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Plant Families Potentially Visited by the Honey Bees (*Apis* spp. and *Trigona* spp.) at Universitas Brawijaya Campus Area and Sawojajar Residential Area of Malang City, East Java, Indonesia

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Abstract Indonesia is known as a megadiverse country with great potential in products of plant organs such as pollen, so that it can support the world-scale honey bee industry. Honey contains antioxidants, so it can improve skin rejuvenation, beauty, and it also is a source of minerals, vitamins, carbohydrates, fructose. This study was conducted based on direct observation of flower plant specimens that were in bloom, making notes on the types of bees, plant organs visited by bees to collect honey, pollen, fruit, and resin. The taxon of flower plants, flowering season, time of visit, and taking nectar by honey bees, were then identified. The next step was to observe the flower structure (pollen-filled anthers) under a binocular and then it was photographed. In collecting data in the community, direct interviews were carried out to obtain additional information on local knowledge about bees. This study aimed to uncover, characterize and analyze the family, types of flower plants, related to honeybee feed in the form of pollen and nectar. From the research results, the types of honey bees found were the Apis genera (*Apis dorsata, Apis mellifera, Apis cerana*) and the stingless bee (*Trigona* sp.). The shape and size of pollen varied in each family, even in one type of plant in the same flower might have two pollen morphology. The diversity of green campuses, school environments, tourist attractions, housing, even urban areas, urban forests has the potential to develop urban honeybee production. Meanwhile, the diversity of plant species visited by honey bees to collect pollen, nectar, and resin includes 43 families. Various flower plants family which grows in campus area, residential area, and urban forests, has the potential to provide honey bee food.

Keywords City of Malang, Campus environment, Housing, Honey bees, Plant families

1. Introduction

Honey bee is an insect that has a social system (eusocial) included in the family Apidae, order Hymenoptera. The Hymenoptera is one of the largest orders of class Insecta comprising more than 100,000 species [11,9]. With the diversity of around 20,000 species of bees worldwide, the honey bees (*Apis* L.) are the most heavily researched and managed, focusing on the efforts of thousands of researchers [6]. *Apis dorsata* Fabricius has 3 subspecies, namely: *Apis dorsata dorsata, Apis dorsata binghami*, and *Apis dorsata breviligula*. From the results of a study by [10] that with mtDNA analysis of *Apis cerana* from Indonesia, China, Korea, Malaysia, Russia, Taiwan, Vietnam, Thailand, and Japan, it was concluded that the *Apis cerana* of Far East Russia is a subspecies. [16] reported four species belonging to the genus *Tetragonula* were found, namely *T. fuscobalteata, T. biroi, T. sapiens*, and *T. laeviceps*. Two species, *T. biroi* and *T. sapiens* are the new records in Sulawesi island. Stingless bees, for example, *Trigona*, are pollinating insects that are important for plants and useful for producing honey. Types of honey bees that have been known consist of: *Apis mellifera; Apis dorsata; Apis cerana; Apis moluensis; Apis koschevnikovi*; *Apis nigrocincta*; *Apis laboriosa*; *Apis florea*; *Apis andreniformis*. Meanwhile, the

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distribution of bee species in Java is the stingless bee, forest honey bee (*Apis dorsata*), *Apis mellifera,* and *Apis cerana*.

Apis cerana is a bee species distributed mainly in Asia and closely related to species of *Apis mellifera*, *Apis cerana* was earlier considered as a sub-species of honeybees *Apis mellifera*. The representatives of the Korean population of *Apis cerana* could be called further as a subspecies of *Apis cerana* koreana. [17] reported the genetic diversity of the honeybee *Apis cerana* in Yunnan, China, based on mitochondrial DNA. GMR Genetics and Molecular Research.

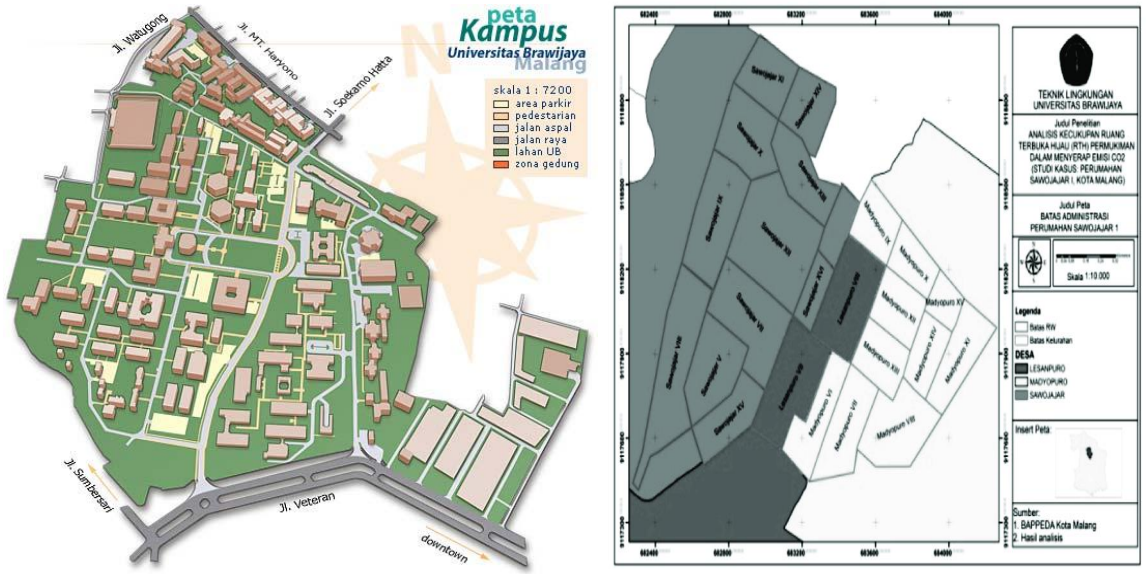
Honey bees produces honey from flower nectar and pollen, in place of flower nectar or other parts of various types of plants that contain liquid nectar. Plants produce a resinous sap, then it is carried by honey bees and used to seal holes in their nests. That resin substance is called propolis. Propolis is a plant-derived product that bees produce from resins that they collect from different plant organs and with which they mix beeswax. It is one of the most fascinating honey bee (*Apis mellifera* L.) products [3].

The activities of bees inadvertently also play a role in pollination, so that they can increase agricultural and plantation production. Likewise, it can carry out the evolutionary process of bees and various types of plants naturally. The diversity of flowering plant species (Spermatophyta) produces nectar, pollen, resin, which are processed by honey bees as honey producers. These processed products can support the honey bee production industry.

[7] reported that pollen morphological characters can be used to identify plant species in the form of number and position, aperture complexity and position, and the exine sculpturing. Pollen grains (microspores) result from the process of microsporogenesis with various structures, sizes, and shapes: radial symmetry (bilateral), round (pores), elongated (colpi), and strong pollen walls (aperture). According to [7], when the amount of phloems is higher, the honey gland content reaches 50%, and the xylem has more sugar content of only 8%. The benefits of honey are to strengthen immunity, increase stamina, heal wounds, prevent various cancers, diabetes, heart disease, influenza, and also corona virus. Honey also contains antioxidants, supports beauty regarding skin rejuvenation, and becomes a source of minerals, vitamins, carbohydrates, and fructose. The purpose of this study is to reveal members of the plant family species at Brawijaya University and Sawojajar housing estate in Malang City, which have the potential to be used as food for honey bees.

2. Materials and Methods

This study was conducted from December 2019 to September 2020 through a random survey based on the presence of types of plants with the habitus of the tree, shrub, herb, and grass visited by honey bees (*Apis* spp. & *Trigona* sp.) in Universitas Brawijaya campus area and Sawojajar residential area in Malang, East Java (Figure 1A,B). Plant species were recorded, identified, then flowers were taken to observe the part of pollen and nectar, then they were made into herbarium. The identification was conducted using the book Flora of Java by [2,4], floral morphological characters with identification books [8,15,4], while the pollen character was identified based on various journals and books. Flower characterization was done by an Olympus SZ61 microscope, a magnifying glass (loupe), while pollen was observed with an Olympus CH20 microscope equipped with micrometers.



A B

Figure 1. A. The Map of the campus of Universitas Brawijaya, and B. Sawojajar residential area of Malang, East Java

Table 1. Potensial plants with their correct nomenclature were arranged by local name, scientific name, family name, and habitus

Local Name	Scientific Name	Family	Habitus
Agave	*Agave angustifolia*	Agavaceae	Shrub
Bayam	*Amaranthus hybridus*	Amaranthaceae	Herb
Bayam duri	*Amaranthus spinosus*	Amaranthaceae	Herb
Sengketan	*Achyranthes aspera*	Amaranthaceae	Herb
Mangga	*Mangifera indica*	Anacardiaceae	Tree
Jambu monyet	*Anacardium officidentale*	Anacardiaceae	Tree
Sirsat	*Annona muricata*	Annonaceae	Tree
Pule	*Alstonia scholaris*	Apocynaceae	Tree
Bintaro	*Cerbera manghas*	Apocynaceae	Tree
Porang	*Amorphophalus mulleri*	Araceae	Herb
Bandotan	*Ageratum conyzoides*	Asteraceae	Shrub
Beluntas	*Plucea indica*	Asteraceae	Shrub
Paitan	*Thitonia diversifolia*	Asteraceae	Shrub
Seruni	*Widelia montana*	Asteraceae	Shrub
Senikir	*Tagetes erecta*	Asteraceae	Shrub
Bunga matahari	*Helianthus anuus*	Asteraceae (Compositae)	Shrub
Pacar	*Impatiens balsamina*	Balsaminaceae	Herb
Kecrutan	*Spathodea campanulata*	Bignoniaceae	Tree
Kapok randu	*Ceiba petandra*	Bombaceae	Tree
Durian	*Durio zibethinus*	Bombaceae	Tree
Sawi	*Brassica oleracea*	Brassicaceae	Herb
Pepaya	*Carica papaya*	Caricaceae	Tree
Manggis	*Garcinia mangostana*	Clusiaceae	Tree
Mundu	*Garcinia dulcis*	Clusiaceae	Tree
Ketapang	*Terminalia catappa*	Combretaceae	Tree
Pakis haji	*Cycas rumhii*	Cycadaceae	Tree
Teki	*Cyperus rotundus*	Cyperaceae	Shrub
Teki	*Cyperus alternifolius*	Cyperaceae	Shrub
Bisbol	*Diospyros blancoi*	Ebenaceae	Tree
Wuni	*Antidesma bunius*	Euphorbiaceae	Tree
Karet	*Hevea brasiliensis*	Euphorbiaceae	Tree
Puring	*Codiaceum* spp.	Euphorbiaceae	Tree
Jarak	*Ricinus communis*	Euphorbiaceae	Tree
Saman/trembesi	*Samanea saman*	Fabaceae	Tree
Asam	*Tamarindus indica*	Fabaceae	Tree
Kaliandra	*Calliandra partoricensis*	Fabaceae	Tree
Putri malu	*Mimosa pudica*	Fabaceae	Shrub
Mlandingan	*Leucaena glauca*	Fabaceae	Tree
Orok-orok	*Crotalaria striata*	Fabaceae	Shrub
Kembang merak	*Caesalpinia pulcherrima*	Fabaceae (Leguminosae)	Shrub
Jagung	*Zea mays*	Gramineae (Poaceae)	Grass
Padi	*Oryza sativa*	Gramineae (Poaceae)	Grass
Rumput gajah	*Pennisetum purpurium*	Gramineae (Poaceae)	Grass
Tebu	*Sacharum officinarum*	Gramineae (Poaceae)	Grass
Sengketan	*Hyptis suaveolens*	Lamiaceae	Shrub
Leng-lengan	*Leucas aspera*	Lamiaceae	Shrub

Kemangi	*Ocimum basilicum*	Lamiaceae (Labiatae)	Shrub
Alpokat	*Persea americana*	Lauraceae	Tree
Telekan	*Lantana camara*	Lauraceae	Shrub
Keben	*Baringtonia asiatica*	Lecythidaceae	Tree
Bawangan	*Crinum zeylanicum*	Liliaceae	Herb
Bawangan putih	*Hymenocallis littoralis*	Liliaceae	Herb
Bungur	*Langerstroemia indica*	Lythraceae	Tree
Cempoko	*Michelia champaca*	Magnoliaceae	Tree
Waru	*Hibiscus tiliaceus*	Malvaceae	Tree
Maribang	*Hibiscus rosa-sinensis*	Malvaceae	Shrub
Kelor	*Moringia oleifera*	Moringaceae	Tree
Pisang	*Musa paradisiaca*	Musaceae	Herb
Salam	*Zyzygium aromaticum*	Myrtaceae	Tree
Jambu klutuk	*Psidium gyajava*	Myrtaceae	Shrub-tree
Jambu bol	*Zyzygium malaccense*	Myrtaceae	Tree
Jambu air	*Zyzigium aqueunum*	Myrtaceae	Tree
Juwet	*Eugenia cumini*	Myrtaceae	Tree
Sikat botol	*Callistemon citrinus*	Myrtaceae	Tree
Klampok watu	*Zyzygium littorale*	Myrtaceae	Tree
Dewandaru	*Eugenia uniflora*	Myrtaceae	Shrub
Blimbing wuluh	*Averrhoa bilimbi*	Oxalidaceae	Tree
Blimbing lingir	*Averrhoa carambola*	Oxalidaceae	Tree
Klopo	*Cocos nucifera*	Palmae (Arecaceae)	Tree
Sawit	*Elaeis guineensis*	Palmae (Arecaceae)	Tree
Palm raja	*Roystonia regia*	Palmae (Arecaceae)	Tree
Palm	*Areca* sp.	Palmae (Arecaceae)	Tree
Pandan	*Pandanus tectorius*	Pandanaceae	Tree-shrub
Nomlang	*Passiflora foetida*	Passifloraceae	Liana
Pinus	*Pinus merkusii*	Pinaceae	Tree
Mawar	*Rosa hybrida*	Rosaceae	Shrub
Sakura	*Prunus* sp.	Rosaceae	Shrub
Pace	*Morinda citrifolia*	Rubiaceae	Tree
Jeruk manis	*Citrus sinensis*	Rutaceae	Shrub
Jeruk keprok	*Citrus nobilis*	Rutaceae	Tree-shrub
Rambutan	*Nephelium lappaceum*	Sapindaceae	Tree
Klengkeng	*Dimocarpus longan*	Sapindaceae	Tree
Sawo	*Achras zapota*	Sapotaceae	Tree
Kernitu	*Chrysophyllum cainitu*	Sapotaceae	Tree
Sawokecik	*Manilkara kauk*i	Sapotaceae	Tree
Tomat	*Lycopersicum esculentum*	Solanaceae	Shrub
Pokak	*Solanum torvum*	Solanaceae	Shrub
Coklat	*Theobroma cacao*	Sterculiaceae	Tree-shrub
Talok	*Muntingia calabura*	Tiliaceae	Tree
Kumbulan	*Chochorus aestuans*	Tiliaceae	Shrub
Telekan	*Lantana camara*	Verbenaceae	Shrub
Pecut kuda	*Stachytarpheta jamaicensis*	Verbenaceae	Shrub
Jati	*Tectona grandis*	Verbenaceae	Tree

3. Results and Discussion

Honeybee Feed Flora Diversity

Malang city has an average height of 450 m above sea level, known for many ancient historical relics, for example, the kingdom of Kanjuruan, Singhasari which is located between Mount Arjuno, Bromo Tengger Semeru, and Mount Kawi. This city is located in a cool highland with an area of 145.28 km, located in the middle of Malang Raya. Meanwhile, the location of the green campus of Universitas Brawijaya is in the middle of Malang city, where many types of flowers are planted, such as trees, shrubs, and herbs. Likewise, Sawojajar residential area, with a dense population and many types of trees, shrubs, grasses, and house ornamental plants are planted.

The diversity of flower plant species of the Monocotyledoneae group favored by honey bees includes the Arecacaeae family (*Roystonia regia, Cocos nucifera, Elaeis quinenesis, Area catechu*); Poaceae (*Zea mays, Oryza sativa, Pennisetum purpurium*), and Agavaceae (*Agave* sp.). Meanwhile, the Dicotyledoneae group includes guavas (Myrtaceae): *Zyzygium malaccense, Zyzigium aqueunum, Zyzygium aromaticum, Zyzygium littorale, Eugenia cumini.* Fabaceae (*Samanea saman, Leucaena glauca, Caliandra haematocephala*); Lecythidaceae (*Baringtonia asiatica*), Asteraceae: Brassicaceae (*Brassica oleracea*), Asteraceae (*Thitonia diversifolia*); Amaranthaceae: *Amaranthus spinosus*; Rutaceae (*Citrus sinensis*), Bombaceae (*Ceiba petandra*); Rubiaceae (*Coffea arabica*), Lauraceae: *Lantana camara*; Lamiaceae: *Ocimum basilicum*, Sapotaceae: *Chrysophyllum cainitu*; Lecythidaceae: *Baringtonia asiatica*; Tiliaceae: *Muntingia calabura*; Sapindaceae, *Dimocarpus longan*; Rosaceae (*Rosa hybrida*). Family characteristics have the power to interpret and determine whether the group's members have the potential to support honeybee production. Therefore, the familia taxonomic level is the key in developing sustainable bee production. For example, farmers by planting jagung, corn (*Zea mays*), produce corns, while honey bee farmers benefit greatly from increased production of nectar and pollen. This symbiotic relationship occurs in other species, for example, silk-cotton tree, star-apple, longan, rambutan, coconut, palm, mango, guava, and grass.

Basically honey bee takes nectar not limited to one type of plant, but also other types of flowers that are blooming. Nectar is generally located at the base of flowers, stamens (anthera), base of ovules, stylus, crown, and other floral plant organs. The smell of flowers, the color of flowers greatly affect the arrival of the type of worker bees to look for nectar, resin, and pollen. Bees are actively involved in pollinating agricultural crops and wild plants are known to have a preference for selecting flowers for pollination. [7] epidermal tissue is covered by a cuticle and the layer below is secretory tissue, there is a network of vessels that are thought to be related to the transport bundle or perhaps the one that produces honey glands.

The people of Malang and schools in Malang, including the campus environment with the potential for flora diversity used by honey bees, have not been interested to cultivate in a traditional or modern way. Malang's urban landscape strongly supports the honeybee industry with the presence of urban forests, many housing estates, schools, research institutions, public and private universities, dry fields, rice fields, and tourist attractions. With the results of this study, it is expected that it can provide data and scientific information to be able to develop beekeeping learning, tourism, production of modern urban honey bee innovations. The diversity of species that have the potential to develop honey production in urban areas includes 43 families (Table 1).

The Life of Honey Bee

In the season when plant species bloom heavily, it turns out that it does not only affect the types of bees looking for nectar but also competes with various other insects such as butterflies (Figure 2), green flies, house flies, beetles, black ants, weaver ants and so on. Flowering season, distance, altitude, and environment are also important factors for the existence of visiting the flower species. An environment with crowds such as human activities on the highway, campus activities, housing affects the presence of bee species in their activity of looking for nectar, pollen, and nesting places. For the detection of nectar in flower organs, researchers are only limited to looking at the instinctive activities of choosing bees to take nectar. [5] reported that small amounts of pollen are sufficient for amplification, and in our observations were able to extend to other species where pollen samples were widely available.

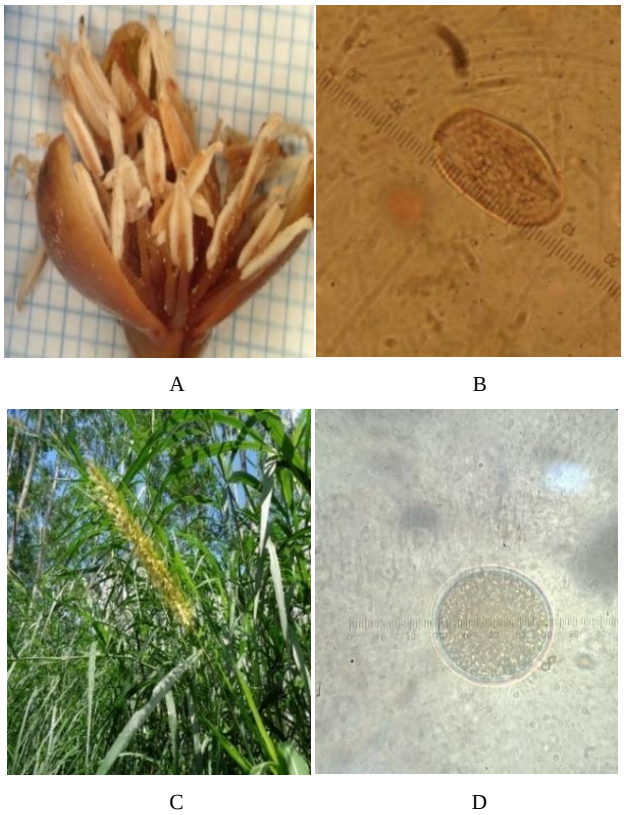
A B

Figure 2. A. Various types of insects perch on clove (*Syzygium aromaticum*), B. cherry (*Prunus* sp.)

Pollen in Monocotyledoneae

In Arecaceae, the flowers in the form of bunches, the big number of flowers may indicate that the amount of nectar and pollen is also large, for example, coconut (*Cocos nucifera*). In the *Areca* sp., the pollen shape is round, the exine is generally irregular, and slightly elongated. Meanwhile, pollen diameter is 57.75 - 66 µm; and some are slightly elongated 77-83.5 x 33-41.25 µm (Fig. 3A). In Poaceae, for instance, elephant grass (*Pennisetum purpureum*) was transparent, grayish-white, round in shape, clear exine, porous with streaks or spots, 55-57.75 µm in diameter (Figure 3B). Meanwhile, Liliaceae, for example, the crinum species (*Crinum zeylanicum)* has shape and size

of 100-110 µm x 40-42 µm, uniform pollen (Figure 4).



A B C D

Figure 3. A,B. Arecaceae pollen (*Areca* sp) and C,D. Poaceae pollen (*Pennisetum purpureum*)

Pollen in Dicotyledoneae

The shape and size of pollen, the color of each type of dicotyledoneae plant is generally similar, but some have various sizes. Several species of the Myrtaceae family, Surinam cherry (*Eugenia uniflora*), have a pollen size of 30.25-35.75 µm (Fig. 5A). Members of the Arecaceae, Myrtaceae are visited and most favored by various types of bees, both the *Apis* and *Trigona* genera. In Polygonaceae, the pollen shape is invariable, but there are different sizes, the spherical pollen's diameter is 66-71.5 µm; while the oval is 66-71.5 m x 41.25-18.15 µm (Fig. 5 B). In Fabaceae, for example, rain tree (*Samanea saman*), there are two kinds of pollen's shape in one flower (Figure 7B). In the Malvaceae family, they are generally identical, only differing in size and density of spines on the surface of exin, for example in *Hibiscus rosa-sinensis* where the pollen is rounded with dense spiked edges measuring 13.75 x 5.5 µm (Figure 7A). While the sea mango (*Cerbera manghas*), family Apocynaceae (6A); Verbenaceae, e.g. blue porterweed (*Stachytarpheta jamaicensis*) have triangular-shaped pollen which contains easily broken pollen liquid (Figure 6B).

Figure 4. Liliaceae pollen, beach spider lily (*Hymenocallis littoralis*)

A B C D

Figure 5. A,B Pollen Myrtaceae (Surinam cherry-Eugenia uniflora*)* and B, C. Polygonaceae (knotweed-*Polygonum* sp.)

A B

Figure 6. A. Sea mango (*Cerbera manghas*). B. Verbenaceae (blue porterweed-*Stachytarpheta jamaicensis*)

A B C

Figure 7. A. Malvaceae pollen (Chinese hibiscus, *Hibiscus rosa-sinensis*) and B, C Fabaceae (pollen from rain tree-*Samanea saman*)

Honeycomb

The existence of the nest of a stingless bee (*Trigona* sp.) follows the choice of the queen bee, in any place on dry bamboo, doors, windows, earthen mounds, caves, iron holes, dry wood, wood holes, house tiles, plant pots, etc. Similarly, *Apis cerana* and *Apis mellifera* bees are in the house, coconut tree holes, other tree species, gravestone holes, cauldron, etc. Local people usually make and move to a bee house called *glodokan* made of coconut trees, mahogany, and so on. According to Mr. Yacobus, the banyan tree (*Ficus benyamina*) is often used for nesting giant honey bees (*Apis dorsata*), wherein in one tree, there is more than one nest. According to Mr. Ustadi, the sustainable development of honey bees can be done with innovation from the manufacture of queen bees. Meanwwhile, the harvesting of giant honey bees by the local community is also explained by Dewi Masyitoh (Universitas Brawijaya), Ervan (Universitas Mataram), and Mr. Yacobos (Universitas Pattimura) that it is started by performing traditional rituals, the mantra to chant the drum. The character of the family taxon is the key to developing sustainable bee production.

In general, pollen with a small structure and unattractive flower color is distributed with the help of the wind. In contrast, large pollen structures and attractive flower colors are distributed with the help of insects. Variations in the shape and size of pollen between plant species are caused by differences in plant species based on the genus, so that the shape and size of pollen in plants in different genera have different pollen forms [14,1]. However, several species of the same flower plant have different shapes and sizes of pollen, for example, in the *Samanea saman* species (Fig. 7 B, C).

The family of Arecaceae (palm trees), class monocotyledoneae has a tree habit, generally unbranched, with large and long leaves. Arecaceae flowers, for example Cuban royal palm (*Roystonia regia*), oil palm (*Elaeis guineensis*), and coconut (*Cocos nucifera*) have potential as honey bee feed because of the large number of flowers per bunch and its resistance in all seasons. Similarly, the family of grasses (*Poaceae*), for example corn (*Zea mays*), rice (*Oryza sativa*), and reeds (*Imperata cylindrica*) have great potential as producers of honey bee feed: pollen, nectar due to the amount of pollen. Pandan (*Pandanus tectorius*) is visited by many bees, mainly stingless bee (*Trigona* spp.) and honey bee genus (*Apis* spp.).

Dicotyledoneae (Magnoliopsida) has characteristics of either herbaceous or woody, having simple or compound leaves, sitting leaves scattered or craggy, alternate with carrier bundle elements, cambium produces layers with secondary growth. For instance, the orders Ranales (Polycarpicae), Passiflorales, Cactales (Opuntiales), Rosales, Malvales (Columniflorae), Sapindales, Urticales, Myrtales (Myrtiflorae), Santalales, Proteales, Piperales, Ebenales, Primulales, Tubiflorae, Rubiales, etc.

The order Myrtales includes several families namely Myrtaceae, Lecythidaceae, Melastomaceae, Lythraceae, Thymelaceae, Bignoniaceae, Rhizophoracea. The myrtle family (Myrtaceae) including clove (*Zyzygium aromaticum*), blume (*Zyzygium littorale*), watery rose apple (*Zyzygium aqueum*), and Malay apple (*Zyzygium malaccense*) were visited by many types of bees, among others, Western honey bee (*Apis mellifera*), stingless bee (*Trigona* spp.), and giant honey bee (*Apis dorsata*), as well as butterflies, green flies, house flies to many ants in the flower location. Common guava (*Psidium guajava*), blume, and watery rose apple generally bloom in December to January; therefore, the researchers encountered a lot of Western honey bees and stingless bees. Similarly, a number of families of Sapindaceae were also found, including rambutan (*Nephelium lappaceum*), lac tree (*Schleichera oleosa*), lychee (*Litchi chinensis*), matoa (*Pometia pinnata*), longan (*Dimocarpus longan*), fern tree (*Filicium decipiens*).

In addition, the spurge family (Euphorbiaceae) was also useful for honey bee feed. For instance, the rubber tree (*Hevea brasiliensis*), croton (*Codiaeum* spp.), cassava (*Manihot esculenta*), bignay (*Antidesma bunius*), castor bean (*Ricinus communis*), asthma plant (*Euphorbia hirta*), poinsettia (*Euphorbia pulcherrima*) (Table 1). The rubber tree (*Hevea brasiliensis*) and northern wattle (*Akasia crassicarpa*) are now the main supporters of honey bee production at the Kembang Joyo Sriwijaya company located in Karang Ploso, Malang East Java [12]. [3] reported that western honey bee (*Apis mellifera* L.) has the potential for producing mix beeswax.

4. Conclusions

The diversity of flowers which supply the pollen and also nectar in residential area, campus area, and urban area, have an implication for the development of the local honey bee industry. The shape and size of pollen vary in each family, even in one type of plant in the same flower may have two pollen morphology. Availability the type of family member and development locations which located in urban areas causing the limitation to the development of the local honey bee industry. The diversity of plant species shows the implications of the availability of bee food in the form of pollen and honey glands. The collaborative partnership between scientists and industrial enterprise (PT Kembang Joyo Sriwijaya Karang Ploso) also helps small honey bee farmers in suburban areas around the honey factory. However, it can be used as a learning innovation and unique honey bee cultivation model. Based on a survey at Brawijaya University and residential area Sawojajar in Malang City, the diversity of species that have the potential to develop honey production in urban areas includes 43 families. The nest of *Trigona* sp. and *Apis* spp. can be found in the place of dry bamboo, doors, windows, mounds of soil, trees, caves, dry wood, wood holes, house tiles, plant pots, coconut tree holes, gravestones, and cauldron.

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