Architectonics of Stingless Bee Nest

Deeksha, M. G., Mahesh Jadhav, Niraj Guleria and Sandeep Kumar

Insect a ubiquitous critter has been encroached every corner of this tellurian. They are immensely diversified, thus making them to evolve more distinctly among themselves to survive by overcoming their stumbling block. There are some insects which are more advanced in their behaviour where they show socialism.

One among them is stingless bees, these are tropical and subtropical eusocial organism belongs to the subfamily Meliponinae, of the family Apidae. Worldwide there are more than 500 species of stingless bees taxonomically identified (Michener, 2007). This stingless bees have organised system on division of labours and work cordially in their nest. Their colony strength depending on species varies from several hundreds to lakh individuals (Wille, 1983). Commonly these bees are called stingless bees, as females have weak or vestigial stinger. In order to protect themselves from their anthropogenic foe they show belligerent nature by wreaking mild bite with mandibles, cause skin irritation by emanating caustic substance from mouth and crawl into nostril or ears of violator (Bhatta *et al.,* 2019; Roubik, 2006).

The nesting behaviour of stingless bee play cardinal role in visualising the stingless bees activity. The nest of stingless bee is a complexly organised and made from cerumen (a mixture of collected plant resins and wax produced by the bees on the dorsal side of their abdomen), other building materials like mud, vertebrate faeces, plant fibres and chewed leaf materials are also used for nest construction. The nesting design, both interior and exterior depends on the stingless bee species. Nest site preferred by stingless bees are hollow trees (Fig. 1a), on the ground, or occasionally in active colonies of social insects like termites, ants, wasps or other stingless bee colonies (Willie and Michener, 1973).

Archetypal design of nest has compartments like entrance, waste and resin dumps, batumen, brood cells, involucrum and store pots. Nest entrance act as a bridge between external environment and internal cavity of the nest and are built by the soil matter, dried plant materials and resin. In the nest entrance waste and resin substances are dumped (Fig. 1b) (Bhatta *et al.,* 2019). This resinous substance collected by bees from plants producing yellow coloured sticky materials, upon which nest wastes like excreta, dead bees or part of them, parts of brood, cocoons are deposited. The resins are also used to repair the nest if any cracks are found (Fig. 1c). The outermost covering, i.e., the interior wall of stingless bee nest is coated by batumen (Fig. 1d). It is made up of resin, mud and wax which has many roles like helping to size up the hive volume, temperature regulation and protection from rain (Divya *et al.,* 2016). The most executed part of nest is the brood cells, which occupy the heart point in nest and are divergent in

Fig. 1. (a) Dwelling of stingless bee on wooden log, (b) Nest entrance with waste and resin substances, (c & d) Resin and Batumen on interior wall of nest, (e & f) Brood cells and Involucrum, (g & h) Store pots, honey and pollen pack.

their shapes like spherical, ovoid and columnar depending on species (Fig. 1e) (Roubik, 2006). In this region worker bees as a skilled mason gives a strong foundation for brood cells by constructing wax pillars (Divya *et al.,* 2016). The brood region is surrounded by lamellar sheaths of involucrums which act as a passive thermoregulation system in nest (Fig. 1f) (Bhatta *et al.,* 2019). The number of layers and structure of involucrum varies according to the changes in external environment in order to maintain the internal brood temperature (Divya *et al.,* 2016). Outside the brood chamber, the food pots consisting honey and pollen collection are located. These food pots are comparatively many times larger than brood cells, where gazillions of pollens and millilitres of honey are packed and stockpiled (Fig. 1g&h) (Bhatta *et al.,* 2019).

Thus, by following this idiosyncratic way to build their nest according to the species requirement, stingless bees act as an artisan of their own perennial nest. This evince that this tiny creature has sensibility within them to prudent enough to own their well-being.

References

Bhattaa C P, Gonzalezb V H, Mayesa D, Simoes M, Smith D R. 2019. Nesting biology and niche modelling of *Tetragonula iridipennis* (Smith) (Hymenoptera: Apidae, Meliponini) in Nepal. Journal of Apicultural Research 1-11.

Divya K K, Amritha V S, Devanesan S. 2016. Nest Architecture of Stingless Bees. Advances in Life Sciences 5(6): 2035-2038.

Michener C D. 2007. The Bees of the World. 2nd ed. Baltimore, MD: Johns Hopkins University Press.

Roubik D W. 2006. Stingless bee nesting biology. Apidologie 37(2): 124–143.

Willie A, Michener C D. 1973. The nest architecture of the stingless bees with special reference to those of Costa Rica. Revista de Biología Tropical 21: 122-140.

Willie A. 1983. Biology of the stingless bees. Annual Review of Entomology 28:41-64.

AUTHORS

Deeksha, M. G. (Corresponding author), **Mahesh Jadhav, Niraj Guleria** & **Sandeep Kumar** - Division of Entomology, ICAR –Indian Agricultural Research Institute, New Delhi -110012
Email: deekshamudagadde@gmail.com