

## Ecological Assessment of Spider Diversity in Voorhees College Campus, Vellore, Tamil Nadu, India

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### ABSTRACT

Spiders belonging to the order *Araneae* are important predatory arthropods that contribute significantly to ecosystem functioning through insect population regulation. The present investigation was carried out to document the diversity and community composition of spiders within the Voorhees College campus, Vellore, Tamil Nadu. Surveys were conducted across various habitat types, including vegetated areas, open grounds, and urban environments within the campus. The study recorded a total of 70 spider species representing 18 families. Among the documented families, Araneidae showed the highest representation, followed by Salticidae and Oxyopidae. The

predominance of these families suggests that the campus provides suitable ecological conditions such as diverse vegetation, sufficient prey availability, and favorable microclimatic factors. In contrast, several families exhibited lower species abundance, which may be related to habitat specificity, limited microhabitat availability, or competitive interactions. The findings highlight the role of the college campus as a supportive habitat for spider assemblages and reinforce the value of spiders as sensitive indicators of environmental conditions. This study provides baseline information on spider diversity in an urban educational landscape and emphasizes the importance of site-specific biodiversity assessments for future conservation and habitat management efforts.

**Keywords** Spider diversity, Araneae, Predators and prey.

### INTRODUCTION

Spiders belong to the order *Araneae* and occupy the seventh position globally in terms of total species diversity (Sebastian and Peter 2009). Spiders represent a highly diverse group of terrestrial predators; however, broad generalizations about their habitat use are difficult due to the wide variation in their foraging strategies (Goldsbrough *et al.* 2004). They serve as effective biological indicators for evaluating ecosystem health, as they are readily identifiable and exhibit varied responses to both natural and anthro-

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pogenic impacts (Pearce and Venier 2006). Spider diversity, spatial distribution, and insectivorous feeding behavior are believed to play a significant role in maintaining ecological balance (Oyewole and Oyelade 2014). The majority of spiders remain in a particular habitat throughout their life cycle, owing to their capacity to produce silk and venom and their well-developed defence mechanisms.

Spiders are polyphagous predators that feed on a wide range of available prey. As carnivorous organisms, they primarily consume insects and small arachnids and are among the most abundant and ecologically important predators across nearly all terrestrial and semi-terrestrial habitats worldwide, ranging from cold tundra and alpine ecosystems to tropical rainforests and deserts. Members of Eurasian spider families consume a wide range of insects that are harmful or bothersome to humans, including mosquitoes and cockroaches. Considering that spiders constitute one of the most diverse groups of organisms, detailed studies on their diversity are necessary, which has previously been neglected or overlooked (Palem *et al.* 2016).

In addition, its populations in forest ecosystems, the availability of spiders in urban environments should be evaluated. Moreover, the rising rate of deforestation has resulted in significant loss of their natural habitats (Branco and Cardoso 2020). Recent updates to the Indian spider fauna report 1,855 species distributed across 477 genera and 61 families (Caleb and Sankaran 2021). Nevertheless, numerous species are likely to have remained undiscovered to date, and many specimens preserved in collections await proper description and classification.

Spiders are valuable allies of farmers, as they help control a wide range of crop pests. In addition, many spiders' species prey on mosquitoes, thereby contributing to the reduction of malaria and other mosquito-borne diseases. Although small in size, spiders have an undeniable ecological importance due to their abundance as predators of forest arthropods (Scharff *et al.* 2003). Recently, developmental activities have changed land use and land cover, leading to widespread destruction and encroachment of forest habitats. Consequently, spider populations

are decreasing day by day as a result of urbanization (Ramakrishnaiah *et al.* 2016). Hence, site-specific studies of spider diversity are very important for adopting a holistic approach to habitat restoration and species conservation in the future. Beyond their unique behaviors and adaptations, spiders contribute significantly to ecosystem functioning by providing essential services such as pest control and pollination.

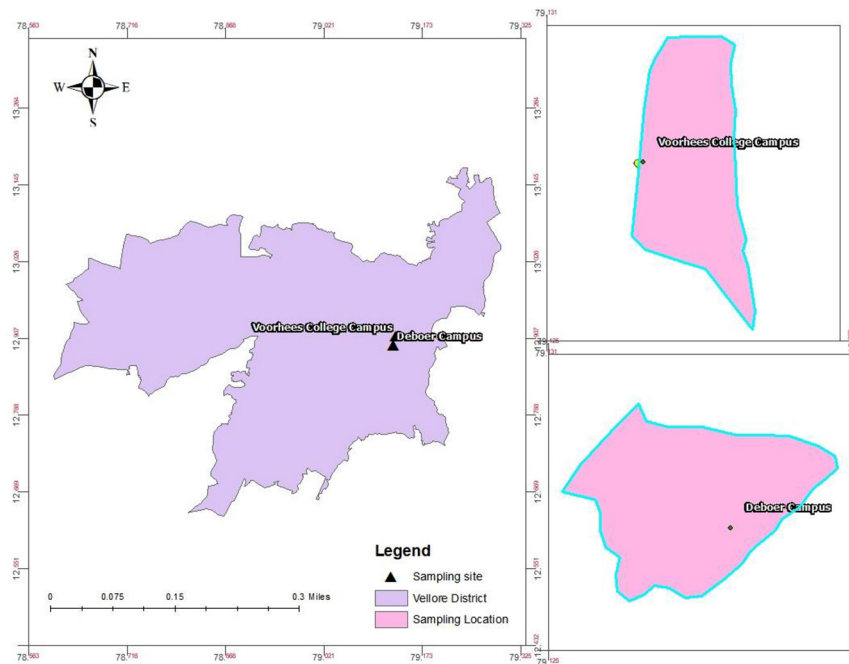
Despite the ecological importance of spiders, there is a notable lack of comprehensive studies focusing on their diversity in Vellore region. Hence, this study aims to fill this gap by systematically documenting the spider species present in Voorhees College campus, analyzing their distribution and ecological roles. By employing a combination of field surveys, morphological identification and ecological analysis this study seeks to contribute to the understanding of arachnid diversity in Voorhees College campus, highlighting the importance of conserving these often-misunderstood creatures. This study will provide a comprehensive overview of spider diversity at Voorhees College campus, offering valuable insights into the ecological significance of these arachnids and their role in the broader context of biodiversity conservation. Through this work, we hope to foster greater awareness and appreciation for spiders and their contributions to the ecosystem they inhabit.

## MATERIALS AND METHODS

### Study area

Voorhees College is located in Vellore Town, Tamil Nadu, India, a region known for its rich floral and faunal diversity. The college campus provides a heterogeneous habitat comprising gardens, tree-lined avenues, shrubs, grassy patches, and semi-natural vegetation, making it an ideal site for studying spider diversity.

The study was conducted within the Voorhees College main campus (12°54'37.99" N, 79°07'56.22" E) and includes the De Boer campus (12°53'44.89" N, 79°07'38.69" E) (Fig. 1). The College campus covers approximately 13 acres and is particularly rich in vegetation, supporting a wide variety of microhabitats such as leaf litter, tree canopies, hedges, and built



**Fig. 1.** Geographical Location of the Study Area.

structures. These varied habitats provide favorable conditions for different spider guilds, including web-builders and hunting spiders. The combination of natural and semi-managed habitats within the campus limits offers an excellent opportunity to document spider diversity and assess their distribution across different microhabitats.

### Sampling

The current investigation was carried out from January 2025 to April 2025. The survey was conducted in the morning hours between 07:00 a.m. and 09:00 a.m. and from 04.00 p.m. to 06.00 p.m. in the evening. The following methods were used to collect samples.

#### *Visual search method*

This method is also called ‘Hand collection method.’ Spiders were spotted on the flowers, folded leaves, under the leaflets, ground, shrubs, and on the bark. Spiders were easily collected by driving them into a dry container. Collections of most web-building species were made early in the morning.

#### *Kerchief method*

This method was used for collecting running and wandering spiders, especially those belonging to the family Salticidae. An open kerchief was thrown over the running spider, which was then carefully caught in the folds of kerchief.

#### *Inverted umbrella method*

In this method, an inverted umbrella was placed below flowering plants and shrubs and the branches were shaken thoroughly. Spiders along with insects fell into the inverted umbrella. Spiders were transferred into collecting vials after removing other insects from the umbrella.

#### *Sweep net method*

This is one of the simplest methods followed to collect spiders. The ideal habitat for using sweep net was one with grasses and flowers. The habitats were swept as many times as necessary to get a good sample. Spiders that fell into the net were collected before they were

**Table 1.** Spider diversity in Voorhees College campus, Vellore.

Sl. No.	Family	Species Name	Common Name
1	Salticidae (Stalkers)	<i>Colonus</i> sp	Jumping spider
2		<i>Lyssomanes viridis</i>	Mangolia green jumper
3		<i>Myrmaplata plataleoides</i>	Ant- mimicking jumping spider
4		<i>Platycryptus</i> sp	Flat jumping spider
5		<i>Pseudeuophrys erratia</i>	Jumping spider
6		<i>Plexippus paykulli</i>	Wall jumper
7		<i>Menemerus birittatus</i>	Gray wall jumper
8		<i>Platycryptus undatus</i>	Tan jumping spider
9		<i>Plexippus peteresi</i>	Jumping spider
10		<i>Plexippus setipes</i>	Gray wall jumper
11		<i>Telamonia dimidiata</i>	Two - striped jumper
12		<i>Metacyrba taeniola</i>	Barn spider
13	Araneidae (Orb web builders)	<i>Araneus cavaticus</i>	Barn spider
14		<i>Argiope keyserlingi</i>	St Andrew's cross spider
15		<i>Argiope aetharea</i>	Northern St Andrew's cross spider
16		<i>Argiope anasuja</i>	Signature spider
17		<i>Argiope catenulata</i>	Grass cross spider
18		<i>Argiope aurantia</i>	Garden spider
19		<i>Argiope pulchella</i>	Garden spider
20		<i>Eustala</i> sp	Orb weaving spider
21		<i>Argiope</i> sp	Orb weaver
22		<i>Argiope</i> sp	Orb weaver
23		<i>Argiope</i> sp	Orb weaver
24		<i>Araneus pratensis</i>	Open field orbweaver
25		<i>Araneus diadematus</i>	Cross-orb weaver
26		<i>Araneus</i> sp	Orb weaving spider
27		<i>Araneus</i> sp	Orb weaver
28		<i>Crytophora</i> sp	Tent web spider
29		<i>Crytophora</i> sp	Tent web spider
30	Tetragnathidae (Long-jawed orb weavers)	<i>Tetragnatha monotana</i>	Long jawed orb weaver
31		<i>Leucauge venusta</i>	Orchard orb weaver
32		<i>Leucauge magnifica</i>	Long jawed orb weaver
33		<i>Tetragnatha Pinicola</i>	Orb weaver
34		<i>Leucauge</i> sp	Orchard orb weaver
35	Oxyopidae (Stalkers)	<i>Oxyopes salticus</i>	Lynx spider
36		<i>Oxyopes shweta</i>	Lynx spider
37		<i>Oxyopes lineatipes</i>	Lynx spider
38		<i>Oxyopes gracilipes</i>	Lynx spider
39		<i>Oxyopes</i> sp	Lynx spider
40		<i>Oxyopes</i> sp	Lynx spider
41		<i>Oxyopes</i> sp	Lynx spider
42		<i>Oxyopes</i> sp	Lynx spider
43		<i>Oxyopes</i> sp	Lynx spider
44	Pholcidae (Cellar spiders)	<i>Holocnemus</i> sp	Daddy long legs spider
45		<i>Holocnemus pluchei</i>	Marbled cellar spider
46		<i>Pholeus phalangioides</i>	Marble spider
47		<i>Holocnemus</i> sp	Marble cellar spider
48	<i>Pholcus opilionoides</i>	Fishing spider	
49	Dolomedidae (Raft spiders)	<i>Dolomedes tenebrosus</i>	Dark fishing spider
50		<i>Dolomedes scriptus</i>	Striped fishing spider
51	Anyphaenidae (Ghost spiders)	<i>Arenomorph</i> sp	Ghost spider
52	Sparassidae (Huntsman spiders)	<i>Palystes</i> sp	Rain spider
53		<i>Heteropoda venatoria</i>	Giant crab spider
54		<i>Micrommata vires ens</i>	Green huntsman spider
55		<i>Delena</i> sp	Social huntsman spider

**Table 1.** Continued.

Sl. No.	Family	Species Name	Common Name
56		<i>Micrommata</i> sp	Goldenrod crab spider
57	Thomisidae (Crab spiders)	<i>Misumena vatia</i>	Flower crab spider
58		<i>Xysticus auctificus</i>	Bold ground crab spider
59	Scytodidae (Ground runner)	<i>Scytodes thoracica</i>	Spitting spider
60	Linyphiidae (Sheetweb weavers)	<i>Linyphia triangularis</i>	Triangle hammock spider
61	Ammotrechidae (Sand runners)	<i>Solifugae</i> sp	Camel spider
62	Caddidae	<i>Opiliones</i> sp	Harvestman
63	Sparassidae (Ground runner)	<i>Palystes superciliosus</i>	South African rain spider
64		<i>Heteropoda</i> sp	Huntsman spider
65	Zoropsidae (False wolf spiders)	<i>Zoropsis spinimana</i>	False wolf spider
66		<i>Zoropsis oertzeni</i>	False wolf spider
67	Hersiliidae (Two-tailed spiders)	<i>Hersilia clypealis</i>	Tree trunk spider
68	Gnaphosidae (Ground spiders)	<i>Micarria pulcaria</i>	Ant mimicking spider
69	Selenopidae (Wall crab spiders)	<i>Selenops actophilus</i>	Wall crab spider
70	Philodromidae (Running crab spiders)	<i>Tibellus oblongus</i>	Slender crab spider

escaped. The caught spiders were placed separately on vials with 70% ethyl alcohol. Compartment name and habitat were recorded on each vial.

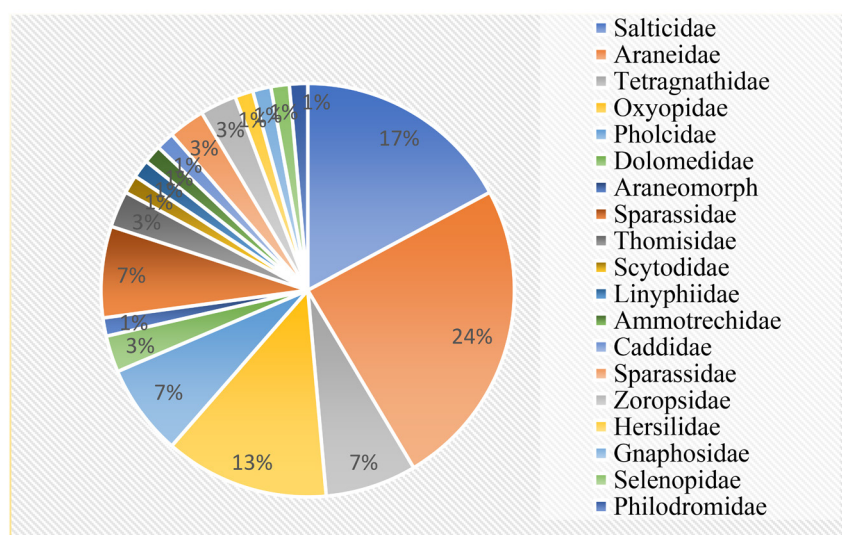
#### Identification of species

The spiders were photographed and identified following 'Taxonomic keys for Indian spiders.'

## RESULTS

A total of 70 spider species belonging to 18 families

were recorded from the Voorhees College campus, Vellore (Table 1), indicating considerable spider diversity within the study area. Among the recorded families, Araneidae was the most dominant, represented by (17 species), followed by Salticidae with (12 species) and Oxyopidae with (9 species). Sparassidae contributed (7 species), while Tetragnathidae and Pholcidae were represented by (5 species) each. Dolomedidae, Thomisidae, and Zoropsidae showed moderate representation with (2 species) each. The remaining families, including Anyphaenidae, Ammotrechidae, Caddidae, Hersiliidae, Gnaphosidae, Selenopidae, and Philodromidae



**Fig. 2.** Family-wise spider distribution in Voorhees College campus, Vellore.

dae, Selenopidae, Philodromidae, Scytodidae, and Linyphiidae, were each represented by a single species, reflecting their comparatively low abundance in the study area.

In the present study, the highest species diversity was recorded in the family Araneidae, which accounted for 24% of the total species, followed by Salticidae (17%) and Oxyopidae (13%). The documented spider species are listed in Table 1. Furthermore, the family-wise distribution of the recorded spider fauna (Fig. 2).

The diversity of spiders recorded at the Voorhees College campus, Vellore, clearly reflects the ecological significance and habitat suitability of the region. The campus provides a heterogeneous environment with varied microhabitats that support a wide range of spider families. The dominance of certain families, such as Araneidae, Salticidae, and Oxyopidae, suggests favorable environmental conditions, including suitable temperature regimes, structural complexity of vegetation, and sufficient prey availability. In contrast, the lower abundance of some families may be attributed to specific habitat requirements, limited prey resources, or competitive interactions among species. Additionally, interspecific interactions, seasonal variations, and human disturbances within the campus environment may also influence species composition and distribution. Overall, these findings indicate that environmental factors and habitat characteristics play a crucial role in shaping spider community structure in the study area.

## DISCUSSION

The high diversity of spiders observed at Voorhees College campus, Vellore indicates that the college campus is having favorable habitat for the spider population. Spiders are the biological indicators; they indicate very minute alterations in the environment as they are sensitive to ecological changes.

### Dominant species and their ecological significance

Among the recorded species, the families Salticidae (jumping spiders), Araneidae (orb-weaving spiders), and Oxyopidae (lynx spiders) exhibited notable dom-

inance. Salticidae represents the largest spider family globally, comprising more than 6,000 described species. These spiders are active hunters characterized by exceptional vision and strong jumping abilities. Rather than constructing webs, they capture prey by stalking and pouncing on it. These families are well known for adapting to different microhabitats, hunting effectively, and tolerating environmental changes.

In the present study, the family Salticidae emerged as the most dominant group, with species such as *Plexippus paykulli*, *Menemerus birittatus*, and *Platycryptus* sp. being frequently observed across the study area. These jumping spiders are active and efficient predators that depend on acute visual perception and swift movements to locate and capture prey. The pronounced dominance of Salticidae may be attributed to several favorable ecological factors, including the abundance of small arthropods as prey, the presence of diverse and structurally complex vegetation, and their capacity to tolerate and adapt to a wide range of temperature conditions (Harland and Jackson 2004).

Araneidae is one of the most diverse families of spiders, comprising more than 3,000 described species worldwide. Members of this family are well known for constructing complex, orb-shaped webs that are used to capture flying insects. These spiders build circular, adhesive orb webs for prey capture and possess moderately developed vision. They detect prey by sensing vibrations transmitted through the web. A high abundance of the family Araneidae was recorded in the present investigation, with orb-weaving species such as *Argiope keyserlingi*, *Argiope aetherea*, and *Araneus diadematus* being frequently observed. These spiders typically prefer relatively undisturbed habitats with ample vegetation that supports web construction. Their dominance indicates that the college campus offers stable microhabitats and a plentiful supply of prey insects, likely facilitated by well-maintained vegetation and artificial light sources that attract insects during night time (Nentwig 1987). This confirms that the diversity of Salticidae and Araneidae observed in the present study may be attributed to the diverse vegetation present on the Voorhees College campus. Species including *Oxyopes salticus*, *Oxyopes gracilipes*, and *Oxyopes lineatipes*

were observed in moderate abundance. Lynx spiders are active hunters typically associated with grasslands and shrub vegetation, suggesting that the presence of open spaces within the campus provides favorable conditions for their survival.

### Less abundant species and their ecological constraints

Certain spider groups, including members of the families Pholcidae (cellar spiders), Thomisidae (crab spiders), and Hersiliidae (two-tailed spiders), were recorded in relatively low numbers. Pholcid species such as *Holocnemus pluchei* and *Pholcus opilionoides* exhibit strong habitat specificity, preferring dark and humid environments that are largely confined to shaded or indoor areas of the campus. Cellar spiders are more frequently associated with anthropogenic structures than with open habitats (Huber 2011).

Ambush predators such as crab spiders (*Misumenavatia*) and ground-dwelling gnaphosids (*Micaria pulicaria*) rely on prey competition strategies that involve sit-and-wait predation, which may restrict their presence in habitats dominated by highly active hunters like Salticidae. Such ambush predators are typically highly specialized and depend on floral or specific structural resources, which may be limited in increasingly urbanized environments (Morse 2007). Species such as *Zoropsis spinimana* (Zoropsidae) and *Hersilia clypealis* (Hersiliidae) may exhibit lower adaptability to temperature fluctuations and environmental disturbances, which could influence their population densities. Hersiliids are primarily bark-dwelling spiders and are therefore more frequently associated with undisturbed forest habitats, while being less commonly encountered in human-modified landscapes (Jocqué and Dippenaar-Schoeman 2006).

### Impact of environmental factors

The Vellore district experiences generally warm climatic conditions with seasonal fluctuations, which may favor spider species adapted to higher temperatures, particularly members of the families Salticidae and Oxyopidae. Temperature has been shown to play a critical role in influencing spider

metabolism, foraging behavior, and web-building activities (Schmalhofer 1999).

The occurrence of dominant spider species in urbanized and semi-natural habitats is consistent with global patterns, where generalist predators tend to flourish in disturbed environments (Argañaraz *et al.* 2023). Spider diversity and abundance are strongly influenced by floral diversity, as vegetation structure directly affects prey availability. Increased vegetation complexity particularly favors web-building spiders such as Araneidae by offering adequate structural support for web construction (Turnbull 1973).

Spiders play a significant role in terrestrial ecosystems as abundant and effective predators that regulate populations of insects and other arthropods. Their predatory activities contribute to natural pest suppression in agricultural and natural habitats, thereby supporting ecosystem stability and reducing the need for chemical pest control (Nyffeler and Birkhofer 2017). Spiders also occupy an important position in food webs, functioning both as predators and as prey for higher trophic organisms such as birds, reptiles, and small mammals, thus facilitating energy transfer across trophic levels (Michalko *et al.* 2019). In addition, spider communities provide valuable ecosystem services including pest regulation, biodiversity monitoring, and contributions to nutrient cycling within ecosystems (Cardoso *et al.* 2025).

### CONCLUSION

Our findings indicate that spider diversity at Vellore Voorhees College Campus is shaped by a combination of habitat availability, prey abundance, and environmental factors. The predominance of families such as Salticidae, Araneidae, and Oxyopidae indicates that the campus offers favorable ecological conditions for their survival and proliferation. In contrast, the relatively lower abundance of other species may reflect specialized microhabitat requirements or the effects of interspecific competition. Further investigations incorporating seasonal variations and detailed prey analyses would provide a more comprehensive understanding of the factors governing spider diversity in this region.

## REFERENCES

- Argañaraz, C. I., Benitez, J., Soler, R., Sola, F., & Lencinas, M. V. (2023). Urbanization effect of homogenization on ground-dwelling arachnids' diversity in natural forest and peatland remnants. *Journal of Insect Conservation*, 27(2), 283–294.
- Branco, V. V., & Cardoso, P. (2020). An expert-based assessment of global threats and conservation measures for spiders. *Global Ecology and Conservation*, 24, e01290.
- Caleb, J. T. D., & Sankaran, P. M. (2021). Araneae of India, version. <https://indianspiders.in/>
- Cardoso, P., Pekár, S., Birkhofer, K., Chuang, A., Fukushima, C. S., Hebets, E. A., Henaut, Y., Hesselberg, T., Malumbres-Olarte, J., Michálek, O., Michalko, R., Scott, C., Wolff, J., & Mammola, S. (2025). Ecosystem services provided by spiders. *Biological Reviews*, 100: 2217–2236.
- Goldsbrough, C. L., Hochuli, D. F., & Shine, R. (2004). Fitness benefits of retreat-site selection: Spiders, rocks, and thermal cues. *Ecology*, 85(6), 1635–1641.
- Harland, D. P., & Jackson, R. R. (2004). Portia perceptions: The Umwelt of an araneophagic jumping spider. *Vision Research*, 44(22), 2305–2313.
- Huber, B. A. (2011). Phylogeny and classification of Pholcidae (Araneae): An update. *The Journal of Arachnology*, 39(2), 211–222.
- Jocqué, R., & Dippenaar-Schoeman, A. S. (2006). *Spider families of the world*. Tervuren: Royal Museum for Central Africa.
- Michalko, R., Pekár, S., & Entling, M. H. (2019). An updated perspective on spiders as generalist predators in terrestrial food webs. *Oecologia*, 189, 21–36.
- Morse, D. H. (2007). Predator upon a flower: Life history and fitness in a crab spider. *Harvard University Press*.
- Nentwig, W. (1987). The prey of spiders. In W. Nentwig (Ed.), *Ecophysiology of Spiders* (pp. 249–263). Springer-Verlag.
- Nyffeler, M., & Birkhofer, K. (2017). An estimated 400–800 million tons of prey are annually killed by the global spider community. *The Science of Nature*, 104: 30.
- Oyewole, O., & Oyelade, O. (2014) Diversity and Distribution of Spiders in Southwestern Nigeria. *Natural Resources*, 5, 926-935. <http://dx.doi.org/10.4236/nr.2014.515079>
- Palem, H., Kanike, S., & Purushottam, V. R. S. (2016). Diversity of spider fauna (Arachnida: Araneae) in different ecosystems, Eastern Ghats, Southern Andhra Pradesh, India. *South Asian Journal of Life Science*, 4(2), 51–60.
- Pearce, J. L., & Venier, L. A. (2006). The use of ground beetles (Coleoptera: Carabidae) and spiders (Araneae) as bioindicators of sustainable forest management: A review. *Ecological Indicators*, 6(4), 780–793.
- Ramakrishnaiah, T., Jayaprakash, N., & Ramakrishna, S. (2016). Impact of urbanization on population dynamics of spider species in Bangalore. *International Journal of Pure and Applied Zoology*, 4(1), 18–23.
- Scharff, N., Coddington, J. A., Griswold, C. E., Hormiga, G., & Björn, P. D. P. (2003). When to quit? Estimating spider species richness in a northern European deciduous forest. *Journal of Arachnology*, 31(2), 246–273.
- Schmalhofer, V. R. (1999). Thermal tolerances and preferences of the crab spiders *Misumena vatia* and *Misumenoides formosipes* (Araneae, Thomisidae). *Journal of Arachnology*, 27, 470-480.
- Sebastian, P. A., & Peter, K. V. (2009). *Spiders of India*. Universities Press.
- Turnbull, A. L. (1973). Ecology of the true spiders (Araneomorphae). *Annual Review of Entomology*, 18(1), 305–348.