

**A COMPARATIVE STUDY OF THE SPIDER (ARANEAE)  
FAUNA IN KEOLADEO NATIONAL PARK (KNP),  
NAHARGARH WILDLIFE SANCTUARY (NWS) AND  
SUR-SAROVAR BIRD SANCTUARY (SBS), INDIA.**

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**ABSTRACT:** Spiders are the highly diverse group of invertebrates and occupy various habitats. A preliminary checklist of spiders of the three reserve areas namely, KNP, NWS and SBS is provided based on a comparative study undertaken during March 2012 to February 2014. A total of 88 species belonging to 54 genera and 17 families were recorded from the said areas. In all these areas, Salticidae (Ground runner), Araneidae (Orb web weaver), Lycocidae (Ground-active runner) and Oxyopidae (Foliage runner) families were most diverse families. The present study was undertaken to establish a relationship in similar climatic zone.

**KEY WORDS:** Comparative diversity, spider fauna, KNP, NWS, SBS.

India is the home of thousands of species of wild animal, viz. mammals, birds, reptiles, fishes, amphibians and invertebrates. They live in and around the country's diverse vegetation that varies from the open thorny forest with dessert of Rajasthan in the west to the evergreen forest of Kerala in the south; the rain forest of northeast India and the alpine pastures of Kashmir in north and also in the inland and marine waters, swamps and marshes.

Spiders comprise one of the largest order of animals. The spider fauna of India has never been studied its entirety despite of contribution by many arachnologists (Pocock, 1900a,b; Tikader, 1980, 1982, 1987). Although spider diversity in temperate regions has been well studied, tropical areas however, have received relatively little attention and their study had always remained largely neglected. They have, however, largely been ignored because of the human tendency to favor some organism over others of equal importance because they lack a universal appeal. Spiders are the most diverse and abundant invertebrate predators in terrestrial ecosystems (Wise, 1993; Nyffeler, 2000). They regulate the terrestrial arthropod population (Riechert & Bishop, 1990; Coddington & Levi, 1991). The global list of spider fauna is approximately 39,882 species belonging to 3676 genera and 108 families (Platnick, 2011). Tikader (1987) published the first comprehensive list of Indian spiders which included 1067 species belonging to 249 genera in 43 families. Rajasthan and Uttarpradesh states have not been studied extensively for its spider diversity; fragmentary reports however, are available (Bastawade & Khandal, 2006; Saini et al., 2012; Anjali & Santprakash, 2012; Lawania & Trigunayat, 2013a,b,c,d,e,f,g,h; Kaur et al., 2014). The aims of this study were to investigate the comparative diversity of spiders in said areas and reveal the species richness, endemism, affinity and similarity with other

geographic faunas. This study is focused on the comparison of spider fauna and providing base line information for further studies.

## MATERIALS AND METHODS

### Study area

The study area includes three reserve areas, namely Keoladeo National Park (KNP, 29sq.km.), Nahargarh Wildlife Sanctuary (NWS, 52.40 sq.km.), Sursarovar Bird Sanctuary (SBS, 7.97 sq.km.).

**Keoladeo National Park (KNP)** – Keoladeo National park is situated in Indo-Gangetic flood plains at 174 m MSL between longitude 77°-29'5" to 77°-33'9" E. and longitude 27°-7'6" to 27°-12'2" N in Bharatpur district of Rajasthan. It is a man made wetland. The park covers 29 Sq.km. areas out of which 12 sq. km. forms the wetland zone. It is flat with a gentle slope towards the centre forming a depression of about 8.5 Sq.km. which is the submersible area of the park providing shelter to the water fowls and other aquatic animals. This park is commonly called Ghana means thick forest.

**Nahargarh Wildlife Sanctuary (NWS)** –Nahargarh Wildlife Sanctuary is a small sanctuary and situated at Northeastern part of Aravalli hills and Northern outskirts of Jaipur city (Rajasthan) and mean sea level above 1,219 m. It is confined between 26°15' to 28°45'N and 75°45' to 77°05'E. The Aravalli ranges (oldest hills of the World) traverse through sanctuary and the forest type is subsidiary edaphic type of dry tropical thorn forest.

**Sursarovar Bird Sanctuary (SBS)** – Sursarovar bird Sanctuary was declared as national bird Sanctuary on 27 March 1991 by Uttar Pradesh Forest Department. The Sanctuary is situated between 27.57°N Latitude, 80.09°E Longitude at 300m. MSL. Sursarovar Bird Sanctuary located close to Keetham Lake / Sursarovar (Latitude – 27.25 'N, Longitude – 77.89 E) Sursarovar Bird Sanctuary spread over an area of 7.97 Sq. Km. it sanctuary comprises a large lake covering area of 2.25 Sq Km. The depth of lake varies from 4 Meters to 8 Meters The riverine belt of Yamuna surrounds the area of Sursarovar. The climatic condition of the Sanctuary area is typical of Uttar Pradesh plains with hot windy summers and extremely cold winters. The average temperature range between 1.5°C to 49°C. The monsoon season occurs during July to August.

### Collection

The Study was undertaken from March 2012 to February 2014. Bushes tree trunks, forest floor, foliage and grass lands were searched for spiders and collected by using various methods such as hand picking, pitfall trapping, sweep netting, and cryptic searching.

### Identification

The identification of spiders was done following Tikader (1980, 1982, and 1987), Murphy (2000), as well as pictorial guide Levi (2002), Sebastian & Peter (2009). The Collected specimens were preserved in 70% ethyl alcohol with a few drops of glycerin (Prasad, 1985).

## RESULTS AND DISCUSSION

A total of 88 species represented by 53 genera and 17 families were recorded from in these reserve areas. The family composition of the spider fauna for the three study areas is shown in table-I. In all study area Salticidae (Ground

runners), Oxyopidae (Foliage runners), Araneidae (Orb web builders), and Lycosidae (Ground dweller) accounted for the largest population of spider species. NWS recorded higher species abundance (68 species belonging to 49 genera and 17 families) than SBS (54 species belonging to 36 genera and 14 families) and KNP (68 species belonging to 49 genera and 13 families). The Salticidae (22 species), Araneidae (18 species), Oxyopidae (10 species) and Lycosidae (8 species) families made up the biggest proportion of species in these habitats. A total of 88 species were recorded and 42 species were common in these reserve areas. 13 species are well represented in only NWS but are known to be absent from SBS and KNP. 11 species are well represented is only in SBS but absent from NWS and KNP, and 03 Species are well represented from KNP but absent from NWS and SBS.

## CONCLUSION

Spider community structure is closely related to variation in habitat structure, food abundance, microclimatic changes and spatial variation. In this study area we compared the spider fauna of three reserve areas (KNP, NWS, SBS) in India. The conclusion drawn as the difference in spider species richness among the three areas will depend to some extent on how complete the sampling effort was in each. It is assumed that the difference in spider species richness between NWS, KNP and SBS is real rather than an artifact of under sampling, some factors might account for the difference. These areas have a similar climatic conditions and difference mean sea level (KNP- 174 m. MSL, SBS- 300 m. MSL and NWS- 1,219 m. MSL) and difference mean rainfall (2012-2014) ( KNP- 768 mm., SBS- 813mm. and NWS- 844mm.). There are at least three possible explanations, none of which are necessarily mutually exclusive: a) spider diversity exists, with highest diversity at the increasing mean sea level (MSL); b) spider diversity is related to mean annual rainfall, with higher diversity in wetter areas; c) there are unique differences in the regional pools of available spider species in the three regions which determines the diversity in each area. There is some support for the concept of a latitudinal gradient of diversity of spiders.

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## LITERATURE CITED

- Anjali & Santprakash** 2012. Diversity of spiders (araneae) from semi-arid habitat of agra(India). Indian society of arachnology, 1 (2): 66-72.
- Bastawade, D. B. & Dharmendra Khandal** 2006. Fauna of Sanjay Gandhi National Park (Invertebrate). Zool. Surv. India, conservation Area series, 26: 139-184.
- Coddington, J. A. & Levi, H. W.** 1991. Systematic and evaluation of spiders (Araneae). Annual Review of Ecology and Systematic, 22: 565-592.
- Kaur et al.** 2014. Preliminary checklist of spiders of Keoladeo National Park, Bharatpur, Rajasthan with first record of *Ptocostius strupifer* Simon 1901 (Araneae: Salticidae) from India, Mun. Ent. Zool., 9 (1): 501-509.
- Lawania, K. K., Sant Prakash & Trigunayat, M. M.** 2013a. Biodiversity of Spider in and around Agra, Souvenir of National Conference on forest and wildlife: Present Status, Future needs and challenges ahead, Pp. 12.
- Lawania, K. K. & Trigunayat, M. M.** 2013b. Baseline studies on the spider fauna (Araneae) of Braj Region (Brajbhoomi) India. International journal of Biotechnology and Bioengineering Research, 4: 16-19.

- Lawania, K. K. & Trigunayat, M. M.** 2013c. Web pattern and architecture in some spiders (Araneae) from Central India. *International journal of Biotechnology and Bioengineering Research*, 4: 20-22.
- Lawania, K. K. & Trigunayat, M. M.** 2013d. On the diversity of spiders in and around Sur-sarovar Bird sanctuary, Agra (UP) India. *International journal of Engineering Research and Technology*, 6: 99-104.
- Lawania, K. K. & Trigunayat, M. M.** 2013e. Diversity and distribution of spiders in and around Vrindavan, Mathura (UP) India. *International journal of Engineering Research and Technology*, 6: 105-110.
- Lawania, K. K., Kritika Trigunayat & Trigunayat, M. M.** 2013f. Spider in mosquito control, *International journal of Biotechnology and Bioengineering Research*, 4 (6): 609-616.
- Lawania, K. K., Kritika Trigunayat & Trigunayat, M. M.** 2013g. On the diversity in and around Deeg-Town bharatpur (raj.). *Indian society of arachnology*, 2 (2): 609-616.
- Lawania, K. K. & Trigunayat, M. M.** 2013h. Studies on the spiders (Araneae) diversity of Mewat region, India. *International journal of environmental science*, 4: 159-163.
- Levi, L. R.** 2002. *Spider and their kin*. St.martins press, Newyork.
- Murphy, J. F.** 2000. *An introduction to the spider of South East Asia*. Kuala- Lumpur, Malaysia. Malaysian Nature Society, 625 pp.
- Nyffeler, M.** 2000. Ecological impact of spider predation: a critical assessment of Bristowe's and Turnbull's estimates. *Bull. Br. arachnol. Soc.*, 11: 367-373.
- Pocock, R. I.** 1900a. *The fauna of British India, Arachnida*. Taylor and Francis, London. 279 pp.
- Pocock, R. I.** 1900b. *The fauna of British India, including Ceylon and Burma. Arachnida*. London.
- Prasad, B.** 1985. Setting and preservation of spiders. *Entomologists' news letter*, 1 (8): 2-3.
- Platnick, N. I.** 2011. *The World Spider Catalog, version 12.0*. American Museum of Natural History. <http://research.amnh.org/entomology/spiders/catalog/index.html>
- Riechert, S. E. & Bishop, L.** 1990. Prey Control By assemblage Generalists' predators: Spider in garden test system. *Ecology*, 71: 1441-1450.
- Saini et al.** 2012. Analysis of spider density across Shekhawati region of Rajasthan, India. *Indian society of arachnology*, 1 (2): 30-38.
- Sebastian, P. A. & Peter, K. V. 2009. *Spiders of India*, University Press publication.
- Tikader, B. K.** 1980. Thomisidae (Crab-spiders) - Fauna of India (Araneae). *Zoological Survey of India*, 1: 1-247.
- Tikader, B. K.** 1982. Family Araneidae Argiopidae) typical orb weavers. *Fauna of India (Araneae)*, 2: 1-293.
- Tikader, B. K.** 1987. *Handbook of Indian Spiders*. Zool. Surv. India, Calcutta, 251 pp.
- Wise, D. A.** 1993. *Spiders in ecological webs*. Cambridge, UK: Cambridge University Press.

Table 1. Shown spider species, recorded from three conserve areas (KNP, NWS and SWS) of India.

Family	Species	Guild	Distribution of species			
			KNP	NWS	SBS	
Agelenidae	(i) <i>Agelendia</i> sp.	Funnel Web builders	--	++	--	
	(ii) <i>Teganaria domestica</i>	Funnel Web builders	--	++	--	
Araneidae	(i) <i>Acusilas indicus</i>	Orb web builders	--	++	--	
	(ii) <i>Araneus mitificus</i>	Orb web builders	--	++	--	
	(iii) <i>Argiope aemula</i>	Orb web builders	++	++	++	
	(iv) <i>Argiope anasuja</i>	Orb web builders	++	++	++	
	(v) <i>Argiope pulchella</i>	Orb web builders	++	++	++	
	(vi) <i>Cylosa insulana</i>	Orb web builders	++	++	++	
	(vii) <i>Cylosa</i> sp.	Orb web builders	--	++	++	
	(viii) <i>Cyrtarachne keralayensis</i>	Orb web builders	--	++	--	
	(ix) <i>Cyrtophora cicatrosa</i>	Orb web builders	++	++	++	
	(x) <i>Cyrtophora citricola</i>	Orb web builders	++	++	--	
	(xi) <i>Cyrtophora faei</i>	Orb web builders	--	--	++	
	(xii) <i>Cyrtophora molucensis</i>	Orb web builders	--	++	++	
	(xiii) <i>Eriovixia excelsa</i>	Orb web builders	++	--	--	
	(xiv) <i>Larinia emertoni</i>	Orb web builders	++	--	--	
	(xv) <i>Leucauge decorata</i>	Orb web builders	++	++	++	
Corinnidae	(xvi) <i>Larinia chlorus</i>	Orb web builders	++	++	++	
	(xvii) <i>Neoscona mukerjai</i>	Orb web builders	++	++	++	
	(xviii) <i>Zygella indica</i>	Orb web builders	++	++	++	
	(i) <i>Castianeira</i> sp.	Ground runner	--	++	++	
	Clubionidae	(i) <i>Chiracanthium</i> sp.	Foliage runner	--	++	--
	Dictynidae	(i) <i>Nigma shiprai</i>	Irregular web builders	--	++	--
	Gnaphosidae	(i) <i>Callilepis lambai</i>	Ground runner	--	++	++
		(ii) <i>Callilepis rukminiae</i>	Ground runner	--	--	++
(iii) <i>Drassodes</i> sp.		Ground runner	++	++	++	
Hersiliidae	(i) <i>Hersilia savignyi</i>	Foliage runner	++	++	++	
Linyphiidae	(i) <i>Linyphia</i> sp.	Sheet web builders	++	++	++	
Lycosidae	(i) <i>Geolycosa urbana</i>	Ground runner	--	++	++	
	(ii) <i>Hippasa madhuae</i>	Ground runner	++	--	--	
	(iii) <i>Hippasa pisaurina</i>	Ground runner	++	--	++	
	(iv) <i>Lycosa mackenziei</i>	Ground runner	--	++	--	
	(v) <i>Lycosa pictula</i>	Ground runner	++	++	++	
	(vi) <i>Pardosa birmanica</i>	Ground runner	++	++	++	
	(vii) <i>Perdosa sangosa</i>	Ground runner	++	--	++	
	(viii) <i>Pardosa pseudomulata</i>	Ground runner	--	--	++	
	Nephilidae	(i) <i>Nephila</i> sp.	Orb web builders	--	--	++
(ii) <i>Nephila kuhlli</i>		Orb web builders	--	++	--	
(iii) <i>Nephila pilipes</i>		Orb web builders	++	++	++	
Oxyopidae	(i) <i>Oxyopes assamesis</i>	Foliage runner	--	++	++	
	(ii) <i>Oxyopes biramanicus</i>	Foliage runner	++	++	++	
	(iii) <i>Oxyopes javanus</i>	Foliage runner	++	++	++	
	(iv) <i>Oxyopes ratanae</i>	Foliage runner	++	++	++	
	(v) <i>Oxyopes shweta</i>	Foliage runner	++	++	++	
	(v) <i>Oxyopes</i> sp.	Foliage runner	--	--	++	
	(vi) <i>Oxyopes pankaji</i>	Foliage runner	++	++	++	
	(vii) <i>Oxyopes rufisternum</i>	Foliage runner	--	++	--	
	(viii) <i>Oxyopes sertatus</i>	Foliage runner	--	--	++	
	(ix) <i>Oxyopes retani</i>	Foliage runner	++	++	++	
Pholcidae	(x) <i>Oxyopes viridana</i>	Foliage runner	++	--	++	
	(i) <i>Artema atlanta</i>	Irregular web builders	++	++	++	
	(ii) <i>Crosspriza lyoni</i>	Irregular web builders	++	++	++	

	(iii) <i>Pholcus phalangiodes</i>	Irregular web builders	++	++	++
	(iv) <i>Pholcus</i> sp.	Irregular web builders	++	++	++
Salticidae	(i) <i>Acemonea tenuipes</i>	Ground runner	--	--	++
	(ii) <i>Bavia</i> sp.	Ground runner	--	++	--
	(iii) <i>Binor albobimaculatus</i>	Ground runner	++	++	++
	(iv) <i>Binor pseudomaculatus</i>	Ground runner	++	++	++
	(vi) <i>Cosmophasis umbortia</i>	Ground runner	--	++	--
	(vi) <i>Hasarius andersoni</i>	Ground runner	++	--	++
	(vii) <i>Hyllus semicupreus</i>	Ground runner	++	++	--
	(viii) <i>Myrmaracne mathewei</i>	Ground runner	--	--	++
	(ix) <i>Myrmaracne orientalis</i>	Ground runner	--	++	--
	(x) <i>Neoscona</i> sp.	Ground runner	--	++	++
	(xi) <i>Phintella vittella</i>	Ground runner	++	--	++
	(xii) <i>Plexippus paykuli male</i>	Ground runner	++	++	++
	(xiii) <i>Plexippus paykuli female</i>	Ground runner	++	++	++
	(xiv) <i>Phidippus pateli</i>	Ground runner	++	++	++
	(xv) <i>Phidippus yashdharae</i>	Ground runner	++	++	++
	(xvi) <i>Salticus runjitus</i>	Ground runner	++	++	++
	(xvii) <i>Phidippus indicus</i>	Ground runner	++	++	++
	(xviii) <i>Portia assamensis</i>	Ground runner	++	++	++
	(xix) <i>Portia</i> sp.	Ground runner	++	++	++
	(xx) <i>Ptocasius strupifer</i>	Ground runner	++	++	--
	(xxi) <i>Selenops</i> Sp.	Ground runner	--	--	++
	(xxii) <i>Telamanata dimidiata</i>	Ground runner	++	++	++
Tetragnathidae	(i) <i>Leucauge decorata</i>	Orb web builders	++	++	++
	(ii) <i>Tetragnatha chamberlini</i>	Orb web builders	++	++	--
	(iii) <i>Leucauge</i> sp.	Orb web builders	++	--	++
Theridiidae	(i) <i>Achaearanea mundula</i>	Single line snare web	--	++	++
	(ii) <i>Chryso nigra</i>	Single line snare web	--	--	++
	(iii) <i>Chryso pulcherrimus</i>	Single line snare web	--	++	--
	(iv) <i>Steatoda</i> sp.	Single line snare web	++	++	++
Thomisidae	(i) <i>Philodromus</i> sp.	Ambusher	--	--	++
	(ii) <i>Thomisus lobosus</i>	Ambusher	++	++	++
	(iii) <i>Thomisus projectus</i>	Ambusher	++	++	++
	(iv) <i>Xysticus minutus</i>	Ambusher	--	++	++
Uloboridae	(i) <i>Uloborus donoliuis</i>	Dome shape horizontal web	++	++	++