

Study on diversity of spider fauna in Mangalwedha region of Solapur District, Maharashtra

Deepali Sangale*, Sandip Chordiya, Vitthal Nale

Department of Zoology, Tuljaram Chaturchand College of Arts, Science & Commerce, Baramati, (Autonomous), Savitribai Phule Pune University, Pune, Maharashtra, India

Abstract

The purposes of present research work is to provide information about the diversity of spiders' fauna in the Mangalwedha region of Solapur District, Maharashtra. Research data were collected from January -2024 to April 2024 from ten different localities of Mangalwedha of Solapur District by using the bottle, camera, field book, paraffin films, plastic bags, and chemicals such as formaldehyde (4%). The spiders were identified with the help of special identification keys, spiders were distinguished into families, genera, and species. Throughout this study a total of 32 specimens of spiders were collected belonging to 06 families and 10 species were identified. The current study shows that Salticidae was the most dominant family as compared to number of other species samples. The collected spider belongs to order Araneae 6 families that is Oxyopidae, Salticidae, Araneidae, Pholcidae, Theridiidae, Selenopidae. The identified species are *Oxyopes salticus*, *Plexippus paykulli*, *Plexippus spetersi*, *Menemerus bivittatus*, *Argiope anasuja*, *Cyrtophora cicastrosa*, *Pholcus phalangioides*, *Crossopriza lyoni*, *Parasteatoda tepidariorum*, *Selenops radiates*.

Keywords: Pedicel, wasps, tubular web

Introduction

Spiders are belonging to phylum Arthropoda, which is largest group of kingdom animalia. Generally, spiders are air-breathing animals that fall under the order Araneae. Spiders are involved under the class Arachnida which shows a higher number of species than other organisms with 7th rank in the total species diversity. In India there are about 1,686 spider species found out of the total species of 44,906 recorded throughout the world (Dharmaraj *et al.*, 2017) ^[5]. Spiders have four pairs of segmented legs, lack wings and antennae. The body of a spider is divided into two parts first part is known as the cephalothorax which includes the head and thorax the second part is the abdomen or opisthosoma, both parts are connected with a small stalk-like structure known as pedicel. The spiders are differentiated from other arachnids due to their characteristic feature of pedicel. (Fernandes & Ganesh, 2020) ^[6]. The presence of a spinneret is a unique feature of a spiders body which is situated at the end of the abdomen region. There are six different types of silk gland are present in abdomen region. The function of spinnerets is to release silk (Oyeniyi Abiola Oyewole, 2014). Most arachnids are largest carnivorous group, feed on insects and other terrestrial animals. Arachnids play vital role in the ecosystem to control the population of insects. Spiders can't feed on solid food material, so by using digestive juices they liquefy their food material and then consume it (Dharmaraj *et al.*, 2017) ^[5].

Spiders belonging to order Araneae are found in different locales such as in bark, dried leaves, on forest floors, and on trees, and resides in the underground, under stones (Perveen *et al.*, 2012; Biswas and Roy, 2004) ^[11, 18]. Spiders shows different sizes, shapes, eye patterns, and different colors. They are adapted to live in variety of niches with various survival practices and play an important role in the ecosystem. (Sharma & Vyas, 2010) ^[12]. Spiders are carnivorous act as predators and prey to feed on insect and small arachnids. play an important role in every terrestrial

and non-terrestrial habitat in regulation of insect pest ecosystem.

The distribution, carnivorous feeding habitat and diversity, has an important role in balance of ecosystem (Oyeniyi Abiola Oyewole, 2014). Worldwide the degradation of natural habitats is responsible for loss of biodiversity (Foelix, 1996) and change in species distributions (Chakraborty, D. & Gupta, A. 2005) ^[3]. This will create a major threat to biodiversity conservation which results into disturbance of ecosystem functions.

Spiders can feed on a variety of available prey called polyphagous. They not prey on adult insect pests but also feed on their eggs and larvae. They help to maintain the ecosystem balance (Anindita *et al.*, 2017) ^[1]. Spiders are our friends! They feed on insect pest, including mosquitoes which can transmit a diseases to human like dengue and malaria. Spiders that prey on mosquitoes directly lower the numbers of these pests and can help reduce the spread of mosquito-borne diseases. They are prolific breeders with a growth rate. If not for some predators such as birds, lizards, frogs, toads, hunting beetles, wasps, ants, and larger insects who feed on the spiders. Spiders also play significant role in plantation, agriculture, and protecting house from insect pest (Brunet, 2000). Furthermore, spiders act as bioindicator for variation in environmental contions (Kapoor, 2006) ^[8].

Majorly based on web building, Spiders are categorized into two general groups, such as web builders and non – web-building spiders. All spiders possess silk glands to produce silk for web building, however, all spiders do not make webs. The spider belongs to the Web-weaving group builds webs for the purpose of living and catching prey. Different types of webs such as funnel web, orb web, sheet web, tangle web, tubular web, and tent web are some remarkable webs made by spiders (Bradley, 2012) ^[2]. These webs sometimes act as species identification tools. The webs which are visible around our home is a circular shape, similar to a giant wheel and most common type is known as orb web.

Generally, the Non-web building species of spiders are the wandering spiders that search out for prey, or trapping spiders. The non-web-building spider sits and waits for prey to come close to them, and water spiders, capture their prey by trapping air bubbles under their abdomen and taking their air chamber below the water (Oraze, *et al.* 1988) ^[19]. In addition to this, the silk is produced by six silk glands that can be used for the purposes of making a web, wrapping up prey, protecting eggs, also it helps the spider for movement from one area to another, and even for communication. (Herbert & Lorna, 1968) ^[20].

Material and Methods

Study Area

The collection of spiders will be carried out by surveying selected areas of the Mangalwedha. The study was carried out from January to April. The collection of spiders was carried out during the morning and evening.

Sampling Sites

A detailed survey of some places in and around Mangalwedha town was carried out to cover the maximum study area, the sites were visited (Table No.1). Actual collection sites are shown in table no.1 and show details of collection site along with their GPS location of Mangalwedha city.

Collection of the spiders

The study was conducted in the Mangalwedha region of Solapur district. During this survey spiders were actively searched or collected from different localities. The collection was carried out in the morning and evening time.

Active Visual Search

the spider specimens were collected by walking through the habitat and searching visually for spider webs. In this method, Spider from both above ground and underground including folded leaves, decaying bark of trees, microhabitat, rock surface, leaf litter, tree trunk, plant branches, grass lands, and vegetation, near water bodies were collected. The collection was done by sweeping and handpicking methods.

Net Sweeping Method

In this method, a specimen net with a diameter of 30cm was used to collect the spiders. The specimen from the grass layer, herb layer, and flowers can be easily collected with a net sweeping method.

Plant Beating Method

The plant beating or shaking method was used to collect Spiders from trees above 5 feet height. The specimen from vegetation, trees, or shrubs can be easily collected with a long stick and collected spiders were transferred into a plastic vial.

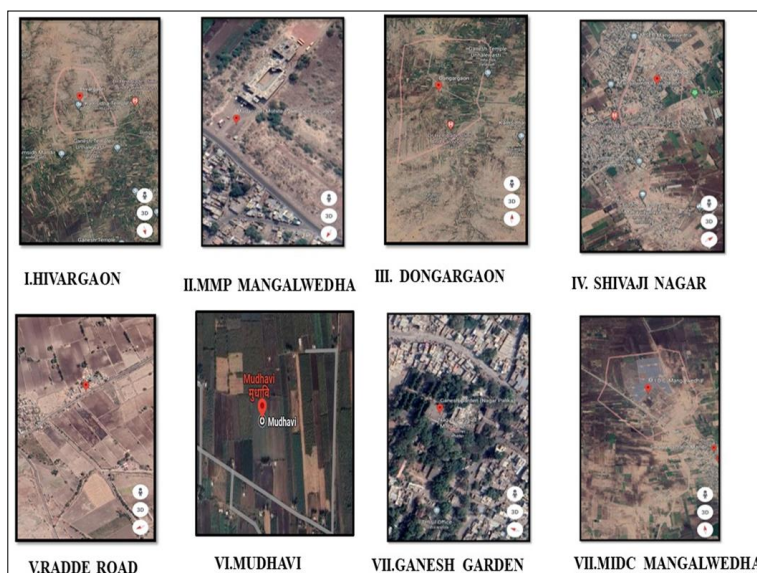
Preservation

Collected spiders were photographed and later preserved in 4% formaldehyde. The wet preservation of all specimens was carried out.

Identification: Spiders were observed using zoom microscopes to study standard article identification keys. The taxonomic keys given by Tikader (1982&1962) ^[16-15], and Biswas and Roy (2008) ^[17] were used for identification of all specimens.

Table 1: Sampling sites along the GPS location

Sr. No.	Sample Site	State	Exact location	Latitude	Longitude
1	Hivargaon	Maharashtra	Hivergaon, Mangalwedha	17°25'24"N	75°26'06"E
2	Mmp	Maharashtra	Madhansinh Mohite Patil Science Mahavidyalaya, Mangalwedha	17°30'23"N	75°26'34"E
3	Dongargaon	Maharashtra	Dongargaon, Mangalwedha	17°26'51"N	75°25'07"E
4	Shivaji NAGAR	Maharashtra	Shivaji Nagar, Mangalwedha	17°31'09"N	75°26'49"E
5	Radde ROAD	Maharashtra	Radde Rd, Dongargaon	17°25'15"N	75°25'24"E
6	Mudhavi	Maharashtra	Mudhavi, Mangalwedha	17°33'54"N	75°28'19"E
7	Ganesh Garden	Maharashtra	Ganesh Garden, Mangalwedha	17°30'40"N	75°26'43"E
8	MIDC	Maharashtra	M.I.D.C. Mangalwedha	17°31'49"N	75°25'52"E
9	Kumbhar Galli	Maharashtra	Kumbhar Galli, Mangalwedha	17°30'38"N	75°26'53"E
10	Khomnal	Maharashtra	Khomnal Mangalwedha	17°27'23"N	75°27'32"E



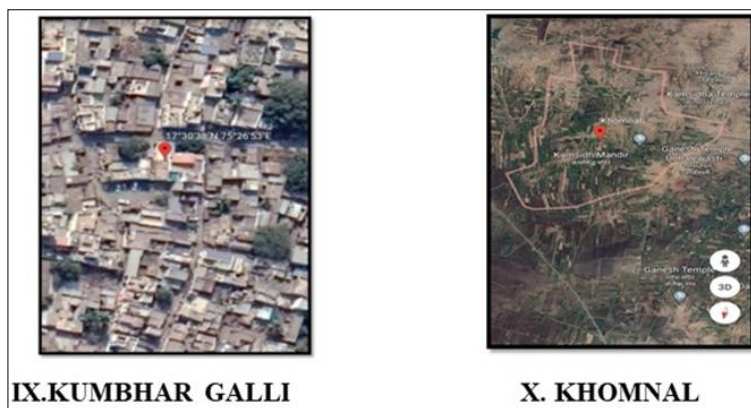


Fig 1: Sample collection site

Result and discussion

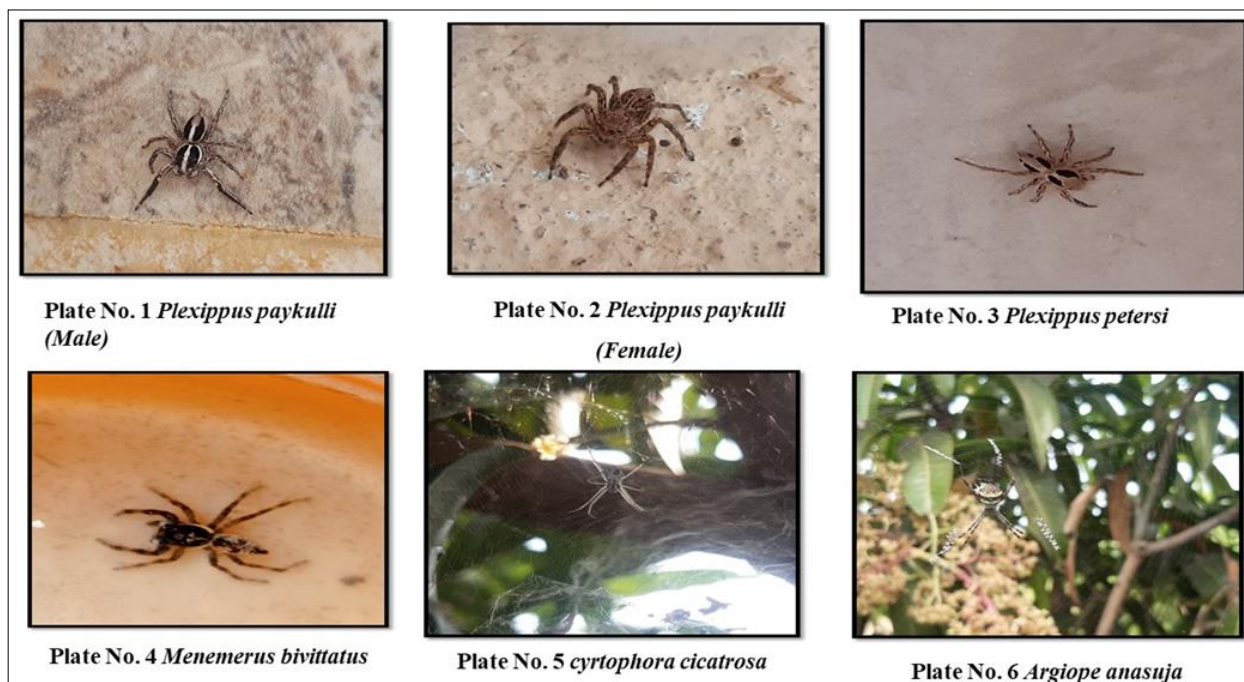
The present research work was carried out to understand the diversity of spiders in the Mangalwadha region in the Solapur district. During the current research work, a total of 32 spider specimens were collected from Jan 2024 to April 2024. 10 species of spiders were identified belonging to the order Araneae 6 families. The Salticidae family was found to be the most abundant followed by Araneidae, Pholcidae, Oxyopidae, Theridiidae, and Selenopidae. Familywise diversity of spiders was observed as: The Salticidae was most species-rich family with 3 species under 2 genera, followed by family Araneidae with 2 species and family Pholcidae with 2 species, family Oxyopidae with 1 species, family Theridiidae with 1 species, and family Selenopidae with 1 species.

The identified species during study are *Oxyopes salticus*, *Plexippus paykulli* (male and female), *Plexippus petersi*, *Menemerus bivittatus*, *Argiope anasuja*, *Cyrtophora cicastosa*, *Pholcus phalangioides*, *Crossopriza lyoni*, *Parasteatoda tepidariorum*, *Selenops radiatus*.

The color photographs of all the identified 10 species are presented in Fig. 2. The checklist of all identified spiders is given in Table 2.

Table 2: Spider Species Recorded During the Study

Sr. No.	Family	Genus	Scientific name
1	Salticidae	Plexippus	<i>Plexippus paykulli</i> (Audouin, 1826)
2	Salticidae	Plexippus	<i>Plexippus petersi</i> (Karsch, 1778)
3	Salticidae	Menemerus	<i>Menemerus bivittatus</i> (Dufour, 1831)
4	Araneidae	Argiope	<i>Argiope anasuja</i> (Thorell, 1887)
5	Araneidae	Cyrtophora	<i>Cyrtophora cicastosa</i> (Stoliczka, 1869)
6	Pholcidae	Pholcus	<i>Pholcus phalangioides</i> (Fussli, 1775)
7	Pholcidae	Crossopriza	<i>Crossopriza lyoni</i> (Blackwall, 1867)
8	Theridiidae	Parasteatoda	<i>Parasteatoda tepidariorum</i> (C.L. Koch, 1841)
9	Selenopidae	Selenops	<i>Selenops radiatus</i> (Latreille, 1819)
10	Oxyopidae	Oxyopes	<i>Oxyopes salticus</i> (Hentz, 1845)



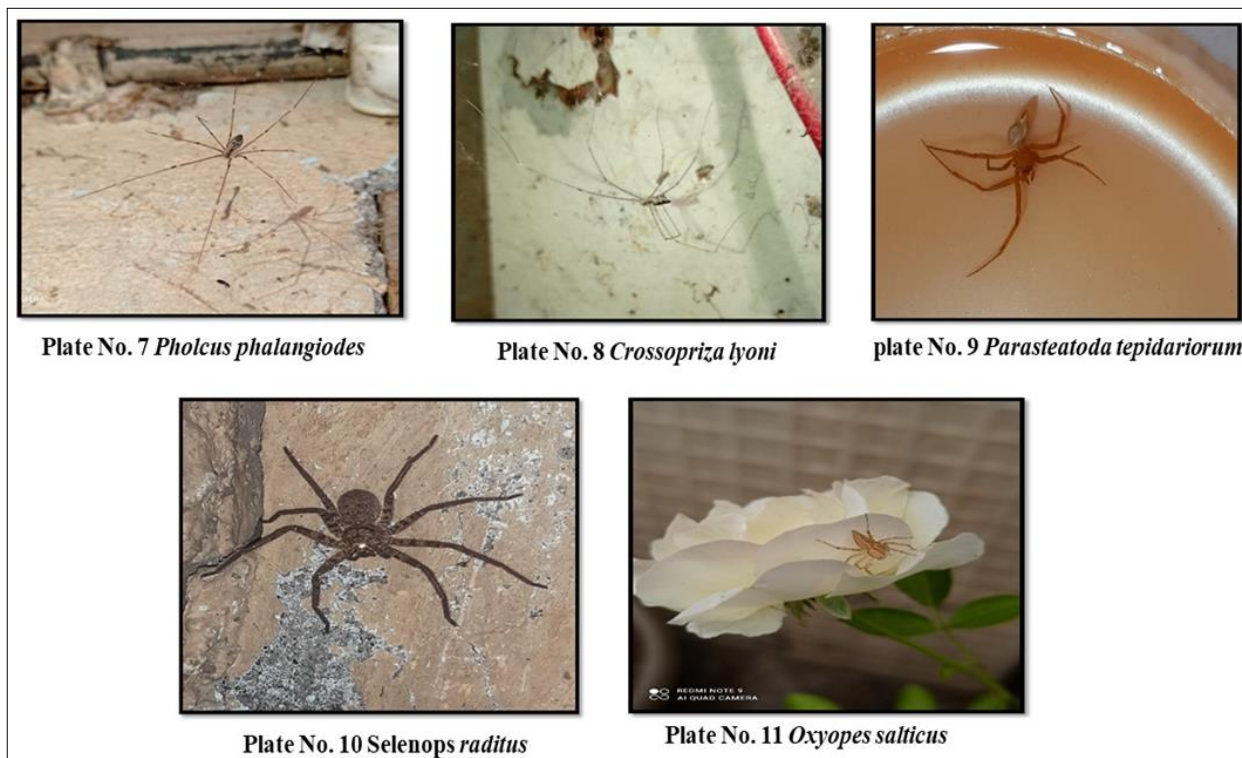


Fig 2: Photographs of identified species

Conclusion

In present research, faunal diversity of invertebrate, spiders belonging to phylum Arthropoda, Class Arachnida, and order Araneae were studied from various habitats from the Mangalwedha region of the Solapur district. A total 32 individuals belong to six families. The family Salticidae was found to be the most abundant followed by Araneidae, Pholcidae, Oxyopidae, Theridiidae, and Selenopidae. Familywise diversity of spiders was studied.

References

1. Anindita B, Mahadev C, Prabal S. Spider diversity in different habitats at Jaintia Hills of Meghalaya. *International J. of Life Sciences*, 2017;5(4):613-619.
2. Bradley RA. *Common Spiders of North America*. Univ of California Press. Berkeley, CA, 2012, 271.
3. Chakraborty D, Gupta AK. Impact of habitat fragmentation on hoolock gibbon (*Bunopithecus hoolock*) in gibbon wildlife sanctuary, Assam, India. *Conservation of Hoolock Gibbon (Bonopithecus hoolock) in Northeast India*, Wildlife Institute of India, 2005, 213-232.
4. Corronca JA. The South American spiders of the genus *Selenops* (Araneae, Selenopidae) with a description of three new species. *Studies on Neotropical Fauna and Environment*, 1998;33(2):124-148.
5. Dharmaraj J, Gunasekaran C, Rajkumar V, Chinnaraj P. Diversity of spiders (Arachnida: Araneae) in Nilgiris, Tamilnadu. *International journal of advanced research in biological sciences*, 2017, 4(5).
6. Fernandes S, Ganesh S. Study on the Diversity of Spiders (Order: Araneae) of Lalbagh Botanical Garden and Tavarekere Park, Bangalore South. *International Journal of Environment, Agriculture and Biotechnology*, 2020;5:2.
7. Foelix RF. Mechano- and chemoreceptive sensilla. In *Neurobiology of arachnids*. Springer, Berlin, Heidelberg, 1985, 118-137.
8. Kapoor V. An assessment of spider sampling methods in tropical rainforest fragments of the Anamalai Hills, Western Ghats, India. *Zoo's Print*, 2006;21:2483-2488.
9. Latreille PA. Articles sur les araignées. *Nouveau Dictionnaire d'histoire Naturelle Paris Ed. II*, Paris, 1819, 22.
10. Oyewole OA, Oyelade OJ. Diversity and distribution of spiders in southwestern Nigeria. *Natural Resources*, 2014;5(15):926.
11. Perveen F, Jamal A, Yasmin S, Khatak KU. Biodiversity of spiders fauna in the Frontier Region, Peshawar, Pakistan. *Journal of Entomology and Nematology*, 2012;4(3):22-33.
12. Sharma S, Vyas A, Sharma R. Diversity and abundance of spider fauna of Narmada river at Rajghat (Barwani) (Madhya Pradesh) India. *Researcher*, 2010;2(11):1-5.
13. Stoliczka F. Contribution towards the knowledge of Indian Arachnoidea. *Journal of the Asiatic Society of Bengal*, 1869;38:201-251.
14. Thorell T. Viaggio di L. Fea in Birmania e regioni vicine. II. Primo saggio sui ragni birmani. *Ann. Mus. civ. stor. nat. Genova*, 1887;25:5-417.
15. Tikader BK. Studies on some Indian spiders (Araneae; Arachnida) J. Linn. Soc. London, 1962;44(300):561-584.
16. Tikader BK. The fauna of India Araneae, 1982;2(1):1-293.
17. Biswas B, Roy R. Description of Six New Species of Spiders of the Genera *Lathys* (Family : Dictynidae), *Marpissa* (Family : Salticidae), *Misumenoides* (Family : Thomisidae), *Agroeca* (Family : Clubionidae), *Gnaphosa* (Family : Gnaphosidae) and *Flanona* (Family : Lycosidae)-from India. *Records of*

- the Zoological Survey of India*,2008:108(1):43–57.
<https://doi.org/10.26515/rzsi/v108/i1/2008/159070>
18. Biswas Bijan, Roy Rakhi. Description of a new species of spider genus *Pachygnatha* Sundevall (Araneae : Tetragnathidae) from India. *Rec. zool. Surv. India*,2004:103(3-4):183-185.
 19. Orazi MJ, Grigarick AA, Lynch JH, Smith KA. Spider Fauna of flooded rice field in Northern California- *Journal of Arachnology*,1988:16:331-337.
 20. Herbert W Levi, Lorna R Levi. A Guide to spiders and their kin.Golden press New York, Western Publishing Company, Inc. Catalog Card Number, 1968, 68-23522.
 21. Nyffeler M. Ecological impact of spider predation: a critical assessment of Bristowe's and Turnbull's estimates. *Bulletin of the British arachnological Society*,2000:11(9):367-373.
 22. Orazi MJ, Grigarick AA, Lynch JH, Smith KA. Spider Fauna of flooded rice field in Northern California- *Journal of Arachnology*,1988:16:331-337.