



## Spider diversity of Kerala University Campus, Thiruvananthapuram, Kerala, India

A. Asima<sup>1</sup>, G. Prasad<sup>2\*</sup> and A.V. Sudhikumar<sup>3</sup>

<sup>1,2</sup> Department of Zoology, Kariavattom Campus, University of Kerala, 695582, India,

<sup>3</sup>Christ College, Irinjalakuda, Kerala, 680125, India. Email: asimaashrafkh15@gmail.com, probios1@gmail.com, avsudhi@rediffmail.com

**ABSTRACT:** A study of spider diversity of Kerala University Campus, conducted for a period of four months revealed a total of 116 species of spiders belonging to 20 families. Among the families, Salticidae was found as the most common family and among the species *Hersilia savignyi* and *Hippasa agelenoides* were found as the most common species. *Plexipus petersi*, *Plexipus pykulli*, *Xysticus minutes* and *Tibellus elongates* were also noted as the commonly found spider species.

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**KEYWORDS:** Spider species, biodiversity, Salticidae

### INTRODUCTION

Spiders make up the order Araneae in the class Arachnida. There are currently over 39,000 described species placed in 3,642 genera and 111 families. Major contributions to Indian Arachnology were made by Pocock (1895, 1899a, 1899b, 1900a, 1900b and 1901) and Tikader (1977, 1980, 1982 and 1987) who were responsible for bringing spider studies to the notice of other researchers. India's described spider fauna consists of about 1600 species, perhaps as little as half of the total spider fauna. World-wide, more than 40,000 species of spiders have been described (Uniyal *et al.*, 2011). Although more than 1,400 species have been described from India (and with many more still to be documented), the study on the taxonomy, biology and ecology of Indian spiders remain miserably inadequate. This has largely been due to lack of expertise in this field and the absence of sufficient

literature (Sebastian and Peter, 2009). The present study of spider diversity was conducted in the Kerala University Campus, Kariavattom, laden with enchanting greenery covering about 350 acres of land.

### MATERIALS AND METHODS

#### Study Site

Kerala University Campus, Kariavattom (8°32', 8°34'N and 76°52', 76°54' E) is situated about 10 km north of Thiruvananthapuram City, houses the various teaching departments under the University of Kerala. The campus covering about 350 acres of land is located on either side of the National Highway (NH 66). The elevation of the study area is about 57m MSL. The annual temperature variation ranges from 22°C to 34°C. For the purpose of the study the entire campus has been surveyed, by dividing the area into two sites. Site 1 is the

\* Author for correspondence

north block of the campus, and the south region of the campus is selected as site 2. The sites were selected based on the habitat variation and the geographic isolation created by the National Highway (NH 66) as it divides the campus in to two regions. North campus areas are comprised of mixed habitats of wetland, grasslands, small trees and shrubs. The area possesses little or no canopy layer; some area of the north campus is devoted to farming and gardening, new construction and the rest by acacia tree plantation. There is a sacred grove present in it and is the only place that has some amount of canopy layer. Site 1 is again divided into 3 sub sites based on the habitat variation, and they are Botany Garden 1 of site 1 (S1a), Botany Garden 2 of site 2 (S1b) and Acacia tree plantation of site1 (S1c). The south campus is the largest portion of the campus and consists of roads that connect departments, and have the highest concentration of people and buildings. Even though the site possesses a large amount of acacia plantation, these sites have wide variety of habitats in it, which include grasslands, wetland, ponds and good amount of indigenous plants. For the study purpose the site 2 is again divided into 2 sub sites, medicinal garden of site 2 (S2a), Sarovara garden of site 2 (S2b) (Fig. 1).

### Sampling Methods

The study was conducted from January 2017 to April 2017. The microhabitats that are likely to support the spiders in the study area such as tree trunks, foliage, water bodies, ground, litter, undergrowth and bushes were searched for spiders. Collections were made by active searching for spiders following a line transect method. Spiders were collected by handpicking method, pit fall trap and beating method.

**Handpicking method:** The areas around each plant along the transect were thoroughly examined from the top to bottom on leaf blades, flowers and dry leaves for spiders. The ground area near the plants was also searched. According to the collection, the location where the spiders were found was also noted. Spiders were easily collected by leading them into glass vials (5.2 cm x 2.0 cm)

from the ground stratum and from the terminals of the plants. All the collected specimens were preserved in 70% ethyl alcohol with proper labeling of locality, date, crop stage and other notes. Field record was maintained throughout the study period.

**The beating method:** The beating method is suited for sturdier vegetation, such as tree and shrubs. A beating tray (an inverted umbrella is used as beating tray) is placed beneath the tree or shrub, and firmly tap the plant with a stick and collect the spiders that have fallen before they get away.

**The pitfall trap:** This is the ideal method for catching ground dwelling spiders. Pitfall traps usually consists of suitable pots or jars dug into the ground. At the bottom, the jar contains a small quantity of preserving fluid such as ethylene glycol with a drop of washing-up liquid (to reduce the surface tension). A lid is placed a little way above the trap so that crawling spiders can get by, but small vertebrates, rain, dirt, etc., are kept out of the trap (Sebastian and Peter, 2009).

### Identification

The spiders were identified using field guide (Sebastian and Peter, 2009) and Tikader (1977, 1987). World spider catalogue by Platnick (2014) was used for the taxonomy and nomenclature of spiders.

### Statistical analysis

Shannon- Weiner Index and Simpson index were used for statistical analysis.

Shannon- Weiner Index is calculated by using the formula,

$$H' = - \sum (p_i \ln p_i)$$

Where,

H'= General diversity index; Pi= Proportion of the ith species such that

Pi= Ni/N; Ni= Number of individuals in the ith species, N= Total number of individuals of all species in the community.

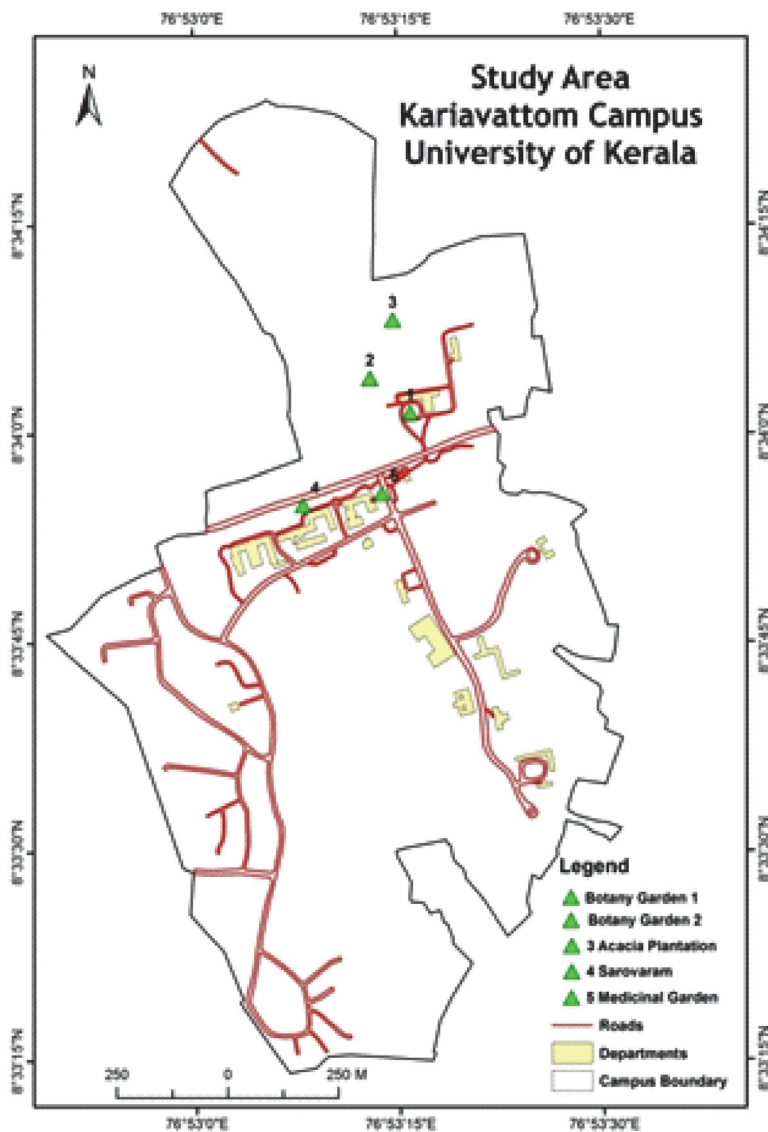


Fig.1 Study area

Simpson index is calculated by using the formula,

$$D = \sum \frac{n(n-1)}{N(N-1)}$$

Where, n = the total number of organisms of a particular species N = the total number of organisms of all species.

## RESULTS AND DISCUSSION

A total 116 species of spiders (we could identify only up to 63 species of spiders at the species level) belonging to 20 families were recorded during the

period of 4 months (January 2017- April 2017) study. The classification of observed species revealed that the family Salticidae was the dominant family. Among the 63 identified species, 19 species were belonging to Salticidae. The family Araneidae ranked second with 10 species, followed by the family Thomisidae with 5 species. There were four species each in the family Lycosidae and Tetragnathidae and three species under family Theridiidae and Oxiopidae. In the family Corinnidae, Pholcidae, Sparassidae and Uloboridae there were two species each. The least common families noted

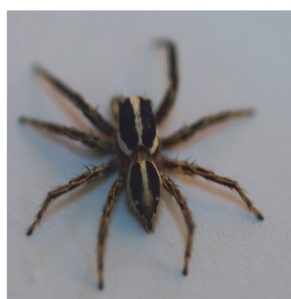
*Tibellus elongates**Hersilia savignyi**Hippasa agelenoides**Xysticus minutes**Plexippus paykulli**Plexippus petersi**Chylobrachys hardwicki**Siler semiglaucus**Stegodyphus sarasinorum*

Plate 1. Spiders

were Erisidae, Gnaphosidae, Hersilidae, Miturgidae, Philodromidae and Theraphosidae with single species each. Among families, Salticidae was found as the most common family and among the species *Hersilia savignyi* (28 numbers) and *Hippasa agelenoides* (24 numbers) were found as the most common species. *Plexippus petersi*, *Plexippus pykulli*, *Xysticus minutes* and *Tibellus elongates* were also found as the common species of the

campus (Plate 1). Shannon-Weiner index showed that the spider diversity of the Kariavattom campus as 3.668. The maximum diversity of spiders was obtained from medicinal garden (S2a) of site 2 (3.667), and the lowest measured from the Acacia plantation (S1c) of site1 (2.269). Shannon-Weiner index of site 1 was 3.847 and site 2 as 3.889. Simpson index of site 1 was 0.9686 and site 2 as 0.9755. The guild structure analysis of spider

Table 1. Checklist of spiders collected and identified from Kerala University Campus

Sl. No	Family / Species	Guild	Sl. No	Family / Species	Guild
	<b>ARANEIDAE</b>		25	<i>Oedignatha scrobiculata</i> (Thorell, 1881)	Ground dweller
1	<i>Araneus sp.</i>	Orb-web builders	26	<i>Oedignatha sp.</i>	Ground dweller
2	<i>Argiope catenulate</i> (Doleschall, 1859)	Orb-web builders		<b>ERESIDAE</b>	
3	<i>Argiope pulchella</i> (Thorell, 1881)	Orb-web builders	27	<i>Stegodyphus sarasinorum</i> (Karsch, 1891)	Space web builders
4	<i>Chorizopus sp.</i>	Orb-web builders		<b>GNAPHOSIDAE</b>	
5	<i>Anepion maritatum</i> (O.P-Cambridge, 1877)	Orb-web builders	28	<i>Zelotes ashae</i> (Tikader & Gajbe, 1976)	Ground runner
6	<i>Cyrtophora citriola</i> (Forskall, 1775)	Orb-web builders	29	<i>Zelotes sp.</i>	Ground runner
7	<i>Cyrtophora sp.</i>	Orb-web builders		<b>HERSILIDAE</b>	
8	<i>Cyclosa bifida</i> (Doleschall, 1859)	Orb-web builders	30	<i>Hersilia savignyi</i> (Lucas, 1836)	Ambushers
9	<i>Cyclosa fissicauda</i> (Menge, 1866)	Orb-web builders	31	<i>Hersilia sp. 1</i>	Ambushers
10	<i>Cyclosa sp.</i>	Orb-web builders	32	<i>Hersilia sp.2</i>	Ambushers
11	<i>Eriovixia laglaisei</i> (Simon, 1877)	Orb-web builders		<b>LYNYPHIDAE</b>	
12	<i>Gasteracantha germinate</i> (Fabricius, 1798)	Orb-web builders	33	<i>Lyniphia sp.</i>	Sheet web builders
13	<i>Gasteracantha sp.</i>	Orb-web builders		<b>LYCOSIDAE</b>	
14	<i>Hypognatha sp.</i>	Orb-web builders	34	<i>Hippasa agelenoides</i> (Simon, 1884)	Ground runners
15	<i>Micrathena sp.1</i>	Orb-web builders	35	<i>Hippasa sp.</i>	Ground runners
16	<i>Micrathena sp.2</i>	Orb-web builders	36	<i>Lycosa mackenziei</i> (Gravely, 1924)	Ground runners
17	<i>Neoscona mukerjei</i> (Tikader, 1980)	Orb-web builders	37	<i>Lycosa tista</i> (Tikader, 1970)	Ground runners
18	<i>Neoscona vigilans</i> (Blackwall, 1865)	Orb-web builders	38	<i>Pardosa pseudoannulata</i> (Bosenberg & Strand, 1906)	Ground runners
19	<i>Neoscona sp.</i>	Orb-web builders		<b>MIMETIDAE</b>	
20	<i>Pasilobus sp.</i>	Orb-web builders	39	<i>Mimetus sp.1</i>	Miscellaneous
	<b>CLUBIONIDAE</b>		40	<i>Mimetus sp.2</i>	Miscellaneous
21	<i>Clubiona sp.1</i>	Foliage runner		<b>MITURGIDAE</b>	
22	<i>Clubiona sp.2</i>	Foliage runner	41	<i>Cheiracanthium danieli</i> (Tikader, 1975)	Foliage runner
23	<i>Clubiona sp. 3</i>	Foliage runner	42	<i>Cheiracanthium sp.1</i>	Foliage runner
	<b>CORINNIDAE</b>		43	<i>Cheiracanthium sp.2</i>	Foliage runner
24	<i>Castianeira zetes</i> (Simon, 1897)	Ground dweller	44	<i>Cheiracanthium sp.3</i>	Foliage runner



Sl. No	Family / Species	Guild	Sl. No	Family / Species	Guild
	<b>OXIOPIDAE</b>		66	<i>Myrmarachne orientalis</i> (Tikader, 1973)	Stalkers
45	<i>Oxiopes sunanthae</i> (Tikader, 1970)	Stalkers	67	<i>Myrmarachne plataleoides</i> (O.P-Cambridge, 1877)	Stalkers
46	<i>Oxiopes swetha</i> (Tikader, 1970)	Stalkers	68	<i>Phaecius malayensis</i> (Wanless, 1981)	Stalkers
47	<i>Oxiopes sp.1</i>	Stalkers	69	<i>Phintella vitata</i> (C.L. koch, 1846)	Stalkers
48	<i>Oxiopes sp.2</i>	Stalkers	70	<i>Plexippus paykulli</i> (Audouin, 1826)	Stalkers
49	<i>Peucetia viridiana</i> (Stoliczka 1869)	Stalkers	71	<i>Plexippus petersi</i> (karsch, 1878)	Stalkers
	<b>PHILODROMIDAE</b>		72	<i>Plexippus sp.</i>	Stalkers
50	<i>Tibellus elongates</i> (Tikader, 1960)	Ambushers	73	<i>Portia fimbriata</i> (Doleschall, 1859)	Stalkers
	<b>PHOLCIDAE</b>		74	<i>Ptocassius sp.</i>	Stalkers
51	<i>Crossopriza lyoni</i> (Blackwall, 1867)	Scattered line weavers	75	<i>Rhene danieli</i> (Tikader, 1973)	Stalkers
52	<i>Pholcus phalangioides</i> (Fuesslin, 1775)	Scattered line weavers	76	<i>Rhene flavicomans</i> (C.L. koch, 1846)	Stalkers
53	<i>Pholcus sp.</i>	Scattered line weavers	77	<i>Siler semiglaucus</i> (Simon, 1901)	Stalkers
	<b>SALTICIDAE</b>		78	<i>Telamonia dimidiata</i> (Simon, 1899)	Stalkers
54	<i>Carhottus viduus</i> (C.L Koch, 1846)	Stalkers	79	<i>Thiania bhamoensis</i> (Thorell, 1887)	Stalkers
55	<i>Cybra sp.</i>	Stalkers	80	<i>Thiania sp.1</i>	Stalkers
56	<i>Epeus sp.1</i>	Stalkers	81	<i>Thiania sp.2</i>	Stalkers
57	<i>Epeus sp.2</i>	Stalkers		<b>SPARASSIDAE</b>	
58	<i>Epeus flavobilineatus</i> (Doleschall, 1859)	Stalkers	82	<i>Heteropoda nilgirina</i> (Pocock, 1901)	Foliage runner
59	<i>Harmochirus brachiatus</i> (Thorell, 1877)	Stalkers	83	<i>Heteropoda venatoria</i> (Linnaeus, 1767)	Foliage runner
60	<i>Hasarius adansoni</i> (Audouin, 1826)	Stalkers	84	<i>Heteropoda sp.1</i>	Foliage runner
61	<i>Hasarius sp.</i>	Stalkers	85	<i>Heteropoda sp.2</i>	Foliage runner
62	<i>Hyllus semicupreus</i> (Simon, 1885)	Stalkers	86	<i>Heteropoda sp.3</i>	Foliage runner
63	<i>Hyllus lacertosis</i> (C.L Koch, 1846)	Stalkers	87	<i>Heteropoda sp.4</i>	Foliage runner
64	<i>Hyllus sp.</i>	Stalkers	88	<i>Thelicticopes sp.1</i>	Foliage runner
65	<i>Menemerus bivittatus</i> (Dufour, 1831)	Stalkers	89	<i>Thelicticopes sp.2</i>	Foliage runner

Sl. No	Family / Species	Guild	Sl. No	Family / Species	Guild
	<b>TETRAGNATHIDAE</b>			<b>THOMISIDAE</b>	
90	<i>Leucage pondae</i> (Tikader, 1970)	Orb-web weavers	102	<i>Amycea sp.</i>	Ambushers
91	<i>Tetragnatha elongate</i> (Walckenaer, 1842)	Orb-web weavers	103	<i>Misumena chrysanthemii</i>	Ambushers
92	<i>Tetragnatha mandibulata</i> (Walckenaer, 1842)	Orb-web weavers	104	<i>Strigoplus netravati</i> (Tikader, 1963)	Ambushers
93	<i>Tylorida ventralis</i> (Thorell, 1877)	Orb-web weavers	105	<i>Strigoplus sp.</i>	Ambushers
	<b>THERAPHOSIDAE</b>		106	<i>Thomisus pugilis</i> (Stoliczka, 1869)	Ambushers
94	<i>Chilobrachys hardwicki</i> (Pocock, 18950)	Ground runner	107	<i>Thomisus sp.</i>	Ambushers
	<b>THERIDIIDAE</b>		108	<i>Xysticus minutes</i> (Tikader, 1960)	Ambushers
95	<i>Argyrodes argentatus</i> (O.P-Cambridge, 1880)	Scattered line weavers	109	<i>Xysticus breviceps</i> (O.P-Cambridge, 1885)	Ambushers
96	<i>Argyrodes flavescens</i> (O.P-Cambridge, 1880)	Scattered line weavers		<b>ULOBORIDAE</b>	
97	<i>Argyrodes sp.</i>	Scattered line weavers	110	<i>Migrammopes sp.</i>	Orb web spider
98	<i>Ariamnes flagellum</i> (Doleschall, 1857)	Scattered line weavers	111	<i>Migrammopes extensis</i> (Simon, 1889)	Orb web spider
99	<i>Platnickina mneon</i> (Bosenberg & Strand, 1906)	Scattered line weavers	112	<i>Uloborus sp.1</i>	Orb web spider
100	<i>Theridion sp.1</i>	Scattered line weavers	113	<i>Uloborus sp.2</i>	Orb web spider
101	<i>Theridion sp.2</i>	Scattered line weavers	114	<i>Uloborus sp.3</i>	Orb web spider
			115	<i>Zosis geniculata</i> (Olivier, 1789)	Orb web spider
			116	<i>Zosis sp.</i>	Orb web spider
				<b>Simpson Index</b>	<b>0.9637</b>
				<b>Shannon-Weiner Index</b>	<b>3.668</b>

revealed ten types of feeding guilds (Uetz et al. 1999).

Similar type of spider diversity assessment studies were carried out at Kerala Agricultural University Campus, Thrissur, India and reported 86 species of 50 genera under 20 families of spiders. Araneidae was found to be the dominant family (Adarsh and Nameer, 2015). A study of spider diversity in Vazhappally village in Changanacherry thaluk in Kottayam, Kerala, documented about 43 species of spiders belong to 14 families and observed Salticidae as the dominant family (Sakkeena, 2012).

Shamna (2015) also reported Salticidae as the dominant family with 12 species in the, Mokeri village in Thalasseri thaluk, Kannur, Kerala

A similar study done at Toranmal sanctuary, Maharashtra, India reported 117 species from 20 families and 55 genera (Archana, 2011). A study of spider diversity of Rundiv, Sidheshwar and Ramnadi area of Chandoli National Park reported a total of 58 species belonging to 38 genera and 16 families (More, 2015). Adarsh and Nameer (2016) documented 101 species of spiders belonging to 65 genera under 29 families from Chinnar Wildlife

Sanctuary, Idukki District, Kerala State in southern India. The Arachnology division of the Sacred Heart College at Ernakulam in Kerala, reported 51 species of spiders coming under 40 genera and 16 families from Mangalavanam forest (Pothalil *et al.*, 2005). A study of spider diversity from Vakoba, Devrai Region of Radhanagari Wildlife Sanctuary, Kolhapur, Maharashtra (More, 2013), reported a total of 61 species belonging to 50 genera and 19 families. Suvarna (2015) documented a total of 90 species belonging to 55 genera and 19 families in the Zolambi region of Chandoli National Park, in the western Ghats of Maharashtra.

Even though Kariavattom campus belongs to an urban area under the constant developmental and anthropogenic stresses, it supports rich diversity of spiders in various habitats of the campus. The 116 species indicate that the area still have a healthy population of spiders. The microhabitats in the campus such as ground, litter, bushes, tree trunks, foliage, and water bodies support the spider diversity. Being the first Arachnofaunal assessment study of Kariavattom Campus, University of Kerala, the study provides baseline for the future surveys and to discuss the various threats to the Arachnofauna of the Kariavattom Campus. Regular maintenance of gardens, beautification of gardens surrounding the departments and construction of roads destroys the habitat for common funnel web spiders (*Hippasa agelenoides*). All the four species reported from the family Tetragnathidae were observed from or near the artificial ponds inside the green house in the sub site (S1b) of the site 1 emphasizing that these families prefer gardens near water bodies. The only tarantula spider, *Chilobrachys hardwicki* of the family Theraphosidae was obtained from the sub site (S1c) of the site 1. So it is essential to protect the spider fauna as they play an important role in ecosystem functioning.

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