

The diversity and distribution of spiders (*Arachnida: Araneae*) in the Swami Ramanand Teerth Marathwada University Campus, Nanded, Maharashtra, India

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Abstract

Spiders are one of the key species of the terrestrial ecosystems. The present investigation describes the diversity and distributional patterns of spider fauna within the Swami Ramanand Teerth Marathwada University Campus region of the Nanded district, Maharashtra, India. From the 12 different families, 21 species of spider were identified. The most common taxa in the research region were Araneidae and Lycosidae, which also showed the highest levels of taxonomic diversity and the distribution of species was significantly impacted by habitat heterogeneity; ground-dwelling species were more common in grassland habitats, but web-building and leaping spiders were more common in shrub, garden, and human-modified environments. Several ecologically significant taxa, including *Neoscona species*, *Pardosa pseudoannulata*, and *Oxyopes javanus*, which are recognised natural adversaries of agricultural insect pests, are included in the documented assemblage. During the monsoon season diversity of spiders was high (19 species; 90.5%), followed by winter (15 species; 71.4%) and summer (13 species; 61.9%). Spider communities in the studied area are significantly influenced by seasonal climatic circumstances. Through establishing a crucial baseline to guide future conservation tactics and ecological management frameworks, this study offers a more thorough understanding of the regional arachnid biodiversity.

Keywords: *Arachnida*, spider, Insecta, diversity, S.R.T.M.U., Nanded

Introduction

From the Arachnid group, the order *Araneae* represents a fundamental constituent of terrestrial ecosystems, having a critical role to maintain ecological equilibrium. Spiders, comprising the order *Araneae* within the class *Arachnida* (Phylum: Arthropoda), are specialised, terrestrial predators with a cosmopolitan distribution across diverse ecological niches (Biswas & Biswas, 2004) [2]. These organisms occupy unique ecological niches and are distributed across a wide range of global environments. As the most prolific predators of insects within terrestrial ecosystems, they consume substantial quantities of prey without damaging host vegetation (Vairale *et al.*, 2021) [16]. Spiders are significant predators of insect populations and serve as essential biological control agents (Fabre, 1999) [6]. Members of the order *Araneae*, commonly referred to as spiders, are hypothesised to have originated approximately 380 million years ago during the Devonian period (Platnick, 1991) [9]. Pocock, 1900 [10] documented 216 species of *Araneae*, establishing the first comprehensive taxonomic record of the spider fauna within the Indian subcontinent. According to Sebastian and Peter (2009) [12], the araneofauna of India comprises 1,520 species distributed across 377 genera and 60 families. According to the general fauna series of The Gazetteer of India, a total of 90 spider species across 14 families have been documented within the state of Maharashtra (Sebastian and Peter, 2009) [12].

Recent investigators have documented the species richness and distribution of spiders within protected habitats from the Saurashtra University Campus, Rajkot, Gujarat (38 species; Dave *et al.*, 2024) [5], Rajaram College, Campus, Kolhapur

(26 species; Chavan *et al.*, 2024) [4], Munia Conservation Reserve (MCR), Nagpur (46 species; Chandewar, 2023) [3], forest area near Ashti, Wardha District (32 species; Nimgare, 2023) [8], NNTR in Gondia (20 species; Bhandarkar *et al.*, 2019) [1], dry deciduous forests of Chandrapur district (90 species: Sawane, 2022) [11] and Katepurna Sanctuary in Akola (26 species; Shirbhate *et al.*, 2017) [13]. Despite their ecological importance, there is a notable paucity of data regarding spider diversity and distribution within the Swami Ramanand Teerth University Campus area of Nanded, Maharashtra.

The Swami Ramanand Teerth Marathwada University, situated in the Nanded district of Maharashtra, India, has garnered increasing academic and ecological interest due to its distinctive and specialised ecosystem. This study aims to establish the inaugural comprehensive record of araneofauna diversity and distribution within this critical conservation area. The identification and cataloguing of extant *Araneae* species are fundamental to the development of robust conservation strategies and the maintenance of ecological equilibrium.

Materials and Methods

Study Area

This study, conducted at S.R.T.M.U. Nanded, Maharashtra (19°09'N 77°27'E.), was selected for systematic surveys to sample various ecological habitats, including thick forest patches mainly of teak wood, shrubland, and grassland. The campus is noted for its significant faunal diversity, particularly a rich variety of arachnids with high species richness and population density.



Fig 1: Study area, S.R.T.M. University, Nanded, Maharashtra (By <http://srtmun.ac.in>)

Survey, Sampling, and Data Acquisition

Specimen sampling was conducted through a dual approach of visual search surveys for photo record and pitfall trapping to effectively capture both foliage-dwelling and ground-dwelling arachnid communities (Sorensen *et al.*, 2002) [14]. Spider species were collected by hand picking, shaking of vegetation, Pitfall trapping, sweep netting, and litter sampling. The study was conducted for one-year duration, beginning in May 2023 to April 2024. Specimens were collected and photographed, then subsequently identified and classified to the genus or species level using standard taxonomic keys and expert validation. Taxonomic identification of spiders was done with the help of Tikader and Malhotra, 1980 [15], supplemented by regional checklists by Gajbe, 2004 [7], and Sebastian and Peter, 2009 [12]. Specimens were captured solely for photographic documentation and taxonomic identification before being released into their original habitat. Systematic surveys were conducted across diverse habitats of the selected area utilising a variety of methodologies, strictly adhering to the protocols established by Sorensen *et al.*, 2002 [14]. For the seasonal analysis of species, the period was divided into three seasons: Monsoon, Winter and Summer. Survey was done seasonally in a year and data was recorded and analysed.

Result and Discussion

The survey of the study documented 21 spider species, representing 12 families. The families Araneidae and Lycosidae exhibited the highest levels of taxonomic diversity and were the most abundantly represented taxa within the study area. Across the 12 families under consideration, the family Araneidae comprises 4 Species, Lycosidae (3 species), Pholcidae (3 species), Salticidae (2 Species), Family Gnaphosidae (1 species), Hahniidae (1 species), Nephilidae (1 species), Oxyopidae (1 species), Sicariidae (1 species), Sparassidae (1 species), Tetragnathidae (1 species), Theridiidae (1 Species) (Table No.1).

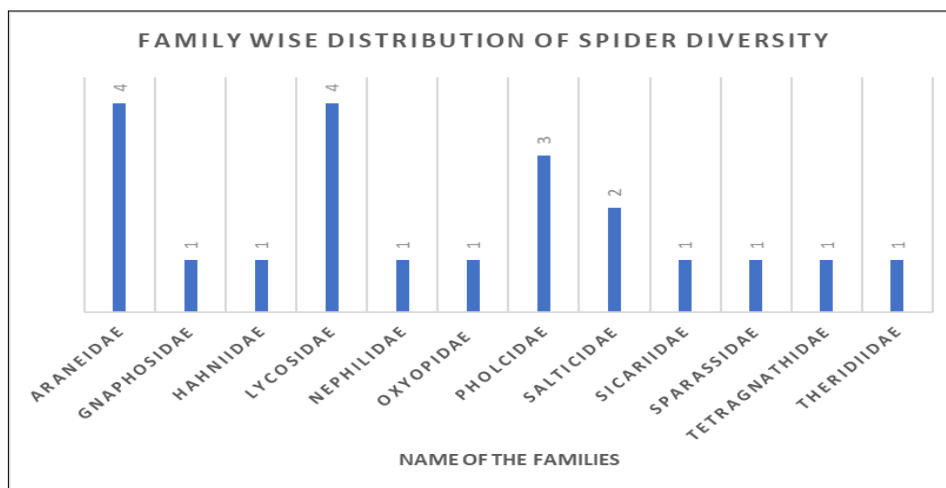
The species *Argiope aemula*, *Cyrtophora cicatrosa*, *Neoscona bengalensis*, and *Neoscona nautica* are among the Araneidae family of orb-weaving spiders that are primarily

found in shrub, garden, and marshy grassland habitats. The majority of ground-dwelling wolf spiders (Lycosidae), including *Hippasa* spp., *Lycosa tista*, and *Pardosa pseudoannulata*, have been found in grassland and soil surface environments. The fact that Pholcidae species were only connected to human habitations suggests that they are synanthropic. Grasslands and marshy environments around the pond in the university area supported the greatest number of species, especially ground-dwelling and cursorial spiders, according to the habitat-wise distribution. Large web-building species like *Nephila pilipes* were found in forest edge environments, whereas a wide variety of orb-weaving and jumping spiders were found in shrubs and garden vegetation. Synanthropic species like *Pholcus phalangioides*, *Artema atlanta*, and *Smeringopus pallidus* were found in human-modified habitats. The overall findings show that sustaining spider diversity on campus is greatly aided by habitat variability. The study highlights the diversity of spiders on the S.R.T.M.U. campus, pointing out the dominance of Araneidae because of the ideal vegetation for orb-webs and the notable diversity of Lycosidae in grassland habitats. It highlights species that have adapted to human habitats, such as Pholcidae and Salticidae, highlighting their significance in controlling pests. The need for habitat conservation to maintain spider communities and improve knowledge of Maharashtra's regional spider fauna is highlighted by the discovery that habitat heterogeneity is crucial for spider diversity. During the monsoon season diversity of spiders was high (19 species; 90.5%), followed by winter (15 species; 71.4%) and summer (13 species; 61.9%). While certain synanthropic and drought-tolerant species continued to exist during the summer, the majority of orb-weavers and wolf spiders peaked during the monsoon. These findings show that the makeup of spider communities in the studied area is significantly influenced by seasonal climatic circumstances.

Many studies revealed that in different habitats, such as agricultural, grassland, and human-modified ecosystems in India, families like Araneidae, Lycosidae, Pholcidae, and Salticidae are ecologically important and dominant (Shabnam *et al.*, 2021; Mishra & Rastogi, 2025) [17, 18]. The observed taxonomic diversity seems to have been influenced by the existence of several habitat types, including grasslands, marshy areas, forest borders, gardens, and human habitations. Because structurally complex vegetation offers more web attachment sites, prey availability, and shelter from disturbance, habitat variety is a major factor in spider diversification (Warghat *et al.*, 2011) [19]. The four species of the Araneidae family were dominant in the vegetation habitat. Shabnam *et al.*, 2021 [17] reported that these Orb-weavers are sensitive to the vegetation structure and are typically abundant in grasslands, shrubs and agroecosystems. *Neoscona* and *Cyrtophora* species feed on flying insects, protect agricultural farm and are found in agricultural landscapes. Species like *Pardosa pseudoannulata*, *Neoscona* spp. and *Oxyopes javanus* are known to play a significant role in regulating insect populations in agroecosystems (Mishra & Rastogi, 2025) [20].

Table 1: List of Spider species observed during the study period, in the S.R.T.M.U.N. Campus

Sr. No.	Family	Genus	Scientific Name of the Species	Common Name	Habitat
1	Araneidae	Argiope	<i>Argiope aemula</i> (Walckenaer, 1842)	Oval cross spider	Garden
		Cyrtophora	<i>Cyrtophora cicatrosa</i> (Stoliczka, 1869)	Garden tent web spider	Shrubs
		Neoscona	<i>Neoscona bengalensis</i> (Tikader & Bal, 1981)	Spotted orb weaver	Grassland with marshy habitat
			<i>Neoscona nautica</i> (L. Koch, 1875)	Grey sphere spider	Grassland with marshy habitat
2	Gnaphosidae	Scotophaeus	<i>Scotophaeus</i> sp. (Simon, 1893)	Mouse spider	Ground dwellers
3	Hahniidae	Hahnia	<i>Hahnia mridulae</i> (Tikader, 1970)	Comb-tailed spider	Dry leaf litter
4	Lycosidae	Hippasa	<i>Hippasa agelenoides</i> (Simon, 1884)	Common funnel web spider	Ground dweller (dune)
			<i>Hippasa greenalliae</i> (Blackwall, 1867)	Grass funnel web spider	Ground dweller (grassland)
		Lycosa	<i>Lycosa tista</i> (Tikader, 1970)	Grassland lycosid spider	Ground dweller (grassland)
		Pardosa	<i>Pardosa pseudoannulata</i> (Bösenberg & Strand, 1906)	Pond wolf spider	Ground dweller (grassland)
5	Nephilidae	Nephila	<i>Nephila pilipes</i> (Fabricius, 1793)	Giant wood spider	In & around the forest
6	Oxyopidae	Oxyopes	<i>Oxyopes javanus</i> (Thorell, 1887)	Striped lynx spider	Grass & low shrubs
7	Pholcidae	Artema	<i>Artema atlanta</i> (Walckenaer, 1837)	Oval daddy long-leg spider	Human habitation
		Pholcus	<i>Pholcus phalangioides</i> (Fuesslin, 1775)	Long-bodied cellar spider	Human habitation
		Smeringopus	<i>Smeringopus pallidus</i> (Blackwall, 1858)	Pale daddy long-leg spider	Human habitation
8	Salticidae	Hasarius	<i>Hasarius adansoni</i> (Audouin, 1826)	Adanson's house jumper	House wall & garden
		Plexippus	<i>Plexippus paykulli</i> (Audouin, 1826)	Common zebra jumper	Wall of building & tree trunk
9	Sicariidae	Loxosceles	<i>Loxosceles rufescens</i> (Dufour, 1820)	Violin spider	Under stones & logs in damp soil
10	Sparassidae	Heteropoda	<i>Heteropoda venatoria</i> (Linnaeus, 1767)	Common house spider	Houses & tree trunk in garden
11	Tetragnathidae	Tylorida	<i>Tylorida striata</i> (Thorell, 1877)	Striped <i>Tylorida</i> spider	Shaded vegetation in garden
12	Theridiidae	Theridion	<i>Theridion manjithar</i> (Tikader, 1970)	Common comb-footed spider	Foliage of trees & bushes



Graph 1: Different family represents different numbers of species

Table 2: Seasonal presence of Spider species

Sr. No.	Name of spider Species	Monsoon	Winter	Summer
1.	<i>Argiope aemula</i>	✓	✓	✗
2.	<i>Cyrtophora cicatrosa</i>	✓	✓	✓
3.	<i>Neoscona bengalensis</i>	✓	✓	✓
4.	<i>Neoscona nautica</i>	✓	✓	✓

5.	<i>Scotophaeus sp.</i>	✓	✓	✗
6.	<i>Hahnia mridulae</i>	✓	✗	✓
7.	<i>Hippasa agelenoides</i>	✓	✓	✗
8.	<i>Hippasa greenalliae</i>	✓	✓	✗
9.	<i>Lycosa tista</i>	✓	✓	✓
10.	<i>Pardosa pseudoannulata</i>	✓	✓	✓
11.	<i>Nephila pilipes</i>	✓	✓	✗
12.	<i>Oxyopes javanus</i>	✓	✗	✓
13.	<i>Artema atlanta</i>	✓	✓	✓
14.	<i>Pholcus phalangioides</i>	✓	✓	✓
15.	<i>Smeringopus pallidus</i>	✓	✓	✓
16.	<i>Hasarius adansoni</i>	✓	✗	✗
17.	<i>Plexippus paykulli</i>	✓	✓	✓
18.	<i>Loxosceles rufescens</i>	✗	✗	✓
19.	<i>Heteropoda venatoria</i>	✗	✗	✓
20.	<i>Tylorida striata</i>	✓	✓	✗
21.	<i>Theridion manjithar</i>	✓	✗	✓

✓= Presence of species, ✗=Absence of species

Conclusion

This study constitutes the first comprehensive investigation into the diversity and spatial distribution of *Araneae* (spiders) within the S.R.T. M. University, Nanded. By doing so, it elucidates the ecological significance of a taxonomic group that has historically remained underrepresented in regional arachnological literature. These findings offer

significant utility for subsequent research, conservation strategies, and reserve management. Furthermore, this study advances the broader understanding of India’s arachnid diversity, facilitating more informed conservation planning.

Spider diversity in Swami Ramanand Teerth Marathwada University Campus, Nanded, Maharashtra



Fig 2: *Argiope aemula*



Fig 3: *Cytophora cicatrosa*



Fig 4: *Neoscona bengalensis*



Fig 5: *Neoscona nautica*



Fig 6: *Scotophaeus sp.*



Fig 7: *Hahnia mridulae*



Fig 8: *Hippasa agelenoides*



Fig 9: *Hippasa greenalliae*



Fig 10: *Lycosa tista*



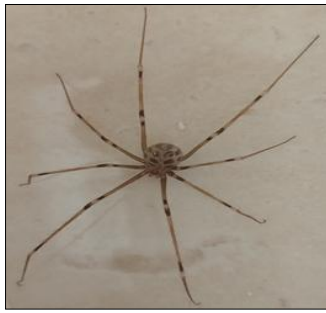
Fig 11: *Pardosa pseudoannulata*



Fig 12: *Nephilan pilipes*



Fig 13: *Oxyopes javanus*

Fig 14: *Artema atlanta*Fig 15: *Pholcus phalangioides*Fig 16: *Smeringopus pallidus*Fig 17: *Hasarius adansoni*Fig 18: *Plexippus paykulli*Fig 19: *Loxosceles rufescens*Fig 20: *Heteropoda venatoria*Fig 21: *Tylorida striata*Fig 22: *Theridion manjithar*

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