

SURVEY OF SPIDER DIVERSITY IN TEHSIL TANGMARG, DISTRICT BARAMULLA, KASHMIR

Malik Irshad and V. T. Tantarapale

P.G. Department of Zoology, Vidya Bharati Mahavidyalaya, Amravati.
malikirshad236@gmail.com

Abstract

The current study provides a thorough investigation of the diversity of spiders in the Tangmarg District, J&K. The study focusses on the ecological subtleties, behavioural patterns, and current challenges. A checklist of spider from Tangmarg Tehsil, District Baramulla is provided which indicate occurrence of various spider species. Total 25 species were recorded in selected region. Out of 25 species, Salticidae were most commonly found, followed by Lycosidae and Pholcidae. The checklist includes Taxa that have been identified up to species level. The present study was conducted in month from March to July. Samples were collected for photography from four different sites.

Introduction

Spiders are air-breathing arthropods with eight legs and chelicerae, which are fangs that inject venom. They belong to the order Araneae. Among all the groups of creatures, they are the biggest order of arachnids and rank sixth in terms of overall species diversity. With a history spanning over 350 million years, spiders are incredibly old creatures. Almost all ecosystems have them in large quantities, making them a crucial element of the world's biodiversity. Because they are only predators and hence preserve ecological balance, spiders have a huge ecological function to perform. All spider is a predator, and insects are their main food source (Turnball, 1973). Biodiversity is diversity among the animals and plants. India is hotspot for biodiversity with its rich flora and fauna. Spiders belong to class Arachnida. Spiders are extremely selective and sensitive about their environment, including habitat diversity, microclimate and litter distribution. With about 34000 recognised species, spiders are widespread and diversified and make up one of the biggest invertebrate faunas in any given area. They are diverse and occupied all over the world except Antarctica, Except for the air and sea, they are suited to all habitats. The presence of carapace on Dorsal side of cephalothorax is most significant characteristic of spiders. Spiders have fangs also known as Chelicerae which are used to s piercing device for injecting venom. They are diverse in colour and size. The old skin is replaced with new one which increases size. They are useful for pest control, as they protect crop from pests. In both cultivated and natural settings, spider populations are abundant. The average annual abundance of spiders in these settings is between 50 and 150 individuals per square metre, however they can occasionally reach maximal densities of over 1000 individuals per square metre (Pearse, 1946; Duffey, 1962; Weidemann, 1978; Nyffeler, 1982). Spiders come into sight to be good subject for studying biodiversity patterns (Platnick, 1999) as

their allocation and amount is strongly influenced by habitat structure and vegetation parameters (Greenstone, 1984; Uetz, 1991; Wise, 1993; The present study was carried out in selected regions of Baramulla District, as there has been no study conducted on the spider fauna in this region. This study is probably going to be the first baseline data of this kind for the spider fauna in some area of Tangmarg which will, reinforce more research in this field in this region and, on the other, aid in evaluating the state of spider diversity in this area.

Material and Method

The sampling technique was carried out in three times, including morning, afternoon and evening shift. The present study was conducted in months from October to April. The spiders were photographed and released into natural environment. The following techniques were used for collection and identification of spiders.

1. Visual search: simply by walking and searching habitats of spiders, their webs or retreats (curled leaves, silken cases) house walls, basement and building, which are grounds for spider haunting.

2. Sweeping method: A heavy insect net is used to comb through the tall grass or soft plants. After a few sweeps, empty the contents onto flat sheet, to capture the spiders. This is one of the easiest and most effective ways to catch active hunters.

3. Beating method: Inverted open umbrella is kept under a bush or the low branches of tree. Grab the branches and shaking them vigorously. Spiders will be dislodged from their location that is from branches/leaves and will fall into the umbrella. In wet conditions, sweeping and beating techniques do not work well.

4. Pitfall trapping method: This effective method is for capturing ground-living spiders. Any container with smooth sides buried within the ground surface will work. Some peoples use funnel at the top of the container. Place a second cup

inside the pit, so that the contents can be removed without disturbance to the edge of the pit. If a lip or a ridge detected by a spider, it is likely to walk around rather than fall into the trap.

5. Litter Sampling: By wearing gloves, collect a large amount of litter of leaf and place them over a large funnel that is fitted with 1-to-6-inch hardware-cloth or wire screen. Bright light is suspended over the top of the leaf litter. The small organisms will migrate down. As the pile of leaves dries out and eventually fall through the funnel into the cup filled with alcohol.

Photography and identification: Freshly collected specimens were anaesthetized with ether and then placed on a slide or leaf and photographed immediately. The data and location of collection were noted and the other morphological features were observed clearly and noted. All Spiders specimens were identified referring the taxonomic keys for Indian spiders. After taking the photograph of spiders collected, they were released into their natural habitat.

Species diversity Indices: The species diversity is estimated using Shannon – wiener, (1949) as

$$H' = - \sum_{i=1}^{i=s} \left[\frac{n_i}{N} \right] \log_e \left[\frac{n_i}{N} \right]$$

H' = Index of species diversity

n_i = Density of one species

N = Density of all the species

e = Base of natural logarithm $\log_e \left[\frac{n_i}{N} \right] = 2.303 \log_{10} \left[\frac{n_i}{N} \right]$

$\sum_{i=1}^{i=s}$ = Addition of the expression for values of i = 1 to i = S

Observation and Result: This study was conducted in the Tangmarg tehsil of the district Baramulla. The district is situated in the northern part of the state of Jammu and Kashmir. An evergreen forest covers most of this country, and it is in this area that the widest variety of spider species may be found. I have found a few species in this area which are reported first time from the Kashmir, which is one of the reasons I chose it for my study.

The area which was under study is Tangmarg tehsil. The Tangmarg is located between 34.03-19.80" N latitude and 74.25-16.79"E longitude whereas the altitude shows variations from 5,320 feet to 7073 feet above the sea level. The area of this tehsil has recorded as much as 111 sq. km. the area is covered with various apple, cherry gardens, lush green forests and crop fields. About 90 % of population of the area mostly depends on the agriculture and tourism. The study is carried out in month of March to July. samples were collected for photography from four different sites.

Sample collection: The pitfall trapping, beating, and sweeping methods were used to gather the samples. Spiders of the families Araneidae, Salticidae, Oxyopidae, Lycosidae, Gnaphosidae, and Thomisidae can be readily gathered by employing the several techniques.

Identification: The genitalia were used for identification. It is therefore considered unfeasible to identify juvenile spiders to the species level because sexual traits are necessary for species-level identification (Edwards, 1993). It is also feasible to identify and classify the different body parts based on their morphometric properties.

Table 1: Number of individuals found at different sites of tehsil Tangmarg, Baramulla, Kashmir.

Sr. No	Name of the Species	No. of Individuals at site 1	No. of individuals at site 2	No. of Individuals at site 3	No. of Individuals at site 4
01	<i>Tegenaria parietina</i>	18	12	10	08
02	<i>Tegenaria domestica</i>	13	09	08	06
03	<i>Pardosa vancouveri</i>	20	14	12	04
04	<i>Herpyllus ecclesiasticus</i>	25	18	14	09
05	<i>Pardosa amentata</i>	28	21	16	11
06	<i>Pisaura mirabilis</i>	14	11	09	02
07	<i>Frontinellina frutetorum</i>	16	12	11	08
08	<i>Oxyopes salticus</i>	13	09	07	01
09	<i>Urozelotes rusticus</i>	08	04	03	01
10	<i>Habronattus hirsutus</i>	12	09	04	01
11	<i>Argiope keyserlingi</i>	11	07	05	01
12	<i>Tibellus maritmus</i>	10	04	08	02
13	<i>Tetragnatha sp.</i>	11	08	06	04
14	<i>Menemerus nigli</i>	16	07	05	03
15	<i>Hasarius adansoni</i>	13	08	04	06
16	<i>Thomisus onustus</i>	11	05	06	02

17	<i>Epocilla aurantiaca</i>	14	09	04	01
18	<i>Ozyptila practicola</i>	09	06	08	07
19	<i>Lycosa sp.</i>	11	05	09	03
20	<i>A. lignaria</i>	08	06	02	04
21	<i>Plexipus paykulli</i>	14	08	11	03
22	<i>Pholcus phalangiodes</i>	12	06	04	02
23	<i>Crossopriza lyoni</i>	14	08	07	07
24	<i>Pardosa sp.</i>	18	06	08	02
25	<i>Argiope aemula</i>	09	04	02	04

Table 2: Shannon-Wiener Diversity Index of Species of tehsil Tangmarg, District Baramulla, Kashmir.

Species diversity index	At site 1	At site 2	At site 3	At site 4
Shanon-Wiener index	3.16	3.07	3.09	2.99

Discussion

Twelve families were spotted from Tangmarg tehsil, out of the 59 families recorded from the Indian region. This accounted for 20.69% of all Indian families that have been documented. There are 377 genera in the Indian subcontinent. Of these, 23 genera were also found in the district Baramulla's tehsil Tangmarg (J&K). Affinities the spider fauna bears affinities with Pantropical, Palearctic, Holarctic, Palearctic and Cosmotropical regions. Araneus (Araneidae) shows Palaearctic affinities and (Salticidae) Araneidae bears affinities with Cosmotropical region. Non-phylogenetic groups of species known as guilds share one or more valuable resources (Cardoso et al., 2011). In 1967, the term "guild" was first used to refer to a group of species in a community that had a similar role (Cardoso et al., 2011). Guilds cover all sympatric rival species, irrespective of their taxonomic affiliation. The more potential niches for a functionally diverse suite of fauna are likely to support a greater range of food webs than less complex habitats as result of heterogeneity of the vegetation structure. Relative humidity appears to crucial factor as reported by Kaston (1978) for spiders in general, as in the current study we also found species diversity was found to be more at moist places.

Conclusion

The results of the current study, locations with high moisture content all year round were found to have the highest concentration of species. In the district of Baramulla, tehsil Tangmarg registered a total of twenty-five species. Salticidae, the most frequently found of the twenty-five species, followed by Lycosidae and Pholcidae. They consume pests, spider species serve as biological pest control. The present study aims to provide insight on the function of spiders in sustaining the population of pests. The information will help farmers control the number of pests in the ecosystem. Much more research is still needed on the diversity of spiders in Kashmir, particularly in Tangmarg Tehsil.

References

- Buddle, C. M., Spence, J. R. and Langor, D. W. 2000. Succession of boreal spider assemblages following wildfire and harvesting. *Ecography*, 23:434–436.
- Carvalho J. C., Cardoso P., Crespo L. C., Henriques S., Carvalho, R. and Gomes P. (2011). Biogeographic patterns of spiders in coastal dunes along a gradient of mediterraneity. *Biodiversity and Conservation*, 20: 873-894.
- De Souza, A.L.T. and Martins, R.P. 2004. Distribution of plant-dwelling spiders: Inflorescences versus vegetative branches. *Austral Ecology*, 29:342–349
- Duffey, E. 1962. A population study of spiders in limestone grassland. *J. Anim. Ecol.*, 31: 571–599.
- Edwards, C. A., Butler, C. G. and Lofty, J. R. 1976. The Invertebrate fauna of the park grass plots II. Surface fauna Rep. Rothamst. *Exp. Stn.* 1975, Part2:63–89.
- Edwards, R. L. 1993. Can species richness of spiders be determined. *Psyche.*, 100: 185-208.
- Greenstone, M. H. 1984. Determinants of web spider species diversity: Vegetation structural diversity vs. prey availability. *Oecologia*, 62: 299–304.
- Kaston, B. J. (1978). How to Know the Spiders, 3rd-ed. Wm. C. Brown Co., Dubuque, Iowa, 272 pp. Recent bites by spiders other than Latrodectus and Loxoceles. *California Vector Views*, 25:25-27.
- Kaston, B. J. 1978. How to know spiders? The pictured key Nature series. Wm. C. Brown. Co. Publishers. Dubuque, Iowa, USA: 1-272.
- Nyffeler, M. 1982. Field studies on the ecological role of the spiders as insect predators in agro ecosystems abandoned grassland, meadows and cereal fields. Ph. D. thesis, Swiss Federal Institute of Technology, Zurich.

11. Pearse, A. 1946. Observations on the microfauna of the Duke forest. *Ecol. Monogr.*, 16: 127–150.
12. Platnick, N. I. 1999. Dimensions of biodiversity: targeting megadiverse groups. 33–52. In Cracraft, J. and F. T. Grifo, editors. *The Living Planet in Crisis: Biodiversity Science and Policy* Columbia University Press. New York.
13. Turnbull, A. L. 1973. Ecology of the true spiders (Araneomorphae). *Ann. Rev. Entomol.*, 18 305-348.
14. Uetz, G. W. 1991. Habitat structure and spider foraging. 325–48. In McCoy., Ed., S. S. Bell, and H. R. Mushinsky, editors. *Habitat*
15. Weidemann, G. 1978. Ueber die Bedeutung von Insekten im Oekosystem Laubwald. *Mitt. Naturforsch. Ges. Schaffhausen*, 15: 1–35
16. Wise, D. H. 1993. *Spiders in ecological webs.* University Press. Cambridge, UK. 342