



# STUDY ON SEASONAL DIVERSITY OF SPIDER FAUNA (ORDER ARANEAE) FROM NAGPUR DISTRICT, MAHARASHTRA, INDIA.

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## Abstract

Spiders are invertebrates which belongs to the group of animals known as Arachnids. It belongs to phylum Athropoda, Class Arachnida and Order Araneae. Spiders are important predators in terrestrial ecosystem and biological control agents against pest in agro-ecosystem. The Class Arachnida of order Araneae has a special value in the studies of ecology as it serves as a biological indicators. Arachnida provides an important service, keeping insects population under control. They are unique among other Arachnids due to the presence of Spinnerets. Hence a preliminary survey was carried out in diversity of spider Fauna (order araneae) from Nagpur district, Maharashtra, India. The main aim to conduct this survey was to evaluate the current status of spider diversity in the study area. The research is to explore the diversity of spider fauna (order araneae) from Nagpur district and other adjoining selected study area. The objective of study is to examine the morphology of the local spider fauna, to investigate the research area's seasonal diversity of spiders, and to examine the spinnerest of spiders. The techniques use for collection were like sweep netting, ground hand collection, active visual search, aerial hand collection, photograph collection. The 17 numbers of species were identified in 6 month duration, Male lynx spider, Scotophaeus blackwalli, Male Plexippus Paykuli, Female Plexippus paykulli, Lycosa, Ground spider, Pardosa, Allocosa, Scytodes thoracica, Tenuiphantes, Steatoda grossa, Hasarius adansoni, Pholcus phalangioides, following are the common species identified in this area Pholcus phalangioides, Male Plexippus Paykuli, Female Plexippus paykulli,

**Key words:** Arachnida, Araneae, Spider, Diversity.

## INTRODUCTION

The Class Arachnida of order Araneae has a special value in the studies of ecology as it serves as a biological indicators (Gawali A. R, et al., 2020). Arachnida provides an important service, keeping insects population under control (Rain F. F, et al., 2016). They are found in a variety of places from mountain tops to underground caves, also at the places where there is prey on which they can feed. The variety of species, each with its own particular ecological requirements, makes spiders an excellent group to survey when assessing the health and habitats. Most arachnids are carnivorous, typically preying on insects and other terrestrial organisms many of which eat our crops and pester our livestock (Wankhede V. W, et al., 2013). Spiders (order Araneae) are air-breathing arthropods that have eight legs, chelicerae with fangs, generally able to inject venom and spinnerets that extrude silk (Marples B. J. 2008). Most of the spiders are having four pairs of eyes and some are having three pairs of eyes. Spinnerets are six in numbers (three pairs)

present below the anal tubercle which is present at the end of the abdomen. They possess two main body parts, anterior prosoma or cephalothorax, and posterior opisthosoma or abdomen, joined by a narrow pedicel. They have four pairs of legs. The abdomen is the largest and wide part of spiders body with a remarkable variation in shape, size, coloration, markings and fine hairs (Markhad S. R. 2020). Numerical data is maximum in summer and rainy season as compared to winter (Sarwade et al., 2017). While the venom of a few species is dangerous to humans, scientists are now researching the use of spiders venom in medicine and as non-polluting pesticides (Pande G.S, et al., 2019). As spider diversity reports are scanty, it is necessary to update knowledge about them and update the current data. Therefore, a survey was carried out in the Nagpur district, Maharashtra, India. This information will enrich the base data on diversity in the Nagpur district.

## STUDY AREA

The study was conducted in Nagpur district, Maharashtra, India. Following sites were used for study. Sites A Nagpur Sites B Mouda Sites C Ramtek Sites D Kamptee.

**Site A Nagpur:** Nagpur district of Maharashtra also known as the city of Oranges. Nagpur is the third largest city of the Indian state of Maharashtra. Total area of Nagpur is 9,892 km<sup>2</sup> Nagpur district including 9,409.05 km<sup>2</sup> rural area and 482.95 km<sup>2</sup> urban area. The average annual rainfall in the district is 1100 mm (43.3 inches). During summer, the mean daily maximum temperature is 35.4°C and the minimum is 29.3°C and it decreases toward winter with a mean daily maximum temperature of 30.6°C and a minimum of 16.2°C.

**Site B Mouda:** Mouda is a town and Tehsil in Nagpur district of Maharashtra. Total area of Mouda Tehsil is 619 km<sup>2</sup> including 606.36 km<sup>2</sup> rural area and 13.06 km<sup>2</sup> urban area. Mouda is 50 kilometers away from Nagpur. Mouda includes 314 Villages.

**Site C Ramtek:** Ramtek is a town and Tehsil in Nagpur district of Maharashtra. Total area of Ramtek Tehsil is 1,168 km<sup>2</sup> including 1,157.54 km<sup>2</sup> rural area and 10.71 km<sup>2</sup> urban area. The Ramtek is 56 kilometers away from Nagpur. Ramtek includes 156 Villages.

**Site D Kamptee:** Kamptee is a town and Tehsil in Nagpur district of Maharashtra. Total area of Kamptee Tehsil is 402.88 km<sup>2</sup> including 365.74 km<sup>2</sup> rural area and 37.14 km<sup>2</sup> urban area. The Kamptee is 15 kilometers away from Nagpur. Kamptee includes 77 Villages.

## MATERIALS AND METHODS

Study Area (Nagpur and other selected Sites Mouda, Ramtek, Kamptee).

Survey Method- Monthly, Seasonal. Following Techniques were used for Collection.

**Sweep Netting:** Is also good technique, in which the spider is collected from small herbaceous herbs.

**Ground hand Collection:** This method of sampling was used to collect the spiders, which were found to be visible in the ground.

**Aerial hand collection:** This method was used to collect web-building and free-living spiders on the foliage and stem of living or dead shrubs, high herbs, tree trunks etc.

**Active Visual Search:** Walked through the habitat and search visually for spiders. Spiders both the ground level, underground and above ground microhabitat, folded leaves, plant branches, rock surface, grass land, decaying bark of trees, vegetation were collected.

## Methodology

To study the diversity of spiders survey was conducted for 7 months from July 2023 to January 2024. This included 4 sites.

Sites A Nagpur Sites B Mouda Sites C Ramtek Sites D Kamptee.

## Photography and Identification

The data and location of collection were noted and the other morphological features were observed clearly and noted. All spider specimens were identified referring the taxonomic keys. After taking the photograph of collected spiders they were released into their natural habitats.

## RESULT AND DISCUSSION

Nagpur District provides diverse habitat for various spider species. A total of 17 spiders representing 10 families and 17 species were recorded in the Nagpur district. In the study period Salticidae is the most representing family. In the present study 3 individual belonging to family Gnaphosidae, 4 individual belonging to family Salticidae, 3 individual belonging to family Lycosidae, 1 individual belonging to family Oxyopidae, 1 individual belonging to family Oecobiidae, 1 individual belonging to family Scytodidae, 1 individual belonging to family Linyphiidae, 1 individual belonging to family Theridiidae, 1 individual belonging to family Pholcidae, 1 individual belonging to family Araneidae were recorded.

**Table 1. Spider species collected in the Nagpur District**

| Sl. No. | Family      | Spider fauna genus/species                  |
|---------|-------------|---|
| 1       | Salticidae  | 1. Male Plexippus paykulli/Jumping spider   |
|         |             | 2. Female Plexippus paykulli/jumping spider |
|         |             | 3. Hasarius adansoni/Adanson house jumper   |
|         |             | 4. Menemerus bivittatus/gray wall jumper    |
| 2       | Gnaphosidae | 5. Scotophaeus blackwalli/mouse spider      |
|         |             | 6. Herpyllus ecclesiasticus                 |
|         |             | 7. Ground spider                            |
| 3       | Lycosidae   | 8. Lycosa/Tarantulas                        |
|         |             | 9. Pardosa/Legged wolf spider               |
|         |             | 10. Allocosa/Wolf spider                    |
| 4       | Oxyopidae   | 11. Male lynx spider                        |
| 5       | Oecobiidae  | 12. Oecobiids/Wall spider                   |
| 6       | Scytodidae  | 13. Scytodes thoracica                      |
| 7       | Linyphiidae | 14. Tenuiphantes                            |
| 8       | Theridiidae | 15. Steatoda grossa/Cupboard spider         |
| 9       | Araneidae   | 16. Argiope keyserlingi                     |
| 10      | Pholcidae   | 17. Pholcus phalangioides                   |

It is also interesting to note that out of 60 families recorded in India (Sebastian P.A. 2009) by scientists 10 families were recorded from Nagpur district. Salticidae were the dominant family in the biome. The members of this family were found on the soil and grass land, these were recorded more in sites B Mouda and Sites C Ramtek, as more number of species were identified from this area. The second most dominant families were Gnaphosidae and Lycosidae were identified from Site A Nagpur and site D Kamptee respectively. The members belonging to this families are commonly called as Home spider, as they mostly prefer the man made habitat. The family Gnaphosidae included 5 individuals, which were found in site B Mouda as the members of this family mostly prefer the grass habitat land habitat as well as lead arboreal mode of life. 3 and 1 individuals belonging to family's Lycosidae and Araneidae respectively were recorded from site C Ramtek as these individuals prefer man made habitat. The highest species diversity was observed that site B Mouda table 2 and figure 3, and second most species diversity site A Nagpur a Site C Ramtek.

The most number species diversity is family salticidae 23% and second most species diversity is Gnaphoisidae 17% and Lycosidae 18% table 2 and figure 1.

**Table 2. Distribution of spider species in different habitats.**

| Sl. No. | Family Name  | Site A Nagpur | Site B Mouda | Site C Ramtek | Site D Kamptee |
|---------|--------------|---------------|--------------|---------------|----------------|
| 1       | Salticidae   | +             | +            | +             | +              |
| 2       | Gnaphoisidae | +             | +            | +             | -              |
| 3       | Lycosidae    | +             | +            | +             | -              |
| 4       | Oxyopidae    | -             | +            | -             | -              |
| 5       | Oecobiidae   | -             | +            | -             | -              |
| 6       | Scytodidae   | -             | +            | -             | -              |
| 7       | Linyphiidae  | -             | +            | -             | -              |
| 8       | Theridiidae  | -             | +            | -             | -              |
| 9       | Araneidae    | -             | -            | +             | -              |
| 10      | Pholcidae    | +             | -            | -             | -              |

**Table 3. family-wise count of spiders collected from different habitats in Nagpur district**

| Sl. No. | Family       | Total No. of individuals collected |
|---------|--------------|------------------------------------|
| 1       | Salticidae   | 4                                  |
| 2       | Gnaphoisidae | 3                                  |
| 3       | Lycosidae    | 3                                  |
| 4       | Oxyopidae    | 1                                  |
| 5       | Oecobiidae   | 1                                  |
| 6       | Scytodidae   | 1                                  |
| 7       | Linyphiidae  | 1                                  |
| 8       | Theridiidae  | 1                                  |
| 9       | Araneidae    | 1                                  |
| 10      | Pholcidae    | 1                                  |
|         | <b>TOTAL</b> | <b>17</b>                          |

**Figure. 1, Chart showing the percent wise of families of spider in the study area.**

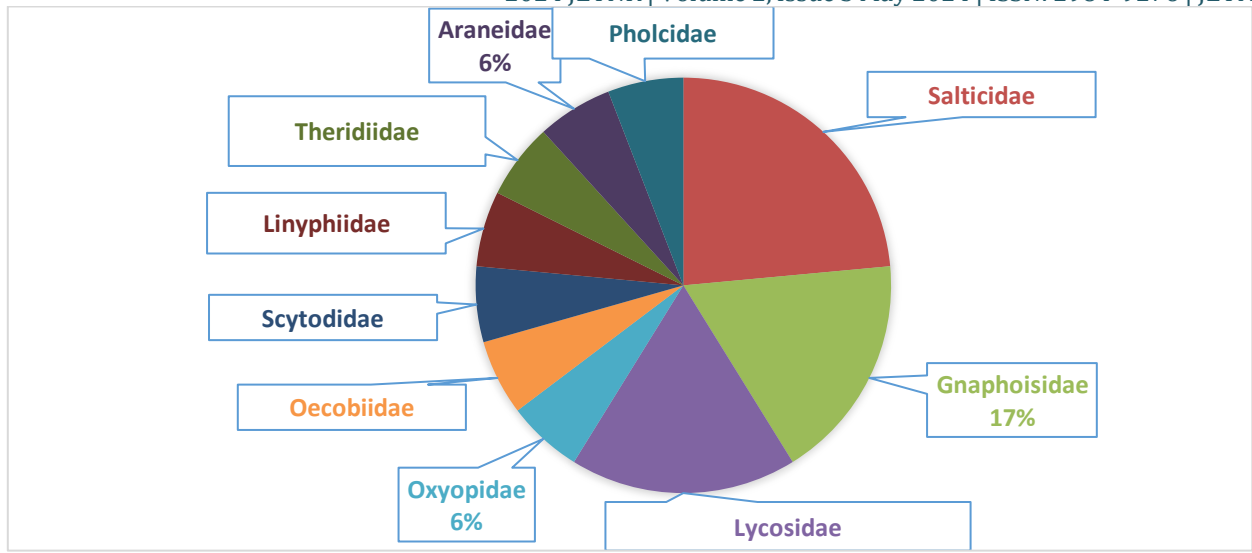


Figure. 2, Chart showing the distribution of families of spider in the study area.

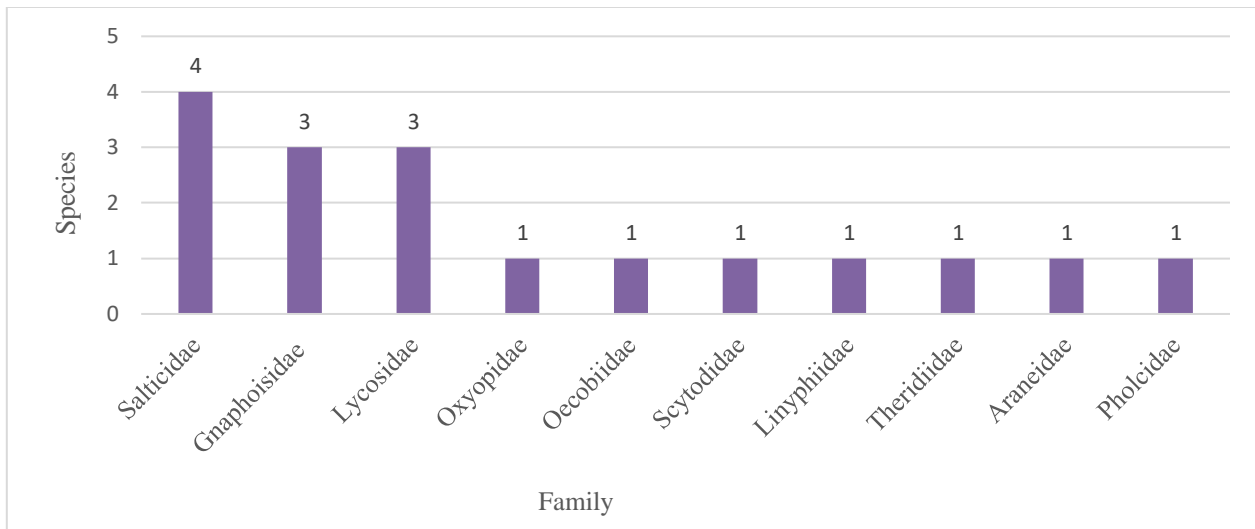
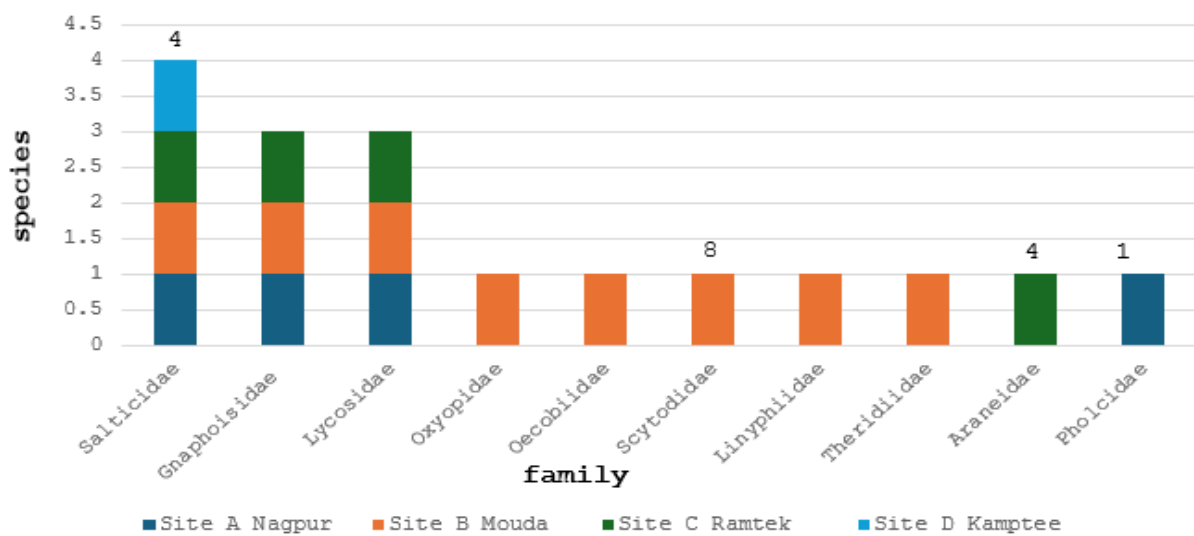


Figure. 3, Chart showing the Site wise of families of spider in the study area.



**CONCLUSION**

Spider being the largest portion of invertebrate fauna with over 34000 recognized species, Nagpur district exhibits remarkable and good number of spider diversity. From the recent studies the importance of spiders as ecological indicators is also inferred. This ecosystem with rich floral diversity provide a favorable environment to the spider fauna and emphasizes the need for conservation of the ecosystem by characterizing species diversity.

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