



Biodiversity of spiders recorded from Osmanabad district of Maharashtra, (India)

Amol A Palke¹, Shahaji S Chandanshive²

¹ Department of Zoology, Arts, Science & Commerce College, Badnapur Tq- Badnapur, Jalna, Maharashtra, India

² Department of Zoology, S. G. R. G. Shinde Mahavidyalaya Paranda. Tq. Paranda, Osmanabad, Maharashtra, India

Abstract

Spider is important for maintaining balance of ecosystem, in osmanabad district still not cover the work on diversity of spider so, we have working on the diversity of spider in osmanabad district found that the different spider belonging to 11 families of 17 species of spider. all spider are collected by walking through out working area and visually searching and captured by pitfall trap brushing etc. then collected spider brought in laboratory for identification, morphological, abundance and diversity parameter studied according to Tikader (1987) [13]. Morphology and population structures of spiders in Osmanabad region are closely affected by human interference due to temple area compared with species inhabiting undisturbed temperate areas. As far as the spider diversity of Osmanabad is concerned; it is still not completely explored or understood. So, present study is an attempt to investigate the spider diversity of selected habitats of osmanabad district of Maharashtra, India.

Keywords: Diversity, spider, identification, family, species and Osmanabad

Introduction

Arthropods is segmented body, an exoskeleton and jointed appendages and largest phylum in the kingdom of animal, near about 80% known living species of insects, lobsters, crabs, scorpion, spider, mites, centipedes and millipedes that in ecosystem on earth and diversity with different adaptation. It is an important role in ecosystem and also beneficial to human being. The spiders (Arthropoda: Chelicerata: Arachnida) are amongst the most common arthropods like insects, present everywhere except Antarctica. Spider 350 million years history and they 7th rank in the world they are almost predators preying mostly of insects in terrestrial ecosystems throughout the world. Globally, 49,876 species are described in 4,237 genera belonging to 131 families (World Spider Catalog (WSC), 2022). Despite recent research on the faunistic biodiversity of spiders in India, their recorded number is less as compared to other parts of the world (Singh & Singh, 2022a). India having a very rich biodiversity and a tropical climate with biodiversity hotspots, has the best account so far of only 2344 species described under 596 genera comprising 65 families (Singh & Singh, 2021a), however, general Series on fauna published by Gazetteer of India, Maharashtra State, records a total of 90 species of spiders belonging to 14 families (Tikader, 1974). Long term and meaningful conservation requires the complete knowledge of the species in various ecosystems. In view of this it is imperative to undertake studies concerning the spider diversity of Maharashtra. Some recent workers on Indian spiders include Majumdar and Tikader (1991), Reddy and Patel (1992), Biswas and Biswas (1992), Biswas and Majumdar (1995), Sadana and Goel (1995), Biswas *et al.* (1996), Biswas and Majumdar (2000), Patel and Vyas (2001), Patel (2003a, b), many author under take studies of concern spider include Majumdar and Tikader (1991), Reddy and Patel (1992), Biswas and Biswas (1992), Biswas and Biswas (2003). Biodiversity is the different living organism live on the earth and they measured and described at different levels, species diversity, genetic diversity and ecological diversity. spider diversity are the

number different species of same genus on earth or in an environmental condition. Within all species of same genus or different species of different genus. Ecological diversity is different ecosystem on earth formed from living organism and their species interact with each other and environment. Lower spider abundance and species diversity are characteristics of areas subjected to high levels of disturbance, such as grazing, agricultural practices, forestry, and burning. Spiders are suggested to be good indicators of the effect of environmental impact on biodiversity. Thus the study will be planned with the objective to determine seasonal changes in spider's community membership as there is absence of any relative work report from this area or even in India. According to a study published in Frontiers, "the known diversity of spiders, around 51,000 species, represents but a fraction of their actual diversity that may be as great as 150-200,000 species." Out of thousands of spider species in India, so far, only the bite of spiders belonging to six genera – *Loxosceles*, *Latrodectus*, *Chilobrachys*, *Macrothele*, *Poecilotheria* and *Cheiracanthium* (compared less than 2% of their population in India) – has been recorded to require treatment beyond first aid, says Ayan Mondal, an arachnologist and assistant professor at Government General Degree College in West Bengal. He is currently writing a book on medically important spiders in India but only few species are non-venomous enough to harm humans. However, the venom of some spiders is useful in the study of neuromuscular and cardiac pharmacology. While there are only a few spiders in India that are really dangerous to humans, there are significant numbers around the world. it is necessary to study its diversity as it has been previously neglected or ignored (Palem *et al.*, 2016).

Material and methods

Study area

The spider diversity studies were completed in the duration of 2022 to 2023 at osmanabad district of Maharashtra, India. The district is located on the south side of the Marathwada region between latitude 17.35 to 18.40 degrees north, and

latitude 75.16 to 76.40 degrees east. Osmanabad District is bordered by the Beed District to the north, Latur District to the east, Solapur District to the west, Ahmednagar district to the north-west and the Bidar and Kalaburagi districts of state of Karnataka to the south. Most of the district lies in the hilly areas of the Balaghat Range, Osmanabad has a

Tropical wet and dry or savanna climate (Classification: Aw). The district’s yearly temperature is 29.14°C (84.45°F) and it is 3.17% higher than India’s averages. Osmanabad typically receives about 126.79 millimeters (4.99 inches) of precipitation and has 128.37 rainy days (35.17% of the time) annually.

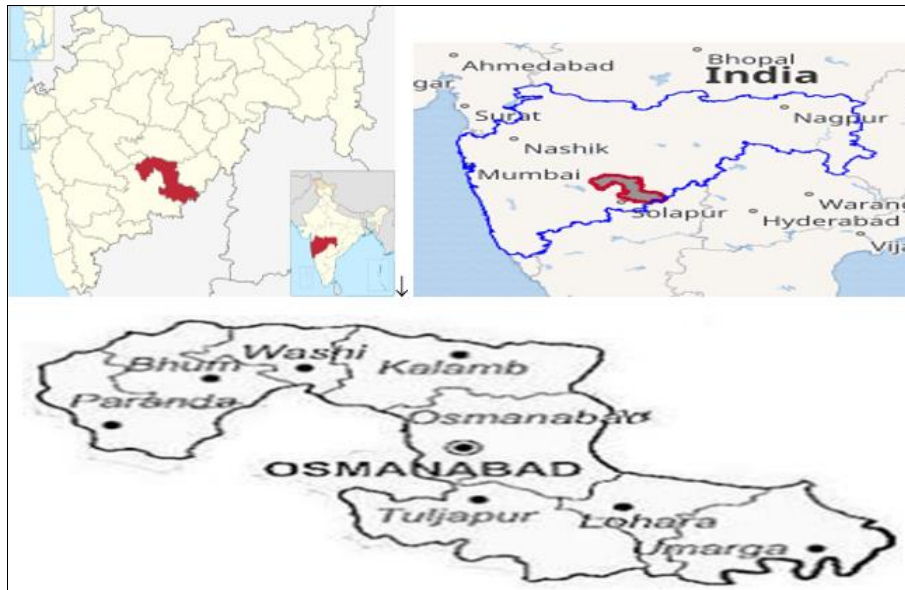


Fig 1: Map showing site of study area

Collection and identification

The Spider collections were carried out period from the 2022 & 2023 at district osmanabad. Collection of spider by various method used like bush beating, pitfall trap sweep net and visual searching. Spider collection and preservation methodology was followed according to Tikader (1987) [13]. The spiders are collected by walking throughout the area and visually searching the spiders, and their webs. Spiders are collected using the mobile camera and some

monographic books are to help to identified and classified the spiders. All calculation according to following formula.

$$\text{Simpson Index } D = \frac{(\sum nx(n-1))}{(NX(N-1))}$$

$$\text{Shannon index of Diversity} = -1x - \sum pi \times \ln pi$$

Observation

Table 1: Collected and identified family, genera and species found in osmanabad district, Maharashtra state India

Sr. No.	Family	Genera	Species	Species name
1	Araneidae	06	15	<i>Argiope aemula</i> -Female
				<i>Poltys nagpurensis</i> -Tikader Female
				<i>Neoscona theis</i> -female
				<i>Neoscona rumpfi</i> - Female
				<i>Neoscona nautica</i> –Male
				<i>Neoscona mukergai</i> -male
				<i>Neoscona excelsus</i> -male
				<i>Leucange decorate</i> -female
				<i>Cyclosa spirifera</i> -Female
				<i>Cyclosa mooduesis</i> - female
				<i>Cyclosa insulana</i> -Male
				<i>Cyclosa hexatubulata</i> - female
				<i>Cryptophora citricola</i> -female
2	Clubionidae	01	02	<i>Clubiona tikaderi</i> female
				<i>Callilepis rukminiae</i> female
3	Eresidae	01	01	<i>Stegodyphus sangivani</i> -female
4	Gnaphosidae	03	02	<i>Zelotes chandosiensis</i> Tikader
				<i>Zelotes mandlaensis</i> Tikader
5	Hersiliidae	01	02	<i>Cylognatha surajbae</i>
				<i>heridion tikaderi</i>
6	Lycosidae	04	06	<i>Hippasa pisaurina</i>
				<i>Pardosa</i> sp.
				<i>Pardosa sumatrana</i>

7	<i>Miturgidae</i>	01	01	
8	<i>Oxyopidae</i>	1	6	
9	<i>Saltisidae</i>	7	03	<i>Plexyppus payakullii</i> <i>Marpissa decorata</i>
10	<i>Tetragnathidae</i>	2	5	<i>Tetragnath mandibulata</i> <i>Tetragnath listeri</i>
11	<i>Thomisidae</i>	6	17	<i>thomismus sp.</i> , <i>Camaricus sp</i>
	11	33	N=69	

Table 2: Diversity indices of spider families from four study sites of Osmanabad District

Taxa (Family)	Bhoom	Paranda	Washi	Kalam
Simpson_1-D	0.8425	0.75	0.9677	1.231
Shannon_H	2.658	3.219	3.425	3.921
Dominance_D	0.04552	0.03	0.03321	0.04813

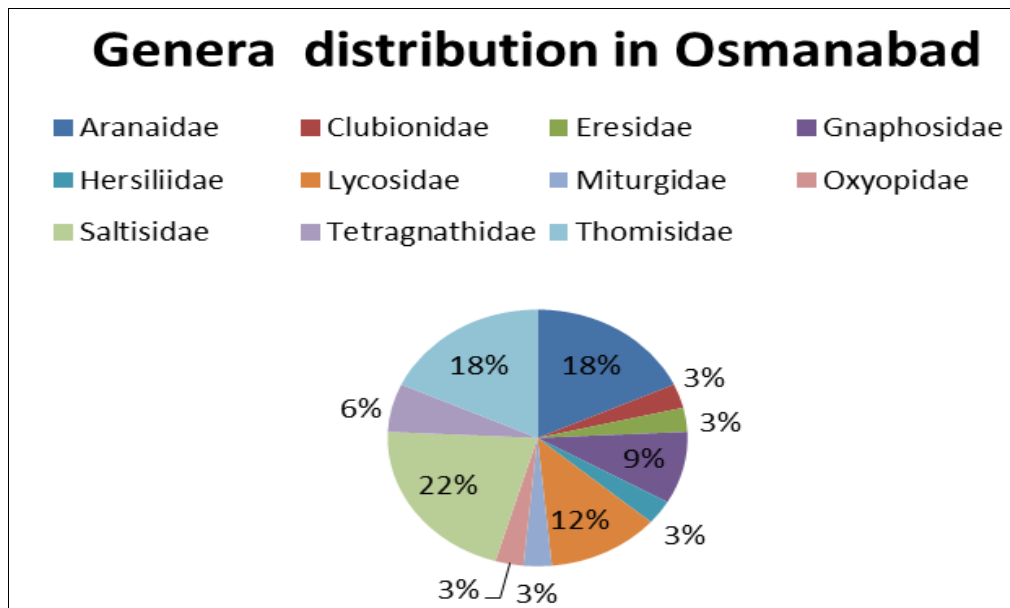


Fig 2: Genera distribution in Osmanabad

Results and discussion

In present studies on spider diversity in osmanabad district tehsil observed that the 11 families were recorded in four tehsil of osmanabad district, *Araneidae* 06 genera in this family it is represent t 15 species and dominant in area. *Clubionidae* 01 genera 02 species were recorded. Spider richness were observed in given area.

In most species are belong to the *Arachinidae* class and *Araneae* order. 15 species belonging to the family the class of *Arachnidae* from the field area of osmanabad district from the different habitats of the studied area. Spider species were recorded from *Oxyopidae*, *Salticidae*, *Lycosidae*, *Tetragnathidae* *Gnaphosidae* *Eresidae* and *Thomisidae* (Table no1). Spider biodiversity, distribution and their insect feeding habits play an important role in balance of nature (Yong and Edward, 1990). They are the potential biological indicators of natural habitats and they are used for determining how communities react to environmental changes or disturbances (Marc and Canard 1997) [6]. Highest species diversity is an indicator of a healthier and complex ecosystem because a greater variety of species allows more interactions, and diversity of species found hence they greater system stability which in turn indicates the good environment (Hill, 1973) [4]. Osmanabad region, vegetation pattern and climatic condition at different regions may be an important factor for spider diversity.

Phenology and community structures of spiders in Osmanabad region are closely affected by human interference due to temple area compared with species inhabiting undisturbed temperate areas. As far as the spider diversity of Osmanabad is concerned; it is still not completely explored or understood.

Conclusion

Present studies on spider diversity in osmanabad district we have found that spider species belonging to 11 families and their species 69 so spider Spiders are high abundance and diversity of microhabitats allows their effect in the environment. Spiders are suggested to be good indicators of the effect of environmental impact on biodiversity. Spider is most important factor or considerable insect for controlling insect and past in agricultural field indirectly spider is help to farmer for controlling past and disease plant through insect So the study will be help in determination of seasonal changes in spider population according to available vegetation and their predator in ecosystem and also work help in further investigation of spider diversity in osmanabad district because still date not reported the work on spider diversity in this area. So, present study is an attempt to investigate the spider diversity of selected habitats of osmanabad district of Maharashtra, India.

References

1. Clarke A, Morris GJ, Fonseca F, *et al.* A low temperature limit for life on earth. PLoS ONE, 2013, 8.
2. Gajbe PU. Analysis on the diversity of jumping spiders of Maharashtra, India. Biosc Biotech Res Comm, 2021, 14(2).
3. Gawande B, Zade V. A preliminary study on the spider diversity in Wari Forest region at the boundary of districts Amravati, Buldhana, Akola (Maharashtra State) and Madhya Pradesh, India, 2022. Available from: <https://ssrn.com/abstract=4183752> or <http://dx.doi.org/10.2139/ssrn.4183752>
4. Hill MO. Diversity and evenness: a unifying notation and its consequences. Ecology, 1973;54(2):427-32.
5. Hooper DU, Chapin FS, Ewel JJ, *et al.* Effects of biodiversity on ecosystem functioning: a consensus of current knowledge. Ecol Monogr, 2005;75:3-35.
6. Marc P, Canard A. Maintaining spider biodiversity in agro ecosystems as a tool in pest control. Agric Ecosyst Environ, 1997;62(2):229-35.
7. MarcYoung OP, Edwards B. Spiders in United States field crops and their potential effect on crop pests. J Arachnol, 1990;18:1-27.
8. Menge BA, Olson AM. Role of scale and environmental factors in regulation of community structure. Trends Ecol Evol, 1990;5:52-7.
9. Russell-Smith A. The spiders of Mkomazi Game Reserve. In: Coe M, McWilliam N, Stone G, Parker M, editors. Mkomazi: The Ecology, Biodiversity and Conservation of a Tanzanian Savanna. London: Royal Geographical Society, 1999, 197-222.
10. Sangavi D, Anisha PS, Vinothini G, Nathan PT. Diversity of spiders (Arachnida: Araneae) in natural and altered ecosystems in Salem district, Tamil Nadu, India. J Arachnol, 2023;5(1):113-26.
11. Sebastian PA, Mathew MJ, Beevi SP, Joseph J, Biju CR. The spider fauna of the irrigated rice ecosystem in central Kerala, India across different elevational ranges. J Arachnol, 2005;24:247-55. Available from: <https://doi.org/10.1636/05-08.1>
12. Smitha MS, Sudhikumar AV. A diversity of spiders (Arachnida: Araneae) from a cashew ecosystem in Kerala, India. J Threatened Taxa, 2020;12(13):16879-84.
13. Tikader BK. Handbook of Indian Spiders. Calcutta: Zoological Survey of India, 1987, 251.
14. Uniyal VP, Shrivastava A, editors. Arthropods and their conservation in India (Insects & Spiders). ENVIS Bulletin: Wildlife & Protected Areas. Vol. 14, 2011. Printed in 2013. Dehradun: Wildlife Institute of India, 2012.