

Diversity and Distribution of Spider (Araneae) in Different Ecosystem of Puthanampatti, Tiruchirappalli District, Tamil Nadu, South India

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Abstract- A pioneering study was conducted to reveal the spider's diversity in Puthanampatti village, Tiruchirappalli District, Tamil Nadu. There were 13 species of spiders belonging to 13 genera of 6 families collected from Puthanampatti village, Tiruchirappalli District, Tamil Nadu, South India. The families Araneidae and Oxyopidae exhibited maximum species. Among the families, Araneidae was the dominant with 6 species. Out of 13 species 6 species were collected from the plantation area, 5 species from the agricultural habitat and 4 species from human habitation. No variation was observed in the species richness and diversity among the habitat while significant variation was observed in the population density among the different **habitats**.

Key Words: Araneidae, Clubionidae, Diversity, Oxyopidae, Pholxidae, Saltisidae, Spiders, Tetragnathidae.

1 Introduction

Spiders are among the most diverse groups on the earth, which received the seventh ranking in the global diversity. Among the various arthropods, the spiders are known for their complete dependence on predation of small insects and arachnoids(1). Spiders are generalist feeders with great species richness in every type of terrestrial habitat and play an important role in the structure of communities and food webs both as an individual numbers and as an energy consumer (2). Number of entomologist has known the importance of the spiders as one of the major predators in regulating the pest of different crops (3). Spiders generally have humidity and temperature preferences that limit them to areas within the range of their physiological tolerances, which in turn makes them ideal candidates for land conservation studies (4). Therefore, documenting spider diversity patterns can provide important information on the biodiversity of ecosystem. Considering the importance of spiders in the natural suppression of many insect pests and as bio indicator, the present study was carried out to know the diversity and population of spiders in Puthanampatti village, Trichy district, Tamil Nadu South India.

2 Materials and Methods

2.1 Study area: Present study was carried out in the human habitation, agriculture land and non-crop lands of Puthanampatti located between latitude 11° 05'N and 78° 73' and 35 km north from Trichirappalli.

2.2 Methodology

2.2.1 Collection and Identification of Spider Species: Spiders were collected by adopting standard sampling techniques as Sweeping method for small tree spider, beating sheets for large trees and shrubs with standard stick spiders, active searching and hand picking methods for collecting spiders from rock, logs, ground, debris and

loose dead bark of trees. Collected specimens were fixed in 70% ethanol with few drops of glycerin (5). Collected spiders were identified using standard Keys of Tikader and Malhotra and Tikader (6, 7) with the help of faculty of Tamil Nadu Agricultural University Coimbatore, Tamil Nadu, India

2.2.2. Population estimation: Spider population was estimated in every week for 3 months. Population of spider species was estimated by the method of Stout and Vandermeer (8).

2.2.3. Species richness and diversity index: Species richness was estimated by following methods (9). Species diversity was calculated by Shannon Wiener diversity index (H'). Diversity index was calculated by using following formula.

Diversity index (H') = $-\sum[(p_i) * \ln(p_i)]$

Evenness (E) = H/H_{max}

$H_{max} = \ln(S)$

Where,

H' = diversity index

Sum = Summation

P_i = Number of individuals of species i /total number of samples

S = Number of species or species richness

H_{max} = Maximum diversity possible

E = Evenness

3 Results

A total of 13 species of spiders belonging to 13 genera of 6 families were identified from the study area. Maximum percentage of species was recorded in families Araneidae (41%) and Oxyopidae (15.4%) (Table 1 & Plate 1). Maximum number of species were recorded in plantation area (6 species) followed by agricultural field (5 species) and human habitat (4 species). *Oxyopes javanus* (79), *Gasteracantha geminta* (55) and *Arterna atlanta walck* (143) were dominant species in agricultural, plantation and

human habitations, respectively. As a total, maximum number spider population was recorded in human habitation and minimum number of species dominant was recorded in plantation area. A significant different (One way ANOVA, $P < 0.005$) in total spider population among the habitats was observed (table 2 and 3). In agriculture habitat maximum number of spider was *Oxyopes javanus thorell* and minimum was *Cybra dhanalakumae*, maximum number of spiders was *Gasteracantha geminta* and minimum number of spiders was *Neoscona neatheis* species and in human habitat maximum number was *Arterna atlanta walck* and minimum number of spiders was *Oxyopes javanus thorell* were recorded. Results of the study indicate that a good diversity was observed in all habitats. Maximum species diversity of spider was found in plantation habitat followed by agricultural habitat and human habitat (table 4).

4 Discussion

Spiders, like many invertebrates, receive little attention from the conservation community. This may be due to fear and dislike of their appearance, behaviors or venomous nature; the fact that most spiders are probably widely dispersed and not presumed to be threatened; or because relatively little is known about the distribution and abundance of these creatures. A pioneering study was conducted to reveal the spider diversity in Puthanampatti village, Trichy District Tamil Nadu, India. A total number of 13 species of spiders belonging to 13 genera of 6 families were collected. The families Araneidae and Oxyopidae exhibited maximum species diversity. Out of the 59 families recorded in Indian region (8, 10) totally of 13 species of spider was recorded in a small area. However, this number is low compared with other region like Andama and Nicobar island-65 species, Sikkim-55 species and Calcutta-99 species (11-13). Diversity of families proves to be important because they bear close association with the diversity of habitats. In this study, maximum number of species was recorded in plantation and agriculture habitat. It is due to the great potential to serve as biological control agent against crop pest in cultivation and agricultural habitat. Human habitat was found in low diversity of spider species. It is due to the regular removal of spiders and its web in the environment and also lack of prey and habitat adaptation. However, human habitat has maximum number of spider population, compared to plantation and agricultural habitat. It might be due to the low number of predators and enemies present in the human habitat. Plantation and agriculture habitat had rich species diversity of spider due to the availability of prey and has less species population due to a lot of enemies present in the plantation and human habitat. From the result it is concluded that there are 13 species of spider belongings to 13 genera of 6 families. Araneidae and Oxyopidae families found in

maximum species diversity and dominant family was Araneidae with 6 species. Out of 13 species recorded in study area, 5 species in plantation area, 5 species in agricultural habitat and 3 species in human habitation were observed. The present study showed significant variation in the population density among the different habitats but not in the species richness and diversity.

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Table 1: Check list of spiders recorded from Puthanampatti village, Trichy District.

S. No	Family Name	Types of species	Total No. of species	Percentage of species
1	Araaneidae	<i>Neoscona neotheis</i>	6	46.1
		<i>Vicaria monostriata</i>		
		<i>Araneus spiniferus</i>		
		<i>Gasteracantha geminate fabricus</i>		
		<i>Argiope pulchella</i>		
		<i>Cybra dhanalakumae</i>		
2	Oxyopidae	<i>Peucetia viridana stoliczka</i>	2	15.4
		<i>Oxyopes javanus thorell</i>		
3	Clubionidae	<i>Clubiona wavesterna</i>	1	7.7
4	Pholxidae	<i>Arterna Atlanta walck</i>	1	7.7
5	Saltisidae	<i>Plexippus vaasudevani</i>	1	7.7
6	Tetragnathidae	<i>Leucauge decorate</i>	2	15.4
		<i>Eucta javana</i>		

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Table 2: Mean population of spider species in different habitats of study area.

S. No	Habitat	Species Name	Population (Total) No/ha
1	Agriculture	<i>Cybra dhanalakumae</i>	45.62±11.92 (32 – 77)
		<i>Plexippus vaasudevani</i>	47.46±19.37 (19 – 80)
		<i>Leucauge decorate</i>	52.46±14.14 (34 – 72)
		<i>Eucta javana</i>	52.85±10.11 (32 – 66)
		<i>Oxyopes javanus thorell</i>	54.48±18.19 (0 – 72)
		Total populations	252±46.24 (178 – 347)
		<i>Gasteracantha geminta</i>	34.15±13.10 (22 – 55)
		<i>Neoscona neatheis</i>	23.23±4.30 (15 – 33)
2	Plantation	<i>Peucetia viridana</i>	27.38±11.53 (11 – 55)

3	Human Habitat	<i>Clubiona wavesternae</i>	27.08±5.68 (15 – 33)
		<i>Plexippus vaasudevani</i>	1.69±6.10 (0 – 22)
		<i>Vicaria monostriata</i>	1.54±5.55 (0 – 20)
		Total population	115.08±27.53 (76 – 176)
		<i>Araneus spiniferus</i>	105.00±26.62 (63 – 143)
		<i>Argiope pulchella thorell</i>	105.23±22.09 (61 – 138)
		<i>Arterna atlanta walck</i>	112.69±20.62 (63 – 138)
		<i>Oxyopes javanus thorell</i>	99.31±16.37 (72 – 124)
		Total population	422.23±61.88 (294 – 483)

Table 3: One way ANOVA and Student's post hoc test showed the variation in spider population among different habitats of study area. (Mean values are arranged in ascending order).

Parameter	One way ANOVA (f2,504=20.74; p<0.005); SNK Post hoc test (Subset for alpha: 0.05)		
Population No./ha	<u>8.85</u>	<u>19.45</u>	<u>32.48</u>

Horizontal line connects similar mean

Table 4: Species richness, dominant, diversity index and evenness of spiders in three different habitats of Puthanampatti village, Trichy District.

S. No	Habitats	Species richness	Species dominant	Diversity (H')	Evenness
1	Agricultural Habitation	5	79	1.591	0.988
2	Plantation	6	55	1.781	0.994
3	Human habitation	4	143	1.382	0.992

Fig.1. Photographic images of different species of spiders recorded in the study area

