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Adaptation and Production of *Heterotrigona itama* from Natural Colonies in Kuantan Singingi

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ABSTRACT

Stingless bees also referred to as kelulut, are a species of honey-producing bees that do not possess a sting. Currently, beekeeping is being developed in Kuantan Singingi. However, there is a lack of research on the adaptability and honey production of Heterotrigona itama from natural colonies. In order to enhance understanding and provide valuable insights to the community, conducting a preliminary study on the adaptability and honey production of Heterotrigona itama from natural colonies in the Kuantan Singingi district is essential. This study was carried out in Central Kuantan, utilizing 10 natural colonies, through surveys and field trials to collect data directly from the field. This research aimed to assess the acceptance rate of box topping by the Heterotrigona itama colonies, which was found to be an average of 82.3 days. Additionally, the average amount of honey per pot was 4.1 ml, with a total volume of honey per colony measuring 93.7 ml. The duration of honey pot production was recorded as 93.6 days, and the number of honey pots obtained over a span of 6 months was 22.8 pieces.

Keywords**:** *Heterotrigona itama, Stingless Bee, Honey, Adaptation, Production*

1. INTRODUCTION

Indonesia possesses one of the largest tropical forest areas globally, ranking third after Brazil and the People's Republic of Congo. These forests serve as the primary habitat for numerous living organisms, crucial for survival. Unfortunately, these tropical forests are currently facing severe threats. Every year, Indonesia loses approximately 2 million hectares of forest. Remarkably, these rainforests harbor 11% of the world's plant species. This highlights Indonesia's potential to generate forest products, including honey, as a non-timber resource.

Honey, a non-timber forest product, is created by bees by collecting nectar from plant flowers. Among these bees, the stingless honey bees, belonging to the Meliponinae order, have the remarkable ability to produce four times more propolis compared to the Apis group. The demand for honey, propolis, and bee pollen, all made by bees, has experienced a significant surge. These valuable resources are harvested from the wild and cultivated by certain communities, mainly focusing on cultivating stingless bees (Priawandiputra et al., 2020).

The popularity of cultivating stingless bees is increasing rapidly; apart from the high production of propolis, this cultivation provides other benefits for humans and the natural surroundings, especially for plants which are the feed ingredients (Priawandiputra et al., 2020), for human health, kelulut honey can kill cells. Cancer (Arung et al., 2021), while for the kelulut bee plant, it has an important function in the ecosystem because it is a primary pollinator, especially in tropical ecosystems (Hrncir et al., 2016). One type of stingless bee is Heterotrigona itama (Lim et al., 2023).

Heterotrigona itama is an aggressive type of stingless bee most commonly found in forests compared to other kinds of bees. This type is also widely bred by breeders, including in Muara Enim (Rahmad et al., 2021), Kuantan Singingi (Seprido & Andriani, 2022) and other areas. This is because this type is very easy for people to cultivate in boxes or artificial stands made of wood (Rahayu et al., 2022). Naturally, kelulut bee hives are characterized by various nest entrances. This type of Heterotrigona itama has 6 entrance shapes, such as forming a long and slender funnel and a short and large funnel. Various colors include black, golden yellow, light brown and dark brown (Febrianti et al., 2020). Some of these beehive positions are found in open areas with a height of 90-210 meters above sea level with an environmental temperature of 28-360C, air humidity of 77-96% and light intensity of 20-660 wattm-2 (Febrianti et al., 2020).

Until now, Heterotrigona itama nests still tend to be obtained by searching directly in the forest because bee cultivation is still poorly developed.

2. MATERIAL AND METHODS

This research on the Adaptation and Production of Heterotrigona itama was carried out using the method of surveying and collecting colonies of natural origin in Kuantan Singingi, and trial cultivation of 10 colonies of Heterotrigona itama to observe its adaptability and production in residential areas. Some of the parameters in this research are the length of time for receiving Box Topping by the colony, the Time for Making Honey Bags, the number and volume of honey pots/bags, and the vegetation of food plants around the cultivation land.

3. RESULT AND DISCUSSION

3.1 Heterotrigona itama colony

A total of 10 Heterotrigona itama colonies in this study were obtained from natural colonies in Kuantan Singingi. Heterotrigona itama was found nesting in gaps in live and dead wood, such as 5 colonies of rubber plants, 4 colonies of *Rambutan* stems and 1 colony of Duku stems. Rubber plants are found in mixed rubber plantations

owned by the community in Pulau Ingu Village, District. Benai. *Rambutan* stems are also found in the yards of people's houses in Siberakun Benai Village, while duku stems are found in Gunung Kesiangan Village, Benai District.

3.2 Adaptation and Honey Production of Heterotrigona itama

A total of 10 colonies of Heterotrigona itama bees collected from the Kuantan Singingi wild were cultivated in community settlements in the village of Pulau Godang Kari. In each colony a topping box is installed with dimensions LxWxH (30cm x 35 cm x 7 cm) made of 2-inch thick boards.

Figure 1. Installing *Heterotrigona itama* Toping a. Toping Square, b Toping installation position

The average time for receiving Box Topping by the colony was 82.3 days with the time for making the honey pot (cup) taking 93.6 days. The average number of honey pots made 30 years after making honey pots was 22.8, with an average volume per pot of 4.1 ml.

Table 1. Heterotrigona itama colonies in adapted nature

No	Colony	Plants of Colonial Origin	Acceptance Time (Days)	Time to Make Honey Pots (days)	Number of honey pots (fruit)	Volume of honey per pot (Ml)
1	1	*Rambutan*	83	102	22	3
2	2	*Rambutan*	85	93	28	4
3	3	*Rambutan*	95	86	18	3.5
4	4	*Rambutan*	74	93	25	3
5	5	Rubber	65	92	21	4
6	6	Rubber	88	84	20	5.5
7	7	Rubber	91	76	26	5
8	8	Rubber	86	112	27	4
9	9	Rubber	81	98	25	5
10	10	Duku	75	100	16	4
Total			823	936	228	41
Average			82.3	93.6	22.8	4.1

3.3 Receiving Time for Box Toppings by Heterotrigona itama.

The average time for receiving Box Topping by Heterotrigona itama is 82.3 days. A sign of acceptance of the Heterotrigona itama topping box is an attempt to close the gap between the boards/wood on the box using the prop. This type produces more propolis than other products because propolis is used as part of the defense external immune system (Dikarulin et al., 2022); even 1 mg/ml of propolis contains 80% antioxidants (Lim et al., 2023). The formation of proplis is more stimulated by the presence of outside air containing pathogens, so worker bees will quickly protect their colony by forming a blanket or closing gaps (Pribadi, 2020).

3.4 Amount and Honey Pot

The average number of honey pots produced during the 4 months of observation was 22.8. This is different from kelulut, which has been adapted for a long period with a total of 4 months of honey collection and is also able to produce several honey pots of around 51.33 to 240 with a total volume ranging from 58.33 to 636.67 ml (Syaifuddin et al., 2021). This difference in honey production is caused by the number of types of nectar-producing plants around the colony placement and the condition of the colony. The development of honey bags was also highest in home gardens (Perbadi, 2021).

3.5 Food Plant Vegetation Around the Colony

Data from field observations showed that 11 types of plants were identified as food for Heterotrigona itama.

No	Type		Feed Source		Remark
	Latin	Indonesia	N	P	
1	*Hevea brasiliensis*	Rubber	√	√	Flowering Fruiting
2	*Pometia pinnata*	Matoa	√	√	Flowering Fruiting
3	*Mangifera indica*	Manggo	√	√	Flowering Fruiting
4	*Zea mays saccharate*	Corn	√	-	Flowering Bebruah
5	*Artocarpus integer*	*Cempedak*	√	√	Flowering Fruiting
6	*Dimocarpus longan*	Longan	√	√	Flowering, Bebruah
7	*Syzygium aqueum*	Guava	√	-	Flowering Fruiting
8	*Elaeis guineensis* Jacq	Palm oil	√	√	Flowering, Fruiting
9	*Nephelium lappaceum*	*Rambutan*	√	√	Flowering, Fruiting
10	*Tectona grandis*	Teak	√	√	Flowering
11	*Acacia mangium*	Acacia	√	√	, Fruiting

During the research carried out, the entire plant experienced a generative phase. Flowers and fruit are the primary food sources for Heterotrigona itama (Priambudi et al., 2021).

4. CONCLUSION

Rubber stems serve as the source for approximately half of the Heterotrigona itama colonies found in their natural habitat. On average, it takes 82.3 days for Heterotrigona itama to receive Box Topping. Creating honey pots takes 93.6 days, resulting in 22.8 honey pots per colony. Each honey pot contains an average volume of 93.7 ml, with each pot producing an average of 4.1 ml of honey. Honey production increases as the plant progresses into the Flowering and Fruiting phases.

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