



**'Diversity and Distribution of Spiders in
Selected ecosystems in Dhemaji District of
Assam, India'**

A

Project Report Submitted

to

**Department of Zoology (PG)
Silapathar Science College,
Dhemaji, Assam**



**In partial fulfilment of the requirements for the
degree of Masters of Science**

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JULY, 2022

*Dedicated to my family and
teachers*

DECLARATION

I **Ruchi Pandey**, bearing Roll No. **202820024015**, Registration No. **451628220** dated: 07-12-2021, hereby declare that the subject matter of the dissertation entitled "**Diversity and Distribution of spider in selected ecosystem in Dhemaji District of Assam, India**" is the record of work done by me. The dissertation is being submitted to Silapathar Science College for the degree of Master of Science in the Department of Zoology (PG) and not been submitted to any other institute for obtaining any degree.

Place: Silapathar Science College

Date: 23 July, 2022

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CERTIFICATE

Certified that the dissertation entitled "**Diversity and Distribution of Spiders in Selected ecosystems in Dhemaji District of Assam, India**" for the award of Master of Science degree (as final semester practical project) is the outcome of a bonafide research work. This work has not been submitted previously for the obtaining any other degree of this or any other institution. I recommended that the project work may be placed before the examiners for consideration of award of the degree.

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ABSTRACT

Spiders represent one of the most important components of global biodiversity. They are abundant and widespread in almost all ecosystems and play a significant role in ecology by being exclusively predatory thereby maintaining the ecological equilibrium. Spiders are also good indicators of environmental health. Their presence in diverse microhabitats acts as an important bio-indicator. To know the diversity and abundance of spider in Dhemaji district of Assam, India a study was carried out at three different sites viz:- agricultural area, forest area and urban area from May 2022 to July 2022. Collections of specimen are made mostly during day time from 09:00 AM to 06:00 PM. Trapping and survey techniques include – trapping, aerial hand and ground hand methods. Among the three sites highest species were recorded from site -3 (agricultural area, $n = 21$) followed by site -1 (forest area, $n = 14$) and site- 2 (urban area, $n = 09$). A total of 267 individuals were encountered with variation among the sites with site -3 (agricultural area, $n = 115$) being highest, followed by site-1 (forest area, $n = 80$) and site- 2 (urban area, $n = 72$). A total of 27 species were recorded belonging to 12 families, 24 genera. The recorded families were- Araneidae, Desidae, Lycosidae, Oxyopidae, Pholcidae, Pisauridae, Salticidae, Scytodidae, Sparassidae, Tetragnathidae, Theridiidae, Thomisidae. Among these families the major percentage of spiders occurred in the family Araneidae (22%, $n = 6$), followed by Lycosidae and Salticidae each (18%, $n = 5$), Oxyopidae and Sparassidae (7%, $n = 2$) each and the rest of the others seven families (3%, $n = 1$). The spiders were classified in five ecological guilds viz., ambushers, foliage runner, ground runners, orb-web builders and stalkers based on their foraging mode. The highest percentage contribution was shown for orb-web builders (37.04%) followed by stalkers and ground runners (22.2%) each, foliage runners (11.1%) and ambushers (7.4%). Diversity and distribution indices showed increasing dominance index of species (Simpson index); 0.0742 (site-3), 0.1378 (site-1), and 0.2704 (site-2). Diversity indices of Shannon Weiner was higher at site-3 agricultural area with value of 2.7303 followed by 2.1773 in site-1 (forest area) and least at site-2 (urban area) with value of 1.6132. The evenness E value calculated for the three sites indicates the site-3 agricultural area (0.8968) to be the highest as compared to the E value for the site-1 forest area (0.8250) and site-2 urban area (0.7342). As the spiders are excellent bio-indicators, the present studies on their diversity and abundance provide important biological information about the ecological condition of the study area.

Keywords: Spiders, Diversity, Distribution, Dhemaji, Assam.

Spiders are an important albeit poorly studied group of arthropods that play a major role in the regulation of other invertebrate population in most ecosystem. They are identified for their webs and web silk with future prospects all spiders can make use the silk to wrap the prey, to form and to make egg sacs and nests. They are ubiquitous in terrestrial ecosystems and abundant in both natural and agricultural habitats. Despite their size, the ecological importance of spider is undeniable as they are abundant predators of other forest arthropods. They play a significant role in the regulation of insects and other invertebrate population in most ecosystems.

Today, class Arachnida comprises of 11 orders and approximately 640 families, 9,000 genera and 93,000 described species (Coddington and Colwell, 2001, Coddington, 2005). Spiders (Order Araneae) are the largest order of Arachnids and rank seventh in total species diversity among all other groups of organisms. They are ancient animals with a history going back over 350 million years (Chetia and Kalita, 2012).

Spiders represent one of the most important components of global biodiversity. They are abundant and widespread in almost all ecosystems and play a significant role in ecology by being exclusively predatory thereby maintaining the ecological equilibrium. Spiders are also good indicators of environmental health. They play important roles in the dynamics of a specific habitat and are sensitive to habitat loss, climatic change and environmental upheavals (Chetia and Kalita, 2012). The ubiquity, diversity and ecological role of spiders make them a promising focal group. However, despite their fundamental roles in most natural ecosystem, they have largely been ignored in conservational studies.

The current world list of spiders includes 46,879 species under 4,062 genera distributed over 112 families (Anonymous, 2017). The final count in India is represented by 1,686 species belonging to 438 genera of 61 families (Keswani, et al., 2012, Roy et al., 2017). In India work by Singh et al., (2021) highlighted the faunal diversity of spiting spiders and have also emphasized upon the need for conservation of them.

Assam is one of the states in North-east India having rich floral and faunal diversity but, till date little work has been carried out on this fauna. Some of the published studies in Assam are those of Gibbon wildlife Sanctuary, Jorhat (Chetia and Kalita, 2012), Barpeta, Assam (Singh et al., 2012), Upper Assam- Jcypore Reserve forest, Kaziranga National park

(ASBB, 2015), Chakrashila Wildlife Sanctuary (Basumatary and Brahma, 2017), tea gardens (Roy et. al., 2010), rice ecosystems in Northern Assam- Lakhimpur, Sonitpur, Darrang and Dhemaji district of Assam (Saikia and Baruah, 2008), 16 species from paddy and horticultural ecosystems in Jorhat, upper Assam (Borkataki et al., 2018). As spider species of Assam are not well documented and very little research has been done so far on the applied use of spider and it's related products in this region. They form one of the ubiquitous groups of predaceous organisms in the animal kingdom male and female spider of the same species is often different shapes and size dimorphism.

Spiders eat lots of insects, mostly those smaller than themselves. Some live in trees and shrubbery some live on the ground and some even tunnel underground. A wide variety of species also utilize regions where human live such as houses, farms, barns, garden, basements foundation and more. They are versatile enough to live in all kinds of habitats hot or cold. There are spiders that live in tropical climates, while others that live in every climate in between. There is no one uniform environment and temperature that they all live in. Spiders play an integral part of ecosystem because they are insect controller and have important role in food source (Deka, et al., 2016, Borkataki, et al. 2018, Prasad, et al., 2020). This kind of studies will also help in the management of agricultural/horticultural pest and surely help in elevating the issues related to degradation of crops by pest in Assam and Northeast India which is primarily an agricultural based economy.

Thus, understanding the need for the spiders in an ecosystem we had worked on below mentioned objectives during the course of this project:

- 1. To conduct survey to understand the diversity of spiders in three selected sites in Dhemaji district of Assam.*
- 2. To understand the differences in the species distribution pattern of spiders between the three study sites.*

Arachnids are an important but generally poor studied group of class Arthropoda. Despite the lack of interest in spiders, many information on spider fauna are available which provide an outline of spider fauna in various regions even including Northeast India. Many authors have put in an effort to popularize spider biology and educate the general public.

Though North-East region is very rich in biological diversity but, very little works on spiders have been carried out in this area with some scare work that was conducted till date. Most of these works were on species diversity enumeration, role of spiders as natural enemy, species composition in different habitats, records of new species, ethno-zoological prospects of spiders, etc. Fage (1924) described a few species from Garo Hills of state Assam (Presently Meghalaya). Tikader (1966) and Manoranjan Barman (Barman, 1979) has conducted work on spiders of Khasi and Jaintia hills of Meghalaya. B. K. Tikader (Tikader, 1970a) also collected some information on diversity of spiders of Northeastern states from the states of Tripura, Meghalaya, Skikim, Manipur, Arunachal Pradesh and Mizoram.

Ironically, in Assam the spider's diversity are not fully explored and are poorly documented so far with some exceptional studies that were conducted from Golaghat, Barpeta, Jorhat, Upper Assam region, North Lakhimpur, etc. Among these studies few have been reported below. Some basic studies were carried out by Pathak and Saha (1998) in rice ecosystem in Barak valley zone of Assam. Saikia and Baruah (2008) had reported 33 species of spiders belonging to 22 genera under 9 families from 2005 to 2007 in Sali and Boro rice agro-ecosystems in North Lakhimpur. Singh et al., (2012) recorded five families of web-less spider and 69 species of 16 families in Barpeta district, Assam. Basumatary and Brahma (2017) worked on check listing of spider from chakrashila Wildlife Sanctuary, Assam. Chetia and kalita (2012) worked on the diversity and distribution of spiders from Gibbon Wildlife Sanctuary, Assam.

Species distribution related work on spiders in Barpeta district were conducted by Singh et al., (2012). Saikia and Baruah (2008) worked on relative abundance of rice field in Northern Assam (Sonitpur, Lakhimpur, Dhemaji and Darrang). Tikader (1966) studied some crab-spider under family Thomisidae from khasi and Jaintia Hills, Assam. Ahmed et al., (2014) work from Agricultural field of Sonitpur District, Assam had recorded a new spider species under wadicosa Genus (suborder: Araneae; Family: Lycosidae). Pandit (2019)

reported the diversity of common garden and house spider in Tinsukia district of Assam. Ahmed (2018) preliminary study on spider diversity in Matia, Goalpara district, Assam. Rudra et al., (2020) carried his work on understanding effects of weather parameters on population build-up of predatory Coccinellids and spider present in Brinjal crop ecosystem of Assam. Rudra et al., (2011) conducted his work in enumeration of spider diversity in paddy and horticultural ecosystem in upper Assam. There is a book published by Assam State Biodiversity Board in 2015 had documented and illustrated spider diversity in upper Assam (Gibbon Wildlife Sanctuary and Jeypore Reserve Forest).

Through the above extensive reviews of available literature from the state of Assam it can be indicated that very few studies were conducted to assess the spider diversity in the Dhemaji district of Assam. So, the proposed study was carried out with an objective to document the spider diversity of Dhemaji district Assam.

Study area:

The present study area belongs to Dhemaji district of Assam, India. Three sites were selected for the study viz., Site-1 (forested area- in Demow), Site-2 (Urban area- in Silapathar) and Site-3 (agricultural area- in Silapathar). Below are the details about the three selected study sites:

Site-1: Demow is a small town in Northern Assam, located about a miles away from the Brahmaputra river. Demow is a small commercial and agricultural spot, located near Highway-37. The location of Demow, Assam, India is 27.127361° N, 97.739922° E. This site was selected to conduct study in forested area.

Site-2: Silapathar is a small town in Dhemaji district of Assam. This site was selected for conducting study in agricultural area. The agricultural fields were mostly close to the bordering area in Assam.

Site-3: Silapathar is a small town area committee in Dhemaji district of Assam located at $26^{\circ}12'21.49''$ N, $93^{\circ}48'34.24''$ E. This site was selected to conduct study in urban area.

Methods:-

The study was carried during monsoon season during the month of May 2022 to June 2022. Most of the survey and collection were made between the hours of 09:00 A.M. to 06:00 P.M. and at night time between 08:00 P.M. to 12:00 P.M.

Collection method:

The following techniques were carried out following the works of Basumatary and Brahma (2017). The specimens were either collected using below mentioned collection techniques. For the study, spiders were looked for in a variety of habitats in the selected sites viz., forested area, urban area and agricultural area along the human dwellings, buildings, gardens, fallow land and around water bodies like ponds. Specimens were also looked for loose bark, in leaf litter and flowers.

Methods included-visual searching for the spiders as far distinct vision is possible. Ground search-hand collection, was done under leaf litter, fallen or dry wood whereas some spiders were hand collected. Sweep netting was done for the foliage dwelling spiders covering the herbs and shrubs in the area. Beating trap was done with a wooden stick and an inverted

umbrella placed under the trees to catch the spiders which were unable to reach or seen hanging above.

Preservation and identification:

When a spider was sighted, it was photographed in its microhabitat with phone camera. The spiders were captured in air-tight plastic collection containers, and then were preserved in storage containers with 70% ethanol. Spiders were picked and transferred using forceps. Collected spiders were identified with the help of available literature, handbook and through online websites – www.nmbe.ch, www.inaturalist.org, www.indiaxbiodiversity.org after separated into orders and families, with voucher specimens preserved in the departmental laboratory.

Data analysis:

The collected data on aquatic insects were analysed using Microsoft excel and other diversity indices formulas which are as follows:

Shannon Wiener diversity Index (1963)

To calculate the diversity of aquatic insect, Shannon index (H') as a measure of species richness and abundance was applied. Shannon index is derived using the following equation:

$$H = - \sum_{i=1}^S p_i * (\ln p_i)$$

Where:

H = Shannon Wiener index for species diversity,

S = Number of species,

p_i = Proportion of total sample belonging to the i th species, and

\ln = Natural log

In addition, Simpson's index (D) and the Evenness index (E) are evaluated as a measure of species dominance and evenness, respectively (Magurran, 1988).

Simpson's index (D)

$$D = \sum_{i=1}^S (p_i)^2$$

Where:

D = Simpson's Index of species diversity

p_i = proportion of total sample belonging to the i^{th} species As biodiversity increases, Simpson's Index decreases.

Evenness index (E)

$$E = H/H(\max) = \sum (p_i(\ln p_i)/\ln S)$$

where H_{\max} is the natural logarithm of the total number of species

Community composition:

In this present study a total of 267 individuals of spiders were encountered and identified into 27 species, belonging to twelve families (figure 1). The major percentage of spiders occurred in the family Araneidae (22%, $n=6$), followed by Lycosidae and Salticidae each (18%, $n=5$), Oxyopidae and Sparassidae (7%, $n=2$) each and rest of the other seven families (3%, $n=1$) (figure 1, table 1).

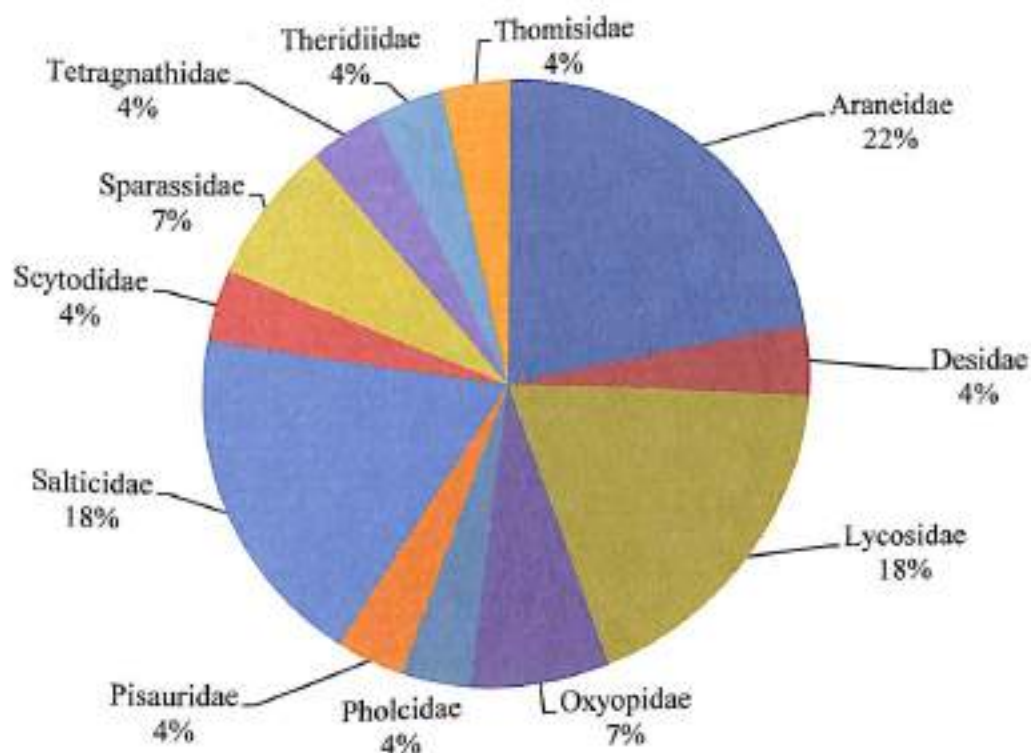


Figure 1. Percentage contribution of different families of spiders encountered.

Generic and species diversity:

The Generic diversity was found to be high in Araneidae, Lycosidae and Salticidae, ($n=05$ each) followed by Desidae, Oxyopidae, Pholcidae, Pisauridae, Scytodidae, Sparassidae, Tetragnathidae, Theridiidae and Thomisidae ($n=1$ each) (Figure 2).

Whereas, the species diversity among the family was found to be high with 02 number of species in Araneidae followed by Lycosidae and Salticidae with 05 species each, Oxyopidae and Sparassidae with 02 species each and rest of seven other families contributed 01 species each (figure 2).

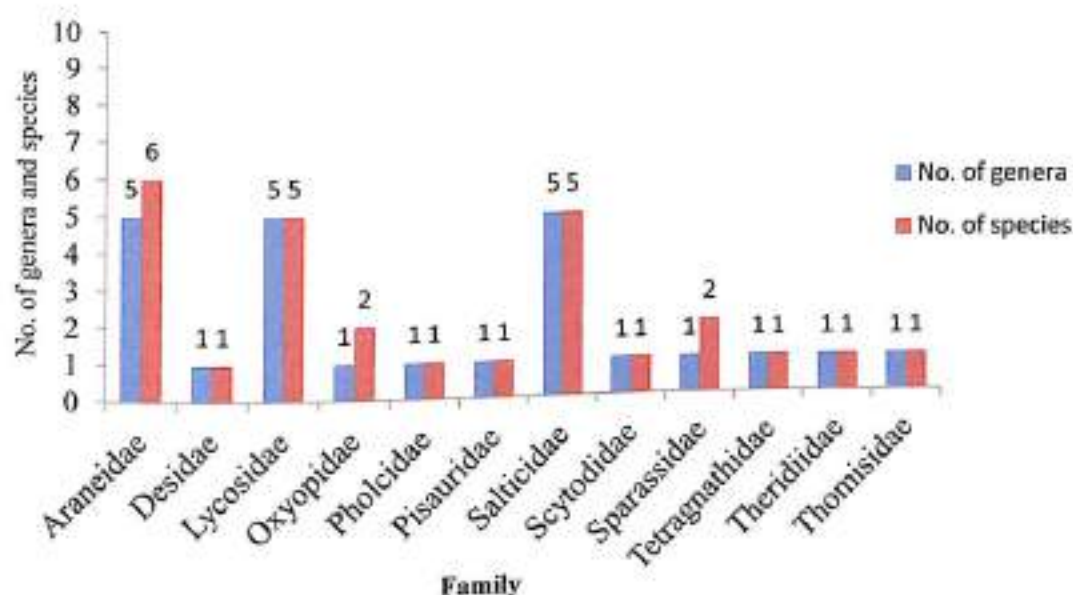


Figure 2. Comparative distribution of generic and species diversity of spiders under different families.

Guild type classification:

The spider guild classification was composed according to the families reported during the study. The spiders were classified into 05 ecological guilds viz., ambushers, foliage runners, ground runners, orb-web builders and stalkers based on their foraging mode (figure 3). The highest percentage contribution was shown for orb-web builders (37.04%) followed by stalkers and ground runners (22.2%) each, foliage runners (11.1%) and ambushers (7.4%) (figure 3).

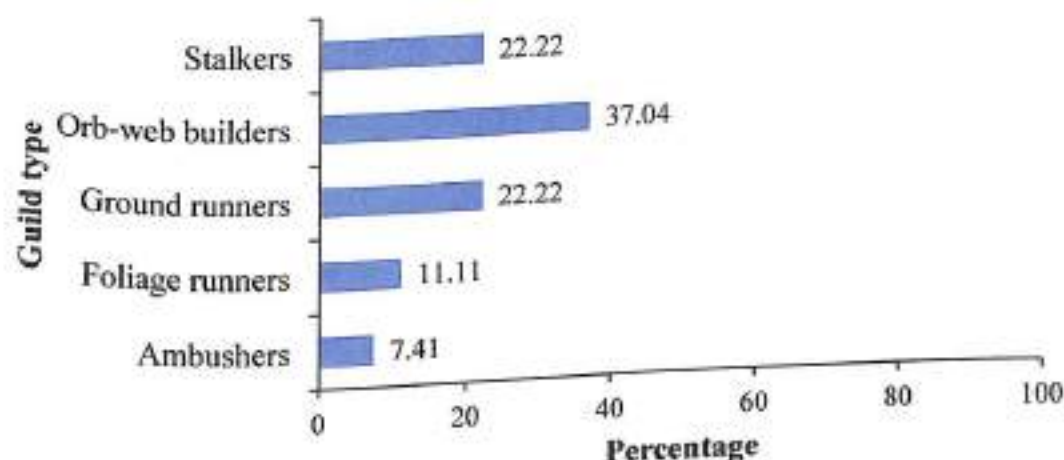


Figure 3. Percentage contribution of different guild structures shared by spiders.

Table 1. Account of total number of individuals of different spider species encountered under respective families during the present study.

Sl. No.	Family	Species encountered	No. of individuals
1	Araneidae	<i>Larinioides sclopetarius</i> (Clerck, 1757)	0
2		<i>Nephila pilipes</i> (Fabricius, 1793)	15
3		<i>Argiope pulchella</i> (Thorell, 1881)	1
4		<i>Gasteracantha kuhli</i> (CL Koch, 1837)	7
5		<i>Gasteracantha hasselti</i> (CL Koch, 1837)	1
6		<i>Araneus mitificus</i> (Simon, 1886)	3
7	Desidae	<i>Metaltella simoni</i> (Keyserling, 1878)	55
8	Lycosidae	<i>Pardosa</i> sp.	7
9		<i>Pirata piraticus</i> (Sundevall, 1833)	6
10		<i>Trochosa urbana</i> (O. Pickard-Cambridge, 1876)	5
11		<i>Arctosa</i> sp.	11
12		<i>Allocosa</i> sp.	7
13	Oxyopidae	<i>Oxyopes birmanicus</i> (Thorell, 1887)	15
14		<i>Oxyopes javanus</i> (Thorell, 1887)	8
15	Pholcidae	<i>Pholcus phalangioides</i> (Fussli, 1775)	22
16	Pisauridae	<i>Dolomedes</i> sp.	7
17	Salticidae	<i>Plexippus paykulli</i> (Audouin, 1826)	10
18		<i>Hasarius adansoni</i> (Audouin, 1826)	15
19		<i>Anasaitis canosa</i> (Walckenaer, 1837)	22
20		<i>Telamonia dimidiata</i> (Simon, 1899)	2
21		<i>Carrhotus viduus</i> (C. L. Konch, 1846)	13
22		<i>Scytodes globule</i> (Nicolet, 1849)	5
23	Sparassidae	<i>Heteropoda venatoria</i> (Bertku, 1872)	3
24		<i>Heteropoda nilgirina</i> (Pocock, 1901)	3
25	Tetragnathidae	<i>Tetragnatha mandibulata</i> (Walckenaer, 1842)	5
26	Theridiidae	<i>Lutrodeus</i> sp.	8
27	Thomisidae	<i>Camariensis formosus</i> (Thorell, 1887)	11
Grand total			267

Site-wise distribution of species:

Among the three site the highest reports of spider species were from site-3 (agricultural area, n= 21) followed by site -1 (forest area, n= 14) and site -2 (urban area, n= 09) (table 2, figure 4). Whereas, site-wise the highest individuals were encountered (n=115) from site-3 (agricultural area), followed by site-1 (forest area, n=80) and site -2 urban area (n=72).

Table 2. Site-wise presence (+) and absence (-) of spider species in three study sites.

Sl. No.	Species encountered	Site-1 (Forest)	Site-2 (Urban)	Site-3 Agricultural)
1	<i>Larinioides sclopetarius</i>	-	+	-
2	<i>Nephila pilipes</i>	+	-	+
3	<i>Argiope pulchella</i>	+	-	+
4	<i>Gasteracantha kuhli</i>	+	-	-
5	<i>Gasteracantha hasselti</i>	+	-	+
6	<i>Araneus mitificus</i>	+	-	+
7	<i>Metafeltella simoni</i>	+	-	+
8	<i>Pardosa sp.</i>	+	-	+
9	<i>Pirata piraticus</i>	-	-	+
10	<i>Trochosa urbana</i>	-	-	+
11	<i>Arctosa sp.</i>	-	-	+
12	<i>Allocosa sp.</i>	-	-	+
13	<i>Oxyopes birmanicus</i>	+	-	+
14	<i>Oxyopes javanus</i>	+	+	+
15	<i>Pholcus phalangioides</i>	-	-	+
16	<i>Dolomedes sp.</i>	+	+	+
17	<i>Plexippus paykulli</i>	-	-	+
18	<i>Hasarius adansonii</i>	-	-	+
19	<i>Anasaltis canosa</i>	+	+	+
20	<i>Telamonia dimidiata</i>	-	+	-
21	<i>Carrhotus viduus</i>	+	-	+
22	<i>Scytodes globule</i>	+	+	-
23	<i>Heteropoda venatoria</i>	-	+	-
24	<i>Heteropoda nilgirina</i>	-	-	+
25	<i>Tetragnatha mandibulata</i>	+	+	-
26	<i>Latrodectus sp.</i>	-	+	+
27	<i>Camaricus formosus</i>	-	09	21
Grand total		14		

‘+’ means presence of species and ‘-’ means absence of species

Spatial variation in species diversity indices across study site:

Present result indicates spider species richness among the three studied sites to be very low at site-2 (urban area, (n= 09), followed by site -1 (forest area, n=21) and site-3 (agricultural area, n=27) (Table 3). Statistical analysis on species distribution in terms of simpson dominance index (D) across the three study site indicated an increasing dominance index of species with 0.0742 in site-3 (agricultural area) followed by 0.1378 in site-1 (forest area) and 0.2704 in site-2 (urban area). The values of D range from 0 to 1, with 0

representing infinite diversity and 1 representing no diversity. Thus, with low value in case of site 3- in agricultural area indicates higher diversity whereas higher value in site -2 (urban area) representing low diversity.

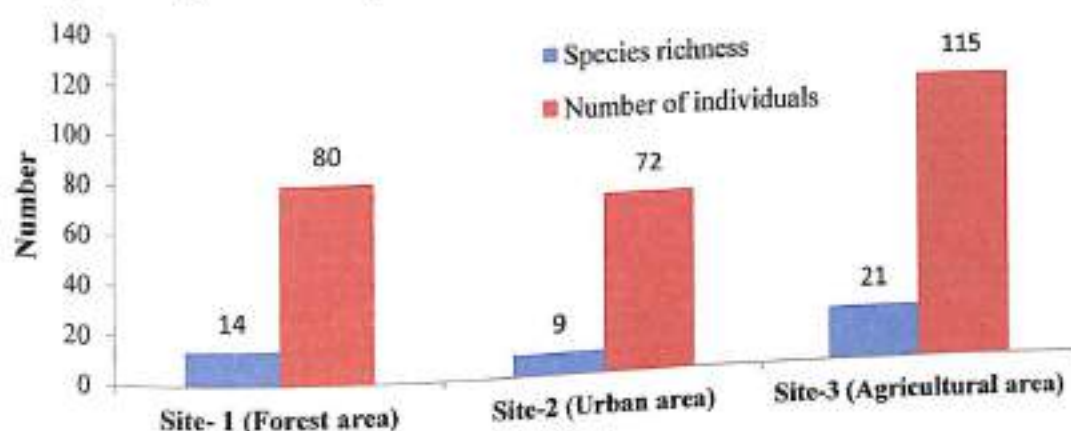


Figure 4. Site-wise variation in species richness and number of individuals recorded for different species of spiders.

Shannon Weiner diversity indices H' represents the diversity of species in a particular community. The lower the value of H' , lower the diversity. A value of $H' = 0$ indicates a community that has only one species. The reported values for H' are found to be higher at site-3 agricultural area with value of 2.7303 followed by 2.1773 in site-1 (forest area) and least at site-2 urban area with value of 1.6132 (Table 3). Thus, reported values here among the sites either close to or above 3.0 indicates that the structure of habitat is stable and balanced; the values under or close to 1.0 indicate that there are factors like pollution, disturbance and degradation of habitat structure in urban area leading to less diversity.

The evenness E value calculated for the three sites indicates the site-3 agricultural area (0.8968) to be the highest as compared to the E value for the site-1 forest area (0.8250) and site-2 urban area (0.7342) (Table 3). The value getting closer to 1 in site 3 (agricultural area) means that the individuals are distributed equally within this site.

Table 3. Species diversity indices across three study sites.

Indices	Site-1	Site-2	Site-3
Species richness	14	09	21
Individual	80	72	115
Simpson dominance index (D)	0.1378	0.2704	0.0742
Evenness (E)	0.8250	0.7342	0.8968
Shannon-Weiner diversity index (H')	2.1773	1.6132	2.7303

*Site-1 (Forest area); Site-2 (Urban area); Site-3 (Agricultural area)

Details of the species of spiders reported from present study:

Species 1: Pantropical jumping spider (*Plexippus paykulli*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order : Araneae

Family : salticidae

Genus : *Plexippus*

Species: *paykulli*



Distinguishing characters: Size females are 9 to 12mm (0.35 to 0.47 in) in body length, while males are 9 to 11 mm (0.35 to 0.43). Male spiders feed less frequently than female spider. It is covered with short greyish hairs with sometimes dramatic accents of red in the male

Habitat: *P. paykulli* is generally found living on and around man-made structures, in particular on buildings, although it has also been recorded from citrus groves and cotton fields.

Distribution: *P. paykulli* is cosmopolitan in distribution. It is native to tropical regions of Africa and Asia. The species has been introduced to the Americas, where it can be found from the Southern United States to Paraguay. It is also present in Australia. They are also found in the islands of Maldives.

Species 2: Andonson's house jumper (*Hasarius adansoni*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order : Araneae

Family : salticidae

Genus : *Hasarius*

Species: *adansoni*



Distinguishing characters: Size female 6-8 mm, Male 5-7 mm. Body size (carapace width; for males and females). Females are cryptic brown, males are black with conspicuous white patches on their palps. The males are mostly black, with a red "mask" and pedipalps that are partly white. A white crescent is present on the back part of the abdomen, and another one on the front part of the opisthosoma. There are two small white dots on the posterior back, and two even smaller ones towards the end. These white areas - especially on the pedipalps - have a nacre-like iridescence.

Habitat: Is a species of jumping spider common and associated with people in most of the warmer parts of the world sometimes collected from the agricultural fields and other habitats.

Distribution: *H. adansoni* is found in warmer climates around the world, for example Malta, India, Japan, Brazil, Taiwan and Australia.

Species 3: Twin flagged jumping spider (*Anasaitis canosa*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order : Araneae

Family : salticidae

Genus : *Anasaitis*

Species: *canosa*



Distinguishing characters: The species is roughly 5-6 mm in length. Two white spots on the pedipalps of the spider look like white flags of surrender when it waves them in circles. Though they look like a 5th pair of legs by the face, they are not. The small Twin flagged Jumping Spider is mostly black with two or four white marks on its cephalothorax (head plate).

Habitat: is a small jumping spider that can typically be found atop leaf-litter or man-made structures such as fences and exterior walls.

Distribution: The geographic range includes United States, Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina, Texas.

Species 4: Two striped jumper (*Telamonia dimidiata*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order : Araneae

Family : salticidae

Genus : *Telamonia*

Species: *dimidiata*



Distinguishing characters: Size female 9-11 mm, male 8-10 mm. Cephalothorax elongated, large and slender, dark brown in males with white central patch and white lateral bands, pale cream coloured in females. Eight eyes present, anterior median are larger than the others. Ocular area with characteristic black and white patch with orange hairs

Habitat: Found commonly resting on the under surface of leaves of bushes and trees. Silk retreats and nests are constructed on under surface of leaves. Males show ferocious posture on being disturbed.

Distribution: India, Bhutan, Malaysia, Sumatra

Species 5: Shere ground spider (*Pardosa sp.*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order : Araneae

Family : Lycosidae

Genus: *Pardosa*

Species: *sp.*



Distinguishing characters: The female is about 0.20 to 0.26 inch total body length. The male is about 0.16 to 0.19 inch total body length. The body color is variable but usually gray or brown. The shore spider has four, large eyes in a trapezoid shape on the top of the carapace. The legs have banded coloration. The male has black around the eyes and on the palps. Spines on the hind legs are almost perpendicular to the leg.

Habitat: This species is found in moist areas on the ground, including swamps, marshes, pastures and along ponds and streams, as well as in woodlands, lawns and farm fields.

Distribution: They are located in high densities near rivers and agricultural areas of eastern North America.

Species 6: Pirata wolf spider (*Pirata piraticus*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order : Araneae

Family : Lycosidae

Genus: *Pirata*

Species: *piraticus*



Distinguishing characters: Size of females can be up to 9 mm long, whilst males are about 6 mm. The colour pattern of this spider is quite distinctive with a red-chestnut abdomen with a central mustard coloured cardiac mark and white sides to both the abdomen and carapace.

Habitat: It is usually associated with marshy places and near to water where it hunts along the banks and on the water's surface thanks to water repellent hairs on its legs.

Distribution: Pirate spiders are found in forests all around the globe, wherein the highest diversity is found in Central and Tropical South America.

Species 7: Rustic wolf spider (*Trochosa urbana*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family: Lycosidae

Genus: *Trochosa*

Species: *urbana*



Distinguishing characters: Male *Trochosa* are 7–9 mm in length while females are 7–14 mm. The female *T. terricola* has a reddish abdomen while the male has darkened front legs. The two short lines which are visible on carapace are a diagnostic feature of *Trochosa* wolf spiders.

Habitat: It is found in woodland, grassland and industrial sites and is often encountered under stones and logs, but overall it shows a preference for drier, heath-like conditions, although has been found in pitfall traps in areas of bog and marsh.

Distribution: In Europe it is found throughout the continent and Great Britain and Ireland but is absent from Iceland.

Species: 8 Pale orb weaver (*Araneus mitificus*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order : Araneae

Family: Araneidae

Genus: *Araneus*

Species: *mitificus*



Distinguishing characters: Size: Female 6–8 mm, Male 3–5 mm. Cephalothorax covered with hairs and pubescence. Chelicerae yellow coloured. 8 eyes arranged in two rows. Anterior median eyes are largest, posterior median eyes encircled by black rings.

Habitat: Found commonly in garden among the bushes, short trees etc. The spider builds its resting nest by folding small leaf like a cone later ties the edges with sticky threads. The spider sits by facing towards the opening of the nest.

Distribution: India to Philippines, Japan, New Guinea.

Source of the photograph: <https://www.projectnoah.org/spotting/453846239>

Species 9: Wolf Spider (*Allocosa Sp.*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family : Lycosidae

Genus: *Allocosa*

Species: *Sp.*



Distinguishing characters: It is a mid-sized cryptic light brown spider of robust build, with a body size of well over 1 cm (0.5 in and more) when fully grown, up to almost twice this size in the largest specimens. The cephalothorax has an inconspicuous darker stripe pattern reminiscent of that found in many lycosids, but the opisthosoma is patterned with yellowish and darker spots the approximate size of sand grains. Males and females look alike in color, but differ in size and genitals. Adult females have a cephalothorax carapace some 4–5 mm wide and some 6–7 mm long on average. Quite unusually for spiders in general, adult males are about 20% larger. The longest leg pair is usually 2 cm or more in adult males and may measure up to about 2.5 cm (1 in). In females, it may grow to almost 1 in, but is usually around 2 cm.

Habitat: The spiders are more frequently found on the land-side of dunes, which is better protected against strong winds, and prefer open habitat to vegetation when outside their burrows.

Distribution: South eastern Brazil via Uruguay and Argentina to southern Chile, though its known occurrences are patchy. To what extent it is found on the Atlantic coast south of the Río de la Plata remains largely unknown, for example. While the males have been known for over a century, the females were only described in 1980.

Species 10: Wolf Spider (*Arctosa sp.*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family : Lycosidae

Genus: *Arctosa*

Species: *Arctosa sp.*



Distinguishing characters: The spider reaches a length of 17 mm (males only 14 mm)
Prosoma greenish yellow, compact, plump, laterally with white hairs, longitudinal stripes indistinct, median band serrated posteriorly, legs yellowish, spotted black. Legs female: spotted black, male: with weak annulations. Opisthosoma light yellow, median arrow-shaped stripe yellow-greenish, laterally with 2 bright spots on each side of it, anterior one longish, posterior one roundish.

Habitat: On sandy or gravelly ground, on beach and near waters, active during the night, in Y-shaped burrow during the day.

Distribution: Europe, North Africa, Congo, Caucasus, Russia (Europe to Far East), Middle East, Kazakhstan, China, Korea, Japan

Species 11: Jumping spider (*Carrhotus viduus*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family : Salticidae

Genus: *Carrhotus*

Species: *viduus*



Distinguishing characters: The body length of the smallest Agelenidae spiders are about 4 mm (0.16 in), excluding the legs, while the larger species grow to 20 mm (0.79 in) long. Agelenids have eight eyes in two horizontal rows of four. Their cephalothoraces narrow somewhat towards the front where the eyes are.

Habitat: Agelenids build a flat sheet of non sticky web with a funnel-shaped retreat to one side or occasionally in the middle, depending on the situation and species.

Distribution: Southern Ontario, Canada.

Species 12: Long bodied cellar spider (*Pholcus phalangioides*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

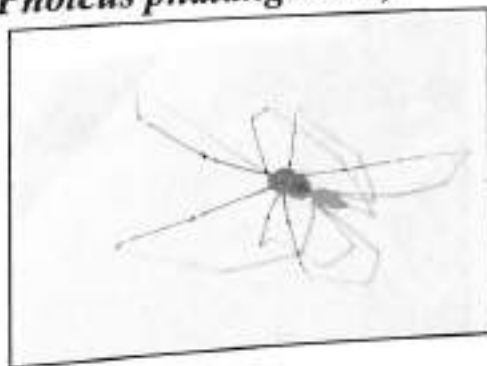
Class: Arachnida

Order: Araneae

Family : Pholcidae

Genus: *Pholcus*

Species: *phalangioides*



Distinguishing characters: Males tend to be around 6 to 10 mm in length with the average male being around 6 mm. The average female ranges from 7 to 8 mm in length. Their legs are roughly 5 to 6 times as long as the spider's body. The average length of an adult female's legs is roughly 50 mm.

Habitat: *P. phalangioides* are not suited for survival in cold environments which is why they prefer the warmth of the indoors, specifically inside human dwellings.

Distribution: This species is native to the subtropical regions of Asia, South America and Europe.

Species 13: Bridge spider (*Larinioides sclopetarius*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

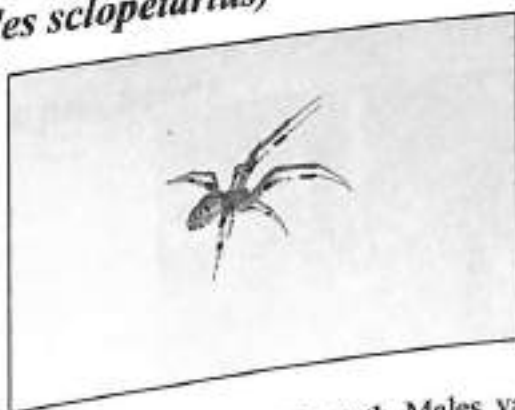
Class: Arachnida

Order: Araneae

Family : Araneidae

Genus: *Larinioides*

Species: *sclopetarius*



Distinguishing characters: Females can range from 4.5- 6.25 mm in length. Males vary from 4.25 mm -7 mm in length. *L. sclopetarius* has white hairs that provide a silhouette for their heads and dark markings on its abdomen. *L. sclopetarius* exhibit a slight sexual dimorphism, where females are heavier than males. Females typically weigh around 60 mg, whereas males weigh around 38 mg.

Habitat: It is mostly found near buildings. They are also most commonly found near artificial sources of light near water bodies such as bridges and boats. The lights tend to attract more insects which increase the spider's prey capture.

Distribution: In North America, Central Europe, often near water.

Species 14: Gaint golden orb weaver (*Nephila pilipes*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family : Araneidae

Genus: *Nephila*

Species: *pilipes*



Distinguishing characters: females a body length that can be well over 5 cm, with a total length of more than 15 cm *N. pilipes* have the most size differences between males and females. The legs span very long, and they are black and yellow. There are no apparent hairs on all legs.

Habitat: They construct webs in bushes and trees, near surface water, and against buildings and other terrain structures. To reduce heat from the sun, like other spiders, *Nephila* spp. has a thermoregulatory behavior.

Distribution: Japan, China, Vietnam, Cambodia, Taiwan, Malaysia, Singapore, Myanmar, Indonesia, Thailand, Philippines, Sri Lanka, India, Nepal, Papua New Guinea, and Australia.

Species 15: Signature spider (*Argiope pulchella*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family : Araneidae

Genus: *Argiope*

Species: *pulchella*



Distinguishing Characters: Size: Female 8-10 mm, Male 4-6 mm. Cephalothorax covered with thick layer of pubescence. Chelicerae small and weak. 8 eyes present, posterior median eyes encircled by black rings and lateral eyes located on tubercles. Easily identified with the presence of cruciate (x-shaped) stabilimentum in the web.

Habitat: It is found commonly in gardens, woodlands, grasslands and crop fields. Upon disturbance the spider vibrates the web or move to the other side of the web. Prefers dense, moist environment

Distribution: India to china and Indonesia.

Species 16: A cribellat spider (*Metaltella simoni*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family : Desidae

Genus: *Metaltella*

Species: *Metaltella simoni*



Distinguishing characters:

Simoni are 7.0 to 8.5 mm in length, whereas females are 8 to 9 mm in length. Males have the carapace (darker anteriorly) and legs (darker distally) yellow to yellow-orange, but these structures in the female are brown. Both sexes have the abdomen mottled gray with four irregular white stripes on the venter.

Habitat: Spiders may be found under logs, with the web attached to log and ground (Leech 1972), under bark, under boards and boxes, in crevices and corners in buildings, or, in the case of males, wandering around.

Distribution: Florida, Argentina, southern Brazil, and Uruguay,

Species 17: Huntsman spider (*Heteropoda venatoria*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family : Sparassidae

Genus: *Heteropoda*

Species: *venatoria*



Distinguishing characters: The average huntsman spider species is about 1 inch (2.5 cm) long with a leg span of up to 5 inches (12.7 cm). Huntsman spiders' legs have twisted joints, which allow the appendages to extend forward like a crab's and their alignment allows the spider to move side-to-side, also similar to a crab. Males have longer legs, although females have larger bodies.

Habitat: The spider typically lives under loose bark on trees, under rocks, in crevices and under foliage.

Distribution: Laos, Asia, Africa, Australia and South America, Florida, California and Texas. They were introduced from Asia.

Species 18: Crossed Iynx spider (*oxyopes birmanicus*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family : Oxyopidae

Genus: *Oxyopes*

Species: *birmanicus*



Distinguishing characters:

Adult females range in size from ~5-6mm, and adult males range in size ~4-5mm. Adult specimens have some color variation between orange, cream and brown. There is a generally a diamond cardiac mark, and macro setae covering legs I-IV. Females have a pale-yellow head with rows of white and dark bands lining the top of the body. Males are smaller than females at 4.0 to 4.5 mm in total body length.

Habitat: Its habitat tends to be grasses and leafy vegetation; grassy, weedy fields, and row crops.

Distribution: Eastern United States from Massachusetts and Iowa south to Florida and Texas, along Mexican border, north along Pacific coast to Oregon.

Species 19: Striped Iynx spider (*oxyopes javanus*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family : Oxyopidae

Genus: *Oxyopes*

Species: *javanus*



Distinguishing characters: Size: Female 6-8 mm, Male 5-7 mm. Dorsal surface of the cephalothorax with a pale V- shaped mark. Brownish patches present on the lateral side of cephalothorax. Heart shaped yellowish brown sternum present. A dark brown line extends from the anterior median eye to chelicerae. Chelicerae yellowish brown.

Habitat: Commonly seen on the upper surface of grasses and shrubby vegetation during daytime. At night they rest underneath the leaves. They are solitary active hunters.

Distribution: India, China to Java and Phillipines

Species 20: Giant little spider (*Heteropoda nilgirina*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family : Sparassidae

Genus: *Heteropoda*

Species: *nilgirina*



Distinguishing characters: Size: Female 21-25 mm, Male 18-20 mm. Cephalothorax yellowish brown. Abdomen pale coloured with rusty brown spots on lateral sides. Anterior median eyes smaller than anterior lateral eyes. Outer margin of chelicerae has three teeth.

Habitat: Prefers dry habitat. Commonly seen amongst dry leaf litter

Distribution: India (Endemic).

Species 21: Dark fishing spider (*Dolomedes sp.*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family: *Pisauridae*

Genus: *Sp.*



Distinguishing characters: Female bodies are 15-26 mm; males are 7-13 mm. Legs range from 50-90 mm. The spider is a pale to dark brown colour with several chevron markers and lighter stripes around its legs.

Habitat: the dark fishing spider is not necessarily found near water. It is indeed common around rocks, shrubs, and other vegetation near permanent water, but it also occurs in drier wooded areas

Distribution: Southern Canada south to Florida and west to Texas and the Dakotas.

Species 22: Dark tetragnathid spider (*Tetragnatha mandibulata*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family: Tetragnathidae

Genus: *Tetragnatha*

Species: *mandibulata*



Distinguishing characters: Size: Female 11-14 mm, Male 7-9 mm. Cephalothorax yellowish brown in colour with distinct fovea. Eight eyes are arranged in two rows. Chelicerae with distinct 16 retro-marginal and 14 pro-marginal teeth. First ventral tooth of the female is forwardly directed

Habitat: It is a nocturnal spider that builds web after sunset. Builds web among grasses, near water bodies and commonly seen in paddy fields.

Distribution: West Africa, India to Philippines and Australia.

Species 23: Brown widow spider (*Latrodectus sp*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family: Theridiidae

Genus: *Latrodectus*

Species: *sp.*



Distinguishing characters: Half an inch to one inch long body. Found in shades of brown with stripes along sides and top of abdomen; sometimes has red or orange markings but not always.

Habitat: They are usually found around buildings in tropical areas.

Distribution: Hawaii, Florida, some Caribbean Islands, parts of Australia, South Africa, Japan, and Cyprus.

Species 24: Crab spider (*Camaricus formosus*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family: Thomisidae

Genus: *Camaricus*

Species: *formosus*



Distinguishing characters: Total length 7 mm. Carapace 2.5 mm long, 2.5 mm wide; abdomen 4.5 mm long, 3 mm wide. Abdomen dark brown, covered with black hairs and distinct white coloured lateral bands. Legs light coloured, covered with spines and hairs. Eight eyes present arranged in two rows.

Habitat: Commonly seen to reside on flowers or seen to rest within leaf folds. It preys on insects visiting the flowers.

Distribution: India to Sumatra, China, Philippines

Source of the photograph: <https://en.wikipedia.org/wiki/Camaricus>

Species 25: Black and white spiny spider (*Gasteracantha kuhli*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family: Araneidae

Genus: *Gasteracantha*

Species: *kuhli*



Distinguishing characters: Eight eyes present, posterior median eyes encircled by black rings. Abdomen almost octagonal, overlaps the cephalothorax, generally white in colour with black spiny edges, black patches and distinct sigilla. Ventrums black in colour.

Habitat: Generally builds web around forest edges and open forest areas. Builds orb webs with open hubs.

Distribution: India to Japan, Philippines

Source of the photograph: <https://spiderid.com/spider/araneidae/gasteracantha/kuhli/>

Species 26: Chilean tiger spider (*Scytodes globule*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family: Scytodidae

Genus: *Scytodes*

Species: *globule*



Distinguishing characters: males range in size from 3.5 to 4 mm while females are slightly larger ranging from 4 to 4.5 mm. Its body is small (especially if compared to the size of its legs, which are usually between three and four times the size of its body). It has slow movements and it hunts only at night.

Habitat: It lives mostly inside houses in dark and hidden places such as behind frames, in closets, etc. But it can also be frequently found outdoors under Eucalyptus trees.

Distribution: The spider is native to South America (it is more common in Chile, but can be found in other parts of South America, specifically in Argentina, Uruguay and Bolivia).

Source of photograph: [https://www.dreamstime.com/tiger-spider-scytodes-globula-spider-web-image156258845](https://www.dreamstime.com/tiger-spider-scytodes-globula-hanging-its-spider-web-tiger-spider-scytodes-globula-spider-web-image156258845)

Species 27: Asian orb weaver (*Gasteracantha hasselti*)

Taxonomic position:

Kingdom : Animalia

Phylum: Arthropoda

Class: Arachnida

Order: Araneae

Family: Araneidae

Genus: *Gasteracantha*

Species: *hasselti*



Distinguishing characters: Females are large and grow to a body size of 30–50 mm (overall size up to 20 cm), with males growing to 5–6 mm.

Habitat: They are the most common group of builders of spiral wheel-shaped webs often found in gardens, fields, and forests.

Distribution: Canada, Alaska, and Hawaii

Source of the photograph: <https://en.wikipedia.org/wiki/Macracantha>

CHAPTER -V

Discussion:

The present study was conducted in few of the selected study sites in Dhemaji district of Assam. This study is being carried out on a small scale which couldn't bring up significantly higher records of spider species as compared to other studies.

In this present study a total of 267 individuals of spiders were encountered and identified into 27 species, belonging to twelve families with major percentage of spiders occurred in the family Araneidae followed by Lycosidae and Salticidae, Oxyopidae and Sparassidae. This is also in accordance with a study carried out in Bangladesh showing richer species contributed by Araneidae family (Rain et al., 2016, Pandit and Pai, 2017, Basumatary and Brahma, 2017).

The differences in diversity of species among different sites viz., forest, urban and agricultural areas was found to be mainly due to differences in the habitat and the environmental conditions which influences the presence and absence of spider species. Dhemaji district is endowed with different types of habitats and comprises of dense vegetation with splendid variety of flora and fauna. The diversity of spider indicates the presence of its associates especially insects which are the main prey base for spiders (Riechert and Bishop, 1990). The rich floral and faunal diversity is the key to build the microhabitat of different species of spiders (Begum and Biswas, 1997, Saikia and Baruah, 2008).

Vegetation architecture also plays a major role in the species composition found within a habitat (Russell, 1999, Sebastian, et al., 2005, Sebastian and Peter, 2009) and vegetation which is structurally more complex can sustain higher abundance and diversity of spiders (Shannon and Wiener, 1949, Sebastian and Peter, 2009). Hence complex vegetation and structural diversity in the present study explain the occurrence of different guild structures. Guilds also provide an understanding of disturbances and habitat modification on spiders (Uetz, et al., 1999).

Humidity and temperature affects the distribution of spiders as it influences the growth, development and activity (Tikader, 1970b, Sharma, et al., 2010). Thus, these factors limit them to areas within the range of their physiological tolerances. The high rate of transpiration by plants in present study area makes the atmosphere humid. Because of this complex interaction of various climatic factors like rainfall, temperature, availability of water source nearby, this area holds many smaller but diverse environmental niches.

Canopy and litter in some areas in present study sites like forested and agricultural site additionally offer greater survival opportunities in the form of ecological niches mostly in agricultural and forested areas. The district thus offers arthropods appropriate environment with favourable factors that support the rich spider diversity in Dhemaji district if enumerated on a larger scale. On this account, the study establishes that diversity normally increases when a greater variety of habitat types are present (Lalisan, et al., 2015) and the physical structure and species composition of vegetation define diversity of species and abundance through habitat availability (Malumbres-Olarte, et al., 2013, Lalisan, et al., 2015, Sarma et. al., 2013, Borkataki, et al., 2018).

All the diversity indices and evenness indices results were generally close and highly resemble to each other, and thus all of these indices can be used in this type of studies carrying out in uninterrupted zones at a landscape level. During the study period, we found that each diversity indices had their individual diverse commitments and it is not conceivable to govern which one has an effective practice in this kind of studies, because each diversity indices based on various parameters like number of species, number of individuals etc. might not be sufficient to provide valid justification due to small sampling area effort.

Conclusion:

Diversity studies of spiders are an ambiguous and consolidated data is lacking in many regions where the role of them is significant in an ecosystem management practices. Insufficient information on ecology and taxonomy of Indian spiders lowers the use of spiders as indicators species (Kapoor, 2008, Noss, 1990). Spiders of Assam are not studied enough in general from Dhemaji district with lack of an extensive account of spider fauna being unavailable. This research has yielded recorded families, genera and species of spiders for the present study area at a smaller scale. This work will also be useful for the studies in future as it will create a database bank, for holding information regarding distribution and diversity of these species, serving as baseline information to the ecology and the importance of spiders of this area. At the same time, the study has also shown that the area has different habitat with its favourable vegetation and climate, which provides an ideal location for the growth and diversity of spiders. But the current development trend due to rapid urbanisation can destroy the original cluster of habitat mosaic. Therefore, documenting the spider diversity pattern from this present study has provided data to justify the conservation of this ecosystem, as spiders are sensitive and are easily affected due to habitat damage resulting from anthropogenic activities.

CHAPTER -VI

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