Foraging plant and palynological analysis of stingless bee pot-pollen in Pattani, Thailand

Isma-ae Chelong
Biology Program, Faculty of Science Technology and Agriculture, Yala Rajabhat University 133 Tesaban Road 3, Amphur Muang, Yala 95000, Thailand

Corresponding author: isma-ae.c@yru.ac.th

Abstract. This is the first foraging plant and palynological study using pollen stored by Heterotrigona itama (Apidae: Meliponini) in the Saiburi, Pattani, Thailand. The samples were directly collected from the pollen pots of H. itama species in apiaries located in Saiburi district. 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 pollen combinations in the pollen pots of H. itama include pollen from Wedelia, Acacia, Cocos and Elaeis. Most pollen types came from the families Mimosasae, Graminae and Asteraceae family.

1. INTRODUCTION
Stingless bees appear in the subtropical and tropical regions. Stingless bees are adapted to different species of foraging plant including fields, forests, savannas and mountains. 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 [2]. The pollen analysis in the pollen pot of stingless bee is importance for providing data about pollen source [11, 12]. There are many countries that support for research about the relation of plant and pollen in the hive such as New Zealand [7] Nigeria [1] Spain [8] and many in Turkey [13]. Most of the plants were pollinated and the nectar had large flowers, fragrant and sweet water [5, 3] Orange [6], Coconut [14], and Eucalyptus [9]. Thus, the objective of this study was to identify the foraging plants that contribute to the pollen pot composition of stingless bees.

2. MATERIAL AND METHOD
Palynological analysis of stingless bee pot-pollen were studied in the learning center of stingless bee in Saiburi district, Pattani province as shown in Figure 1, 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 [4] for identification of pollen types. The sample was mounted on standard glass slides with glycerin jelly. The identification of pollen types in the samples was determined by comparison under microscopic with the reference database.
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.

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             | *Acacia 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 aurantifolia* (Christm.) Swingle | Dominant (9.8) |
| 13            | *Cucumis sativus* L. | Dominant (7.7)      |
| 14            | *Cuphea hyssopifolia* H.B.K. | Rare (2.7) |
| 15            | *Mimosa pudica* L. | Rare (2.6)           |
| 16            | Family Poaceae        | Rare (1.6)           |

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.
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 learning center of stingless bee in Saiburi, Pattani, Thailand is difference to previous findings species such as Portula grandiflora, Antigonan leptopus, Amaranthus tricolor, Hibiscus rosa-sinensis, Cucumis melo, Isora coccinea, Tridax procumbens, Bidens pilosa, Turnera subulata and Isora javanica of plants respectively from their Malaysian pollen pot [10]. Some species of plant in this area are native and economic plant such as Cocos nucifera L., Capsicum frutescens 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.

4. CONCLUSION

Palynological analysis of stingless bee pot-pollen in the Saiburi, Pattani, Thailand, include pollen from Cocos nucifera L., Capsicum frutescens L., Elaeis guineensis Jacq, Coldenia procumbens L. and Muntingia calabura L. respectively. 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 province, Thailand.

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