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# A preliminary study on the spider diversity of a rice ecosystem in Kumarakom

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#### Abstract

The order Araneae which include spiders it is the largest order of class Arachnida. Spiders of a rice field of a village in Kottayam, Kerala were studied during the months of August to November, 2015. 17 species belonging to 6 families were collected and identified from the habitat.

Keywords: spider, diversity, agroecosystem, predators

#### 1. Introduction

Spiders are one of the most numerous groups of terrestrial predators and most fascinating invertebrate animals in the world. A rice field is a complex ecosystem because it is containing many varieties of species. Spiders study in rice field is highly valuable because it helps to observe the effect of these predators on herbivores pest and to understand how profound changes on the environment affect spider diversity. But in kerala little documentation is carried out about the spider diversity in rice field. Kerala, with its varied geographic, climatic, and ecological features, exhibits a rich assemblage of various types of spiders <sup>[11]</sup>. Another potentially important factor is agroecosystem change along plant development, since environmental heterogeneity may be increased by plant growth. Spider assemblage density and diversity are intimately related to environmental structural complexity, which may be increasing as plants become larger and more complex <sup>[2]</sup>.

Fields abundant in spiders, prior to the introduction of chemical pesticides are now witnessing a change in the scenario. In addition to killing pests, these chemicals are also taking a heavy toll on useful insects. Preservation of spiders necessitates abandoning of these pesticides, or spot treatment and rational use of the same. Once pesticides are kept away from the fields, spiders invariably take shelter in the fields, feed on the pests and add to the productivity. Spiders have always been known to be effective predators, though their potential as bio-control agents has not been exploited to its fullest, at least in India <sup>[3]</sup>. By detailed research in this field, and a series of awareness and training programmes, we could propagate the use of spiders as a feasible method of pest control. The study is significant as they are known to play an important role in the ecosystem as predators. The diversity studies of spiders are important as the knowledge about many of them could be exploited for developing ecologically and environmentally sound insect pest management strategies.

## 2. Materials and Methods

#### 2.1 Study area

The study area is the paddy field in Kumarakom village in Ettumanoor Block in Kottayam District in Central Kerala. The study was carried out with special reference to Vilakumarakayal paddy field of the village. About 4 acres of the field was selected for the study. Kumarakom situated 13 Kms away from Kottayam is a sleepy little village on Vembanad Lake in Kerala. It offers wide variety of flora, exotic sightseeing, boating and fishing experience. The village sprawls over an area of 51.67 sq km, which is inclusive of 24.13 sq km of the lake. The lush paddy field below sea level are spread over an area of 15.75 sq km. The remaining portion of 1253 hectares is dry land. Kumarakom receives two monsoons- the southwest monsoon (June to August) and the northeast monsoon in November. During the southwest monsoon, backwater cruising is not allowed. The average rainfall is 1100mm.

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#### 2.2 collection and identification of spiders

The investigation was carried out for a period of four months from August to November 2015. Spiders were collected from morning between 7am-9 am. All out-search methods were used for collecting the spiders. Specimens were collected by walking through the habitat and searching visually for spiders, their web or retreat. Collection was conducted mainly by handpicking and sweeping method. Spiders were collected from the ground stratum and from the terminals of plants. Specimens collected were transported to the laboratory and were preserved in 70% alcohol. Preserved specimens were examined under a stereo zoom microscope (Leica-MS5) in the laboratory. Available monographs in books (Sebastian 2009) was used for the identification of spiders.

#### 3. Result

A total of 17 species of spiders belonging to 15 genera of 6 families were collected during the study period. Checklist of spiders recorded is given in Table 1 and their family wise distribution in Table 2. Of the 6 families collected, the families Tetragnathidae and Salticidae was species dominant families, repersented by 5 species each. Among these 5 species of Salticidae, one of the spider were identified up to genes level only. Family Araneidae were the next dominant family having 4 species. The families Hersilidae, Lycosidae and Theridiidae, the spider were identified uptogenes level only. In family Theridiidae, the spider were identified uptogenes level only.

Table 1: Checklist of spider recorded in the study

S. No	Family	Genus	Scientific name
1	Araneidae	Argiope	Argiope anasuja
2	Araneidae	Cyrtophora	Cyrtophora citricola
3	Araneidae	Eriowixia	Eriowixia laglazei
4	Araneidae	Neoscona	Neoscona Mukerji
5	Hersilidae	Hersiliia	Hersilia savignyi
6	Lycosidae	Pardosa	Pardosa dirmincius
7	Salticidae	Bianor	Bianor sps.
8	Salticidae	Bavia	Bavia kairali
9	Salticidae	Menemerus	Menemerus bivittatus
10	Salticidae	Plexiipus	Plexiipus petersi
11	Salticidae	Siler	Siler semiglaces
12	Tetragnathidae	Leucauge	Leucauge dorsotuberculata
13	Tetragnathidae	Opadameta	Opadameta fastigia
14	Tetragnathidae	Tetragnatha	Tetragnatha viresence
15	Tetragnathidae	Tetragnatha	Tetragnatha mandibulata
16	Tetragnathidae	Tetragnatha	Tetragnatha viridorufa
17	Theridiidae	Achaeraena	Achaeraena sp.

Table 2: Family wise distribution of spiders in the study area

Family	No: of species
Araneidae	4
Hersilidae	1
Lycosidae	1
Salticidae	5
Tetragnathidae	5
Theridiidae	1

#### 4. Discussion

The dominant families observed in the present study was almost similar to the studies conducted in different parts of the country. An extensive study on the spider fauna in rice field of Philippines demonstrate their influence in the control of insect pests <sup>[4]</sup>. Tetragnathidae are commonly called stretch spiders, referring to their elongated body form. When

disturbed, they will stretch their front legs forward and the others in the other direction, thus being able to hide on blades of grass or similar elongated substrates. The body and leg shapes and the silver, black and yellow markings of Leucauge make identification of the genus relatively easy. In most cases the web is slanted rather than vertical and the spider rests in the middle of the web with its underside facing upwards <sup>[5]</sup>. The web is usually horizontally inclined over streams or bodies of water in sunlit areas. It is taken down and reconstructed daily and the spider is often found on an incomplete <sup>[6]</sup>.

Salticidae, are active hunting spiders capable of jumping over a distance. They are diurnal in activities. They move by walking, running, jumping or leaping and use all these movements in prey capture. They hunt the prey by stalking, chasing and leaping over it. Prey includes mainly insects. Some also prefer other spiders or ants. A few salticids also exhibit aggressive mimicry. They usually do not use web for capturing the prey <sup>[2]</sup>. A great work has been conducted in Indravati Tiger Reserve, recorded 13 species <sup>[8]</sup>. Another study in Kanha Tiger Reserve, Madhya Pradesh recorded 5 species <sup>[9]</sup>. An ecosystem wise study of spiders was initiated in India by Patel. He conducted an extensive study on the predatory spiders from different crops of Sayurashtra and North Gujarat and described 56 species of spiders belonging to 34 genera distributed in 18 families [10]. Araneidae is a large cosmopolitan family commonly known as orb weavers. The family exhibits a wide variation in size, color, shape and behavior. They construct perfect webs with sticky spiral or a modified orb web as in Cyrtophora. In the family, genus Argiope is characterised by the presence of stabilimenta. Their web contains a large white zigzag structure in its centre called the stabilimentum and it reflects UV light. They have been shown to play a role in attracting prey to the web, and possibly to prevent its destruction by large animals <sup>[11]</sup>. Hersilidae is very well camouflaged for life on the varicolored trunks of trees, they have an interesting way of capturing prey <sup>[12]</sup>. Another study on the spider fauna conducted in kuttanad rice field, Kerala identified 1632 individuals from 69 species, 49 genera and 17 families. Most species rich family was salticidae followed by tetragnathidae and araheidae<sup>[13]</sup>. A study in parambikulam wildlife Sanctuary in Kerala described 91 species belonging to 53 genera <sup>[10]</sup>.

### 5. Conclusion

The 17 species of spiders belonging to 6 families reported from the study indicate diversity of spiders in the area. Spiders like pardosa sp and tetragnatha sp are natural enemies of insect pests of rice were also recorded in the study. This throw light on the beneficial role played by spiders as biological control agents of pests of paddy. Preservation of spiders necessitates abandoning of these pesticides, or spot treatment and rational use of the same. Once pesticides are kept away from the fields, spiders invariably take shelter in the fields, feed on the pests and add to the productivity.

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