

# **A Study of the Diversity and Distribution of Garden Spider Species in the Nallamala Forest Region of Nandyala District, Andhra Pradesh**

**\*Dr.H.Rama Subba Reddy<sup>1</sup>, Dr.N.Raja Naik<sup>2</sup>**

<sup>1</sup>*Department of Zoology, SVB. Govt.Degree College, Koilakuntla, Nandyala (D.T)*

<sup>2</sup>*Department of Zoology, National Degree College, Nandyala, Nandyala (D.T)*

[<sup>1</sup>hanumanthu.subbareddy@gmail.com](mailto:hanumanthu.subbareddy@gmail.com), [<sup>2</sup>rajanaiknenavath@gmail.com](mailto:rajanaiknenavath@gmail.com)

## **Abstract**

Spiders can live in almost all environments in which they can survive and are regarded as helpful indicators of the overall species richness and health of terrestrial communities. They are particularly sensitive to disturbances in the natural environment. As a result, the current study was conducted to investigate and identify diverse garden spider species at two distinct locations: a large college campus garden and the Nallamala forest area of the Nandyala District of Andhra Pradesh. Methodology: Visual and camera capture of photographs of spiders at both research sites and identification based on general shape, size, distinctive color pattern, number and positioning of eyes, length and arrangement of legs, and so on. Spiders are among the most diverse groups of organisms that exist in almost all microhabitats, as evidenced by the presence of 12 families, 25 genera, and 58 species in a small area. Due to their small numbers, this group cannot be disproved in conservation studies. Fewer species were found in the small garden and in the house that was located in a well-built area, whereas a large number of different species of spiders were found in the college campus garden with a larger area of vegetation. According to this brief investigation, multiple species were present, each belonging to a different taxonomic group, and as a result, we will be able to gain a better understanding of spider diversity and taxonomy.

*Keywords: Nallamala, diversity, taxonomy and identification*

## **Introduction:**

Spiders are ancient creatures that emerged during the Carboniferous period, over 380 million years ago. They are abundant and widespread in almost all ecosystems, making up a significant portion of global biodiversity. Among all animals, spiders represent 18% of the diversity, and the order Araneae ranks seventh in the total species diversity among all other groups of organisms. Spiders are fascinating creatures with predatory lifestyles. They produce silk, which they use for a variety of purposes, including capturing prey and constructing webs. There are six types of silk-producing glands in spiders, which they use to create their silk. Spiders are not insects because they have two body sections, the cephalothorax and abdomen, as well as four pairs of legs. Additionally, spiders lack wings and antennae, and they possess spinnerets on their abdomen.

## **Study area:**

Nandyala district is a recently formed district situated in the state of Andhra Pradesh, India. Its area extends over 9,681 square kilometers. It is located between the northern latitudes of 15.5 degrees and the eastern longitudes of 78.5 degrees. The district experiences a hot and humid climate. According to revenue records, the total geographical area of Nandyala district is 9,681 square kilometers. Approximately 32% of the district is covered by forests, which span an area of 3,08,607 hectares. These forests are primarily found in the hilly regions of Nallamala, Erramala, and parts of Velikonda hills. Minor forest produce in the area includes tamarind and beedi leaves. The main wild animals in the forest include tigers and panthers, while partridges, peacocks, and red jungle fowl are some of the avian species found there. In order to protect the wildlife in the district, the Nagarjuna Sagar – Srisailem Wildlife Sanctuary was established in the northern region of Nallamalas, covering an area of 46.815 hectares. Additionally, Project Tiger was initiated near Srisailem, covering an area of 3,568 square kilometers.

## **Materials and methods:**

A variety of methods were utilized to collect spiders from diverse habitats. The type of habitat determined the collection approach, which are briefly described as visual search method, Sweep net method, beating method, Berlese Tullgren funnel method, pit fall trap method, and sweep net method. Prior to preservation, photographs of the spiders were taken with a Nikon D5300 camera for documentation. Using a thin surgical knife, the male pedipalp and female genitalia were carefully removed. After that, a 10% aqueous potassium hydroxide (KOH) solution was applied to the epigyne to improve visibility. A Tucsen GT5.0 Color Microscope Camera fitted with a Carl-Zeiss Stemi 305 Stereo-Zoom microscope was used to identify the specimen. The spiders were preserved in polypropylene tubes containing 70% ethyl alcohol and a few drops of glycerin (Prasad, 1985) as a preserving fluid. The containers were labeled with a pen, providing details about the scientific name of the spiders. Spiders collected from different localities on different dates were preserved separately.

## **Statistical analysis:**

After collecting all spiders, they are categorized according to families by knowing their morphological characters. I had consulted number of eminent persons, who are familiar in archeology, and visited WWF and Biodiversity centers for confirming the species name. No. of species present in Nandyala district were compared with in India (P.A. Sebastian and K.V. Peter 2009 and Keswani et al, 2012) as well as the world (Platnick.N. 2013).

**Table: 1. Diversity of Spiders**

<b>DIVERSITY OF SPIDERS</b>			
<b>AREA</b>	<b>FAMILIES</b>	<b>GENERA</b>	<b>SPECIES</b>
<b>WORLD</b>	<b>136</b>	<b>4361</b>	<b>51,813</b>
<b>INDIA</b>	<b>62</b>	<b>499</b>	<b>1974</b>
<b>NANDYALA (Gardens)</b>	<b>12</b>	<b>25</b>	<b>58</b>

**Source:** [NMBE - World Spider Catalog](#), [Araneae of India – Spider diversity of India \(indianspiders.in\)](#)

### **Garden Spiders:**

These types of spiders are commonly found in gardens, crop lands, barren lands, and near water bodies such as streams, lakes, and other still water sources. Argiopes are true garden spiders that belong to the Araneidae family. In the Nandyala district, a wide variety of garden spiders can be observed in different fields. During my visits to various gardens and crop lands in the district, I noticed a significant number of spiders. One of the largest gardens in the district is the "Dr.Y.S.R. Smruthi Vanam" located in Nallakaluva village, Atmakur mandal. This garden was constructed in memory of the late Ex. C.M, Dr. Y.S.Rajasekhar Reddy, and covers an area of 22.20 acres with a capital of 13 crore rupees. The garden features a Fragrance Garden, a Butterfly-shaped Garden, and a Pavitra Vanam that contains 108 sacred plants. There are several parks and gardens in the Nandyala district that are not well-known to the public. For instance, there is a Municipal Park in Nandyal, which are home to numerous spider fauna. Additionally, horticulture crops like Mango, Banana, and Sapota plants serve as habitats for spiders. Most garden spiders are orb weavers, while others are bark dwellers. Lynx spiders typically live in crop lands, and Thomisids can be found on flowers like Chrisanthimam. These spiders play a crucial role in controlling agricultural pests in the agro-ecosystem.

### **Discussion:**

In the gardens, diversity of spiders is very high when compared to house and open land habitats. Here producers the garden habitat in the Nandyala district is teeming with life. Both producers and primary consumers are abundant, and the population and diversity of spiders in the area are particularly high. As secondary or tertiary consumers, spiders feed on primary or secondary consumers, which are also abundant. The spiders in this habitat primarily feed on arthropod insects, which are native to the area. The spider population and diversity are therefore high in this habitat, which includes grassland, cropland, and parks.

In my research, I collected a total of 58 spider species from different gardens, croplands, and parks in the Nandyala district. These species belong to 25 genera and 12 families. Croplands and gardens are particularly rich in spider diversity, while parks have lower diversity. Abiotic factors such as temperature and humidity play a significant role in the distribution of spiders.

The percent abundance of spider families in the garden habitat is summarized in Table 2. Araneidae spiders were the most abundant family in the garden habitat, with 24 species belonging to 9 genera collected and described. Araneidae is the third most diverse family of spiders in India, with a total of 154 species from 29 genera reported so far (Sebastian and Peter, 2009). Medium numbers of spiders from the families Salticidae, Thomisidae, and Tetragnathidae were collected and described.

The spiders found in the garden habitat belong to the families Araneidae, Salticidae, Thomisidae, Tetragnathidae, Oxyopidae, Eresidae, and Theridiidae. These spiders were mainly found in vegetation, with Thomisidae spiders found on flowering plants and seeds of tall grasses. Thomisidae spiders are found throughout the year, as reported by Levy (1985). Oxyopids were found on various types of shrubs, primarily on *Zujupus zuzuba*. Five species of the Oxyopidae family were described in the Nandyala district. These spiders cannot construct webs.

The present study aimed to investigate the diversity of spiders in Nandyala district, Andhra Pradesh, by conducting surveys in three different habitats over a period of four years. A total of 58 species under 25 genera and 12 families were recorded, with 42 species more than the previous study conducted in the Nallamala forest region by K. Thulasi Rao et al. (2005). The study found that orb-weaving spiders such as *Argiope aemula*, *A. pulchella*, *Neoscona muckerjei*, *N. nautica*, *N. vigilans*, *Cyrtophora citricola*, *C. kohensis*, *C. cicatrosa*, and *Larinia dhargadensis* were abundant in the area. Among the araneids, the species *Nephila maculata* and *N. pilipes* were found to construct the largest orb webs, while *Argiope aemula* constructed a large web with an X-shaped stabilimentum. All spiders in the family Araneidae construct orb webs, except for the *Cyrtophora* genus, which builds tent webs. In addition, the study found that *Cyrtophora citricola* vibrates continuously for a period of about 1 or 2 minutes when disturbed.

The results of the present study revealed that a great variety of spiders exists in the study area, with the potential for spider fauna to multiply under suitable climatic conditions and the absence of human interference in their habitats.

**Table -2. Diversity of Garden Spiders**

GARDEN SPIDERS			
S. No	Family Name	No. of Genera	No. of Species
1.	ARANEIDAE	09	24
2.	CTENIDAE	01	01
3.	ERESIDAE	01	01
4.	HERSILIDAE	01	01
5.	LYCOSIDAE	01	01
6.	OXIOPIDAE	02	05
7.	NEPHILIDAE	01	03
8.	TETRAGNATHIDAE	02	07
9.	THOMICIDAE	02	05
10.	PHILODROMIDAE	01	02
11.	SALTICIDAE	03	05
12.	THERIDIIDAE	01	03
TOTAL	12	25	58

The present study records that, out of 25 genera, 10 have been recorded for the first time and 5 for the second time in India. A total of 15 species belonging to 5 families were recorded in human habitations, while 43 species belonging to 20 genera and 7 families were recorded in the gardens and crop lands of the Nandyala district. The present study aims to provide a basis for research on the biodiversity of spiders in the Nandyala district and to determine the variety of spider species in different habitats. The study was conducted from 2020 to 2022, and collections were made once a month from various habitats using different methods from various sites in the study area. All collected specimens were identified and preserved in ethyl alcohol with proper labels. The diversity levels of the spider families found in various habitats were studied in detail. Therefore, conducting such studies in the gardens of the Nandyala district is of great importance to humans. On the other hand, it also enriches the Indian spider fauna, which has great biodiversity value.

Based on the findings of this study, it is evident that the spider fauna in the Nandyala district is both diverse and abundant, and could serve as a valuable, naturally occurring biological control agent against insect pests. However, it is crucial to take appropriate measures to preserve these natural resources. This can be achieved by educating students and farmers about the importance of maintaining ecological balance in various habitats.

**Garden Spiders**  
**Sub order:- Araenomorphae**  
**Family:- Araneidae**



**Argiope anasuja**



**Argiope pulchella**



**Neoscona bengalensis**



**Neoscona vigilans**



**Cyrtophora kohaensis**



**Cyrtophora cicatrosa**



**Aculeperia ceropegia**



**Thelacantha brevispina**

**References:**

- Andres Taucare-Rios & G.B. Edwards** (2012): First records of Jumping spider *Menemerus semilimbatus* in Chile, *Peckhamia*, 102.1, 07 August-2012, 1-3 pp
- Banks, N** (1914). New West Indian Spiders, *Bull. Amer. Nat. Hist.*, 33:639-642
- Basu, B.D** (1964). Diagnosis of two species of *Pistius* (Thomisidae: Araneae) from India. *J.Bengal Nat. Hist. Soc.*, 32(2): 104-109.

- C.J. Pushpa Raj** (2007), Ph.D Thesis, Sri Venkateswara University, Thirupathi.
- Chamberlin, R.V.** (1908). Revision of North American Spiders of the family Lycosidae. Proc. Acad. Nat. Sci., Philad., 60:157.
- Dasmann.R.F.** (1968): A different kind of country, Mac Millan company, New York.
- Edwards, C.A. & Flecher, K.E**(1972): Assessment of terrestrial invertebrate populations, Methods of study in soil Ecology, Paris, UNESCO.
- Ford, M.J.** (1978): Locomotory activity and the Predation strategy of the wolf spider *Pardosaamentata* (Clerk) Lycosidae, Animal behavior, 26,31 pp
- Gettmann, W.W.** (1976): Beutefang Bei Wolf spider Gattung Pirata, Araneae: Lycosidae. Ent. Germany, 3,93 pp
- Hingston, R.W.G** (1927). Protective devices in spider snares, with a description of seven new species of orb-weaveng spiders. Proc. Zool. Soc. Loand, 28: 242.
- Homann, H** (1934): Beitragezur Physiologic derspinnenaugen IV, Das Sehvermogen der Thomisiden, Z. Vergl. Physiol. 20, 420 pp
- Kaston, B.J.** (1978). How to know the spiders, Wm.C.Brown Co.,Dubuque. Iowa: 1-289
- Levy, H.W** (1985 b) Synopsis and classification of Living Organisms, Arthropoda: Chelicerate: 71-96.
- Murphy, J.F. 2000.** An introduction to the spiders of South East Asia, Kuala-Lampur, Malaysia. Malaysian Nature Society, 625 pp.
- Myers Norman et al** (2000): Biodiversity hotspots for conservation priorities, Nature, 403, 845-855 pp.
- Nalini Bai (2012):** Spider diversity in IISc, Bangalore, India, Indian Journal of Arachnology, December, 2012, 1(2), 057pp
- Pimm.J.L et al,** (1995): The future of biodiversity, Science 269, 347-352 pp.
- Platnick, N.I** (1983). Yet another artificial spider Classification: A review *j. Arachnol.*, 11(3):459-460.
- Platnick, N.** (2013). Catalogue of World spiders : family-wise Internetaces.
- Prasad, B. (1985).** Setting and preservation of spiders. Entomologist's Newsletter. 1(8). 2-3 pp

- Ramasubba Reddy. H** (2014): *Atrax robustus* – A new distributional record to Andhra Pradesh, India., International Journal of Natural and Applied Sciences, Vol. 1, Issue-2, July-2014.
- Sadana, G.L.** 1974 A new species of Spider genus *Marpissa* C.L.Koch (Salticidae) from India, Bull. Br. Arachan, Soc., 3(2) : 49-50.
- Sebastian P.A and K V Peter** (2009) Spiders of India- University press, Hyderabad. 100-350p
- Subrahmanayam, T.V** (1940). Some Indian spiders, their season of prosperity.J. Bombay Nat. Hist. Soc., **42**: 21-28 pp.
- Thorell, T** (1895). Descriptive catalogue of the Spiders of Burma, British, Museum, Lond: 1-406.
- Thulasi Rao K. et all**, Records of the zoological Survey of India, Occasional Paper No. 239 Arachid fauna of Nallamalai Region, Eastern Ghats, Andhra Pradesh, India
- Tikader and Bal**, (1981). Rec. Zool. Survey India. Occ.Pap., 24:1-60.