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Rapid Survey on Diversity of Spiders (Arachnida: Araneae) From Some Localities of Ahmednagar City of Maharashtra State, India

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Abstract

Indian faunal diversity includes on extreamly abundant group of animals, spiders. They are most omnipresent and frequent predator in both agriculture and natural ecosystem. Diversity of spiders depends on prey availability and ecology of habitats. The order Araneae of Class - Arachnida includes spiders, which are important links in the terrestrial food webs and also serve as bioindicators. The present study was intended to discover the species diversity of spiders from Ahmednagar city of Maharashtra, India. The study includes collection of spiders from different sites including, Ahmednagar fort, Kapurwadi, Sonewadi, Farah Bagh and Chand Bibi Mahal area. The research activity was spread over a period of six months from October 2019 to March 2020. 27 spider individuals belonging to 08 families were collected, out of which 15 individuals were identified up to species and 12 specimens remained unidentified. Family Araneidae was the most abundant followed by Salticidae, Thomisidae, Pholcidae, Tetragnathidae, Hersilidae, Oxyopidae and Sparassidae.

Key words: Ahmednagar, Diversity, Spiders, Araneae, Maharashtra, Species.

Introduction

Spiders are found worldwide and distributed over every continent except Antarctica. There are approximately 42,055 species of spiders reported globally [18, 19]. Spiders range in body length from 0.5 to about 90 mm (0.02–3.5 inches). The largest spiders are the hairy mygalomorphs, commonly referred to as tarantulas, which are found in warm climates and are most abundant in the Americas. Female spiders generally are much larger than males, a phenomenon known in animals as sexual size dimorphism. Spiders play an important role in the regulation at insect population in many ecosystems. Spider are valuable indicators at the spatial heterogeneity at landscape in terms of composition and diversity of species in an ecosystem. Spiders are ancient and successful invertebrates, residing in all types of habitats worldwide [16]. Spiders are octopod creatures which belong to phylum Arthropoda, Class Arachnida and the order Araneae [6]. Spiders occupy an important part of the overall predatory arthropod fauna in different terrestrial ecosystems [14]. Spiders are found in different habitats with high humidity [11].

Material and methods

The present study was aimed to assess the diversity of spiders in some areas of Ahmednagar city of Maharashtra State of India. The primary objectives of the study were to record spider specimens so as to prepare a preliminary checklist of spiders from the study area and to find out dominant and rare taxa. The research activity was spread over a period of six months from October 2019 to March 2020. Ahmednagar City is the Headquarters of Ahmednagar District [Latitude: 19°05'40.45" N, Longitude: 74°44'18.35" E]. The collection of spiders was done in Ahmednagar fort, Kapurwadi, Sonewadi, Farah Bagh and Chand Bibi Mahal area. Spiders were collected by adopting standard sampling techniques such as active searching, photographing and hand picking [3] &[14]. All surveys were conducted in the morning and evening hours. Collected spiders were photographed and preserved in 70% alcohol. Spiders were looked for and observed in a variety of places such as garden edges, official/ residential buildings, road-side vegetation, on the bark of trees and underneath stones [4]. Ground search were done under leaf litter, fallen or dry wood [2]. The direct capture method (hand-picking method) was implemented to catch spiders above ground and on the plants [8]. Searching was also done by jerking the twigs of trees and bushes [10]. Freshly collected specimens were anaesthetized with Ether and then placed on a plain surface and photographed immediately using Mobile camera. The date and location of collection were noted and the other morphological features observed clearly and noted as per [11] [13] for preliminary identification. Spider identification and classification is based on the morphometric parameters such as an eye arrangement, cephalothorax, labium, palps, abdomen and claws [6,9]. Spiders were observed using stereo zoom microscopes for studying morphological features as per [17]. Identification of the spiders was done with the help of expert taxonomists and scientists from Zoological Survey of India (ZSI), Pune and identification keys [15].

Results

In the present investigation, spider specimens were collected from some areas of Ahmednagar city such as peripheral regions of Ahmednagar fort, suburban zones of Ahmednagar Kapurwadi, Sonewadi, Farah Bagh and mountainous terrain of Chand Bibi Mahal. Spider samples were collected from leaves, branches, barks and trunks of trees; as well as from dried fallen leaves, grasses, rocks and underneath stones. Spiders were also collected from gardens, grasslands, semi-forest patches, official and residential buildings, and roadside vegetation. Spider specimens collected and identified are enlisted in Table 1. Out of the total 27 spider specimens collected, 15 belongs to 08 families, were identified. Family Araneidae was found to be most abundant followed by Salticidae, Thomisidae, Pholcidae, Tetragnathidae, Hersilidae, Oxyopidae and Sparassidae. Family Araneidae included 05 species, Salticidae 03 species, Thomisidae 02 species, whereas families Pholcidae, Tetragnathidae, Hersilidae, Oxyopidae and Sparassidae, each with 01 species. Familywise dominance of spider species is shown in Figure 1. It was observed that higher diversity of spiders was found in areas of vegetation and areas where there was less human activity. Higher number of spiders was found in places of insect abundance, as we know that spiders are carnivores, predatory and chiefly insectivores. Future efforts may be able to focus on 'Integrated Pest Management' using this database.

Discussion

In studies by [2] and [9], the family Araneidae was found to be more dominant and most of the species of spiders are found belonged to family Araenidae and Salticidae. These observations are similar to the results of the present study. A study by [5] involved collection and identification 60 specimens of spiders, out of which 27 species represented 09 families and 18 genera. Family Araneidae was the most dominant with 12 species followed by Salticidae (04 species), Oxyopidae (03 species) and Lycosidae (03 species) and 01 species each from family Pholcidae, Thomisidae, Tetragnathidae, Eresidae and Hersilidae. Among the 19 families of spiders observed by [8] in the Zolambi region of Chandoli National Park, high diversity was observed in the families Araneidae (20 species) > Salticidae (17 species) > Lycosidae (13 species) > Thomisidae (7 species) and her results indicated the dominance of ground dwelling spiders like Salticids, Gnaphosids and Lycosides. Dominance of ground dwelling spiders was also observed in the present investigation. According to the survey of the spider fauna of the irrigated rice ecosystem in central Kerala, India by [12], the widely distributed families were observed to be Araneidae, Lycosidae, Tetragnathidae and Salticidae. The study on the taxonomic status of spiders in Mehsana District North Gujarat, India [10] recorded the higher count of species to be from the families of Araneidae, Salticidae and Lycosidae. Similar observations were made in the present investigation too. According to [1] the Jowai area in Jaintia Hills of Meghalaya, India, tremendous destruction of the forest habitat along with the expansion of civilization may affect the distribution pattern of different spider species. The study sites in Ahmednagar area in present research work also proves that depletion in vegetations and extension of city and suburban areas, might have led decreased spider diversity.

Conclusion

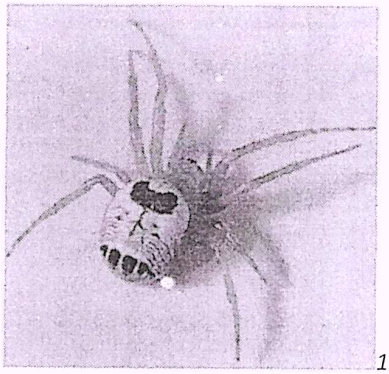
In the present investigation, diversity of invertebrate fauna of spiders belonging to Phylum Arthropoda, Class Arachnida and Order Araneae; was studied from varied habitats in few areas of Ahmednagar city. Total 27 spider individuals belong to 08 families. The family Araneidae was found to be most abundant followed by Salticidae, Thomisidae, , Pholcidae, Tetragnathidae, Hersilidae, Oxyopidae and Sparassidae. Familywise diversity of spiders was observed as: Araneidae (05 species) > Salticidae (03 species) > Thomisidae (02 species) > Pholcidae (01 species), Tetragnathidae (01 species), Hersilidae (01 species), Oxyopidae (01 species), and Sparassidae (01 species). Diversity of spiders was more in the regions of rich vegetation showing abundance of insects, which may be due to their habitat preference and insectivorous habit. During the past few decades, some parts of the densely vegetated areas of the city were converted into domestic and commercial constructions and open spaces have been encroached upon for various purposes. Such change of land use pattern probably has a negative impact on faunal diversity, especially that of spiders. Spider diversity and abundance depends on food i.e., prey population, which is decreasing and therefore we observed less diversity of spiders in the present study.

Table 1. Spider Specimens from some areas of Ahmednagar City

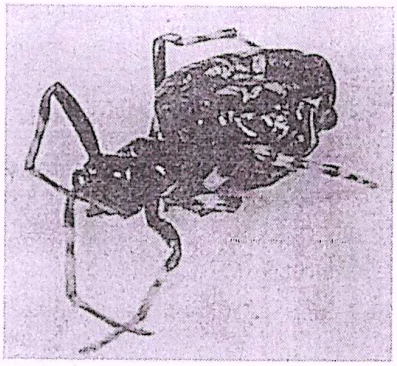
Sr. No.	Order	Family	Zoological Name
	Araneae	Araneidae	Araneus mitificus
	Araneae	Araneidae	Cyclosa sp.
	Araneae	Araneidae	Argiope anasuja
	Araneae	Araneidae	Cyrtophora cicatrosa

	Araneae	Araneidae	Neoscona mukerjei
	Araneae	Salticidae	Plexippus paykulli
	Araneae	Salticidae	Rhene sp.
	Araneae	Salticidae	Hyllus semicupreus
	Araneae	Thomisidae	Thomisus sp.
	Araneae	Thomisidae	Oxytate sp.
	Araneae	Pholcidae	Pholcus sp.
	Araneae	Tetragnathidae	Leucauge decorata
	Araneae	Hersilidae	Hersilia savignyi
	Araneae	Oxyopidae	Oxyopes sp.
	Araneae	Sparassidae	Heteropoda sp.

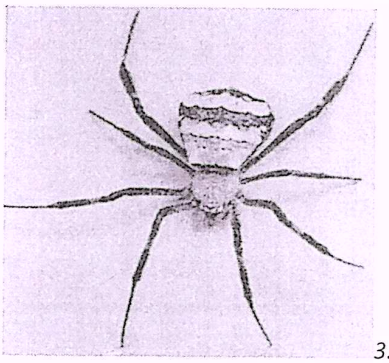
Photo plate- 1



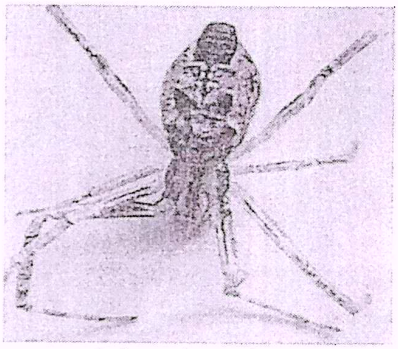
1. *Araneus mitificus*



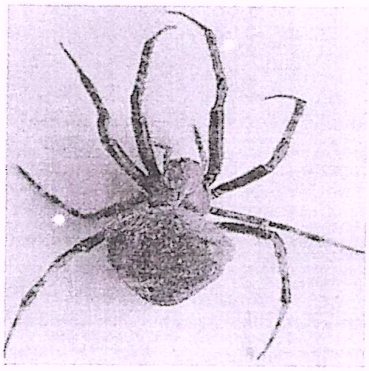
2. *Cyclosa sp.*



3. *Argiope anasuja*

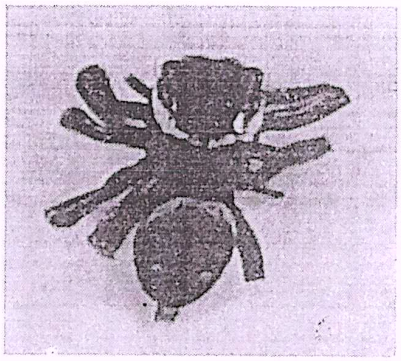


4. *Cyrtophora cicatrosa*

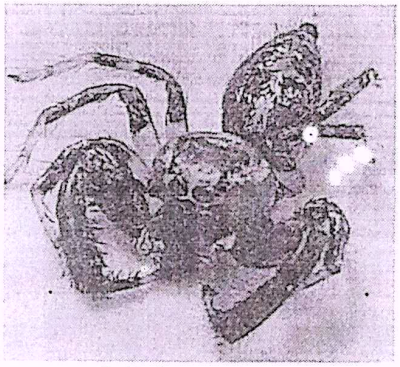


5. *Neoscona mukerjei*

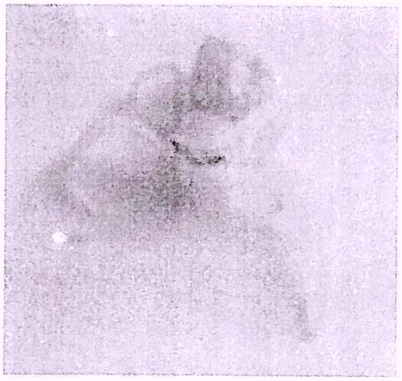
6. *Plexippus paykulli*



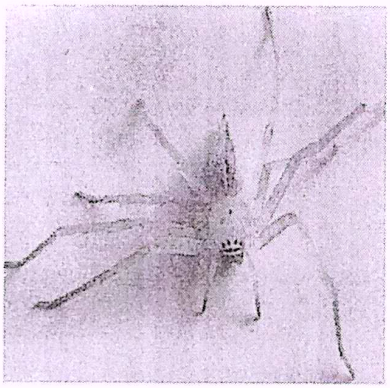
7. Rhene sp.



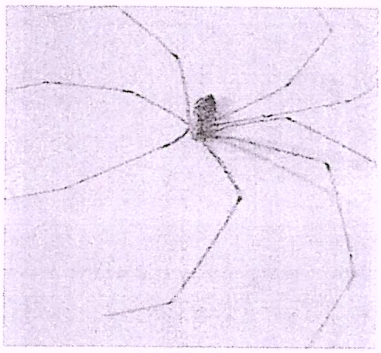
8. Hyllus semicupreus



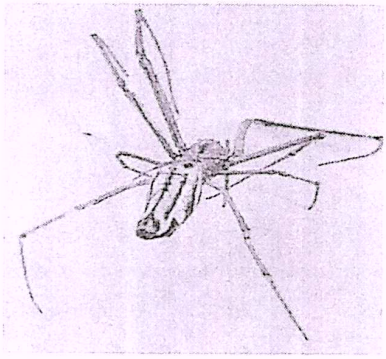
9. Thomisus sp.



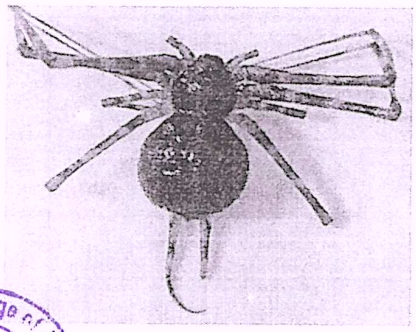
10. Oxytate sp.



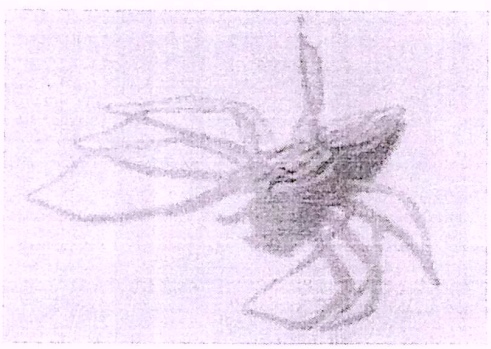
11. Pholcus sp.



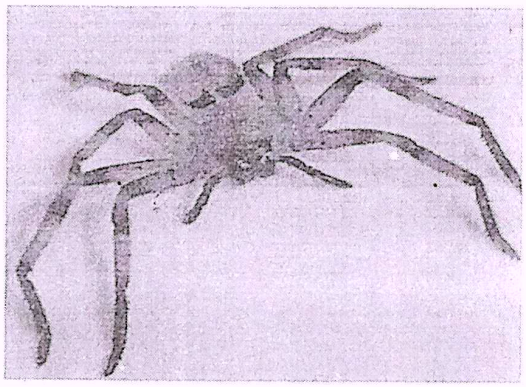
12. Leucauge decorata

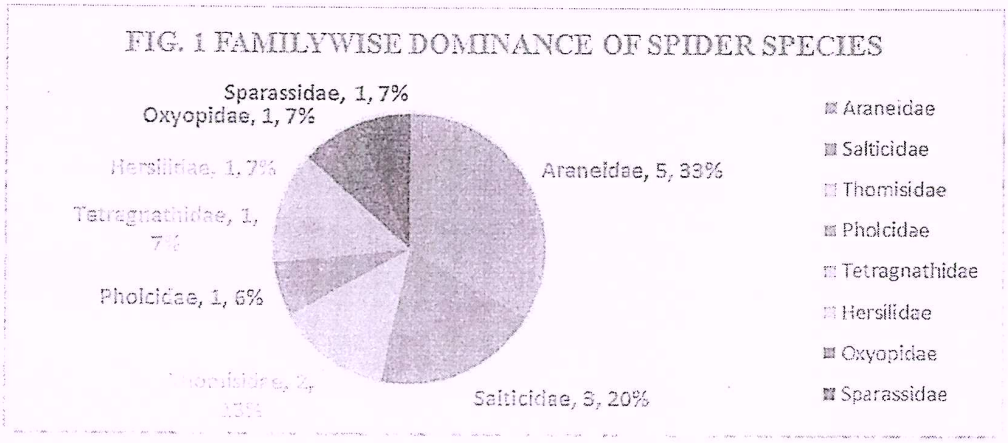


13. Hersilia savignyi



14. Oxyopes sp..





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