# Stingless bees behavior : what we know and don't



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# Introduction

- In Malaysia, information on stingless bee's behavior is lacking.
- Farmers always look on honey as a major income from stingless bees.
- but neglect their honey production related to behavior such as developing, destruction and removable of honey pot
- So what we know so far about their behavior?

# Objectives

- To understand the foraging behavior of *H. itama*.
- To investigate and record bee queens' oviposition behaviour and the proses of provisioning
- To understand the honey pot making behavior and
- To understand the honey seasons pattern in Malaysia

# **Materials and Methods**

- Three colonies of stingless bees *H. itama* were set up in Taman Tropika Tasik Kenyir and MARDI Serdang.
- A study to investigate the behavior of *Heterotrigona itama* (Cockerell, 1918) was conducted on January 2015 to December 2016.
- All behavior study are using DSLR with macro lens and SJCAM.
- Behavior outside the colony also has been observed and recorded using DSLR.



 record every movement of *H. itama* in it's colonies for 20 min per hour between 0800 to 1700 h for 5 days per month.



- Queen behavior
  - the movement in involucrum was recorded 24 hours per day per month.
- the top part which covering the brood cell with wax or involucrum was removed first for comprehensive view

#### Honey pattern

- Honey was collected using honey extractor pump started from September 2015, however only volumes from January 2016 to December 2016 recorded for data analysis.
- Furthermore, only honeys from honey chamber were collected while honeys from the brood chamber were remained for colony survival.



# Foraging behavior

- In foraging out, they are collecting resin, mud, and saw dust for their nest substantial.
- some of species has been seen to collect salt and water from the dead animal and animal urine.

# Foraging proses



# Some picture show they collect salt from the salt lick.



#### **Resin collected**



#### Honey from other



#### Then what happen



After the honey was collected by the forager the honey will be process with spitting out and swallow it again. Sometimes this behavior happen at outside the nest or inside the nest.

### Queen behavior

- Oviposition behavior
- in a day ± 45 eggs has been laid by the queen.
- And how the process of oviposition behavior

### **Oviposition process**



#### **Cell construction**



In the process of ovipositioning, a brood cell will be constructed first and it normally takes 2 hours to finish it.

# Worker deposit larval food

 After the brood cell is constructed by the bee workers, larval food will be deposited into it immediately when an order is received from the queen.

#### Queen checking the cell



The queen will always move around to check the brood cell, whether the food source is full enough or is there any trophic egg deposit by workers (Koedam et al. 2007).



• If the queen is not satisfied with the food, she will communicate with the bee workers to fill it until it is suitable for laying eggs. From the picture we can see the bee workers giving way to the queen.

#### Worker deposit a larval food



The workers deposited the larval food again and queen checks the cell again.



After all conditions are deemed suitable for laying an egg, the queen will deposit the egg. Normally it is take 4 seconds to 6 seconds to lay one egg





#### The queen laid eggs





Then, if the egg has been deposited by the queen, the workers close the brood cell and this was observed to last around 4 minutes ±30 seconds for the *H. itama* species



# The eggs





#### However,

- In some cases the workers was observed to stimulate the queen to lay an eggs.
- There are different between the time lay eggs by our observation queen. Maybe it can be a key to identify the age of the queen.

#### How about the honey pot constructed

- Result showed that the mean time spent (hour) to build up the pots was 78.7±5.3, 83.3±6.5, and 76±3.3 in colonies 1, 2 and 3, respectively
- Maybe different places different time (depend on source)

# Pest on pollen pot

- Our observation on these three colonies found *H. luteous* oviposited their eggs on *H. itama* pollen pot
- However, the *H. itama* removed the eggs before it hatch on the pollen pot.
- Sometimes we see the mites moving around the pot area (in my experience, only the matured and strong colony have this symbiosis)



#### Honey pattern



As such, the best moment for honey harvesting is March to July and September to November.

- There seems to be a specific pattern of honey production for all colonies from January to December 2016.
- which honey was less produced in January then increased to the peak in May before declining back until December
- This situation may due to the typical flowering pattern in Malaysia which start peak in March-May and September-November

# Conclusion

- As a conclusion, this baseline data were important for understanding the behavior of *H. itama*.
- The time to oviposit the egg by queen bees might be the key to understand the age of the queen
- Our finding also, helps to guide researcher to expand the knowledge in queen bee rearing.
- Also, this will help in reducing forest lost due to colony reaping as well as encouraging more small farmers to start rearing at least for their own consumption.

#### Thank you

Talent wins games, but teamwork and intelligence wins championships