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Species Diversity of Spiders from Bidhuna Tehsil of Auraiya District, Uttar Pradesh, India

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Abstract: A total of 37 species of spiders belonging to 12 families and 27 genera were recorded in the Bidhuna tehsil of district Auraiya, Uttar Pradesh, India during the present study. Among them, the family Araneidae included almost half of the species (46.94%) followed by Salticidae (12.24%) and rest of the families comprised less than 10% of the species. This is the first attempt to report the spider assemblages from one of the southwestern district of Uttar Pradesh, India. Such surveys are vital for conservation of these creatures which are helpful for natural pest control and regarded as good indicators of habitat quality.

Keywords: Spiders, Araneae, Fauna report, Foraging guilds, Auraiya district

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Introduction

As a major predator group, spiders (Araneae: Arachnida), which feed on terrestrial arthropod communities, are one of the most abundant, diversified and omnipresent populations in both natural and agricultural habitats (Rodrigues *et al.*, 2016). Their role in natural control of insect pests in terrestrial ecosystems has been well documented by Sharma (2014) and Cotes *et al.* (2018). The position of order Araneae is seventh in global diversity of animals (Sharma *et al.*, 2020). The world spider catalog (WSC, 2022) took account of 49,853 species in 4,238 genera belonging to 131 families. India having a very rich biodiversity and a tropical climate with

biodiversity hotspots, has the best account, having 1893 species belonging to 484 genera and 60 families (Caleb and Sankaran, 2022), however, Singh and Singh (2021a) listed 2344 species described under 596 genera comprising 65 families, though in this list, several species were considered cases of misidentification by the authors. However, there exist many species in the wild and museums that still await description and classification. Despite recent research works on the diversity and distribution of spiders in India, their number is insufficient as compared to the other parts of the world.

For the sustainable management and

conservation of biodiversity of the animal species of any region of the world, their proper documentation is vital as it helps in monitoring the rate of loss of species. Preparation of checklist of species is an essential component of systematic documentation. Hence, in view of increasing intensity of anthropogenic threats to biodiversity, a cataloguing and appropriate documentation of biodiversity, especially on ignored groups like spiders, is most desirable (Singh and Singh, 2021b). Till to date, no account of any spider species from the Auraiya district and the districts bordering it is available, hence, inventory of spider species in Auraiya district (India) was made in the present paper.

Materials and Methods

Study site:

The study area is Bidhuna tehsil (26.8098° N, 79.4966° E) is one of three tehsils of Auraiya district of Uttar Pradesh, India (Fig. 1). There are 430 villages and 2 towns in Bidhuna Tehsil. Auraiya district is located in the south-western part of Kanpur division which has been carved out from Etawah district in 1997. North of Bidhuna lies district Kannauj, on the East Kanpur Dehat, on the west is district Etawah and on the south is tehsil Ajitmal and Auraiya of district Auraiya. Rivers Yamuna and Kunwari separate the district from Jalaun. The Bidhuna is the largest tehsil of Auraiya district and covers an area of 1,111 km² (54.1% of the total area of the district) of which 98.6% is rural area. It lies entirely in the Indo-Gangetic Plain. On the basis of factors like geology, soil, topography, climate and natural vegetation the district Auraiya has been divided into three regions: Arind-Ahneya Plain, Senger Plain and Chambal-Yamuna ravines. The major portion of Bidhuna tehsil is Arind-Ahneya Plain region. It is divided by water dividing line of the Arind river system. A very little part of the tehsil (part of Achhalda) also belong to Sengar Plain which mostly occupies most of the region of Auraiya, Phaphund, Babarpur Ajitmal, and Dibiyapur. Area under forest is insignificant and only few patches of small forests are spread all over the tehsil.

There are few parks, gardens and sanctuaries in Bidhuna tehsil. The climate of the region is humid subtropical. The winter season from mid November to February is followed by the summer season from March to mid June. The period from mid June to the end of September is the south-west monsoon season and the October and the first half of November constitute the post-monsoon season. Summer is very hot, temperature may reach up to 46 C while in winter it may drop to 3 C. More than 80% of the total annual rainfall is received during July to October. Different places of the tehsil were chosen for sampling in different habitats (Fig. 1).

Sampling methods:

Spiders were sampled in different habitat types, having different vegetations: grassland, rice field, road side, railway track, gardens, human dwellings etc. at several places in all the tehsils. Standard sampling protocols for spider collection were adopted in different selected sampling spots. The detailed descriptions of the collection techniques (Sharma and Singh, 2018a, b) are as follows:

(i) *Using sweep net:* The foliage spiders from low level vegetation of shrubs (up to 2 m in height) were sampled by this method. The sweep net consisted a 90 cm handle; 40 cm ring and the collection were poured on white canvas. The net was emptied at regular intervals to avoid loss and destruction of the specimen. During collection sweep net was moved back and forth to cover all ground layer herbs and shrubs till all vegetation in the sampling plots were swept thoroughly.

(ii) *Ground hand collection:* This method of sampling was used to collect the spiders, which were found to be visible in the ground, litter, in broken logs, etc.

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

(iv) *By beating vegetation:* The spiders were collected by beating the vegetation with a stick and collecting the samples on a cloth. The method

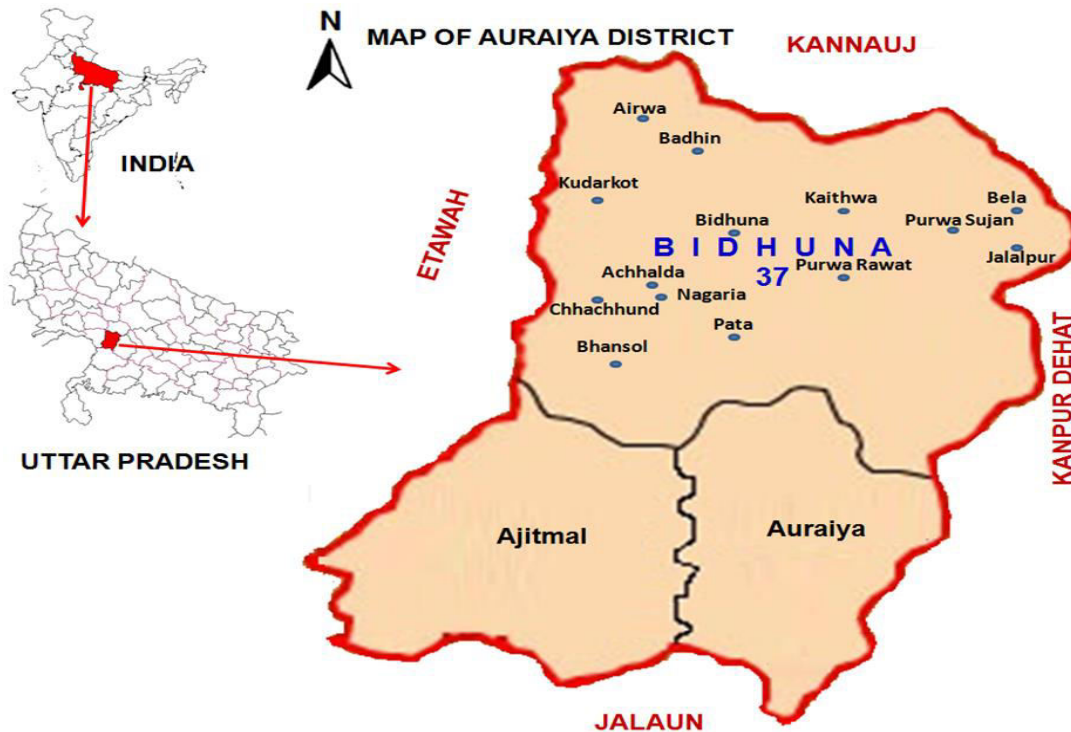


Fig. 1: Number of species of spiders recorded at different places in Bidhuna tehsil of Auraiya district, Uttar Pradesh (not on scale).

was used to sample spiders living in the shrub, high herb vegetation, bushes, and small trees and branches.

(v) *Litter sampling*: Litter sampling involved sorting of spiders from the litter collection tray.

(vi) *By using aspirator*: Small spiders were captured by placing an aspirator above or near the spider and sucking it up with mouth.

(vii) *Pitfall traps*: These traps were commonly used for the collection of ground-dwelling spiders.

Web pattern and habitat types were recorded with every encounter. The collected spiders were placed separately in vials with 70% ethyl alcohol for further taxonomic treatment. The collection date, site and habitat were recorded for each sample.

Identification:

The adult spiders were identified using available literatures such as Tikader (1980, 1982, 1987), Tikader and Malhotra (1980), Barrion and Litsinger (1995) etc. and subject experts. Some of

the immature stages could not be identified and ignored. The specimens that could not be identified up to species level were excluded from the list.

Results and Discussion

Several hundreds of individuals of spiders belonging to 49 species under 27 genera and 12 families were collected from the different areas of Auraiya district, Uttar Pradesh, India. Table 1 displays the species diversity of the collected spiders. Out of 12 families of spiders recorded, Araneidae included less than half of the species (43.24%) followed by Salticidae and Tetragnathidae (10.84% each) and rest of the families consisted less than 10% of the species. All the recorded species were not represented at all places in the Bidhuna tehsil. 7 species were observed in all the tehsils of Auraiya district, however, *Crossopriza lyoni* (Blackwall, 1867) and *Pholcus phalangioides* (Fuessli, 1775) were very common in houses. Most of the species were collected from bushes, field crops and roadside

Table 1: List of spider diversity of at different places of Bidhuna tehsil of Auraiya district, Uttar Pradesh

Family/Species	Locations
1. Araneidae	
1. <i>Araneus diadematus</i> Clerck, 1757	Airwa, Badhin, Bidhuna
2. <i>Argiope pulchella</i> Thorell, 1881	Achhalda, Airwa, Bidhuna, Kudarkot
3. <i>Argiope catenulata</i> (Doleschall, 1859)	Badhin, Bhansol, Jalalpur, Pata
4. <i>Argiope anasuja</i> Thorell, 1887	Airwa, Bela, Chhachhund, Kaithwa, Pata
5. <i>Argiope aemula</i> (Walckenaer, 1842)	Achhalda, Bhansol, Bidhuna
6. <i>Cyclosa bifida</i> (Doleschall, 1859)	Badhin, Bidhuna, Nagaria
7. <i>Cyclosa mulmeinensis</i> (Thorell, 1887)	Airwa, Badhin, Jalalpur, Purwa Rawat
8. <i>Cyrtophora citricola</i> (Forskål, 1775)	Badhin, Bhansol, Nagaria
9. <i>Eriovixia excelsa</i> (Simon, 1889)	Achhalda, Bidhuna, Purwa Rawat
10. <i>Gasteracantha diadesmia</i> Thorell, 1887	Airwa, Badhin, Jalalpur
11. <i>Gasteracantha hasselti</i> C. L. Koch, 1837	Bhansol, Bidhuna, Kaithwa
12. <i>Gea subarmata</i> Thorell, 1890	Badhin, Bidhuna, Pata, Purwa Rawat
13. <i>Neoscona molemensis</i> Tikader & Bal, 1981	Badhin, Bidhuna, Nagaria
14. <i>Neoscona nautica</i> (L. Koch, 1875)	Achhalda, Airwa, Bela, Pata
15. <i>Nephila pilipes</i> (Fabricius, 1793)	Badhin, Bidhuna, Chhachhund, Kudarkot
16. <i>Parawixia dehaanii</i> (Doleschall, 1859)	Achhalda, Bidhuna, Kaithwa
2. Clubionidae	
17. <i>Clubiona drassodes</i> O. P.-Cambridge, 1874	Airwa, Badhin, Jalalpur
3. Gnaphosidae	
18. <i>Urozelotes rusticus</i> (L. Koch, 1872)	Achhalda, Airwa, Bidhuna, Purwa Rawat
4. Hersiliidae	
19. <i>Hersilia savigny</i> Lucas, 1836	Badhin, Bhansol, Jalalpur, Purwa Rawat Purwa Sujan
5. Lycosidae	
20. <i>Lycosa mackenziei</i> Gravely, 1924	Airwa, Badhin, Jalalpur,
21. <i>Pardosa pseudoannulata</i> (Bösenberg & Strand, 1906)	Achhalda, Bidhuna, Nagaria
22. <i>Wadicosa fidelis</i> (O.P.-Cambridge, 1872)	Badhin, Bela, Pata, Purwa Sujan
6. Oxyopidae	
23. <i>Oxyopes javanus</i> Thorell, 1887	Bidhuna, Kaithwa, Purwa Sujan
24. <i>Oxyopes shweta</i> Tikader, 1970*	Bela, Bhansol, Kaithwa, Pata
7. Pholcidae	
25. <i>Crossopriza lyoni</i> (Blackwall, 1867)	Achhalda, Bela, Chhachhund, Bhansol Jalalpur, Kudarkot, Kudarkot, Nagaria Pata, Purwa Sujan
26. <i>Pholcus phalangioides</i> (Fuessli, 1775)	Badhin, Bela, Bhansol, Kudarkot, Jalalpur Pata, Purwa Sujan
8. Salticidae	
27. <i>Hasarius adansonii</i> (Audouin, 1826)	Airwa, Badhin, Kaithwa, Nagaria
28. <i>Myrmarachne melanocephala</i> MacLeay, 1839	Bidhuna, Chhachhund, Purwa Sujan
29. <i>Plexippus paykulli</i> (Audouin, 1826)	Badhin, Bhansol, Purwa Rawat
30. <i>Plexippus petersi</i> (Karsch, 1878)	Airwa, Bela, Jalalpur, Pata
9. Sparassidae	
31. <i>Heteropoda venatoria</i> (Linnaeus, 1767)	Airwa, Badhin, Kaithwa, Purwa Sujan

Family/Species	Locations
10. Tetragnathidae	
32. <i>Leucauge decorata</i> (Blackwall, 1864)	Badhin, Bela, Chhachhund, Kudarkot
33. <i>Tetragnatha javana</i> (Thorell, 1890)	Achhalda, Bidhuna, Nagaria
34. <i>Tetragnatha mandibulata</i> Walckenaer, 1842	
35. <i>Tetragnatha maxillosa</i> Thorell, 1895	Airwa, Badhin, Kaithwa
11. Theridiidae	
36. <i>Molione triacantha</i> (Thorell, 1892)*	Airwa, Bela, Pata, Kudarkot
12. Thomisidae	
37. <i>Camaricus formosus</i> Thorell, 1887	Achhalda, Airwa, Chhachhund, Purwa Sujaan

shrubs. Before this study, no work was carried out about the species diversity of spiders in the Auraiya and its neighboring districts (Singh and Singh, 2022). No spider species was observed new for the state and all the 37 spider species recorded herewith were also recorded in other districts of Uttar Pradesh, viz. Agra (Lawania and Mathur, 2014a, b); Gonda (Singh *et al.*, 2021); Gorakhpur, Kushinagar, Deoria (Singh and Singh, 2014); Lakhimpur Khiri (Hore and Uniyal, 2008a, b, c; Uniyal and Hore, 2009); Lucknow (Kumar *et al.*, 2017a); Mathura (Lawania and Mathur, 2014c); Mehrajganj and Siddharthnagar (Sharma and Singh, 2018a, b); and Unnao (Kumar *et al.*, 2017b).

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