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Spider Diversity in Different Agro-Ecosystems of Kodagu District of Western Ghats (A Preliminary Checklist)

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ABSTRACT: Spiders are the most diverse of all arachnids and omnipresent in their distribution, both in natural and man-made environments. The study was conducted in the period of January 2022 to January 2024 at different agro-ecosystems (coffee plantation, pepper, cardamom etc) in Kodagu district of Western Ghats, Karnataka. A total of 100 species belonging to 79 genera and 17 families were recorded. Among the families, Araneidae (17 genera, 28 species) and Salticidae (20 genera, 26 species) were abundant. Followed by Thomisidae (9 genera, 10 species) and Theridiidae (7 genera, 9 species). Tetragnathidae, Sparassidae and Oxyopidae had 4 genera and 5 species each. The other families Clubonidae, Corinnidae, Theraphosidae, Lycosidae, Hersilidae, Philodromidae, Uloboridae, Linyphiidae, Lamiacae, Pholcidae, Ctenidae, Gnaphosidae had around 1-2 genera and 1-3 species. This study awaits an intensive and an extensive survey to record a near complete spider fauna.

I. INTRODUCTION

As beneficial arthropods that help control insect population in forest, agricultural and horticultural ecosystem, spiders (Arachnida: Araneae) are among the most overlooked [1]. Spiders are sensitive bio-indicators of changes in the environment. As they are effective at suppressing the numbers of plant hoppers, leaf hoppers, beetles and other pests, spiders serve a significant role as predators in the agro-ecosystem [2]. Spider biological control is one of the most effective ways to cut back on the usage of dangerous chemical pesticides as likewise the population of insect pests. Reducing or eliminating the use of these pesticides or using them sparingly, is necessary to preserve spider populations [3]. Spiders always take up residence in fields once chemicals are kept out of them, where they feed on pests and increase yield[4]. Although they are well known as powerful predators, the potential of spiders as bio-control agents has not been fully realized, at least in India. The use of spiders in biological control has gained increased significance in recent years due to their personality that allows them to succeed as predators [5]. Gaining an in-depth knowledge of spiders is essential for comprehending their impact on herbivorous pests and their ability to adapt to changing environmental conditions. Studying spiders in agro-ecosystem is very beneficial because it allows researchers to see how these predators controls the herbivore pests and comprehend how significant environmental changes impact on diversity of spider species[6].

Additionally, there are no published in-depth studies specifically examining the variety of spider species in this area. In order to provide baseline data for upcoming research on spider diversity as a crucial biological control agent in integrated pest management, a study on the species diversity was carried out.

II. MATERIALS AND METHODS

The study has been conducted from January 2022 to January 2024 at different agro-ecosystems (coffee plantation, pepper, cardamom with native shade trees) in Kodagu district of Western Ghats, Karnataka. It is located at 12.565817 E 75.7819908 with an elevation of 1200 m. Temperature in the area varied from 15.7 degrees to 32.4 degrees Celsius. These sites were selected based on the following criteria: accessibility, diversity of vegetation and degree of human activities.

The documentation of spiders were carried out randomly during day and night times. All the spiders were photographed using Additional macro mobile lenses. Most of the spiders were identified on spot and few were photographed and further identification was done. No spiders were collected during the survey.



III. RESULTS AND DISCUSSIONS

The present study revealed that a total of 100 species were keenly observed, identified, photographed and documented. The species predominantly belongs to the Araneidae, Salticidae, Thomisidae, Tetragnathidae, Theridiidae, Sparassidae, Clubonidae, Lycosidae, Oxyopidae, Theraphosidae, Corinnidae, Hersiliidae, Philodromidae, Uloboridae, Linyphiidae, Ctenidae, Gnaphosidae families.

Table 1. Checklist of diversity of spiders from different agro-ecosystem

Family	Genus	Species	
Araneidae	Gea	Gea sp	
	Plebs	Plebs sp	
	Macracantha	Macracantha	Macracantha hasselti
			Macracantha sp
	Eriovixia	Eriovixia	Eriovixia sakiendaorum
			Eriovixia laglaizei
	Gasteracantha	Gasteracantha	Gasteracantha kulhi
			Gasteracantha dalyi
			Gasteracantha germinata
	Araneus	Araneus	Araneus mitificus
			Araneus bilunifera
	Leviaraneus	Leviaraneus	Leviaraneus viridiventris
	Neoscona	Neoscona	Neoscona crucifera
			Neoscona mukerjei
			Neoscona puntigera
	Cyclosa	Cyclosa	Cyclosa walckenaeri
			Cyclosa bifida
	Nephila	Nephila	Nephila pilipes
	Arachnura	Arachnura	Arachnura melanura
	Paravixia	Paravixia	Paravixia dehaani
Herennia	Herennia	Herennia multipunctata	
Plotys	Plotys	Plotys columnaris	
Agriope	Agriope	Agriope pulchella	
		Agriope aemula	
		Agriope catenulata	
	Acusilas	Acusilas coccineus	
	Cyrtophora	Cyrtophora moluccensis	
Clubonidae	Clubonia	Clubonia sp	
Corinnidae	Corinnomma	Corinnomma severum	
Ctenidae	Africactenus	Africactenus sp	
Gnaphosidae	Zelotes	Zelotes sp	
Hersiliidae	Hersilia	Hersilia savignyi	
	Murrícia	Murrícia sp	
Linyphiidae	Neriene	Neriene sp	
	Linyphiidae	Linyphiidae sp	
Lycosidae	Hippasa	Hippasa holmerae	

		Hippasa sp
	Lycosa	Lycosa sp
Oxyopidae	Hamadruas	Hamadruas sikkimensis
	Oxyopes	Oxyopes macilentus
		Oxyopes sp
	Hamataliva	Hamataliva sp
	Peucetia	Peucetia viridana
Philodromidae	Tibellus	Tibellus oblongus
		Tibellus elongatus
Salticidae	Rhene	Rhene flavigera
		Rhene rubrigera
		Rhene flavicomons
	Pintelloides	Pintelloides versicolor
	Epeus	Epeus cf indicus
	Maipanthus	Maipanthus jubatus
	Brettus	Brettus cingulatus
	Telamonia	Telamonia dimidiata
	Carrhotus	Carrhotus viduus
	Hasariini	Hasariini sp
	Prozyskia	Prozyskia diatretra
	Thiania	Thiania bhamoensis
		Thiania indica
	Hyllus	Hyllus semicuprus
	Indopadilla	Indopadilla kodagura
	Portia	Portia sp
	Hindumanis	Hindumanis karnatakensis
	Ghatippus	Ghatippus paschima
	Myrmaplata	Myrmaplata phataleoides
	Marengo	Marengo batheryensis
		Marengo zebra
	Plexipus	Plexipus paikulli
		Plexipus petersi
	Foliabitus	Foliabitus sp
	Myrmarachne	Myrmarachne sp
Saparassidae	Olios	Olios milleti
	Bowie	Bowie sp
	Pandercetes	Pandercetes sp
	Heteropoda	Heteropoda venatoria
Tetragnathidae	Leucage	Leucage decorata
		Leucage fastigata
	Tyloridae	Tyloridae ventralis
	Tetragnatha	Tetragnatha viridorufa
	Mesida	Mesida sp
Theraphosidae	Tarantula	Tarantula sp

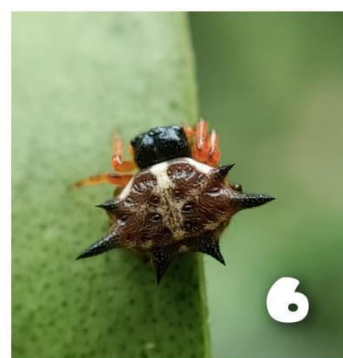


Theridiidae	Chryso	Chryso cf angula Chryso urbassae Chryso sp	
	Meotipa	Meotipa sp	
	Chikunia	Chikunia nigra	
	Anelosimus	Anelosimus sp	
	Parasteatoda	Paeasteatoda sp	
	Rhomphaea	Rhomphaea sp	
	Ariamnes	Ariamnes flagellum	
	Thomisidae	Massuria	Massuria sp
		Ebrechtella	Ebrechtella sp
		Spilosynemma	Spilosynemma sp
Lycopus		Lycopus sp	
Thomisus		Thomisus sp	
Epiduus		Epiduus sp	
Synema		Synema sp	
Runcinia		Runcinia ghorpadei	
Uloboridae	Pistius	Pistius sp	
	Uloborus	Uloborus sp	
	Miagrammopes	Miagrammopes sp	

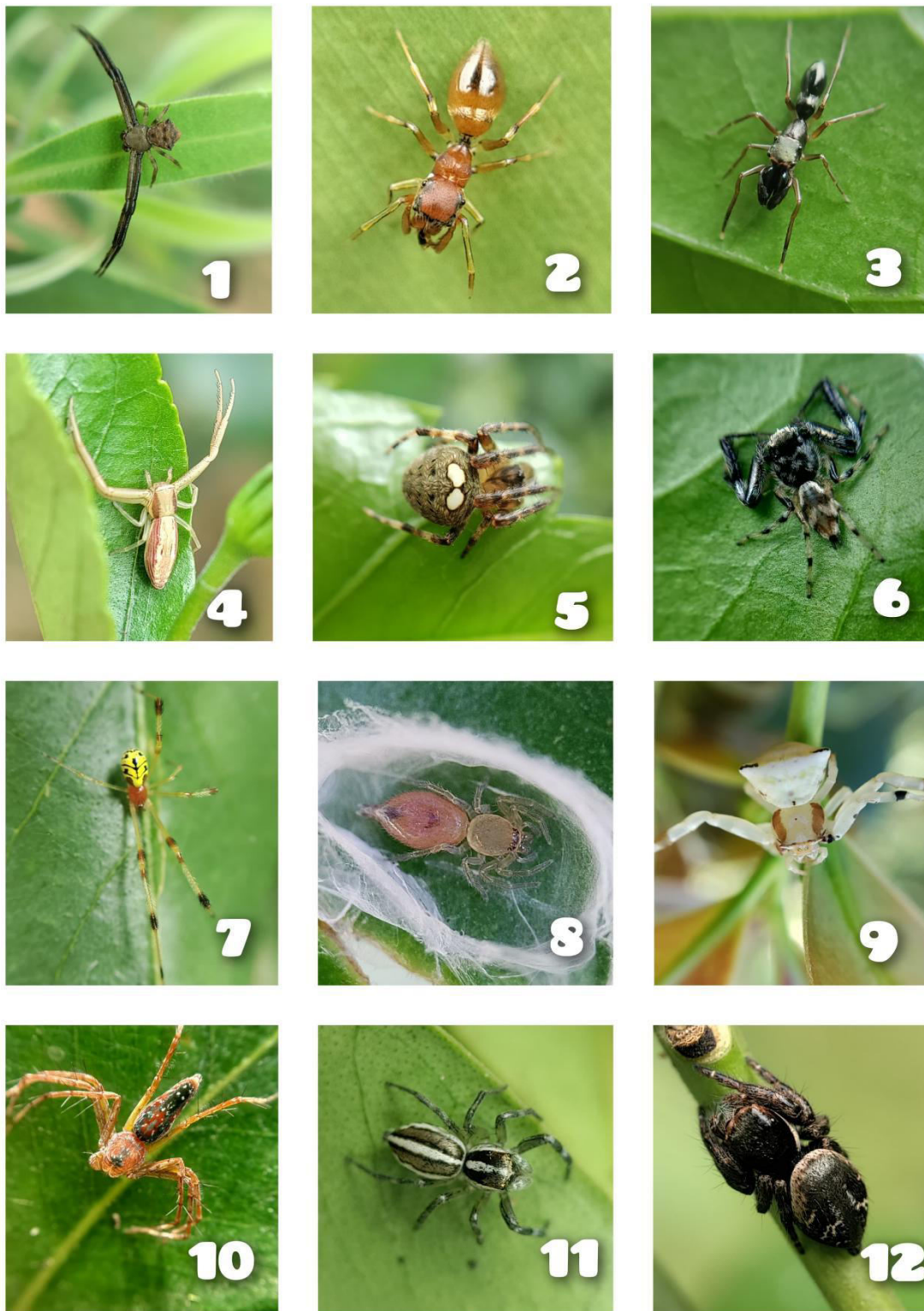
Spiders are ingenious predators that are generalists that are essential to ecosystems, contributing significantly to the organization of food webs and communities. In addition to their significant role in ecosystem preservation, spiders are regarded as potential biological control agents. Spider variety is a significant limiting factor when assessing biological organization at the community level. Because more species allow for more interactions and thus better environmental conditions, higher species diversity is a sign of more complex and healthy group.

A total of 107 species from 81 genera and 18 families were identified in the current study from various agro-ecosystems in the Western Ghats of Kodagu, Karnataka. The 18 families that have been identified from Kodagu’s agro-ecosystems makes up to 29% of all Indian families that are now recognized. When compared to cardamom plantations, the present study’s results show that spider diversity was higher in coffee and pepper plantation due to the habitat’s vegetation pattern, which supports both web building and non-web building spiders.

Furthermore, the use of chemical pesticides and the presence of good microclimate may be connected to richness of spider diversity. Because land use intensification can physically expel spider species from their micro-habitats, destroy them or alter the microclimate inside the habitat, it also can decrease the diversity and number of spider species.



1.Cyclosa sp, 2.Agriope pulchella, 3.Pistius sp, 4.Marengo zebra, 5.Thiania bhamoensis, 6.Macracantha hasselti, 7.Romphia sp, 8.Africactinus sp, 9.Araneus viridiventris,10. Epidius sp, 11.Rhene sp 12.Chryso sp.



1.Pitius sp(male), 2.Myrmarachne sp, 3.Myrmarachne sp, 4.Runcinia ghorpadei, 5.Araenus bilunifer, 6.Thiania sp, 7.Chrysso angula, 8.Clubonia sp, 9.Thomisus sp, 10.Hamadruas sikkimensis, 11.Pintella sp, 12.Carrhotus viduus.



1.Heteropoda venatoria, 2.Ghatippus paschima, 3.Hindumanes karnatakensis, 4.Telamonia dimidiata, 5.Brittus cingulatus, 6.Epeus indicus, 7.Chrysso sp, 8.Arneus mitificus, 9.Foliabitus sp, 10.Eriovixia laglaizei, 11.Lycopus sp, 12.Miagrammopes sp.

Special note : A new species “*Ligdus garvale*” is also a spider from the study area. This Balline spider was noticed in a retreat of double layered web under a leaf of an introduced exotic torch ginger plant. Representing the rediscovery of the genus *Ligdus* after 129 years since its establishment, through the description of a new species from Karnataka state, India, the genus is reported for the first time in India [7].



Ligdus garvale in its retreat (left) and *Ligdus garvale* on the torch ginger leaf (right)

Conclusion: The study conducted between January 2022 and January 2024 in the Kodagu district of the Western Ghats, Karnataka, sheds light on the remarkable diversity of spiders. These arachnids are not only omnipresent in both natural and man-made environments but also play crucial roles in ecosystem dynamics. The research documented a total of **100 spider species**, representing **79 genera** and **17 families**. Among these families, **Araneidae** (with 17 genera and 28 species) and **Salticidae** (with 20 genera and 26 species) were particularly abundant. Other families, such as **Thomisidae**, **Theridiidae**, **Tetragnathidae**, **Sparassidae**, and **Oxyopidae**, also contributed to the rich spider fauna. However, this study remains a stepping stone, awaiting further intensive and extensive surveys to achieve a more comprehensive understanding of the spider diversity in the region.

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