

Spiders Assemblage (Arachnida Araneae) in Apple Orchard, Mukteshwar, District Nainital, Uttarakhand, India

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ABSTRACT

A preliminary investigation was carried out to determine the variety of spiders (Arachnida Araneae) in an apple orchard selected randomly in the area of Mukteshwar, District Nainital, Uttarakhand, India. The spider sampling was accomplished by using visual searching and handpicking methods. They were also released back into their natural environments after being classified and photographed. A total of 21 spider species from 9 different spider families were identified from the research area. The Araneidae family held the most dominance over the other families i.e. Linyphiidae, Lycosidae, Oxyopidae, Philodromidae, Pholcidae, Salticidae, Sparassidae, Theridiidae, Thomisidae. Six feeding guilds, comprising Orb Weavers, Sheet Web, Wandering-Ambush, Wandering-Active, Web-Matrix, and Jumping Spiders, were found during guild structure analysis of the collected spiders.

KEY WORDS

Apple orchard; Spider; Araneidae; Uttarakhand; India.

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INTRODUCTION

Spiders (Arachnida Araneae) are predatory arthropods (Cuff et al., 2021; Saqib et al., 2022) and have a substantial impact on ecological systems. Spiders have a wide range of hunting strategies and several trophic levels, allowing them to effectively utilize a wide range of food sources and adapt on a large scale of environmental circumstances (Sanders et al., 2015). They are significant contributors to ecological stability and pest population controllers (Cuff et al., 2022). Due to their widespread presence, spiders also play a significant role in the health of agroecosystems (Pajač Živković et al., 2019; Nyffeler & Sunderland, 2003). The potential of spiders for biocontrol of pest outbreaks in agroecosystems has been widely acknowledged by researchers (Chapman et

al., 2013; Samiayyan, 2014; Gomez-Polo et al., 2016; Wagan et al., 2019). Although their effectiveness varied amongst crops, a meta-analysis of 58 studies indicated that spiders decreased agricultural insect pests in 79% of the situations (Michalko et al., 2019). Hunting spiders are particularly significant from an economic perspective (Marc et al., 1999; Nyffeler, 1999) and they have a larger trophic niche (Nyffeler, 1999; Michalko & Pekár, 2015). They capture their food straight from the crop's surface and ingest less mobile stages of diverse arthropods (such as eggs, larvae, and nymphs) than web-building spiders.

Despite limited research on their role in biological management in orchards, spiders establish many and diverse assemblages in apple orchards and can help to decrease a variety of apple pests (Michalko & Pekár, 2015; Lefebvre et al., 2017).

Given the foregoing, the purpose of this study was to evaluate the hunting groups of spiders and their web pattern types in the selected apple orchards.

into their natural environment. The available taxonomic keys for spiders and others works cited in References were used for the identification of all specimens (see also World Spider Catalog, 2024).

MATERIAL AND METHODS

For the present study, an apple orchard was selected randomly from Mukteshwar Area, District Nainital, India (29°29'13"N, 79°37'52"E - 2002 m above mean sea level). Before the collection, the spiders were first observed in their natural state of finding, to later classify and attribute them under different hunting guilds. The found spider specimens and, in some cases, their webs were instantly photographed. These specimens were released back

RESULTS AND CONCLUSIONS

A total of 21 spider species belonging to 9 different families of spiders were spotted in the study area (Table 1). Among all families, these of Araneidae was the most dominant (8 species, 38.1%). Three types of spider webs were found at the study site, namely Cob web (19%), Sheet web (21%) and Orb web (69%) (Fig. 1). The Guild Classification is: Orb Weavers: 8 species (38.1%), Wandering-Active: 5 species (23.8%), Wandering-Ambush: 4

N.	Spider Family	Species	Guild Classification
1	ARANEIDAE	<i>Araneus quadratus</i> Clerck, 1757	Orb Weavers
2	ARANEIDAE	<i>Argiope anasuja</i> Thorell, 1887	Orb Weavers
3	ARANEIDAE	<i>Argiope aurantia</i> Lucas, 1833	Orb Weavers
4	ARANEIDAE	<i>Argiope pulchella</i> Thorell, 1881	Orb Weavers
5	ARANEIDAE	<i>Cyclosa bifida</i> (Doleschall, 1859)	Orb Weavers
6	ARANEIDAE	<i>Cyclosa conica</i> (Pallas, 1772)	Orb Weavers
7	ARANEIDAE	<i>Neoscona nautica</i> (L. Koch, 1875)	Orb Weavers
8	ARANEIDAE	<i>Neoscona subfusca</i> (C.L. Koch, 1837)	Orb Weavers
9	LINYPHIIDAE	<i>Linyphia triangularis</i> (Clerck, 1757)	Sheet Web
10	LYCOSIDAE	<i>Alopecosa cursor</i> (Hahn, 1831)	Wandering-Active
11	LYCOSIDAE	<i>Pardosa minuta</i> Tikader et Malhotra, 1976	Wandering-Active
12	OXYOPIDAE	<i>Oxyopes</i> sp.	Wandering-Active
13	PHILODROMIDAE	<i>Philodromus</i> sp.	Wandering-Active
14	PHILODROMIDAE	<i>Tibellus</i> sp.	Wandering-Active
15	PHOLCIDAE	<i>Pholcus phalangioides</i> (Fuesslin, 1775)	Web-Matrix
16	SALTICIDAE	<i>Plexippus paykulli</i> (Audouin, 1826)	Jumping Spiders
17	SALTICIDAE	<i>Salticus</i> sp.	Jumping Spiders
18	SPARASSIDAE	<i>Heteropoda maxima</i> Jäger, 2001	Wandering-Ambush
19	SPARASSIDAE	<i>Heteropoda venatoria</i> (Linnaeus, 1767)	Wandering-Ambush
20	THOMISIDAE	<i>Xysticus cristatus</i> (Clerck, 1757)	Wandering-Ambush
21	THERIDIIDAE	<i>Achaearanea budana</i> Tikader, 1970	Wandering-Ambush

Table 1. Diversity of spider species and their guild classification found in Mukteshwar Area, District Nainital, India.



Figures 1–3. Types of spider webs found in Mukteshwar Area, District Nainital, India.

Fig. 1: Cob web. Fig. 2: Sheet web. Fig. 3: Orb web.

species (19%), Jumping Spiders: 2 species (9.5%), Sheet Web: 1 species (4.8%), and Web-Matrix: 1 species (4.8%).

Spider assemblages serve crucial ecological roles. As voracious predators, spiders help control insect populations, preventing pest outbreaks that could ravage agriculture and ecosystems. They are, in essence, a natural form of pest control, keeping populations in check and contributing to biodiversity. Additionally, spider silk, known for its strength and elasticity, has inspired researchers in the development of advanced materials, from lightweight fabrics to surgical sutures. In conclusion, spider assemblage offers a glimpse into the diverse world of these fascinating creatures. Their formal characteristics, such as their various hunting techniques and intricate web designs, showcase their adaptability and resourcefulness. Despite their short lifespan, spiders play vital roles in maintaining ecological balance and inspiring advancements in various fields. By studying and appreciating spider assemblage, we gain a deeper understanding of the interconnectedness and richness of our natural world.

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