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Assessment of spider richness in the campus of Sree Vidyadhi Raja N.S.S. College, Kottayam (Kerala) India

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ABSTRACT

Present study investigated spider richness in the campus of S.V.R N.S.S College Kottayam, Kerala. A checklist of 110 species belonging to 77 genera and 19 families has been prepared. Salticidae dominated the population with 25 genera. Among the feeding guild type 37.27% of the documented spiders belong to Stalkers. Some of the spiders collected are endemic to India such as *Camaricus khandalaensis*, *Arachnura angura*, *Lycosa tista*, *Oxyopes sunandae*, *Meotipa multuma* and *Chalcotropis pennata*. High species richness of spider in the campus proposes to consider and implement suitable conservation plans at the earliest.

Figures : 03	References : 29	Table : 01
KEY WORDS : Campus, Checkl	ist, Diversity, Endemic, Guild, Spiders, Species.	

Introduction

Spiders are fascinating eight legged creatures. Ecologically they serve as natural predators of insect pests. Spiders are a group which researchers often neglect due to varied reasons. In Kerala, spider documentation studies are limited. Lack of sufficient literature in this field indicates less interest towards spiders when compared to other groups.

Spiders come under the order Araneae and share characters similar with scorpions and whip spiders of order Scorpionida and Amblypygi respectively. Presence of book lungs, poison glands, short legs, absence of spiny pedipalps and long sensory appendages distinguishes spider from whip spiders, whereas presence of spinnerets, a pair of fangs and absence of tail differentiate it from true

scorpions².

Spiders being carnivorous in nature keep the growth of insect population under control and thereby play a significant role in protecting crops from pests. They also impede the spread of various diseases by insects such as mosquitoes^{13,15}. Spiders are also a rich source of protein. Their venom possesses peptides of immense therapeutic and insecticidal potential which can be used for the development of novel medicines and bioinsecticides respectively¹⁶. Some studies prove the effectiveness of spiders as bioindicators in determining the health of various ecosystems¹⁷. Furthermore, spiders are also noteworthy in zoogeographical studies²¹. They can be found throughout all continents except Antarctica. A total of 49,200 species of spiders have been documented and

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S.No.	Scientific Name	Guild type
	Araneidae	
1	Anepsion maritatum	Orbweaver
2	Arachnura angura	Orbweaver
3	Araneus mitificus	Orbweaver
4	Argiope anasuja	Orbweaver
5	Argiope pulchella	Orbweaver
6	Cyclosa hexatuberculata	Orbweavers
7	Cyclosa insulana	Orbweavers
8	Cyclosa moonduensis	Orbweavers
9	Cyclosa spirifera	Orbweavers
10	Cyrtophora cicatrosa	Orbweavers
11	Cyrtophora moluccensis	Orbweavers
12	Eriovixia laglaizei	Orbweavers
13	Eriovixia sakiedaorum	Orbweavers
14	Gasteracantha geminata	Orbweavers
15	Gea subarmata	Orbweavers
16	Herennia multipuncta	Orb Weavers
17	Neoscona mukherji	Orbweavers
18	Parawixia dehaani	Orbweavers
	Cheiracanthidae	
19	Cheiracanthium melanostomum	Foliage Runner
20	Cheiracanthium sp. 1	Foliage Runner
21	Cheiracanthium sp. 2	Foliage Runner

TABLE-1: Checklist of documented spider species, family and guild type

S.No.	Scientific Name	Guild type
	Corinnidae	
22	Castianeira zetes	Ground Runners
	Hersilidae	
23	Hersilia savignyi	Foliage runner
	Lycosidae	
24	Hippasa agelenoides	Ground runner
25	Hippasa holomerae	Ground runner
26	Hippasa greenalliae	Ground runner
27	Lycosa tista	Ground runner
28	<i>Lycosa</i> sp.	Ground runner
29	<i>Ovia</i> sp. 1	Ground runner
30	<i>Ovia</i> sp. 2	Ground runner
31	<i>Pardosa</i> mysorensis	Ground runner
32	Pardosa sumatrana	Ground runner
33	Pardosa sp.	Ground runner
	Oxyopidae	
34	Hamadruas sikkimensis	Stalkers
35	Oxyopes birmanicus	Stalkers
36	Oxyopes javanus	Stalkers
37	Oxyopes shweta	Stalkers
38	Oxyopes sunandae	Stalkers
39	Oxyopes sp.	Stalkers
40	Tapponia micans	Stalkers

S.No.	Scientific Name	Guild type
	Pholcidae	
41	Artema atlanta	Space web Builders
42	Crossopriza Iyoni	Space web Builders
43	Pholcus phalangoides	Space web Builders
44	Smeringopus pallidus	Space web Builders
	Pisauridae	
45	Dendrolycosa gitae	Ambushers
46	Pisaura putiana	Ambushers
	Psechridae	
47	Psechrus torvus	Lace sheet weavers
	Salticidae	
48	<i>Bianor</i> sp.	Stalkers
49	<i>Burmattus</i> sp.	Stalkers
50	Carrhotus viduus	Stalkers
51	Chalcotropis pennata	Stalkers
52	Chinatus sp.	Stalkers
53	Chrysilla volupe	Stalkers
54	<i>Colaxes</i> sp.	Stalkers
55	Epeus tener	Stalkers
56	Epeus indicus	Stalkers
57	<i>Evarcha</i> sp.	Stalkers
58	Hasarious adansoni	Stalkers
59	Hyllus manu	Stalkers
60	Hyllus semicupreus	Stalkers

S.No.	Scientific Name	Guild type
61	<i>Hyllus</i> sp. 1	Stalkers
62	<i>Hyllus</i> sp. 2	Stalkers
63	Indopadilla insularis	Stalkers
64	Menemerus bivittatus	Stalkers
65	Myrmaplata plataleoides	Stalkers
66	<i>Onomastus</i> sp.	Stalkers
67	Phaeacius malayensis	Stalkers
68	Phaeacius lancearius	Stalkers
69	Phidippus yasodharae	Stalkers
70	Phintella debilis	Stalkers
71	Phintella vittata	Stalkers
72	Phintelloides jesudasi	Stalkers
73	Piranthus planolancis	Stalkers
74	Plexippus petersi	Stalkers
75	Plexipus paykuli	Stalkers
76	Siler semiglaucus	Stalkers
77	Stenaelurillus albus	Stalkers
78	Tamigalesus munnaricus	Stalkers
79	Telamonia dimidiata	Stalkers
80	Thiania bhamoensis	Stalkers
	Scytodidae	
81	Scytodes fusca	Stalkers
	Sparassidae	
82	Thelcticopis sp. 1	Foliage Runner

S.No.	Scientific Name	Guild type
83	<i>Thelcticopsis</i> sp. 2	Foliage Runner
84	Heteropoda venatoria	Foliage Runner
85	Heteropoda sp.	Foliage Runner
86	Olios milleti	Foliage Runner
	Tetragnathidae	
87	<i>Leucauge</i> sp.	Orbweavers
88	Nephila pilipes	Orbweavers
89	Tylorida ventralis	Orb Weavers
90	Tylorida sp. 1	Orb Weavers
91	Tylorida sp. 2	Orb Weavers
	Theridiidae	
92	Meotipa multuma	Space web Builders
93	Nesticodes rufipes	Space web Builders
94	Nihonhimea mundula	Space web Builders
95	Parasteatoda celsabdomina	Space web Builders
96	Twaitesia margaritifera	Space web Builders
	Thomisidae	
97	Amyciaea forticeps	Ambushers
98	Camaricus khandalaensis	Ambushers
99	Indoxysticus minutes	Ambushers
100	Oxytate virens	Ambushers
101	Thomisus projectus	Ambushers
102	Thomisus pugilis	Ambushers

S.No.	Scientific Name	Guild type
	Titanoecidae	
103	Pandava sp.	Space web weavers
	Trachelidae	
104	Utivarachna sp.	Foliage runners
	Uloboridae	
105	Miagrammopes extensus	Orb Weavers
106	Uloborus krishnae	Orb Weavers
107	<i>Uloborus</i> sp. 1	Orb Weavers
108	Uloborus sp. 2	Orb Weavers
109	Zosis geniculata	Orb Weavers
	Zodariidae	
110	Asceua sp.	Ground runners

described all over the world²⁹, whereas 1,857 species, 61 families and 477 genera were reported from India which covers around 3.77 percentage of world's total spider diversity⁴.

From Kerala, only limited studies on spider diversity and its distribution are available. One of the most notable and recent work reported 257 species of spiders belonging to 130 genera and 28 families from the sacred grooves of northern Kerala²³. Another study reported 210 species of spiders from Nelliyampathy hill ranges of Western Ghats²⁰. Investigators reported 112 spider species from Kavvayi River Basin, Kerala⁸ and described 86 species, 56 genera and 20 families of spiders from Kerala Agricultural University (KAU) main campus, Vellanikkara, Thrissur District, Kerala¹. They documented 17 species from rice fields, Kumarakom, Kottavam, Kerala⁷ and from Kuttanad, Kerala, 69 species of spiders were collected and identified¹¹. So far no authentic documentation studies on spider richness were carried, present work attempted to prepare a faunistic list of spider species of the campus.

Materials and Method

The present work was carried out in the campus

of Sree Vidyadhi Raja N.S.S College, Vazhoor, Kottayam, Kerala. The campus land is surrounded by lush green bushy plants and huge trees providing an ideal breeding ground for the spiders.

Study site of the present investigation was the campus of S.V.R N.S.S College Vazhoor. The campus is situated in Vazhoor panchayat (27.2048°N, 77.4975°E), Kottayam (District), Kerala (State), India and encompasses an area of 3 acres.

Collection of Samples

The study was conducted from 01 August 2020 to 30 November 2020. Foliage, flowers, tree trunk, crevices in bark, litters and roof and corners of the buildings were searched for spiders. Since more spider activity was expected in the mornings and evenings, time from 7am to 8.30am and 3.30pm to 5.30pm were selected for observation. Samples were collected by hand picking method²⁸. Photographs of the dorsal surface of spiders were taken in the field itself using HTC-U11 mobile with add on macro lens (Skyvik, 20X) for macro shots. For further analysis stereomicroscope (LeicaM205C) was used and identification was done using the available

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Family: Araneidae



a. Anepsion maritatum



b. Arachnura angura



c. Araneus mitificus



d. Cyclosa hexatuberculata



e. Cyclosa insulana



f. Cyclosa moonduensis



g. Cyclosa spirifera



h. Cyrtophora cicatrosa



i. Cyrtophora moluccensis





k. Gasteracantha geminata



l. Gea subarmata



Fig. 1: Photographs of various spider species documented from the campus (Contd....)

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a. C. melanostomum



b. Cheiracanthium sp. 1

Family: Lycosidae



a. Hippasa agelenoides



b. Hippasa holomerae



c. Hippasa greenalliae



d. *Lycosa tista* Family: Oxyopidae



e. Ovia sp. 1



f. Ovia sp. 2



g. Pardosa sumatrana



a. Hamadruas sikkimensis Family: Psechridae



b. Oxyopes birmanicus Family: Salticidae



c. Oxyopes sp.









Fig. 1: Photographs of various spider species documented from the campus (Contd...)

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c. Carrhotus viduus



d. Chalcotropis pennata



e. Chrysilla volupe



f. Colaxes sp.



g. Epeus tener



h. Hyllus semicupreus



i. Indopadilla insularis



j. Menemerus bivittatus



k. Myrmaplata plataleoides



I. Onomastus sp.



n. Phidippus yasodharae



Fig. 1: Photographs of various spider species documented from the campus (Contd...)

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a. Scytodes fusca



t. Tamigalesus munnaricus





b. Thelcticopis sp. 2



v. Thiania bhamoensis



c. Heteropoda venatoria



a. Meotipa multuma



a. Nephila pilipes



a. Thelcticopis sp. 1

b. Tylorida ventralis



c. Tylorida sp. 1 Family: Thomisidae





Fig. 1: Photographs of various spider species documented from the campus (Contd...)

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a. Miagrammopes extensus

b. Uloborus krishnae

c. Uloborus sp. 1

d. Zosis geniculata

Fig. 1: Photographs of various spider species documented from the campus

literatures^{18,25-28}.

Results and Discussion

The study documented a total of 110 species of spiders from various parts of the College campus in a duration of 4 months. Of these, 82 spiders were recognized to the species level and 28 to genus level (Fig. 1). Identified spider specimens were categorized into 19 families as (Table-1).

On statistical analysis of the data, it was noticeable that campus was dominated by Salticidae members with a total of 25 genera constituting 32.467% of the total 77 genera documented. This was followed by Araneidae (12 genera), Theridiidae (5), Thomisidae (5), Lycosidae (4), Pholcidae (4), Oxyopidae (3), Tetragnathidae (3), Uloboridae (3), Sparassidae (3), Pisauridae (2) and remaining 8 families with one genus each (Fig. 2). Further analysis revealed 7 types of feeding guild with Stalkers dominating the population with 37.27% followed by Orb weavers (25.45%), Ground runners (10.90%), Foliage runners (9.09%), Space web builders (9.09%), Ambushers (7.27%) and Lace sheet weavers (0.909%) (Fig. 3). Among the genus, *Oxyopes* of Oxyopidae exhibited relatively higher species richness *i.e.*, 5 species followed by *Cyclosa* of Araneidae (4 species) and *Hyllus* of Salticidae (4 species).

Interestingly, some of the documented spiders from the campus were found to be rare. Chrysilla volupe (Karch, 1879) identified from the campus was first described in 1879 and was rediscovered only after 139 years in 2018 from Wayanad Wildlife Sanctuary, Kerala³. Piranthus planolancis was previously reported from Kerala for the first time in 2019 from Murivad agricultural field, Thrissur is a rare species¹⁰. Another species *Chrysilla jesudasi* was first described in 2014 from Chennai⁵ and is distributed over South India, but its relative abundance in Kerala is less. In India, Stenaelurillus albus is distributed only in Kerala and Karnataka *i.e.*, an endemic species¹⁴. Similarly, Camaricus khandalaensis identified from campus is endemic to India⁶. Arachnura angura, Lycosa tista, Oxyopes sunandae, Meotipa multuma and Chalcotropis pennata are the other endemic species of India identified in this study. Some others such as Anepsion maritatum, Argiope anasuja, Argiope pulchella,



Fig. 2: Graph showing number of genus in each family

Cyclosa hexatuberculata, Gasteracantha geminate, Neoscona mukherji, Castianeira zetes, Hippasa greenalliae, Carrhotus viduus, Chrysilla volupe, Hyllus semicupreus, Myrmaplata plataleoides, Phintella vittata, Phintelloides jesudasi, Telamonia dimidiata and Indoxysticus minutes are endemic to South Asia. Indoxysticus minutes and Gea subarmata sighting reports from Kerala are limited. *Meotipa multuma* first described in 2017 from South India¹² and Nesticodes rufipes from Brahamangalam, Kerala¹⁹ are also considered as rare members.

Out of 1,857 specie reported from India, 110 species were identified from the campus. This is interpreted as 5.92% of the spider species found in India can also be sighted in S.V.R N.S.S College campus. Statistical assessment of density of species richness in 3 acres of campus shows there is potential to encounter a new species in every 110.36 sq. m of land. This is noteworthy when compared to the findings of previous studies reported from other parts of Kerala which included reports from Kuttanad¹¹, Kerala Agricultural University (KAU) main campus, Vellanikkara¹, Kavvayi River Basin, Kerala⁸ and Malabar Wild Life Sanctuary⁶.

Spiders are potential biological control agents in agroecosystems²². *Argiope* sp., *Tetragnatha* sp., *Cheiracanthium* sp., *Clubiona* sp., *Lycosa* sp., *Pardosa* sp. and *Oxyopes* sp. feed mostly on insects and other

invertebrates thus keep the pest population in agroecosystems under control¹³. Spiders also feed on insects which are known to spread diseases among human beings. Spiders of the family Lycosidae, Salticidae, Tetragnathidae feed on mosquitoes which are vectors of malaria and viral infections⁹. *Evarcha* sp. and *Crossopriza lyoni* are potential biocontrol agents of mosquitoes¹³.

Spiders are great tool for zoogeographical studies. For instance, in India, the presence of monotypic genus *Nesticodes* has been recorded from West Bengal²⁴ and Kerala¹⁹. Further, *Artema atlanta, Myrmaplata plataleoides* and *Nephila pilipes* documented in this study are common in Andaman and Nicobar islands. Similarly, *Oxyopes shweta, Nephila pilipes* in Sikkim and *Argiope pulchella, Tylorida ventralis, Phintella vittata* and *Telamonia dimidiata* in Calcutta are also common in the faunistic list of respective regions²¹.

The spider abundance and diversity recorded on the campus indicate the presence of diverse flora in and around the college that create varied microclimate and microhabitat supporting a vast array of other animal species. Studies prove that spiders are effective indicators of the quality of the ecosystem. Spider abundance is directly proportional to the presence of insects which indirectly relate to high floral diversity suggesting the healthy ecosystem that the campus holds. The presence of rare and endemic spider species in S.V.R N.S.S



Fig. 3 : Pie chart showing percentage of feeding guild types identified in the present study

College emphasizes the ecological significance of the area and the need to conserve the plant diversity that the campus inherently possesses.

Conclusion

This was a pioneering work which attempted to prepare a checklist of spiders from the unexplored campus of S.V.R N.S.S College. A total of 110 spider species were recorded. The number is significant considering the small study area and less duration taken for the documentation. Some species found to be very rare while some are endemic. The richness found in species diversity of spider indicates quality of the ecosystem that prevails in campus in terms of floral diversity and insect abundance. Since the entire work was carried out during the covid period, less human interference coupled with rich floral and insect diversity might also have improved migration of spiders to the campus. Considering the high species density, any future developmental projects in the campus for education and other facilities must give due importance to appropriate conservation strategies to preserve these pristine habitats which serve as home for several rare and unique spiders as well as many other undocumented creatures.

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