

## Scientific Note

**First report of the use of extrafloral nectaries of *Bauhinia forficata* Link (Fabales: Fabaceae) by *Tetragonisca angustula* Latreille (Hymenoptera: Apidae)**

Primer reporte del uso de nectarios extraflorales de *Bauhinia forficata* Link (Fabales: Fabaceae) por *Tetragonisca angustula* Latreille (Hymenoptera: Apidae)

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**Abstract.** We report here for the first time the use of extrafloral nectaries of *Bauhinia forficata* Link by *Tetragonisca angustula* (Latreille, 1811). This behavior was observed in an urban area in southern Brazil during the afternoon between December 2018 and January 2019. Known information on alternative food resources for these bees is important for the preservation of this species.

**Key words:** Interaction, jataí, Meliponini, nectar, urban environment.

**Resumen.** En este trabajo se registra por primera vez el uso de nectarios extraflorales de *Bauhinia forficata* Link por *Tetragonisca angustula* (Latreille, 1811). Este comportamiento fue observado durante la tarde en un área urbana del sur de Brasil entre diciembre de 2018 y enero de 2019. Conocer información sobre los recursos alimenticios alternativos para estas abejas es de suma importancia para la conservación de la especie.

**Palabras clave:** Interacción, jataí, Meliponini, néctar, entorno urbano.

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The native stingless bees of the Meliponini group are represented by approximately 400 described species and stand out for their ecological importance related to the pollination of various plant species. In some forest formations, about 30 to 90% of native plant species depend exclusively on this group of bees for pollination (Imperatriz-Fonseca and Nunes-Silva 2010). *Tetragonisca angustula* (Latreille, 1811) is a species of the Meliponini group with wide occurrence, where it is found from Mexico to Argentina. This species is known in Brazil as "jataí", being extensively used in meliponiculture, because it shows wide ecological valence and produces propolis and honey considered of excellent quality (Oliveira *et al.* 2004).

*Tetragonisca angustula* can be classified as a generalist bee because it obtains resin, pollen and nectar from a wide variety of plant species (Toledo *et al.* 2003; Morgado *et al.* 2011). Flowers represent the most important source of these resources, especially pollen and nectar; however, in some situations, bees may seek other sources of food, such as extrafloral nectaries, for example. This allows the insect to avoid inter- and intraspecific competition for flowers, especially in environments or periods of the year with flowering scarcity (Wilms and Wiechers 1997).

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Extrafloral nectars are secretory glands not directly involved in pollination, occurring in more than 90 angiosperm families. These glands attract protective insects, such as ants, which prevent the action of herbivores on the plant (Koptur 1992). *Bauhinia forficata* Link (Fabaceae), known in Brazil as “pata-de-vaca” or “unha-de-vaca” (cow’s hoof), is a pioneer species that can reach up to 10 m in height, which has large leaves and canopy. It is a native species of the Atlantic Forest, and due to its landscape potential, it has been widely used in urban afforestation (Rosa *et al.* 2008). This species possesses cryptic and externally non-visible extrafloral nectaries, constituted by nectar-secreting tissue inside a spine (Gonzales and Marazzi 2018), and they are located along tree branches at distances ranging from eight to 12 cm (on the youngest branches). No extrafloral nectaries are observed at the base of the flowers of this plant.

Bees obtain from the nectar produced by extrafloral nectaries important sugars and amino acids (Heil *et al.* 2000). *Tetragonisca angustula* has already been found feeding on extrafloral nectaries of other species, including *Passiflora alata* Curtis (Cardoso-Gustavson *et al.* 2013). However, these facultative interactions between bees and extrafloral nectaries are poorly studied and poorly recorded in the scientific literature. The objective of this work was to record for the first time the use of extrafloral nectaries of *B. forficata* by *T. angustula*.

Between December 2018 and January 2019, from 4:00 p.m. to 5:00 p.m., specimens of *T. angustula* were observed from two colonies bred in wooden boxes in the urban area of the municipality of Ijuí, state of Rio Grande do Sul, Brazil (28° 23' 19" S, 53° 54' 56" W), visiting extrafloral nectaries of *B. forficata*. The plant was located two meters away from the beehives, and it was flowering during the observation period.

Bees generally landed on a branch just below the extrafloral nectaries and walked to the structure to get nectar (not approaching the flowers). Also, they showed a preference for visiting extrafloral nectaries located on young branches exposed to direct sunlight. During the study period, individuals accessing the extrafloral nectaries were observed more than 50 times. The time of visitation at each extrafloral nectary ranged from two to five seconds. Young (1985) observed the foraging behavior of stingless bees on flowers of *Theobroma cacao* L. (Sterculiaceae) and concluded that these bees foraged on flowers that were exposed to sunlight and avoided those in the shade. Although the incidence of sunlight on extrafloral nectaries and flowers seems to be an important factor in the foraging behavior of some bees, probably due to sun’s effect on nectar composition and quantity (Pleasants 1983), explanations for this phenomenon are still lacking.

During this study we did not see *T. angustula* visiting *B. forficata* flowers. This observation was in line with that reported by Bernardo (2018), who also saw no *T. angustula* visiting flowers of this plant. Although Garcia *et al.* (2008) observed this species of bee visiting *B. forficata* flowers, the flowers of this plant do not seem to be among the favorites of *T. angustula*. Thus, *T. angustula* is a likely visitor of non-pollinating *B. forficata* extrafloral nectaries. Also, because it is not an aggressive bee during foraging, *T. angustula* does not have a mutualistic relationship with this plant, where it does not defend the plant against other herbivorous or phytophagous insects. Bees take less time to obtain nectar from extrafloral nectaries than nectar and pollen from flowers (Free 1962). Also, the nectar composition of extrafloral nectaries and floral nectaries of the same plant may be different, and in many cases, the nectar of extrafloral nectaries has higher sugar concentrations (Koptur 1994). Thus, the role of extrafloral nectaries as a food resource for *T. angustula* and other bees should be better understood and described in future studies.

Due to extensive degradation and fragmentation of the natural environments of *T. angustula* and its low dispersion capacity (Francisco *et al.* 2016), information about alternative food resources for these bees is very important, especially regarding the possibility of human intervention to prioritize the planting of plant species that can be used by this species, as in the case of *B. forficata*.

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