

## Diversity and distribution of spiders (*Arachnida: Aranea*) in the campus of Government Gandhi Memorial Science College, Jammu, J&K (UT), India

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### Abstract

The present survey was conducted from July 2025 to June 2026 to document the spider diversity in the campus of Government Gandhi Memorial Science College, Jammu, J&K (UT), India. During the study period, 63 spider taxa were recorded from the study area, of which 62 taxa belonged to the order Araneae, representing 15 families, while one species belonged to the order Opiliones, family Sclerosomatidae. The family Salticidae emerged as one of the most dominant groups, represented by 17 species (26.98%), followed by Araneidae (12 species, 19.05%) and Oxyopidae (9 species, 14.29%). Spider species namely, *Leucauge decoarata* was recorded as the most dominant species in the outdoor habitats and species namely, *Oecobius navus* and *Crossopriza lyoni* were observed as the dominant species in the indoor habitat. Shannon-Wiener Diversity Index ( $H' = 3.71$ ) was found highest, Menhinick's Index ( $D = 3.08$ ) and Pielou's Evenness Index ( $J = 0.89$ ) were also found high in the study area.

**Keywords:** Araneae, spider diversity, GGM science college, biodiversity, Jammu, salticidae

### Introduction

Spiders are among the most diverse groups of terrestrial arthropods, belonging to the order Araneae of the class Arachnida. They represent a highly diverse and ecologically important group of invertebrate predators that have successfully colonized a wide range of terrestrial ecosystems. Their distribution extends across diverse habitats, including forests, grasslands, agricultural landscapes, and human-dominated urban environments, making them valuable organisms for studying patterns of biodiversity, habitat use, and responses to environmental change (Dimitrov and Hormiga, 2021; Cardoso *et al.*, 2025; Willmott *et al.*, 2025) [3, 29].

Spiders possess numerous silk-producing organs called spinnerets or spinning organs just anterior to the terminal anus, utilized in web architecture, prey capture, reproduction and dispersal (Kaston, 1978) [10]. By regulating insect populations, including agricultural pests and disease vectors, they contribute significantly to biological control and reduce the dependence on chemical pesticides (Nyffeler and Birkhofer, 2017) [17]. In addition to their ecological importance, spiders are considered valuable bioindicators due to their sensitivity to the environmental changes such as habitat disturbance, pollution, and climate variability (Marc *et al.*, 1999) [15].

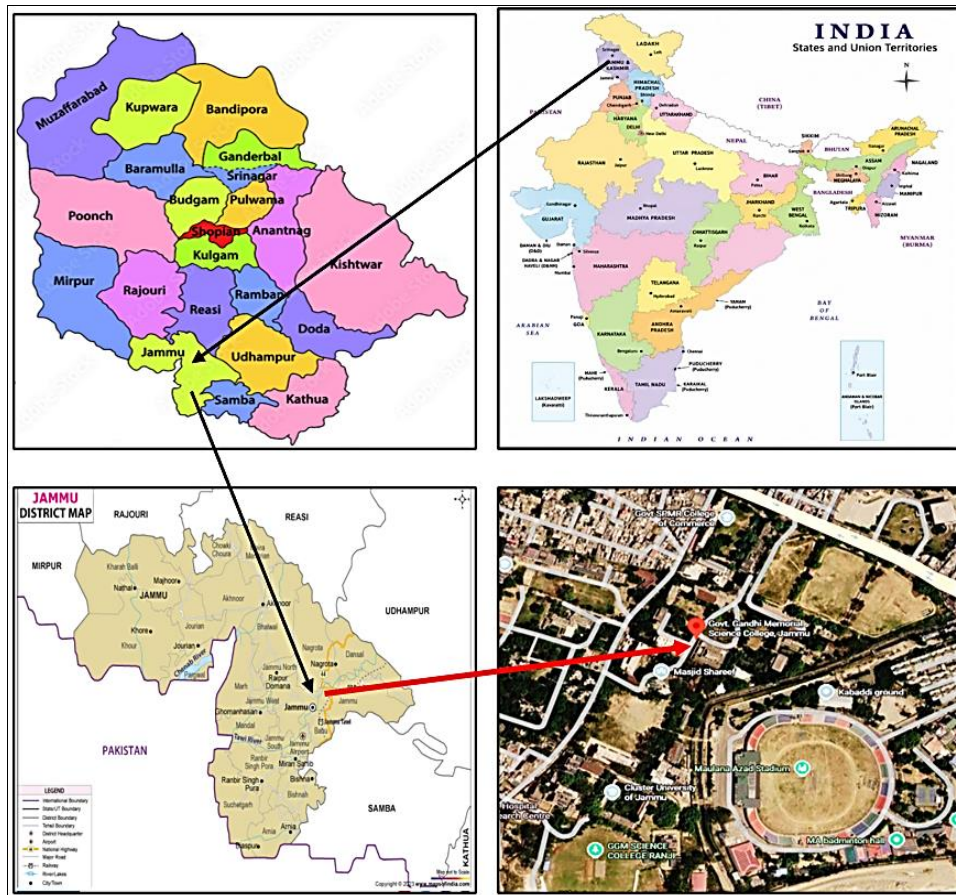
Global spider diversity is currently estimated at approximately 54,108 identified species belonging to 4,525 genera and 139 families (World Spider Catalog 2026 [30], Version 27.0). In India the most recent documentation of the spider fauna lists 1,985 species distributed across 516 genera and 63 families (Caleb and Sankaran, 2026). Despite their remarkable diversity, knowledge of Indian spider fauna is largely confined to the vastness of protected forests and agricultural landscapes. Several regions of India, particularly north-western India including Jammu and Kashmir inadequately surveyed, resulting in limited records regarding spider species. Many spider species are likely to

remain undiscovered or unrecorded, highlighting the need for comprehensive biodiversity assessments in these underexplored areas. Early taxonomic contribution in India was made by Zabka (1981), Tikader (1981), Tikader (1982a, b), Gajbe (1988), Dimitrov and Hormiga (1994), Chakrabarti (2013) [4, 6, 7, 26]. In the Jammu and Kashmir region, however, research on spider diversity is relatively limited and fragmented. Some studies by Khan and Rather (2012), Punjoo and Bhat (2015) [11, 18], Shah and Buhroo (2022), Singh *et al.* (2023), Malik and Tantarapale (2024), Zehbi and Yousuf (2024), Kumar and Saroa (2025) and Kumar (2025) [12, 14, 21, 32]. The present study was conducted at G.G.M. Science College, Jammu, Jammu and Kashmir (UT), where the spider fauna of the campus remains largely undocumented. The study aims to document, identify, and assess the diversity of spiders (Araneae) inhabiting various campus microhabitats. The findings are expected to provide baseline information on the local araneofauna, contribute to filling the existing knowledge gap, and serve as a reference for future studies on spider diversity and distribution in the region.

### Material and Methods

#### Study Area

The present study was conducted from July 2025 [29] to June 2026 within the premises of Government Gandhi Science College, Jammu, J&K (UT), India (Fig. 1). Geographically, the study area lies at approximately 32.73° N latitude and 74.86° E longitude, at an elevation of about 327 meters above sea level. The college is spread over a vast and lush green campus of approximately 58 acres. The campus represents a unique mosaic of microhabitats embedded within a city setting- comprising gardens, lawns, road side vegetation, old buildings and newly constructed structure. This heterogeneous landscape provides a variety of microhabitats that are likely to support a diverse assemblage of spider species.



**Fig 1:** Location of the study area (GGM Science College Campus).

## Materials and Methods

To document the spider diversity, systematic field surveys were conducted across all the possible habitats, viz., gardens, lawns, shrub-covered patches, indoor of old buildings, newly constructed structure, corridors, and boundary walls during the present study. The survey was conducted twice per week during the morning hours (9:00-10:30am) and evening hours (5:00-6:30pm) throughout the study period between July 2025<sup>[29]</sup> to June 2026. Spiders were observed with naked eye during the field investigation, which involved carefully examining tree bark, window corners, crevices in walls, shrubs, leaf litter, and other microhabitats. Photographs were taken through Samsung A56 macro lens camera for proper documentation and later identification. Images were clicked carefully to ensure clear visibility of body features and web patterns, which helped in accurate identification of species. These photographic data were identified using different publications by Tikader (1980, 1982a,1987); Tikader and Malhotra (1980); Barrion and Listinger (1995)<sup>[1, 22, 25, 27]</sup>; Jocque and Dippenaar-Schoeman (2006); Gajbe (2008); Sebastian and Peter (2009); and Metzner (2017)<sup>[8, 9, 16, 19]</sup>. Classification was done by using standard taxonomic published literature, field guide including “Spider Genera of India” and authentic digital resources.

During the survey, following four collection methods (Coddington *et al.*, 1991; Toti *et al.*, 2000)<sup>[5, 28]</sup> were used for locating spiders in different habitats.

1. **Aerial hand collection:** Spiders present on herbs, shrubs, and taller plants were searched manually from

knee height to the top of the vegetation cover and collected by a sweep net.

2. **Beat Sheet Method:** During the survey a light-coloured cloth was placed beneath the vegetation and then leaves or branches were gently shaken in order to dislodge the spider species and allow them fall onto the cloth for observation.
3. **Ground hand collection:** Spiders present on the surface of the ground, rocks, fallen leaves, and vegetation near the ground level were observed and documented.
4. **Building search:** Corners, walls, windows, and sheltered places inside the campus buildings were examined carefully to record spiders found in human-associated habitats.

The Shannon-Wiener Diversity Indices were used to calculate the species diversity from the study area by following formulas:

### Shannon-Wiener's Index

$H'$

Where,  $H'$  = Shannon–Wiener diversity index

$S$  = The community's total species count

$p_i$  = Proportion of individuals belonging to the  $i^{\text{th}}$  species

$\ln$  = Natural log of the number.

**Shannon Equitability index** was calculated by the equation:

$$EH = H / \ln(S)$$

Where, H is Shannon-Wiener diversity index  
 S is species richness.  
 Species richness was measured by Menhinick's index.  
 Where, S= total number of identified species.  
 N = Total number of counted individuals.

## Results and Observations

During the current study, 63 spider taxa were recorded from the study area, of which 62 taxa belonged to the order Araneae, representing 15 families, while one species belonged to the order Opiliones, family Sclerosomatidae (Table 1, Images 1-6). The study revealed that the family Salticidae was the most dominant, represented by 17 species (26.98%), followed by Araneidae with 12 species (19.05%), Oxyopidae with 9 species (14.29%), Thomisidae with 5 species (7.94%), Lycosidae with 4 species (6.35%) each, Theridiidae with 3 species (4.76%), Philodromidae, Pisauridae and Uloboridae with 2 species (3.17%) each, whereas Corinnidae, Dolomedidae, Oecobiidae, Pholcidae, Sparassidae, Tetragnathidae and Sclerosomatidae were least represented with a single species each (Fig. 2-3). *Leucauge decorata*, *Oecobius navus*, and *Crossopriza lyoni* were the most abundant spider species recorded in the study area, followed by *Oxyopes salticus* and *Oxyopes javanus*. Their relatively higher abundance indicates greater representation and prevalence within the surveyed habitat compared with the other recorded species. The calculated diversity indices, Shannon-Wiener Diversity Index ( $H' = 3.718$ ) was found highest in the study area. Menhinick's Richness Index ( $D = 3.08$ ), and Pielou's Evenness Index ( $E_h = 0.897$ ) were also found high in the study area (Table 2). The high diversity, richness, and evenness values from the study area indicate an exceptionally diverse, stable, and healthy habitat in the study area. The findings provide the first baseline information from the campus of G.G.M Science College Jammu and emphasizes the need for further investigations and long-term biodiversity monitoring.

## Discussion

The present study documented 62 spider taxa belonging to the order Araneae, representing 15 families, along with one species of the order Opiliones, from the campus of G.G.M. Science College, Jammu. The findings demonstrate considerable arachnid diversity within a relatively small urban habitat, highlighting the ecological significance of the

college campus as a suitable habitat for diverse arachnid assemblages. It was revealed that the family, Salticidae was the most diverse family representing 17 species (26.98%), followed by Araneidae 12 species (19.05%) and Oxyopidae 9 species (14.29%). The predominance of Salticidae is consistent with recent studies from Jammu and Kashmir, where Salticidae has been reported among the most species-rich spider families (Singh *et al.*, 2023; Kumar and Saroa, 2025) [12, 21]. The high representation of these families may be attributed to the availability of diverse vegetation, buildings, tree trunks, lawns and other microhabitats within the college campus.

The occurrence of *Crossopriza lyoni*, *Leucauge decorata* and *Oecobius navus* among the dominant species is comparable with observations from Udhampur District, where it was also reported as one of the abundant species (Kumar and Saroa, 2025) [12]. The dominance of *Leucauge decorata*, *Oecobius navus* and *Crossopriza lyoni*, followed by *Oxyopes salticus* and *O. javanus*, may be associated with their ecological plasticity, availability of suitable microhabitats and abundant prey resources in the study area. The web-building species *L. decorata*, *O. navus* and *C. lyoni* can efficiently exploit vegetation, walls, crevices and other structural surfaces for web construction, whereas *Oxyopes* species are active hunters commonly associated with vegetation. The availability of suitable substrates, favourable microclimatic conditions and continuous prey availability may therefore have favoured their establishment and higher abundance. Earlier regional studies have documented considerable spider diversity in Jammu and Kashmir, with 252 species belonging to 148 genera and 31 families reported from the Union Territory (Singh *et al.*, 2023) [21]. More recently, Kumar and Saroa (2025) [12] recorded 122 species from Udhampur District, demonstrating the rich but still incompletely explored spider fauna of the Jammu region. The Shannon-Wiener diversity index ( $H' = 3.718$ ) indicates considerable species diversity, while the high Pielou's evenness value ( $J' = 0.897$ ) suggests a relatively uniform distribution of individuals among species. The Menhinick's richness index ( $D = 3.08$ ) further indicates substantial species richness within the study area. Overall, the findings demonstrate that institutional green spaces can support diverse spider communities and provide valuable baseline information for future studies on the taxonomy, ecology and distribution of spiders in Jammu and Kashmir.

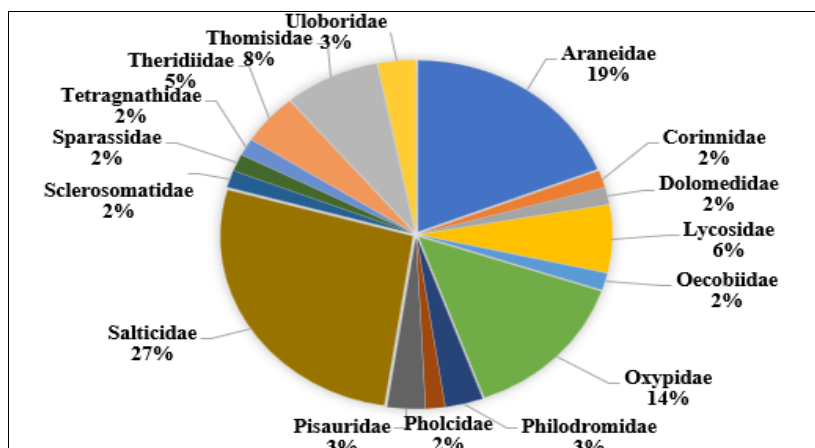
**Table 1:** Systematic list of araneofauna documented in the study area of Government Gandhi Memorial Science College, Jammu, J&K (UT).

| S.no | Common Name                  | Zoological Name                               | Remarks    |
|------|------------------------------|-----------------------------------------------|------------|
|      |                              | Order - Aranea                                |            |
|      | Family - Araneidae           |                                               |            |
| 1    | Humped Backed Araneid spider | <i>Eriovixia excelsa</i> (Simon, 1889)        | Image 1, A |
| 2    | Araneid spider               | <i>Eriovixia sp.</i>                          | Image 1, B |
| 3    | Grass Neoscona spider        | <i>Neoscona moreli</i> (Vinson, 1863)         | Image 1, C |
| 4    | Monkey orb weaver spider     | <i>Neoscona punctigera</i> (Doleschall, 1857) | Image 1, D |
| 5    | Common web spider            | <i>Neoscona theisi</i> (Walckenaer, 1841)     | Image 1, E |
| 6    | Arabesque orb weaver         | <i>Neoscona arabesca</i> (Walckenaer, 1841)   | Image 1, F |
| 7    | Bordered orb weaver          | <i>Neoscona adianta</i> (Walckenaer, 1802)    | Image 1, G |
| 8    | Orb-weaver spider            | <i>Neoscona sp.</i>                           | Image 1, H |
| 9    | Orb-weaver spider            | <i>Guizygiella sp.</i>                        | Image 1, I |
| 10   | Orb-weaver spider            | <i>Hypsosinga sp.</i>                         | Image 1, J |
| 11   | Orb-weaver spider            | <i>Araneus sp.</i>                            | Image 1, K |
| 12   | Orb-weaver spider            | <i>Pronous sp.</i>                            | Image 1, L |

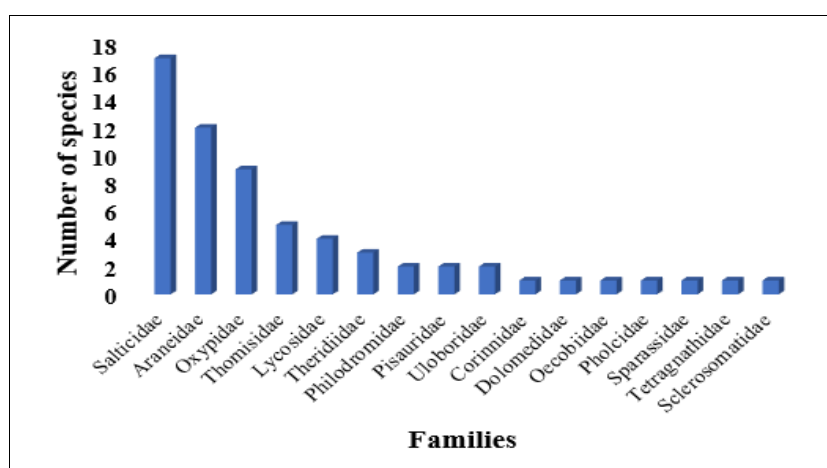
|    |                                |                                                           |               |
|----|--------------------------------|-----------------------------------------------------------|---------------|
|    | Family - Corinnidae            |                                                           |               |
| 13 | Antmimic spider                | <i>Castianeira sp.</i>                                    | Image 2, A    |
|    | Family - Dolomedidae           |                                                           |               |
| 14 |                                | <i>Dolomedes sp.</i>                                      | Image 2, B    |
|    | Family - Lycosidae             |                                                           |               |
| 15 | Wolf spider                    | <i>Pardosa distincta</i> (Blackwall, 1846)                | Image 2, C    |
| 16 | Wolf spider                    | <i>Allocosa sp.</i>                                       | Image 2, D    |
| 17 | Wolf spider                    | <i>Pardosa sp.</i>                                        | Image 2, E    |
| 18 | Wolf spider                    | <i>Honga radiata</i> (Latreille, 1817)                    | Image 2, F    |
|    | Family-Oecobiidae              |                                                           |               |
| 19 | Baseboard spider               | <i>Oecobius navus</i> (Blackwall, 1859)                   | Image 2, G    |
|    | Family- Oxyptidae              |                                                           |               |
| 20 | Burmese Lynx spider            | <i>Oxyopes birmanicus</i> (Thorell, 1887)                 | Image 2, H    |
| 21 | Orange Backed Lynx spider      | <i>Oxyopes kohaensis</i> (Bodkhe & Vankhede, 2012)        | Image 2, I    |
| 22 | Lynx spider                    | <i>Oxyopes hindostanicus</i> (Pocock, 1901)               | Image 2, J    |
| 23 | Striped Lynx spider            | <i>Oxyopes javanus</i> (Thorell, 1887)                    | Image 2, K    |
| 24 | Striped Lynx spider            | <i>Oxyopes salticus</i> (Hentz, 1845)                     | Image 2, L    |
| 25 | Striped Lynx spider            | <i>Oxyopes sertatus</i> (L. Koch, 1878)                   | Image 3, A    |
| 26 | Lynx spider                    | <i>Oxyopes bharratae</i> (Gajbe, 1999)                    | Image 3, B    |
| 27 | Lynx spider                    | <i>Oxyopes sp. 1</i>                                      | Image 3, C    |
| 28 | Lynx spider                    | <i>Oxyopes sp. 2</i>                                      | Image 3, D    |
|    | Family- Philodromidae          |                                                           |               |
| 29 | Runnend crab spider            | <i>Philodromus sp.</i>                                    | Image 3, E    |
| 30 | White running crab spider      | <i>Psellonus sp.</i>                                      | Image 3, F    |
|    | Family- Pholcidae              |                                                           |               |
| 31 | Daddy- long legs               | <i>Crossopriza lyoni</i> (Blackwall, 1867)                | Image 3, G    |
|    | Family- Pisauridae             |                                                           |               |
| 32 | Nursery web spider             | <i>Perenethis venusta</i> (L. Koch, 1878)                 | Image 3, H    |
| 33 | Nursery web spider             | <i>Pisaurina sp.</i>                                      | Image 3, I    |
|    | Family- Salticidae             |                                                           |               |
| 34 | Two-tailed jumping spider      | <i>Telamonia dimidiata</i> (Simon, 1899)                  | Image 3, J    |
| 35 | Adansons house spider          | <i>Hasarius adansoni</i> (Audouin, 1826)                  | Image 3, K, L |
| 36 | Ant mimicking jumping spider   | <i>Myrmarachne melanocephala</i> (MacLeay, 1839)          | Image 4, A    |
| 37 | Ant mimicking jumping spider   | <i>Myrmarachne plataleoides</i> (Pickard-Cambridge, 1869) | Image 4, B    |
| 38 | Banded Phintella               | <i>Phintella vittata</i> (C.K. Koch, 1846)                | Image 4, C    |
| 39 | Common Housefly catcher        | <i>Plexippus petersi</i> (Karsh, 1878)                    | Image 4, D    |
| 40 | Pantropical Jumping spider     | <i>Plexippus paykulli</i> (Audouin, 1826)                 | Image 4, E, F |
| 41 | Half-edged Wall Jumping spider | <i>Menemerus semilimbatus</i> (Hahn, 1829)                | Image 4, G    |
| 42 | Wall Jumping spider            | <i>Menemerus fulvus</i> (L. Koch, 1878)                   | Image 4, H    |
| 43 | Heavy-bodied Jumper            | <i>Hyllus semicupreus</i> (Simon, 1885)                   | Image 4, I    |
| 44 | Imperial Jumping spider        | <i>Thyene imperialis</i> (Rossi, 1846)                    | Image 4, J, K |
| 45 | Jumping spider                 | <i>Menemerus nigli</i> (Wesolowska & Freudenschuss, 2012) | Image 4, L    |
| 46 | Jumping spider                 | <i>Rhene albiger</i> (C.L Koch, 1846)                     | Image 5, A    |
| 47 | Jumping spider                 | <i>Marpissa sp.</i>                                       | Image 5, B    |
| 48 | Jumping spider                 | <i>Evarcha sp.</i>                                        | Image 5, C    |
| 49 | Jumping spider                 | <i>Cyrtophora sp.</i>                                     | Image 5, D    |
| 50 | Jumping spider                 | <i>Euprosthenops sp.</i>                                  | Image 5, E    |
|    | Family- Sparassidae            |                                                           |               |
| 51 | Golden Huntsman spider         | <i>Olios sp.</i>                                          | Image 5, F    |
|    | Family- Tetragnathidae         |                                                           |               |
| 52 | Decorative Silver orb spider   | <i>Leucauge decorata</i> (Blackwall, 1864)                | Image 5, G    |
|    | Family- Theridiidae            |                                                           |               |
| 53 | False Window spider            | <i>Steatoda grossa</i> (C.L Koch, 1838)                   | Image 5, H    |
| 54 | False Window spider            | <i>Steatoda cingulata</i> (Thorell, 1890)                 | Image 5, I    |
| 55 | Red House spider               | <i>Nesticodes rufipes</i> (Lucas, 1846)                   | Image 5, J    |
|    | Family- Thomisidae             |                                                           |               |
| 56 | Crab spider                    | <i>Runcinia yogeshi</i> (Gajbe & Gajbe, 2000)             | Image 5, K    |
| 57 | Crab spider                    | <i>Thomisus akinawensis</i> (Strand, 1907)                | Image 5, L    |
| 58 | Crab spider                    | <i>Thomisus sp.</i>                                       | Image 6, A    |
| 59 | Common crab spider             | <i>Xysticus cristatus</i> (Clerck, 1757)                  | Image 6, B    |
| 60 | Ground Crab spider             | <i>Xysticus sp.</i>                                       | Image 6, C    |
|    | Family- Uloboridae             |                                                           |               |
| 61 | Ninja-star ceiling spider      | <i>Zosis geniculata</i> (Oliver, 1789)                    | Image 6, D    |
| 62 | Feather-legged spider          | <i>Uloborus sp.</i>                                       | Image 6, E    |
|    | Order- Opiliones               |                                                           |               |
|    | Family- Sclerosomatidae        |                                                           |               |
| 63 | Harvestman spider              | <i>Leiobunum blackwalli</i> (Meade, 1861)                 | Image 6, G    |

**Table 2:** Shannon-Wiener Diversity Indices (Magurran, 2004) recorded in the study area.

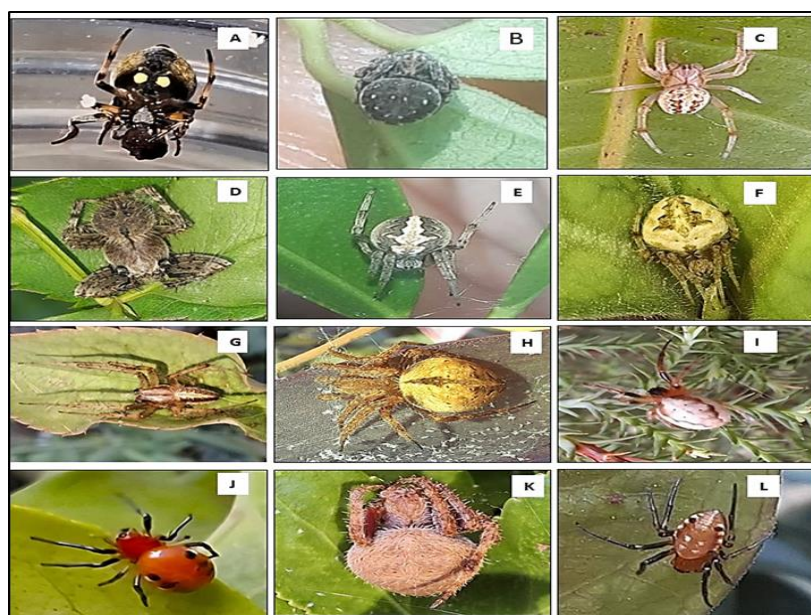
| Shannon-Weiner Diversity Index<br>(H') | Pielou's Evenness Index<br>(J) | Menhinick's Index<br>(D) |
|----------------------------------------|--------------------------------|--------------------------|
| 3.718                                  | 0.897                          | 3.08                     |



**Fig 2:** Pie chart representing percentage distribution of Spider families in the study area.



**Fig 3:** Bar chart depicting the composition of Aranea species family wise from study area of G.G.M Science College, J&K(UT).



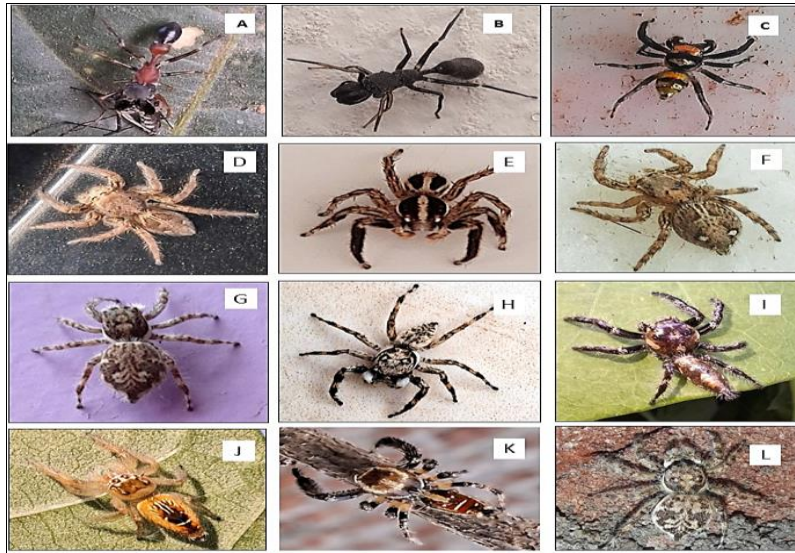
**Image 1:** A – *Eriovixia excelsa* | B – *Eriovixia* sp. | C – *Neoscona moreli* | D – *Neoscona punctigera* | E – *Neoscona theisi* | F – *Neoscona arabesca* | G – *Neoscona adianta* | H – *Neoscona* sp. | I – *Giziugiella* sp. | J – *Hypsosinga* sp. | K – *Araneus* sp. | L – *Pronous* sp.



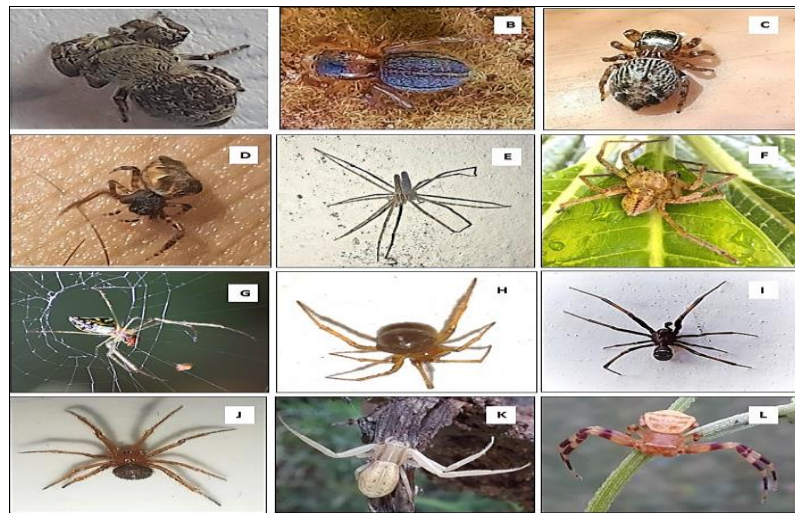
**Image 2:** A – *Castianeira* sp. | B – *Dolomedes* sp. | C – *Pardosa distincta* | D – *Allocosa* sp. | E – *Pardosa* sp. | F – *Hogna radiata* | G – *Oecobius navus* | H – *Oxyopes birmanicus* | I – *Oxyopes kohaensis* | J – *Oxyopes hindostanicus* | K – *Oxyopes javanus* | L – *Oxyopes salticus* |



**Image 3:** A-*Oxyopes sertatus* | B-*Oxyopes bharaatae* | C-*Oxyopes* sp.1 | D-*Oxyopes* sp.2 | E- *Philodromus* sp. F-*Psellonus planus* | G-*Crossopriza Iyoni* | H-*Perenethis venusta* | I-*Pisaurina* sp. | J-*Telamonia dimidiata* | K-*Hasarius adansoni* (M) | L- *Hasarius adansoni* (F).



**Image 4:** A–*Myrmarachne melanocephala* | B–*Myrmaplata plataleoides* | C–*Phintella vittata* | D– *Plexippus petersi* | E– *Plexippus paykulli* (M) | F–*Plexippus paykulli* (F) | G–*Menemerus semilimbatus* | H–*Menemerus fulvus* | I–*Hyllus semicupreus* | J–*Thyene imperialis* (M) | K–*Thyene imperialis* (F) | L–*Menemerus nigli*.



**Image 5:** A–*Rhene albiger* | B–*Marpissa* sp. | C–*Evarcha* sp. | D–*Cyrtophora* sp. | E–*Euprosthenops* sp. | F–*Olios* sp. | G– *Leucauge decorata* | H–*Steatoda grossa* | I–*Steatoda cingulata* | J–*Nesticodes rufipes* | K–*Runcinia yogeshi* | L–*Thomisus okinawensis*.



**Image 6:** A–*Thomisus* sp. | B–*Xysticus cristatus* | C–*Xysticus* sp. D–*Uloborus* sp. E–*Zosis geniculata* F– Jumping spider (Unidentified), G–*Leiobunum blackwalli*

## Conclusion

The Arachnida fauna recorded in the campus of Government Gandhi Memorial Science College, Jammu, J&K (UT), India is represented by a total 63 spider taxa of which 62 taxa belonged to the order Araneae, and one species belonged to the order Opiliones. The present study provides the first baseline photographic documentation of spider diversity from the college campus. The recorded diverse assemblage of spider fauna reflects the heterogeneous habitat of the study area. Further investigation covering different seasons, additional microhabitats, feeding guild and long-term monitoring are recommended to improve the understanding of spider diversity and their distribution pattern in the region.

## Conflict of interest

The authors declare no conflict of interest regarding the publication of this manuscript. This research was conducted independently, with no financial or commercial relationships that could be construed as potential conflicts impacting the results or interpretations presented.

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