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## Diversity of common garden and house spider in Tinsukia district

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### Abstract

A study on the diversity of spider fauna inside the Garden and House in Tinsukia district, Assam. This was studied from September 2015 to July 2019. A total of 18 family, 52 genus and 80 species were recorded. Araneidae is the most dominant family among all followed by the silicide family. The main aim of this study is to bring to known the species which is generally observed by the humans in this area. Beside seasonal variation in species is higher in summer season as compared to winter. Also many species were observed each year in same season repeatedly during the study period, further maximum number of species is seen in vegetation type of habitat.

**Keywords:** Spider, diversity, Tinsukia, seasonal, habitat

### 1. Introduction

As one of the most widely recognized group of Arthropods, Spiders are widespread in distribution except for a few niches, such as Arctic and Antarctic. Almost every plant has its spider fauna, as do dead leaves, on the forest floor and on the trees. They may be found at varied locations, such as under bark, beneath stones, below the fallen logs, among foliage, house dwellings, grass, leaves, underground, burrows etc. (Pai IK., 2018) [23]. Their success is reflected by the fact that, on our planet, there are about 48,358 species recorded till now according to World Spider Catalog. They are also unique among all organisms in their modes of silk production and usage and of reproduction. Spiders form one of the most diverse groups of organisms existing in India but very little documentation has been done on spider in Assam (Paris Basumatary, Dulur Brahma, 2017) [18] specially in eastern part of Tinsukia district. The present study was carried out on Spider diversity in rural areas of common garden and house spider, as of the present study is concern house spiders can be conveniently divided into three categories. True synanthropes are associated with houses, can establish breeding population in these locations and usually have wide distributions because they are often accidentally transported to new area. They seldom occur locally in the natural environment. The second category includes species which are seasonally abundant in natural habitats and in houses. Although some may hibernate indoors and emergence of large no. of spider lings from an occasional egg sac may give the impressions of infestations. This species do not establish populations inside the house. The third category contains species which are rarely found in and around houses (Guarisco. H, 1999) [24] i.e. probably found in Gardens; Garden inhabitants are no different from those in natural habitats. They need food to build their bodies and energy to run them. Garden plants and animal's process energy and materials through their bodies, are eaten in turn by other creatures, and ultimately are decomposed and recycled back into living organisms. Because gardens are usually food rich and complex, there is fascinating diversity in the ways their inhabitants can make a living as such of spiders (Wildlife Gardening Forum). As the work on the spider diversity in this area is very rear particularly in Garden and houses so in order to get some knowledge, Diversity of common garden and house spider in Tinsukia district, Assam has been undertaken. The present study also reveals the remarkable diversity in Gardens and houses along with these it also shows that different environmental factors, different patterns of activities of individual spider and morphology of spider community also influence the variation in seasonal abundance of spider.

### 2. Materials and Methods

The present work was based on the studies and observation carried out for a period of almost four years from September 2015 to July 2019.

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The work has been given priority to Garden and house spider which are generally seen by humans. A live species were collected for measuring their legs, abdomen etc after that released to their place. They were observed in ground, trees leaves; bark, roots this in terms of Garden, nooks, corners, garbage etc for house spiders.

### 2.1 Study Area

This work has been sample under the local area of Tinsukia district generally nearby human habitation also keeping in natural resource places such as Digboi (oil town) and Ledo (coal town). The study area for the present work consists of a part of Tinsukia district, Assam India. The district is blessed

as a principal seat of oil and coal industry along with that various tea gardens. Tinsukia district extends from tropical latitudes 27°30' to 27.5° North and 94°22' to 94.37° East longitudes. The district is 84 KM away from the border of Myanmar. It is bound by dibrugarh district in the South east and Dhemaji district in the north. The district can be physiographically categorized into eastern Himalayas, northeast hills such as patkai hills and the Brahmaputra valley plains. The climate is almost similar to the Brahmaputra valley but has slight difference with the areas situated on the bank of the river. The district experiences subtropical monsoon climate with cold winter, spring, rainy and humid summer

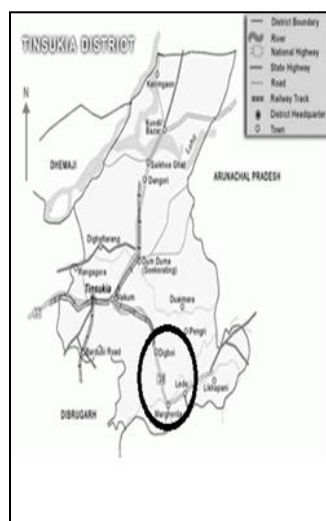


Fig 1: Map of Assam

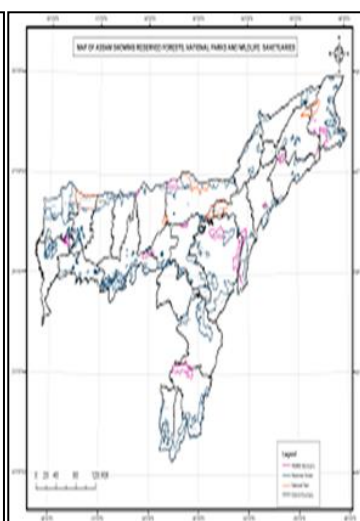


Fig 2: Map of Tinsukia District

### 2.2 Identification

Some of the species has been identified up to Genus level which was observed during 4 years duration. Spiders were identified with the help of literature Sebastian P.A., Peter K.V., 2008,” Spiders of India book [1], Chetia and Kalita (2012) [4] Assam Biodiversity Board experts, Spiders of Assam group and through various journals which is mentioned under Reference. Photographs and other necessary works were done by camera Nikon L-30 in macro mode, mobile phone and also comparing the species and their particular habitats, the following species were identified.

#### Symbol used

a. Spring

- b. Summer
- c. Autumn
- d. Winter
- z. Species Which Is Sited Maximum No. Of Times
- g. Garden
- h. House

**Spring:** March, April, May

**Summer:** June, July, August

**Autumn:** September, October, November

**Winter:** December, January, February

### 4. Illustration

Table 1: Check List of number of families, genera and species recorded during the course of the present study and also seasonal record.

S. no.	Suborder	Family	Genus	Species	Season
	<b>Mygalomorphae</b>				
1		Theraphosidae Thorell 1870, Tarantulas	<i>Chilobrachys</i> Karsch 1891	<i>Chilobrachys hardwicki</i> Pocock 1895, Giant black hairy spider	zb
	<b>Araenomorphae</b>				
2	<b>Araenomorphae</b>	Araneidae Simon 1895 (Orb web spider)	Audouin 1826. Argiope	<i>Argiope pulcella</i> Thorell 1881 (Garden cross spider)	zg
3				<i>Argiope magnifica</i> L. Koch,1871 (St. Andrew cross spider)	b
4				<i>Argiope sp.3</i>	a
5			Araneus Clerck 1757	<i>Araneus mitificus</i> simon 1886 (kidney garden spider)	ab
6				<i>Araneus diadematus</i> clerck,1758	zb
7			Cyclosa Menge 1866	<i>Cyclosa insulana</i> Costa, 1834	zg
8				<i>Cyclosa atrata</i> Bosenberg & Strand,1906	b
9				<i>Cyclosa sp 1</i>	c
10				<i>Cyclosa sp 2</i>	b

11		Gasterocantha Sundevall 1833	<i>Gasterocantha kuhli</i> C.L. Koch 1837 (Black and white spiny spider)	zg
12			<i>Gasterocantha diademesia</i> Thorell 1887 (Spiny orb weaver)	c
13		Neoscona simon 1864	<i>Neoscona mukerjei</i> Tikader 1980 (Common garden spider)	a
14			<i>Neoscona nautica</i> L Koch 1875 (Grey sphere spider)	zh
15		Parawixia FOP Cambridge 1904 (vegetation)	<i>Parawixia dehaani</i> Doleschall 1859 (Abandoned web spider)	zb
16		Cyrtophora simon 1864 vegetation	<i>Cyrtophora moluccensis</i> 1857 Doleschall	zg
17		trees	<i>Cyrtophora exanthematica</i> Doleschall, 1859	a
18		Eriovixia Archer 1951	<i>Eriovixia</i> sp. 1	zc
19			<i>Eriovixia</i> sp.2	c
20			<i>Eriovixia</i> sp.3	c
21		Eriophora simon 1864	<i>Eriophora transmarina</i> Keyserling, 1865	d
22	Nephilidae Simon 1894, Long legged orb weaver	Nephila Leach 1815	<i>Nephila kuhlii</i> Doleschall 1859 (Black wood spider)	b
23			<i>Nephila pilipes</i> Fabricius 1793 (Giant wood spider)	zg
24			<i>Nephila</i> sp.	c
25		Herennia Thorell 1877	<i>Herennia multipuncta</i> Doleschall 1859 (Ornamental tree trunk spider)	c
26		Nephilengys L.Koch 1872	<i>Nephilengys malabarensis</i> Walckenaer 1842(Malabar spider)	zh
27	Oxyopidae Thorell 1870, Lynx spider	Hamadruas Deeleman-reinhold, 2009	<i>Hamadruas</i> sp.	b
28		Oxyopes Latreille 1804	<i>Oxyopes javanus</i> Thorell 1887 (Striped lynx spider)	a
29			<i>Oxyopes birmanicus</i> Thorell 1887 (Crossed lynx spider)	zg
30			<i>Oxyopes shweta</i> Tikader 1970 (White lynx spider)	a
31			<i>Oxyopes scalaris</i> Hentz, 1845( Western Lynx spider)	a
32			<i>Oxyopes</i> sp. 1	b
33			<i>Oxyopes</i> sp. 2	c
34	Theridiidae Sundevall 1833, Comb-footed Spider	Chryso O.P-Cambridge 1882	<i>Chryso nigra</i> O.P. Cambridge 1880 (Black pearl spider)	zc
35			<i>Chryso</i> sp.1	b
36			<i>Chryso</i> sp.2	b
37		Nesticodes Archer, 1950	<i>Nesticodes rufipes</i> Lucas, 1846 (Red house spider)	zh
38	Linyphiidae Blackwall 1859, Sheet web spiders	Frontinella F.O. Pickard-Cambridge, 1902	<i>Frontinella pyramitela</i> Walckenaer,1841	zc
39		Linyphia Latreille 1804	<i>Linyphia urbasae</i> Tikader1970	c
40	Eutichuridae Lehtinen,1967, Sac Spiders	Cheiracanthium C.L. Koch, 1839	<i>Cheiracanthium danieli</i> Tikader 1975, Yellow sac spider	b
41	Pholcidae C.L. Koch 1851, Daddy Long legged Spider	Artema Walckenaer 1837	<i>Artema Atlanta</i> Walckenaer, 1893 (giant daddy long leg spider)	zh
42		Crossopriza Simon 1893	<i>Crossopriza iyonii</i> Simon,1893 (Box spider)	zh
43	Pisauridae simon 1890, Nursery web Spider	Pisaura simon,1886	<i>Pisaura putiana</i> Barrion and litsinger, 1995 (Nursery web spider)	b
44		Dolomedes Latreille, 1804	<i>Dolomedes</i> sp.	b
45	Salticidae Blackwall 1841, Jumping spiders	Epeus, Peckham and Peckham 1886	<i>Epeus indicus</i> Proszynski,1992 (white spotted green jumper)	b
46			<i>Epeus</i> sp.1	b
47			<i>Epeus</i> sp.2	c
48		Hasarius simon 1871	<i>Hasarius adansonii</i> Audouin, 1826	zh
49		Myrmarachne Macheay 1839	<i>Myrmarachne</i> sp.1	c
50			<i>Myrmarachne plataleoides</i> O.P. Cambridge 1869 (red ant mimic)	b
51		Phintella Strand 1906	<i>Phintella vittata</i> CL Koch 1846 (Banded phintella)	zg
52		Plexippus CL Koch 1846	<i>Plexippus paykulli</i> Audouin 1826 Common zebra jumper	zh
53		Telamonia Thorell 1887	<i>Telamonia dimidiata</i> Simon 1899 (Two striped jumper)	b
54		Menemerus Simon 1868	<i>Menemerus bivittatus</i> Dufour 1831 Common wall jumper	zh
55		Harmochirus Thorell 1877	<i>Harmochirus</i> sp.	c
56		Carrhotus Thorell, 1891	<i>Carrhotus</i> sp.	b
57	Scytodidae Blackwall 1864, Spitting spiders	Scytodes Latreille 1804	<i>Scytodes fusca</i> Walckenaer 1837 (Black spitting spider)	b
58	Sparassidae bertkau 1872, Giant crab spiders	Heteropoda Latreille 1804	<i>Heteropoda venatoria</i> Linnaeus 1767	zh
59		Olios Walckenaer 1837	<i>Olios milleti</i> Pocock 1901	b
60	Tetragnathidae Menge 1866, Long jawed orb weaver	Tetragnatha Latreille 1804	<i>Tetragnatha Montana</i> Simon, 1874	b
61			<i>Tetragnatha javana</i> Thorell, 1890	b

62			<i>Tetragnatha demissa</i>	d
63			<i>Tetragnatha sp</i>	c
64		Leucauge White 1841	<i>Leucauge decorata</i> Blackwall 1864 (Three humped leucauge spider)	b
65			<i>Leucauge pondae</i> Tikader 1970 (Pond leucauge spider)	c
66		Tylorida Simon 1894	<i>Tylorida striata</i> Thorell 1877 ( Striated tylorida spider)	b
67	Hersiliidae Thorell 1870, Two-tailed spider	Hersilia Audouin 1826	<i>Hersilia savignyi</i> Lucas 1836 (Two tailed spider)	c
68	Thomisidae sundevall 1833, Crab spider	Camaricus Thorell 1887	<i>Camaricus formosus</i> Thorell 1887 (Brown flower spider)	b
69		Misumena Latreille 1804	<i>Misumena chrysanthemi</i> sp	zh
70		Xysticus CL Koch 1835	<i>Xysticus sp</i>	b
71		Oxytate L Koch 1878	<i>Oxytate sp</i>	a
72		Phrynarachne Thorell, 1869	<i>Phrynarachne sp.</i>	b
73		Thomisus Walckenaer 1805	<i>Thomisus sp.</i>	b
74	Lycosidae Sundevall 1833, Crab spider	Pardosa CL Koch 1847	<i>Pardosa Pseudoannulata</i> Bosenberg and strand 1906 (Pond wolf spider)	zb
75		Rabidoso Roewer 1960	<i>Rabidoso sp</i>	za
76		Alopecosa Simon 1885	<i>Alopecosa sp.</i>	b
77	Clubionidae Wagner 1887, Sac spiders	Clubiona Latrelle 1804	<i>Clubiona terrestris</i> Westring, 1851	a
78			<i>Clubiona sp</i>	b
79	Uloboridae Thorell 1869, Hackled web spider	Zosis Walckenaer 1842	<i>Zosis geniculata</i> Olivier 1789	zh
80		Uloborus Latreille 1806	<i>Uloborus sp</i>	b

## 5. Results

The present study conducted in Garden and house spider which is observed in eastern part of Tinsukia district, Assam provides a diverse presence of species if it is undisturbed. The study revealed the occurrence of 80 species belonging to 52 genus and 18 families (Table 1) along with that 35 unidentified species are also sited. It has been observed that Araneidae family was the most dominant, which includes 20 species, all the species makes a common orb web except the genus Cyrtophora which make a tent web. Almost all the species applies their unique method while preparing their orb web also following nocturnal and diurnal behavior. Next followed by Salticidae family with 12 species, the common jumping spiders which is followed by Tetragnathidae with 7 species, this also prepares a common orb web but it differs with the Araneidae family by long jawed and some other morphological parts along with that sitting position in a web, Oxyopidae Family also contains 7 species with a hairy legs this is followed by Thombicidae family with 6 species with the front legs appearing just like a crab, Nephilidae with 5 species making large golden webs, Theridiidae with 4 species which specially makes cob web, Lycosidae with 3 species which generally sited from the ground and rest all other species are less dominating with 1 or 2 species each (Table 2). The highest number of species is sited during summer season (b) with 33 % followed by autumn season (c) with 16%, Spring season (a) with 9% and common house spider (zh) are equal in number and common Garden spider (zg) with 7%. Here in the Table 3 the Z is used for the maximum no. of times a species is observed during 4 years duration. House spider is always seen in the house if they are not disturbed without following any seasons while it goes same with some garden spider which we see in our garden. While species which are seen every year at the same season they were kept under (za, zb, zc). While the least species were seen during winter (d) with 2%. As far the coloration is concerned the house and ground spider are all with Brown, Black and Grey color on the other side all the other garden species comes with

various colors making our garden colorful and pest free (Table 3). However there are number of differences were observed in orb web builders (some are seen to prepare webs during evening time while some always remain in webs, some of them prepare unique patterns at the centers. Others use silk in the form of making cocoons, also to move from one place to another. As far the observation, Chilobrachys Sp. are seen on a particular season and other time they remain underground they come out during breeding season. Except the genus cyrtophora sp. from the araneidae family which makes a tent web, which is critical structure of an orb web itself otherwise species found from the four families (Araneidae, Nephilidae, Tetragnathidae and Uloboridae) makes an orb web structure. But among all this; some of the differences and similarities are observed such as Genus like Araneus, Neoscona, Parawixia, Eriovixia, Eriophora, Tetragnatha, *Leucauge pondae*, Tylorida, Nephilengys makes orb web during evening time and day time they tend to remain on the substratum nearby while the genus like Argiope, Cyclosa, Gasterocantha, Nephila, Herennia, *Leucauge decorata* if not disturbed remain on the web all the time, we have taken trees and vegetation they take the help of this while preparing their web. Males are smaller than female and are generally seen on the corner of the web. Orb weavers if disturbed they fall on the ground and act as if they are dead. As observed Family Salticidae and Lycosidae are active roamers while salticidae female settle in one place during breeding seasons also some of Myrmarachne sp. of this family mimic like an ant but Lycosidae female carry their eggs with them, some of the species from sparrasidae family also carry eggs with them. Genus like Cheiracanthium, Clubiona makes sac like structure on the leaves and remains inside it. Genus from the Thomisidae family showed a active behavior of folding the leaves and generally remain inside it while some of them also well camouflage on the flowers, leaves etc. Genus Hersilia also showed a active camouflage behavior. On the basis of observation Genus no. is highest on the vegetation area with 36% followed by trees with 31% next house with

17% followed by ground with 7% this is followed by bark and water bodies with 4% and 3% and less species is observed in logs with 2% (Fig:5) (Table 4) Spiders generally do not settle in one place they move from one place to another with the help of Ballooning or walking, jumping etc but during their breeding time they settle in one place and therefore observation is made on the basis of all this. However each species has showed a different behavior in terms of preparing methods of webs, different types of webs, different types of cocoons, egg sac, their silken retreat etc which make them different from each other and due to their creative activities each species became a unique.

**6. Discussion**

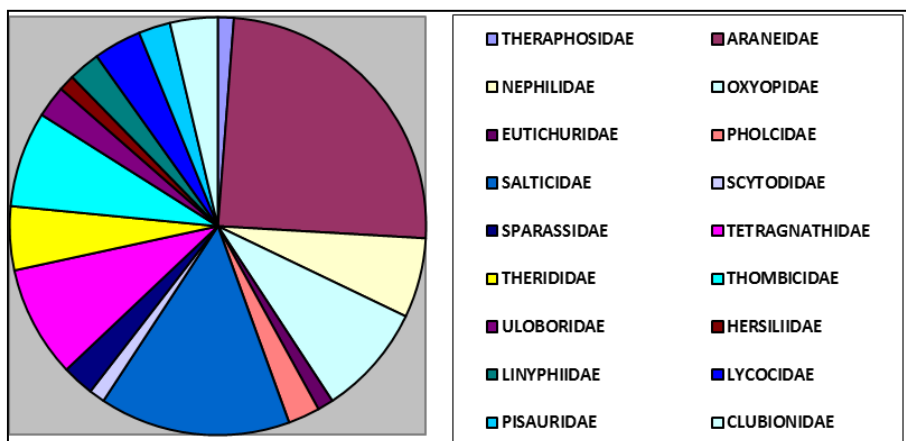
A total of 18 spider families distributed among 52 genera and 80 species were observed in the Garden and House of Tinsukia district Assam. The family richest in species were Araneidae, Salticidae, Oxyopidae and Tetragnathidae while Hersiliidae family was the most rarest to be observed. In Summer season highest no. of species was observed in comparison to Winter (Fig 4) instead of this many of the species were observed repeatedly during the study period. (Table 1). While in Vegetation type, maximum no. of species were observed.

There is no previous work in Tinsukia district to compare the spider diversity but the spiders diversity of this area on

gardens reveal a similar pattern as of pioneering works of Chetia P. 2015 [2], Basumatary P., 2017 [18], Ahmed F.A., 2018 [22] therefore, many of Spiders encountered in this area can be found in other parts of Assam. However studies which were done earlier were based on Forest coverage area for this reason the no. of species richness would be higher in comparison to Garden and House. With the present study it was revealed that Temperature and humidity are important limiting factors for microclimatic preferences by spiders as they have varying range of physiological tolerances. Therefore, the variation in diversity of spider species among the families observed (Table 2) and it is expected to be due to difference in temperature, rainfall, humidity and other physical factors of the environment and probably this is reason in four of this season species observed accordingly. The most common explanation for the observed pattern of spider characteristics is structural diversity; micro environment the level of disturbance of the habitat<sup>18</sup>. Hence the study reveals the potentiality of Assam state as the reservoir of large spider diversity. Interspecific variation in colouration among different spiders differentiating Garden spider to be Colorful in comparison to House and ground spiders to be more darker might be linked with different environmental effects and behavioural patterns observed on them [20].

**Table 2:** Showing number of total species in each of the families

SI	Family	Total no. of species
1	Theraposidae	1
2	Araneidae	20
3	Nephilidae	5
4	Oxyopidae	7
5	Eutichuridae	1
6	Pholcidae	2
7.	Pisauridae	2
8.	Salticidae	12
9.	Scytodidae	1
10.	Sparassidae	2
11.	Tetragnathidae	7
12.	Therididae	4
13.	Thombicidae	6
14.	Uloboridae	2
15.	Hersiliidae	1
16.	Linyphiidae	2
17	Lycosidae	3
18.	Clubionidae	2

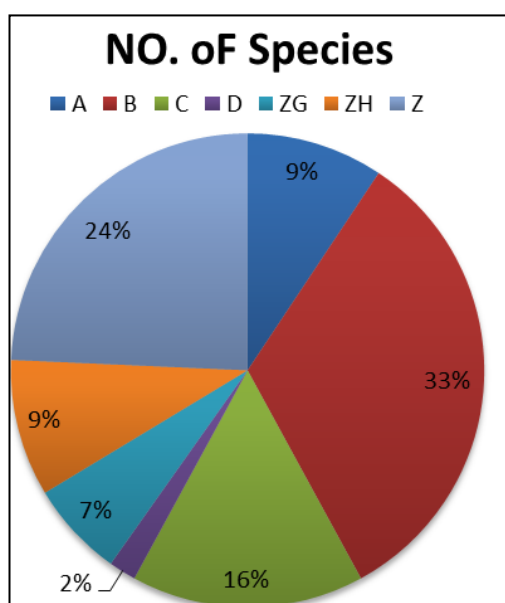


**Fig 3:** Pie chart showing family wise distribution of spider species

**Table 3:** Seasonal and z number of species recorded

Seasonal symbol	No. of species
a	8
b	29
c	14
d	2
ZG	7
Zh	10
Zb	5
Ab	1
Zc	3
Za	1

$a = a + ab + za = 8 + 1 + 1 = 10$   
 $b = b + ab + zb = 29 + 1 + 5 = 35$   
 $c = c + zc = 14 + 3 = 17$   
 $d = 2$   
 $Zg = 7$   
 $Zh = 10$   
 $Z = zg + zh + zb + Zc + za = 7 + 10 + 5 + 3 + 1 = 26$



**Fig 4:** Pie chart showing seasonal distribution and also maximum no. of time species observed

**Table 4:** Showing microhabitat observation till genus level

Family	Genus	Microhabitat
Oxyopidae Thorell 1870	Hamadruas Deeleman-reinhold, 2009	Vegetation
	Oxyopes Latreille 1804	Vegetation
Theridiidae Sundevall 1833	Chryso O.P-Cambridge 1882	Trees, specially seen on the leaves
	Nesticodes Archer, 1950	House, nooks and corner
Linyphiidae Blackwall 1859	Frontinella F.O. Pickard-Cambridge, 1902	Vegetation
	Linyphia Latreille 1804	Vegetation
Eutichuridae Lehtinen, 1967	Cheiracanthium C.L. Koch, 1839	Trees, specially seen on the leaves
Pholcidae C.L. Koch 1851	Crossopriza Simon 1893	House nooks and corner
	Artema Walckenaer 1837	House nooks and corner
Pisauridae Simon 1890	Pisaura Simon, 1886	Vegetation
	Dolomedes Latreille, 1804	Near water bodies
Salticidae Blackwall 1841	Epeus, Peckham and Peckham 1886	Trees
	Hasarius Simon 1871	House
	Myrmarachne	Trees
	Phintella Strand 1906	Tress
	Plexippus CL Koch 1846	House
	Telamonia Thorell 1887	Trees
	Menemerus Simon 1868	House
	Harmochirus Thorell 1877	Vegetation
	Carrhotus Thorell, 1891	Vegetation, they are generally seen on the dry place
Scytodidae Blackwall 1864	Scytodes Latreille 1804	Inside the logs
Sparassidae Bertkau 1872	Heteropoda Latreille 1804	House walls

	Olios Walckenaer 1837	Trees
Hersiliidae Thorell 1870	Hersilia Audouin 1826	Bark
Thomisidae Sundevall 1833	Misumena Latreille 1804	Vegetation, seen on the soft leaves or flowers
	Camaricus Thorell 1887	Same as above
	Xysticus CL Koch 1835	Same as above
	Oxytate L Koch 1878	Same as above
	Phrynarachne Thorell, 1869	Same as above
	Thomisus Walckenaer 1805	Same as above
Lycosidae Sundevall 1833	Pardosa CL Koch.	Ground and grasses
	Rabidosa Roewer 1960	Same as above
	Alopecosa Simon 1885	Same as above
Clubionidae Wagner 1887	Clubiona Latreille 1804	Trees

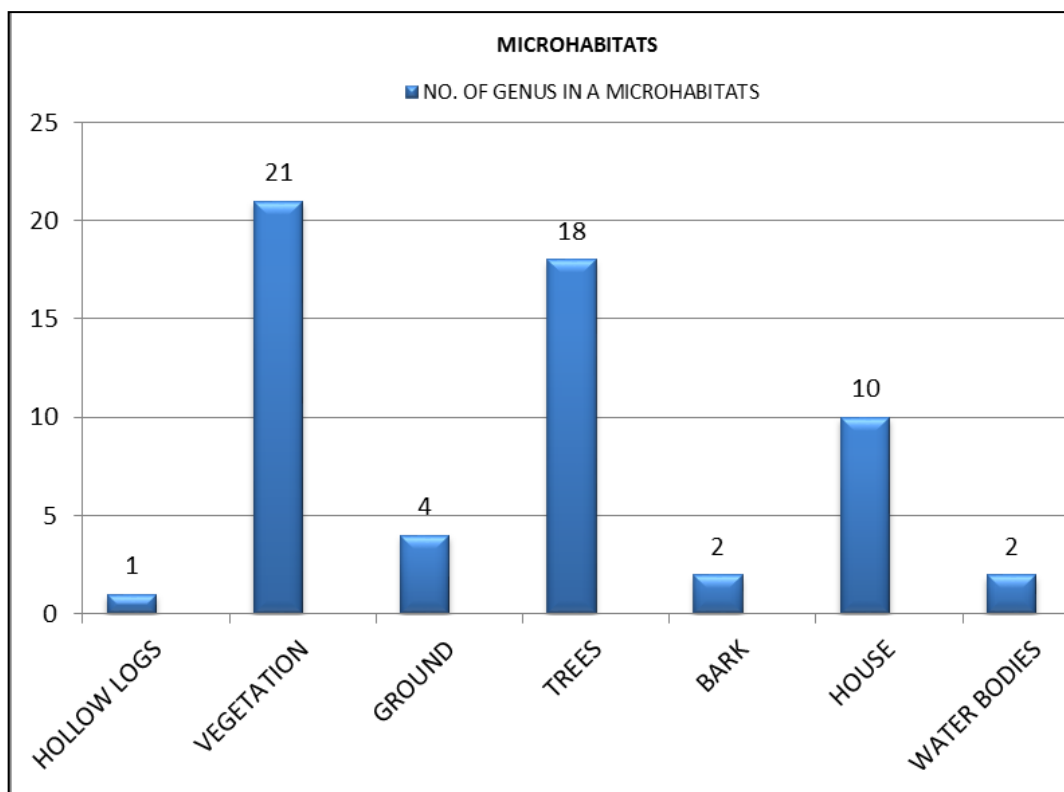


Fig 5: Chart showing no. of particular habitats

## 7. Conclusion

The presence of 80 species along with that 35 unidentified species shows that spiders are more prone to settle near human settlement since they are getting their appropriate foods, it may be possible that due to Forest degradation they are attracted more toward human settlement and they too follow migratory rules which is accomplished them by the process of Ballooning. However, garden and house spiders are subject to change if they do not get suitable environment; as far the species is concerned none of the species are found to be poisonous so far. They are the creature which has ability to adjust in any type of environment and it is possible that in the coming future more species can be discovered from Garden itself if prior attention is given but much of species yet to be studied into the forest area of Tinsukia district.

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