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An Inventory and Spatial Distribution of Spider Fauna (Arachnida: Araneae) in Mannatheshwar Hill, Nagpur District of Maharashtra, India

Nitin M.Raut
Assistant Professor, Department of Zoology, Arvindbabu Deshmukh Mahavidyalaya, Bharsingi, Dis. Nagpur, Maharashtra
niitbio2017@gmail.com

Dinesh K. Dabhaadkar
Associate Professor, Department of Zoology, GopikabaiSitaramGawandeMahavidyalaya, Umarkhed, Dist- Yavatmal, Maharashtra- 445206

Prashant D. Kamble
Research Student, Department of Zoology, GopikabaiSitaramGawandeMahavidyalaya, Umarkhed, Dist- Yavatmal, Maharashtra- 445206

Abstract
The Mannatheshwar hill locally known as Mannathgad is a prominent spiritual and scenic hill station located in Ghogara village, NarkhedTaluka, Nagpur District, Maharashtra. Enriched by the proximity of the Wardha River, the region features a mix of agricultural lands and hilly terrain supporting diverse flora and fauna. Spiders are vital, ubiquitous predatory arthropods that play a critical role in natural biological pest control without harming the ecosystem. However, intensive pesticide use in surrounding agricultural fields often threatens their populations.This study investigates the diversity, distribution, and current status of spider families in the Mannatheshwar hill region from July 2025 to January 2026. During the survey, 210 specimens were photographed, leading to the identification of 54 species belonging to 12 families. Most recorded specimens were adults, with an observed male-to-female ratio of 1:6. The family wise distribution revealed Salticidae as the most species-rich (15 species), followed by Eresidae, Tetragnathidae, and Thomisidae (4 species); Gnaphosidae, Lycosidae, and Oxyopidae (3 species); Pholcidae (2 species); and Clubionidae and Uloboridae (1 species). Spider population abundance, species richness, and diversity peaked significantly between October and December. As exclusive carnivorous predators, these spiders naturally regulate insect populations, highlighting the ecological value of preserving native habitats near agricultural landscapes.
Keywords: *Spiders, Diversity, Biodiversity, Biological Pest Control, Agricultural Ecosystem, Narkhed.*

Introduction

Spiders (Order Araneae) represent one of the most diverse and successful groups of terrestrial predators, with an evolutionary history tracing back approximately 380 million years to the Devonian period (Penney and Seldon, 2011). Globally, spider biodiversity is immense, with estimates documenting approximately 44,234 species belonging to 3,928 genera and 110 families (Platnick, 2019). Within India, this richness is prominently reflected by 1,520 species distributed across 377 genera and 60 families (Sebastian and Peter, 2009). Locally, regional documentations such as the Gazetteer of India for Maharashtra State recorded 90 species across 14 families (Tikader and Malhotra, 1974), while nearby central Indian assessments, such as those in the Jabalpur district of Madhya Pradesh, reported 107 species under 57 genera and 19 families (Gajabe, 2004). Despite these foundational records, localized micro-habitats and hilly ecosystems remain underexplored regarding their specific arachnid fauna.Ecologically, spiders occupy nearly all terrestrial habitats and serve as vital generalist predators within both natural and agricultural ecosystems (Jeyaparvathi*et al.,* 2013). They play an indispensable economic and environmental role by acting as natural biological control agents, suppressing populations of crop-damaging insect pests without the adverse environmental impacts associated with chemical pesticides. Because of their sensitivity to microclimatic variations, structural changes in vegetation, and habitat disturbance, spiders are also widely recognized as reliable bioindicators of ecosystem health and environmental integrity.

The present study focuses on the Mannatheshwar hill region in Narkhedtaluka, Nagpur District, Maharashtra an ecologically rich area spanning over 100 square kilometers along the Wardha River. While a major portion of Narkhedtaluka is dominated by agricultural landscapes, parts of the region feature hilly terrain enveloped by rare dry deciduous forests, reminiscent of nearby pristine zones like Salbardi. Steeped in cultural heritage, Mannatheshwar hill is historically revered as the site where a Shivling was established by Lord Rama, and it derives its name from

Guru Machhindranath, who is believed to have performed severe penance there. This unique convergence of religious conservation, undulating topography, and agricultural interfaces creates a dynamic ecotone that harbors diverse micro-habitats.

Despite the ecological importance of spiders as natural insecticides and biodiversity metrics, comprehensive inventories detailing their spatial distribution and species composition in localized central Indian hill ecosystems remain scarce. Therefore, the present study was designed to assess the diversity, abundance, and spatial distribution of spider fauna across the varied terrestrial and agricultural habitats of Mannatheshwar hill, aiming to establish baseline data for local conservation and ecological monitoring.

Material And Method:

The present investigation was conducted across Mannatheshwar hill and its adjacent environs located in the Narkhedtaluka of Nagpur District, Maharashtra, India. The study area extends over an region of approximately 100 km² along the basin of the Wardha River on the northwestern boundary of the district, situated at geographical coordinates of approximately 21°26'N latitude and 78°34'E longitude. Topographically, the landscape represents a heterogeneous mosaic of undulating hillocks, remnants of dry deciduous forests geographically contiguous with the pristine forest tracts of Salbardi, and extensive agricultural ecosystems. Natural flora is dominated by dry deciduous species interspersed with shrublands, grass patches, and agricultural crops, primarily orange orchards (*Citrus sinensis*), cotton, and soybean fields. The region experiences a tropical hot and sub-humid climate with an annual rainfall ranging between 1000 mm and 1200 mm, primarily received during the south-west monsoon (June-September). Ambient temperatures fluctuate between a minimum of 9°C in winter and a maximum of 45°C during the dry summer months. Culturally, Mannatheshwar hill holds religious significance associated with historical penance by Guru Machhindranath, fostering traditional local reverence that has indirectly contributed to the preservation of the local vegetation cover.

Spider fauna was sampled and photographed weekly during weekend visits to the Mannatheshwar hill in the Narkhed region. Sampling targeted both nocturnal and diurnal species across diverse microhabitats, including foliage, crop fields, under stones, and within rock crevices, using a combination of standard sampling protocols. For detailed identification, key diagnostic morphological features such as epigyne structures, male pedipalps, eye arrangements, chelicerae, and spinnerets—were examined under a stereomicroscope. Taxonomic identification to the family, genus, and species levels was subsequently accomplished using standard taxonomic keys, manuals, and reference literature, including Tikader (1962, 1973, 1980, 1982), Gajbe (1987a, b), Davies and Żabka (1989), Barrion and Litsinger (1995), Sebastian and Peter (2009), and the World Spider Catalog (2024).

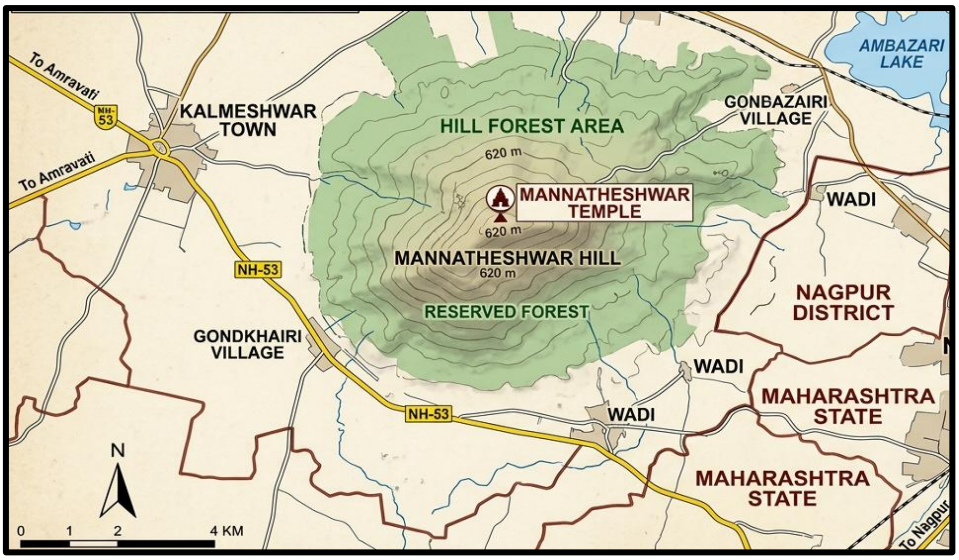


Fig: Map of study area

Result and Discussion

The spider fauna of Mannatheshwar Hill, Narkhed, exhibited considerable abundance and diversity, with a total of 210 specimens photographed and 54 species identified across 32 genera and 12 families. Among the recorded taxa,*Salticidae* was the most dominant group with 15 species, followed by *Eresidae, Tetragnathidae*, and *Thomisidae* with 4 species each; *Gnaphosidae, Lycosidae*, and *Oxyopidae* with 3 species each;*Pholcidae* with 2 species; and *Clubionidae* and *Uloboridae* each represented by a single species. Population abundance, species richness, and overall diversity peaked between October and December (Table 1, 2). These spiders inhabited a wide range of microhabitats: members of *Araneidae*, *Eresidae*, *Oxyopidae*, *Tetragnathidae*, and *Thomisidae* were predominantly observed on shrubs and trees; *Araneidae*, *Lycosidae*, *Salticidae*, and *Uloboridae* were found along riverbanks and swamp areas; and a large proportion of spiders lived on the ground beneath crop fields, leaf litter, and low vegetation, frequently exhibiting cryptic colorations for camouflage. No exceptionally venomous species were encountered. Because spiders are exclusively carnivorous, ecologically important, and abundant, they naturally help control insect pests across ecosystems and serve as effective bio-indicators.

Spiders play a crucial ecological role across terrestrial ecosystems as obligate carnivores, effectively regulating insect pest populations and serving as reliable bio-indicators of ecosystem health. The high diversity observed at Mannatheshwar hill underscores the ecological complexity of the region. Environmental factors play a major role in shaping community structure and species richness (Rosenzweig, 1995). The high species diversity recorded during the post-monsoon period (October–December) can be attributed to increased vegetation complexity and food availability.In agreement with Ried and Miller (1989), species diversity generally increases in areas providing a wider variety of habitat types. Spiders are known to be particularly sensitive to subtle changes in habitat architecture, including structural complexity, leaf litter depth, and microclimatic variations (Downie*et al*., 1999; New, 1999). Consequently, documenting spider assemblages in this ecosystem provides critical baseline data that highlights the ecological value of the area and supports local biodiversity conservation efforts.

SN	Family	Genera	Species
1	*Araneidae*	07	13
2	*Clubinidae*	01	01
3	*Eresidae*	04	04
4	*Gnaphosidae*	03	03
5	*Lycosidae*	03	03
6	*Oxyopidae*	03	03
7	*Philodromidae*	01	01
8	*Pholcidae*	02	02
9	*Salticidae*	15	15
10	*Tetragnathidae*	04	04
11	*Thomisidae*	04	04
12	*Uloboridae*	01	01
Total		**32**	**54**

Table 1: Checklist of Spider Species from Mannatheshawr hill of Narkhed region, District Nagpur. Maharashtra State

Table 2: Taxonomic Classification of Identified Spider Species across Different Families

SN	FAMILY	SPECIES
1	**ARANEIDAE**	1. *Araneussp.*Female 2. *Araneus sp.* Female 3. *Araneusmitificus* (Simon) Female 4. *Argiope sp.* Female 5.*Argiopeaemula*(Walckenaer) Female 6.*Chorizopestikadari*(Tikader) Female 7.*Cyclosamoonduens.* (Tikader) Female 8. *Cyclosa simony* Female & Male 9. *Cyrtophoracitricola*(Forscal) Female 10.*Neoscona sp.* Female 11.*Neosconasinhagadensis* (Tikader) Female 12. *Neosconatheis* (Walckenaer) Female 13.*Zygillaindica.* (Tikader and Bal) Female
2	**CLUBIONIDAE**	14. *Clubionatikadary* (Tikader) Female
3	**ERESIDAE**	15.*Stegodyphusamaravatiee*Male 16. *Stegodephuskundensis* Female 17.*Stegodyphus salbardensis*Female 18. *Stegodyphussarsinorum* (Karsch) Female
4	**GNAPHOCIDAE**	19.*Megamyrmecionashae* (Tikader and Gajbe) Female 20.*Sosticus jabulpurensis (Bhandari and Gajbe)* Female *21.Zelotes jabalpurensis*(Tikader and Gajbe) Female
5	**LYCOSIDAE**	*22.Lycosa sp.* Female 23.*Hippasa sp.* Female *24.Hippasa sp.* Female
6	**OXYOPIDAE**	25.*Oxyopus sp.* Female 26.*Oxyopus jabalpurensis(*Gajbe&Gajbe) Female & Male 27.*Oxyopupuspankaji (*Gajbe and Gajbe). Female & Male
7	**PHILODROMIDAE**	28.*Philodromus sp.* Female
8	**PHOLCIDAE**	29.*Pholcus sp.* Female 30. *Pholcusphalangioides*Female
9	**SALTICIDAE**	*31. Euophrys Species* 32. *Eryattus* 33. *Ophisthoncus*. 34.*Marpissa bengalensis*(Tikader1974) Female 36.*Marpissa dhakurensis*(Tikader1974) Female 35.*Marpissa mandali*(Tikader1974) Female 37.*Myrmarachne orientalis*Tikader Female 38. *Phidippuspatelli* Female. 39.*Phidippus paykulli* Female & Male 40.*Plexipus paykulli*Female 41. *Phintellaindica* Female 42. *Phintellabifurcata.* Female 43. *Telamonia dimidiate* (Simon). Female.
10	**TETRAGNATHIDAE**	46. *Leucaugebengalensis*Female. 47. *Leucauge decorate* (Blackwall) Female 48. *Tetragnathamandibulata*(Walckenaer) Female & Male 49. *Tetragnathamaxillosa* Female.
11	**THOMISIDAE (CRAB SPIDERS)**	50.*Thomisus sp.*Female 51.*Thomisus beutifularis(*Basu) Female 52. *Xysticussp.*Female 53. *Xysticus minutes* (Tikader) Female
12	**ULOBORIDAE**	54.*Uloborus sp.* Female

Conclusion

This study provides vital baseline data on the spider diversity within the Mannatheshwar hill ecosystem in Narkhedtaluka, Nagpur District. Through comprehensive sampling across diverse micro-habitats including dry deciduous forests, agricultural fields, and riverbanks a total of 210 specimens representing 54 species, 32 genera, and 12 families were recorded. Jumping spiders (*Salticidae*) emerged as the most dominant group with 15 species, followed by *Eresidae*, *Tetragnathidae*, and *Thomisidae*, each represented by 4 species. Spider abundance, species richness, and overall diversity peaked during the post-monsoon season (October- December), a shift driven primarily by enhanced vegetation density and increased prey availability. Importantly, no medically significant or exceptionally venomous species were observed. As obligate generalist predators, these spiders act as essential natural biological control agents against agricultural pests while serving as critical bio-indicators of overall ecosystem health.

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