



## Social tolerance of spider *Stegodyphus sarasinorum* Karsch (1891) between their colonies under controlled and field conditions

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**ABSTRACT:** Investigation on social interaction between the individuals of *Stegodyphus sarasinorum* of two different colonies and their cooperation in prey capture showed that members of different colony were socially accepted by both adults and juveniles. The study also revealed that this species prey upon rice ear bugs and cercopids which form major pests in paddy fields and banana plantation respectively. © 2020 Association for Advancement of Entomology

**KEY WORDS:** Social organization, social interaction, *Stegodyphus sarasinorum*, rice ear bugs, cercopids, paddy fields, banana plantation

Social organization and maintenance of group living is exhibited by a few species of spiders which has evolutionary significances in reducing risk of predation. *Stegodyphus sarasinorum* Karsch (1891) belonging to family Eresidae is one such group that lives in large colonies as social spiders. Largely, females are inhabited in *Stegodyphus* colony than males. Female spiders display collective behavior in prey capture, web maintenance and brood care, while adult males rarely take part in these tasks in *S. sarasinorum*, as in other species of social spiders (Lubin and Bilde, 2007). Not just the colony association but also the complex nest which provides protection from outside environmental influences and their predators is an important factor facilitating social behaviour. This kind of a communal living categorizes them under social species. Groups of spiders can capture larger prey than can solitary

individuals of the same species (Burgess, 1976; Ward, 1986), and the thicker, larger web of social spiders aids in the capture of large prey (Jackson, 1979). Collective predation and communal feeding reveals the interaction between the members of their colony. Organisms foraging in groups experience increased foraging efficiency in comparison to solitary foragers by capturing large or greater numbers of prey, reducing the likelihood of prey escape, hunting risk and lower variability in prey capture (Rypstra, 1989). The present study was conducted to analyze whether individuals of different colonies can perform similar behaviour when maintained in controlled and field conditions. The study was conducted in Department of Zoology University of Kerala, Kariavattom, Thiruvananthapuram, Kerala (8.5678 °N, 76.8908°E). The duration of the study was from February 2020 to July 2020.

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## Collection

Webs having colonies of *S. sarasinorum* were collected from three different plants, *Citrus limon*, *Polyalthia longifolia*, and *Celosia cristata*. In the laboratory, the spiders were taken out from the web using brush and fine forceps without injury and collected in a bottle to count the number of individuals in a colony.

## Experimental set up in laboratory

Spiders were introduced in three cages of surface area 1.08m<sup>2</sup> each covered with a white net cloth.

**Cage I-** Seven adult females marked with non-toxic acrylic paint from a colony.

**Cage II-** Eleven adult females of from one colony and one female from another colony (marked with non-toxic paint).

**Cage III-** Fifty five spiderlings of one colony and one adult female of another colony.

Before commencement of the experiment the colonies in the cages were allowed to build their nests. The spider colonies under observation of this experimental setup were fed with insects such as rice ear bugs (*Leptocorisa oratoria*), Cercopid (*Phymatostetha deschampsi*) and housefly (*Musca domestica*) which are collected using a sweeping net. The prey was introduced using forceps into the cage through a small opening made on the white net cloth covering the cage. The opening was plugged with a cork after introducing the prey. The insect was allowed to get trapped on the web by gently placing them on it. Each prey was introduced alternatively i.e. one day only one type of prey was provided to each cage as their

feed. The consumption rate of the spiders is given in Table 1.

## Experimental set up in field

Colonies of *S. sarasinorum* was observed near the paddy field constructed on electric posts in Edthuva, Kuttanad, Kerala. The paddy field is surrounded with banana plantation on one side. Two small webs from the above mentioned colonies were allowed to grow on an artificial frame made of bamboo sticks and was placed at a corner of this paddy field in such a way that the frame is situated between the paddy and the banana plantation. Overnight construction of the web was observed in both the experimental setups. Images of the experimental setup are illustrated in Figs. 1, 2, 3, 4, 5 and 6.

## Laboratory Experimental set up

When a prey was introduced in the cage, only few of the spiders get attracted initially by the vibration of the insect. Later a large number of spiders crowd together over the prey and drag it into the retreat. It was observed that in Cage I, out of the seven adult female spiders, two attacked the prey and the struggle between the spider and the prey caused vibration which was detected by the rest of the spiders. It was also noted that the females preparing for laying egg sacs did not participate in prey capturing, instead the prey was dragged towards them by the other members this spider colony. In Cage II, adult females were reported to capture the introduced prey as mentioned above in Cage I. Adult female from a different colony was equally involved while feeding the prey. No sign of aggressiveness or competition were observed between the individuals of this experimental group.

Table 1. Prey consumption rate of *S. sarasinorum* in experimental rearing

Sl. no.	Experimental set up no. (Cage)	Type of prey	Consumption rate (per cage/ day)		
			Feb-March	April-May	June-July
1.	I, II and III	Housefly	3/3	4/4	4/5
2.	I, II and III	Cercopid	3/3	4/4	4/5
3.	I, II and III	Rice ear bug	3/3	3/4	3/5

Plate 1



Fig. 1. *S. sarasinorum* colony for laboratory rearing



Fig. 2. Laboratory experimental set up (Cage)



Fig. 3. Field experimental set up with one colony



Fig. 4. Field experimental set up with two colonies



Fig. 5. Field experimental set up with three colonies



Fig. 6. Field experimental set up (side view)



Spiderlings collected from one colony and an adult female from another colony was also under observation in Cage III. Maternal care by this female spider was shown to the spiderlings by attacking the prey and then letting the young ones to feed on it.

### Field experimental set up

Both the colonies constructed their webs on the wooden frame. In the subsequent month another colony was built by these spiders. By the end of July three colonies (Fig. 5) were observed on the frame. The web was decorated with the exuviae of these spiders and remains of different insects like dragonfly, rice ear bug, cercopid, beetles, and bugs.

From the study we infer that the Indian social spider *S. sarasinorum* exhibit high level of colony coherence. They maintain an amiable environment with other colony members. They are also believed to feed communally even though all the members do not participate in prey capture (Bradoo 1980). It was examined from both the experimental setup in laboratory and field that these species can feed on different types of insects because all the three insects introduced in the cage were consumed. And they have the capability to attack the pests of rice crop (rice ear bug) and banana plantation (cercopid). The study reveals the feeding activity of the predators instead of their preference to a particular prey. It is shown that these conspecific individuals which prefer to form open societies are freely exchangeable between colonies as stated by Seibt and Wickler (1988). *S. sarasinorum* can help the

farmers to get rid of insect pests to a greater extent if sufficient numbers of colonies are reintroduced in the agro ecosystem.

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