UNIVERSITI TEKNOLOGI MARA

POLLEN ANALYSIS OF *Heterotrigona itama* HONEY

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

This study focused on pollen analysis in *Heterotrigona itama* (*H. itama*) honey harvested from Lenggong, Perak (Malaysia). Pollen analysis is frequently used to determine the environmental context of archaeological artefacts (Twiddle, 2012). The study of pollen analysis in honey calculated the abundance of pollen grains in *H. itama* honey and determine the preferred flowers chose by *H. itama* towards choosing flower for its food. Previously, pollen analysis was used to solve the problem of mad-honey intoxification (Cagli et al., 2009), analyse the presence of chemical and pollen in Silver Lake (Gordon, 1966) and related the theoretical relationship between vegetational percentages and percentage of pollen in sediment (Crowell, 1978). The principal methods involved in pollen analysis are qualitative and quantitative methods (Moar, 1985). The quantitative method involves calculation of relative pollen frequencies from total count of pollen (Moar, 1985). In contrast, the qualitative method consists of morphological observation of pollen presence honey (Hamid et al., 2015)

Pollen morphology has been used to differentiate the pollen grains of flowers visited by *H. itama* bees. The size (Reitsma, 1969), shape and the structure of pollen grains (Hyde, 1955; van der Merwe, Van Wyk, & Kok, 1990) are the factors needed to be considered during pollen analysis.

The pollen grains were collected by *H. itama* using their legs during foraging. Stingless bees produced honey that can be called by their genus name (Souza et al., 2006). For examples, *H. itama* honey is produced by *H. itama*. Stingless bees are differ from the stinging bees as they cannot sting and only bite for defense. In addition, the nest of stingless bees contains fresh resin to protect their nest from insects (Roubik, 2006). Stingless bees live longer and forage well in enclosed areas and under adequate climate conditions compared to honey bees (Slaa et al., 2006). The size of tongue (Shape & Tropical, 1998) and stinger (Roubik, 2006)of stingless bees were also found different from honey bees. *H. itama* lives in Malaysia and the calculation on the abundance of *H. itama* in Malaysia was previously done (Nagamitsu & Inoue, 2002). Studying on the species and external nest characteristics of *H. itama* (Tropical Agricultural Science ,2016), determination of the influences of flowers to *H. itama* (Shape & Tropical, 1998) and the preferences of *H. itama* toward flowers (Roubik et al, 1999) were reported.

H. itama bees produced honey by collecting the nectar during foraging using its long tongue (Shape & Tropical, 1998). The nectar will be mixed with wax scales secreted from wax glands in the abdomen (Tsutsumi & Oishi, 2010). In the beehive, the bees passed the nectar to another bee using their mouths from the stomach of each other (Tsutsumi & Oishi, 2010). Honey produced by stingless bees was thought to have medicinal properties more than honey from bees of the *Apis* genus (Simone-Finstrom & Spivak, 2010). It was believed to have antioxidant (Khalil, Sulaiman, & Boukraa, 2010) and antibacterial properties which was beneficial on cosmetic products (Marylenlid et al., 2013). Antioxidants properties of honey was claimed able to reduce the risk of some forms of cancer, heart disease, strokes, and cataracts and may slow the aging process (Khalil et al., 2010). The healing property of honey