Life Science Informatics Publications
Research Journal of Life Sciences, Bioinformatics, Pharmaceutical and Chemical Sciences
Journal Home page http://www.rjlbpcs.com/
RJLBPCS
ISSN 2454-6348

Original Research Article **DOI: 10.26479/2018.0404.34**

SPECIES DIVERSITY AND GUILD STRUCTURE OF SPIDERS FROM SIDDHARTHNAGAR, UTTAR PRADESH, INDIA

Akhilesh Sharma, Rajendra Singh

1.Department of Zoology, S.P.P.G. College, Shoharatgarh, Siddharthnagar, India.

2. Department of Zoology, D.D.U. Gorakhpur University, Gorakhpur, India

ABSTRACT: A total of 62 species of spiders belonging to 36 genera and 12 families were recorded in the district Siddharthnagar, U.P. during the study. Among them, the family Araneidae includes almost half of the species (45.2%) followed by Salticidae (12.9%) and rest of the families consist of less than 10% of the species. The guild structure of the spiders reveals following 6 kinds: Orb weaver, stalkers, ground runner, foliage runner, space builder and ambushers. Most of the spiders (54.9%) are orb weavers followed by stalkers (10%), ground runner (7%), space builder (5%), foliage runner (4%) and ambushers (2%). This is the first attempt to report the spider assemblages and their microhabitat preferences from northeastern, Uttar Pradesh, India. Ten species were reported for the first time from Uttar Pradesh while one species *Argiope luzona* (Walckenaer, 1841) was recorded for the first time from 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, Siddharthnagar.

Corresponding Author: Prof. Dr. Rajendra Singh* Ph.D.

Department of Zoology, D.D.U. Gorakhpur University, Gorakhpur, India.

Email Address: rsinghgpu@gmail.com

1. INTRODUCTION

As a major predator group, spiders, which feed on terrestrial arthropod communities, are one of the most abundant, diversified and omnipresent populations in both natural and agricultural habitats [1]. Role of spiders as biocontrol agents in terrestrial ecosystems have been well documented [2],[3]. The current world list of spider includes 46,386 species under 4,026 genera and 113 families [4]. India has over 1,700 species belonging to 450 genera under 61 families [4]. So far, in India, state

level checklists have not been compiled for all states which is crucial for the forest department to understand the wealth of biodiversity in their states [5], but there are several faunal studies in different localities of the country. More recently, spider fauna of following protected and unprotected areas in different states of India were studied : Andman and Nicobar Islands [6], [7], Andhra Pradesh [8], [9], Arunachal Pradesh [10], Assam [11], Bihar [12], Chhattisgarh [13], Goa [14], Gujarat [15], [16], Haryana [17], Jammu and Kashmir [18], Karnataka [19], [20], Kerala [21], [22], Madhya Pradesh [23], [24], Manipur [25], Meghalaya [26], Mizoram [27], Odisha [28], [29], Rajasthan [30], Sikkim [31], Tamil Nadu [32], Tripura [33], Uttar Pradesh [34], [35], Uttarakhand [36], [37], and West Bengal [38], 39]. Spiders are the least studied or understood fauna in relation to conservation and fragmentation of habitats in northeastern part of Uttar Pradesh, India. Hence, it was felt to explore spider diversity in this region.

2. MATERIALS AND METHODS

Study area is Siddharthnagar district that lies between 27°N - 27°28' N and 82°45' E to 83°10'E. It is part of Purvanchal. The district borders Nepal's Kapilvastu district on the north and Rupandehi district on the northeast. Otherwise, it is surrounded by other districts of Uttar Pradesh: Maharajganj on the east, Basti and Sant Kabir Nagar on the south, and Balrampur on the west. Siddarthnagar's area is 2,752 km^2 which is a part of Indo-Gangetic plain of northeastern Uttar Pradesh. The district has a climate which is more equable than that of the adjoining districts in the west and the northern climate is conditioned to some extent by the proximity of the hills in the north and the terai swamps. Meteorological parameters have been so distinct and have such regular impact that a year can be divided climatologically in to four seasons. 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. Spiders were sampled in different habitat types, having different vegetations: grassland, rice field, forest, road side, railway track, and garden, etc. and human dwellings. The sampling methods include a visual searching for the spiders as far distinct vision is possible. Ground search were done under leaf litter, fallen or dry wood. Sweep netting was done for the foliage dwelling spiders covering the herbs and shrubs. Beating trap was used with a wooden stick and an umbrella placed under the trees to catch the spiders which were unable to reach or seen hanging above. Web pattern and habitat type 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. Spiders were identified up to the species level using the identification keys provided [40], [41].

3. RESULTS AND DISCUSSION

Thousands of individuals of spiders belonging to 62 species under 36 genera and 12 families were collected from the different areas of Siddharthnagar Uttar Pradesh. Table 1 display the species diversity of the collected spiders. Among them, a total of 10 species marked with (*) were reported for the first time from Uttar Pradesh while one species, *Argiope luzona* (Walckenaer, 1841) was reported for the first time from India. Fig. 1 illustrates that out of 12 families of spiders recorded, Araneidae includes almost half of the species (45.2%) followed by salticidae (12.9%) and rest of the families consist of less than 10% of the species. The guild structure demonstrated 6 types : orb weaver, stalkers, ground runner, foliage runner, space builder and ambushers. Most of spiders (54.9%) are orb weavers followed by stalkers (10%), ground runner (7%), space builder (5%), foliage runner (4%) and ambushers (2%) (Fig. 2).

Table 1. List of spiders of Siddharthnagar, Uttar Pradesh

Family	Species
Araneidae	*Araneus ellipticus* (Tikader & Bal, 1981)
	Araneus mitificus (Simon, 1886)
	Argiope aemula (Walckenaer, 1842)
	Argiope anasuja Thorell, 1887
	Argiope catenulata (Doleschall, 1859)
	Argiope luzona (Walckenaer, 1841)♦
	Argiope pulchella Thorell, 1881*
	Cyclosa bifida (Doleschall, 1859)
	Cyclosa insulana (Costa, 1834)
	Cyclosa mulmeinensis (Thorell, 1887)
	Cyrtophora citricola (Forskål, 1775)
	Cyrtophora exanthematica (Doleschall, 1859)
	Eriovixia excelsa (Simon, 1889)
	Eriovixia laglaizei (Simon, 1877)
	Gasteracantha diadesmia Thorell, 1887
	Gasteracantha hasselti C. L. Koch, 1837*
	Gasteracantha kuhlii C.L. Koch, 1837
	Gea subarmata Thorell, 1890
	Larinia emertoni Gajbe & Gajbe, 2004
	Larinia phthisica (L. Koch, 1871)
	Neoscona dhruvai Patel & Nigam, 1994
	Neoscona molemensis Tikader & Bal, 1981

	Neoscona nautica (L. Koch, 1875)
	Neoscona theisi (Walckenaer, 1842)
	Nephila pilipes (Fabricius, 1793)*
	Nephilengys malabarensis (Walckenaer, 1842)
	Parawixia dehaanii (Doleschall, 1859)
	Poltys illepidus C. L. Koch, 1843
Clubionidae	*Clubiona drassodes* O. P.-Cambridge, 1874
	Clubiona japonicola Boesenberg & Strand, 1906
Gnaphosidae	*Urozelotes rusticus* (L. Koch, 1872)
Hersiliidae	*Hersilia clathrata* Thorell, 1895
Lycosidae	*Hippasa holmerae* Thorell, 1895
	Hippasa partita (O.P.-Cambridge, 1876)
	Lycosa mackenziei Gravely, 1924
	Pardosa birmanica Simon, 1884
	Pardosa pseudoannulata (Bösenberg & Strand, 1906)
	Pardosa sumatrana (Thorell, 1890)
Oxyopidae	*Oxyopes javanus* Thorell, 1887
	Oxyopes shweta Tikader, 1970*
Pholcidae	*Crossopriza lyoni* (Blackwall, 1867)
	Pholcus phalangioides (Fuessli, 1775)
Salticidae	*Harmochirus brachiatus* (Thorell, 1977)
	Hasarius adansoni (Audouin, 1826)
	Marengo crassipes (Peckham and Peckham,1892)*
	Myrmarachne orientales Tikader, 1973
	Plexippus calcutaensis (Tikader, 1974)
	Plexippus paykulli (Audouin, 1826)
	Plexippus petersi (Karsch, 1878)
	Stenaelurillus lesserti Reimoser, 1934*
Sparassidae	*Heteropoda venatoria* (Linnaeus, 1767)
Tetragnathidae	*Leucauge celebesiana* (Walckenaer, 1842)
	Leucauge decorata (Blackwall, 1864
	Tetragnatha ceylonica O.P. Cambridge, 1869*
	Tetragnatha javana (Thorell, 1890)
	Tetragnatha mandibulata Walckenaer, 1842
	Tetragnatha maxillosa Thorell, 1895
Theridiidae	*Dipoenura fimbriata* (Simon,1909)*

Molione triacantha (Thorell, 1892)*

Thwaitesia margaritifera (O.P. Cambridge,1881)*

Thomisidae *Camaricus formosus* Thorell, 1887

Mastira moneka (Tikader, 1963)

*Reported for the first time from Uttar Pradesh.

♦ Reported for the first time from India.

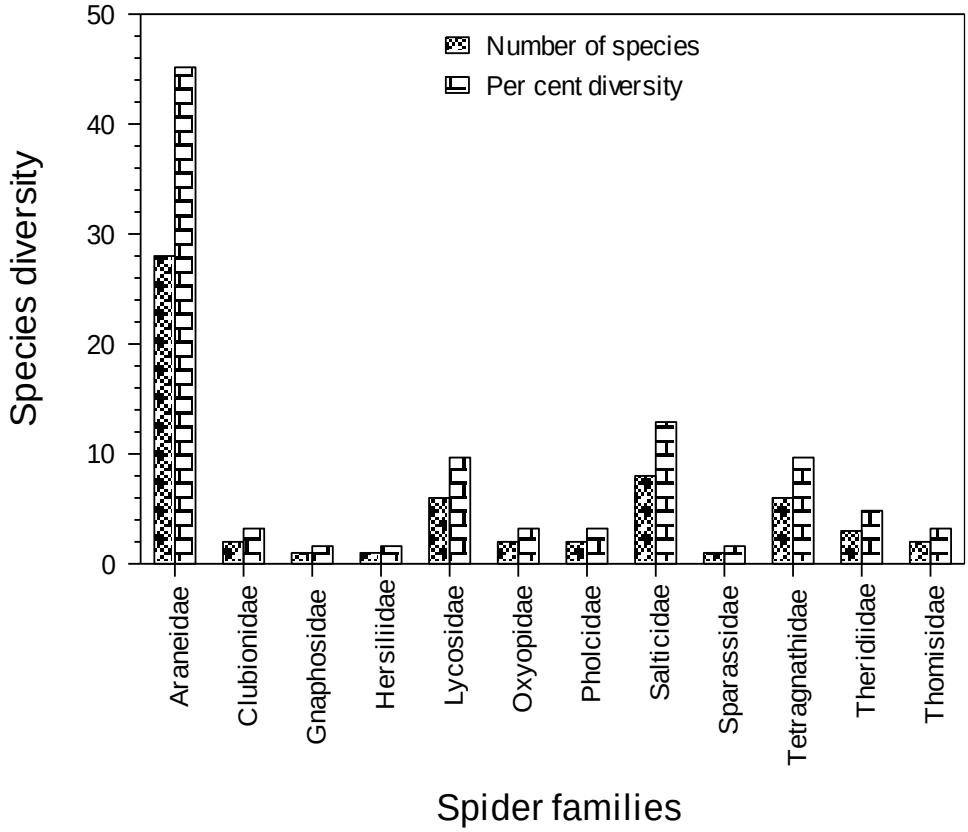

Fig. 1. Familywise species diversity of spiders recorded in Siddharthnagar district.

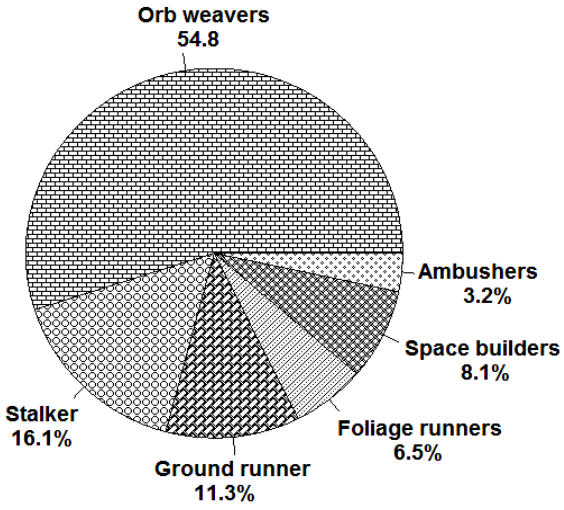

Fig. 2. The foraging guild structures of the spiders

4. CONCLUSION

Before this study, no work was carried out about the species diversity of spiders and their guild structure in Siddharthnagar district, Uttar Pradesh, India. A total of 62 species of spiders belonging to 36 genera and 12 families were recorded with six different types of guild structure: orb weaver, stalkers, ground runner, foliage runner, space builder and ambushers. Ten species were reported for the first time from Uttar Pradesh while one species *Argiope luzona* was recorded for the first time from India.

ACKNOWLEDGEMENT

The first author thanks the Principal, S.P.P.G. College, Shoharatgarh, Siddharthnagar for permission to carry out the present work.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

REFERENCES

1. Rodrigues ENL, Rodrigues PES, Mendonça MDs Jr. Spider species composition in the tree-shrub strata of riparian forests and its microhabitats in southern Brazil. Zoologia. 2016; 33(3): e20150102.
2. Sharma S. A study on spiders as predators in the agro ecosystems. Mun Ent Zool. 2014; 9(1): 80-83.
3. Cotes B, González M, Benítez E, De Mas, E, Clemente-Orta G, Campos M, Rodríguez E. Spider communities and biological control in native habitats surrounding greenhouses. Insects. 2018; 9(33): 1-12.
4. Platnick NI. World Spider Catalog. Version 19.0. Natural History Museum Bern, 2018. online at http://wsc.nmbe.ch.
5. Yadav A, Solanki R, Siliwal M, Kumar D. Spiders of Gujarat: a preliminary checklist. J Threat Taxa. 2017; 9(9):10697–10716.
6. Tikader BK. Studies on spider fauna of Andaman and Nicobar islands, Indian Ocean. Rec Zool Surv India. 1977; 72: 153-212.
7. Biswas B, Majumdar SC. Fauna of Tripura (Arachnida: Araneae). State Fauna Series. 2000; 7: 113-122.
8. Subba Reddy HR. Diversity of Megalomorphae spiders in Nallamala Forest, Andhra Pradesh, India. Int Res J Nat & Appl Sci. 2016; 3(5): 30-38.
9. Palem H, Kanike S, Purushottam VRS. Diversity of spider fauna (Arachnida: Araneae) in different ecosystems, Eastern Ghats, Southern Andhra Pradesh, India. South Asian J Life Sci. 2017; 4(2): 51-60.
10. Biswas B, Biswas K. Araneae: Spiders in Fauna of Arunachal Pradesh, State Fauna Series. Zool Surv India, Kolkata. 2006; 13(2): 491-518.

11. Chetia P, Kalita DK. Diversity and distribution of spiders from Gibbon Wildlife Sanctuary, Assam, India. Indian J Arachnol. 2012; 1(1): 130-142.
13. Kujur R, Ekka A. Exploring the spider fauna of Gomarda Wildlife Sanctuary, Chhattisgarh, India. Int Res J Biol Sci. 2016; 5(6): 31-36.
14. Pandit R, Pai IK. Spiders of Taleigao Plateau, Goa, India. J Environ Sci & Public Health USA. 2017; 1(4): 240-252
15. Siliwal M, Suresh B, Dhuru S, Pilo B. Spider diversity of riparian zone of river Vishwamitri, Gujarat. J Curr Sci. 2003; 3(2): 429–434.
16. Parmar BM, Patel KB. Jumping spiders (Araneae: Salticidae) of Satlasana Taluka. Int J Adv Engg Res & Sci. 2018; 5(3): 159-162.
16. Yadav M, Goswami TN, Anil, Ray SN. Species composition of spider-fauna in paddy ecosystem throughout the cropping period at Sabour, Bihar, India. Ecol, Environ & Conserv Paper. 2016; 22(2): 719-722.
17. Malik V, Goyal V. Biodiversity of spiders in different habitats of Western Haryana, India. J Entomoly & Zool Stud. 2017; 5(4): 822-825.
18. Khan AA, Rather AQ. Diversity and foraging behaviour of spider (Arachnida: Araneae) in the temperate maize ecosystem of Kashmir. J Biol Cont. 2012; 26 (2): 179-189.
19. Deshpande A, Paul R. Preliminary study on spiders of Gulbarga, Karnataka State. Int J Enviro, Agric & Biotechnol. 2016; 1(4): 680-686.
20. Jose AC, Sudhin PP, Prasad PM, Sreejith KA. Spider diversity in Kavvayi river basin, Kerala, southern India. Curr World Environ 2018;13(1): 100-112.
21. Adarsh CK, Nameer PO. Spiders of Kerala Agricultural University Campus, Thrissur, Kerala, India. J Threat Taxa. 2015; 7(15): 8288–8295.
22. Adarsh CK, Nameer PO. A preliminary checklist of spiders (Araneae: Arachnida) in Chinnar Wildlife Sanctuary, Western Ghats, India. J Threat Taxa. 2016; 8(4): 8703–8713.
23. Sharma S, Vyas A, Sharma R. Diversity and abundance of spider fauna of Narmada river at Rajghat (Barwani) (Madhya Pradesh) India. Researcher. 2010; 2(12): 113-117. Sildenafil
24. Shirbhate MV, Shirbhate AM. Diversity and distribution of spider fauna (Family: Araneidae) in and around Katepurna Sanctuary, Akola, India. Environ Conserv J. 2017; 18(3): 45-52.
25. Biswas B, Biswas K. Araneae: Spiders. In: Fauna of Manipur. State Fauna Series. Zool Surv India, Kolkata. 2004; 10: 25-46.
26. Biswas B, Majumder SC. Araneae: Spider. State Fauna Series-4 Fauna of Meghalaya Part 2. Zool Surv India, Kolkata. 1995; 93-128.
27. Biswas BK, Biswas K. Araneae: Spiders. In: Fauna of Mizoram, State Fauna Series. Zool Surv India, Kolkata. 2007; 14: 455-475.

28. Mallick JR, Dash S, Patnaik HP. Spider fauna of brinjal ecosystem in coastal Odisha. J Appl Zool Res. 2017; 28(2): 233-237.
29. De K, Palita SK. A checklist of spiders from six sacred groves in Southern Odisha, India. Serket. 2018; 16(1): 30-40.
30. Sivaperuman C, Rathore NS. Spiders in the Desert National Park. Faunal Ecology & Conserv Great Indian Desert. 2009; 49-52.
31. Tikader BK. Spider fauna of Sikkim. Rec Zool Surv, India. 1970; 64: 1-83.
32. Sugumaran, MP. Biodiversity of spiders in western ghats of Tamil Nadu, Ph.D. thesis, Tamil Nadu Agricultural University, Coimbatore, 2001.
33. Dey A, Debnath S, Debbarma B, Chaudhuri PS. A preliminary study on spider diversity from a house hold garden artificial mixed plantation in west Tripura, India. J Res Biol. 2013; 3:1009-1017.
34. De R. Management plan of Dudwa Tiger Reserve (2000-2001) to 2009-2010). Wildlife Preservation Organisation, Forest Department, Uttar Pradesh. 2001; pp. 407.
35. Singh BB, Singh R. Incidence and biodiversity of riceland spiders (Arthropoda : Arachnida) in northeastern Uttar Pradesh, India. Indo-Amer J Life Sci & Biotechnol. 2014; 2(1): 64-89.
36. Siliwal M, Molur S, Biswas BK. Indian Spiders (Arachnida: Araneae): Updated checklist. Zoos' Print J. 2005; 20(10): 1999-2049.
37. Uniyal VP, Sivakumar K, Quasin S. Diversity of spiders in Nanda Devi Biosphere Reserve. Wildlife Institute of India, Dehradun 2011; 1-199.
38. Majumder SC. A new species of wolf spider (Araneae : Lycosidae) from crop fields of the Sunderban Estuary, West Bengal, India. J Bomb Nat Hist Soc. 2004; 101: 121-123.
39. Majumder SC. Studies on spider fauna of coastal region of India: description of two new species of *Pardosa* Koch (Araneae : Lycosidae) from the coastal region of Sunderbans, West Bengal (Part-1). Rec Zool Surv, India. 2004; 102: 97-103.
40. Tikader BK. Handbook of Indian spiders. Zoological Survey of India, Calcutta, India. 1987.
41. Barrion AT, Litsinger JA. Riceland Spiders of South and Southeast Asia. CAB International, Wallingford, UK 1995; pp xix + 700.