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Potential breeding sites for spider with special reference to *Jatropha integerrima*

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Abstract
Spiders are among the most common animals and are abundant, widespread in almost all terrestrial ecosystems. They choose various ideal habitats to build their nests for feeding, and breeding. All spiders have spinning glands, which they employ to produce traps and webs as well as egg sacs (Cocoons). Several case studies of spiders living in conjunction with plants are presented, along with descriptions of spatial and temporal adaptations in spider plant partnerships. This research paper represents the nest building choices of spider and its plant interactions. Jatropha integerrima is a shrub to small tree native to Cuba has an excellent plant architecture, physical traits of the leaf, its abundance in their habitat and of leaf modification structures such as rosette shaped clusters of leaves or glandular trichomes, strongly influenced the spiders to protect and provide an excellent home for the life cycle of spiders and access to their prey. Females are usually larger in size which prefers long and large leaves found in *Jatropha integerrima* to build their breeding nests.

Keywords: *Jatropha integerrima*, spider, breeding nest, host selection

Introduction
Jatropha integerrima is a shrub to small tree native to Cuba that has been imported as an attractive species across tropical and subtropical locations worldwide. Despite becoming established in some locations, it is not considered an invasive species.

1. Habitat
Jatropha integerrima is a tiny tree to shrub that is commonly used as an ornamental. It has been found in sandy semi-arid places, near swamps, on disturbed soils, limestone cliffs, and humus pockets in woods, and it is farmed in cities.

2. Environmental Services
Hummingbirds and butterflies are attracted to *Jatropha integerrima*. It is also a nectar source for Eumaeusatala in Florida, USA. J. integerrima is visited for nectar and pollen by a variety of bee species, including honeybees, in Costa Rica.

3. Spider and their lifecycle
Spiders are the world's biggest order of arachnids, with 40,000 to 50,000 recognized species. While spiders vary in size and color, they are all air-breathing arthropods with many similarities, including an exoskeleton that they molt or shed as they develop, eight jointed legs in four pairs, and segmented bodies coated in hair so fine that it is not usually visible. Most spiders can spin silk from spinnerets at the back of their bodies to create webs. Spider silk is extraordinarily strong and sticky. The female Spider rules the world of spiders. Female spiders are often larger than males and may be stronger and more venomous. After mating, certain female spider species may kill and eat the male (Sebastian, P. A. & Peter, K.V. (2009) [1]. The Spider life cycle is divided into three stages: egg, spiderling, and adult. Depending on the species, spiders can deposit up to 3,000 eggs, generally in one or more egg sacs or breeding nests. In some spider species, the female dies after laying the eggs. Others carry the egg sac in their chelicerae or attach it to their spinnerets, and some establish breeding nests in plant leaves. Other spiders either bury their eggs in nests or attach them to their web. Spiders develop into larvae within the egg. Spiders lay so many eggs because not all of them mature. The Spider lings that hatch from the eggs are smaller copies of their adult counterparts. A spider's average life span can range from a year to two years, depending on the species. The majority of spiders only live for one season.

4. Flora and Fauna Association
Vegetation is one aspect that gives structural diversity to habitat, since diverse patterns of branching and modular organization of plants can provide a wide range of architectural arrangements (Bell *et al*.1979; Küppers 1989; Bell 1991) [2-4]. Numerous studies have indicated that plant design is a crucial role in determining the richness of fauna linked with vegetation, particularly among the arthropod population (Halaj *et al*., 2000 Hatley and MacMahon 1980;) [5, 6].

5. Spider and Guilds
Plant and animal ecologists used the term guild to describe trophic groups called Genossenschaften or Syntrophia. The term guild was coined in a study of avian niche exploitation patterns as "a group of species that exploit the same class of environmental resources in a similar way," and this notion was later extended to collard arthropod fauna. Thus, a guild consists of potentially competing species and is an important feature of biological communities. The guild concept has been applied to several animal and plant groups since its inception (Simberloff and Dayan 1991) [7].
Spiders are categorized into guilds based on the various

techniques they employ to catch their prey. Spider families that comprise the guilds of stalkers, ambushers, and foliage runners are the most numerous occupants of vegetation (Höfer and Brescovit 2001; Romero and Vasconcellos-Neto 2007a; Mohsin *et al*. 2010; Cardoso *et al*. 2011) [8-11]. In a comprehensive investigation, Nentwig *et al*. (1993) [12] identified numerous Spider species connected with flowers, leaves, and trunks of various plant species. Some spiders in the stalker, ambush, and foliage runner guilds do not form webs but instead live in close contact with the plants; they frequently have closer associations with this type of substrate than web builders. They employ plants for shelter and breeding habitat in addition to feeding. Several studies have been conducted to investigate the impact of plant architectural features on the abundance and diversity of arthropods, particularly spiders. This influence is related to the plant's various vegetative parts (e.g., needles, branches, leaves) and the presence of reproductive structures, which can provide a wide range of shelters, favorable microclimate conditions, anchoring points for prey capture webs, and opportunities to use various foraging methods.

Plant structures (e.g., tree trunks, branches, leaves, flowers) contribute to plant structural complexity and are factors of Spider community distribution on vegetation. Once a Spider's eggs have been fertilized, they must be protected from predators until the Spiderlings hatch. As previously stated, certain Spider species will encase their eggs in a silken pouch or nest and abandon them, whereas others will remain with them until the eggs hatch.

Material and methods

1. Study area and nest types

This study was conducted in Tropical Butterfly Conservatory (Butterfly Park) at Tiruchirapalli (78.637202°lat. 10.877862°lon.), Tamil Nadu, India. Euphorbiaceous plant *Jatropha integerrima* was planted as nector plant for pollinators in the study area. The Spider seemed to access this plant species in the study area for nesting. As a juvenile, the Spider is univoltine. The juvenile constructs a moulting nest from of plant leaves, whereas the adult constructs a nest for mating and breeding. After the Spider's reproductive process is completed in the study area, the adult female constructs a nest for breeding.

Breeding nest: a nest created by an adult female for the purpose of laying eggs and caring for the eggs and juveniles until the second instar eats her in the nest (De Omena PM, Romero GQ. 2008) [13]. The spider is nocturnal and uses the nests throughout the day to rest and hide.

2. Host plant preference

The Animal prefers the *Jatropha integerrima* plant due to its leaf shape and structure as follows

- **Leaf type:** simple
- **Leaf margin:** lobed
- **Leaf shape:** oblong; obovate
- **Leaf arrangement:** Simple and fascicled
- **Leaf blade:** Ovate and elliptical, 5-10 cm long, accute tip, green, smooth and shiny upper surface, pinnate venation, and margin is entire

3. Leaf Measurements

Adult leaves from the plant has been collected and measured and it has 13cm length and 9.3cm breadth

4. Nest Measurements

The animal builds nest with the length of 7mm and 8mm breadth. The Samples were collected from the field for measurements and left back in the field.

Result and Discussion

1. Breeding nest

Female spiders construct a breeding nest or one egg sac carrying several to a thousand eggs in successively fewer egg sacs. Many species' females die after the last egg sac is laid. Others offer care for the young for a period of time; these females live one to two years. Female mygalomorph spiders can live up to 25 years and primitive haplogyne spiders up to 10 years.

Silk is used to make the protective nest that surrounds the eggs or young ones. The nest is made up of several layers of silk; most people build intricate nests out of many layers of thick silk. Eggs, which frequently resemble drops of fluid, are deposited on the base of a leaf and then wrapped and coated with a few layers of silk, resulting in a white or creamy-colored, spherical or disk-shaped nest. This plant serves as a breeding ground for a variety of Spider species. The nest is either in the center or a corner of the leaf (Schoonhoven *et al*., 2005) [14]. Females protect their eggs and Spiderlings until they reach maturity.

2. Maturation

When spider lings emerge from the egg sac, they are self-sufficient. After hatching, wolf Spider lings, which normally number 20 to 100, clamber atop the back of their mother and stay there for around 10 days until dispersing. If they fall off, they will climb back up, looking for bristle-like structures (setae). Some female spiders feed their young. When the female has adequately liquefied the food (in Spider, digestion occurs outside the mouth), the young feed on their mother's prey.

Except for their size and undeveloped reproductive organs, young Spider lings resemble adults. They shed their skins (molt) as they grow in size. The number of molts varies between species, within species, and even among related young of the same sex. Males grow earlier and have fewer molts (2 to 8) than females (6 to 12). Males of some species

mature after they emerge from the egg sac, after one or two molts. Some Spiders develop a few weeks after hatching, but many overwinter as immatures.

Because to increasing blood pressure, the protective covering (carapace) of the cephalothorax tears, either below the eyes or at the posterior end. The spider then pulls its legs and abdomen from the old cuticle (skin) with great difficulty. Blood pressure fluctuates dramatically during the emergence process. These pressure fluctuations elevate and drop the setae, gradually releasing the legs. The exuviate, or cast-off cuticle, persists. Many web builders molt while suspended, the freshly emerging Spider dangling from a silk strand. The Spider is defenseless until the new exoskeleton solidifies, making molting dangerous for Spiderlings. They may dry out before properly emerging from the old cuticle, or they may fall victim to a predator while defenseless. Even minor injuries during the molting stage are frequently lethal. Hormones are thought to govern growth and molting. Some Spider lings never molt, while others molt late, possibly because to improper hormone balance, and perish. Many Spider lings finally disperse via ballooning, generally in the fall.

Conclusion

As a result, we believe that the physical structure of the plant habitat is a more essential component for spider populations, and that microhabitat selection is mostly controlled by plant architecture, particularly Leaf Morphology. After continuous observation and investigation, we conclude that the spiders choose *Jatropha integerrima* plant based on comfortable zone, boat shaped leaf to provide best platform to build nesting, densed canopy, and to protect the spider lings from their enemies. We found that the symbiotic relationship between spiders and the host plant *Jatropha integerrima* is remarkable.

Conflicts interest

All authors have no conflicts of interest to declare.

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