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Research Article

ECOLOGICAL ASSESSMENT OF SPIDER DIVERSITY IN AN EDUCATIONAL LANDSCAPE: A CASE STUDY FROM SANGOLA

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Abstract

Indian college campuses, often characterized by expansive green cover and semi-natural habitats, serve as overlooked reservoirs of biodiversity. This study assesses the ecological significance of Sangola College Campus, District Solapur, with a focus on spider diversity as an indicator of habitat complexity and ecological health. Over a three-month survey period, 17 entries were documented, of which 16 were confirmed as true spiders (Order: Araneae), spanning 13 families. One entry, *Messorbarbarus*, was misclassified under Hymenoptera, underscoring the need for taxonomic refinement in field-based biodiversity assessments. The recorded spider fauna included both ground-dwelling and arboreal species, reflecting diverse ecological adaptations. Dominant families such as Lycosidae, Cheiracanthiidae, Sparassidae, and Oxyopidae were frequently observed, with genera like *Rabidosa*, *Trochosa*, and *Oxyopessalticus* indicating habitat richness. The presence of orb-weavers (Araneidae, Tetragnathidae) and sac spiders (Cheiracanthiidae) further highlights the structural complexity of the campus vegetation. Spiders, as both predators and prey, play a crucial role in natural pest regulation and ecosystem balance. These findings establish a baseline for future biodiversity monitoring and reinforce the value of college campuses as living laboratories for ecological education and conservation.

Keywords: Diversity , Ecology, Spider, Landscape, Sangola.

INTRODUCTION

Indian college campuses, often spread across large tracts of land with mature vegetation, serve as unrecognized biodiversity reservoirs. This study explores the ecological significance of such campuses, focusing on their role in supporting faunal and floral diversity, facilitating ecological education, and promoting conservation practices. Field observations and literature synthesis reveal that campuses harbor diverse taxa and offer unique opportunities for biodiversity documentation and environmental stewardship.

Spiders (*Order: Araneae*) are among the most diverse and ecologically significant arthropods, occupying nearly every terrestrial habitat and playing a vital role in ecosystem functioning as both predators and prey (Foelix, 2011). Morphologically, their bodies are divided into two main parts: the cephalothorax, which bears four pairs of legs, and the unsegmented abdomen (Bhattacharya *et al.,* 2017). Spiders feed by external digestion, using digestive enzymes to liquefy prey tissues before ingestion (Sebastian & Peter, 2009). Globally, approximately 44,906 spider species have been described (Bhattacharya *et al.,* 2017), though recent estimates suggest around 42,055 species across 3,821 genera and 110 families (Platnick, 2014). India, recognized as a megadiverse country, hosts rich arachnid fauna with about 1,686 species (Bhattacharya *et al.,* 2017), though other sources report 1,520 species across 377 genera and 60 families (Majumdar &Tikader, 1991). Biodiversity hotspots such as the Western Ghats and Eastern Himalayas are known for their high spider species richness (Dhali *et al.,* 2016). Spiders are considered effective biological control agents due to their predation on a wide range of insect pests, especially in agricultural ecosystems like paddy fields (Nyffeler & Birkhofer, 2017; Rao *et al.,* 2018).

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Their ecological importance is further emphasized by their role in food webs, serving as prey for birds, reptiles, and other arthropods (Bhattacharya *et al.,* 2017). Some species are aquatic, while most are terrestrial, and studies have shown that rural habitats often support higher spider diversity than urban environments (Kazim, 2015). Several regional studies have enriched our understanding of spider diversity in India. Chetia and Kalita (2012) documented species richness in the Gibbon Wildlife Sanctuary, Assam, while Dhali *et al. (*2016) reported 111 Mygalomorph species across 17 states and two union territories. Rao *et al.* (2018) recorded 32 species from the Mangalore University Campus, noting habitat-specific assemblages in arboreal, grassland, and built environments. Majumdar and Tikader (1991) provided foundational taxonomic work on Indian spiders, emphasizing the need for continued documentation and revision. Beyond India, arachnid diversity in the trans-Himalayan and Karakoram regions has also been explored. Caporicco (1935) described 105 new species from the Karakoram, while Kazim (2015) and Kok et al. (2015) recorded 29 species from Gilgit-Baltistan, Pakistan, representing 17 families and 25 genera, with *Salticidae*, *Lycosidae*, and *Araneidae* being dominant.

MATERIALS AND METHODS

The study was conducted over a three-month period on the Sangola College Campus, located in District Solapur. Spanning approximately 10 acres, the campus comprises diverse ecological habitats including grasslands, arboreal zones (such as tree canopies and shrubs), and human-made structures. These habitats were strategically selected to represent the range of microenvironments inhabited by spiders. Field observations were carried out five days a week, with six hours dedicated each day to systematic data collection. The daily schedule was divided into three time slots: 6:00 AM to 10:00 AM, 1:00 PM to 2:00 PM, and 5:00 PM to 6:00 PM.

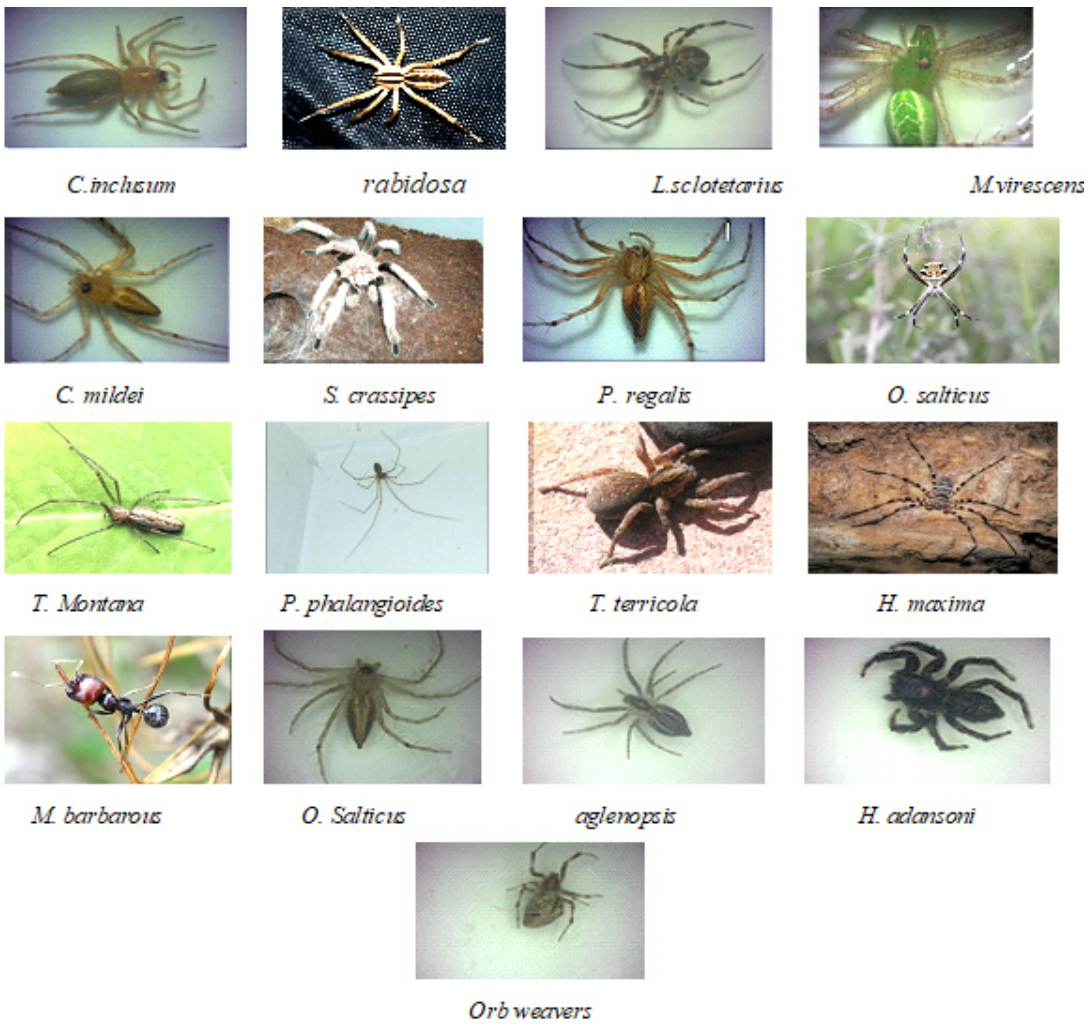
During these periods, spiders were photographed and counted to monitor their diversity, abundance, and behavioral patterns across the selected habitats. Spider collection was performed using non-invasive techniques tailored to each habitat type. For arboreal zones, small tree-dwelling spiders were captured using nets, while ground and grassland spiders were located through active searching and handpicking methods. Two primary hand collection techniques were used: ground hand collection (from ground level up to knee height) and aerial hand collection (from knee level up to arm's reach), targeting spiders on leaf litter, rocks, grasses, shrubs, and tree trunks.

Collected specimens were temporarily transported to the laboratory for identification. Taxonomic classification was conducted using the spiders were identified by the book *Spiders of India* Sebastian by P.A., & Peter, K.V. (Eds.). (2009). was used as a primary reference for identifying the recorded spider specimens. In addition to this comprehensive guide, online resources such as Spiders.us and Project Noah, along with other scientific papers, were consulted to support accurate identification, All spiders were returned to their original habitats to minimize ecological disturbance.

RESULTS AND DISCUSSION

Table 1. Diversity of spiders from the college campus area

Sr. No.	Name of type of spider	Order	Family	Genus	Species
1.	Rabidosa	Araneae	Lycosidae	*Rabidosa*	*Rabidosa*
2.	Hasariusadansoni		Salticidae	*Hararіusadansoni*	*H. adansoni*
3.	Selenocosmiacrassipes		Theraphosidae	*Selenocosmia*	*S. crassipes*
4.	Silver argiope		Therephosidae	*Poecilotheria*	*P. regalis*
5.	Striped Lynx Spider		Oryopidae	*Oxyopes*	*Oxyopes Salticus*
6.	Araneusventricous		Araneidae	*Araneus Ventricosus*	*Orb weavers*
7.	Grass spider		Agelenidae	*Agelenopsis Giebel*	*Aglenopsis*
8.	Tetragnathamotana		Tetragnathidae	*Tetragnatha*	*T. montana*
9.	Black-footed yellow sac spider		Cheiracanthiidae	*Cheiracanthium*	*C. inclusum*
10.	Pholcusphalangioides		Pholcidae	*Pholcus*	*P. phalangioides*
11.	Oxyopes		Oxypidae	*Oxyopes Latreille*	*O. salticus*
12.	Trochosa		Lycosidae	*Trochosa*	*T. terricola*
13.	Larinioides		Araneidae	*Lariniydes*	*L. sclotetarius*
14.	Micrommata		Sparassidae	*Micrommata Latreille*	*M. virescens*
15.	Huntsman spider		Sparassidae	*Heteropoda*	*H. maxima*
16.	Cheiracanthiumemildei		Cheiracanthiidae	*Cheiracanthium*	*C. mildei*
17.	Messorbarbarus	Hymenoptera	Formicidae	*Messor*	*M. barbarus*



The present study highlights the diversity and ecological distribution of spider species inhabiting the Sangola College Campus, District Solapur. A total of 17 entries were documented, of which 16 belonged to the order *Araneae*, representing true spiders, and one entry (*Messorbarbarus*) was incorrectly classified under *Hymenoptera*, indicating a need for taxonomic refinement (Foelix, 2011; Gajbe, 2004). The spider species identified span 13 families, demonstrating a wide range of ecological adaptations and habitat preferences (Sebastian & Peter, 2009). The most represented families were *Lycosidae*, *Cheiracanthiidae*, *Sparassidae*, and *Oxyopidae*, each contributing multiple species to the dataset. These families include both active hunters and web-building spiders, reflecting the structural complexity and resource availability of the campus habitats (Nyffeler and Birkhofer, 2017; Siliwal *et al.,* 2005). For instance, *Lycosidae* species such as *Rabidosa* and *Trochosa* are known for their ground-dwelling, cursorial behavior, while *Araneidae* and *Tetragnathidae* species construct orb webs in arboreal zones, indicating vertical stratification in habitat use (Malumbres-Olarte *et al.,* 2017). Such stratification is a key ecological trait that supports niche partitioning and reduces interspecific competition (Cardoso *et al.,* 2011).Several taxonomic inconsistencies were observed, including misspellings in genus and species names (e.g., *Aglenopsis* instead of *Agelenopsis*, *Lariniydes* instead of *Larinioides*) and incorrect family assignments (e.g., *Silver argiope* placed under *Theraphosidae* instead of *Araneidae*) (Platnick, 2014). Additionally, duplication of species entries, such as *Oxyopessalticus*, suggests the need for data curation to ensure accuracy and avoid redundancy. Such errors, if uncorrected, can compromise biodiversity assessments and ecological interpretations (Gajbe, 2004; Siliwal *et al.,* 2005).

Conclusion

The present study was conducted on the Sangola College Campus to assess spider diversity and provide a foundation for future research within the department. The survey spanned a period of three months, from February to April 2023. Spiders play a crucial role in maintaining ecological balance by feeding on large populations of insect prey. The Sangola College Campus exhibited notable species diversity and richness, surpassing that observed in the nearby zoological garden. Diversity indices revealed the presence of approximately 17 spider species on campus, highlighting their dual ecological roles as both predators and prey. This underscores the importance of studying seasonal variations in spider fauna and conserving the ecosystems that serve as habitats for multiple spider species. Spiders are considered ecologically dominant due to their widespread distribution, diverse functional roles, and high abundance. Their dominance is supported by their capacity to regulate pest populations, contribute to nutrient cycling, and inhabit nearly every terrestrial environment. Indian college campuses, with their unique blend of natural and semi-managed habitats, are vital biodiversity hubs. Recognizing and nurturing this potential can transform these institutions into models of sustainable living and ecological resilience. As centers of learning and conservation, they hold promise for advancing biodiversity science and public awareness.

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