

**MELISSOPALYNOLOGY AND FORAGING
ACTIVITY OF THE STINGLESS BEES,
HETEROTRIGONA ITAMA (HYMENOPTERA:
APIDAE) AT TAMAN TROPIKA KENYIR,
TERENGGANU**

ROZIAH BINTI GHAZI

**MASTER OF SCIENCE
UNIVERSITI MALAYSIA TERENGGANU**

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**Thesis Submitted in Fulfilment of the
Requirement for the Degree of Master of Science
in the School of Marine and Environmental Sciences
Universiti Malaysia Terengganu**

2015

DEDICATION

To my beloved family....

رَبَّنَا آتِنَا فِي الدُّنْيَا حَسَنَةً وَفِي الْآخِرَةِ حَسَنَةً وَقِنَا عَذَابَ النَّارِ

[البقرة: 201]

Our Lord! Grant us good in this world and good in the hereafter, and save us from the chastisement of the fire [2:201]

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in
fulfillment of the requirements for the degree of Master of Science
MELISSOPALYNOLOGY AND FORAGING ACTIVITY OF THE STINGLESS
BEES, *HETEROTRIGONA ITAMA* (HYMENOPTERA: APIDAE) AT TAMAN
TROIKA KENYIR, TERENGGANU
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2015

Main Supervisor : **Wahizatul Afzan Azmi, Ph.D.**
Co Supervisor : **Nurol Badriah Hassan, Ph.D.**
School : **Marine & Environmental Sciences**

A study on melissopalynology and foraging activity of stingless bees, *Heterotrigona itama* (Hymenoptera: Apidae) was conducted at Taman Tropika Kenyir (TTK), Terengganu from April until September 2013. The main aim of this study was to use melissopalynology or pollen analysis in order to determine the foraging preference and active period of foraging activity of *H. itama* in tropical island of TTK. Overall, there were 59 plant species belonging to 30 families of plants that were visited by *H. itama* throughout direct observation and melissopalynological analysis in TTK. However, only 27 plant species from 24 families were successfully identified which include of native species, ruderal species as well as introduced and cultivated species that consist of ornamental trees, underutilised fruits, agriculture fruits and others. The overall result shows that family Flacourtiaceae (*Flacourtia jangomas*) was the most dominant pollen collected by *H. itama*, followed by Fagacea (*Lithocarpus* sp.) and Sapotaceae (*Mimusops elengi*). Other types of pollen grains were considered as accessory, isolated or occasional pollen grains. Higher abundance and more pollen

types were collected in August 2013 as it was the flowering period of most plant species in TTK ($F_{5,354}$ pollen abundances=17.939, $P < 0.05$) ($F_{5,35}$ pollen types =11.710, $P < 0.05$). The distance of pollen spectrum between hives and flowers visited by *H. itama* was in the range of 1 m to 107.01 m radius. The foraging activities which include of outgoing foragers, incoming foragers with pollen load, and incoming foragers without pollen load were observed throughout the sampling period from 0800 to 1800 hours by video monitoring. There was a significant difference in terms of average outgoing foragers, incoming foragers with pollen load, and incoming foragers without pollen load to the hive by the time of foraging activity ($F_{10,22}$ outgoing foragers =5.569, $P < 0.05$) ($F_{10,22}$ incoming foragers with pollen load =5.852, $P < 0.05$) ($F_{10,22}$ incoming foragers without pollen loads =2.341, $P < 0.05$). The most active time for the outgoing and incoming foragers was early in the morning between 0800 to 1000 hour, and the numbers were declined after 1200-1400 hour. This study provides information on the favoured stingless bee plant species, pollen preferences of stingless bees which are influenced by flowering season and location of the flowers, as well as the most active time for foraging activities of the stingless bees in TTK. The outcome of this study is hoped to give useful information to the sustainable development of apiculture industry in Malaysia especially for future use of honey production and crop pollination success.

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu
sebagai memenuhi keperluan untuk ijazah Master Sains

MELISSOPALYNOLOGI DAN AKTIVITI MENCARI MAKANAN LEBAH
KELULUT, *HETEROTRIGONA ITAMA* (HYMENOPTERA: APIDAE) DI TAMAN
TROIKA KENYIR, TERENGGANU

ROZIAH BINTI GHAZI

2015

Penyelia Utama : **Dr Wahizatul Afzan Azmi, Ph.D.**
Penyelia Bersama : **Nurol Badriah Hassan, Ph.D.**
Pusat Pengajian : **Sains Marin dan Sekitaran**

Satu kajian melissopalynologi dan aktiviti mencari makanan lebah kelulut *Heterotrigona itama* (Hymenoptera: Apidae) telah dijalankan di Taman Tropika Kenyir (TTK), Terengganu dari bulan April hingga September 2013. Sasaran utama kajian ini adalah untuk menggunakan maklumat melissopalynologi atau analisis debunga bagi menentukan aktiviti mencari makanan yang digemari dan masa aktif mencari makanan lebah kelulut *H. itama* di kepulauan tropika TTK. Secara keseluruhannya, terdapat 59 spesies tumbuhan daripada 30 famili yang telah dilawati oleh *H. itama* sepanjang pemerhatian secara terus dan analisis melissopalynologi di TTK. Walaubagaimana pun, hanya 27 spesies tumbuhan daripada 24 famili telah berjaya dikenalpasti termasuk spesies asal, spesies pokok yang tumbuh selepas tanah diganggu samaada yang diperkenalkan atau yang di tanam seperti tanaman hiasan, buah-buahan nadir, tanaman pertanian dan lain-lain. Hasil kajian menunjukkan bahawa debunga yang paling dominan dikutip oleh *H. itama* ialah daripada famili Flacourtiaceae (*Flacourtia jangomas*), diikuti oleh Fagacea (*Lithocarpus* sp.) dan

Sapotaceae (*Mimusops elengi*). Jenis debunga yang lain dianggap sebagai debunga aksesori, terasing atau jarang dikutip. Kelimpahan yang lebih tinggi dan lebih banyak jenis debunga di kutip pada bulan Ogos kerana ianya merupakan waktu berbunga untuk kebanyakan spesies pokok di TTK ($F_{5,354}$ Kelimpahan debunga = 17,939, $P < 0.05$) ($F_{5,35}$ jenis debunga = 11,710, $P < 0.05$). Jarak spektrum antara bunga yang dikunjungi oleh *H. itama* dari sarangnya adalah dalam lingkungan 1 m sehingga 107.01 m. Aktiviti lebah yang diperhatikan dari jam 0800 hingga 1800 melalui pemerhatian video adalah bilangan lebah pencari makanan keluar, lebah pencari makanan masuk ke dalam sarang bersama kantung debunga atau tanpa kantung debunga. Terdapat perbezaan yang signifikan pada bilangan purata lebah pencari makanan keluar, lebah pencari makanan pulang bersama kantung debunga ataupun tanpa kantung debunga masuk ke dalam sarang pada setiap waktu aktiviti mencari makanan ($F_{10,22} = 5,852$, $P < 0.05$). ($F_{10,22}$ lebah pencari makanan keluar = 5.569, $P < 0.05$) ($F_{10,22}$ lebah pencari makanan kembali bersama kantung debunga = 5.852, $P < 0.05$) ($F_{10,22}$ lebah pencari makanan kembali tanpa kantung debunga = 2.341, $P < 0.05$). Keputusan kajian menunjukkan waktu aktif untuk lebah pencari makanan ialah pada awal waktu pagi antara jam 0800 hingga 1000 dan bilangannya menurun selepas jam 1200 hingga 1400. Kajian ini telah menyediakan maklumat mengenai spesies pokok kegemaran lebah kelulut, debunga kesukaan lebah kelulut yang dipengaruhi oleh musim bunga dan lokasi bunga. Hasil kajian ini diharap dapat memberikan maklumat yang berguna kepada pembangunan mampan industri apikultur di Malaysia terutamanya pada masa akan datang untuk pengeluaran madu dan kejayaan pengebungaan tanaman.