DIVERSITY OF SPIDER FAUNA OF INDAPUR TEHSIL, (UJANI BACKWATER RIGION) PUNE, MAHARASHTRA, INDIA.

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ABSTRACT

The objectives of the present study were to explore the diversity of spider fauna at different habitats. The study was conducted at different places of Indapur Tehsil (Ujani backwater region) Pune, Maharashtra, India. In this study we observed the diversity of Spiders (Class Insecta, phylum Arthopoda) and efforts were made to evaluate the status of ecosystems in Ujani backwarer region Indapur. In total 43 species of spiders belonging to 10 families were observed. Thus family Salticidae was the most dominant family exploring 27% of species. The high species diversity of spiders in Ujani backwater,Indapur can be attributed to the high diversity of plants and insects. This could be an important centre of speciation Indapur, Pune region. Spiders are important predators in terrestrial ecosystem. Survey was done from March 2020 to August 2020 during day time from 7 A.M. to 7 P.M. every weekend.

KEY WORDS: Spider, Salticidae, Ujani, backwarer region, Diversity, Indapur.

INTRODUCTION

India is rich in both flora and fauna and is mega diverse country. Knowledge about the diversity, Spiders form one of the most ubiquitous groups of predaceous organisms in the animal kingdom (Riechert and Lockley 1984). Spiders, unique among all organisms in their modes of silk production and usage are common predatory arthropods in all terrestrial and many aquatic ecosystems, from marine intertidal zones to tundra and rocky peaks, and all points between.

Among all organisms, spiders (Order: Araneae) form the seventh largest order in terms of number of known species, after Coleoptera, Hymenoptera, Lepidoptera, Diptera, Hemiptera and Acarina. Furthermore, this is the most diverse, female-dominated and entirely predatory order in the arthropod world. As such, spiders are key components of all ecosystems in which they live. Currently 39,725 valid species of spiders in 3677 genera and 108 families have been described (Plat- nick 2007). Coddington and Levi (1991) commented that up to 170,000 species exist worldwide. Being highly diverse and abundant predators, spiders are important regulators of terrestrial arthropod populations (Riechert and Bishop 1990; Coddington and Levi 1991; Moran et al. 1996) and may prove to be useful indicators of the overall species richness and health of terrestrial communities (Noss 1990).

Spider body is divided into 2 main parts- ‘The head’ and ‘The Abdomen’. This two part joined by Cephalothorax. The head contains brain, venom glands, eyes and mouthparts. Sensory hairs are found on the fore legs. They sense air temperature and moisture. Spiders have eight eyes but even then their vision is poor. Abdomens contain heart, lungs, digestive system, web making gland (Silk gland). All spider reproduces sexually. The male spiders have modified sperm storage structures in Known as pedipalps to store the spermatheca. A sperm drop is laid on web and is absorbed in storage receptacles

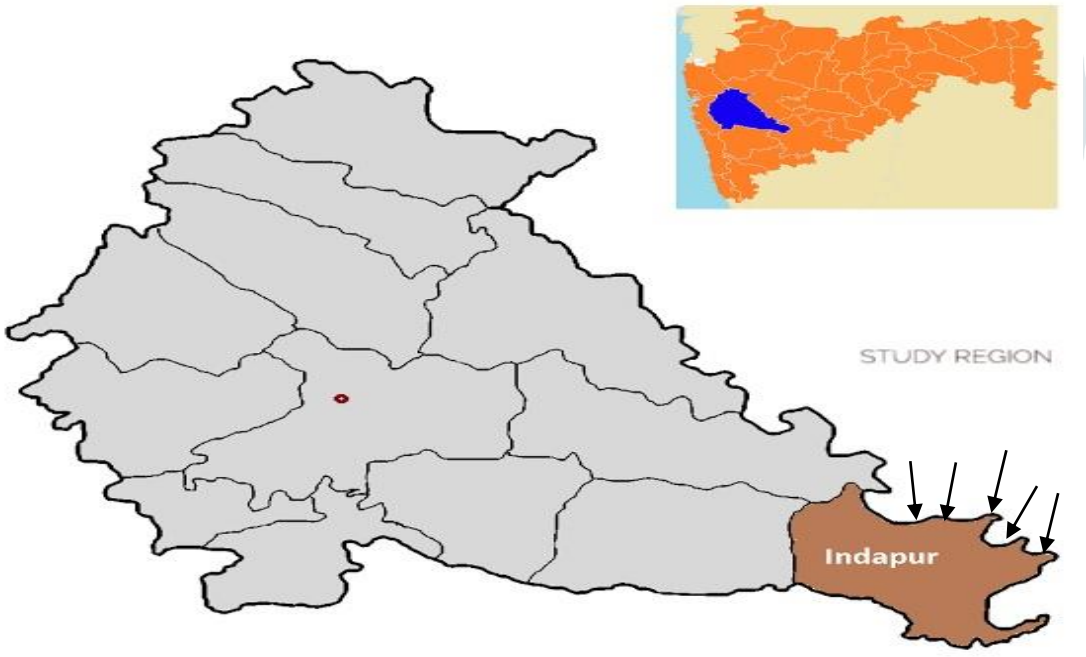
in the pedipalp of male (Cooke, 1970; Lopez, 1987). These palps are then introduced into the female epigyne. This was first described in 1678 by Martin Listen. The female fertilizes her eggs with stored sperm and lays them into an egg sac.

Due to high species endemism, Western Ghats are listed in the 34 'Biodiversity hotspots' of the world (Mittermeier et al. 2005). In this Forest there are considerable plans for its protection. Due to less awareness about the spiders, diversity study in Western Ghats remains unexplored. Studies have demonstrated that a correlation exists between the structural complexity of habitats and species diversity (Hawksworth and Kalin-Arroyo 1995). Diversity generally increases when a greater variety of habitat types are present (Ried and Miller 1989). Structurally more complex shrubs can support a more diverse spider community (Uetz 1991). Spiders are found near water's edge, on the ground, in underground caves and the top of mountains.

Spiders of the Western Ghats are poorly studied compared to other parts of the country. With respect to its geographical, climatic and ecological features, the Western Ghats harbours a rich amount of arachnids of which spiders have a huge share. Therefore, documenting spider diversity patterns in this ecosystem can provide important information to justify the conservation of this ecosystem. Species richness is only one way of assessing habitat quality.

Study area – The present study was conducted from March 2020 to August 2020 at different study sites of Indapur Tehsil,(Ujani backwater region) District- Pune, Maharashtra.

Spider collection sites - 1. Shirsodi 2. Padsthal. 3.Kalthan no-2 4. Malwadi no-1 5.varkute BR 6. Pimpri KH 7.dalaj no-2 8.Palasdev 9. Loni 10. Forest area of Indapur Tehsil.



Showing Indapur Tehsil, Pune, Maharashtra on the map

SAMPLING METHODS

1. Pitfall Trap Method: To collection ground dwelling & nocturnal spiders, pitfall traps like cylindrical plastic bottles of 9cm diameter and 10 cm depth were arranged within ground surface will work. The traps were filled with liquid preservative 69% water, 30% ethyl acetate and 1% detergent.

2. Plant Beating Method: Spiders from trees above 5 feet height were collected using plant beating method or shaking method. This method consisted of vegetation, trees or shrubs with long stick and catch falling spiders in an inverted umbrella. It is easy to transfer from the umbrella into plastic vial.

3. Net Sweeping Method: The specimen net used was 30cm in diameter. This net is used to collect spider mainly from flowers, grass layer and herb layer. The content was placed into an umbrella or bucket and transferred to collect into vial.

4. Active Visual Search: Walk through the habitat and search visually for spiders. Spider both the ground level, underground and above ground including microhabitat, folded leaves, plant branches, leaf little, tree trunk, rock surface, grass lands, decaying bark of trees, vegetation, near water bodies were collected.

IDENTIFICATION

Spiders were observed using stereo zoom microscopes for studying identification keys. All specimens were identified using the taxonomic keys for Indian spiders given by Tikader (1987), Reddy and Patel (1992), Biswas and Biswas (2003), Majumdar (1995) and Sabbastian ,and Peter (2009).

Statistical analysis

Shannon Wiener Diversity Index

H = - SUM [(Pi)* In (pi)] E = H/H max

Where, SUM = Summation Pi = number of individuals of species I/ Total number of species

S = Number of species or species richness

H max = Maximum diversity possible

E = Evenness = H/H max

RESULTS AND DISCUSSION

Total 43 species under 34 genera and 10 families were recorded during the 6 month survey in Indapur Tehsil. This area is rich in floral diversity. In our observation Salticidae is the most represented family with 12 species.

Distribution of Spider families

Present study was done to observe the diversity of spider in Indapur Tehsil. We observed 12 species belonging to family Salticidae , 10 species belonging to family Araneidae., 7 species of family Lycosidae., 5 species of family Pholcidae., 2 species belonging to family Agelenidae., 2 species

belonging to family Tetragnathidae., 2 species belonging to family Theraphosidae., 1species belonging to family Ctenizidae., 1species belonging to family Theridiidae., 1 species belonging to family Zodariidae.Table no. 1.

Thus family Salticidae is the most dominant family exploring 27% of species second leading family is Araneidae with 23% of species, the third most diverse family is Lycosidae with 16% of species, family Pholcidae represents 11% of species, families Agelenidae, Theraphosidae and Tetragnathidae exhibit 4% of species, family Ctenizidae ,Theridiidae and Zodariidae display 2% each of the total species diversity. And the samples of 10 families with 43 species are 2,10,1,7,5,12,2,2,1,1 the Shannon Wiener diversity index and Evenness for these sample values are, Shannon diversity index (H) = 1.93 Evenness = 0.83

Table no 1- Number of genera and species of spiders families from Indapur Tehsil,(Ujani backwater region) Pune, Maharashtra, India.

Sr. No	Families	No. of Genus	No. of Species
1	Agelenidae	02	02
2	Araneidae	06	10
3	Ctenizidae	01	01
4	Lycosidae	05	07
5	Pholcidae	03	05
6	Salticidae	11	12
7	Tetragnathidae	02	02
8	Theraphosidae	02	02
9	Theridiidae	01	01
10	Zodariidae	01	01

Statistical analysis

Shannon Wiener Diversity Index

H = - SUM [(Pi)* In (pi)] E = H/H max

Where,

SUM = Summation Pi = number of individuals of species I/ Total number of species

S = Number of species or species richness

H max = Maximum diversity possible

E = Evenness = H/H max

The samples of 10 families with 43 species are 2,10,1,7,5,12,2,2,1,1 the Shannon Wiener diversity index and Evenness for these sample values are,

Shannon Wiener diversity index and Evenness i

Sum = 2,10,1,7,5,12,2,2,1,1 = 43

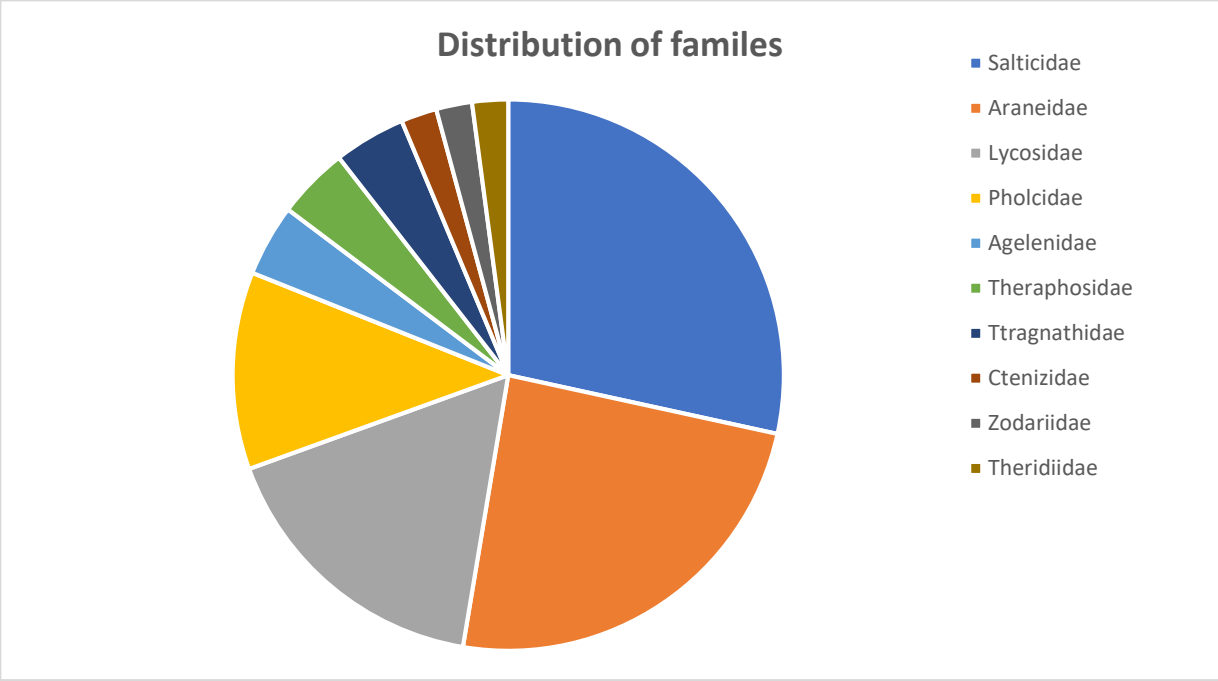
Sample Values (S) = 43 number of species (N) = 10

Sr no	No. of samples	Pi=Sample/Sum	ln (Pi)	Pi x ln (Pi)	% of family
1	02	0.0465	-3.0683	-0.1426	04
2	10	0.2325	-1.4588	-0.3391	23
3	01	0.02325	-3.7614	-0.0874	02
4	07	0.1627	-1.8158	-0.2954	16
5	05	0.1162	-2.1524	-0.2501	11
6	12	0.2790	-1.2765	-0.3561	27
7	02	0.0465	-3.0683	-0.1426	04
8	02	0.0465	-3.0683	-0.1426	04
9	01	0.02325	-3.7614	-0.0874	02
10	01	0.02325	-3.7614	-0.0874	02
	Sum= 43			**H=1.93**	

H max = ln(N) = ln (10) = 2.30 Evenness = H/Hmax = 1.93/2.30 = 0.83

Shannon diversity index (H) = 1.93, Evenness = 0.83

Fig.1.Percentage of family wise distribution.



List of spider species recorded during the study

Family- Agelenidae (Funnel web spider)

- *Agelenopsis pennsyvanica* (C.L. Koch,1843)
- *Tegenaria domestica* (Clerck,1757)

Family- Araneidae (Orb weavers)

- *Agriope anasuja* (Thorell,1887)
- *Agriope aurantia* (Lucas,1833)

- *Neoscona nautica* (C.L. Koch,1875)
- *Neoscona crucifera* (Lucas,1839)
- *Cryotophora citricola* (Stoliczka,1869)
- *Agriope pulchela* (Thorell,1881)
- *Cyclosa hexatuberculata* (Tikadar,1982)
- *Neoscona sanghi* (Gajbe,2004)
- *Nephila pilipes* (Fabricius,1793)
- *Aranea lobate* (Pallas,1772)

Family- Ctenizidae (Trapdoor spiders)

- *Cteniza sauvagesi* (Thorell,1887)

Family- Lycosidae (Ground runner)

- *Hipassa* sps.1
- *Perdosa brimanica* (Simon,1884)
- *Perdosa mukundi* (Tikadar and Malhotra,1980)
- *Lycosa prolifica* (Picock,1910)
- *Rabidosa rabita* (Walckenar,1837)
- *Acantholycosa baltoria* (Caporiacco,1935)
- *Hipassa partita* (Tikadar,1970)

Family- Pholcidae (Space builders)

- *Pholcus phalangioides* (Fussli,1775)
- *Crossopriza lyoni* (Blackwall,1900)
- *Pholcus lyoni* (Blackwall,1867)
- *Smeringopus lyoni* (Thorell,1895)
- *Crossopriza pristina* (Simon,1890)

Family- Salticidae (Stalkers)

- *Plexippus paykulli* (Audouin,1826)
- *Platycryptus undatus* (de Geer,1778)
- *Hyllus gigianteus* (C.L. Koch,1846)
- *Myrmarachene melanocephala* (MacLeay,1839)
- *Hasarius adansoni* (Audouin,1826)
- *Menemerus bivittatus* (Dufour,1831)
- *Hyllus semicupreus* (Simon,1895)
- *Colonus sylvanus* (Hentz,1846)
- *Salticus scenicus* (Clerck,1757)
- *Marpissa muscosa* (Clerck,1757)
- *Attulus distinguendus* (Simon,1868)
- *Phidippus insignarius* (C.L. Koch,1846)

Family- Tetragnathidae (Orb weavers)

- *Metellina mengei* (Backwall,1870)
- *Leucauge celebesiana* (Walckenaer,1842)

Family- Theraphosidae (Orb web builders)

- *Brachypelma klaasi* (Thorell,1869)
- *Poecilotheria regalis* (Pocock,1899)

Family- Theridiidae (Space builders)

- *Parastratoda tepidarionum* (C.L. Koch,1841)

Family- Zodariidae (Ground runners)

- *Mallinella fulvipes* (Ono and Tanikawa,1990)

CONCLUSION

Ujani backwater region Indapur Tehsil,Dist-Pune, Maharashtra, India is rich in spider diversity. This study serves as a baseline for future study of spiders in these ecosystems. But further study is required to confer. This study was conducted only for six months. So seasonal variation in diversity and abundance of spider fauna will needed to be studied. It also emphasizes the need for conservation of this ecosystem by characterizing species diversity and highlighting rare and endemic species in this ecosystem.

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