

Density, Abundance and Per Cent Occurrence of Spider Species (Arachnida: Araneae) In and Around Mysore City, Karnataka, India – A Case Study

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Abstract: Field survey was conducted to record the diversity of spiders at different ecosystems in and around Mysore city during January to April, 2018. Observations were made from morning 8.00 to 11.00 hrs and 16.00 to 18.00 hrs by employing Visual Count Method at Fixed Variable Width Line Transects and an All Out Search Method. Around 65 species of spiders belonging to 15 families were recorded. Salticidae family was represented with eight species (e.g. *Rhene rubrigeria*, *Telamonia dimidiata*, *T. sikkimensis*, *Carrhotus viduus*, *Epocilla aurantiaca*, *Myrmarachne* sp. and *Plexippus paykulli*) followed by Araneidae (e.g. *Araneus* sp., *Argiope aemula*, *Cyclosa tuberculata*, *Cyrtophora cycatrosa*, *Gasteracantha geminata*, *Neoscona mukherjei*, *Larinia chloris*), Oxyopidae (e.g. *Oxyopes javanus*, *O. birmanicus*, *O. shweta*, *Peucetia viridana*), Lycosidae, (e.g. *Pardosa mysorensis*, *Hyppasa* sp., *Trochosa* sp.), Tetragnathidae (e.g. *Tetragnatha*, *Tylorida striata*) and Uloboridae (e.g. *Miagrammopes* sp.). However, Theridiidae, Eresidae, Pholcidae, Hersilidae, Nephilidae, Clubionidae, Corinnidae, Thomisidae and Linyphiidae family members were very less. The density, abundance and per cent occurrence of different spider species revealed variation in their distribution and there existed a significant difference ($F=5.53$; $P>0.05$) between different ecosystems in and around Mysore. Further, recorded spider species shown different types of nests and predatory behavior on various insect species including their own species thereby proved themselves as integral part of local biodiversity amidst different ecosystems.

Key words: Spiders, density, abundance, different ecosystems, Mysore, Karnataka.

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I. Introduction

Spiders are one of the most diverse groups of organisms belonging to the largest order Araneae of the class Arachnida. They rank seventh position in total species diversity among all other animals on this planet earth (Ayyar, 1964). Spiders occur in every terrestrial, semi-terrestrial, wetland ecosystems and from cold tundra, alpine ecosystems to tropical rainforests, deserts excepting in Antarctica, and becomes part of various food chains and food webs amidst different ecosystems. Around 46, 960 species of spiders which belong to 112 families are recorded at different parts of the world. In India, 1, 520 spider species belong to 377 genera and 59 families are recorded by Sebastian and Peter (2009). Spiders play a pivotal role at different tropic levels; their species composition at various ecosystems nearby urban areas is poor.

Several researchers have reported on various aspects of spiders and their diversity at different parts of the world. Bambaradeniya et al. (2004) have studied the biodiversity of spiders associated with irrigated rice agro-ecosystems in Sri Lanka. Villanueva-Bonilla et al. (2017) have reported the tree-dwelling spiders (Family: Selenopidae) in a tropical forest. Abdelmoniem et al. (2003) have identified the spider diversity in relation to habitat heterogeneity and an altitudinal gradient in south Sinai, Egypt. Masumoto (1998) has documented the cooperative prey capture by the communal web spider, *Philoponella raffrayi* (Araneae, Uloboridae). Gallé et al. (2018) have noted the spider assemblage structure and functional diversity patterns in natural forest ecosystem. However, in India, Patel (2001) has prepared a preliminary list of spiders by describing three new species along with already existed 91 spider species belonging to 53 genera and 22 families from Parambikulam Wildlife Sanctuary, Kerala. Gajbe (2004) has given the description of three new species of crab spiders (Araneae:Thomisidae) from Madhya Pradesh. Sudhikumar et al. (2005) have presented the preliminary studies on 72 species of spiders belonging to 57 genera and 20 families in Mannavan Shola Forest, Kerala. Siliwal et al. (2005) have prepared an updated checklist of Indian spiders. Similarly, Sudhikumar and Sebastian (2005) have reported 99 species of spiders belonging to 66 genera, which belong to 20 families in Kuttanad rice agro-ecosystem, Kerala. Hore (2009) has studied diversity and structure of spider assemblages with 186 species belongs to 77 genera and 27 families in Terai Conservation Area. Shazia et al. (2011) have published a report on spider diversity that comprised 244 species belonging to 108 genera and 33 families along altitudinal gradient

and associated changes in microclimate attributes in Nanda Devi Biosphere Reserve, Uttarakhand. Varsha et al. (2013) have studied the diversity and guild structure of spider fauna consisted of 42 species of spiders belonging to 14 families at Sawaga-Vithoba Lake (Malkhed Project) area in Pohara Forest Dist. Deshmukh and Raut (2014) have provided an information on 104 spider species which belonging to 18 families and their seasonal diversity and status in Salbardi Forest Satpura Range, Maharashtra. Adarsh and Nameer (2015) have reported 86 spider species belonging to 56 genera and 20 families amidst Kerala Agricultural University Campus, Thrissur. Dhali et al. (2016) have reviewed the diversity and distribution of Indian primitive spiders (Araneae: Opisthothelae: Mygalomorphae) at different parts of India. Their review suggested the primitive spider fauna is maximum in Tamil Nadu followed by Kerala, West Bengal and Karnataka. Moreover, Adharsh and Nameer (2016) have documented two endemic genera of Indian spiders viz., *Annandaliella* and *Neoheterophriectus* (Family: Theraphosidae) along with 101 species of spiders belonging to 65 genera from 29 families in Chinnar Wildlife Sanctuary, Kerala. Amravati. Shirbhate and Shirbhate (2017) have identified 11 genera and 26 species belong to family Araneidae in and around Katepurna Sanctuary, Akola. Hence, by reporting spider fauna at diversified ecosystems, researchers enable to identify their pivotal role and ecological indicator ship at various ecosystems (Hore and Uniyal, 2008). However, in Karnataka, published reports on spiders and their species diversity is poor. Rachana et al. (2012) have studied the diversity of spiders in the vicinity of Kukkarahalli Lake, Mysore city. Basavarajappa and Vijayan (2012) have published the list of spiders recorded at Kukkarahalli Lake in Mysore city. Prashanthakumar and Venkateshwarlu (2017) have made a preliminary study of spiders in Gudavi Bird Sanctuary, Shivamogga. Spider's distribution at different ecosystems at the vicinity of urban areas is fragmentary (Bhat et al. 2013; Mubeen, 2018; Mubeen and Basavarajappa, 2018). Hence, knowledge on locally available spider fauna has necessitated. Thus, the present investigation was undertaken to record the species composition, density, abundance and per cent occurrence of different spider species at various ecosystems in and around Mysore, Karnataka, India.

II. Materials and methods

Study Area: Mysore is situated near the Western Ghats and possesses different type of ecosystems viz., urban area (e.g. neatly maintained lawns, parks etc.), agro-ecosystem (e.g. paddy fields), aquatic habitat (e.g. ponds and lakes), protected ecosystem (e.g. forest habitat) and supported by a great variety of flora and fauna. So, these different areas were chosen and their brief details are as follows.

Manasagangotri Campus: Manasagangotri campus was established in 1916 and it is a main post-graduate centre of the University of Mysore, aptly named fountain head of the Ganges of the mind by the poet K.V. Puttappa in 1960. Manasagangotri campus lies at 12^o 18¹ N and 76^o 38¹ E in a picturesque area of 852 acres at the western end of the Kukkarahalli Lake (Kamath, 2001). The campus is housed with more than 54 post-graduate Departments, eight specialized research and training centers established with modern facilities amidst rich diversity of flora and fauna (Basavarajappa and Vijayan, 2012).

Kukkarahalli Lake: This Lake was established by Krishnaraja Wodeyar, ruler of Mysore in 1864 to provide water for irrigation as well as for drinking to the people of Mysore city. Now, it is a part of Manasagangotri campus, has 150 acres catchment area unevenly spread shoreline surrounded by marshy area with wild grass species thick bushes, herbs, shrubs along with *Proposis juli*, *Eucalyptus*, *Bamboo* species. The dry deciduous tree species including teak, sandal wood etc, are grown under social forestry in Kukkarahalli Lake upper bank on north-east side (Basavarajappa and Vijayan, 2012). Both these two areas were selected during the preset study.

Agricultural Ecosystem: It is situated in Jakkanakuppe (12^o 23¹ N, 76^o 37¹ E) which is 9.2 Kilometers away from the Manasagangotri campus. This place has a large land area used for the cultivation of paddy (*Oryza sativa*).

Methodology: Field observations were carried out for a period of four months from January to April, 2018. To record the spiders, 10 study sites were randomly selected and visited two times per week. Observations were made morning to evening by following Visual Count Method (VCM) at five meters length Fixed Variable Width Line Transect. Spiders were observed on different shrubs, herbs, on leaf blades, flowers, dry leaves and even at the ground stratum. All Out Search Method was also followed as and when it is required. Hand Picking Method was employed to collect the dead spiders and preserved in 70% ethyl alcohol with proper labeling and brought to the laboratory for identification. Live spiders were photographed with the help of digital camera by following VCM. Information on species composition, distribution, guild structure, nest type and feeding habits, prey species and prevailed ecological conditions were collected from those study sites as mentioned above with the help of pre-tested questionnaire. The spiders were identified on the basis of morphological characteristics as per Cohn (1990), Tikader (1987) and Sebastian and Peter (2009). The guild structure gives information about why the spider has selected a particular habitat. Collected data was compiled systematically, analyzed the density, abundance and percentage as per Wankhade et al. (2012).

III. Results

Spider species composition: Altogether 65 spider species which belonging to 15 families of the order Araneae were observed at different ecosystems in and around Mysore (Table 1). The Salticidae, Araneidae, Oxyopidae, Lycosidae, Tetragnathidae, Corinnidae, Thomisidae, Nephilidae, Theridiidae, Uloboridae, Clubionidae, Eresidae, Linyphiidae, Philodromidae and Hersilidae families were represented during January to April at different ecosystems in and around Mysore (Table 2). The family Salticidae was represented by 15 species namely: *Carrhotus viduus*, *Chalcotropis pennata*, *Curubis* sp., *Cocalus* sp., *Epocilla aurantiaca*, *Hasarius adansoni*, *Hyllus semicupreus*, *Indomarengo* sp., *Myrmaplata plateleoides*, *Myrmarachne orientales*, *Plexippus paykulli*, *P. petersi*, *Rhene rubrigera*, *Telamonia dimidiata* and *Phaeacius lancearius* (Table 1). It was followed by Araneidae with 12 species such as *Araneus* sp., *Argiope aemula*, *A. catenulata*, *A. pulchella*, *Cyclosa tuberculata*, *Cyrtophora cicatrosa*, *C. citricola*, *Eriovixia excelsa*, *Gasteracantha geminata*, *G. hasselti*, *Larinia chloris* and *Neoscona mukherjei* and Oxyopidae family with 11 species viz., *Hamataliwa* sp., *Oxyopes bharathae*, *O. javanus*, *O. shweta*, *O. sunandae*, *Oxyopes* sp., *Peucetia viridana* and *Peucetia* sp. (Table 1), However, remaining 11 families such as Lycosidae, Tetragnathidae, Corinnidae, Thomisidae, Nephilidae, Theridiidae, Clubionidae, Hersilidae, Eresidae, Linyphiidae and Philodromidae have represented by less than 10 spider species at different ecosystems in and around Mysore (Table 1). Around seven spider species were recorded in Lycosidae and five species in Tetragnathidae families. In Corinnidae and Thomisidae families, only three species were recorded. However, in Nephilidae, Theridiidae and Uloboridae families recorded only two species each. In Clubionidae, Eresidae, Hersilidae, Linyphiidae and Philodromidae families, recorded only one species each (Table 1). The spider family and their species composition in and around Mysore are predicted in Table 2. Further, the density, abundance and per cent occurrence of these spider species is shown in Table 1.

Spider species density: The density of *Peucetia viridana* (Oxyopidae) was high (4.09) and it was followed by *Parasteatoda corrugate* (Theridiidae) (2.0). However, *Tetragnatha viridorufa* (Tetragnathidae), *Stegodyphus sarasinorum* (Eresidae), *Pardosa pseudoannulata* (Lycosidae) and *Hippasa agelenoides* (Lycosidae), *Oxyopes javanus* (Oxyopidae), *Oxyopes* sp. (Oxyopidae) density was less than two (Table 1). Moreover, around 12 spider species density was moderate and it was in between 0.12 and 0.78. Further, 44 spider species density was very less and it was in between 0.03 and 0.09 (Table 1).

Spider species abundance: The *Oxyopes javanus* (Oxyopidae) was more abundant (0.62) and it was followed by *Peucetia viridana* (Oxyopidae) (0.34). However, *Neoscona mukherjei* (Araneidae), *Hippasa greenalliae* (Lycosidae), *Herennia multipuncta* (Nephilidae), *Tetragnatha elongates* and *T. viridorufa* (Tetragnathidae) abundance was 0.12 only (Table 1). Further, *Hersilia sumatran* (Hersilidae), *Hippasa agelenoides* and *Parados pseudoannulata* (Lycosidae), *Oxyopes bharathae* (Oxyopidae) and *Telamonia dimidiata* (Salticidae) abundance was respectively 0.21, 0.28 and 0.48, 0.18 each (Table 1). Remaining 53 spider species abundance was less and it was ranged between 0.03 and 0.09 (Table 1).

Per cent occurrence of spider species: The *Peucetia viridana* (Oxyopidae) occurred more (19.1%) commonly compared to other species in and around Mysore. It was followed by *Parasteatoda corrugate* (Theridiidae) (9.3%), *Tetragnatha viridorufa* (Tetragnathidae) (9.1%), *Stegodyphus sarasinorum* (Eregidae), *Oxyopes javanus* (Oxyopidae) respectively 8.7 and 8.4% (Table 1). *Pardosa pseudoannulata* (Lycosidae) occurrence was 7.1%, and it was followed by *Hippasa agelenoides* (Lycosidae) 4.6%. Moreover, the *Tetragnatha elongates* (Tetragnathidae) occurred 3.6%. Similarly, *Cyrtophora cicatrosa* (Araneidae), *Herennia multipuncta* (Nephilidae), *Hippasa greenalliae* (Lycosidae), *Cyrtophora citricola* (Araneidae) and *Hersilia sumatran* (Hersilidae) per cent occurrence was 2.8, 2.5, 2.3, 2.2 and 2.0 respectively. However, *Oxyopes shweta* and *O. birmanicus* (Oxyopidae) per cent occurrence was respectively 1.8 and 1.7. *Telamonia dimidiata* (Salticidae) per cent occurrence was one (Table 1). Thus, majority (51) of spider species per cent occurrence was less than one. Table 2 shows the per cent occurrence of different spider families in and around Mysore. The Salticidae family represented more (23.1%) followed by Araneidae (18.5%), Oxyopidae (13.9%) and Lycosidae (10.8%). However, other families represented less than 10 (Table 2).

Distribution of spider species at different ecosystems: In Manasagangotri campus (human inhabited area), 36 spider species were recorded and that accounted for 35.6%. On the bank and in Kukkarahalli Lake, 25 spider species were recorded and representing 24.8%. However, in thickly vegetated area of Kukkarahalli has indicated only 19 spider species and accounting 18.8%. Further, in agro-ecosystem i.e., paddy field, around 21 spider species were recorded and that constituted 20.8% (Table 3). Thus, spider species distribution differed significantly ($F=5.53$; $P>0.05$) among four different ecosystems in and around Mysore (Table 3).

Guild types: Around eight types of guild structures constructed by different species of spiders in and around Mysore. Per cent occurrence of these guild types are depicted in the Table 4. The stalkers was highest (38.5%) and it was followed by orb-web builders (30.8%) and ground runners (15.4%). The ambushers, foliage runners

and scattered line weavers guild types were respectively 6.2, 3.1 and 3%. However, the communal web-builder and sheet-web builders guild type was only 1.5% each (Table 4).

Prey species of spiders: Table 5 shows the prey of spiders found in and around Mysore. Around 44 spider species depended for their food on black ants, red ants, small ants, flies, honeybees, butterflies, moths and other small to medium sized insects which are residing on various objects amidst different ecosystems. This clearly demonstrated that spiders are integral part of every ecosystem, play pivotal role in regulating the population of certain insect species. However, 21 spider species prey animals was unable to record during the present study (Table 5).

IV. Discussion

Spiders are ubiquitous creatures in terrestrial ecosystems, distributed in both natural and man-made habitats (Sebastian et al., 2005). They are known for their high diversity per unit area (Coleman and Crossley, 1996) however, their density, abundance and per cent occurrence varied considerable at different ecosystems. Around 65 spider species were recorded in and around Mysore. The Manasagangotri campus indicated highest (36) spider species and accounted for 35.6% compared to other ecosystems. It is an academic institution, neatly maintained habitat with good vegetation. Here, human interference is although more, but the habitat degradation is very less and doesn't create any disturbance for the survival of spiders. Perhaps, on/in the wall cracks/crevices of various buildings and on/under dry leaves, tree bark, stones, tall grass etc, at Manasagangotri campus might have provided congenial habitat for many spider species survival. However, on the bank and in Kukkarahalli Lake, 25 spider species were recorded and represented 24.8%. The shoreline of Kukkarahalli Lake experience more human interference, but the habitat degradation is very less and doesn't create any problem for the survival of spiders. The prevailed freshwater environment and the shoreline of Kukkarahalli Lake perhaps, helped to collect certain prey species. Similar type of observation was made by Foelix (1996). The thickly vegetated upper part of Kukkarahalli Lake has indicated only 19 spider species and that accounted 18.8%. This area indicated less diversity of spiders contrary to the expectation. The area is dominated with dry deciduous trees and most of the trees shed their leaves during summer. Due to less foliage on the tree, prey species were less both on the foliage and on the ground. Major part of the area has been left uncultivated where, grasses are grown and other shrubs grown naturally which is some time grazed upon by cattle and other domesticated animals. As a result, spiders might have moved on to safer places in search of suitable habitat or in search of food source. Perhaps, this might be one of the reasons for less number of spiders in this ecosystem. However, few tolerant spider species thrived well and few spider species might have migrated or died off. Moreover, this area is not complex in its floral composition, but simpler than paddy field and Manasagangotri campus. Although it is considered as one of the reserved forest area, spider diversity is less compared to other ecosystems. Further, in agro-ecosystem i.e., paddy field, around 21 spider species were recorded and that constituted 20.8% spider fauna. In paddy fields, where tall trees are less and during paddy cultivation, different cultural practices such as land tilling, pesticides spray, clearing of weeds etc, were undertaken right from the day of plantation to till harvest. During these activities, considerable number of spider population might have removed/killed from this ecosystem. In spite of this, good number of spider species was recorded. Thus, population density and abundance of spider species in agricultural fields was high compared to other natural ecosystems. Similar type of observations was reported by Riechert and Gillespie (1986) and Tanaka (1989). Thus, spider species distribution differed significantly among four different ecosystems in and around Mysore.

Further, Sudhikumar et al. (2005) have identified 72 spider species, which belonging to 57 genera and 20 families in Mannavan Shola Forest, Kerala during five day study. Amongst recorded species, Araneidae family members were predominant (17 species) and revealed six feeding guilds. Varsha et al. (2013) have studied the diversity and guild structure of spider fauna consisted of 42 spider species, belonging to 14 families at Sawaga-Vithoba Lake in Amravati. Araneidae family members represented more (15 species) in this area. However, during four months observations, 65 spider species, which belong to 45 genera and 15 families with eight guild types, were recorded. During present study, Salticidae family members were predominant (8 species) and only seven species were recorded in Araneidae family. Adarsh and Nameer (2015) have reported more (14) species in Salticidae family amidst Kerala Agricultural University Campus, Thrissur. Prashanthakumara and Venkateshwarlu (2017) have reported more (17 species) in Salticidae family at Gudavi Bird Sanctuary, Shivamogga. The Salticidae family members are jumping spiders and majority of them show diversified feeding habits (Jackson et al., 2001). Perhaps, due to more availability of different prey species, Salticidae family members are predominating amidst different ecosystems in and around Mysore. Moreover, Salticidae members might have well acquainted with human inhabited places rather than natural habitats. Our observations are on par with the observations of Jackson et al. (2001), Sudhikumar et al. (2005), Varsha et al. (2013), Bhat et al. (2013), Adarsh and Nameer (2015), Prashanthakumara and Venkateshwarlu (2017). Thus, spiders prefer specific habitats for their feeding and nest building activities.

Furthermore, spiders establish different type of guilds. It is a species specific activity (Young and Edwards, 1990), influenced by ecological characteristics including foraging behavior, availability of prey species, microhabitat and daily activities. Majority of spiders are predators (Riechert and Gillespie, 1986) and obligate carnivores, feed on insects, arthropods and even on other spider species. Since, predation contributes significantly to stabilize the insect pest population under natural conditions. Predatory spiders capable to regulate many insect pests amidst different ecosystems thereby contribute much to the prey population decline (Coddington and Levi, 1991). Interestingly, few spiders (e.g. Salticidae family members) feed on nectar of various flowering plants (Jackson et al, 2001) and few other species are predominantly herbivorous, feeds on plant sap also. This shows spiders diversified feeding habits. Further, many spiders are associated with terrestrial food webs of many birds, reptiles, amphibians and mammals (Johnston, 2000) and become important source of food for many birds (Peterson et al., 1989). Furthermore, spider silk is used by various bird species for nest building (Hansel, 1993). In this way, spiders are useful creatures and vital components of different food chains and food webs at various tropic levels, their presence reveal their ecological indicator ship amidst diversified ecosystems (Hore and Uniyal, 2008). Hence, spiders hold the unique position among arthropods (Ayyar, 1964), reporting spider fauna of local ecosystems is very essential to understand the local biodiversity. Without the basic studies on distribution and abundance of spider species, it is difficult to reveal their status and to undertake appropriate measures for their protection. In this regard, present study could provide base-line information amidst different ecosystems of urban areas where, wild fauna (e.g. spiders) experiencing threat for their survival. Therefore, understanding the ecology of spiders at both man-made and natural ecosystems has necessitated and this type of studies are quite useful to generate scientific information for further in depth research and in turn to formulate appropriate conservation measures to restore the local biodiversity.

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Table 1. Density, abundance and per cent occurrence of spiders at different ecosystems in and around Mysore

Sl. No.	Family	Sl. No	Scientific name	Common name	Density	Abundance	% Occurrence
1.	Araneidae	1.	<i>Araneus</i> sp.	Orb-weaving spider	0.03	0.03	0.2
		2.	<i>Argiope aemula</i>	Signature spider/ Oval cross spider	0.06	0.06	0.3
		3.	<i>A. catenulata</i>	Signature spider/ Oval cross spider	0.09	0.06	0.4
		4.	<i>A. pulchella</i>	Signature spider/ Oval cross spider	0.03	0.03	0.2
		5.	<i>Cyclosa tuberculata</i>	Garbage spider	0.09	0.03	0.4
		6.	<i>Cyrtophora cicutrosa</i>	Garden tent web builder	0.62	0.06	2.8
		7.	<i>C. citricola</i>	-	0.46	0.03	2.2
		8.	<i>Eriovixia excelsa</i>	-	0.03	0.03	0.1
		9.	<i>Gasteracantha geminate</i>	Oriental spiny orb weaver	0.06	0.06	0.3
		10.	<i>G. hasselti</i>	-	0.03	0.03	0.2
		11.	<i>Larinia chloris</i>	-	0.03	0.03	0.2
		12.	<i>Neoscona mukherjei</i>	Garden spider	0.12	0.12	0.6
2.	Clubionidae	13.	<i>Clubiona drassodes</i>	Patchy sac spider	0.03	0.03	0.2
3.	Corinnidae	14.	<i>Apochinoma nitidum</i>	Black ant mimicking spider	0.09	0.06	0.4
		15.	<i>Cambalida</i> sp.	-	0.06	0.03	0.3
		16.	<i>Castianeira zetes</i>	-	0.03	0.03	0.2
4.	Eresidae	17.	<i>Stegodyphus</i>	Indian	1.87	0.03	8.7

			<i>sarasinorum</i>	cooperative spider			
5.	Hersiliidae	18.	<i>Hersilia sumatran</i>	Two-tailed spider	0.43	0.21	2.0
6.	Linyphiidae	19.	<i>Neriene sundaica</i>	Dwarf spider	0.03	0.03	0.2
7.	Lycosidae	20.	<i>Hippasa agelenoides</i>	Common funnel-web spider	1.00	0.28	4.6
		21.	<i>H. greenalliae</i>	-	0.50	0.12	2.3
		22.	<i>Lycosa tista</i>	-	0.06	0.03	0.3
		23.	<i>Lycosa</i> sp.	-	0.03	0.03	0.2
		24.	<i>Pardosa pseudoannulata</i>	Wolf spider	1.53	0.43	7.1
		25.	<i>Pardosa</i> sp.	-	0.03	0.03	0.2
		26.	<i>Trochosa</i> sp.	Wolf spider	0.03	0.03	0.2
8.	Nephilidae	27.	<i>Herennia multipuncta</i>	Ornamental tree-trunk spider	0.56	0.12	2.5
		28.	<i>Nephilengys malabarensis</i>	-	0.15	0.03	0.7
9.	Oxyopidae	29.	<i>Hamataliwa</i> sp.	-	0.03	0.03	0.2
		30.	<i>Oxyopes bharathae</i>	-	0.06	0.03	0.3
		31.	<i>O. birmanicus</i>	Crossed lynx spider	0.37	0.18	1.7
		32.	<i>O. javanus</i>	Striped lynx spider	1.81	0.62	8.4
		33.	<i>O. shweta</i>	White lynx spider	0.40	0.09	1.8
		34.	<i>O. sunandae</i>	-	0.15	0.06	0.7
		35.	<i>Oxyopes</i> sp.	-	1.20	0.09	0.6
		36.	<i>Peucetia viridana</i>	Green lynx spider	4.09	0.34	19.1
10.	Philodromidae	37.	<i>Peucetia</i> sp.	-	0.03	0.03	0.2
		38.	<i>Tibellus elongates</i>	-	0.06	0.06	0.3
11.	Salticidae	39.	<i>Carrhotus viduus</i>	Jumping spider	0.03	0.03	0.2
		40.	<i>Chalcotropis pennata</i>	-	0.03	0.03	0.2
		41.	<i>Curubis</i> sp.	-	0.03	0.03	0.2
		42.	<i>Cocalus</i> sp.	-	0.03	0.03	0.2
		43.	<i>Epocilla aurantiaca</i>	Jolly epocilla	0.03	0.03	0.2
		44.	<i>Hasarius adansoni</i>	-	0.03	0.03	0.2
		45.	<i>Hyllus semicupreus</i>	-	0.12	0.06	0.6
		46.	<i>Indomarengo</i> sp.	-	0.03	0.03	0.2
		47.	<i>Myrmaplata plateleoides</i>	Red ant mimicking spider	0.09	0.09	0.4
		48.	<i>Myrmarachne orientales</i>	-	0.06	0.06	0.3
		49.	<i>Plexippus paykulli</i>	Pan-tropical jumping spider	0.03	0.03	0.2
		50.	<i>Phaeacius lancearius</i>	-	0.03	0.03	0.2
		51.	<i>Plexippus petersi</i>	-	0.03	0.03	0.2
		52.	<i>Rhene rubrigera</i>	Beetle spider	0.06	0.06	0.3
		53.	<i>Telamonia dimidiata</i>	Two-striped jumper	0.21	0.18	1.0
12.	Tetragnathidae	54.	<i>Tetragnatha elongatus</i>	Stretch spiders	0.78	0.12	3.6
		55.	<i>T. viridorufa</i>	-	1.96	0.12	9.1
		56.	<i>Tetragnatha</i> sp.	-	0.03	0.03	0.2
		57.	<i>Tylorida striata</i>	Orb weaver spider	0.06	0.06	0.3
		58.	<i>T. ventralis</i>	-	0.03	0.03	0.2
13.	Theridiidae	59.	<i>Achaeranea</i> sp.	Tangle web spider	0.03	0.03	0.2
		60.	<i>Parasteatoda corrugata</i>	-	2.00	0.03	9.3
14.	Thomisidae	61.	<i>Amyciaea forticeps</i>	-	0.03	0.03	0.2
		62.	<i>Misumena vatia</i>	Golden crab spider	0.03	0.03	0.2
		63.	<i>Runcinia</i> sp.	-	0.03	0.03	0.2
15.	Uloboridae	64.	<i>Uloborus danolius</i>	Cribellate orb weaver	0.06	0.03	0.3
		65.	<i>U. krishnae</i>	Cribellate orb weaver	0.06	0.06	0.3

Range	0.03 to 4.09	0.03 to 0.43	100.0
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Table 2. Spider family and their species composition in and around Mysore

Sl. No.	Family	No. of species	%
1.	Salticidae	15	23.1
2.	Araneidae	12	18.5
3.	Oxyopidae	9	13.9
4.	Lycosidae	7	10.8
5.	Tetragnathidae	5	7.7
6.	Corinnidae	3 each	4.6 each
7.	Thomisidae		
8.	Nephilidae	2 each	3.1 each
9.	Theridiidae		
10.	Uloboridae		
11.	Clubionidae	1 each	1.5 each
12.	Eresidae		
13.	Hersilidae		
14.	Linyphiidae		
15.	Philodromidae		
Total		65	100.0

Table 3. Spider species recorded at different ecosystems in and around Mysore

Sl. No.	Name of the spider	Different ecosystems			
		MC	KL	KF	PF
1.	<u>Achaeranea sp.</u>	-	1	-	-
2.	<u>Amyciaea forticeps</u>	1	-	-	-
3.	<u>Apochinoma nitidum</u>	3	-	-	-
4.	<u>Araneus sp.</u>	1	-	-	-
5.	<u>Argiope aemula</u>	1	1	-	-
6.	<u>A. catenulata</u>	-	-	-	3
7.	<u>A. pulchella</u>	-	-	1	-
8.	<u>Cambalida sp.</u>	2	-	-	-
9.	<u>Carrhotus viduus</u>	1	-	-	-
10.	<u>Castianeira zetes</u>	-	1	-	-
11.	<u>Chalcotropis pennata</u>	1	-	-	-
12.	<u>Clubiona drassodes</u>	-	-	-	1
13.	<u>Cocalus sp.</u>	-	-	-	1
14.	<u>Curubis sp.</u>	-	-	-	1
15.	<u>Cyclosa tuberculata</u>	3	-	-	-
16.	<u>Cyrtophora cicutrosa</u>	20	-	-	-
17.	<u>C. citricola</u>	15	-	-	-
18.	<u>Epocilla aurantiaca</u>	-	1	-	-
19.	<u>Eriovixia excels</u>	1	-	-	-
20.	<u>Gasteracantha geminate</u>	2	-	-	-
21.	<u>G. hasselti</u>	-	-	-	1
22.	<u>Hamataliwa sp.</u>	-	-	1	-
23.	<u>Hasarius adansoni</u>	-	1	-	-
24.	<u>Herennia multipuncta</u>	5	13	-	-
25.	<u>Hersilia sumatran</u>	2	7	5	-
26.	<u>Hippasa agelenoides</u>	12	10	3	7
27.	<u>Hippasa greenalliae</u>	3	10	2	1
28.	<u>Hyllus semicupreus</u>	-	-	2	2
29.	<u>Indomarengo sp.</u>	1	-	-	-
30.	<u>Larinia chloris</u>	-	-	-	1
31.	<u>Lycosa tista</u>	-	-	-	2
32.	<u>Lycosa sp.</u>	-	1	-	-
33.	<u>Misumena vatia</u>	-	1	-	-
34.	<u>Myrmaplata plateleoides</u>	2	-	1	-
35.	<u>Myrmarachne orientales</u>	-	2	-	-
36.	<u>Neoscona mukherjei</u>	1	2	-	1
37.	<u>Nephilengys malabarensis</u>	5	-	-	-
38.	<u>Neriene sundaica</u>	1	-	-	-

Density, abundance and per cent occurrence of spider species (Arachnida: Araneae) in and around Mysore city,

39.	<u>Oxyopes bharathae</u>	2	-	-	-
40.	<u>O. birmanicus</u>	1	2	7	2
41.	<u>O. javanus</u>	11	7	8	32
42.	<u>O. shweta</u>	-	1	12	-
43.	<u>O. sunandae</u>	-	-	4	1
44.	<u>Oxyopes sp.</u>	1	2	1	-
45.	<u>Peucetia viridana</u>	8	15	107	2
46.	<u>Peucetia sp.</u>	-	-	1	-
47.	<u>Pardosa pseudoannulata</u>	2	20	5	22
48.	<u>Pardosa sp.</u>	1	-	-	-
49.	<u>Parasteatoda corrugata</u>	64	-	-	-

Note: MC: Manasagangotri Campus; KL: Kukkarahalli Lake;
 KF: Kukkarahalli Forest; PF: Paddy Field.
 Each value is a mean of 24 observations. S: Value is significant.

Table 4. Per cent occurrence of spiders Guild

Sl. No.	Type Guild	%	No. of species
1.	Orb web builder	30.8	20
2.	Foliage runner	3.1	2
3.	Ground runner	15.4	10
4.	Communal web builder	1.5	1
5.	Sheet web builder	1.5	1
6.	Ambusher	6.2	4
7.	Stalkers	38.5	25
8.	Scattered line weaver	3.0	2.0
Total		100.0	65

Table 5. Spiders and their prey species recorded in and around Mysore

Sl. No.	Spider species	Prey species
1.	Amyciaea forticeps	Black ants and other small insects
2.	Araneus sp., Argiope aemula, A. catenulate and A. pulchella	Small to medium sized insects
3.	Apochinoma nitidum, Cambalida sp., and Castianeira zetes	All type of ants and other small insects
4.	Carrhotus viduus and Chalcotropis pennata	Small insects on the ground
5.	Cyrtophora cicatrosa	Small flying insects
6.	C. citricola	Honeybees, butterflies and moths
7.	Epocilla aurantiaca	Small insects
8.	Gasteracantha geminate and G. hasselti	Flies, moths, beetles, small insects
9.	Hersilia Sumatran	Ants, moths, insects on tree barks
10.	Hippasa agelenoides, H. greenalliae, Lycosa tista, Lycosa sp., Pardosa pseudoannulata and Pardosa sp.	Ground dwelling insects
11.	Herennia multipuncta	Flying and non flying insects on tree trunks
12.	Hasarius adansoni and Hyllus semicupreus	Small insects on ground
13.	Indomarengo sp.	Small ants and other insects
14.	Misumena vatia	Pollinating insects at flowers
15.	Myrmaplata plateleoides	Mainly feeds on red ants (Oecophylla sp.)
16.	Myrmarachne orientales	Mainly feeds on red ants
17.	Nephilengys malabarensis	Larger flying insects
18.	Neoscona mukherjei	Small sized insects
19.	Peucetia viridana, Oxyopes bharathae, O. birmanicus, O. javanus, O. shweta and O. sunandae and Oxyopes sp.	Insects residing on plants, shrubs and grassy vegetation and other spider species.
20.	Plexippus paykulli, Plexippus petersi, Phaeacius lancearius, Rhene rubrigeria and Telamonia dimidiata	Small insects on ground and other elevated surfaces
21.	Parasteatoda corrugata	Small flying insects

Total 44 spider species	
22.	Achaeranea sp., Cocalus sp., Curubis sp., Clubiona drassodes, Cyclosa tuberculata, Eriovixia excels, Hamataliwa sp., Larinia chloris Neriene sundaica, Peucetia sp., Runcinia sp., Stegodyphus sarasinorum, Tetragnatha elongatus, Tetragnatha sp., Tetragnatha viridorufa, Tibellus elongates, Trochosa sp., Tylorida striata, T. ventralis, Uloborus danolius and U. Krishna. Total 21 spider species

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