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PRELIMINARY SURVEY AND CHECKLIST OF SPIDER DIVERSITY IN KOLLAM DISTRICT, KERALA, INDIA

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Abstract

Spiders (Order: Araneae) are vital ecological agents that help regulate insect populations and maintain ecosystem balance. Although spider diversity has been extensively studied across India, district-level evaluations remain scarce. This study investigates the diversity of spiders in Kollam district, Kerala, through field surveys conducted between August 2019 and March 2020. A total of 24 species representing 11 families were recorded, with Salticidae exhibiting the highest species richness (10 species), likely due to their high adaptability, active hunting behavior, and presence across varied microhabitats. Observations revealed variations in habitat preferences, web-building behavior, and distribution across agroecosystems, grasslands, and human settlements. The findings emphasize the ecological importance of spiders and the threats posed by habitat loss and human activity. As bioindicators, conserving spider populations is crucial for ecological stability. This study advocates for protecting rural and suburban habitats to support spider diversity and associated fauna.

Keywords: *Spider diversity, Araneae, Salticidae, Habitat preference, Bioindicator, Conservation*

1. Introduction

Spiders, belonging to the order Araneae of the class Arachnida under the phylum Arthropoda, are a diverse group of arachnids with over 48,200 species and 120 families recorded as of July 2019 (World Spider Catalog). They are found worldwide, except in Antarctica, and survive in all habitats except air and sea. Spiders first appeared in the Devonian period, about 386 million years ago, with true spiders emerging in the Carboniferous period. Spiders play a crucial ecological role as predators, primarily feeding on insects, including agricultural pests, and regulating insect populations. Various species exhibit specialized hunting strategies, such as building intricate webs, using bolas to capture moths, or employing ambush tactics. Some spiders, like Portia, demonstrate intelligence in prey capture. While most species live solitarily, a few exhibit social behavior, forming communal webs. Despite the venom of some species being harmful to humans, spider venom is being explored for medical applications and as an eco-friendly pesticide. Their silk, known for its strength and elasticity, has inspired

advancements in material science.

Many surveys have been conducted in Kerala and all over the India for exploring the diversity of Spiders. Siliwal et al. (2005) has published an updated checklist of Indian spiders. It reported 1442 species from 361 genera of 59 families from India. Out of these 1442 species, 1002 were endemic to the Indian mainland. Recently, 1520 species belonging to 361 genera and 61 families were reported by Sebastian and Peter (2009) in the book 'Spiders of India'. Earlier the knowledge on the spiders of Western Ghats remained confined to the works of Pocock (1895, 1899, 1900), Hirst (1909), Gravely (1915, 1935), Sherriff (1919, 1927a,b,c), Sinha (1951), Subramanian (1955) and Charpentier (1996). Jose and Sebastian (2001), Smith (2004), Sugumaran et al. (2005), and Jose et al. (2006) tried to document the diversity of spider fauna in and around the Western Ghats. The Western Ghats harbours a total of 275 species of spiders belonging to 139 genera of 39 families (Sebastian et al., 2012).

Sathiamma et al. (1998) studied the predatory spiders associated with coconut plantations of central Kerala. Patel (2003) and Sunil et al. (2008) studied the spiders of Parambikulam wildlife sanctuary, Kerala. Then 2005 witnessed some important studies on the diversity of spider in Kerala (Sebastian et al., 2005, Sudhikumar et al., 2005a and Jose, 2005). Mathew et al. (2005) studiedthediversityofspidersincardamomplantation of high ranges of Kerala. A total of 72 species of spiders belonging to 57 genera of 20 families were collected from Mannavan shola, Kerala the largest Shola patch in Asia, existing in the Western Ghats, one of the biodiversity hot spots of the world (Sudhikumar et al., 2005b). Sebastian et al. (2005) documented the spider diversity in the high ranges associated with the Western Ghats of central Kerala. District wise local studies portraying the diversity of spiders deserve more importance in the current scenario of ecological destruction and other anthropogenic interventions. Given their ecological significance, the conservation of spider diversity is essential for maintaining ecological balance. This study focuses on documenting the diversity of spiders in the Kollam district of Kerala.

2. Materials and Methods

Regular visits were made in various ecosystems in the study area from the first week of August 2019 to the first week of March 2020. Areas including buildings, gardens, agroecosystems, shrubs and herbs, grasslands and ponds were visited. Typical and unique features of the spider and pattern of web making were noted down. The pattern of color patches was recorded. Clear photographs of spiders were taken from different angles to accurately identify the species. These photographs were compared with published articles and the species were identified. Species identity was confirmed with the help of 'Spiders of India' by Sebastian and Peter (2009) and research articles of Sudhikumar et al. (2005a and 2005b). Taxonomy of recorded spiders was updated.

3. Results and Discussion

A total of 24 spider species belonging to 20 genera and 11 families were recorded during the field surveys conducted in various parts of Kollam district (Table 1). Among the recorded families, Salticidae (Jumping spiders) was the most dominant, represented by 10 species (41.7% of total species) followed by Araneidae (Orb-weavers) with four species. Oxyopidae recorded 2 species while the remaining families recorded one species each (Figure 1).

The high diversity of Salticidae could be attributed to their wide habitat tolerance, effective visual hunting strategies, and adaptability to disturbed environments such as home gardens and urban areas. Araneidae, being typical orb web-builders, were more frequently observed in forest edges and agroecosystems, where vegetation structure supports web anchoring. Spiders were recorded from diverse habitats including agroecosystems, forest edges, home gardens, grasslands, and wetland margins, indicating their broad ecological amplitude. However, it was observed that urbanized and degraded habitats harbored fewer spider species, with individuals mostly belonging to generalist families like Salticidae and Oxyopidae. This pattern highlights the potential negative impact of habitat simplification and pesticide use on spider diversity.

Table 1. List of the Spiders recorded from the study area	
Sl. No.	**Scientific name**
Family Salticidae	
1	*Bianor* sp.
2	*Epeus* sp.
3	*Hyllus semicupreus* Simon 1885
4	*Hyllus* sp.
5	*Phaeacius* sp.
6	*Plexippus paykulii* Audouin 1826
7	*Plexippus petersi* Karsch 1878
8	*Plexippus* sp.
9	*Rhene flavigera* C.L. Koch 1846
10	*Telamonia dimidiate* Simon 1899
Family Araneidae	
11	*Argiopean asuja* Thorell 1887
12	*Argiope pulchella* Thorell 1881
13	*Eriowixia laglaizei* Simon 1877
14	*Gasteracantha geminata* Fabricius 1798
Family Oxyopidae	
15	*Oxyopes javanus* Thorell 1887
16	*Peucetia viridana* Stoliczka 1869
Family Lycosidae	
17	*Pardosa* sp.
Family Nephilidae	
18	*Nephila pilipes* Fabricius 1793
Family Pholcidae	
19	*Crossopriza lyoni* Blackwall 1867
Family Psechridae	
20	*Psechrus* sp.
Family Sparassidae	
21	*Heteropoda venatoria* Linnaeus 1767
Family Tetragnathidae	
22	*Leucauge pondae* Tikader 1970
Family Theraphosidae	
23	*Plesiophryctus* sp.
Family Theridiidae	
24	*Theridion tikaderi* Patel 1973

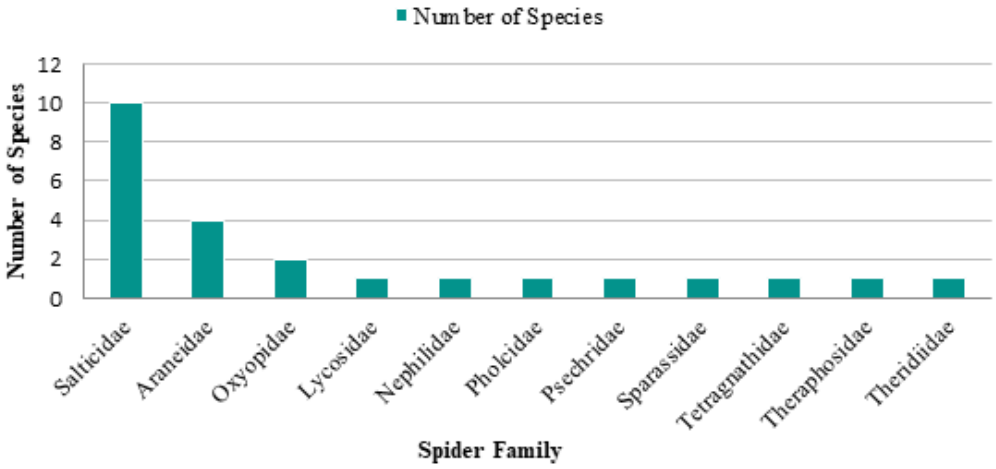

Fig 1. Numbers of species recorded from each family of spiders

Though abundance data were not collected, the presence of multiple trophic groups such as active hunters (Salticidae, Lycosidae), ambush predators (Thomisidae), and web builders (Araneidae, Tetragnathidae, Theridiidae), reflects a functionally diverse spider community in Kollam district. This diversity underscores the ecological importance of spiders as natural pest control agents in agricultural landscapes and as indicators of habitat quality.

The present study also recorded species such as *Marpissa muscosa, Plexippus paykulli*, and *Argiopean asuja*, which have previously been reported from other parts of Kerala, reaffirming their widespread distribution. No new species were recorded; however, the updated checklist contributes valuable locality-

specific data which were previously lacking for Kollam district.

Holloway et al.(1992) observed that conversion of forest to plantation and other man-induced disturbances lead to reduction in the diversity of invertebrates, both in species richness and in the taxonomic and biogoeographic quality. Studies have demonstrated that a correlation exists between the structural complexity of habitats and species diversity (Hawksworth and Kalin-Arroyo, 1995). Diversity generally increases when a greater variety of habitat types are present (Ried and Miller, 1989). Uetz (1991) suggests that structurally more complex shrubs can support a more diverse spider community. Downie et al. (1999) and New (1999) have demonstrated that spiders are extremely sensitive to small changes in the habitat structure, including habitat complexity, litter depth and microclimate characteristics. Spiders generally have humidity and temperature preferences that limit them to areas within the range of their 'physiological tolerances' which make them ideal candidates for land conservation studies (Riechert and Gillespie, 1986). The present study recorded considerably little number of spiders. It might be due to the ecological threats posed by the areas because of the decline in the undisturbed shrubby areas and agricultural ecosystems. This study points towards the need for conservation of the rural and suburban ecosystems imposing little threats due to developmental activities thereby conserving entire fauna in these ecosystems

4. Conclusion

This preliminary documentation of spider fauna in Kollam district reveals a moderate diversity comprising 24 species from 11 families. The dominance of Salticidae and Araneidae reflects habitat characteristics and ecological conditions prevalent in the study area. The results highlight the role of spiders as important bioindicators and suggest the need to conserve heterogeneous habitats that support diverse spider assemblages. This study provides baseline data for future ecological and conservation-focused research in the region and emphasizes the importance of regular biodiversity monitoring at the district level.

5. References

Charpentier P. 1996. The illustrated redescription of *Poecilotheria rufilata* Pocock, 1899. Exothermae Magazine, Exothermae Publishing, Belgium. No. 0 (special edition), p.34

Downie, I.S., Wilson, W.L., Abernethy, V.J., Mccracken, D.I., Foster, G.N., Ribera, I., Murphy, K.J. and Waterhouse A. 1999. The impact of different agricultural land-use on epigeal spider diversity in Scotland. *Journal of insect Conservation*, 3: 273-286.

Gravely, F.H. 1915. Notes on Indian mygalomorph Spiders. I. *Records of Indian Museum*, 11: 257-287.

Gravely, F.H. 1935. Notes on Indian mygalomorph spiders. II. *Records of Indian Museum*, 37: 69-84.

Hawksworth, D.L., Kalin-Arroyo M,T. 1995. Magnitude and distribution of biodiversity. In: V. H. Heywood, ed. *Global Biodiversity Assessment*. United Nations Environment Programme. London, Cambridge University Press, pp.107-191.

Hirst, A.S. 1909. On some new or little-known mygalomorph spiders from the Oriental Region and Australasia. *Records of Indian Museum*, 3: 383-390.

Holloway, J.D., Kirk-Spriggs, A.H. and Khen, C.Y. 1992. The response of some rain forest insect groups to logging and conversion to plantation. *Philosophical Transaction of the Royal Society of London B*, 335: 425–436.

Jose, K.S. 2005. A faunistic survey of spiders (Araneae: Arachnida) in Kerala. Sacred Heart College Ph D theses submitted to Mahatma Gandhi University, Kottayam, India.

Jose, S.K., Sudhikumar, A.V., Davis, S., Sebastian, P.A. 2006. Preliminary studies on the spider fauna (Arachnida: Araneae) in Parambikulam wildlife sanctuary in Western Ghats, Kerala, India. *Journal of the Bombay Natural History Society*, 105 (3): 264-273.

Jose, S.K., Sebastian, P.A. 2001. Occurrence of *Psechrus alticeps* Pocock (Araneae: Psechridae) in Western Ghats, Kerala with a redescription and notes on its habit and habitat. *Journal of the Bombay Natural History Society*, 98: 304-306.

Mathew, M.J., Sudhikumar, A.V., Sunish, E., Sebastian, P.A. 2005. Spiders as fauna in a Cardomom Ecosystem. *Insect Environment,* 11(2): 83-85.

New, T.R. 1999. Untangling the web: Spiders and the Challenges of Invertebrate Conservation. - *Journal of Insect Conservation*, 3: 251-256.

Patel, B.H. 2003. Fauna of protected areas in India-2: A Preliminary list of spiders with description of three new species from Parambikulam Wildlife Sanctuary. Kerala, India. *Zoo's Print Journal*, 18(10): 1207-1212.

Pocock, R.I. 1895. Notes on the identity of some of the types of Mygalomorphae in the collection of the British Museum. *Annals and Magazine of Natural History, Sixth Series*, 16: 223-230.

Pocock, R.I. 1899. Diagnoses of some new Indian Arachnida. *Journal of the Bombay Natural History Society*, 12: 744-753.

Pocock, R.I. 1900. Great Indian spiders - The genus Poecilotheria: Its habits, history and species. *Journal of the Bombay Natural History Society*, 13: 121-133.

Riechert, S.E. and Gillespie, R.G. 1986. Habitat choice and utilization in web-building spiders. In: W. B. Shear, ed. *Spiders: Webs, Behavior and Evolution*. Stanford, Stanford University Press, pp.23-48

Ried, W.V., Miller, K.R. 1989. Keeping options alive: A scientific basis for conserving biodiversity. Washington D.C., World Resources Institute.

Sathiamma, B., Nair, K.R.C., Soniya, V.P. 1998. Record of the natural enemies of the Lacebug, *Stephanitis typicus* (D.) a pest on coconut palm. *Entomon*, 23: 321–324.

Sebastian, P.A., Mathew, M.J., Beevi, S.P., Joseph, J., Biju, C.R. 2005. The spider fauna of the irrigated rice ecosystem in Central Kerala, India across different elevational ranges. *The Journal of Arachnology*, 33(2): 247- 255.

Sebastian, P.A., Sudhikumar, A.V., Mathew, M.J. and Sunish, E. 2012. Diversity of spiders (Araneae) in the Western Ghats – an overview. In): P.D. Rajan et al., eds. *Invertebrate diversity and conservation in the Western Ghats*. Publisher: ATREE, Bangalore, pp.235-247.

Sebastian, P.A. and Peter, K.V. 2009. Spiders of India. Universities Press (India) Pvt. Ltd, Hyderabad.

Sherriff, W.R. 1919. A contribution to the study of South Indian Arachnology I. *Annals and Magazine of Natural History*, 9: 220-253.

Sherriff, W.R. 1927a. A contribution to the study of South Indian Arachnology II. *Annals and Magazine of Natural History*, 9: 533-542.

Sherriff, W.R. 1927b. A contribution to the study of South Indian Arachnology III. *Annals and Magazine of Natural History*, 10 (2): 177-181.

Sherriff, W.R. 1927c. A contribution to the study of South Indian Arachnology IV. *Annals and Magazine of Natural History*, 10 (2): 233-249.

Siliwal, M., Molur, S., Biswas, B,K. 2005. Indian Spiders (Arachnida: Araneae) Updated Check list 2005. *Zoos' print Journal*, 20(10): 1999- 2049.

Sinha, T.B. 1951. On the collection of Lycosid spiders in the Zoological Survey of India. *Records of Indian Museum*, 48: 9-52.

Smith, A.M. 2004. A new species of the arboreal theraphosid, genus Poecilotheria, from southern India (Araneae, Mygalomorphae, Theraphosidae) with notes on its conservation status. *Journal of British Tarantula Society*, 19: 48-61.

Subramanian, T.V. 1955. Habits and habitat of some common spiders found in Western Ghats. *Journal of the Bombay Natural History Society*, 52 (4): 876-881.

Sudhikumar, A.V., Mathew, M.J., Sunish, E., Sebastian, P.A. 2005a. Seasonal variation in spider abundance in Kuttanad rice agro ecosystem, Kerala, India (Araneae). *European Arachnology, Acta Zoologica Bulgarica, Suppl No. 1*, pp.181-190.

Sudhikumar, A.V., Mathew, M.J., Sunish, E., Murugesan, S., Sebastian, P.A. 2005b. Preliminary studies on the spider fauna in Mannavan shola forest, Kerala, India (Araneae). *European Arachnology, Acta Zoologica Bulgarica, Suppl. No. 1,* pp.319-327.

Sugumaran, M.P., Ganeshkumar, M., Ramasamy, K. 2005. Biodiversity of spiders in Western Ghats of Tamil Nadu. *Entomon*, 30 (2): 157-163.

Sunil, J.K.**,** Sudhikumar, A.V., Davis, S. and Sebastian, P.A. 2008. Preliminary Studies on the Diversity of Spider Fauna (Araneae: Arachnida) in Parambikulam Wildlife Sanctuary in Western Ghats, Kerala, India. Journal of the Bombay Natural History Society, 105 (3): 264-273.

Uetz, G.W. 1991. Habitat structure and spider foraging. In: S.S.Bell et al., (eds): *Habitat structure: the physical arrangement of objects in space*. London, Chapman & Hall.