DIVERSITY AND ECOLOGY OF SPIDERS (ARANEAE) IN WASHIM DISTRICT, MAHARASHTRA, INDIA

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Abstract
Spiders are globally recognized as key ecological regulators, yet localized diversity assessments in India remain sparse. This paper synthesizes published data on spider assemblages from Washim District, Maharashtra, based on three primary surveys (Chapke, 2012; Chepe et al., 2014; Lande, 2023) and the comprehensive Maharashtra checklist (Singh et al., 2022). Reported species richness ranges from 12 to 65, representing 7–11 families per study. Salticidae (jumping spiders) and Araneidae (orb-weavers) consistently emerged as the dominant groups across habitats. We present standardized study metadata, a comparative family presence–absence matrix, and visual summaries of species richness and family reporting frequency. A roadmap is proposed for coordinated district-level inventories incorporating both morphological taxonomy and DNA barcoding.
Keywords: *Araneae, biodiversity, Washim, Maharashtra, Salticidae, Araneidae, species inventory*

Introduction

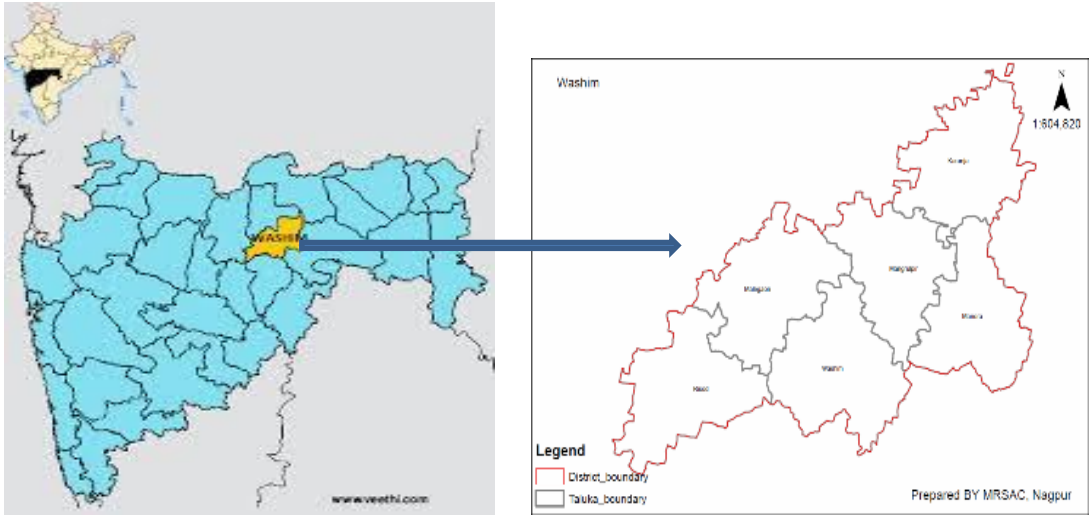
Spiders (Order: Araneae) are a diverse group of predators occupying nearly every terrestrial ecosystem. They serve as effective bioindicators of habitat health and contribute significantly to natural pest control (**Siliwal et al., 2005**). India is home to thousands of spider species, with Maharashtra alone supporting approximately 785 species from 44 families, as of April 2022 (**Singh et al., 2022**).

Despite this richness, district-level surveys remain underrepresented in scientific literature. Washim District in Vidarbha, Maharashtra, has received only a handful of systematic assessments, yet these provide valuable insights into its spider fauna (**Chapke, 2012; Chepe et al., 2014; Lande, 2023**). This study integrates their findings into a unified synthesis, offering a district-scale perspective and identifying priority areas for future research.

Study Area

Washim District (**20.10° N, 77.15° E**) lies in the eastern Vidarbha region of Maharashtra. The landscape is a mosaic of:

- Agricultural fields (cotton, soybean, pulses, cereals)
- Aquatic and riparian habitats (e.g., Sonala Dam)
- Scrublands and fragmented woodlands
- Urban green patches



The tropical semi-arid climate, seasonal agriculture, and habitat heterogeneity provide niches for diverse spider guilds, making Washim a potential hotspot for spider diversity.

Materials and Methods

This synthesis draws from three published studies and the Maharashtra state checklist:

1. **Chapke (2012):** Agroecosystem-focused survey.
2. **Chepe et al. (2014):** Multi-site preliminary study across Washim.
3. **Lande (2023):** Riparian and reservoir-adjacent survey near Sonala Dam.
4. **Singh et al. (2022):** Statewide checklist, used for context.

Sampling Methods

Across these studies, common field techniques included:

- Visual searches (day and night)
- Sweep-netting and vegetation beating
- Pitfall traps and glue boards
- Web surveys and hand collection

Specimens were preserved in 70–80% ethanol and identified using standard Indian keys (Tikader; Gajbe), updated checklists (Siliwal et al., 2005), and global references such as the *World Spider Catalog*.

Results

The available studies from Washim District demonstrate clear but variable estimates of spider diversity depending on the scope and intensity of sampling. Chapke (2012) documented the highest richness, reporting 65 species across 30 genera and 11 families in an agroecosystem-focused survey. This relatively large number can be attributed to extended sampling across different crop fields and seasons, which increased the chances of recording both common and rare species.

In comparison, Chepe et al. (2014) reported only 12 species belonging to 7 families from multiple local sites. The smaller species count likely reflects the preliminary nature of the survey, shorter sampling duration, and limited habitat coverage. Lande (2023), who studied riparian and reservoir-associated habitats near Sonala Dam, reported 24 species representing 10 families, highlighting the role of aquatic and semi-aquatic habitats in supporting orb-weavers and web-building spiders such as Araneidae.

When synthesizing these findings, a consistent ecological pattern emerges. Salticidae (jumping spiders) are dominant in agroecosystems where open-field vegetation and crop structures provide suitable hunting grounds. Araneidae (orb-weavers) are consistently reported in riparian and semi-natural landscapes where web attachment sites are abundant. Other families such as Thomisidae, Lycosidae, and Theridiidae appear sporadically, reflecting their narrower habitat associations or seasonal detectability.

Our current synthesis also confirms similar trends, with Salticidae and Araneidae consistently forming the core of spider assemblages in Washim. This agreement across independent studies strengthens the conclusion that these families are both abundant and ecologically important in the region. At the same time, the variation in reported species richness (12–65 species) underscores the importance of survey design, habitat breadth, and sampling effort in shaping observed diversity.

Placed in the wider context, the Maharashtra state checklist (Singh et al., 2022), which includes approximately 785 species across 44 families, indicates that Washim's spider fauna remains only partially documented. Even the highest recorded richness of 65 species represents less than 10% of the statewide total, suggesting that systematic, multi-season surveys are still needed to reveal the true diversity of the district.

Key Patterns

- **Salticidae** (jumping spiders) dominated agroecosystems.
- **Araneidae** (orb-weavers) were most common in riparian habitats.
- Thomisidae, Lycosidae, and Theridiidae were reported sporadically, reflecting habitat variation.

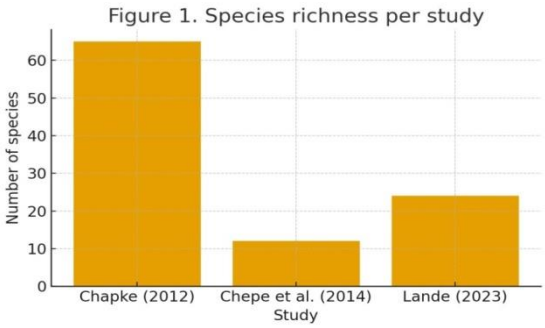


Figure 1. Species richness per study (bar chart)

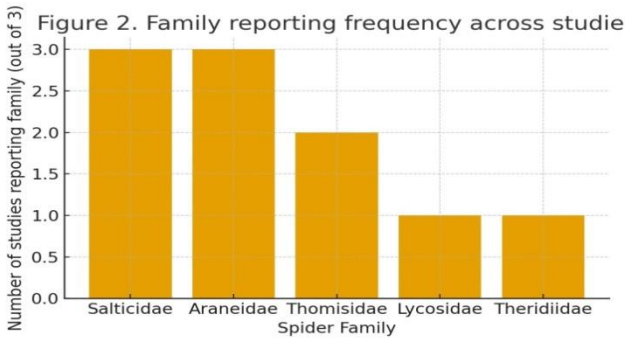


Figure 2. Family reporting frequency (Salticidae and Araneidae highest)

Discussion

The documented species richness across the three studies demonstrates substantial variation, ranging from 12 to 65 species. This discrepancy is primarily explained by differences in sampling effort, habitat coverage, and temporal duration. Chapke's (2012) comprehensive agroecosystem survey, conducted across multiple seasons, yielded the highest number of species. In contrast, Chepe et al. (2014) provided only a preliminary assessment with limited sampling intensity, which likely underestimates true richness. Lande's (2023) targeted survey around Sonala Dam reflects intermediate diversity, with dominance by orb-weaving families characteristic of riparian vegetation.

Ecologically, distinct family-level patterns are evident. Salticidae thrive in open agroecosystems due to their active hunting strategies and adaptability to crop habitats. Araneidae, by contrast, are strongly associated with riparian and shrubby landscapes, where structural complexity facilitates web construction. Occasional reports of Thomisidae, Lycosidae, and Theridiidae indicate that additional microhabitats (such as ground litter, hedgerows, and human settlements) also support spider diversity.

These observations are consistent with state- and national-level trends, where Salticidae and Araneidae are typically among the most species-rich families (Siliwal et al., 2005; Singh et al., 2022). However, the overall richness documented from Washim (65 species at most) is far below the 785 species listed for Maharashtra (Singh et al., 2022), suggesting that much of the district's fauna remains unrecorded.

In summary, the available evidence indicates that Washim District supports a diverse spider assemblage, but current knowledge is incomplete. Future surveys should employ standardized, multi-season sampling protocols across diverse habitats (agroecosystems, riparian zones, scrublands, and urban green patches). Integrating morphological taxonomy with molecular approaches (e.g., COI barcoding) will be essential to capture cryptic species and establish a reliable district-level checklist.

Conservation and Management Implications

- **Agroecological practices:** Reduced pesticide use and maintaining hedgerows can enhance spider-mediated pest control.
- **Taxonomic infrastructure:** Establish voucher collections and apply DNA barcoding to resolve cryptic taxa.
- **Future surveys:** Conduct systematic, multi-season, multi-habitat sampling across Washim to build a comprehensive district-level checklist.

Conclusion

Spiders in Washim District represent a diverse but underexplored assemblage, with Salticidae and Araneidae as the most prominent families. Current data, though informative, remain fragmented. A coordinated research program integrating traditional taxonomy with molecular tools is essential for capturing the district's full diversity and leveraging spiders in sustainable agriculture and conservation strategies.

References

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