

SPATIAL DIVERSITY OF SPIDERS OF ROSE GARDEN, RAIGARH, CHHATTISGARH, INDIA

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ABSTRACT

Chhattisgarh is endured with rich flora and fauna. Diversity of spider fauna had been documented from Indravati Tiger Reserve (Jagdalpur) and research projects in Raipur district is ongoing by ZSI (Zoological Survey of India), Raigarh area of Chhattisgarh state is still untouched, and there is no single information available on documentation of spider diversity. Hence, present study was carried out in Rose Garden, located at (21° 54' N - 21.9° N / 83° 24' E - 83.4° E) Raigarh city, Chhattisgarh, India. Arachnids are an essential poorly studied group of arthropods that play a major role in the regulation of other invertebrate populations in most ecosystems. Spiders represent the second trophic level of consumers in food webs and take part in herbivore and detritivore food webs. As spiders make use of extensive variety of niches, to collect samples, sampling has to be done in all habitats of study area. During this study sweep netting, aerial hand collection, vegetation beating, ground hand collection, litter sampling were used as collection techniques. After collection samples were preserved in 70% alcohol. Identification of spiders was done according to their morphology, and their reported characteristics as given in literatures. Total 20 species of spiders belonging to 13 genera distributed in 6 families were reported from study sites of Raigarh city, some of the species identified as *Araneamitifica*, *Cyclosa bifida*, *Xysticus minutus* etc. From this preliminary study it is concluded that, Raigarh is rich in diversity of spider fauna. Databases of present study will provide documentation for further research work in Raigarh, Chhattisgarh, India.

Keywords: Arachnida, Chhattisgarh, Ecosystem, Raigarh, Spider fauna

I INTRODUCTION

Spider attracts attention, because of their fascinating biology. They represent class Arachnida under Phylum Arthropoda. They are widespread and abundant group in nature (Wilder, 2011) also found on all type of terrestrial habitats (Warui, 2004). They participate in maintaining biological balance of nature by regulating population of insects in agricultural as well as in natural ecosystem (Wise 1993). They can also be used as biological indicators to evaluate the fitness of an ecosystem because they can be easily acknowledged and are differentially responsive to

natural as well as anthropogenic disturbances (Pearce and Venier, 2006) like grazing pressure (Warui, 2004). Spider webs are also very useful indicators of environmental chemistry (Hose *et.al.* 2002).

The major contributions to arachnology of India were made by Pocock (1900) and Tikader (1982). Regarding biodiversity of spiders, world spider catalogue indicates presence of about 44,906 described species globally (Platnick, 2014; version 15.0). 1685 species belonging 438 genera and 60 families were catalogued from India by Keshwaniet.al. (2012). Sebastian and Peter (2009) exemplified 1520 spider species under 377 genera representing 60 families from India. State Chhattisgarh is endowed with rich flora and fauna. Diversity of spider fauna had been documented from Indravati Tiger Reserve (Jagdalpur) and research projects in Raipur district is ongoing by ZSI (Zoological Survey of India), Raigarh area of Chhattisgarh state is still untouched, and there is no single information available on documentation of spider diversity. Hence, present study was conducted in Rose Garden, located at (21°54'49.2" N & 83°25'40.4" E) Raigarh city, Chhattisgarh, India. Raigarh is well known as cultural and industrial capital of Chhattisgarh. Average elevation is 215 meter, river Kelo flows through the city which is the most important source of irrigation.

The aim of the present study was to investigate the diversity of spiders and its guild structure at Rose Garden, Raigarh, Chhattisgarh, India. Present study is the first record of the spider fauna from this area. The present study forms a basis for further investigations on this group.

II MATERIALS AND METHODS

2.1. Study Area

Study area is geographically located at Raigarh city (21°54'49.2" N & 83°25'40.4" E), state Chhattisgarh, India. Average elevation is 215 meter, river Kelo flows through the city which is the most important source of irrigation.

The temperature ranges between 29.5 - 49 °C in summer and 8 - 25 °C in winter.

2.2. Collection and Identification of spiders

The techniques used for collecting spiders were pitfall trapping, sweep netting, ground hand collection, aerial hand collection, vegetation beating, litter sampling (Sorensen *et al.* 2002) because they utilize wide variety of niches. The study was carried out during early morning hours and evening hours, from all types of habitats. Sampling was conducted for six months from month of September 2012 to February 2013. During the study period spiders were sampled every month. Specimens were preserved in 70% alcohol with date and time for further identification. The adult spiders were identified on basis of web structure, guild and on the basis of morphological identification features by using available literatures (Tikader, 1982, 1987; Sebastian and Mathew, 2009).

III RESULT AND DISCUSSION

The diversity of spider fauna of Rose Garden resulted in identification of 20 species representing 13 genera and 5 families of order Araneae (Table 1). In the present survey, the family Araneidae was the predominant family, constituting 9 species from 4 genera. Among the 20 species *Plexippuspaykulli*(10.79%) and *Argiopepulchella* (10.79%) represented maximum number of species followed by *Xysticusminutus*(7.4 %), *Oxyopes sp.* (7.26 %), *Rhene sp.*(6.8 %), *Leucagedecorata* (6.8 %), *Hippasaagelenoides* (6.8 %), *Neoscanabengalensis* (6.8 %), *Araneusmitifica*(5.7 %), *Neoscanapavida*(5.0%),*Thomisusprojectus*(4.1%), *Araneusnympha*(4.6 %), *Cyclohexatuberculata*(3.08 %), *Xysticusminutus* (3.74 %), *Pardosabirmanicus* (3.7%),*Neoscana sp.*(3.3 %), *Cyclosaconfrafa*(2.86 %), *Pardosa sp.* (2.2%),*Cyclosa bifida* (1.98 %), *Thomisus sp.* (1.98 %) and *Oxytate sp.* (1.76 %).Family Araneidae comprised of *Araneusmitifica*, *Araneusnympha*, *Argiopepulchella*, *Cyclosa bifida*, *Cyclosaconfrafa*, *Cyclohexatuberculata*, *Neoscanabengalensis*, *Neoscanapavida*, *Neoscana sp.* Among them *Argiopepulchella* commonly known as signature spider was found to be predominant in the study area followed by *Plexippuspaykulli*.(Salticidae). Oxyopidae comprised only on *Oxyopes sp.* Family Lycosidae comprise genus *Hippasa* includes *Hippasaagelenoides* and *Pardosa* include *spardosabirmanicus* and *Pardosa sp.* Family Salticidae comprises *Plexippuspay kulli* and *Rhene sp.* Tetragnathidae comprises only one species i.e. *Leucage decorate*.FamilyThomisidae comprise *Thomisus projectus*, *Thomisus sp.* *Oxytate sp.* and *Xysticusminutus*.

The feeding guild classification was followed by Uetzet.al. (1999),these guilds are orb weavers, foliage runner, ground runner and ambushers (Fig. 1).In the study area the web weaving spiders belonging to the family Araneidae and Tetragnathidae and thenon-weaving spiders belonging to thefamily Oxyopidae, Lycosidae, Salticidae, Thomisidae.

Rose Garden is rich in diversity of the species richness of spiders. This was probably due to the vegetation stratification that provides heterogenous habitat and niche for spider species. Vegetation architecture may influence the presence of spiders through a variety of factors i.e.prey availability, temperature, humidityetc. (Wise 1993).Studies on spiders are of ecological interestbecause they are ubiquitous in nature and act as generalist predators, helps in maintaining ecological balance by controlling population of other arthropods (Roth, 1993). Spiders can efficiently, be used for controlling pest in different economically important crops ex. Cotton, rice, maize and wheat (Mansooret al., 1980; Manoleyet.al. 2003).

IV FIGURES AND TABLES

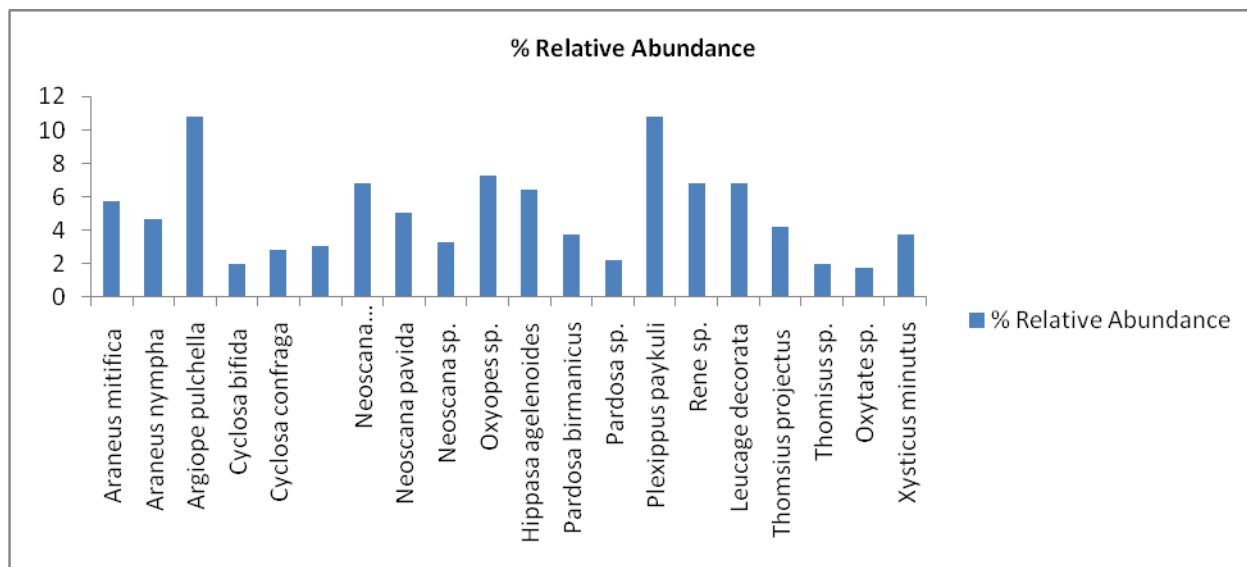


Fig. 1: Relative abundance of spider species recorded during survey.

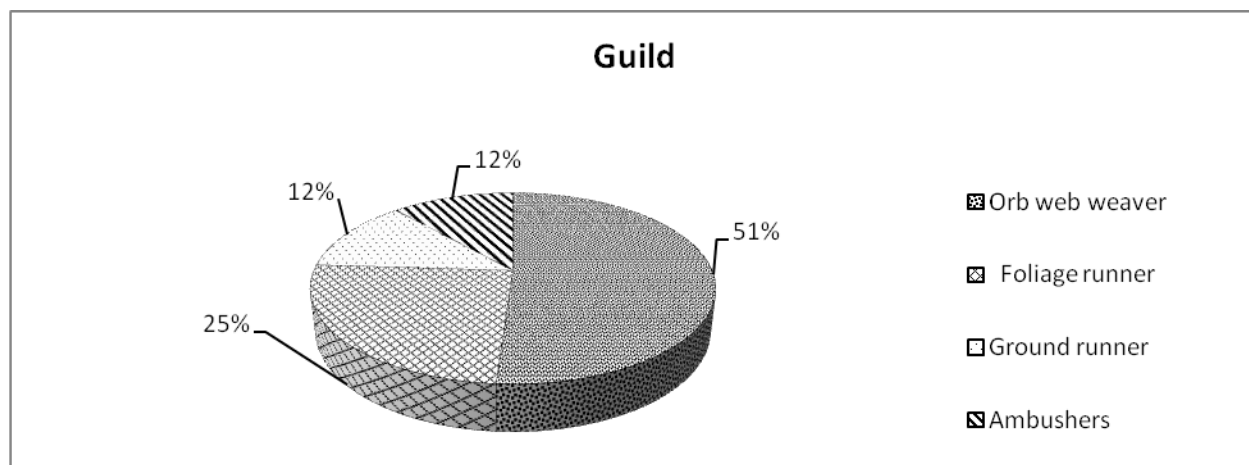


Fig. 2: Guild structure of spiders in Rose Garden, Raigarh, Chhattisgarh, India

Table 1: Observation list of spiders collected from Rose Garden, Raigarh, Chhattisgarh, India.

FAMILY	GENUS	SPECIES	GUILD
Araneidae	<i>Araneus</i>	<i>Araneusmitifica</i>	Orb web weaver
		<i>Araneusnympha</i>	
	<i>Argiope</i>	<i>Argiopepulchella</i>	
	<i>Cyclosa</i>	<i>Cyclosa bifida</i>	
		<i>Cyclosaconfra</i>	
		<i>Cyclosahexaberculata</i>	
	<i>Neoscana</i>	<i>Neoscanabengalensis</i>	
		<i>Neoscanapavida</i>	
		<i>Neoscana sp.</i>	
Oxyopidae	<i>Oxyopes</i>	<i>Oxyopes sp.</i>	Foliage runner
Lycosidae	<i>Hippasa</i>	<i>Hippasaagelenoides</i>	Ground runner
	<i>Pardosa</i>	<i>Pardosabirmanicus</i>	
		<i>Pardosa sp.</i>	
Salticidae	<i>Plexippus</i>	<i>Plexippuspaykuli</i>	Foliage runner
	<i>Rhene</i>	<i>Rene sp.</i>	
Tetragnathidae	<i>Leucage</i>	<i>Leucagedecorate</i>	Orb web weaver
Thomisidae	<i>Thomisus</i>	<i>Thomsiusprojectus</i>	Ambushers
		<i>Thomisus sp.</i>	
	<i>Oxytate</i>	<i>Oxytate sp.</i>	
	<i>Xysticus</i>	<i>Xysticusminutus</i>	

V CONCLUSION

Among arthropods, spiders are the most copious predators in natural as well as agricultural ecosystem, taking part in ecosystem functioning throughout habitats (Van Hook, 1971).The study reveals information related to the distribution of spider species in environment, disturbance and availability of prey in the Rose Garden, Raigarh, Chhattisgarh, India. Spider species such as *Plexippuspaykuli* and *Argiopepulchella* were the predominant species of spiders in the study area. Spiders may be considered as natural pest controller with decrease in pesticide usage to maintain the Rose Garden. From this preliminary study it is concluded that, Raigarh is rich in diversity of spider fauna.

VI ACKNOWLEDGEMENT

Authors are extremely indebted towards Forest Department, Raigarh, (C.G) for their help and permission. Authors are also grateful towards Prof. S. C. Naithani, HOD, SoS in Life Sciences, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh and UGC for their financial assistance.

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