



## ARANEAE (SPIDERS) FAUNA OF COTTON AGROECOSYSTEM IN NANGUNERI, TIRUNELVELI, TAMIL NADU

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### ABSTRACT

Araneae fauna was recorded in cotton agroecosystem in experiments carried out during February 2015 to September 2015 and February 2016 to September 2016 at Nanguneri Taluk, Tirunelveli Dist, Tamil Nadu. Araneae were collected using standard collection procedure and their presence, abundance and distribution on the plant was determined. 33 species of spiders classified under families Oxyopidae, Salticidae, Lycosidae, Tetragnathidae, Araneidae, Gnaphosidae, Dictynidae, Thomisidae, Pisauridae, Eutichuridae and Sparassidae were found to be associated with cotton crop. Oxyopidae were the richest in species (11) followed by the Salticidae (6) and Lycosidae (5). The most abundant spider species were *Oxyopes salticus* (Hentz) (Oxyopidae), *Plexippus paykulli* (Audouin) (Salticidae), *Hippasa olivacea* (Thorell) (Lycosidae) and *Metellina menzei* (Blackwall) (Tetragnathidae). This study would serve as baseline information for insect biodiversity and changing pest complex on cotton crop and help in framing efficient cotton pest management strategies.

**KEYWORDS:** Cotton agroecosystems, Araneae (spiders), abundance, distribution.

### INTRODUCTION

Cotton (*Gossypium hirsutum*) is one of the Indian field crops, and is steadily increasing in importance. Several pests that attack cotton have a wide range of natural enemies, of which spiders are prominent ones (Van den Berg and Dippenaar- Schoeman 1991) whose potential as biological control agents have nevertheless been largely ignored in applied scientific research. Spider communities on cotton in the USA have been widely studied, with more than 300 species having been recorded (Whitcomb and Bell 1964; Leigh and Hunter 1969; Young and Lockley 1985; Nyffeler and co-workers 1987-1994). Bishop and Blood (1977, 1981) and Bishop (1979, 1980, 1981) reported on work carried out in Australia while Wu *et al.* (1981), Zhao (1984) and Zhao *et al.* (1989) studied spiders on cotton in Asia. Studies on Indian spider Fauna have been carried out by different workers (Biswas and Biswas (1992), Patel (2002), Gajbe (2004) in different regions of the country and documented 1035 species belonging to 240 genera under 46 families from Indian sub continent. Therefore, comprehensive surveys, to determine species diversity and numerically dominant species and their abundance, are essential before experiments on their effectiveness can be conducted (Green 1996). This paper presents the results of a survey of spiders on cotton agroecosystem in Nanguneri Taluk, Tirunelveli Dist, Tamil Nadu. We provide a checklist of spiders commonly found in the

study area, with reference also to spider guilds, abundance and distribution.

### MATERIALS AND METHODS

Spiders were collected from the cotton fields in Nanguneri Taluk, Tirunelveli Dist, Tamil Nadu. Nanguneri is located at a latitude of 8°29'45.98" N and a longitude of 77°38'47.23"E. The investigation was carried out for a period of the February 2015-September 2015 and February 2016 – September 2016.

The surveillance of cotton crop was initiated at the seedling emergence of the crop and continued until the life span. Sampling was conducted in selected at random sites at weekly interval. Spiders were collected by visual search, pit trap and hand picking. The collected spiders were identified to species level followed by the method adopted by Gajbe, (2004).

### RESULTS AND DISCUSSION

In the present study, eleven families, represented by 23 genera and 33 species of spiders were recorded on the cotton crop, out of which, maximum number of species belonged to families Oxyopidae (11 species), Salticidae (6 species), Lycosidae (5 species), Tetragnathidae (3 species), Araneidae (2 species); Gnaphosidae, Dictynidae, Thomisidae, Pisauridae, Sparassidae and

Eutichuridae with represented only one species each (Table 1). Our results are in accordance with earlier reports by Mahalakshmi and Jeyaparvathi (2014) who

have studied the spider fauna in the cotton field of Thailakulam, Virudhunagar District of Tamil Nadu.

**Table 1: List of spiders in Nanguneri cotton agroecosystem.**

S. No.	Scientific name	Family	Plant part harboured
1	<i>Peuceitia viridana</i> (Stoliczka, 1869)	Oxyopidae	leaf
2	<i>Oxyopes salticus</i> (Hentz, 1845)	Oxyopidae	leaf
3	<i>Oxyopes heterophthalmus</i> (Latreille, 1804)	Oxyopidae	Leaf and stem
4	<i>Oxyopes birmanicus</i> (Thorell, 1887)	Oxyopidae	leaf
5	<i>Peuceitia latikae</i> (Tikader, 1970)	Oxyopidae	leaf
6	<i>Hamataliwa</i> sp.	Oxyopidae	stem
7	<i>Oxyopes javanus</i> (Koch, 1878)	Oxyopidae	Flower and leaf
8	<i>Oxyopes sunandae</i> (Tikader, 1970).	Oxyopidae	leaf
9	<i>Oxyopes variabilis</i> (Koch, 1878)	Oxyopidae	Leaf and boll
10	<i>Oxyopes macilentus</i> (L.Koch, 1878)	Oxyopidae	Leaf and stem
11	<i>Oxyopes lineatipes</i> (Koch, 1847)	Oxyopidae	Boll
12	<i>Plexippus paykulli</i> (Audouin, 1826)	Salticidae	ground
13	<i>Plexippus petersi</i> (Karsch, 1878)	Salticidae	ground
14	<i>Telamonia dimidiata</i> (Simon, 1899)	Salticidae	leaf
15	<i>Pandisus indicus</i> (Prószyński, 1992)	Salticidae	leaf
16	<i>Platycryptus undatus</i> (de Geer, 1778)	Salticidae	ground
17	<i>Phidippus</i> sp.	Salticidae	boll
18	<i>Lycosa</i> sp.	Lycosidae	ground
19	<i>Hippasa olivacea</i> (Thorell, 1887)	Lycosidae	ground
20	<i>Lycosa pseudoannulata</i> (Boesenberg and Strand)	Lycosidae	boll
21	<i>Hogna lenta</i> (Sundevall, 1833)	Lycosidae	Ground and stem
22	<i>Hogna</i> sp.	Lycosidae	Ground and stem
23	<i>Metellina mengei</i> (Blackwall, 1870)	Tetragnathidae	leaf
24	<i>Opadometa fastigata</i> (Eugene Simon, 1877)	Tetragnathidae	web
25	<i>Tetragnatha maxillosa</i> (Thorell, 1895)	Tetragnathidae	boll
26	<i>Cyrtophora moluccensis</i> (Doleschall, 1857)	Araneidae	web
27	<i>Araneus inustus</i> (Koch, 1871)	Araneidae	boll
28	<i>Gnaphosa</i> sp.	Gnaphosidae	ground
29	<i>Dictyna</i> sp.	Dictynidae	ground and stem
30	<i>Olios millet</i> (Pocock, 1901)	Sparassidae	tender leaf
31	<i>Thalassius albocinctus</i> (Doleschall, 1859)	Pisauridae	web
32	<i>Ozyptila praticola</i> (Koch, 1837)	Thomisidae	leaf
33	<i>Cheiracanthium inclusum</i> (Hentz, 1847)	Eutichuridae	leaf

The availability of spiders were governed by various reasons. Species distribution depends on the habitat, availability of food, climatic condition and disturbance. The increase in spider population may be influenced by the increase in prey population. In the present study spider population increased as the cotton plant grew up and reached flowering and fruiting stage. Many species could be recorded during these periods indicating proper anchorage for the webs and availability of prey in the form insects. Bal Harit and Dhawan (2009) have reported that spiders act as natural enemies in a cotton agroecosystem.

Spiders are among the first predacious arthropods to colonise newly-planted cotton fields and their populations gradually build up in size as plant density and prey numbers increase (Dinkins *et al.* 1970; Van den Berg 1989; Van den Berg and Dippenaar-Schoeman

1991). Most spider species are polyphagous and feed on a variety of prey (Nyffeler *et al.* 1994a). Predation is not limited to adult insects but includes the egg and larval or nymphal stages as well (Whitcomb 1974; Nyffeler *et al.*, 1990). Spiders use diverse foraging modes and hunting strategies to obtain prey, and could play an important role in the control of pest species (Dippenaar-Schoeman 1976; Sterling *et al.* 1992).

Spider assemblages can be effective in stabilizing pest population. The buffering effect of spiders can only be achieved through the combined activities of a variety of species in a given habitat (Dippenaar-Schoeman *et al.*, 1999). As reported, here also spider assemblages were observed. They belonged to web builders (family Araneidae) Ground –Wanderers, (family Lycosidae and family Gnaphosidae) and plant wanderers, (family Oxyopidae, Salticidae, Thomisidae). Thus spiders have

different niches in the cotton field predated on many arthropods. Web spinners construct their webs on leaves or between plants or in pit traps or close to soil. Ground wanderers are cursorial hunters and were observed on the leaves and flowers of cotton plants or running on the ground and hiding under dry leaves (Vanden Berg 1989). Plant wanderers are free living hunters found on cotton plants frequently near the flowering parts, stems or leaves. The above observations are in agreement with the earlier reports of Dippenaar-Schoeman *et al.* (1999). Representative of the above families show predating ability at various stages of the growth of cotton plant.

## CONCLUSION

Spiders are common and occur in high numbers in cotton fields, where they are also some of the very first predators to colonize the fields. In cotton fields they occur on the plants as well as the soil surface. Spiders have a very wide range of prey, including all stages of pest such as eggs, larvae, pupae and adults. Although spiders may be incapable of controlling major pest outbreaks by themselves, their role in a complex predating community could be important in regulating pest species at low densities. The study shows spiders such as *Oxyopes salticus*, *Plexippus paykulli*, *Hippasa olivacea* and *Metellina mengei* were the predominant species in the study area and serve as agents of biological control.

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