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MELISSOPALYNOLOGY AND FORAGING PLANTS OF STINGLESS BEES, HETEROTRIGONA ITAMA (HYMENOPTERA: APIDAE) FROM PATTANI, THAILAND

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ABSTRACT

This is the first foraging plant and palynological study using pollen stored by Heterotrigona itama (Apidae: Meliponini) in the Pattani, Thailand. The samples were directly collected from the pollen pots of H. itama species in apiaries located in the Pattani province. The samples were dried, weighed, diluted in warm water and ethanol, centrifuged and then processed using the acetolysis method. After mounting the pollen samples on the glass slides, we identified and counted at least 500 pollen grains per sample. The results show that the main and dominant pollen (over 10%) combinations in the pollen pots of H. itama include pollen from Cocos nucifera L., Capsicum flutescens L., Elaeis guineensis Jacq, Coldenia procumbens L. and Muntingia calabura L., respectively. This result, we can use data for present to the stingless bee farm in the future.

Keywords: Foraging plant, Palynological analysis, Pollen.

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1. INTRODUCTION

Stingless bees (Apidae: Meliponini) appear in the subtropical and tropical regions. Stingless bees are adapted to different species of foraging plant including fields, forests, savannas and mountains. Stingless bees are common in tropical rainforests and are crucial pollinators of a large proportion of tropical plant species, potentially summing up to one fifth of the local angiosperm flora (Wilms et al., 1996 : Corlett, 2004). Flowering duration effect on the honey properties and pollen diversity. The melissopalynology of stingless bees allows recognizing floral preferences in different duration, localities and the vegetation types (Barth, 2013). The pollen analysis in the pollen pot of stingless bee is importance for providing data about pollen source (Suhaizan et al., 2017: Stawiarz and Wróblewska, 2010). There are many countries that support for research about the relation of plant and pollen in the hive such as New Zealand (Mear, 1985) Nigeria (Agwu et al., 1989) Spain (Romas et al., 1999) and many in Turkey (Von Der Ohe et al., 2004).

Most of the plants were pollinated and the nectar had large flowers, fragrant or sweet taste (Faegri and Pijl, 1979) : ChambóI et al., 2011 : Kumari and Kumar,) etc. Orange (Folino and Mee, 2014) Coconut (Sommeijer et al., 1983) and Eucalyptus (Seijo et al., 2011).

Thus, the objective of this study was to identify the foraging plants that contribute to the pollen pot composition of stingless bees.

2. MATERIALS AND METHODS

Palynological analysis of stingless bee pot-pollen were studied in the learning center of stingless bee in the Pattani province as shown in FIGURE 1. The experiments were conducted during summer 2019. The experiments was used 50 stingless bee hive. Pollen in the hive correctly collected and kept in the plastic tube. We used the acetolysis method (Erdtman, 1960) for identification of pollen types. The samples were specially treated to determine the floral composition of pollen and the concentrations of pollen (Louveaux et al., 2015). 10 g of honey were dissolved in 20 ml of distilled water and centrifuged for 10 min at 3000 rev/min. The top layer of the solution was then removed, 10 ml of water added and centrifuged for 5 min. The top layer of the solution was removed, leaving from 0.1 ml to 0.3 ml of the solution on the deposition. For microscopy, 0.1 ml of the stirred deposition was dripped on a slide and dried. Pollen identification was performed three times with a magnification of 400× (Ščevková et al., 2015). For analysis, the number of pollen grains in honey was counted using standard methods (Louveaux et al., 2015). For the foraging plant study, flowers around the sampling sites (coastal and forest) were also collected as the pollen references and compare with the pollen in hives.

Figure 1 Stingless bee hive (A) and pollen pot (B)

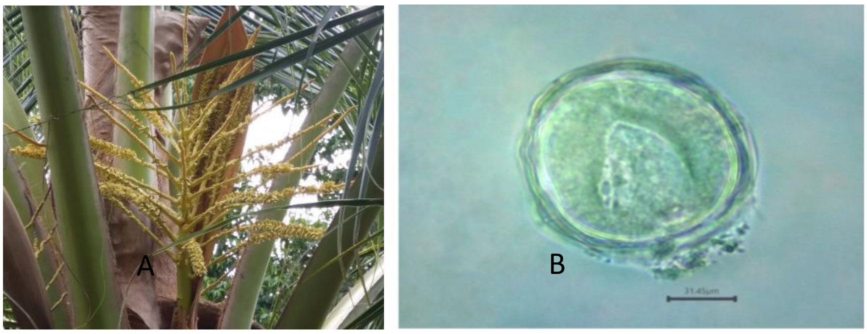

Figure 2 Flower morphology (A) and pollen (B) of *Cocos nucifera* L.

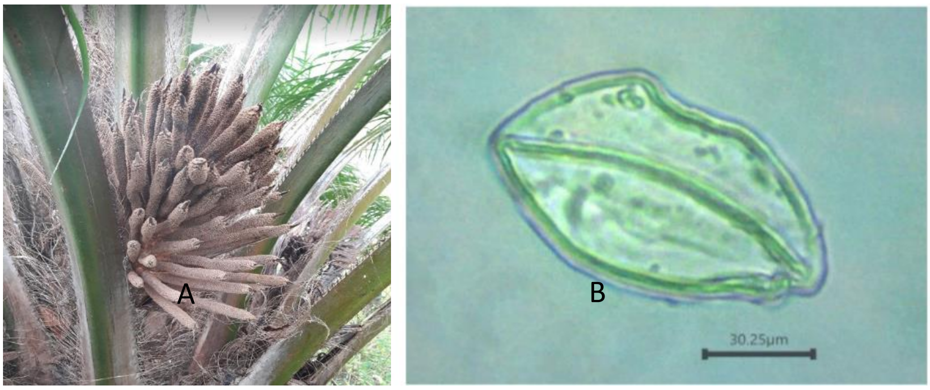

Figure 3 Flower morphology (A) and pollen (B) of *Elaeis guineensis* Jacq

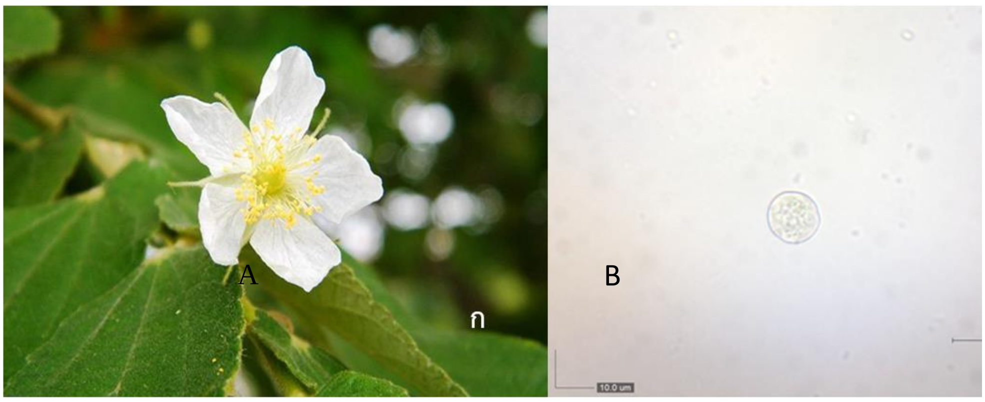

Figure 4 Flower morphology (A) and pollen (B) of *Muntingia calabura* L.

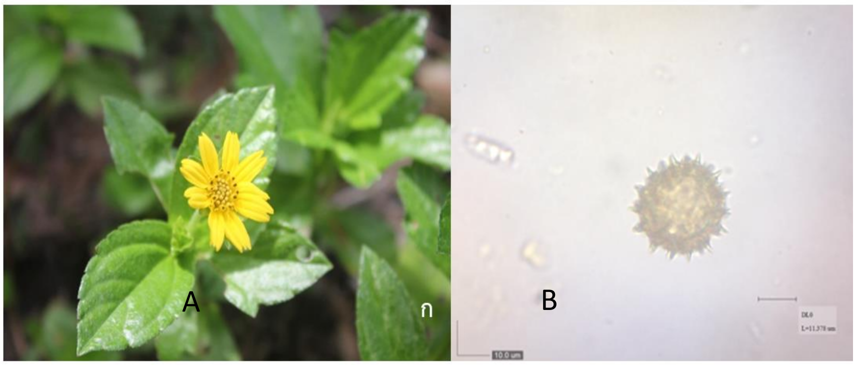

Figure 5 Flower morphology (A) and pollen (B) of *Wedelia trilobata* L.

Figure 6 Flower morphology (A) and pollen (B) of *Citrus aurantiifolia* (Christm.) Swingle

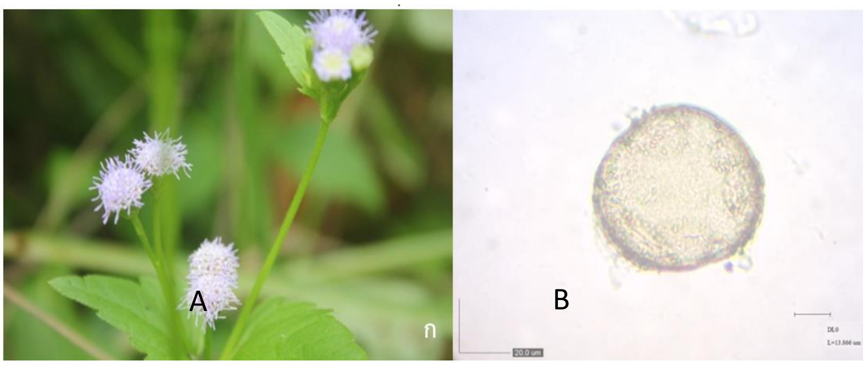

Figure 7 Flower morphology (A) and pollen (B) of *Chromolaena odorata* (L.) R.M.King & H.Rob.

Figure 8 Flower morphology (A) and pollen (B) of *Cucumis sativus* L.

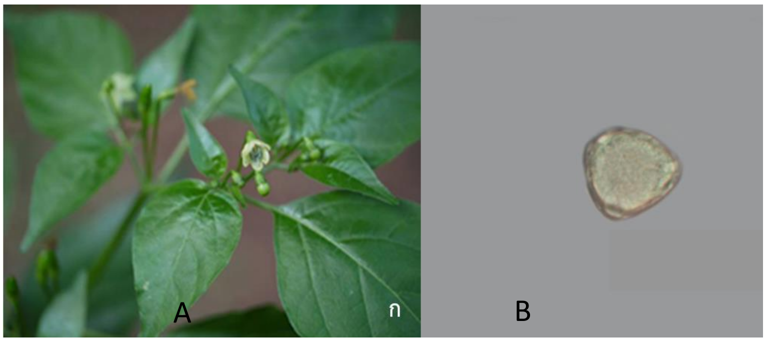

Figure 9 Flower morphology (A) and pollen (B) of *Capsicum flutescens* L.

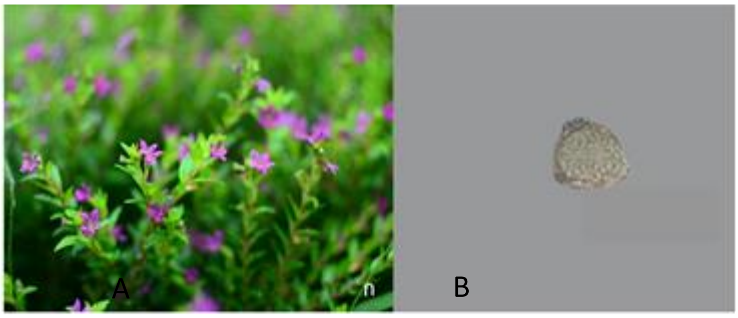

Figure 10 Flower morphology (A) and pollen (B) of *Cuphea hyssopifola* H.B.K.

Figure 11 Flower morphology (A) and pollen (B) of *Mimosa pudica* L.

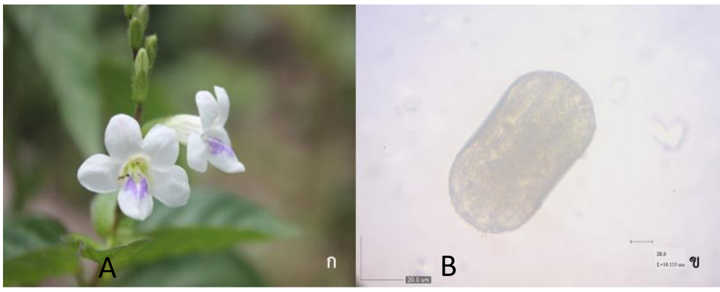

Figure 12 Flower morphology (A) and pollen (B) of *Asystasia gangetica* (L.) T. Anderson

3. RESULTS AND DISCUSSION

Pollen grains of 15 species and 1 family of plant were recovered (TABLE 1). Some of the recovered pollen were identified to species and family levels while others which could not be identified even to family level were morphologically described. Those that could not be categorized at all were regarded as undetermined. The total number of pollen of stingless bee in the pot of 15 species and 1 family of plant found in this project in the stingless bee hives in the Pattani, Thailand is difference to previous findings species such as *Portula grandiflora,* *Antigonan leptopus, Amaranthus tricolor, Hibiscus rosa-sinensis, Cucumis melo, Ixora coccinea, Tridax procumbens, Biden pilosa, Turnera subulata* and *Ixora javanica* of plants respectively from their Malaysian pollen pot (Suhaizan et al., 2017). Some species of plant in this area are native and economic plant such as *Cocos nucifera* L., *Capsicum flutescens* L., *Elaeis guineensis* Jacq, *Coldenia procumbens* L. and *Muntingia calabura* L. respectively, therefore, these plants are the main foraging plants of the stingless bee (TABLE 1). In conclusion, this study can to improve of stingless bee farm for good managing in the future. Thus, palynological analysis of stingless bee pot-pollen in the Pattani, Thailand, include pollen from *Cocos nucifera* L., *Capsicum flutescens* L., *Elaeis guineensis* Jacq, *Coldenia procumbens* L. and *Muntingia calabura* L. respectively. The values attained by *Cocos nucifera* L. *Wedelia trilobata* L., *Capsicum flutescens* L.,

Table 1 Palynomorphs identified from pollen pot sample of *H. itama*

Species number	Species name/Families	Number of pollen (%)
1	*Cocos nucifera* L.	Dominant (13.2)
2	*Wedelia trilobata* L.	Rare (3.8)
3	*Elaeis guineensis* Jacq	Dominant (11.4)
4	*Leucaena leucocephala* (Lam.) de Wit	Rare (3.8)
5	*Melastoma malabathricum* L.	Rare (3.6)
6	*Acaacia mangium* willd	Rare (2.4)
7	*Capsicum flutescens* L.	Dominant (12.7)
8	*Coldenia procumbens* L.	Dominant (10.4)
9	*Asystasia gangetica* (L.) T. Anderson	Rare (1.7)
10	*Chromolaena odorata* (L.) R.M.King & H.Rob.)	Rare (2.4)
11	*Muntingia calabura* L.	Dominant (10.2)
12	*Citrus aurantiifolia* (Christm.) Swingle	Dominant (9.8)
13	*Cucumis sativus* L.	Dominant (7.7)
14	*Cuphea hyssopifola* H.B.K.	Rare (2.7)
15	*Mimosa pudica* L.	Rare (2.6)
16	Family Poaceae	Rare (1.6)

Coldenia procumbens L., *Muntingia calabura* L., *Citrus aurantiifolia* (Christm.) Swingle and *Cucumis sativus* L. differentiate Galician (Northwest Spain) honeys from the others. These are very frequent pollen grains in the honeys from this region (Seijo et al. 1997, Seijo and Jato, 1998). Thus, it was concluded that region and vegetation in field had an effect on diversity of pollen in pollen pot of *H. itama* in Pattani provice, Thailand.

4. CONCLUSION

The main and dominant pollen (over 10%) combinations in the pollen pots of *H. itama* include pollen from *Cocos nucifera* L., *Capsicum flutescens* L., *Elaeis guineensis* Jacq, *Coldenia procumbens* L. and *Muntingia calabura* L.

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