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Assessment of orb weaver spider (*Araneidae* Clerck, 1757) diversity in Gariaband forest region with a new endemic species in Chhattisgarh region, India

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Abstract
Chhattisgarh is a state surrounded by dense forests and full of beauty, where various types of fauna and flora are found. The biodiversity here is very rich, but we do not know much about the spiders found here. In this chapter, some species of orb weaver spiders found in the Gariaband forest region of Chhattisgarh have been described, which were recorded during the study. According to the data till now, 300 species of spiders are found in Chhattisgarh, which belong to 70 genera and 45 families. This number is very less compared to other states of India. This study was conducted in Gariaband forest region of Chhattisgarh state. In this study, three forest sites were taken for study, which are (1) Pairi Ghumar Dam (2) Bhuteshwar Nath jungle (3) Raipur - Deobhog National Highway forest site. Research conducted from December 2024 to April 2025 approximately 5 months. Plants, litters, stone cracks, barks and ground surface found in these sites were examined by direct visual method. During the study, 24 spider species were obtained from all three sites, which belong to 9 genus. Out of these 24 spiders, a spider species *Arachnura angura* Tikader, 1970 from Bhuteshwar nath region have been recorded for the first time in Chhattisgarh region, whose description is given in this chapter. It has been given well. In the overall forest region most of the genus *Neoscona* has 7 species, *Argiope* 4, *Cyclosa* 4, *Cyrtophora* 2, *Eriovixia* 2, Guizygiella 2 and 1 species each of *Arachnura*, *Bijoaraneus* and *Larinia* found.

Keywords: *Araneidae*, Chhattisgarh, diversity, fauna, Gariaband, orb weaver spider

Introduction
The spiders coming under the family *Araneidae* are called orb weaver spiders. These orb weaver spiders are Araneomorph or New World spiders, Ecribellate and Entelegynae spiders, which are found all over the world except Antarctica and Arctic regions (WSC, 2025)[29]. Spiders are mostly of nocturnal nature, which weave a large orb web or wheel shaped web during the night, in which insects or other flying insects are caught and the spiders eat them as food (Nayak *et al., 2025a*) [10]. Their size is slightly larger than the rest of the spider group (Nayak *et al.*, 2025b) [11]. Sexual dimorphism is found in them, that is, in these spiders the size of the male is much smaller than the female (Nayak *et al.*, 2025e) [19]. Their cephalothorax is quite small in comparison to the abdomen. There is a lot of variation in the morphology of the abdomen of this group of spiders. While the abdomen of *Neoscona* is large and round, that of *Larinia* is long, in *Gasteracantha* spines emerge from the abdomen and the poster abdomen region of *Arachnura* becomes cylinder and forms a tail-like structure (Tikader, 1970) [26].
The first study of spider diversity in Chhattisgarh was done in 2003, in both Chhattisgarh and Madhya Pradesh simultaneously. The study was conducted in both Madhya Pradesh and Chhattisgarh states. 186 spider species were identified in this study. These included 12 species of orb weaver spiders belonging to 5 genera (Gajbe, 2003) [3].
After Chhattisgarh was separated from Madhya Pradesh, in 2012, 63 spider species were recorded from Indra Vihar park in Raigarh district, of which 15 species were from *Araneidae* family which belong to 7 genera (Kujur *et al.*, 2016b) [7]. Many studies were conducted at different places in Raigarh district and more species of orb weaver spiders were recorded. Maximum 25 *Araneidae* species under 9 genera were recorded from Ram Jharna (Ekka *et al.*, 2015) [5] and 20 species and 9 genera were recorded from Rose garden (Kujur *et al.*, 2016a) [6]. 22 species and 8 genera of *Araneidae* family were identified from

Gomarda wildlife sanctuary (Kujur *et al.*, 2016a) [6]. In the study of spider diversity in Chhura, Rajim and Gariaband city of Gariaband district, only 4 orb weaver spider species were identified which represent only 3 genera (Sen, 2021). Then, 11 species and 5 genera of *Araneidae* family were recorded from Khutagat dam region of Kharun river in Bilaspur (Toppo *et al.*, 2022) [28].

Orb weaver spider species have also been collected from two areas of Gariaband district, Deobhog and Chhura (North East Gariaband). 15 species and 10 genera from Deobhog (Nichat *et al.*, 2024a) [15] and 17 species and 9 genera from Chhura region (Nichat *et al.*, 2025) [17]. Apart from this, 49 orb weaver spider species and 20 genera have been recorded from various districts of Chhattisgarh (Bastar, Bijapur, Bilashpur, Chapa, Kanker, Korba, Mungeli, Raigarh, Surguja) (Chaudhury *et al.*, 2025) [30].

Methods

Study area

Site I Pairi Ghumar region (20°34'25"N/20°34'20"N & 82°11'55"E/ 82°12'05"E)

Pairi Ghumar is a picnic spot located in the eastern direction of Gariaband. It is approximately 12 km away from Gariaband city. This area is surrounded by dense jungle. A small river flows through this area which quenches the thirst of the jungle animals there. A simple dam has been built on this river. This area is surrounded by dense vegetation and animals.

Site II Bhuteshwar naath forest area (20°36'35"N/20°36'05"N & 42°02'45"E/42°02'55"E)

Bhuteshwar Naath is a region situated in the south western region of Gariaband, which is considered very sacred for religious purposes, whose distance is approximately 6 km. This area is a small part of Gariaband forest area. The number of Saal trees in this region is very high. The environment of this place is very good for the survival of life.

Site III Raipur -Deobhog Highway (20°35'40"N/ 20°35'15" N & 82°05'05"E/82°05'15"E)

Raipur Deobhog highway is the most important road of Gariaband district. There is a very dense forest area on both sides of this highway. Many types of vegetation and species of animals (insects, beetles, spider, butterfly etc.) are found here. It is like a home for the living beings found here.

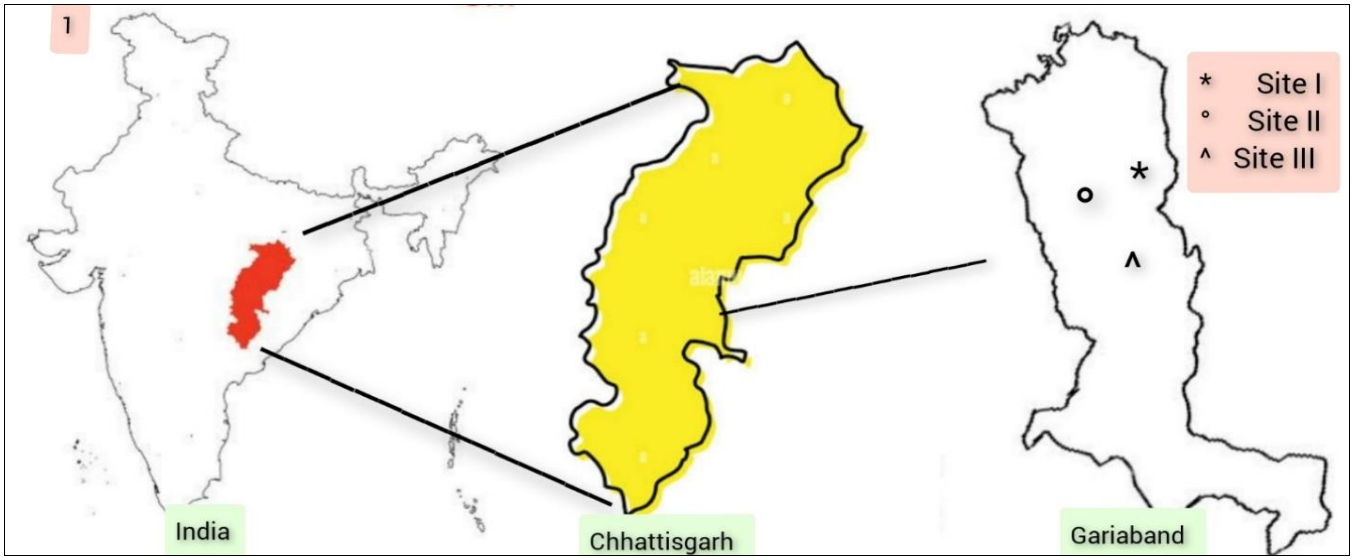

Fig 1: The location of Chhattisgarh and Gariaband district with study sites.

Fig 2: All three study sites of Gariaband district (Site I pairi Ghumar, Site II Bhuteshwar naath forest area, Site III Raipur -Deobhog Highway)

Sample collection techniques

The collection of orb weaver spider species from all study sites was done using standard collection techniques. Standard techniques like direct visual method i.e. plants, trees, stones, cracks and tree barks of the study area were thoroughly examined and live photography of spiders found there was done with INFINIX smart HD mobile camera (Nayak *et al.*, 2025d) [13]. Mostly spiders make their nest on the ventral surface of leaves. So, each leaf was thoroughly examined. Most of the orb weaver spiders make large orb webs between two trees due to which they can be seen easily.

Identification

These spiders have been identified on the basis of their body structure, pattern, leg arrangement, eye configuration and their coloration (Nayak *et al.*, 2025c) [12]. They were not preserved because preservation damages their body and otherwise their body coloration is lost. Only their live photography was done which makes their identification even easier. Some recently published literature (2010-2025) has been used for their identification (Sebastian *et al.*, 2011) [23].

Result

After a thorough study of the all three sites, 24 orb weaver spider species of the family *Araneidae* were recorded which belong to 9 genera. In this, a new species *Arachnura angura* Tikader, 1970 was recorded for the first time in Chhattisgarh. From observation, maximum 7 species from *Neoscona*, 4 each of *Argiope* and *Cyclosa* and only 1 each of *Arachnura*, *Bijoaraneus* and *Larinia* were recorded. Out of the species found in this study, 7 species (29.16%) are endemic species which are found only in India while the remaining 17 species (70.83%) are cosmopolitan species which are found in the whole world apart from India.

Table 1: A list of Spiders species of family *Araneidae* recorded from Gariaband

Family: *Araneidae* Clerck, 1757	No. of species	Site I	Site II	Site III
Arachnura Vinson, 1863				
1. *Arachnura angura Tikader, 1970** (NR)	01	-	+	+
Argiope Audouin, 1826				
2. *Argiope aemula (Walckenaer, 1841)*	04	+	+	+
3. *Argiope anasuja Thorell, 1887*		+	+	+
4. *Argiope minuta Karsch, 1879*		+	-	+
5. *Argiope pulchella Thorell, 1881*		-	+	+
Bijoaraneus Tanikawa, Yamasaki & Petcharad, 2021				
6. *Bijoaraneus mitificus (Simon, 1886)*	01	-	+	-
Cyclosa Menge, 1866				
7. *Cyclosa bifida (Doleschall, 1859)*	04	+	+	+
8. *Cyclosa confraga (Thorell, 1892)*		+	+	+
9. *Cyclosa hexatuberculata Tikader, 1982**		-	+	-
10. *Cyclosa insulana (Costa, 1834)*		+	+	+
Cyrtophora Simon, 1864				
11. *Cyrtophora cicatrosa (Stoliczka, 1869)**	02	-	+	+
12. *Cyrtophora citricola (Forsskål, 1775)*		+	+	+
Eriovixia Archer, 1951				
13. *Eriovixia excelsa (Simon, 1889)*	02	+	+	+
14. *Eriovixia laglaizei (Simon, 1877)*		+	+	-
Guizygiella Zhu, Kim & Song, 1997				
15. *Guizygiella indica (Tikader & Bal, 1980)**	02	+	+	+
16. *Guizygiella melanocrania (Thorell, 1887)*		+	+	-
Larinia Simon, 1874				
17. *Larinia chloris (Savigny, 1825)*	01	+	+	+
Neoscona Simon, 1864				
18. *Neoscona bengalensis Tikader & Bal, 1981**	07	+	+	+
19. *Neoscona biswasi Bhandari & Gajbe, 2001**		+	-	+
20. *Neoscona crucifera (Lucas, 1838)*		+	+	+
21. *Neoscona mukerjei Tikader, 1980**		-	+	-
22. *Neoscona punctigera (Doleschall, 1857)*		-	+	+
23. *Neoscona theisi (Walckenaer, 1837)*		+	-	+
24. *Neoscona vigilans (Blackwall, 1865)*		+	+	+

NR New Record, * Endemic in India, + present, - absent.

During the study a total of 17 species were recorded from site I which is 70.83% of the total species count, 21 species were recorded from site II which is 87.5% and a total of 19 species were recorded from site III which is 79.16%. Most were recorded from site II and least from site I.

- New record
- Taxonomy
- Family: Araneidae Clerck, 1757
- Arachnura Vinson, 1863
- *Arachnura angura* Tikader, 1970

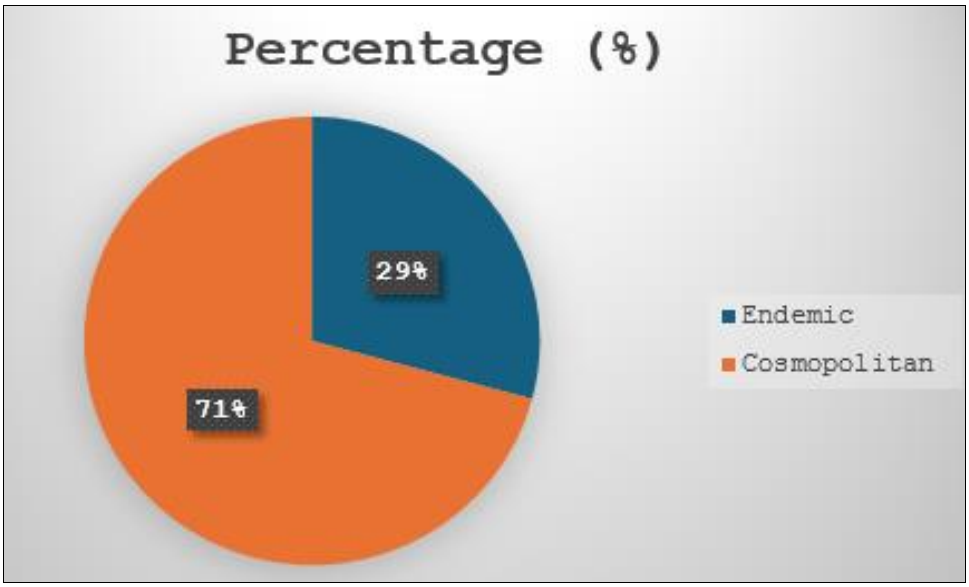

Fig 3: The percentage of endemic and cosmopolitan species record during study (A comparison).

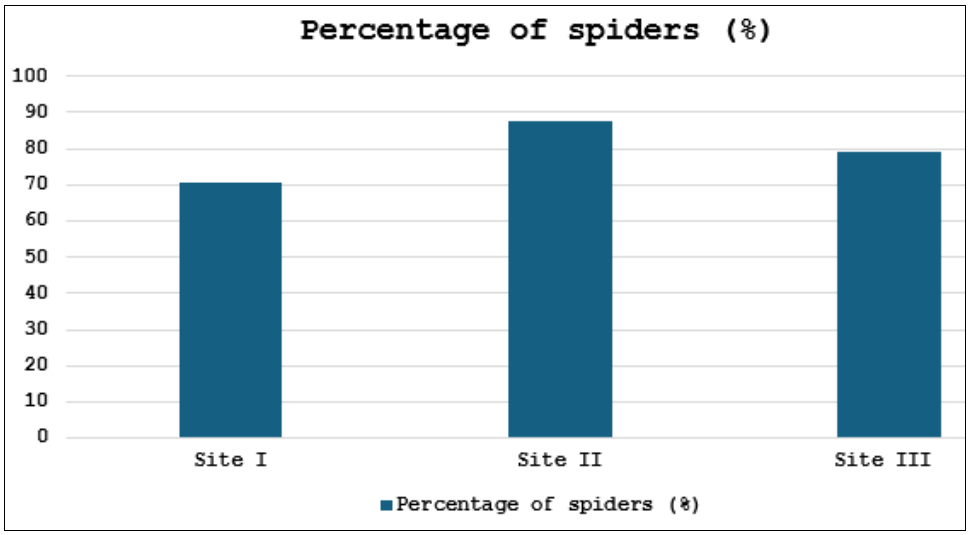

Fig 4: Percentage of spider's species recorded from different sites of Gariaband.

Distribution

Goa (Pandit & Dharwadkar, 2020), Gujarat (Parmar, 2021), Karnataka (Bhat *et al.*, 2013; Prashanthakumara & Venkateshwarlu, 2017a), Kerala (Sebastian *et al.*, 2011), Maharashtra (Bhuvad *et al.*, 2011), Sikkim (Tikader, 1970; Saha *et al.*, 2016), Tamil Nadu (Kapoor, 2008), West Bengal (S en *et al.*, 2015; Raychaudhuri *et al.*, 2016; Saha *et al.*, 2016), present record in Chhattisgarh.

Collection site: The specimen of *Arachnura angura* Tikader, 1970 has been collected from the Bhuteshwar Nath forest region of Gariaband, (20°36'35"N/20°36'05"N & 42°02'45"E/42°02'55"E) on the leaf of Sal tree. The specimen is collected by Jashavant Nayak during evening time.

Identification characteristics

The body of the female is much smaller than that of the male, its colour is light white brown.

The cephalothorax is smaller than the abdomen, its shape is like a pear, its colour is dark brown, there is a dark black coloured line from front to back.

The abdomen is large and is heart shaped towards the front, the back part of the abdomen becomes cylindrical towards the top and forms a tail like structure. The terminal part is divided into two small parts, long stripes are found on both sides of the body which extend from front to back.

Its first pair of legs is quite large and projected forwards. Leg I and leg II are larger than the other legs. Leg III and leg IV are projected towards the back.

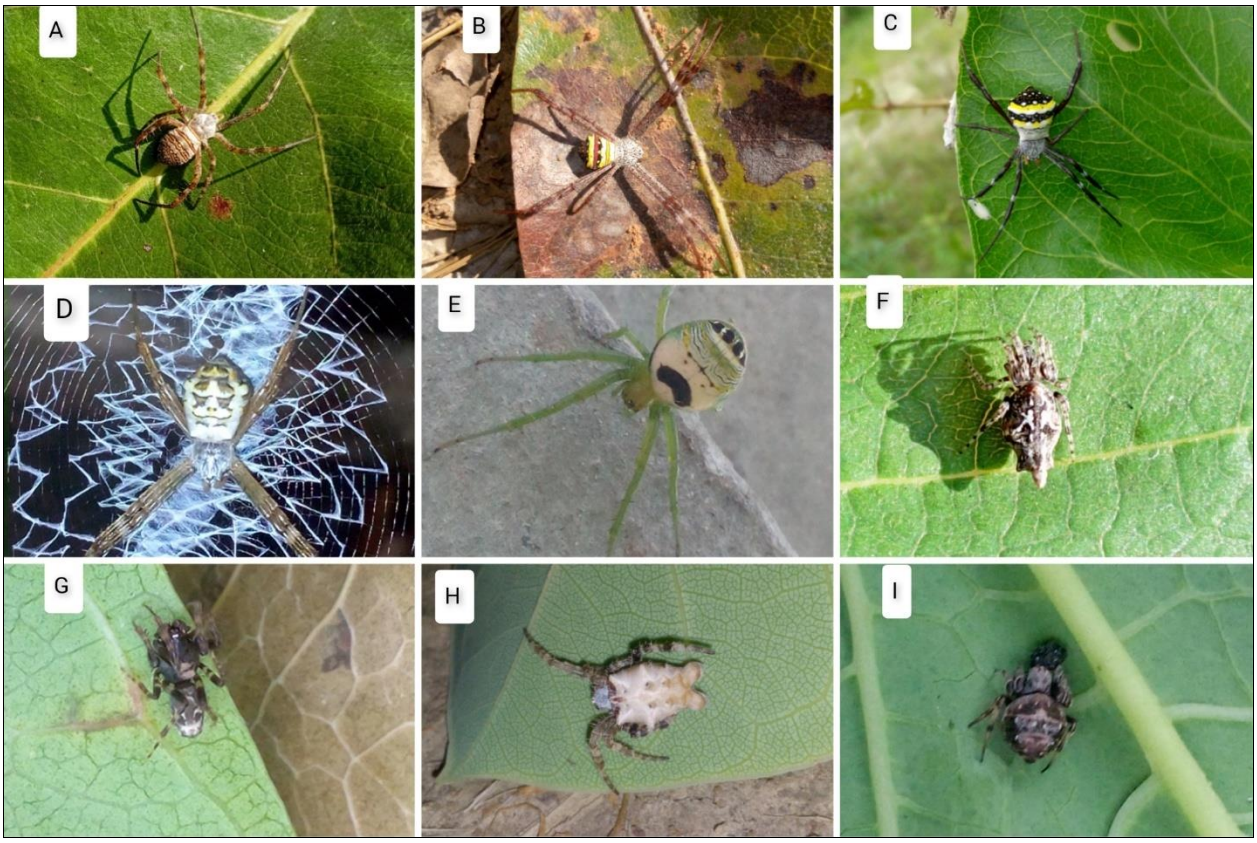

Fig 5: Orb weaver spiders from Gariaband district.

Argiope aemula, B. *Argiope pulchella*, C. *Argiope anasuja*, D. *Argiope minuta*, E. *Bijoaraneus* mitificus, F. *Cyclosa bifida*, G. *Cyclosa hexatuberculata*, H. *Cyrtophora citricola*, I. *Eriovixia excelsa.*

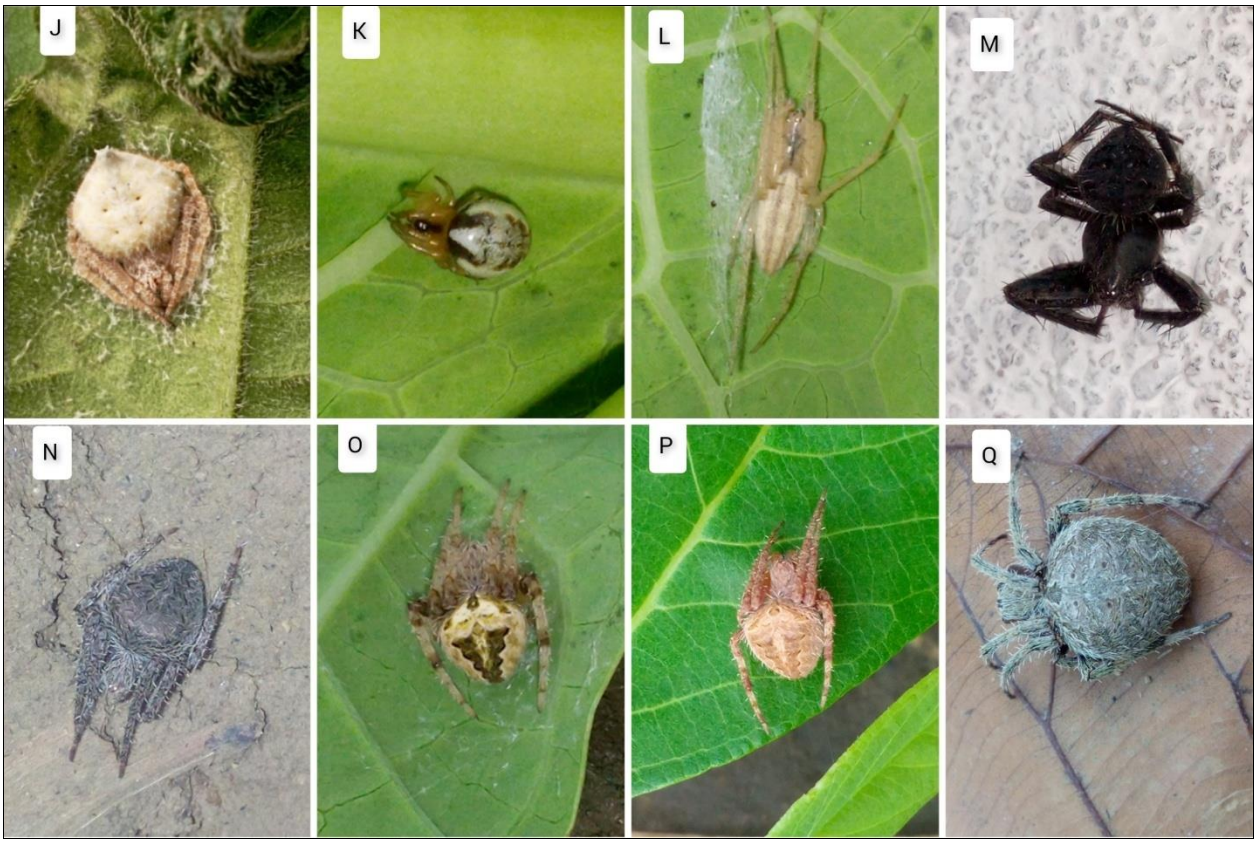

Fig 6: J. *Eriovixia laglaizei*, K. *Guizygiella indica*, L. *Larinia chloris*, M. *Neoscona punctigera*, N. *Neoscona crucifera*, O. *Neoscona mukerjei*, P. *Neoscona theisi*, Q. *Neoscona bengalensis*.

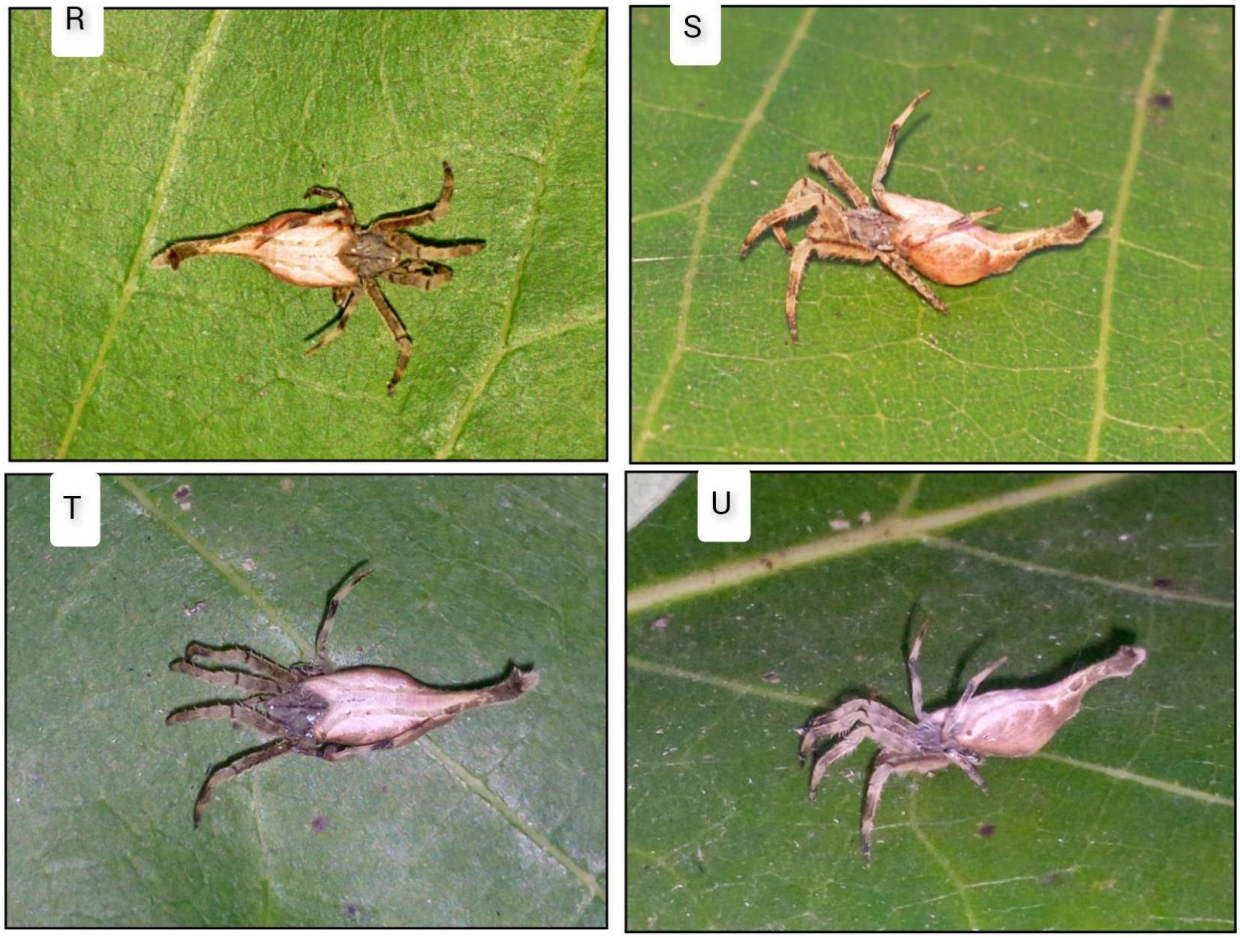

Fig 7: Habitus- *Arachnura angura* Tikader, 1970, R &T. Dorsal view, S & U. Lateral view.

Discussion

There are 23 common species of spiders collected from Gariaband region which have been reported in Chhattisgarh but one species Arachnura has been recorded for the first time in Chhattisgarh. This species is a new species for Chhattisgarh state which will be added in the Chhattisgarh spider list. Apart from Chhattisgarh, it has already been recorded in 8 other states. Among the spiders collected, genus Neoscona has the maximum species which is 29.16% of the total species. Most species of Neoscona are found in this region. According to previous studies conducted in Chhattisgarh, this is the second time that maximum number of orb weaver spiders have been collected, before this 25 species were reported in the Ram Jharna region of the region.

Conclusion

Spiders are usually very important components of an ecosystem. They play the role of predators for insects and prey for other vertebrates in the food chain. Especially orb weaver spiders weave a large orb web in the dark in which many insects get trapped, keeping the insect population stable for an ecosystem. This study is an important effort to know the diversity of spiders, which will help future studies and researchers to understand spiders.

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