

# A Preliminary Study on Diversity of Spiders from Tumkur University Campus, Tumakuru, India

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## Abstract

A survey of spider fauna of Tumkur University, Tumakuru, India was conducted from January 2018 to June 2018. A total of 46 species belonging to 34 genera of 13 families were observed. This accounted for 2.72% of Indian spider species, 7.76% and 21.66% of Indian spider genera and families. The dominant families were Araneidae (20 species), Salticidae (6 spp.), Pholcidae (3 spp.) and Oxyopidae (3 spp.). A total of six guild structures of spider were observed. Among these Orb weavers (52.17%) were most dominant group followed by Stalkers (19.56%), Scattered line weavers (10.86%), Ambushers and Ground runners (6.52%) and Foliage runners (4.34%) with least dominant group. The different types of habitat and ecological factors of the campus evidenced with rich diversity of spider species. The present study establishes a baseline data for future research in the field of arachnology and the study was first of its kind with respect to Tumkur district.

**Keywords:** Diversity, Spider, Guilds, Tumkur University

## 1. Introduction

Spiders are one of the most fascinating and omnipresent arthropod. Being present in various microhabitats they act as an important bio indicators and bio control agents (Riechert and Bishop, 1990). They are the largest order of Arachnids and rank seventh in the total species diversity among all the other groups of organisms (Sebastian, 2009). They regulate the terrestrial Arthropod populations as predators and becoming prey to other organisms present in nature (Salomon, M. et. al., 2015).

A total of 44,540 species of spiders belonging to 3,924 genera of 112 families have been described all over the world (Platnick, 2014). A total of 2,299 species of spiders from 67 families have been reported from South Asia (Siliwal et. al., 2005). A total of 1,686 species belonging to 438 genera of 60

families were recorded from India (Keswani et. al., 2012). Pocock (1900) and Tikader (1987) have given a baseline data on diversity of Indian spider fauna by publishing the comprehensive lists of Indian spiders. In Karnataka the information on diversity of spider fauna is highly fragmented. Some of the recent published works on spider diversity of Karnataka include 17 species of spiders reported from Thungabhadra project (Vijaykumar, 2004), about 40 spider species were documented from IISc., Bangalore (Nalini Bai and Ravindranatha, 2012), 17 species were noticed from Jnanasahyadri campus, Shivamogga (Prashanthakumara et al, 2015), nearly 25 species of spider fauna were recorded from Gulbarga (Ashwini Deshpande and Ravindra Paul, 2016). About 71 species of spiders were located from Gudavi bird sanctuary, Shivamogga (Prashanthakumara and Venkateshwarlu, 2017) and 41 species from Karnatak University, Dharwad (Vaibhav and Vidyavati, 2017). From Mangalore University campus, Mangalore about 32 species of spiders were reported (Sumangala Rao et al., 2018). Tumkur district is one of the well-known places for having wide diversity of flora and fauna of Karnataka state, but no documentation work has been done so far on the diversity of spider fauna. As a preliminary work the present study has been conducted with respect to Tumkur University campus with the intension to provide the baseline data for future research work on biology of spider fauna.

## 2. Materials & Methods

### 2.1. Study area

Tumkur is situated at a distance of 70km (43 miles) northwest of Bengaluru, the capital city of Karnataka at 13°20'16" N and 77°7'13" E in the plains of Deccan plateau of peninsular India. The climatic condition of the district constitutes monsoon (June to

November), post monsoon (December to February) and pre monsoon (March to May) with an average annual temperature of 36°C - 38°C. The district receives annual rain fall between 500mm to 900mm.

The study was conducted at Tumkur University campus, Tumakuru. It is established in 2004 and located in the heart of the Tumkur city. It includes thick vegetation with diverse flora and fauna. The University campus is about 90 acres and infrastructure is about 98,800 sq. ft. The infrastructure includes the buildings like University Science College, University Arts College, Sadananda Maiya Block, Dr. V. S. Acharya Memorial Block, University Library, Dr. M. S. Subba Lakshmi Art Gallery, Guest House, and Play grounds. The campus also includes dense vegetation gardens like Buddavana, Dhanavantri vana, Sri Ramana Maharshi Dhyana Mandira and others with herbs, shrubs, climbers and trees of medicinal and ornamental plants.

## 2.2. Sampling methods

The study was conducted from January 2018 to June 2018. Quadrates of 20x20m were taken at random sites. Sampling was conducted every day from 8 to 9 am and 5 to 7 pm as many spiders are active at evening and night time. The spiders were captured using standard methods such as visual searching, Hand picking, inverted umbrella method, by sweep net. As spiders were ubiquitous in distribution, they were collected from flowers, leaves, webs, tree trunks, under the stones, on the grounds, and from the buildings and were photographed using Finepix s3300 digital camera.

## 2.3. Identification

The collected spiders were identified with the help of field guide (Sebastian and Peter, 2017; Tikader, 1987), after identification the spiders were released to their natural habitat.

## 3. Results & Discussion

The spider diversity of Tumkur University campus is found to be rich. The study revealed the occurrence of 46 species spiders belonging to 34 genera of 13 families (Table 1). This accounted for 2.72% of Indian spider species, 7.76% of genera and 21.66% of the spider families of India. Out of these families Aranidae family (20 spp.) was the most dominant family followed by Salticidae (6 spp.), Pholcidae, Oxyopidae, Tetragnathidae, (3 spp. each) Theridiidae, Lycosidae, Thomisidae (2 spp. each) Clubionidae, Gnaphocidae, Hersiliidae, Sparassidae, Uloboridae having single species each (Fig. 1). Diversity generally increases when a greater variety of habitat types are present (Ried, Miller 1989, Noss 1990). The structurally more complex shrubs could support a more diverse spider community (Uetz, 1991). As such the University campus has various

thick vegetational gardens they supported the rich diversity of spiders in the study area.

The spiders of Tumkur University were noticed with the following foraging behaviour. The Orb weavers (Araneidae, Tetragnathidae, Uloboridae), Stalkers (Oxyopidae, Salticidae), Scattered line weavers (Pholcidae, Theridiidae), Ambushers (Hersiliidae, Thomisidae), Ground runners (Gnaphocidae, Lycosidae), Foliage runners (Clubionidae, Sparassidae) (Table 2). Among these Orb weavers were dominant with 52.17% of species, followed by Stalkers (19.56%), Scattered line weavers (10.86%), Ambushers and Ground runners (6.52%), Foliage runners (4.34%) (Fig.2). Spiders select habitat in such a way that they benefit in various forms to reduce inter specific competition within its communities (Ann E. Kronk and Susan E. Riechert, 1979; Uetz et al., 1999).

Most of the spiders preferred moist and thick vegetation. Culin, Yeargan (1983) noted that the species richness of spiders is significantly higher in systems that have not been heavily manipulated. From the study area it was noticed that *Cyrtophora cicatrosa* the species belong to Araneidae was preferred to build their guild in shrubs, whereas the *Thomisus pugilis* found most of the time on Flowers. Among orb weavers the species *Gasteracantha geminata* was found to build strong and highly elastic guild. *Telamonia dimidiata* was found on shrubs, *Uloborus* sp. construct web that mimics bird poop, and the *Argiope pulchella* build web that had zig-zag marking in 'X' shape. The species of Salticidae family were very active and jumping spiders, *Myrmarachnae plataleoides* had different body structure that mimic ants on the trees. The spiders of the family Pholcidae were located from the corners and walls of the buildings of the study area.

## 4. Conclusion

From the present study it has been concluded that Tumkur University Campus has a rich and wide diversity of spider species with 46 species belong to 34 genera of 13 families. A total of six guild structures of spiders based on foraging behaviour were observed. The diversity of spider species and the composition of spider communities increase with different physical structure of environment particularly the plant community and the moderation of weather factors and creation of diverse microclimates, and the increased availability of web attachment sites for orb-weavers and other web-builders (Uetz et al., 1999). As these ecological conditions were persists in the University campus during the survey period it was possible to document the wide diversity of spider fauna from the study area. It is the first document of spider diversity in

Tumkur district, still more work has to be done on spider's biology especially with respect to food and feeding habits, their web construction, physiology, reproduction and life cycle, comparative anatomy, molecular work and their ecological importance.

Table 1. List of spider species distributed in Tumkur University campus

Family	Species	No. of species
Araneidae	<i>Araneus species</i> (Simon, 1886)	20
	<i>Argiopepulchella</i> (Thorell, 1881)	
	<i>Argiopeaemula</i> (Walckenaer, 1842)	
	<i>Argiopeanasuja</i> (Thorell, 1887)	
	<i>Argiope sp.</i> (Audouin, 1826)	
	<i>Araneusinusustus</i> (L Koch, 1871)	
	<i>Cyclosa sp.</i> (Menge, 1866)	
	<i>Cyclosaconfraga</i> (Thorell, 1892)	
	<i>Cyclosa bifida</i> (Dolescall, 1859)	
	<i>Cyrtophoracicatrosa</i> (Stoliczka, 1869)	
	<i>Cyrtophoracitricola</i> (Forskal, 1775)	
	<i>Cyrtophoramolluciensis</i> (Doleschall, 1857)	
	<i>Gasteracanthacancriformis</i> (Sundevall, 1833)	
	<i>Gasteracanthageminata</i> (Fabricius, 1798)	
	<i>Neosconamukerjei</i> (Tikader, 1980)	
	<i>Neoscona Scylla</i> (Simon, 1864)	
<i>Nephila sp.</i>		
<i>Neoscona nautical</i> (Taczanowski, 1873)		
<i>Parawixiadehaani</i> (Doleschall, 1859)		
<i>Thelacanthabrevispina</i> (Doleschall, 1857)		
Clubionidae	<i>Clubionidae sp.</i> (Wagner, 1887)	1
Gnaphocidae	<i>Gnaphocidae sp.</i> (Pocock, 1898)	1
Hersiliidae	<i>Hersilia sp.</i> (Thorell, 1870)	1
Lycosidae	<i>Hippasa sp.</i> (Simon, 1885)	2
	<i>Lycosa sp.</i> (Latreille, 1804)	
Oxyopidae	<i>Oxyopusjavanus</i> (Thorell, 1887)	3
	<i>Oxyopusshwetha</i> (Tikader, 1970)	
	<i>Peucetiaviridana</i> (Stoliczka, 1869)	
Pholcidae	<i>Crossoprizalyoni</i> (Blackwall, 1867)	3
	<i>Pholcusphalangeoides</i> (Fuesslin, 1775)	
	<i>Smeringopus pallidus</i> (Blackwall, 1858)	
Salticidae	<i>Hyllussemicupreus</i> (Simon, 1885)	6
	<i>Menemerusbivittatus</i> (Dufour, 1831)	
	<i>Myrmarchneplataleoides</i> (O. P. Cambridge, 1869)	
	<i>Plexippuspaykulli</i> (Audouin, 1826)	
	<i>Telamoniadimidiata</i> (Simon, 1899)	
<i>Rhene sp.</i> (Thorell, 1869)		
Sparassidae	<i>Olios sp.</i> (Walckenaer, 1837)	1
Tetragnathidae	<i>Leucaugedecorata</i>	3
	<i>Tetragnathidae sp.</i> (Menge, 1866)	
	<i>Tetragnatha sp. 1</i>	
Theridiidae	<i>Achaeranea sp.</i> (Strand, 1929)	2
	<i>Parasteatoda sp.</i>	
Thomisidae	<i>Runciniaafinis</i> (Simon, 1897)	2
	<i>Thomisuspugilis</i> (Stoliczka, 1869)	
Uloboridae	<i>Uloborus sp.</i> (Thorell, 1869)	1

Table 2. Genera and Species of spiders distribution in Tumkur University campus

S. No.	Family	Genera	Species	Guild Structure
1	Araneidae	9	20	Orb weavers
2	Clubionidae	1	1	Foliage runners
3	Gnaphocidae	1	1	Ground runners
4	Hersiliidae	1	1	Ambushers
5	Lycosidae	2	2	Ground runners
6	Oxyopidae	2	3	Stalkers
7	Pholcidae	3	3	Scattered line weavers
8	Salticidae	6	6	Stalkers
9	Sparassidae	1	1	Foliage runners
10	Tetragnathidae	3	3	Orb web weavers
11	Theridiidae	2	2	Scattered line weavers
12	Thomisidae	2	2	Ambushers
13	Uloboridae	1	1	Orb web weavers
<b>Total</b>	<b>13 Family</b>	<b>34 Genera</b>	<b>46 Species</b>	

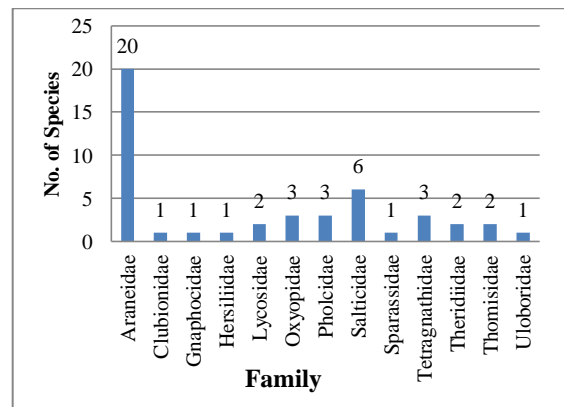


Fig. 1: Family wise distribution of spiders in Tumkur University campus

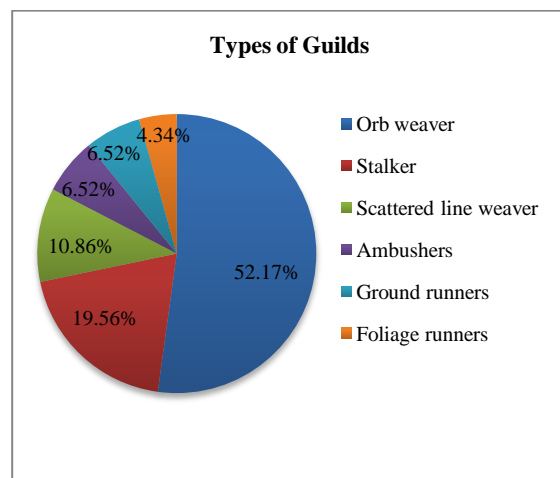


Fig. 2: Types of guilds found in Tumkur University campus

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