Chapter 12
Propagation of Stingless Bees Using a Colony Split Technique for Sustainable Meliponiculture

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ABSTRACT

Stingless bee farming or meliponiculture is a flourishing industry in Malaysia. The common practice by local stingless bee keepers in order to get new colonies is to obtain feral stingless bees hive from their natural habitat. This practice includes cutting down whole trees to extract stingless bee colonies for domestication. This is not a sustainable way of meliponiculture. The more efficient, sustainable, economic, and eco-friendly method is to breed stingless bees in hives and propagate them for colony multiplication. The aim of this experiment is to provide a good propagation method for stingless bee (Heterotrigonaitama) by dividing brood and queen cells and transfer them into a new box (split method). This method requires a portion of brood with queen cells from original log hive to be transferredinto an empty box hive. From this experiment, 80% of new box hives become new colonies (with new queens).

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INTRODUCTION

The Stingless bee is a large group of bees from the Apidae family and order Hymenoptera (Michener & Michener, 1974). Approximately 700 species of stingless bees were recorded, most found in tropical countries (Heard, 1999). Each species has unique characteristics regarding morphology and behaviour, including size, population and habitat quality (Fonseca, 2012). Stingless bees are highly eusocial insects. They possessed stingers but were highly reduced, which rendered them unusable for defence. Therefore, they are safe for domestication as they do not sting. In addition, most species are perennial, which suited well for meliponiculture.

Heterotrigonaitama is the common species for its honey and other bee products, such as bee bread and propolis. Malaysian beekeepers prefer this species over others since it is less vulnerable to seasonal changes and capable of surviving in harsh environments (Kelly et al., 2014). Heterotrigonaitama makes up 83.2% of the colonies reared in Malaysia. Heterotrigonaitama prefers mild light intensity, climatic conditions, and the vicinity of abundant flora. This species can be easily distinguished from other commonly encountered stingless bees by size and colouration. The colony of H.itama) is usually nested in a trunk of trees and other cavities. Stingless beekeepers normally cut down the trees to get the colony for domestication. This practice of cutting down trees from the wild could lead to environmental destruction, such as soil erosion, flooding, and global warming.

As in other eusocial insects, the queen of H.itama controls the day-to-day organisation and activities of the colony. The queen is important in transmitting information, and workers' participation in the queen's court was correlated to their activity in cell construction (Sommeijer & De Bruijn 1984). The queen signals her presence to the workers via pheromone. The queen's pheromone comprises mostly volatile compounds originating from the mandibular glands. After fertilisation, the queen can easily be identified through size, especially the engorged abdomen. The queen of stingless bees lays fertile eggs that hatch and become female workers, while infertile eggs will turn into drones or males. The larva that consumed more food will turn into queens compared to the ones that eat less (which will turn into female/male caste) (Hartfelder & Engels, 1989). Stingless bees usually produce new queens only when a daughter colony is to be split off from the mother colony and in the case of accidental loss or replacement of an old queen (Michener & Michener, 1974).

The drone of a stingless bee can be seen from a distinctive congregation of up to several hundred individuals, which can persist several times. Generally, male production in a social insect colony is influenced by outside factors related to climatic periodicity and factors inside the colony, such as colony strength and demographic

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