



ISSN 2347-2677
IJFBS 2016; 3(5): 124-129
Received: 22-07-2016
Accepted: 23-08-2016

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A Faunistic Study of Spider (Arachnida: Araneae) in Jahangirnagar University campus

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Abstract

An experiment was performed in Jahangirnagar university campus to make a checklist of spider fauna from March, 2013 to February, 2014. Total 116 spider species under 11 families viz, Araneidae, Clubionidae, Lycosidae, Oxyopidae, Pholcidae, Salticidae, Sparassidae Tetragnathidae, Theridiidae, Thomsidae and Uloboridae were recorded during study period. Spiders were collected using hand picking and beating sheet method. In beating method, all studied spider families were found but in hand picking method family Lycosidae and Thomsidae were absent. Beating method was considered more suitable than hand picking because in hand picking and beating method, 40.9% and 59.03% spider species were collected respectively. This study is the baseline information over the ecology, importance of spider species. The rich floral and faunal diversity of Jahangirnagar University campus is the key to build the healthy habitats of different species. This experiment will also aid to work for the preservation of the species and postulate the hidden benefits in them.

Keywords: Spiders, hand picking, beating, Jahangirnagar University Campus

Introduction

Inventories of faunas are important fact over considering conservation issues and the sustainable use of biological diversity. Spiders form one of the most ubiquitous and diverse groups of organisms existing throughout world but their study have always remained largely neglected [27]. Spiders are playing great role in controlling the insect population in all the ecosystems [15].

Though Jahangirnagar University campus is rich in flora and fauna, spiders' composition of this area is remained untouched. Jahangirnagar University is located at Savar in Dhaka, 23°52'0''E to 23°53'50''E latitude and 90°15'20''N to 90°16'40''N longitude. It encompasses about 697.56 acres of land with diverse ecological surroundings and vegetation forms. This is the first attempt to understand the resident spider population in Jahangirnagar University campus.

Spiders belong to the order Araneae and occupy the seventh position in total species diversity [23, 26]. The global list of spider fauna is almost 44906 belonging to 3935 genera and 114 families found all over the world [21]. Recent studies show that 134 genera and 412 species of spiders are available in Bangladesh [16].

Spiders play significant role in regulating insect populations because they are one of the most numerous insectivores and active biological control agents in agro-ecosystems [14]. In many countries, spiders are regarded as significant natural enemies of arthropod pests. The ecological and faunistic studies which have been performed on forests, fields and grasslands showed that spiders are more common predators of the harmful insects [19, 25, 29]. To conserve biodiversity and usage of chemicals IPM program should be encouraged to farmers [6].

The present study was therefore undertaken to establish the spider species collection method and make a checklist of spider fauna and in Jahangirnagar University campus.

2. Materials and Method

2.1 Study Period and Study area

The experiment was carried out from March, 2013 to February, 2014 in different region of Jahangirnagar University campus. Samples were collected from four sites per week in each month and rest of the days of that month was used up for sorting and identifying the macro invertebrates using standard keys. Spiders were collected from 7.00 am to 9.00 am.

Four sites of JU campus were selected for spider sampling according to their vegetation.

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Study area	Geographic Location	Vegetation
Insect Rearing and Experimental Stations	23°52'32.28"N, 90° 16'0.06"E	<i>Mangifera indica</i> , <i>Artocarpus heterophyllus</i> , <i>Olea europaea</i> , <i>boroi Ziziphus mauritiana</i> , <i>Averrhoa carambola</i> , <i>Curcuma longa</i> , <i>Manilkara zapota</i> , <i>Punica granatum</i> , <i>Musa acuminata</i> , <i>Citrus limon</i> , <i>Acacia catechu</i> , etc.
Botanical Garden	23°52'22.8"N, 90° 16'414."E	<i>Phyllanthus emblica</i> , <i>Swietenia mahagoni</i> , <i>Artocarpus heterophyllus</i> , <i>Averrhoa carambola</i> , <i>Casuarina equisetifolia</i> , <i>Bambusa sp.</i> , various shrubs, herbs etc.
Premises of Statistical Building	23°52'56.58"N, longitude 90° 16'12.36"E.	<i>Acacia catechu</i> , <i>Mangifera indica</i> , <i>Artocarpus heterophyllus</i> are dominant tree
North East Region of JU campus	23°53' 32.34"N, 90° 16'5.46"E.	Grassland, shrub, herb

2.2 Collection of Spider

Random sampling was done from different habitats of Jahangirnagar University campus in all the seasons. Spiders were collected by adopting standard sampling techniques such as beating sheets, and hand picking given by Green [13].

2.3 Preservation

The collected samples were brought to the entomology lab of Zoology Department, Jahangirnagar University. At first the collected Spiders were anesthetized with the help of chloroform. The caught spiders were placed separately on vials with 75% ethyl alcohol. The collection dates, collection site, amount of spider number were recorded on each vial.

2.4 Identification

Spiders were observed under stereo zoom microscopes and specimens were identified using standard taxonomic keys [3, 6, 17, 26, 30-34].

2.5 Data analysis

All data were recorded subject to analysis with the help of Microsoft Excel Office 2010.

3. Results

A study was conducted to explore the diversity of spider fauna in Jahangirnagar University campus. The recorded specimens yielded 116 species from 11 families, are shown in table 1. A total of 1690 specimens were collected during study period.

Table 1: List of Spiders collected from Jahangirnagar University campus

Sl	Family	Species	Guild
1.	Araneidae	<i>Araneus inustus</i> (C.L.Koch, 1871)	Orb web spider
		<i>Argiope anasuja</i> (Thorell, 1887)	
		<i>Argiope catenulata</i> (Doleschall,1859)	
		<i>Argiope luzona</i> (Walckenaer,1841)	
		<i>Argiope pulchella</i> (Thorell, 1881)	
		<i>Argiope sapoa</i> (Barrion and Litsinger, 1995)	
		<i>Cyclosa bifida</i> (Doleschall,1859)	
		<i>Cyclosa elongata</i> (Biswas and Raychaudhuri,1998)	
		<i>Cyclosa parangtarugoa</i> (Barrion and Litsinger,1995)	
		<i>Cyrtophora lahiri</i> (Biswas and Raychaudhuri,1998)	
		<i>Cyrtophora naresh i</i> (Biswas and Raychaudhuri,1998)	
		<i>Eriovixia laglaizei</i> (Simon,1877)	
		<i>Gasteracantha hasselti</i> (C.L.koch,1838)	
		<i>Neoscona brownius</i> (Biswas,2007)	
		<i>Neoscona dorsonigra</i> (Biswas,2007)	
		<i>Neoscona dostinikea</i> (Biswas,2007)	
		<i>Neoscona elliptica</i> (Tikader and Bal,1981)	
		<i>Neoscona laglaizei</i> (Simon,1877)	
		<i>Neoscona molemensis</i> (Tikader and Bal, 1981)	
		<i>Neoscona nautica</i> (L.koch,1875)	
<i>Neoscona oriemindoroana</i> (Barrion and Litsinger,1995)			
<i>Neoscona ovata</i> (Biswas,2007)			
<i>Neoscona theis</i> (Walckenaer,1841)			
<i>Neoscona yptinika</i> (Barrion and Litsinger,1995)			
<i>Paravixia dehaani</i> (Doleschall,1859)			
<i>Zygeilla munuriae</i> (Biswas,2007)			
2.	Clubionidae	<i>Cheiracanthium tagorei</i> (Biswas and Raychaudhuri,2003)	Sac spider
		<i>Castianeira nigricephalis</i> (Biswas,2006)	
		<i>Clubiona analis</i> (Thorell,1895)	
		<i>Clubiona anwarae</i> (Biswas and Raychaudhuri,1994)	
		<i>Clubiona drassodes</i> (Cambridge,1874)	
		<i>Clubiona filicata</i> (Cambridge,1874)	
		<i>Clubiona mujibari</i> (Biswas and Raychaudhur,1994i)	
<i>Sphingius barkudaensis</i> (Gravely,1931)			
3.	Lycosidae	<i>Hippasa pantherina</i> (Pocock,1899)	Ground dweller
		<i>Lycosa chaperi</i> (Simon,1885)	
		<i>Lycosa choudhuryi</i> (Tikader and Malhotra,1980)	

		<i>Pardosa pseudoannulata</i> (Boesenberg and Strand,1906)	
		<i>Pardosa ladhakhensis</i> (Tikader,1977)	
4.	Oxyopidae	<i>Oxyopes assamensis</i> (Tikader,1969)	Plant dwelling spider
		<i>Oxyopes bikakaeus</i> (Barrion and Litsinger,1995)	
		<i>Oxyopes birmanicus</i> (Thorell,1887)	
		<i>Oxyopes javanus</i> (Thorell,1887)	
		<i>Oxyopes matiensis</i> (Barrion and Litsinger,1995)	
		<i>Oxyopes ratnae</i> (Tikader,1970)	
		<i>Oxyopes shweta</i> (Tikader,1970)	
		<i>Peucetia viridana</i> (Stoliczka,1869)	
5.	Pholcidae	<i>Artema atlanta</i> (Walckeneer,1837)	Zunk web spider
6.	Salticidae	<i>Bianor hotingchiehi</i> (Schenkel,1963)	Jumping spider
		<i>Epeus minutus</i> (Biswas,2007)	
		<i>Chrysilla lauta</i> (Thorell, 1887)	
		<i>Hasarius adansoni</i> (Audouin,1827)	
		<i>Marpissa andamanensis</i> (Tikader,1977)	
		<i>Marpissa bengalensis</i> (Tikader,1974)	
		<i>Marpissa bijoni</i> (Biswas,2007)	
		<i>Marpissa calcuttaensis</i> (Tikader,1974)	
		<i>Marpissa decorata</i> (Tikader,1974)	
		<i>Marpissa dhakuriensis</i> (Tikader,1974)	
		<i>Marpissa gajebi</i> (Biswas,2007)	
		<i>Marpissa ludhianaensis</i> (Tikader,1974)	
		<i>Marpissa majumderi</i> (Biswas,2007)	
		<i>Marpissa minutus</i> (Biswas,2007)	
		<i>Marpissa mondali</i> (Tikader,1974)	
		<i>Marpissa sannjali</i> (Biswas,2007)	
		<i>Menemerus bivittatus</i> (Dufour,1831)	
		<i>Myrmarachne elongata</i> (Szombathy,1915)	
		<i>Myrmarachne legon</i> (Wanless,1978)	
		<i>Myrmarachne maratha</i> (Tikader,1973)	
		<i>Myrmarachne orientalis</i> (Tikader,1973)	
		<i>Myrmarachne ovaloabdominalis</i> (Biswas,2007)	
		<i>Myrmarachne pictocephalis</i> (Biswas,2007)	
		<i>Myrmarachne plataleoides</i> (O.P.Cambridge,1869)	
		<i>Myrmarachne poonaensis</i> (Tikader,1973)	
		<i>Myrmarachne radhamadhobi</i> (Biswas,2007)	
		<i>Pancorius magnus</i> (Zabka,1985)	
		<i>Phidippus bengalensis</i> (Tikader,1977)	
		<i>Phidippus majumderi</i> (Biswas,1999)	
		<i>Phidippus pateli</i> (Tikader,1974)	
		<i>Phintella rampalensis</i> (Biswas,2007)	
		<i>Phintella vittata</i> (C.L.Koch,1846)	
		<i>Plexippus paykulli</i> (Savigny and Audouin,1827)	
		<i>Plexippus petersi</i> (Karsch,1878)	
<i>Plexippus wesolowskai</i> (Biswas and Raychaudhuri,1997)			
<i>Plexippus zabkai</i> (Biswas,1999)			
<i>Rhene kustiaensis</i> (Biswas,2007)			
<i>Salticus minutus</i> (Biswas,2007)			
<i>Telamonia dimidata</i> (Thorell,1887)			
<i>Thiania bhamoensis</i> (Thorell,1887)			
<i>Zygoballus narmadaensis</i> (Tikader,1975)			
<i>Zygoballus pashanensis</i> (Tikader,1975)			
7.	Sparassidae	<i>Olios gravelyi</i> (Sethi and Tikader,1988)	Wandering Spider
		<i>Olios hampsoni</i> (Pocock,1901)	
		<i>Heteropoda buxa</i> (Saha, Biswas and Raychaudhuri,1995)	
8.	Tetragnathidae	<i>Leucauge decorata</i> (Blackwall,1864)	Orb web spider
		<i>Tetragnatha andamanensis</i> (Tikader,1977)	
		<i>Tetragnatha fletcheri</i> (Gravely,1921)	
		<i>Tetragnatha hasselti</i> (Thorell,1890)	
		<i>Tetragnatha jaculator</i> (Tullgren,1910)	
		<i>Tetragnatha javana</i> (Thorell,1890)	

		<i>Tetragnatha mandibulata</i> (Walckenaer,1841)	
		<i>Tetragnatha nitens</i> (Audouin,1826)	
		<i>Tetragnatha vermiformes</i> (Emerton,1884)	
		<i>Tetragnatha virescens</i> (Okuma,1979)	
		<i>Nephila maculata</i> (Fabricius,1793)	
9.	Therididae	<i>Argyrodes argetatus</i> (O.P.Cambridge,1880)	Tangle webbed
		<i>Argyrodes gazingensis</i> (Tikader,1970)	
		<i>Coleosoma blandum</i> (O.P.Cambridge,1882)	
		<i>Enoplognatha tuybaana</i> (Barrion and Litsinger,1995)	
		<i>Theriodon ovatus</i> (Biswas,2007)	
10.	Thomsidae	<i>Bomis bengalensis</i> (Tikader,1962)	Foliage dweller
		<i>Diaea variabilis</i> (Thorell,1869)	
		<i>Mossuria laterotuberculata</i> (Biswas,2007)	
		<i>Thomsius projectus</i> (Tikader,1960)	
		<i>Thomsius pugilis</i> (Stoliczka,1960)	
11.	Uloboridae	<i>Uloborus danoliui</i> (Tikader, 1969)	Orb web spider

3.1 Comparison of sampling method to estimate the spider family in Jahangirnagar University campus

In hand picking method, family Araneidae showed 32.43% of species where in beating method, it was 20.75%. In hand picking method, family Clubionidae, Oxyopidae, Pholcidae, Salticidae, Tetragnathidae, Therididae, Uloboridae, Lycosidae, and Thomsidae showed 5.40%, 5.40%, 2.70%, 24.32%, 24.32%, 2.70%, and 2.70% respectively. In beating method, Clubionidae, Oxyopidae, Pholcidae, Salticidae, Tetragnathidae, Therididae, Uloboridae, Lycosidae, Thomsidae. Lycosidae, and Thomsidae showed 6.60%, 6.60%, 0.94%, 40.57%, 6.60%, 0.94%, 6.60%, and 5.66% respectively. Family Lycosidae and Thomsidae were absent in hand picking method (Fig 2).

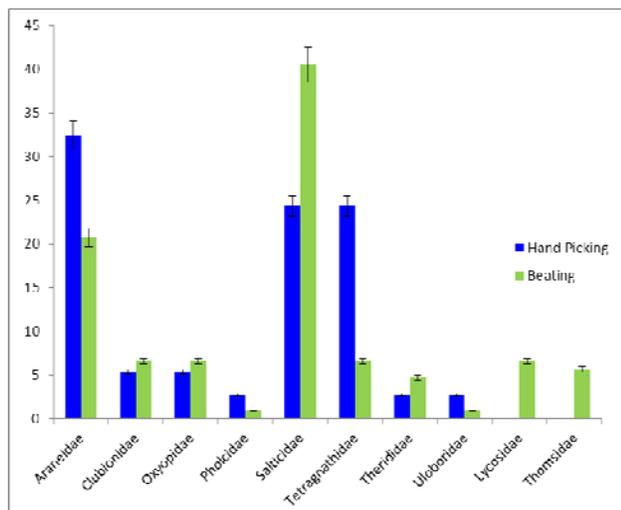


Fig 2: Comparison of sampling method to estimate the spider family

3.2 Comparison of sampling method to estimate the total spider species

By both sampling method, 1690 spider specimens were recorded. In hand picking method, 999 specimens were recorded and in beating method, 691 spider specimens were recorded. In hand picking method and beating method, the 40.9% and 59.03% spider species were collected (Fig 3). Beating method is more suitable than hand picking method.

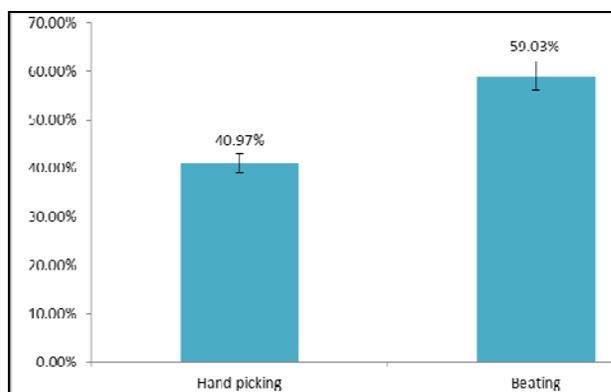


Fig 3: Comparison of sampling method to estimate the total spider species in Jahangirnagar University campus

By both sampling method, 1690 spider specimens were recorded. In hand picking method, 691 specimens were recorded and in beating method, 999 spider specimens were recorded. In hand picking method and beating method, the 40.9% and 59.03% spider species were collected (fig 3).

4. Discussion

In Bangladesh, very limited researches are found on spider fauna [3, 7-11, 14, 20]. There was no previous work in Jahangirnagar University campus to compare the spider diversity. In Bangladesh, Habib recorded 232 species of spiders from the four forest communities of all over the Bangladesh [14]. Arshad *et al.*, reported 18 species under 13 genera and 8 families of the spider [2]. The spider fauna of India represents 1520 spider species belonging to 377 genera and 60 families [27]. Wankhade *et al.*, recorded 32 species under 17 genera and 7 families during the six month survey [37]. Uetz *et al.*, recorded 18 families, 56 genera and 95 species arranged on their foraging behaviour in the field [35]. Puja recorded a total 16 species belonging to 7 families from India [22]. Bhat *et al.*, conducted an exhaustive study to record the spider diversity [5]. These studies showed differences in diversity of spiders' fauna due to differences in the climatic factors of these areas. Barrion and Litsinger recorded only 6 spider species for rice field [3]. Our present research found 116 spider species in Jahangirnagar University campus.

Since the study was mainly based on visual searches and beating of bushes, other sampling methods such as pitfall trapping, fogging, sweeping would certainly reveal occurrence of few more species of spiders. By both sampling method (hand picking and beating), 1690 spider specimens were recorded in present research. In hand picking method, 691 specimens and in beating method, 999 spider specimens were recorded. In our total recorded spiders' family, Lycosidae and Thomsidae were totally absent in hand picking method (Fig 2). In hand picking and beating method, the 40.9% and 59.03% spider species were collected (Fig 3). Singh *et al.*, reported that in hand picking method, 28.14% Araneidae family was recorded where in our present research, 32.43% Araneidae was recorded [28]. Vincent and Hadrien used same sampling techniques to collect spiders and the recorded spider species number was found 442 and 224 in beating and hand picking respectively [36]. Nobre *et al.*, recorded 214 spider individuals in 214 minutes of handling time in hand picking method and 243 spider individuals were recorded in beating method which duration was only 45 minutes [18]. Amalin *et al.*, compared of three sampling methods revealed that highest number of spiders' collection was possible by visual sampling method than other collection techniques [1]. Costello and Daane used various collection techniques for spider species sampling. They concluded that beating method is most suitable than other sampling method [12].

We have found that beating method of spider is more significant than hand picking method. By beating method, we have collected more samples of spider in our study. This findings support the result of Singh *et al.* [28]. Moreover, beating method is more suitable than hand picking method, because visual search is not always effective for every family of spider.

5. Conclusion

To conserve the spider species, identification of spiders is very necessary. For identification of any specimen, collection is vital. In present study, we have mentioned that beating method is the easiest and effective collection technique of spider species than rest. Jahangirnagar University is enriched with various fauna and flora. From above discussion it has been proved that a very good spider composition is found in Jahangirnagar University campus and further studies might discover other species. Our findings will help the researchers who have interest in Arachnology and who will discover some more spider species in Jahangirnagar university campus.

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