



Nest architecture of stingless bee, *Tetragonula gressitti* Sakagami from Nagaland, India

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Abstract

Tetragonula gressitti Sakagami is the new species of stingless bee discovered in Nagaland (2020). It was earlier found in Arunachal Pradesh (2013), South West China (2019) and Vietnam in 1978. The nest architecture of this particular species was never studied although there had been regular reports of its presence in forest areas by the local populace and all earlier reports were simply documented on the basis of collected samples from forests. This is the first detailed report on nesting characteristics of the stingless bee, *T. gressitti*, which were found located in the forest and village areas of Phek district in Nagaland during the early winters of 2019. The natural nests were found in tropical to sub-tropical evergreen forests on tree cavities, commonly at a height of $2.91 \text{ m} \pm 0.21$ with a single entrance for each colony. The colonies were naturally active as seen and recorded from the activity of bees at their entrance gates during day time. The nests were extracted carefully with appropriate tools and transported to the experimental site. A total of seven natural nests were located for the study. Out of them, three nests were opened to observe the internal nest structure while the remaining nests were kept intact for further development and pollination studies. The observations revealed that the nest entrance on the external region was free from any wax or cerumen funnel tube and was meticulously kept clean by the bees. The nest entrances of all the colonies varied in size and shape. Internally, the entrance was connected to the brood through a waxy passage of $11.42 \text{ cm} \pm 0.73$ length till it reached the involucreum. The brood was covered in a partial involucreum of $2.15 \text{ cm} \pm 0.23$ thickness. The honey pots and pollen pots were found separated from the brood area and were connected through numerous small openings in the involucreum. The adult bees were observed to be deep black in colour. The required data on size of different cells and castes were also recorded accordingly.

Keywords *Tetragonula gressitti* Sakagami · Nest architecture · First report · Involucreum · Honey pots · Pollen pots

Introduction

Stingless bees are important pollinators belonging to the order Hymenoptera and family Apidae. These bees are close relatives of honey bees and bumble bees. Unlike honey bees, stingless bees do not possess sting and are quite smaller in size. They are highly developed social insects living in colonies found in all sub-tropical and tropical regions of the globe with more than 500 described species comprising the tribe Meliponini and sub tribe Meliponina (Michener 2013). The presence of nesting sites is essential for survival,

maintenance and reproduction of Stingless bees (Hubbell and Johnson 1977; Batista et al. 2003; Eltz et al. 2003; Roubik 2006). Although their nesting habits are variable, most of the stingless bee species build their nests in several substrates ranging from subterranean cavities to arboreal ant nests (Campos 1987; Roubik 2006). The nest entrances of stingless bees vary in shape, size, length, colour etc. and is one of the important characteristic feature among different species (Chauhan et al. 2019). The chief building component of the colony is cerumen, a mixture of bee wax and plant resins (Rasmussen 2013). The common structure of stingless bee nests consists of entrance tunnels, brood cells, food storages (honey and pollen cells), cerumen, bitumen layers and involucreum (Sakagami et al. 1990; Michener 2007). The stingless bees are being reared in Nagaland since time immemorial and the diversity of stingless bees also vary from one district to another. A total of eight species of

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