



## Research Note

# Diversity and abundance of spider fauna of agro-ecosystems: A case study of Mahabubnagar district, Telangana state

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**ABSTRACT:** The present study mainly focused on the diversity of spider fauna in the agro-ecosystem of Mahabubnagar district during the Kharif and Rabi seasons of 2020-21. The sampling was collected at monthly intervals by different methods (*in situ* counts, net sweeping, pitfall traps and litter sampling). A total of 30 spider species were identified of which, Araneidae family is represented by 8 species belonging to four genera followed by the Salticidae family (5 species), Oxyopidae (4 species), Lycosidae and Pholcidae (3 species), Thomisidae (2 species) Gnaphosidae, Hersillidae, Sparassidae and Tetragnathidae represented by one species, respectively. The diversity indices viz., Shannon-Weiner Index (2.785- Kharif season and 2.752-Rabi season), Simpson Index (0.912-Kharif season and 0.899 Rabi season), Margalef Index (4.122-Kharif season and 4.25- Rabi season) and Pielou's Index (0.104 Kharif season and 0.09 Rabi season) were calculated.

**KEYWORDS:** Agro-ecosystems, diversity indices, spider diversity

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Spiders are ancient animals with a history going back many millions of years. They have always been a source of fear and fascination as widespread generalist predators in an ecosystem, having a significant role in the natural control of pests (Araujo and Pearson, 2005). Ecological diversity is known to impart stability in agroecosystems by promoting the process of natural check and balance (Bishop and Riechert, 1990). Spiders form one of the most ubiquitous group of predacious organisms (Riechert and Lockely, 1984) and these have been promoted as a predator against insect pests as reported by some workers (Kiritani, 1979, Mansour *et al.*, 1980, Nyffeler and Benz, 1987). Further, the presence of spiders in a biotic environment of insect pests greatly influences their population dynamics (Sandidique, 2005; Rajeshwaran *et al.*, 2005; Bastawade and Khandal, 2006, Hount *et al.*, 2005; Singh and Sihag, 2007). Spiders are an integral part of global biodiversity since they play many important roles in any ecosystem as predators. Spiders have been suggested to be an ideal group for predicting extinction debt in other taxa due to habitat destruction (Cardoso *et al.*, 2010). According to the World Spider Catalogue (2022), 49,876 species have been identified about 4,237 genera belonging to 131 families and recent investigations on the

diversity of spider fauna indicate that only 2344 species have been identified which belonging to 596 genera consisting of 65 families (Singh and Singh, 2021a).

Environmental factors such as rainfall, temperature and humidity have an impact on the abundance and diversity of spider fauna (Bonte *et al.*, 2002; and Paredes Mungía, 2012). However, very little information is available on the diversity of spider fauna in the southwest part of Telangana state. Hence, the present investigation has been undertaken to record the diversity and composition of spider's fauna.

The study has been conducted from September 2020 to August 2021 at different sites in Mahabubnagar district. The study area is located at 16.3841° N, 78.1108° E with an elevation of 500 meters. The temperature in the area varied from 31° to 34°C. The sites were selected based on the accessibility of different agroecosystems and characteristics of the soil. The identification of species based on standard and authorised literature of Indian spider fauna, recognised journals, peer-reviewed proceedings of conferences, data of the ZSI (Zoological Survey of India, Kolkata), and World Spider Catalogue (WSC, 2022).

The total number of spider species identified in different sites of the study area is presented in Table 1. In the present investigation, reveals that, a total of 30 species belonging to 10 families, and 20 genera respectively.

Among 10 families of spider fauna identified, Araneidae family is represented by 8 species belonging to four genera followed by the Salticidae family (5 species), Oxyopidae (4 species), Lycosidae and Pholcidae (3 species), Thomisidae (2 species) Gnaphosidae, Hersillidae, Sparassidae and Tetragnathidae represented by one species respectively. According to IUCN, Theraphosidae (tarantulas) family is included in Red List (Molur *et al.*, 2008a).

Recent taxonomic and diversity studies on spider fauna of Telangana state (Rao *et al.*, 2005; Ramasubba Reddy, 2016; Sailu *et al.*, 2017; Anitha and Vijay, 2019; Ramanujam, *et al.*, 2019; Khartade *et al.*, 2019 and Patil, 2021) revealed that only 65 species are recorded and R Singh and A Sharma (2022) studied only a few districts of Telangana state and reported that, Hyderabad district consists of high diversity of spider fauna, followed by Nalgonda district, Medak district and Ranga Reddy district.

The analysis of diversity indices stated that high Shannon-Weiner Diversity Index ( $H'$ ) values (2.785) were noticed during the Kharif season and low values (2.752) were observed during the Rabi season. Simpson Dominance Index (D) was high during the Kharif season (0.912) and low value (0.898) in the Rabi season, Margalef Richness Index ( $\alpha$ ) exhibited a high (4.122) during Kharif and minimum index value (4.25) was noticed during Rabi season. While, Pielou's Evenness Index (E1) stated that, a maximum value of 0.102 was in Kharif and low values (0.091) were observed during Rabi season.

The diversity and distribution of Spider fauna are exclusively depending on feeding (Yong and Edward, 1990). The spider fauna diversity is an important tool to examine the biological organization at the community level and the high diversity of species habits (insects feeding) and it plays a vital role in the ecological equilibrium of the ecosystem of any area is an indicator of a healthy ecosystem (Hill, 1973). These beautiful and magnificent creatures are considered to be effective biological indicators of different habitats indulging agroecosystems (Rajashekhara *et al.*, 2020). Spider fauna can be employed in understanding interactions of communities with environmental fluctuations (Marc and Canard, 1997). Similar studies were conducted by Anitha and Vijay (2016) who reported that the Kharif season is the most favourable and exhibits with high diversity values.

**Table 1.** Spider fauna of study area

Sl. No	Family	Genus	Species
1	Araneidae	Argiope	<i>Argiope keyselingi</i>
			<i>Argiope anasuja</i>
		Cryptophora	<i>C. cicatrosa</i>
		Nephila	<i>N. clavipes</i>
		Neoscona	<i>Neoscona nautica</i>
			<i>Neoscona odites</i>
			<i>Neoscona molemensis</i>
			<i>Neoscona sp.</i>
2	Gnaphosidae	<i>Gnaphosa</i>	<i>Gnaphosa sp.</i>
3	Hersillidae	<i>Hersilia</i>	<i>Hersilia savignayii</i>
4	Lycosidae	<i>Hippasa</i>	<i>Hippasa agelenidae</i>
		<i>Hippasa holomerae</i>	
		<i>Draposa</i>	<i>Draposa atropalpis</i>
5	Oxyopidae	<i>Oxyopes</i>	<i>Oxyopes javanus</i>
			<i>Oxyopes birmanicus</i>
			<i>Oxyopes sp.</i>
		<i>Peucetia</i>	<i>Peucetia viridana</i>
6	Pholcidae	<i>Pholcus</i>	<i>Pholcus sp.</i>
		<i>Crossopriza</i>	<i>Crossopriza lyoni</i>
		<i>Belisana</i>	<i>Belisana sp.</i>
7	Salticidae	<i>Telamonia</i>	<i>Telamonia dimidiata</i>
			<i>Telamonia sp.</i>
		<i>Plexippus</i>	<i>Plexippus paykulli</i>
			<i>Plexippus petersi</i>
		<i>Ptocassius</i>	<i>Ptocassius sp.</i>
8	Sparassidae	<i>Heteropoda</i>	<i>Heteropoda sp.</i>
9	Thomisidae	<i>Runcinia</i>	<i>Runcinia</i>
		<i>Striglopus</i>	<i>Striglopus sp.</i>
10	Tetragnathidae	<i>Leucauge</i>	<i>Leucauge decorata</i>

**Table 2.** Different diversity indices values of the spider fauna of Mahabubnagar district

S. No	Indices/seasons	Kharif	Rabi
1	Shannon index (H)	2.785	2.752
2	Simpson Index (1-D)	0.912	0.898
3	Margalef's Index	4.122	4.250
4	Pielou's Evenness Index	0.102	0.091

**CONCLUSION**

The diversity of spider fauna of two different agro-seasons of Mahabubnagar district is reported. A total of 30 species are identified from 10 families. Spiders are a highly neglected group and are the most diverse and key organisms to

maintain the ecosystems through their predator characteristics and also serve as biological indicators. Extensive taxonomic studies of spiders are urgently required.

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