Pradesh and Mizoram except Assam. As spiders species of Assam are poorly documented & no research has been done so far for the applied use of spider & its related product in this region.

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