

Stem Nesting Bees - Notes on Nesting Behaviour of *Ceratina hieroglyphica* in Cashew

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In nature, only five per cent of the crops are self-pollinated and remaining 95 per cent are cross-pollinated. At least 100,000 species of fauna act as pollinators of the estimated 250,000 species of flowering plants in the world. Animals, birds, insects, wind and other biotic and abiotic agents serve as pollinating agents. Among all, insects (Entomophily) especially bees play a key role in pollination of several flowering plants. Bees include honey bees as well as several wild bees. Plenty of wild bee species present in an ecosystem serve as pollinators of wide range of crops and flora. All social and solitary bees make nests in a variety of habitats with amazing type of materials. They may be ground nesters, wood and pith nesters or cavity nesters (stem nesting bees). The majority of bee species nest in the ground, either using existing cavities or building their own nesting tunnels eg., bees belonging to Andrenidae and Halictidae. While most wood nesting bees either rely on existing tunnels left behind by beetles and other insects, or they themselves chew and excavate their own nests eg., carpenter bees. Around 30% of native bees are cavity nesting such as leafcutter bees and mason bees. Stem nesting bees build their nests in solid wood, pithy stems, dead wood, hollow stems, or brush piles and other similar materials.

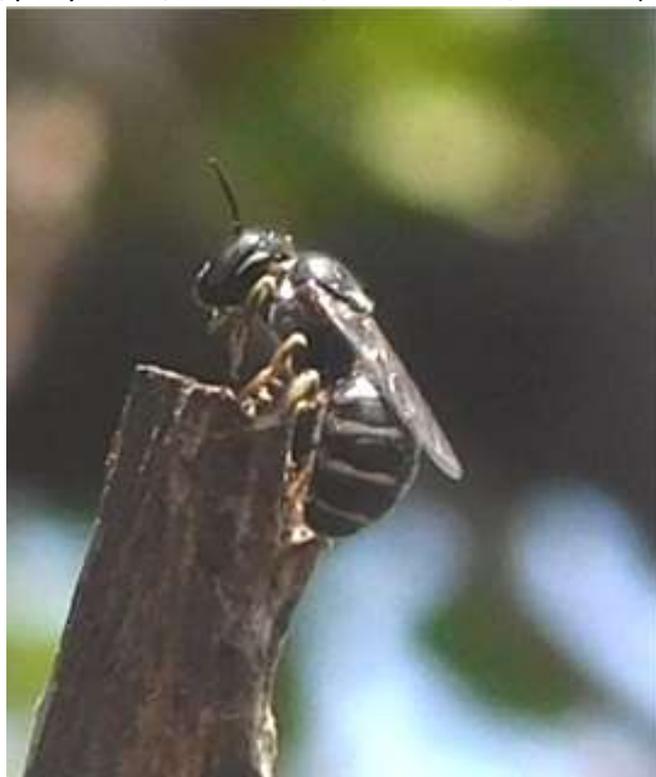


Fig. 1. *Ceratina hieroglyphica*, sitting at its nest entrance, a cut end of cashew stem

By looking at the material used to divide the nest cells and to close the entrance tunnel and the size of entrance hole, it is possible to say to which group a bee nest belongs. In the genus *Osmia*, known as mason bees (and including the orchard bees) use mud and sometimes chewed plant material for their nest divisions. Leafcutter bees (*Megachile* sp.) cut leaves and flower petals as wrapping for their egg cells. The resin bees (*Hoplitis* and *Heriades*), seal their nest with plant resins. The tiny yellow-faced bees (Colletidae) make their own cellophane-like substance as nesting material. This material is produced from glands on their body, and is astonishingly strong, waterproof, and has anti-fungal properties. The common bumble bees (*Bombus* sp.) makes nests in

abandoned mouse nests, cavities in the soil, in trees and buildings. Bees of Genus *Anthidium*, *Xylocopa*, *Ceratina*, *Anthidiellum*, *Dianthidium*, *Euodynerus* are other stem nesting bees.

Cashew (*Anacardium occidentale* L.) native of Brazil, is an important tree nut crop grown widely in several countries including India. Cashew is a cross pollinated crop requiring insects especially bees for successful pollination. Among the cashew pollinators, *Ceratina hieroglyphica* Smith (Apidae: Hymenoptera) serves as one of the common pollinators of cashew. Field observations revealed that *C. hieroglyphica* makes nest in the dried sticks of cashew and the cut ends of pruned trees. Peak foraging activity of these bees was noticed in cashew flowers between 11.00 and 13.00 hrs and the foraging rate was 3-5 flowers/ trip. Nests of *C. hieroglyphica* can be easily identified with circular entrance hole of 2.5-3.5 mm diameter. Its nest is a narrow simple burrow in the pithy region of a dried cashew twig. Most *C. hieroglyphica* nests were found in dried thin twigs of cashew of 5.0 – 20.0 mm thickness. Nests were commonly seen on the twigs with exposed pith especially on the pruned cut ends. The nests had typical compartments known as cells of 7.1 ± 0.48 mm length, arranged linearly along the stick, and separated by cylindrical partitions made of fine wood particles of 1.0 -2.5 mm thickness. Cell length was almost equal to the length of adult bees, and the cells were of equal size except for a very few. They were continuous without any empty spaces.

The nests invariably had only one entrance with older ones present near the inner end and the younger ones towards the entrance. A maximum of six adults were seen in a nest. The egg stage lasted for 3-4 days. The first instar larvae were translucent, rested on top of nearly intact food masses and ate the pollen provision. Post-defecating larvae were identified by feces evident inside the cells before pupation. The larval stage lasted for 8-10 days. Pupal stage was completed in 7-9 days. The total life cycle lasted 26-34 days.



Fig. 2. Life stages of *Ceratina hieroglyphica* inside the cashew stem

How to Conserve the Stem Nesting Bees

1. Proving bee flora, reducing pesticide usage, protecting and creating bee habitats are important ways to conserve bees.
2. Dead trees, plant stems of dormant perennials and grasses from edges can be left in the plantations as long as they are not problematic, as they serve as nesting habitats.
3. Logs from cut trees (especially those containing burrows) can be piled up so as to allow larvae of beetles, ants and wood wasps make nests, and to provide abandoned tunnels later for nesting bees.
4. One way that we can conserve stem nesting bees is to build a “bee hotel.” Bee hotels generally consist of different nesting materials for cavity and wood-nesting bees under a roofed enclosure. One can use tubes, bamboo, drilled wooden blocks, bricks, or any other materials that provide a range of holes for different species of stem nesting bees.

References

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