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Research Article

AUTECOLOGICAL OBSERVATIONS ON THE INDIAN COOPERATIVE SPIDER *STEGODYPHUS SARASINORUM* KARSCH (ERESIDAE:ARANEAE)

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ABSTRACT

Autecological observations on the Indian cooperative spider *Stegodyphus sarasinorum* Karsch (Eresidae: Araneae) was undertaken in the Jnana Bharathi Campus of Bangalore University during summer 2010. Nest circumference ranging from 22 cm to 165 cm of 10 interconnected colonies of a population of *Stegodyphus sarasinorum* was measured. Nest density, sex ratio and interconnectivity between nests were assessed. The colonies showed a sex ratio with 0.24 males for every female. Other species of spiders were also recorded during the present observations.

Keywords: Autecological, *Stegodyphus sarasinorum*, Nest colony, Nest density, sex ratio and Interconnectivity.

INTRODUCTION

Most spiders are asocial except a few social spiders with special attributes like tolerance, interattraction, and cooperation. The Indian cooperative spider *Stegodyphus sarasinorum* Karsch (1891) (Eresidae: Araneae) is distributed in India, Sri Lanka, Nepal and Afghanistan (Kraus and Kraus, 1988) and is one of three permanently cooperative species in the genus *Stegodyphus* (Kraus and Kraus, 1988). Individuals live in large cooperatively built colonies with a nest or retreat constructed of silk woven together with leaves, twigs, and remains of food, and a sheet web for prey capture (Jacson and Joseph, 1973). The natural history of *S. sarasinorum* has been investigated by Jambunathan (1905), Bradoo (1972, 1975, 1980), Jacson and Joseph (1973) and Kraus and Kraus (1988). In the present study interconnectedness of plants by colony web structure and sex ratio are reported based on studies undertaken in a scrub forest ecosystem in Bengaluru.

MATERIALS AND METHODS

Study area

The study was conducted in the Jnana Bharathi Campus of Bangalore University, Bengaluru South Taluk, Bengaluru Urban District (12º58'N, 77º34'E). The study was undertaken during summer 2010.

Nesting material and sociality

Nests were hand collected and carefully analysed to check its composition. The aggregation behaviour of the inmates was studied. Additionally sex ratio and coexisting fauna during the study period is reported.

Nest count and morphometry

A random count of number of nests in a scrub patch behind the Department of Zoology on 16 plants (shrub/ tree) of three species *viz.*, *Acacia catechu* (Fabaceae) *Lantana camara* (Verbenaceae) and *Chromolaena odorata* (Asteraceae) was recorded to know the range of nests accommodated on a plant. Morphometric measurements and inter-nest distance was measured on ten interconnected nests

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interspersed on four different species of plants, *Azadirachta indica* (Meliaceae), *Holmskioldia sanguine* (Lamiaceae), *Acacia catechu* (Fabaceae) *Lantana camara* (Verbenaceae) and *Chromolaena odorata* (Asteraceae). The measurements (cm) were made using measuring tape.

RESULTS AND DISCUSSION

Nesting material and sociality

In the Jnana Bharathi campus study area individuals of *S. sarasinorum* (Figure 1) were found living in large cooperatively built colonies with a nest constructed of silk woven together with leaves and twigs of the host plant, additionally remains of food were found interspersed in the nesting material. Leaf litter presumably provides optimal conditions for young spiders, and may promote their numbers. Exoskeletal remains of different insects (beetles, butterflies and grasshoppers) (Figures 2 and 3) indicate prey capture and joint feeding as a cooperative effort as recorded by Bradoo (1980). The inmates of a colony show strong aggregation within the nest and aggregate together when removed out of the nest (Figure 4), an observation in agreement with Seibt and Wickler (1988). Presence of an unidentified spider species and a terrestrial snail, *Rachis punctatus* were observed co-existing with the nest indicating interspecific tolerance (Figure 5 and 6). These spiders are tolerant of individuals from other nests (Kullman 1968), and migration among colonies in close proximity has been observed (Bradoo, 1972). The African social eresid spiders *Stegodyphus mimosarum* and *S. dumicola* exhibit extreme intra as well as interspecific social tolerance (Seibt and Wickler, 1988). Interspecific inter-colony tolerance has also been reported in the social spiders *Agelena consociata* Denis and *A. republicana* Darchen (Agelenidae), *Metabus gravidus* Cambridge (Araneidae), *Anelosimus eximus* Simon and *A. studiosus* Hentz (Theridiidae) and in *Mallos gregalis* Simon (Dictynidae) (Buskirk 1981). Kullmann (1968) and Bradoo (1980) obtained the same results for *S. sarasinorum.*

S. sarasinorum colonies exhibited high density of females (Figure 7) and strongly female-biased sex ratios, with 0.24 males for every female which is in conformity with earlier observations (Jacson and Joseph, 1973).

Nest count and morphometry

A random check on 16 plant (shrub/ tree) of three species viz., *A. catechu, L. camara* and *C. odorata* in the area revealed nest number ranging from 1-20 on each plant (Figure 8 and 9). Further studies to understand the floral diversity and nest count interrelation would provide information regarding host and microhabitat preferences. Of the ten interconnected nests interspersed on four different species of plants, *A. indica, H. sanguine, A. catechu, L. camara* and *C. odorata,* minimum circumference of 22 cm and a maximum of 165 cm were observed with a Mean ± SD (105.10 ± 51.58). In the field we observed intermigration between separate (presumably daughter-colonies over distances less than 10 m). Measurements of inter-nest distance considering ten nests are represented in Figures 10 and 11. *S. sarasinorum* are known to spread by ballooning and swarming (Smith and Engel, 1994) so that spiders in nearby colonies are likely to be members of the same large extended family.

Figure 1. *S. sarasinorum* (female) in habit.

Figure 2. Exosketal remains of left-over in the nest material.

Figure 3. Remains of insects recovered from the nest.

Figure 4. Aggregating behaviour of the nest mates removed from nest.

Figure 5. Unidentified spider species found co-existing in *S. sarasinorum* nest.

Figure 6. *Rachis punctatus* snail adhering to the nest.

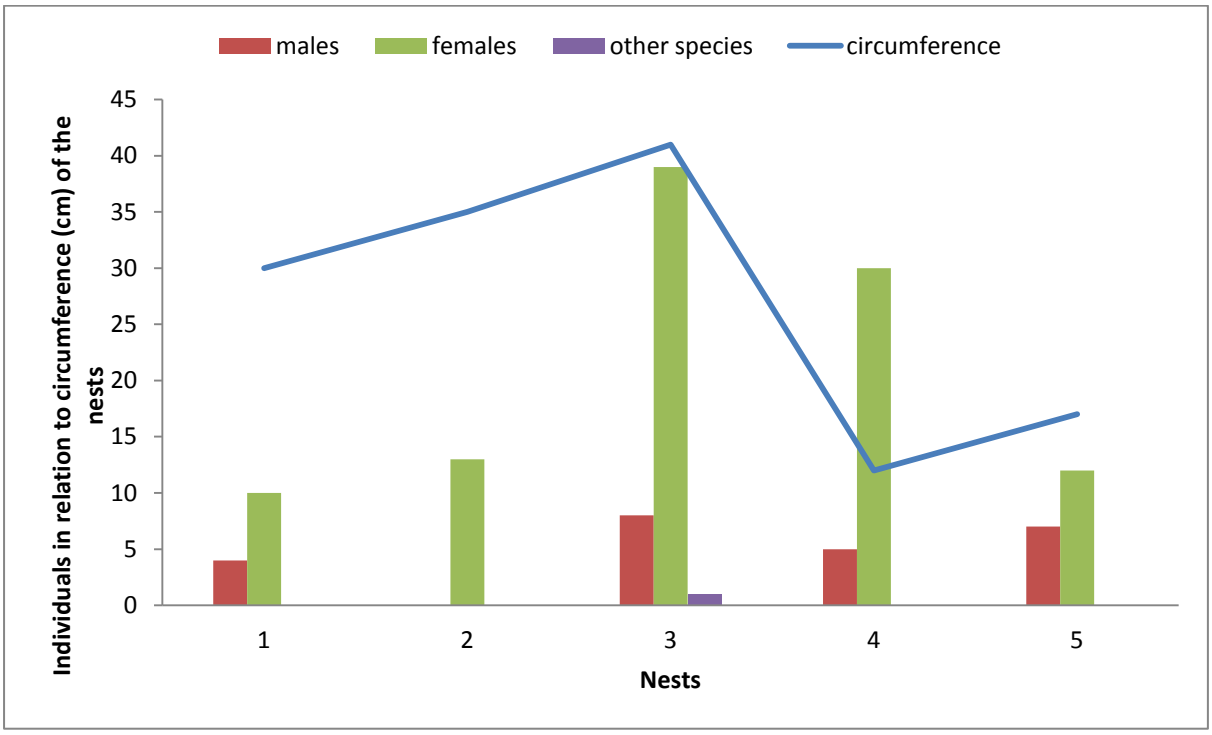

Figure 7. Intra and interspecific nest mate composition (N=5).

Figure 8. Nests interconnecting *Acacia catechu* and *Chromolaena odorata* shrubs.

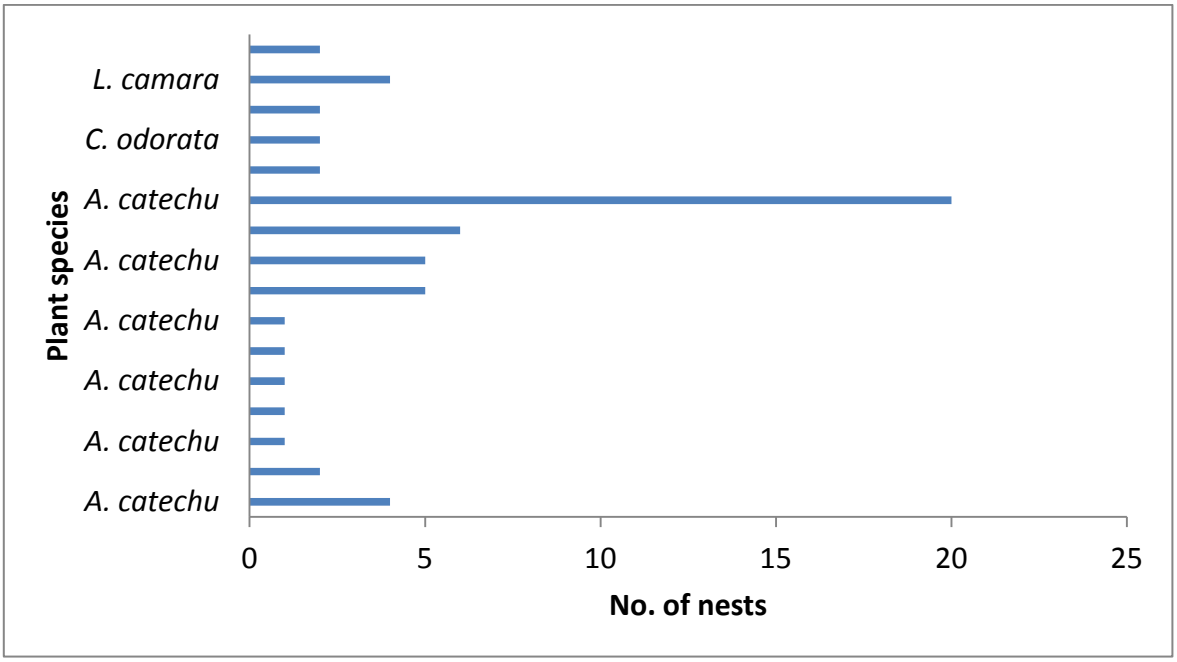

Figure 9. No of nests counted on randomly selected plant/ tree in the study area.

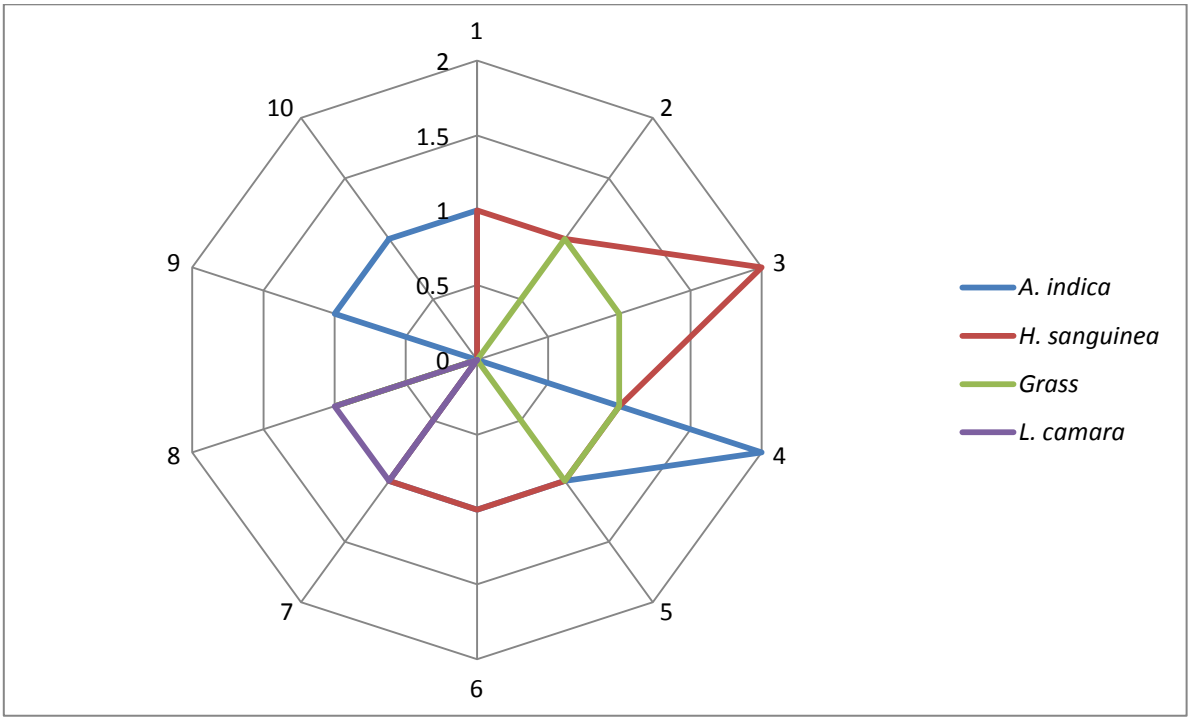

Figure 10. Plant species (N=4) interconnected by *S. sarasinorum* nests (N=10). (Note: Legends 0-2 indicate the number of plants interconnected by corresponding webs).

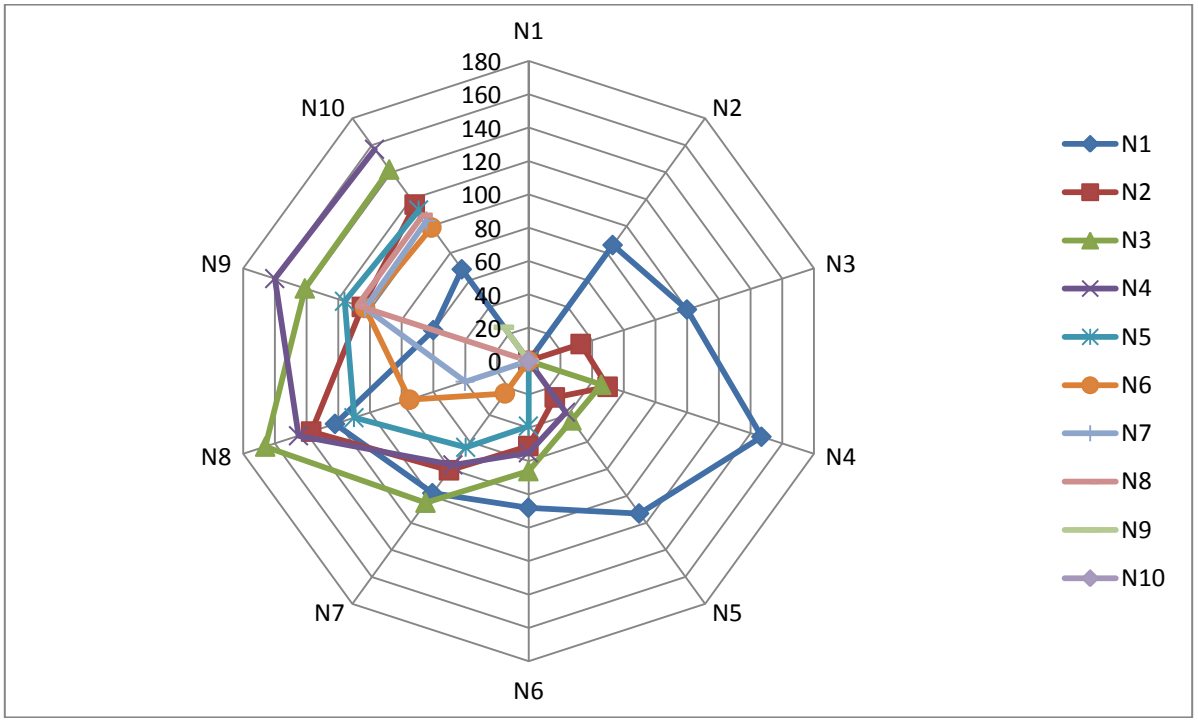

Figure 11. Inter-nest distance of *S. sarasinorum* nests in the study area (N=10). (Note: Legends 0-200 indicate the distance (cm) between plants interconnected by corresponding webs).

CONCLUSION

The present study is a preliminary observation of the nest architecture of the permanently cooperative spider, *S. saracinorum*. The observations of nest building manifest a collective effort of the species as a social group. As established earlier, this social group exhibited tolerance, lack of caste and hierarchy. Existence of multiple nests in the study area indicates the colony expansion with time. Future studies on the ecobiology *viz*., feeding behaviour including gerantophagy, and fecundity needs to be undertaken.

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