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Spider guilds in the sugarcane fields of two districts of Sindh, Pakistan

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Abstract
Guild (Ecology) a group of closely related species which exploits, compete same kinds of the resources in similar ways as a result of their shared ancestory. Especially for spiders (abundant arthropods) forage for a common resource mostly insects and other arthropods which has led to numerous attempts to classify them into guilds. Their study is very important because spiders can play a predatory role and could be helpful in reducing pest damage to crops. At this juncture, we intend an unconventional approach to guild classification of spiders, using quantitative analysis of ecological characteristics of spider families. On behalf of that survey of two districts of Sindh, Hyderabad and Matiari were selected and in this effort 1735 specimens were collected and a few live behaviors of spiders were observed during May-November 2016. This material was sorted out into nine families and fourteen genera. Most abundant spider families were lycosidae, salticidae and sparassidae simultaneously. Among nine families two were mostly found on foliage while seven on ground. This approach also recommends two guilds of spiders, one on the basis of spiders feeding habits and other on their circadian behavior. The relative abundance of guilds based on numbers of individuals varied greatly, which may reflect availability of resources within a sugarcane crop type (duration). Patterns of similarity in guild composition suggest the possibility of plant habitat structure as an influences on the spider community. As recent studies have shown that assemblages of spiders can impact pest populations and reduce crop damage, a better understanding of spider guild composition and variation in spider community structure among crops is essential in future studies of the arthropod fauna in agro ecosystems.

Keywords: guild, predator, sugarcane, circadian behavior, pest infestation

1. Introduction
Sugarcane (*Saccharum officinarum* L.) is cash crop of Pakistan, acting essential role in economy of farmers. Pakistan is vital cane producing country has fifth in world cane land while 15th in sugar production. Mostly borers were observed that cane yield out of 70 tons per acre was harvested sugarcane crop, although losses of sugarcane yield was recorded 9, 19 and 31 with borer infestation of 25 %, 50 % and 75 %, respectively in the year 2002-2004 according to a survey. While this study is about bio control agent called spiders. They combine to gather form guilds for feeding a vast variety of pests. The environmental guild or association perception has been of immense significance to the Arachnologists, which deals the unlike approaches of spiders forage designed for a general resources. Hunting of arthropods due to their great diversity has led into organized them into guilds especially spiders. This concept originates when Ecologists study the Trophic Levels called Genossenschaften [1, 2]. In early Floral and Faunal Ecology and recently the term guild is dignified for the study of avian niche exploitation patterns [3] and the extended for arthropods fauna of collards [4]. According to [5] view the guilds are comprised of an ecologically proper background in which to study interspecific and intraspecific competition among and within species. Arachnologists suggests that there are many attempts to divide or classify spiders into as few as two or many as 11 guilds, with varying degrees of specificity. As [6, 7] said with other taxa, problems raised assigning species to particular guilds, for generalizations based on higher taxa may not apply to all species due to diurnal and nocturnal. Beside more relevant work on spiders was done by [8, 9, 10, 3, 4, 11, 12]. Pakistan is an agricultural country and sugarcane is one of its major crop. It has 15th position in sugar production in the world. Sindh is its province which is famous for the sugarcane cultivation but this crop received heavy losses due to pest infestation during the last few years. People use pesticides for pests which is hazardous effect on fauna and flora. For this author determined to see spider guilds in the sugar cane crop of two districts Matiari and Hyderabad. Due to the role of spiders as a biocontrol agent these occurs in a great diversity in above mentioned two districts. They may be the best alternative against pesticides due their predatory nature.

2. Materials and methods
2.1 Collection of Spiders: 1735 specimens of spiders were collected during May-November 2016 by using net; hand picking and light traps and these were found on the ground, middle and a few web builders at top of sugar cane.

2.2 Killing and Preservation: Specimens were brought to laboratory in film-canisters/jars having 70% alcohol in bottles and in separate vials containing alcohol and few drops of glycerin and labeled.

2.3 Classification: The identification was made with the help of keys and descriptions given in literature by [13, 14, 15, 16, 17, 18, 19].

2.4 Feeding Habit: Observations on the feeding habits were determined on live spiders in open fields during early morning and late evening. After locating the species and quietly watching their feeding for about 2 to 4 hours where data were documented.

2.5 Guild spiders: Guild study was carried out while doing live observations in the open field and some experimental observations were documented at green house at IBGE along with morphological and anatomical characteristics of spiders.

3. Result and Discussion

The author assessed spider guilds abundance and vegetation complexity of sugar cane crop from May to November 2016 and found two guilds as table 1. Nine families of spiders were found in sugar cane crop of two Districts Matirai and Hyderabad, these are Lycosidae, Sparassidae, Pholcidae, Salticidae, Thomisidae, Araneidae, Clubionidae, Gnaphosidae and Oxyopidae. After analysis of the data which were accumulated in the open field and laboratory we found two guild clusters of spiders. These guilds are wandering spiders and web builder spiders. Out of nine families two are web builder spiders i e, Pholcidae and Araneidae while other seven built wandering spider guilds. The guilds structure not only found in adults but also witnessed between immature spiders. Hence out of 1735 collected spider specimens, 73% were adults spiders and 27% were immature. Wandering spiders was the most rich guild whereas web builders the least rich one. Hence Wandering spiders dominated over wed builder 59%, 40.58%, correspondingly. Further family Lycosidae was most diverse and found in abundance I sugar cane while Oxyopidae was least diverse family. The author spectator four sub sites in sugarcane crop which build according to the age of crop these sub sites are 1bottom , 2 middle and foliage 3 foliage to top while 4 leaf litter are hence interchangeable with the terms of sugarcane and thus both numerical and dominant of the family. Metaphors which point toward the hierarchical come together in studies two districts scrutiny is formed a dendrogram which was used to construct spider guilds (tables 1, 2). The collapse of succeeding groups of spiders come into sight were based first and foremost on web use, web-type, and microhabitat, resulting in two clusters of spider families that have been eyewitnesses could be measured as spiders guilds or spiders foraging habits.

Table 1: Showing family wise Spider Guild classification

Spider family studies	Uetz 1977 (2 Guilds)	Post & Riechert 1977 (8 Guilds)	Hyderabad & Matiari districts survey 2015- 2016 (2 Guilds)
Lycosidae	Wandering spiders	Diurnal running spiders	wandering spider guild
Sparassidae	Web-builders	Crab spiders	---
Pholcidae	Wandering spiders	Web-builders	Web-builders
Salticidae	---	Jumping spiders	wandering spider guild
Thomisidae	---	Crab spiders	---
Araneidae	Web-builders	Orb weavers	Web-builders
Clubionidae	Wandering spiders	Nocturnal running	wandering spider guild
Gnaphosidae	---	spiders	---
Oxyopidae	---	---	---
		Diurnal running spiders	

Table 2: Family wise feeding/foraging for food and making Guilds in sugarcane

Spider family	Feeding Guilds of spiders in sugarcane
Lycosidae	(Ground Runners) The member of this family called wolf spider and eats crickets, other spiders, ants, grasshoppers, invertebrates and occasionally consumes small lizards and frogs.
Sparassidae	(Foliage Runners) The member of this family famous as Huntsman spiders, diet consists primarily of insects and other invertebrates, and intermittently small skinks and geckos.
Pholcidae	(Web Builders) They commonly recognized as cellar spiders, They forage upon insects, spiders, and other small invertebrates.
Salticidae	(Stalker) They famous as jumping spider. They are carnivorous and some species forage upon nectar.
Thomisidae	(Ambusher) They are crab spiders are ambush their prey, mainly insect and relying on their camouflage to keep them from being seen by their prey.
Araneidae	(Web Builders) Orb-weavers are predators that are generally low in the food web. They built guild for food sources which is vary, but typically any small insects while bigger orb weavers (Argiope) eating small frogs and humming birds if trapped within the web.
Clubionidae	(Foliage Runners) The popularly called Sac Spiders, scientifically known as Clubionidae in the Encyclopedia of Life. Sac spiders are aggressive hunters. They search vegetation at night, grabbing, biting, and feeding Insects and other invertebrates.
Gnaphosidae	(Ground Runners) Avoiding land or groud spiders and other hunting spider's starts with eliminating their food. Since these spiders eat insects that crawl, inspect the outside for insect entryways. Abundant Insects and Other Arthropods
Oxyopidae	(Stalker) Lynx spider is the general name for any member of family Oxyopidae. The majority species make slight use of webs, instead spending their lives as hunting and foraging spiders on sugarcane.

Table 3: Total 1735 specimens, Number of individuals collected and occurrences in percentage from sugarcane field from 2 Districts of Sindh

Spider family	#of specimens	%
Lycosidae	565	30.02
Sparassidae	352	21.05
Pholcidae	283	16.92
Salticidae	215	12.85
Thomisidae	124	7.410
Araneidae	78	4.660
Clubionidae	73	4.360
Gnaphosidae	25	1.490
Oxyopidae	20	1.190

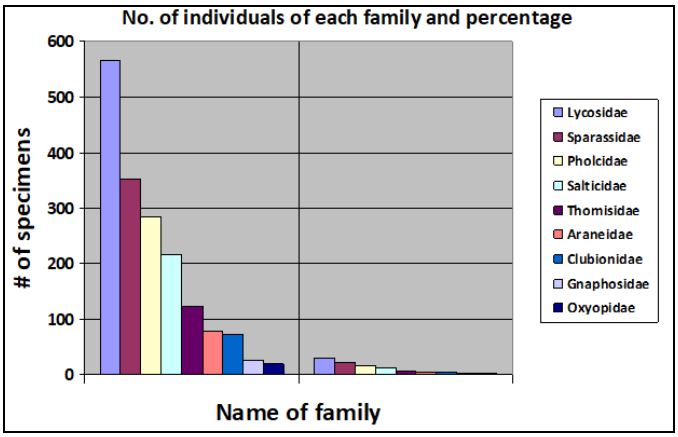

Fig 1

Table 4: Sites chosen from two districts, each site visited five times according to the age of sugarcane

Name of Site	No of spiders specimens
Khyber	163
Saeedabad,	210
Hala,	312
Odero Lal,	344
Thorha,	131
BhitShah	056
Odero Station	380
Halanaka	102
Channel	037
Total specimens	1735

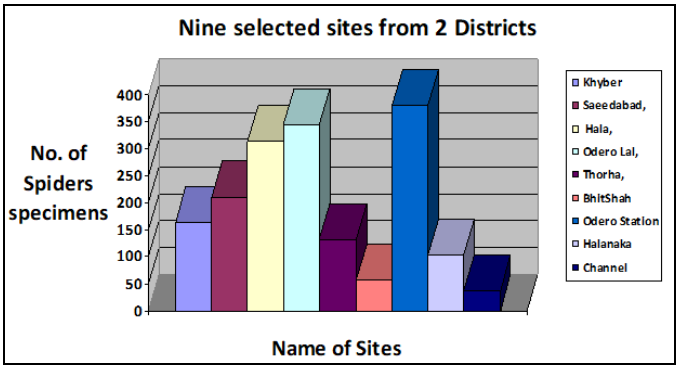

Fig 2

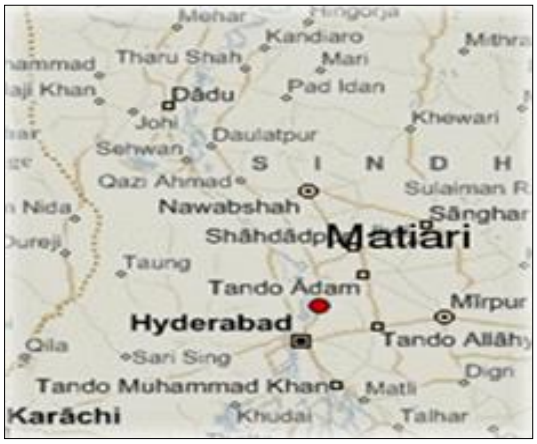

Fig 3: Map of district Matiari and Hyderabad

Fig 4: The sites of collection from Matiari

Fig 5: site of the collection of spider from near Hyderabad

Fig 6: Method of collection

Fig 7, 8: feeding behavior *Argiope billali* and *Lycosa tahiri*, in Advance Entomology Lab, Department of Zoology.

4. Conclusion

Research demonstrate that a variety of spider's species consume analogous resources (*food, shelter, mating etc*) in a diverse ways and structures in an assemblage (*Guilds*) in an ecosystem. In the same way it was also found that not only diverse spider species are linked by means of special guilds in sugarcane crops even their work of art were also diverges. The presence of meticulous spider fauna in sugarcane crops is showing its effect on the especial features of the environment because surroundings arrangement sustains a variety of the spider species. In sugarcane crops of 2 districts nine families Lycosidae, Sparassidae, Pholcidae, Salticidae, Thomisidae, Araneidae, Clubionidae, Gnaphosidae and Oxyopidae were deeply studied and recognized four new records and two spider guilds clusters i.e wandering spiders and web builder spiders are reported first time from Matiari and Hyderabad. Out of nine families the wandering families are seven and two are web builder spiders. Wandering spiders built most rich guild structure whereas web builders built least rich one. Hence Wandering spiders dominated over wed builder 59%, 40.58%, correspondingly. The guilds structure not only found in adults but also witnessed between immature spiders. Further family Lycosidae was most diverse and found in abundance I sugar cane while Oxyopidae was least diverse family. The author spectator four sub sites in sugarcane crop which build according to the age of crop these sub sites are 1bottom, 2 middle and foliage 3 foliage to top while 4 leaf litter are hence interchangeable with the terms of sugarcane and thus both numerical and dominant of the family. Metaphors which point toward the hierarchical come together in studies two districts scrutiny is formed a dendrogram which was used to construct spider guilds (tables 1, 2). The collapse of succeeding groups of spiders come into sight were based first and foremost on web use, web-type, and microhabitat, resulting in two clusters of spider families that have been eyewitnesses could be measured as spiders guilds or spiders foraging habits. The spiders are predators feed upon a variety of pests hence can be used as biological control agents. This research is the baseline study especially for particular crop spider guilds and provides more than enough evidence that spiders can be used in a better way in IPM strategies.

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6. References

1. Schmidt MH, Rocker S, Hanafi J, Gigon A. Rotational fallows as overwintering habitat for grassland arthropods: the case of spiders in fen meadows. Biodiversity and Conservation. 2008; 17:3003-3012.
2. Balogh J, Loksa J. Untersuchungen u¨ber die Zoozo¨nose des Luzernefeldes. Acta Zool. Acad. Sci. Hungary. 1956; 2:17-114.
3. Root RB. The exploitation pattern of the blue-grey gnatcatcher. Ecol. Monogr. 1967; 37:317-350.
4. Root RB. Organization of a plant-arthropod association in simple and diverse habitats: The fauna of collards (Brassica oleracea). Ecol. Monogr. 1973; 43:95-124.
5. Hawkins CP, MacMahon JA. Guilds: The multiple meanings of a concept. Annu. Rev. Entomol. 1989; 34:423-451.
6. Riechert SE, Cady BA. Patterns of resource use and tests for competitive release in a spider community. Ecology. 1983; 64:899-913.
7. Riechert SE, Lockley T. Spiders as biological control agents. Annu. Rev. Entomol. 1984; 29:299-320.
8. Ghafoor A. Taxonomic and some Ecological studies of the Cursorial spiders of cotton fields at Faisalabad. Ph.D. Thesis, Department of zoology and fisheries, University of Agriculture, Faisalabad, 2002, 223235.
9. Musthaq SMA, Ali M, Riaz A, Murtaza Ahmad S. Spider as insect's natural enemies: evaluation of feeding niche of co-existing foliage species in cotton. Indus Cotton. 2005; 2:193-204.
10. Patrick LB, Kershner MW, Fraser LH. Epigeal spider responses to fertilization and plant litter: testing biodiversity theory at the ground level. Journal of Arachnology. 2012; 40:309-324.
11. Tahir T. Ecological studies on foliage spider fauna of cotton agroecosystem. M. Phil. Thesis, Department of zoology and fisheries, University of Agriculture, Faisalabad, 2008.
12. Uetz GW, Halaj J, Cady AB. Guild structure of spiders in major crops. Journal of Arachnology. 1999; 27:270-280.
13. Locket GH, Millidge AF. British Spiders: Society: London Volume 1. Ray, 1951, 310.
14. Locket GH, Millidge AF. British Spiders: Volume 2. Ray Society: London, 1953, 450.
15. Locket GH, Millidge AF, Merrett P. British Spiders: Volume 3. Ray Society: London, 1974, 316.
16. Roberts MJ. The Spiders of Great Britain and Ireland. Volume 2: Description of Species - Linyphiidae; Checklist of the British Species. Harley: Colchester, 1987, 204.
17. Kaston BJ. How to know the Spiders. The Pictured Key Nature Series. Win. C. Brown Co. Publishers. Dubuque, Iowa, USA, 1978, 1-272.
18. Ursani TJ, Soomro NM, Malik S, Soomro MH. Description of one male new species of Philodromus sindhica (Aranae: Philodromidae) from Sindh, Pakistan. Sindh Univ. Res. Jour. (Sci. Ser.). 2013; 45(2):379-380.
19. Ursani TJ, Soomro NM. Checklist of spider fauna of Sindh Province, Pakistan. Pak. J. Ent. 2010; 32:61-73.