



Faunistic diversity of spiders (Araneae) in Peechi-Vazhani Wildlife Sanctuary, Kerala, India

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ABSTRACT: The study describes the identification of the spider assemblages with respect to their diversity within the Peechi-Vazhani Wildlife Sanctuary. A total of 106 species, from 24 families were recorded from the area, which forms baseline information of spiders of the sanctuary. Families showed varying degrees of habitat fidelity with some being abundant while others rare. Amongst these, Salticidae, Araneidae, Oxyopidae and Lycosidae were to have more species in the area. However, analyses of functional groups, e.g., ground runners (29%) showed the positive influence of structural complexity of the habitat. The presence of different species in all habitats highlights the importance of conserving a wide array of representative habitats within ecosystems.

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KEYWORDS: Identification, guild structure, functional groups, Western Ghats

INTRODUCTION

The Western Ghats region's exceptional biological richness and endemism are inherent in its inclusion among the 34 global hotspots. Although protected areas (PAs) are the most effective strategy to conserve biodiversity (Terborgh *et al.*, 2002), it is becoming increasingly recognized that they are insufficient to conserve tropical biodiversity in the long run (Rosenzweig, 2003). In the past,

invertebrates were mostly overlooked when it came to conservation, and were only saved as a result of existing parks and reserves (DeWet and Schoonbee, 1991). Spiders are extremely varied arthropods, with 49,932 species classified into 4,239 taxa and 130 families worldwide. There are 1,897 species of spiders in India, divided into 488 genera and 60 families (World Spider Catalog, 2022). A comprehensive pioneering study was carried out on the alpha diversity of spider fauna in Peechi-

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Vazhani Wildlife Sanctuary and to provide species database to the Forest Department for developing a conservation action.

MATERIALS AND METHODS

Study area

Peechi-Vazhani Wildlife Sanctuary (P-VWS) situated in Thrissur district, Kerala state (76° 18' and 76°28' E ; 10° 28' and 10° 38' N) extending about 125 km². On the east, it is bounded by the Chimmini Wildlife Sanctuary, while on the north, it is flanked by the forests of the Palakkad division (Fig. 1). The sanctuary, which is located at 45–900m, receives 3000mm of annual precipitation. According to Champion and Seth (1986), the sanctuary's forest type is moist deciduous forest (almost 80%), followed by evergreen and semi-evergreen forest (15%), and teak and softwood plantations (5%). *Erythrina indica*, *Eugenia hemispheria*, *Dalbergia latifolia*, *Palanquium ellipticum*, *Terminalia tomentosa*, *Mesua ferrea*, *Cullenia excelsa*, *Cedrella toona*, *Bombax ceiba*, *Syzygium cumini*, *Largerstroemia lanceolata*, *Adina cordifolia*, *Albizia procera*, *Alstonia scholaris* and *Xylia xylocarpa* are the common tree species. The lower canopy includes, *Ixora* spp., *Clerodendrum* sp. and *Lantana camara*.

Sampling

The study was carried out during April 2021. Study sites included Vellani, Vazhani, Vallikayam and Olakkara sections of the sanctuary (Fig. 2). Spiders were actively searched from different microhabitats such as ground, litter, undergrowth, bushes, tree trunks, foliage, and water bodies. A visual search technique using a line transect was used to make collections. The handpicking and beating method were mostly used for collection. Smaller spiders were captured by pushing them into alcohol-filled tubes using a brush soaked in alcohol. Holding the jar open beneath the spiders and tapping them into it with the lid, spiders found on leaf blades, tree trunks, and webs were captured in the container. Running and wandering species, like lycosids, were explored among leaf litter, under surface of logs, rocks, and plant surfaces and

captured and transferred them to the jars (Sebastian and Peter, 2009). When a spider was noted, it was photographed and collected using Tikader's (1987) recommended handpicking approach. The specimens were preserved in ethanol (70%) and deposited in the collection of spiders, Arachnologylab, Deva Matha College, Kuravilangad (DMCK). Nomenclature follows the World Spider Catalog (2022). Adult males and females were identified up to species level while immature spiders were identified up to generic level.

RESULTS AND DISCUSSION

The spider diversity of Peechi-Vazhani Wildlife Sanctuary is found to be rich. Spiders representing 106 species coming under 68 genera and 24 families were recorded from the Sanctuary (Table 1, Plate 1 - 3). Among the twentyfour families, Salticidae (24 genera and 29 species) dominated in terms of spider diversity followed by Araneidae (5 genera and 19 species), Oxyopidae (4 genera and 12 species) and Lycosidae (4 genera, 5 species). Greater the variety of habitat type's available, larger is the diversity (Ried Miller 1989; Sudhikumar *et al.*, 2005; Siliwal and Molur, 2007; Adarsh and Nameer, 2015; Caleb, 2020). According to studies, habitat complexity and species richness are correlated, which shows that structurally more complex plants can support a greater variety of spider communities (Uetz, 1991). Salticidae or jumping spiders, are masters of camouflage and can coexist with their surroundings which may be the probable reason for their dominance in the nature. The abundance of various spider families in terms of individual numbers, which prominently reflects Salticidae and Araneidae as more abundant through a less diverse family in comparison to Cheiracanthiidae, Ctenidae, Hersiliidae, Clubionidae, Linyphiidae, Liocranidae, Mimetidae, Philodromidae, Pholcidae, Pisauridae, Theraphosidae, Scytodidae and Zodaridae.

The spiders of Peechi-Vazhani Wildlife Sanctuary can be divided into eight feeding guilds based on the foraging behaviour (Uetz *et al.*, 1999). They are the orb weavers, stalkers, ground runners, foliage runners, foliage hunters, sheet web builders, scattered line weavers and ambushers (Table 1).

Table 1. Checklist of spiders of Peechi-Vazhani Wildlife Sanctuary, Kerala

Family: Araneidae Clerck, 1757	27. <i>Scotophaeus</i> sp (Simon, 1893)
1. <i>Gasteracantha geminata</i> (Fabricius, 1798)	28. <i>Gnaphosid</i> sp (Pocock, 1898)
2. <i>Cyclosa spirifera</i> (Simon, 1889)	Family: Hersiliidae Thorell, 1870
3. <i>Cyclosa</i> sp 2 (Menge, 1866)	29. <i>Hersilia</i> sp (Audouin, 1826)
4. <i>Neoscona muckerjei</i> (Tikader, 1980)	Family: Linyphiidae Blackwall, 1859
5. <i>Araneid</i> sp (Clerck, 1757)	30. <i>Oeodothorax</i> sp (Bertkau, 1883)
6. <i>Eriovixia</i> sp 2 (Archer, 1951)	Family: Liocranidae Simon, 1897
7. <i>Cyclosa</i> sp (Menge, 1866)	31. <i>Oedignatha binoyii</i> (Reddy & Patel, 1993)
8. <i>Eriovixia laglaizei</i> (Simon, 1877)	Family: Lycosidae Sundevall, 1833
9. <i>Cyclosa</i> sp (Menge, 1866)	32. <i>Draposa</i> sp (Kronstedt, 2010)
10. <i>Gasteracantha</i> sp (Sundevall, 1833)	33. <i>Lycosa</i> sp (Latreille, 1804)
11. <i>Gasteracantha kuhli</i> (C. L. Koch, 1837)	34. <i>Hippasa agelenoides</i> (Simon, 1884)
12. <i>Araneid</i> sp (Clerck, 1757)	35. <i>Pardosa pseudoannulata</i> (Bösenberg & Strand, 1906)
13. <i>Neoscona</i> sp male (Simon, 1864)	36. <i>Pardosa</i> sp (C. L. Koch, 1847)
14. <i>Neoscona</i> sp1 (Simon, 1864)	Family: Mimetidae Simon, 1881
15. <i>Neoscona</i> sp 2 (Simon, 1864)	37. Mimetidae sp (Simon, 1881)
16. <i>Neoscona</i> sp 3 (Simon, 1864)	Family: Oxyopidae Thorell, 1870
17. <i>Argiope pulchella</i> (Thorell, 1881)	38. <i>Oxyopes shweta</i> (Tikader, 1970)
18. <i>Neoscona</i> sp (Simon, 1864)	39. <i>O. sunandae</i> (Tikader, 1970)
19. <i>Gasteracantha</i> sp (Sundevall, 1833)	40. <i>Hamadraus</i> sp (Deeleman-Reinhold, 2009)
Family: Cheiracanthiidae Wagner, 1887	41. <i>Hamataliwa</i> sp1 (Keyserling, 1887)
20. <i>Cheiracanthium</i> sp (C. L. Koch, 1839)	42. <i>Oxyopes javanus</i> (Thorell, 1887)
Family: Clubionidae Wagner, 1887	43. <i>O. forcipiformis</i> (Xie & Kim, 1996)
21. <i>Clubiona</i> sp1 (Latreille, 1804)	44. <i>Oxyopes</i> sp1 (Latreille, 1804)
22. <i>Clubiona</i> sp 2 (Latreille, 1804)	45. <i>Hamataliwa</i> sp 2 (Keyserling, 1887)
Family: Corinnidae Karsch, 1880	46. <i>Peucetia viridans</i> (Hentz, 1832)
23. <i>Cambalida</i> sp (Simon, 1909)	47. <i>Oxyopes</i> sp 2 (Latreille, 1804)
24. <i>Castianeria</i> sp (Keyserling, 1879)	48. <i>Hamataliwa pentagona</i> (Tang & Li, 2012)
25. <i>Cambalida deorsa</i> (Murthappa, Prajapati, Sankaran & Sebastian, 2016)	49. <i>Oxyopes birmanicus</i> (Thorell, 1887)
Family: Ctenidae Keyserling, 1877	Family: Philodromidae Thorell, 1870
26. <i>Ctenus cochinesis</i> (Gravely, 1931)	50. <i>Philodromidae</i> sp (Thorell, 1870)
Family: Gnaphosidae Pocock, 1898	Family: Pholcidae C. L. Koch, 1850

51. <i>Pholcus</i> sp1 (Walckenaer, 1805)	81. <i>Salticid</i> sp (Blackwall, 1841)
52. <i>Pholcus</i> sp 2 (Walckenaer, 1805) Family Pisauridae Simon, 1890	82. <i>Chalcotropis</i> sp (Simon, 1902)
53. <i>Dendrolycosa</i> sp1 (Doleschall, 1859)	83. <i>Telamonia dimitata</i> (male) (Simon, 1899)
54. <i>Dendrolycosa</i> sp 2 (Doleschall, 1859) Family: Salticidae Blackwall, 1841	84. <i>Telamonia dimitata</i> (female) (Simon, 1899) Family Scytodidae Blackwall, 1864
55. <i>Tamigalesus munnaricus</i> (abka, 1988)	85. <i>Scytodes thoracica</i> (Latreille, 1802) Family: Sparassidae Bertkau, 1872
56. <i>Epeus indicus</i> (Prószyński, 1992)	86. <i>Olios milleti</i> (Pocock, 1901)
57. <i>Stenaelurillus albus</i> (Sebastian, Sankaran, Malamel & Joseph, 2015)	87. <i>Heteropoda venetoria</i> (Linnaeus, 1767)
58. <i>Plexippus paykulli</i> (Audouin, 1826)	88. <i>Heteropoda</i> sp. (Latreille, 1804) Family: Tetragnathidae Menge, 1866
59. <i>Epocilla xaurantiaca</i> (Simon, 1885)	89. <i>Leucagede corata</i> (Blackwall, 1864)
60. <i>Brettus cingulatus</i> (Thorell, 1895)	90. <i>Tetragnatha keyserlingi</i> (Simon, 1890)
61. <i>Salticid</i> sp (Blackwall, 1841)	91. <i>Tetragnatha</i> sp (Latreille, 1804)
62. <i>Hyllus semicupreus</i> (Simon, 1885)	92. <i>Leucauge fastigata</i> (Simon, 1877)
63. <i>Cyrba ocellata</i> (Kroneberg, 1875)	93. <i>Tetragnatha</i> sp1 (Latreille, 1804) Family: Theridiidae Sundevall, 1833
64. <i>Hasarius adansonii</i> (Audouin, 1826)	94. <i>Parasteatoda celsabdomina</i> (Zhu, 1998)
65. <i>Epeus</i> sp (Prószyński, 1992)	95. <i>Molione</i> sp (Thorell, 1892)
66. <i>Habrocestum</i> sp1 (Simon, 1876)	96. <i>Therididae</i> sp1 (Sundevall, 1833)
67. <i>Salticid</i> sp (Blackwall, 1841)	97. <i>Therididae</i> sp 2 (Sundevall, 1833) Family: Theraphosidae Thorell, 1869
68. <i>Asemonea tenuipes</i> (O. Pickard-Cambridge, 1869)	98. <i>Annandaliella travancorica</i> (Hirst, 1909) Family: Thomisidae Sundevall, 1833
69. <i>Myrmaplata plataleoides</i> (O. Pickard Cambridge, 1869)	99. <i>Tmarus</i> sp (Simon 1875)
70. <i>Bianor</i> sp. (G.W. Peckham & E.G. Peckham, 1886)	100. <i>Thomisus projectus</i> (Tikader, 1960)
71. <i>Epeus triangulopalpis</i> (Malamel, Nafin, Sudhikumar & Sebastian, 2019)	101. <i>Camaricus formosus</i> (Thorell, 1887)
72. <i>Lyssomanes</i> sp (Hentz, 1845)	102. <i>Indoxysticus minutus</i> (Tang, Yin & Peng, 2005) Family Uloboridae Thorell, 1869
73. <i>Salticid</i> sp (Blackwall, 1841)	103. <i>Miagrammopes</i> sp (O.Pickard-Cambridge, 1870)
74. <i>Rhene flavigera</i> (C. L. Koch, 1846)	104. <i>Uloborus</i> sp (Latreille, 1806)
75. <i>Indopadilla insularis</i> (male) (Malamel, Sankaran & Sebastian, 2015)	105. <i>Miagrammopes</i> sp1 (O.Pickard-Cambridge, 1870) Family: Zodariidae Thorell, 1881
76. <i>Indopadilla insularis</i> (female) (Malamel, Sankaran & Sebastian, 2015)	106. <i>Zodariidae</i> sp (Thorell, 1881)
77. <i>Epeus</i> sp (G. W. Peckham & E. G. Peckham, 1886)	
78. <i>Rhene flavicomans</i> (Simon, 1902)	
79. <i>Phintella vittata</i> (C.L. Koch, 1846)	
80. <i>Telemonia</i> sp (Thorell, 1887)	

Table 2. Number of families, genera, species and functional guilds of spiders in Peechi-Vazhani Wildlife Sanctuary

No.	Family	Genera	Species	Guild
1.	Araneidae	5	19	Orb weavers
2.	Cheiracanthiidae	1	1	Foliage hunters
3.	Clubionidae	1	2	Foliage runners
4.	Corinnidae	3	3	Ground runners
5.	Ctenidae	1	1	Ground runners
6.	Gnaphosidae	2	2	Ground runners
7.	Hersilidae	1	1	Ambushers
8.	Linyphiidae	1	1	Sheet web builders
9.	Liocranidae	1	1	Ground runners
10.	Lycosidae	4	5	Ground runners
11.	Mimetidae	1	1	Stalkers
12.	Oxyopidae	4	12	Stalkers
13.	Philodromidae	1	1	Ambushers
14.	Pholcidae	1	2	Scattered line weavers
15.	Pisauridae	1	2	Foliage hunters
16.	Salticidae	24	29	Stalkers
17.	Scytodidae	1	1	Foliage hunters
18.	Sparassidae	2	3	Foliage runners
19.	Tetragnathidae	3	5	Orb weavers
20.	Theraphosidae	1	1	Ground runners
21.	Theridiidae	3	4	Scattered line weavers
22.	Thomisidae	4	5	Ambushers
23.	Uloboridae	2	3	Orb web weavers
24.	Zodaridae	1	1	Ground runners



Fig. 1 Location map of Peechi Vazhani Wildlife Sanctuary, southern Western Ghats

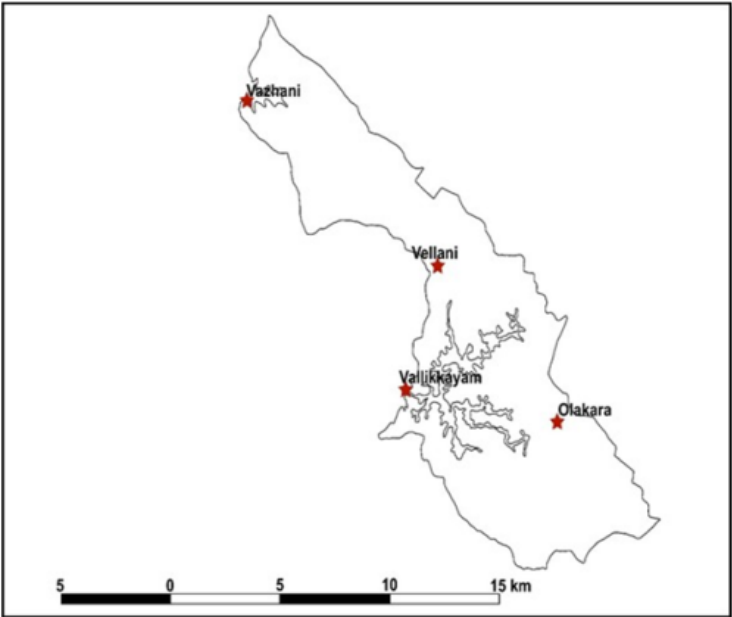


Fig. 2 Sample sites of Peechi - Vazhani Wildlife Sanctuary, Trissur, Kerala

Plate 1



Amyciaea sp.



Annandaliella travancorica



Argiope anasuja



Araneus sp.



Camaricus sp.



Cheracanthium sp.



Cyclosa sp.



Corinnomma sp.



Cyrtophora cicatrosa



Eriovixia sp.



Gasteracantha dalyi



Dendrolycosa robusta



Ctenus indicus

Plate 2

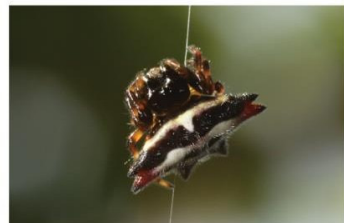
*Phintella vittata**Rhene flavicomans**Oxyopes shweta**Stenaelurillus albus**Scytodes sp.**Plexippus paykulli**Pardosa sp.**Peucetia sp.**Smeringopus sp.**Hyllus semicupreus**Nephilengys malabarensis**Gasteracantha geminata**Oxyopes sp.**Leucauge fastigata**Thomisus sp.*

Plate 3



Indopadilla insularis



Tetragnatha sp.



Neoscona sp.1



Miagrammopes sp.



Asemonea tenuipes



Telamonia dimidiata



Zelotes sp.



Heteropoda sp.



Hamataliwa sp.



Tmarus sp.



Neoscona sp.2



Porcataraneus sp.



Tamigalesus sp.



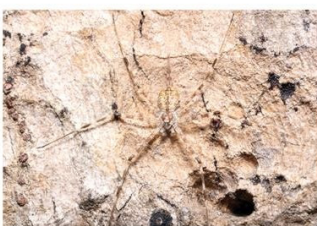
Anepsion maritatum



Hippasa agelenoides



Hersilia sp.1



Hersilia sp.2



Wadicosa sp.

Ground runners (29%) constitute the dominant feeding guild and are followed by stalkers (13%), ambushers (13%), foliage hunters (13%), orb weavers (12%), foliage runner (8%), scattered line weavers (8%) and sheet web builders (4%). The most probable reason for the observed pattern of spider guilds is structural diversity, micro environment, or the degree of habitat disturbance. The composition of guilds can shed information on the effect of habitat modification and disturbances on arthropod diversity.

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