

THE INTEGRATION OF INDO-MALAYAN STINGLESS
BEE SPECIES (*Heterotrigona itama*) IN *Stevia rebaudiana*
FARMING SYSTEM

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MASTER OF SCIENCE
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**Thesis Submitted in Fulfillment of the Requirement for the
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TABLE OF CONTENTS

DEDICATION	i
ABSTARCT	ii-iii
ABSTRAK	iv-v
ACKNOWLEDGEMENTS	vi
APPROVAL	vii-viii
DECLARATION	ix
LIST OF TABLES	x
LIST OF FIGURES	xi-xii
LIST OF SYMBOLS AND ABBREVIATIONS	xiii
CHAPTER 1	INTRODUCTION
1.1 Background of study	1-6
1.2 Problem statement	6
1.3 Objectives	7
CHAPTER 2	LITERATURE REVIEW
2.1 Meliponines (Stingless bee)	8-10
2.1.1 Ecology of Meliponines	11
2.1.2 Hives sites and hives materials	12-14
2.1.3 Hives structure	14-17
2.1.4 Life cycle and reproduction	18-20
2.1.5 Swarming (colony reproduction)	20
2.1.6 Colony behavior	21-22
2.1.7 Taxonomy of stingless bee (<i>H.itama</i>)	22-25
2.1.8 Economic importance	25
2.1.8.1 Pollination	25-26
2.1.10 Hive products	27
2.1.10.1 Honey	27-28
2.1.10.2 Beebread	28
2.1.10.3 Propolis	28-29
2.2 <i>Stevia rebaudiana</i>	29
2.2.1 Botanical description	29-30
2.2.2 Cultivation	30-31
2.2.3 Propagation	31-33
2.2.4 Biochemical and nutritional aspects of Stevia	33
2.2.4.1 Stevioside	33-35

DEDICATION

REFERENCES
APPENDICES
CURRICULUM VITAE

78-89
90-146
147-149

DEDICATION

I dedicate this thesis to my strongest backbones during the journey of finishing my Master degree; this dedication goes to my beloved parents, siblings and friends. I also would like to dedicate this thesis for my future generations.

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in fulfillment of the requirement for the degree of Master of Science

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SITI ASMA' SAMSUDIN

Jun 2016

Main Supervisor: Assoc Prof. Shamsul Bahri b. Abd Razak, Ph.D.

School: Food Science and Technology

The integration of Indo-Malayan stingless bee species (*H.itama*) in *Stevia rebaudiana* farming was conducted at Pusat Tunas Stevia (PTS), Kampung Tempinis, Jabi, Terengganu from Januari until December 2015. Integration honey of stingless bee and stevia is something new in honey industry. Stingless bee colonies were placed in stevia farm so that, stingless bee will visit and takes nectar naturally and produce stevia stingless bee honey. This combination of honey and stevia which is high in nourishment is good for health. There are three objectives in this study; 1) to determine the distribution and variation of pollen by stingless bee (*H.itama*) that forage in stevia farming system. 2) to produce the designer stingless bee honey that contains stevioside, a compound from stevia. 3) to periodically characterize stingless bee honey in PTS, Kg Tempinis. The total pollens found is 44 types of plant with 20 types are identified pollen from 18 families of plant and another 24 types are unidentified pollens. The most dominant pollen is *Antigonon leptopus* in family Polygonaceae that found seven months out of 12 months. The stingless bee honey was designed

by producing the stevia stingless bee honey by letting the stingless bee forage nectar from Stevia flowers. By comparing the retention time (R_t) of stevioside standard ($R_t = 1.383$) with stevioside compound in stevia stingless bee honey, there is no significant between the months. Stingless bee honey was periodically characterized using Brix and moisture content. The Brix and moisture content were different according to the weather and environment of surrounding. Brix reading in May is significantly different from the other months with mean 74.8333 ± 0.47804^e . While the moisture content reading in May is significantly different from the other months with mean 23.5667 ± 0.52015^a . During dry season, Brix content was high, while moisture content was low. However, in monsoon season Brix content was low and moisture content is high.

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu sebagai memenuhi keperluan untuk Ijazah Sarjana Sains

INTEGRASI ANTARA KELULUT SPESIS INDO-MALAYA (*Heterotrigna itama*) dan SISTEM TANAMAN *Stevia rebaudiana*

SITI ASMA' SAMSUDIN

Jun 2016

Penyelia Utama: Prof. Madya Shamsul Bahri b Abd Razak, Ph.D.

Pusat Pengajian: Sains dan Teknologi Makanan

Integrasi Kelulut spesis Indo-Malayan (*H.itama*) dalam system tanaman *Stevia rebaudiana* adalah satu kajian yang telah dijalankan di Pusat Tunas Stevia (PTS), Kampung tempinis, Jabi, Terengganu dari Januari sehingga Disember 2015. Integrasi kelulut dan stevia sesuatu yang baru dalam industri madu. Koloni kelulut telah diletakkan di ladang stevia supaya, kelulut akan melawat dan mengambil madu secara semula jadi dan menghasilkan madu kelulut stevia. Integrasi madu dan stevia adalah makanan tambahan yang baik untuk kesihatan. Terdapat tiga objektif dalam kajian ini; 1) untuk menentukan taburan dan variasi debunga oleh kelulut (*H.itama*). 2) untuk mereka madu kelulut yang mengandungi stevioside, sebatian daripada stevia. 3) untuk mencirikan madu kelulut di PTS, Kg tempinis secara berkala. Jumlah debunga ditemui adalah 44 jenis tumbuhan dengan 20 jenis debunga dikenal pasti daripada 18 keluarga tumbuhan dan 24 jenis adalah debunga yang tidak dikenali. Taburan debunga

yang paling dominan adalah *Antigonon leptopus* dalam keluarga Polygonaceae yang mendapati tujuh bulan daripada 12 bulan. Madu kelulut telah direka dengan membiarkan kelulut mengambil nektar daripada pokok Stevia menghasilkan madu kelulut stevia dengan membandingkan masa tahanan (R_t) standard stevioside ($R_t = 1.383$) dengan sebatian stevioside dalam stevia madu kelulut, tidak ada yang signifikan di antara 12 bulan. Kualiti madu kelulut telah dicirikan secara berkala dengan menggunakan Brix dan kandungan kelembapan. Brix dan kandungan air berbeza mengikut cuaca dan persekitaran sekeliling. Bacaan Brix pada Mei adalah jauh berbeza dari bulan-bulan yang lain dengan bacaan min 74.8333 ± 0.47804^e . Manakala kandungan air pada Mei pula adalah min 23.5667 ± 0.52015^a . Semasa musim panas, kandungan Brix adalah tinggi, manakala kandungan air adalah rendah. Pada musim tengkujuh kandungan Brix adalah rendah dan kadar air yang tinggi.