

## Scientific Notes on Practical Guide to Assess Colony Strength for Stingless Bee *Geniotrigona thoracica* and *Heterotrigona itama* Colonies

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### Abstract

Colony strength of the *Geniotrigona thoracica* and *Heterotrigona itama* colonies were classified into strong, moderate and weak colonies. This colony strength assessment were done based on brood size, workers productivity and workers presence. With this practical guide, uniformity in colony strength can be established for *G. thoracica* and *H. itama* colonies and provide a quick references to the Meliponiculturist.

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### 1. Introduction

Meliponiculture is a new and booming industry in Malaysia. Until May 2013, 26 % of the total 235,000 kg of honey production in Malaysia was contributed by stingless bee (Noor, 2013). With the advance of meliponiculture (Cortopassi-Laurino, et al., 2006), and the growing interest in using these stingless bees as agricultural pollinators, as well as for the commercialization of stingless bee products, such as pollen, honey, and propolis, the demand for colonies has considerably increased. In Malaysia, a colony of *H. itama* cost between USD155-310, while *G. thoracica* cost USD310-930. As the industry progress, a practical approach is needed to maintain the uniformity and quality of the colonies established. Though the colony strength assessment methods was well established in apiculture industry (Delaplane et al., 2013), those methods is not applicable to the Meliponiculture industry as the nest structure and behaviour of stingless bees differs. The population measures cannot be performed as the stingless bees workers carry sticky resin on their hind legs and when the workers gathered, they tend to clumped and die. In addition, recently, new comer to Meliponiculture industry found their colonies collapsed after few months of establishment. Therefore, to avoid unscrupulous person to take advantage of this industry by providing and selling colonies which is not stable and weak, this practical guide on colony strength assessments will serve as a guide to

assess the colony strength of stingless bee, *G. thoracica* and *H. itama* colonies which is stingless bee species of economic value in this region.

### 2. Materials and Methods

The assessment was done by quadrat technique. For colony strength assessment, the colony is divided into 4 quadrats each representing 25% of the hive section (Figure 1 and Figure 2). Based on this quadrat, the brood area size and productivity of the workers can be assessed based on parameters describe in Table 1. Meanwhile, assessment for the workers bee activity is subjective. Generally, when the hive is open, for a strong colony, there will be a rush of bees coming out from the colony in large number, normally in hundreds. Further inspection of the hive, will show many workers on the brood and on the honey/pollen pots. At the same time, hundreds more will be waiting outside the colony to get into hive, if the hives moved for inspection during the day. In moderate colony, the number of the workers much less compared with strong colony. In weak colony, only few workers tend to come out when the hive opened, and majority of the workers will be confined to the brood comb.

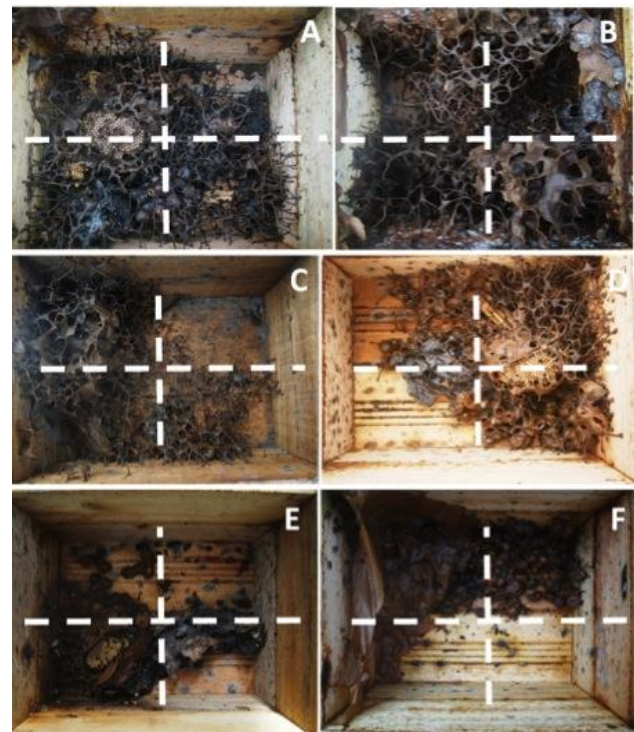
### 3. Results and Discussion

Our observation found that the strong colonies will survive and produce bee products in short period of

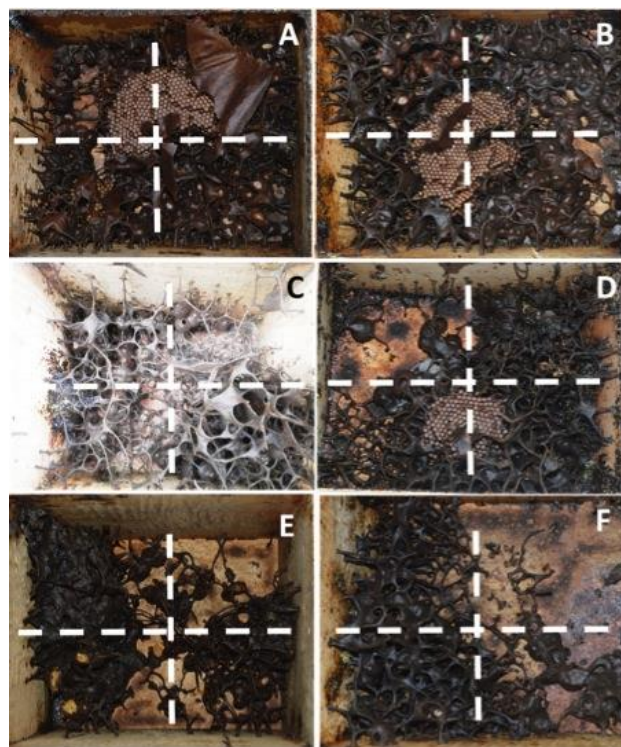
time after establishment. The moderate colonies have a 50% of survival chances, whereas the weak colonies have less than 50% survival chance. During our study, we found bee farmers divide the one single strong colony into 2-3 daughter colonies.

**Table 1:** Classification of colony strength for *G. thoracica* and *H. itama*.

Parameters	Colony strength		
	Strong (Figure 1A & 1B; Figure 2A & 2B)	Moderate (Figure 1C & 1D; Figure 2C & 2D)	Weak (Figure 1E & 1F; Figure 2E & 2F)
Brood combs size	≥ 25 %	< 25%	< 25%
Workers productivity	> 75 % of the hive bottom covered with propolis involucrum/honey pots/pollen pots	25-50% of the hive bottom not covered with propolis involucrum/honey pots/pollen pots	>50% of the hive bottom not covered with propolis involucrum/honey pots/pollen pots
Workers presence	Heavy presence of worker	Moderate presence of workers	Small number of workers



**Figure 2:** *Heterotrigona itama* colonies. A & B – strong colonies; C & D – moderate colonies; E & F - weak colonies. Dashed white lines divided into quadrats with each quadrat represent 25% of the hive.



**Figure 1:** *Geniotrigona thoracica* colonies. A & B – strong colonies; C & D – moderate colonies; E & F - weak colonies. Dashed white lines divided into quadrats with each quadrat represent 25% of the hive.

Each daughter colony normally provided with the queen cells or virgin queen with the assumption either the new queen will emerge or the virgin queen will mate and lay eggs. Unfortunately, these daughter colonies fall in moderate and weak colony strength assessment. In most cases these colonies collapsed after few months of establishment.

Otherwise, we noticed, when few colonies of same species purchased in a cohort, some of the colony was found to return to the much strong colony from the same cohort. This proved the colonies were actually originated from single strong colony. Therefore, we raised caution to the Meliponiculturist to be aware and if possible avoid getting moderate and weak colonies. Previously, we established the colony strength based on the age of the colony with colonies aged more than 6 months as strong colony, 3-6 months as moderate colony and less than 3 month as weak colony. This previous classification was based on the assumption that the daughter colony will be independent from the mother colony after 6 months. However, colony maturation depends on the species, environments and food scarcity. When the daughter colonies have a productive queen and the food sources are abundant, they become independent much faster. In addition, most of the bee farmers do not document the date they divide the colonies. Therefore, we opted for the current colony strength assessment describes as it is practical and useful for a quick assessment in the farm before the colonies being procured.

#### 4. Conclusion

This practical guide is used to assess colony strength of stingless bee in a standard hive. As multiple new designs of hives being sold in the market, the potential investor should be caution as the design of hive and species differs, this practical guide might not be applicable.

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