

## Review of research on spider fauna in Different regions of Karnataka, India

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### Abstract

Biodiversity refers to varieties and variability among all the living organisms and communities in a defined area. India is rich in flora and fauna and it is a mega diversity country. Spiders are the most diverse groups of organisms in India and they play an important role in ecological balance and considered as the ecological indicators. Hence, review study of spider fauna was carried out in the various areas of Karnataka. In this review study, a total of 23 researchers have carried out research on spider fauna in various regions of Karnataka. The main aim is to conduct this review study to evaluate the current status of spider diversity in Karnataka state. Spiders aid in natural pest control.

**Key words :** Spider diversity, Pest control, Karnataka.

Spiders are plentiful, various and there are 45,516 recognised species, contain among the biggest parts of invertebrate fauna in any natural surroundings<sup>5</sup>. They are dispersed on each mainland with the exception of Antarctica and have adjusted to all realized biological conditions aside from air and vast ocean<sup>6,38</sup>. Quantities of entomologists have recognized the significance of spiders as one the significant hunters in managing the vermin of various yields<sup>17,21</sup>. Spiders are tracked down in various environments, on dry leaves on

forest floor, tall grasses, and underground caves, under bark, stones logs, close to water source, mountains regions and artificial territories.

Spiders have great abilities of dispersal, they are different and bountiful in rural scenes and they consume an extensive variety of bug prey<sup>15</sup>. Besides, they affect the harvest plants. These attributes make them possibly helpful normal adversaries of insect pests in crops. Insects are delicate pointer and

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model gathering to decide ecological change<sup>8,9</sup> and they are considered as a measuring stick in conservational studies<sup>23</sup>. Spiders are likely hunters of insect pests in earthly biological system and furthermore filling in as food hotspots for arthropod leaning toward predators<sup>16</sup>.

A few spiders dig holes in the ground and make use of shallow holes for hiding. Many spiders prefer dark and shaded area with high humidity. Latest studies have shown the significance of spiders as ecological signs. Terrestrial arthropods such as spiders are among, have lengthy been monitored for early warning signs and symptoms of environmental exchange. In evaluation to vertebrate indicator species, the physiology of many arthropods exhibits a extra detectability to many monitoring methods<sup>11</sup>. Spiders have realistic role as biological control agents within the pest management<sup>4,39</sup>.

Spiders are really an integral part of worldwide biodiversity on account that they play many vital roles in ecosystems as predators and assets of food for other creatures. Spiders possess the characteristics of predators that can make contributions to density-independent limitation of prey, which include self-damping, excessive ranges of polyphagy, and life cycles that are asynchronous to those of prey species<sup>24</sup>. Moreover spiders are an vital food sources for birds, lizard, wasps and other animals. In a look at of trunk arthropod, spiders provided a especially regular food source in the course of the 12 months for bark-gleaning birds<sup>19</sup>. Additionally spider silk is essential to hen species for nest constructing<sup>7,20</sup>.

Literature survey exhibits that very scanty facts at the spiders from Karnataka is to be had; a few of the works such as those of Venkatasalu<sup>35</sup> and Vijayakumar<sup>36</sup> on insect pest control mention the occurrence of a few spider species in the agriculture ecosystems from Bangalore and Dharwad area respectively. Further, Bastawade *et al.*,<sup>2</sup> made a cursory mention of the distribution of a species of Thomisid spider from North Kanara, Karnataka; Silwal *et al.*,<sup>29</sup> while analyzing the occurrence of genus *Tigidia* in the Western Ghats reviews the availability of one species from the Karnataka region of Western Ghats; However, Nalini Bai and Ravindranatha<sup>13</sup> reported the spider diversity in IISc campus, Bangalore, wherein in 40 species had been observed with the aid of the author.

The knowledge on diversity and distribution of spiders of Karnataka is meager as compared to other parts of Western Ghats and different habitats. The need is, in fact made all the more urgent by the spirit of developmental activities, new settlements also affected the natural habitat for spiders. This review study aims to carry out the work on distribution of spider species in different locations of Karnataka.

#### *Study area :*

Karnataka's northern part of which is the second biggest arid district in India. The Mullayanagiri hills in the Chikmagalur district, which are at an elevation of 1,925 meters (6,316 feet), are Karnataka's highest point. The Krishna and its tributaries—the Bhima, Ghataprabha, Vedavathi, Malaprabha, and Tungabhadra—are the two river systems in



Figure 1: Karnataka state map showing districts

North Karnataka. In South Karnataka, the Kaveri and its tributaries—the Hemavati, Shimsha, Arkavati, Lakshmana Thirtha, and Kabini—are the two river systems. The majority of these rivers originate in Karnataka and travel eastward before reaching the Bay of Bengal sea. The Sharavati in Shimoga and the Netravati in Dakshina Kannada are two other significant rivers that flow west to the Lakshadweep Sea. Countless dams and supplies are built across these waterways which are utilized for water system and

hydroelectricity power period in the state.

Secondary data was collected by referring books, journals, monographs and web references. In addition, secondary information was gathered from local people of surrounding areas and forest personnel about the different spiders by interviewing and showing pictures of the species to them.

Vijaykumar and Patil<sup>37</sup> surveyed the spider fauna in 05 locations of Tungabhadra project area of Karnataka and they recorded

17 species of spiders belonging to 14 genera and 08 families. The highest number of species were represented by Salticidae and Araneidae followed by Lycosidae and Tetragnathidae and one species each in Clubionidae, Eresidae, Thomisidae and Pisauridae.

Siliwal *et al.*,<sup>30</sup> have recorded in their paper a new genus *Neoheterophriectus* with three new species, *Neoheterophriectus crurofulvus*, *N. sahyadri* sp. and *N. Uttarakannada* sp. described from Uttara Kannada District, Karnataka, India. The new genus is close to *Heterophriectus* Pocock, 1900 and *Plesiophriectus* Pocock, 1899 but has multi lobed spermathecae, which was consistent in all the three species and the males possessing double tibial spur.

Prashanthakumara and Venkateshwarlu<sup>20</sup> have conducted to document spider diversity in Gudvi bird Sanctuary, Shivamogga District, Karnataka, India. They recorded a total of 71 species of spiders belonging to 58 genera from 18 families. The dominant families were Salticidae (17 species), Araneidae (16 sp.) and Theridiidae (9 sp.). A guild structure analysis of the spiders revealed, 08 different

feeding guilds were observed by them. Among these stalkers are most dominant (28%) group followed by orb web weavers (25%), ground runner (23%), and space web spiders (13%). The other groups like foliage runners (4%), sheet web spiders (3%), Ambushers (3%) and Burrowers (1%) are very less number of species. Spiders are considered as generally species richness and the health of terrestrial communities. Shraddha Kumari and Chaturved Shet<sup>28</sup> studied the spider diversity in Amanikere Park of Tumakuru district. During their study, 50 species belonging to 41 genera of 14 families were documented. In their it was found that, the family Araneidae was dominated by 15 species followed by the family Salticidae with 13 species.

The spider survey was carried out by Shraddha Kumari and Chaturved Shet<sup>27</sup> from Malavagoppa village of Shimoga district. During their study, 51 species belonging to 42 genera and 16 families were documented. They reported that the family Araneidae was dominant having 14 species preceded by the family Salticidae with 12 species.



Figure 2: Photographs showing Spider fauna in Karnataka (Source: Sumangala Rao *et al.*, 2018)

Sumangala Rao *et al.*,<sup>31</sup> have updated the list of spiders in various patches of Mangalore University campus. A total of 32 species belonging to 16 genera were documented by them. Of these, 10 genera were found to be arboreal, grassland ecosystem has species belonging to three genera and six were found to be in human constructions. Biodiversity indices revealed that the species richness in arboreal and dominance of some species over others in human constructions.

An attempt has been made by Shiva Sharma and Rama Krishna<sup>26</sup> to explore the spider fauna of Bangalore University campus. They recorded 52 species, 32 genera and 13 families of spiders. The dominant families were Araneidae with 22 species, Salticidae by 8 species, Oxyopidae with 5 species, Pholcidae and Lycosidae with 3 species each. A total of 06 guild structures of spiders were observed. The data throws light on rich diversity of spiders in campus which is attributed to diverse habitats and ecological niche.

Suraj and Parimala<sup>33</sup> studied the spider fauna in the University College of Science Campus, Tumkur University. During their survey, a total 172 number of spiders belonged to 14 species, 6 families were been identified. From their survey it is inferred that, their study area provides a favorable condition to the spider's diversity.

Field survey was conducted by Mubeen and Basavarajappa<sup>12</sup> to record the diversity of spiders at different ecosystems in and around Mysore city. Around 65 species of spiders belonging to 15 families were recorded by them.

Consecutive survey of Bhat *et al.*,<sup>3</sup> for three years has revealed occurrence of 117 species of spiders belonging to 18 families and 63 genera in cashew plantation. Among them, 30 species were very common, 26 species were common, 34 species as rare and 27 species were very rare. Salticids were predominant and Araneidae contributed 22 % of the spider fauna. Spider feeding guilds and population was maximum during winter and monsoon season.

Raiz Tabasum *et al.*,<sup>22</sup> have quantify and compare the effects of environmental variation and spatial proximity on ground dwelling spider assemblages in different microhabitat types (open grassland, logs, trees) that recur across structurally heterogeneous grassy woodlands. They identified 50 species and 19 families of spiders in and around the Vijayanagara Sri Krishnadevaraya University Ballari.

Prashanthakumara *et al.*,<sup>21</sup> have studied the diversity of spiders in different locations of Jnana Sahyadri campus, Kuvempu University, Shimoga, Karnataka using beating, Active searching, visual observation and net sweeping and leaf litter sampling techniques. Among 316 individuals, 17 species and 10 families of spiders were recorded. Salticidae was the most dominant family according to their investigation.

Ashwini Deshpande and Ravindra Paul<sup>01</sup> have reported 25 species of spiders belonging to 10 families and 17 genera from Gulbarga, Karnataka. Araneidae, Salticidae and Oxyopidae were the dominant families. According to them the most abundant genus was Neoscona.

The spider fauna of Indian Institute of Science, Bangalore, was carried out by Nalini Bai and Ravindranatha<sup>13</sup> and they recorded 40 species of spiders belonging to 33 genera under 14 families. Among these families, the Araneidae was represented by 5 Genera & 10 species. The salticidae was 9 genera & 9 species. Occurrence of large number of Araneids may possibly be due to thick vegetation.

Nautiyal *et al.*,<sup>14</sup> have undertaken a baseline study to understand the population and distribution of spiders in different ecosystems of Gogi, yadgir district. A total of 82 spider species belonging to 19 families were recorded by them.

Rushikesh Pawar and Ganesh<sup>18</sup> undertaken to determine the spider diversity in Londa (Belagavi District) and they documented a total of 36 species from 30 genera, 15 families in the study area. Overall, their results suggest a need for conservation of ecosystem in Londa area in order to avoid depletion of rare species by reducing human activities such as deforestation, urbanization and different forms of environmental pollution. Kokilamani *et al.*,<sup>10</sup> have surveyed spider fauna of Tumkur University, Tumakuru, India.

A total of 46 species belonging to 34 genera of 13 families were observed by them. The different types of habitat and ecological factors of the campus evidenced with rich diversity of spider species. Their study establishes a baseline data for future research in the field of arachnology.

Selifa Fernandes and Ganesh<sup>25</sup> have recorded the spiders belonging to Order Araneae in the Class Arachnida. Their study focuses on the diversity of spiders in Lalbagh Botanical Garden and Tavarekere Park in Bangalore, Karnataka. During their study, a total of 21 species belonging to 16 genera and 10 families were documented. Salticidae was highest with 06 species as compared to the other families.

Supriya *et al.*,<sup>32</sup> have looked into the temporal and spatial variation of spider species over a two-year period at Chincholli Wildlife Sanctuary of Kalaburagi, Karnataka, India. They recorded a total of 48 species and 20 families via alternate methodologies, and the data obtained was then subjected to conventional diversity indexes. Their findings indicated a substantial positive link between similarity in the spider community and plant species.

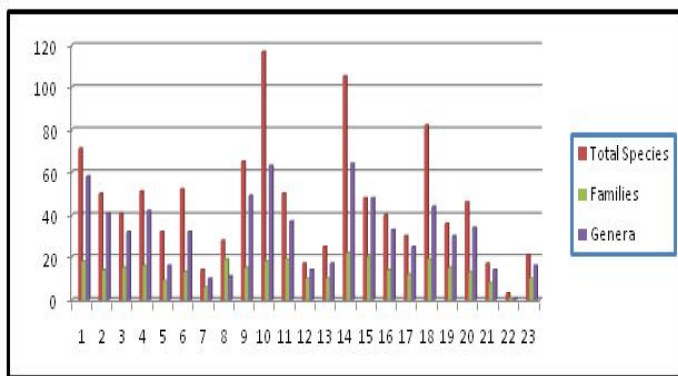


Figure 3: Total number of species, families and genera of spiders in various locations of Karnataka

**One way Analysis of Variance (ANOVA) for Total species, families and Genera of spiders in Karnataka :**

Table-1. Analysis of Variance (ANOVA) for Total species, families and Genera of spiders in Karnataka as worked out by various researchers

Group	N	Mean	Std.deviation	Std Error	
Total species	23	45.2609	28.1606	5.8719	
Families	23	13.7391	5.0472	1.0524	
Genera	23	31.7826	17.6891	3.6884	
Source	DF	Sum of squares	Mean square	F-stat	P-value
Between Groups	2	11506.5653	5753.2826	15.2553	0
Within Groups	66	24890.7533	377.1326		
Total	68	36397.3186			

Table-2. Total species, families and genera of Spiders in various localities of Karnataka as worked out by various researchers

Area No.	Total Species	Families	Genera	Area	References
1	71	18	58	Gudavi Bird Sanctuary, Shivamogga	Prashantha Kumara and Venkateshwarlu, 2017
2	50	14	41	Amanikere park, Tumakuru district	Shraddha Kumari and chaturved Shet, 2020
3	41	15	32	Karnataka University Campus, Dharwad	Vaibhav <i>et al.</i> , 2017
4	51	16	42	Malavagoppa village, Shimoga district	Shraddha Kumari and chaturved Shet, 2019
5	32	09	16	Mangalore University Campus	Sumangala Rao <i>et al.</i> , 2018
6	52	13	32	Bengaluru University Campus, Bengaluru	Shiva Sharma and Ramakrishna, 2021
7	14	06	10	University college of Science campus, Tumakuru	Suraj and Parimala, 2020
8	28	19	11	Dakshina kannada, Karnataka	Jnaneshwari Joshi & Venkteshwarlu, 2018
9	65	15	49	In & around Mysore city, Karnataka	Mubeen & Basavarajappa, 2018
10	117	18	63	Cashew ecosystem, Puttur	Bhat <i>et al.</i> , 2013
11	50	19	37	Tungabhadra irrigation Channel at Ballari, Karnataka	Raiz Tabasum <i>et al.</i> , 2018

12	17	10	14	Jnanasahyadri Campus, Shimoga	Prashantha Kumara <i>et al.</i> , 2015
13	25	10	17	Gulbarga, Karnataka	Ashwini Deshpande and Ravindra Paul, 2016
14	105	22	64	Mysore city, Karnataka	Nijagal <i>et al.</i> , 2020
15	48	20	48	Chincholli wild life Sanctuary, Karnataka	Supriya <i>et al.</i> , 2022
16	40	14	33	Indian Institute of Science, Bangalore	Nalini Bai and Ravindranatha, 2012
17	30	12	25	Agro Ecosystems of Western ghats, Karnataka	Somashekar <i>et al.</i> , 2020
18	82	19	44	Gogi, Yadgir district	Nautiyal <i>et al.</i> , 2017
19	36	15	30	Londa, Belagavi district	Rushikesh Pawar and Ganesh, 2016
20	46	13	34	Tumkur University Campus, Tumkur	Kokilamani <i>et al.</i> , 2019
21	17	08	14	Tungabhadra project	Vijaykumar and Patil, 2004
22	03	01	01	Uttara Kannada district	Siliwal <i>et al.</i> , 2012
23	21	10	16	Lalbagh Botanical Garden and Tavarekere Park, Bangalore South	Selifa Fernandes and Ganesh, 2020

Present review study updates the checklist of spiders in the various regions of Karnataka state. This type of documentation would be useful in the future assessment of environmental conditions as well to create awareness for their conservation. In conclusion, it is possible to state that there is an urgent need to learn more about spider diversity given their significance as bioindicators of changes in our environment.

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