Department of Zoology
Christ College (Autonomous)
Irinjalakuda, Kerala, India

FAUNAL DIVERSITY AND RECENT TRENDS in ANIMAL TAXONOMY

Editor
Dr. Sudhikumar A.V.

Sponsored by

Kerala State Council for Science, Technology and Environment

Kerala State Biodiversity Board

2018

ISBN 978-81-930507-6-7

Chapter 24

A PRELIMINARY INVESTIGATION ON SPIDER FAUNA FROM TWO SELECTED HABITATS OF THRISSUR DISTRICT, KERALA

Sumesh N.V.* and Sudhikumar A.V.
Centre for Animal Taxonomy and Ecology, Department of Zoology,
Christ College, Irinjalakuda, Kerala
**sumeshvasu14@gmail.com*

ABSTRACT

The distribution and diversity of spiders has been drawn attention of naturalist in different parts of the world since the eighteenth century and they exhibits taxon guild – specific responses to environmental change, and are relatively easy to sample and identify. The study sites are located in the Thrissur district in the state of Kerala. The study intends to carry out sampling of two different habitats such as sacred grove and scrub jungle. Standard sampling methods were used to collect specimens. The aim of study is to reveal the diversity, species richness and spider assemblage of selected habitats. The diversity, richness and evenness were calculated using SPSS Program. A total of 50 species of spiders belonging to 40 genera coming under 14 families were collected from sacred grove and scrub jungle. Sacred grove contained 27 species of spiders belonging to 22 genera under 14 families. The scrub jungle consisted of 29 species of spiders coming under 24 genera under 10 families. Out of the 14 families collected during the study, the family Salticidae was dominant family with 11species belonging to 11 genera. A total of 7 feeding guilds were identified by the analysis of feeding behaviour of collected spiders. Species richness was high in the scrub jungle. Highest species diversity found in Kalari-Pambum Kavu.

Key words: Spider, diversity, scrub jungle, sacred grove, guild structure

INTRODUCTION

Spiders are ancient animals, emerged in carboniferous era, date back over 380 million years. They are found worldwide on every continent except for Antarctica, and have become established in nearly every habitat with the exceptions of air and sea colonization. Among animals spiders represent 18% of diversity. Spiders as a group may even provide useful conservation tools as ecological indicators or in rapid biodiversity measurement. Jocque (1981) showed that size in spiders is dependent on the quality of the habitat. Spiders are clearly an integral part of biodiversity, since they play an important role in ecosystem as exclusive predators on other organisms and maintaining the prey predator balance. Spider is used as a model organism for research in biology, behaviour and communication.

A sacred grove or sacred woods are any grove of trees that are of special religious importance to a particular culture. Sacred groves feature in various cultures throughout the world. The societies of Greece, Roman, Asia and Africa had long preserved sections of the natural environment as sacred groves to Gods and Goddesses (Khiewtam & Ramakrishnan, 1989). In spite of a general very high land to man ratio, sacred groves which are the relics

of vegetation which have survived under a variety of ecological situations in India and they represent hot spots of biodiversity. The changes in socio-economic condition and land use systems many sacred groves are now threatened and altered both in terms of size, vegetation structure and species composition. In Kerala, based on management systems, sacred groves can be categorized into three types. They are sacred groves managed by individual families, by groups of families and by the statutory agencies for temple management (Devaswom Board).

Scrub jungles are forests occur in the areas where annual rainfall is between 20 to 70 cm, dry season is hot and very long. The vegetation is of open type consisting of small trees (8 to 10 m height) and thorny or spiny shrubs of stunted growth. The forests remain leafless for most part of the year and are sometimes called thorn scrub or scrub jungles. There is luxuriant growth of ephemeral herbs and grasses during the rainy season. Most natural scrublands occur under relatively harsh conditions.

In general, taxonomic studies on spiders and invertebrates of sacred groves of Kerala, India are few and limited. So this study was conducted with the main objectives of obtaining the first comprehensive representation of the spider fauna from two selected habitats; that will help in assessing the status of spider diversity in this region keeping in mind its conservation value.

METHODOLOGY

Study area

Kalari - Pambum Kavu: Kalari - Pambum Kavu is located between 10°34´32.4´´ North latitude and 076° 10´21. 0´´East longitude in the Puzhakkal Taluk in Thrissur district of Kerala state, India. The study intends to carry out sampling at different regions of the grove. As yet, no systematic work has been carried out on the spiders of this sacred grove.

Mayiladum Kunnu: Mayiladum Kunnu is located between 10°36´22.1256´´ North latitude and 076° 10´19.5312´´East longitude in the Thangalur village of Thrissur Taluk in Thrissur district of Kerala. Scrub land is a plant community characterized by vegetation dominated by shrubs, often also including grasses, herbs, and geophytes. Scrubland may either occur naturally or be the result of human activity.

Study time: The observation of spider was made during the period of 3 months from April, 2017 to June, 2017; which include pre-monsoon and monsoon seasons (partial). Spiders were collected once in a month in the morning (7.00 am up to 11.00 am).

Sampling: The standard sampling methods like Collection by hand, Beating method, Aerial sampling and Ground hand collection. Specimens collected were transported to the laboratory. Comparatively large specimens were photographed in the field itself with the help of special digital camera and lens (Canon EOS 5D digital SLR and Canon 180 mm macro lens). Specimens were preserved in 70% alcohol with proper labeling of locality, date, and other notes of importance for further studies. Preserved specimens were examined under a stereo zoom microscope (Magnus MSZ TR) in the laboratory for taxonomic identification. Spiders were identified up to species level with the help of available literature, keys and catalogues of Sebastian &

ISBN 9788193050767

Peter (2009), Tikader (1987), Pocock (1900), Platnick (2010). Field record was maintained throughout the study period. The field collection data also used to calculate the species richness, species diversity and relative abundance of dominant spiders present in different location and season. The diversity, richness and evenness indices of spider communities were calculated using SPSS Program. Ecological characteristics relating to foraging manner, nature of web, prey species, microhabitat use and daily activity pattern at family level were subjected to guild classification.

RESULTS

A total of 50 species of spiders belonging to 40 genera of 14 families were collected during the study period (Table 1). Out of the 14 families collected during the study, the family Salticidae was the first dominant family.

Habitat-wise diversity

Kalari - Pambum Kavu: Sacred grove contained 27 species of spiders belonging to 22genera under 14 families. The most dominant family was Salticidae. The second dominant family was Uloboridae. The most dominant species were *Castianeira zetes* under the family Corinnidae and *Scytodes thoracica* under the family Scytodidae.

Mayiladum Kunnu: Mayiladum Kunnu contained 29 species of spider coming under 24 genera belongings to 10 families. The most dominant family was Salticidae. The second dominant family was Oxyopidae. The most dominant species are *Xysticus minutes* and *Hyllus semicupreus.*

Spiders collected during the study were divided in to 7 ecological guilds based on the foraging mode of the spiders. Out of 50 species of spiders collected from selected habitats, majority of species (40%) belong to “Stalkers” category. The second dominant guild constituted categories are “Ambushers” and “Orb web weavers” (18%). Other guilds are, “Sheet web builders” (12%), “Foliage runners” (6%), “Hunters” (4%) and “Ground Hunters” (2%).

Biodiversity indices

Habitat	No. of Species (S)	No. of Individual (N)	Species richness (d)	Shannon-Weiner Index(H1)	Simpson Index (D)	Evenness (E)
Kalari-Pambum Kavu	26	75	0.346	2.784	0.926	0.854
Mayiladum Kunnu	29	57	0.508	2.962	0.879	0.879

DISCUSSION

From the resulting data, get an idea about number of species in relation to spider habitat and month. The selected habitat such as, Kalari - Pambum Kavu (Sacred grove) and Mayiladum Kunnu (Scrub jungle). These provide variation in species composition. Dominance of this family in the study area is directly consequential to the vegetational architecture. Vegetational architecture plays a major role in the species composition

found within a habitat (Rypstra et al., 1999), and vegetation which is structurally more complex can sustain a higher abundance and diversity of spiders.

Studies have demonstrated that a correlation exists between the structural complexity of habitat and species diversity. Uetz (1991) suggests that structurally more complex plants cans support a more diverse spider community. Downie et al. (1999) and New (1999) have demonstrated that the spiders are extremely sensitive to small changes in the habitat structure; including habitat complexity and microclimate characteristics.

The Kalari - Pambum Kavu sacred grove consisted of moist-deciduous forests. The average altitude of the sacred grove is about 28 m above mean sea level. The area receives both southwest and northeast monsoons. Most of the precipitation is received during southwest monsoon from June to September. The temperature ranges between 20°C to 35°C. Summer the temperature rises above 35°c. This may affect the spider diversity. Spiders generally have humidity and temperature preferences that limit them to areas within the range of their physiological tolerances, which in turn makes them ideal candidates for land conservation studies (Noss, 1990). The scrub jungle consisted of shrub forests. Most of the precipitation is received during southwest monsoon from June to September.

Diversity analysis determines the significance of observed differences in community structure between selected habitats (sacred grove and scrub jungle). A diversity index incorporates both species richness and evenness in a single value (Magurran, 1988). Two diversity indices used here are Shannon-Wiener index (H1), which is sensitive to changes in the abundance of rare species in a community, and Simpson index (D), which is sensitive to changes in the most abundant species in a community. In the present study, the value of H1 is above in scrub jungle. This indicates the presence of some rare species in the area. At the same time a decline in the value of D can also see in this habitat. Both habitats had shown high diversity index which is close to the value 1. This shows the increased diversity of species.

In this study it was understood that diversity of spiders from selected habitat i.e., sacred grove and scrub jungle intends to create a primary data on the spiders of this region paving way for further research into the topic. The data produced in the form of a checklist shall be of great help to anyone who is keen on exploring the diversity of spiders of this region. Future studies can focus on the other important factors such as environmental factors, habitat regulating microclimate variability and anthropogenic disturbance factors, which may seriously affect the faunal diversity in a large scale.

Table 1. Checklist of spiders collected from two selected habitats during the study

Sl. No.	Family/Genus/Species
	1. ARANEIDAE Simon, 1895
1	*Cyrtophora citricola* Stoliczka,1869
2	*Neoscona mukerjei* Tikader, 1980
3	*Araneus* sp.

	2. ANPHYNIDAE Bertkau,1978
4	*Anyphaena* sp.
	3. CORINIDAE Karsch, 1880
5	*Castianeira zetes* Simon, 1897
	4. EUTICHURIDAE Lehtinen, 1967
6	*Cheiracanthium punctorium* Villers, 1789
7	*Cheiracanthium* sp.
	5. OXYOPIDAE Thorell, 1870
8	*Hamadruas* sp.
9	*Hamataliwa* sp.
10	*Oxyopes birmanicus* Thorell, 1887
11	*Oxyopes javanus* Thorell, 1887
12	*Oxyopes shweta* Tikader, 1970
13	*Peucetia ananthakrishnae* Murugesan et al., 2006
14	*Peucetia viridana* Stoliczka, 1869
	6. PHILODROMIDAE Thorell, 1870
15	*Thanatus* sp.
16	*Philodromus* sp.
17	*Tibellus elongates* Tikader, 1960
	7. PHOLCIDAE C. L. Koch, 1850
18	*Artema atlanta* Walckenaer, 1837
19	*Pholcus phalangioides* Fuesslin, 1775
	8. SALTICIDAE, Blackwall, 1841
20	*Asemonea tenuipes* O.P. Cambridge, 1869
21	*Bavia insularis* Malamel et al., 2015
22	*Epeus tener* Simon, 1877
23	*Eupoa* sp.
24	*Hyllus semicupreus* Simon, 1885
25	*Myrmarachne plataleoides* O.P. Cambridge 1869
26	*Neon reticulatus* Blackwall, 1853
27	*Phintella vittata* C. L. Koch, 1846
28	*Siler* sp.
29	*Telamonia dimidiata* Simon, 1899
30	*Thyene* sp.
	9. SCYTODIDAE Blackwall, 1864
31	*Scytodes thoracica* Latreille, 1802
32	*Scytodes pallida* Doleschall, 1859
	10. SPARASSIDAE Bertkau, 1872
33	*Heteropoda* sp.
34	*Olios milleti* Pocock, 1901
	11. TETRAGNATHIDAE Menge, 1866
35	*Tylorida striata* Thorell, 1899
	12. THERIDIIDAE Sundevall, 1833
36	*Achaearanea* sp.
37	*Achaearanea durgae* Locket, 1980
38	*Theridiid* sp.
39	*Thwaitesia margaritifera* O.P. Cambridge, 1881

ISBN 9788193050767

	13. THOMISIDAE Sundevall, 1833
40	*Amyciaea forticeps* O.P. Cambridge, 1873
41	*Camaricus* sp.
42	*Heriaeus* sp.
43	*Thomisus projectus* Tikader, 1960
44	*Thomisus* sp.
45	*Xysticus minutes* Tikader 1960
	14. ULOBORIDAE Thorell, 1869
46	*Miagrammopes* sp.
47	*Uloborus glomosus* Walckenaer, 1841
48	*Uloborus krishnae* Tikader, 1970
49	*Uloborus* sp.
50	*Zosis geniculatus* Latreille, 1806

ACKNOWLEDGEMENT

Authors are thankful to The Principal, Christ College, Irinjalakuda for providing facilities. The authors also thank Sruthi E.S, Sudhin P.P., Nafin K.S and Drisya Mohan O.M. for their valuable suggestions and support. This study was funded by E- grantz Scheme, Government of Kerala.

REFERENCES

Downie I.S. 1999. The impact of different agricultural land-uses on epigeal spider diversity in Scotland. *Journal of Insect Conservation* 3, 273 – 286.

Khiewtam R.S. & Ramakrishnan P.S.1989. Socio-cultural studies of the sacred groves at Cherrapunji and adjoining areas in North-Eastern India. *Man in India* 69 (1):64-71.

Magurran A. E.1988**.** Ecological diversity and its measurement. New Jersey, Princeton University Press, 255 p.

New T. R. 1999. Untangling the web: spiders and the challenges of invertebrate conservation. *Journal of Insect Conservation*, 3, 251-256.

Noss R.F. 1990. Indicators for monitoring biodiversity: A hierarchical approach. *Conserv. Biol.*, 4(4): 355-364.

Platnick N.I. 2013. The world spider catalog, version 13.5. The American museum of Natural History, Jan 2013.

Pocock R.I. 1900. Great Indian Spiders – The genus *Pocecilotheria*: Its habits, history And Species. *Journal of Bombay Natural History Society*, 13:121-133.

Rypstra A.L., P.E. Carter, R.A. Balfour & S.D. Marshall. 1999. Architectural features of agricultural habitats and their impacts on the spider inhabitants. *J. Arachnol.* 27:371ñ377.

Sebastian P.A & Peter K.V. 2009**.** Spiders of India. University Press Pvt. Ltd. Hyderabad, India.

Tikader B.K. 1987**.** A hand book on Indian spiders.ZSI.350 pp.

Uetz G. W. 1991. Habitat structure: the physical arrangement of objects in space. London, Chapman andHall, 348 p.

World Spider Catalog. 2017. World Spider Catalog. Natural History Museum Bem, Online at http://wsc.nmbe.ch,version18.5, doi: 10.24436/2