



**DIVERSITY OF SPIDERS IN THE BHENDI AGRO ECOSYSTEM OF  
KALLANTHARI, MADURAI DISTRICT, TAMIL NADU, SOUTH INDIA**

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**ABSTRACT**

An attempt was made to elicit and assess the diversity and distribution of spiders in the Bhendi Agro ecosystem of Kallanthari, Madurai District, Tamil Nadu. Besides the scientific knowledge up to species level, habits, and behaviour of spiders have been studied in eight species belonging to seven genera of spiders and they were recorded in the Bhendi agro ecosystem of Kallanthari area.

**Keywords:** Spiders, Bhendi, Kallanthari, Biodiversity and Insect

**INTRODUCTION**

Biodiversity and community structure are now recognized to be important determinants of ecosystem functioning. Community structure results from factors such as the richness and evenness of the diversity. Diversity at all level, including intra specific or genetic diversity that characterize populations of a species diversity that characterize communities and in turn community diversity that characterize an ecosystem all play a major role of species richness and diversity of the Indian faunal composition (Krebs, 1985;

Muralirangan, 1993 and Sanjayan, 1993). Spiders are ubiquitous in natural habitats (Riechert, 1984) taking the above points into consideration.

Spiders have to adapt different environmental conditions. However they seem to prefer particular temperature zone and select a strategic, line for web building in consonance with the availability of prey (Luczack, 1900, Endors, 1997 and Lazarar, 1998). Even though the spiders are abundant throughout the country, our knowledge of

Indian spiders is extremely fragmentary (Tikader, 1975).

The biogeographical environment and climatic conditions in Alagar hill (study area) vary with the altitude although the region experience a typical tropical climate being warm and humid during most of the with annul mean, temperature ranging from 24°C in the winter to 40°C in the summer. However, scientific research on the invertebrates in this region has largely been restricted to a few groups of organisms. Amongst the known insects, ants and cockroach have been studied so far their habits and ecology in this region (Periasamy Alagesan, 2013) while there are only a few studies on spiders in Alagar hill.

Hence an attempt was made to study the diversity of spider fauna in the Bhendi ecosystem of Kallanthari.

## MATERIAL AND METHODS

The study area Bhendi Agro ecosystem of Kallanthari, Madurai district, Tamil Nadu, south India (MSL  $\pm$  160.90 mm, 9°-05'–10 N and 77° 42' – 78° - 42E) was selected to study the biodiversity of spiders. Insect collecting nets (30 cm diameter) were used to collect the insect between 600 to 650 hours in the field. The field record was maintained throughout the study period from August 2018 – December 2018. The annual mean temperature was 26°C and the relative humidity was 90%. A

periodical survey and a systematic study of spiders were undertaken for a period of five months from August 2018 to December 2018. Spiders were collected by adopting the following standard sampling procedures (Sutherland, 1996) using Pit fall traps, Hand picking and Net sweeping and the collected specimens were brought to the laboratory. Identification of spider diversity was carried out based on the carapace and abdomen. The collected spiders were preserved in 70% alcohol and identified using the key given by Tikader (1987).

## RESULTS AND DISCUSSION

A total of 485 specimens were documented from the study area during the period of August, 2018 to December, 2018.

The results of systematic survey have been presented in Table 1. Eight spiders were identified upto species level. The spider belongs to the family *Araneidae* which includes seven genera of spiders. The most frequently encountered species were *Araneus cucubitionus* (Clerk), *Nephila maculate* (Fabricius), *Argiope pulchella* (Thorell), *Neosconatheis* (Walcknear), *Neoscona nautical* (L. Koch), *Cyclosa bifida* (Doles chall), *Leucauge decorate* (Blackwall) and *Gasteracantha geminater* (Fabricius).

The diversity of spider was calculated by using Shannon Weiner index and Simpson-index. The index value showed that *Araneus cucubitionus* of logarithmic base was found to be highest range (0.2832; 0.0220) and *Gasteracantha geminater* was found to be the lowest range (0.2177; 0.0082) (Table:2 and Figure:2). The present result showed comparatively more number

of species between eight and 485 in the field; generally Indian spider fauna is richer than the other geographic regions. In the field, it was found that the increased pest population was followed by an increase in the number of spider. The pest population was found to be suppressed in the presence of spiders in the large numbers.

**Table:1 Showing the monthly collected spiders from August, 2018 to December, 2018 in Bhendi agro ecosystem of Kallanthari.**

S.NO.	Species	Aug- 18	Sep - 18	.Oct -18	Nov -18	Dec - 18	Total No. of Spiders
1	<i>Araneus cucubitionus</i>	18	15	17	12	10	72
2	<i>Nephilamaculata</i>	13	12	15	12	9	61
3	<i>Agrioppe pulchella</i>	15	13	13	11	10	62
4	<i>Neoscona theis</i>	17	12	13	14	8	64
5	<i>Neoscona nautica</i>	19	15	13	12	9	68
6	<i>Cyclosa bifida</i>	15	11	9	8	9	52
7	<i>Leucauge decorata</i>	18	16	11	11	6	62
8	<i>Gasteracantha geminater</i>	12	9	8	9	6	44
		127	103	99	89	67	485

**Table: 2 showing Shannon Weiner Index of spider species**

S.NO.	Species	No. of Spiders	%	Pi	Pi In Pi
1	<i>Araneus cucubitionus</i>	72	14.85%	0.1485	0.2832
2	<i>Nephilamaculata</i>	61	12.58%	0.1258	0.2608
3	<i>Agrioppe pulchella</i>	62	12.78%	0.1278	0.2630
4	<i>Neoscona theis</i>	64	13.20%	0.1320	0.2673
5	<i>Neoscona nautica</i>	68	14.02%	0.1402	0.2755
6	<i>Cyclosa bifida</i>	52	10.72%	0.1072	0.2394
7	<i>Leucauge decorata</i>	62	12.78%	0.1278	0.2630
8	<i>Gasteracantha geminater</i>	44	9.07%	0.0907	0.2177
	Total	485		1.00	2.07

The absence of spider predator was associated with more pests thus the availability of spiders in any locality depends upon the occurrence of insects in the area. This is an evidence for the occurrence of spider diversity in the Bhendi Agro ecosystem of Kallanthari out of the eight spiders. Two are of orb weavers, two communal webs revealing the social life. One horizontal web and irregularly Orb web, one retreat web and irregular Cob web, two spiders do not spin webs documenting such variation is essential for effective management of environment resources.

*Gasteracantha geminater* an orb web spider has a greater pest control potential and it predate *Cyclopelta siccifolia* (Sucking pest) and *Disphinctus politus* (Sucking pest). These are the serious pests of Bhendi agro ecosystem. The reproductive potential of *Gasteracantha geminater* is evidenced by its fecundity with 800 eggs per female.

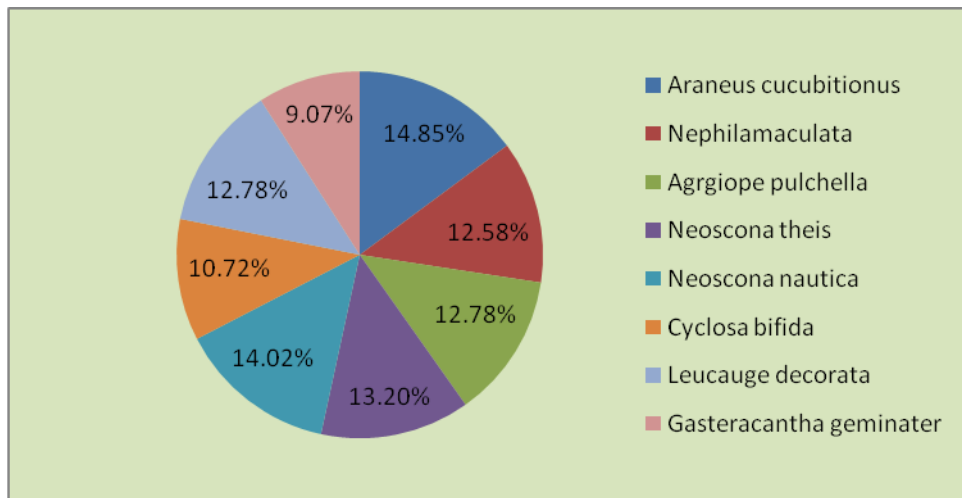
In the present study, the prey availability was higher in the field. It may be surmised that the population density synchronized with the pest load in the Bhendi agro ecosystem.

**Table – 3 showing Simpson – Index of spider species**

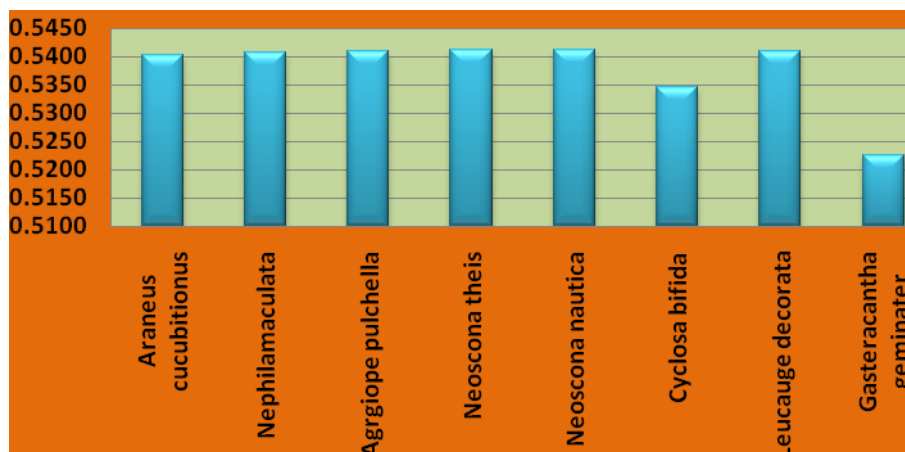
S.NO.	Species	No. of Spiders [H']	Pi	Pi <sup>2</sup>
1	<i>Araneus cucubitionus</i>	72	0.1485	0.0220
2	<i>Nephilamaculata</i>	61	0.1258	0.0158
3	<i>Agrgioppe pulchella</i>	62	0.1278	0.0163
4	<i>Neoscona theis</i>	64	0.1320	0.0174
5	<i>Neoscona nautica</i>	68	0.1402	0.0197
6	<i>Cyclosa bifida</i>	52	0.1072	0.0115
7	<i>Leucauge decorata</i>	62	0.1278	0.0163
8	<i>Gasteracantha geminater</i>	44	0.0907	0.0082
		485	1.00	0.1273

**Simpson's index D = 12.73**

**Figure: 2 showing percentage of the monthly collected spiders from August 2018 to December 2018 in Bhendi agro ecosystem of Kallanthari.**



**Figure: 3 showing Shannon Weiner Index of spider species**



## CONCLUSION

The present study showed that the information related to the species distribution in a particular habitat with response to the environment, disturbance and availability of food. The spiders such as *Araneus cucubitionus* (14.85%), *Neoscona nautica* (14.02%) were the predominant species of spiders in the Bhendi ecosystem area. The increase in the population of

spiders is influenced by the increase in prey population between the month of August (127) and September (103). We conclude that the spider like *Araneus cucubitionus*, *Neoscona nautica* are the predominant species of biological controlling agents. Hence the study suggested that biofertilizer such as vermicompost, neem powder and extract and Thumbai plant could be used as biopesticides.

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