Insect's Visitation on Melastoma malabathricum in UKM Bangi Forest Reserve

Syuhada Ataa1, Izfa Riza Hazmi1,2, Siti Fatimah bt Samsudin1
1 The Centre for Insect Systematics, Faculty of Sciences and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia. 2 School of Environmental & Natural Resources Science, Faculty of Science & Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia.

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1. INTRODUCTION

Plants and insects are living organisms that continuously interacting on their own way. This situation was known as plant-insect interaction. Insects play an important role as pollinators to spread pollen for germination [1]. In addition, they are also important to ensure the reproduction and conservation of floras populations [2]. It was reported that weevil from species Elaeidobius kammerunicus has been proven successfully improve the pollination and increase fruit set of palm oil as being mentioned by Norowi et al. [3]. Therefore, it is very interesting to study the field of insect-plant interaction to gain insights on the co-evolutionary and dependency of two species. One of the interactions that need to be looked into is the interaction of insects with M. malabathricum. More than 4000 species of Melastomataceae plants estimated exist in the world, M. malabathricum has been one of 22 species found in the Southeast Asian region alone [4]. Melastoma malabathricum are well-known herb in Malaysia, particularly, where its leaves, shoots, and roots are prepared in various ways for treatment of different diseases and ailments. Many reviews have appeared in the literature regarding M. malabathricum medicinal uses compare to the ecological studies of this plant. Therefore, this study was carried out to investigate the insects that visited M. malabathricum at UKM Bangi Forest Reserve, Selangor. The study done by Nur Athirah et al. [5] found that, there were 8 insects order consisting of 29 families recorded to visit M. malabathricum on different part of the plant in their study in Rompin Pahang.

2. Material and Methods

The study site is Bangi Forest Reserve that is located within the main campus of Universiti Kebangsaan Malaysia (UKM) in Bangi, Selangor. The samples were collected randomly at the forest edge in 10 days for the consecutive two weeks for each month starting from February till April 2016. Active sampling by sweeping net was employed. The samples obtained were pinned, oven-dried and labeled in the laboratory. The identification process was done due to their characteristics and morphology by referring to the Triplehorn & Johnson [6] and comparing the samples obtained in repository of Centre of Insects Systematic (CIS), UKM. All the data were analyzed by One – way ANOVA by using PAST software version 2.17c.

3. Results and Discussion

A total of 214 individuals comprising 3 orders consisting 7 families and 15 species were recorded to visit on M. malabathricum in UKM Bangi Forest Reserve (Table 1). Among all the recorded orders, the most encounter order visited to M. malabathricum was Hymenoptera. This result was aligned to the study conducted by Nur Athirah [5] that also reported Hymenoptera as the most insects order to be found visited the Melastoma malabathricum. The order recorded from this study builds up to three major families, namely Apidae, Xylocopidae and Formicidae comprising of 10 species with 195 individuals (91 % from the total number of insects sampled) (Figure 1). Meanwhile, Hemiptera was the least found which only 9 individuals comprise of 2 families sampled namely Membracidae and Pentatomidae. The other order recorded from this study was Coleoptera. This order consists of 2 families namely Curculionidae and Chrysomelidae with 3 species and 10 individuals.

<table>
<thead>
<tr>
<th>ORDER</th>
<th>FAMILY</th>
<th>SPECIES</th>
<th>Total of insects in Melastoma malabathricum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hymenoptera</td>
<td>Apidae</td>
<td>Trigona</td>
<td>195 (91 % from the total number of insects sampled)</td>
</tr>
<tr>
<td></td>
<td>Xylocopidae</td>
<td>Xylocopa</td>
<td>195 (91 % from the total number of insects sampled)</td>
</tr>
<tr>
<td></td>
<td>Formicidae</td>
<td>Formica</td>
<td>195 (91 % from the total number of insects sampled)</td>
</tr>
</tbody>
</table>

Referring to Table 1, Trigona itama was the highest species recorded with a total of 127 individuals (59.34 %). Trigona itama was known as a stings bee that involved in meliponiculture in Malaysia. The number of stings bee species in Malaysia varies between 17 to 32 species depending on the study areas [7]. Another species of Trigona that were recorded in this study is T. thoracica. Based on the observation made on the sampling site, species of T. itama was the active visitor to Melastoma malabathricum as well as Xylocopa latipes and X. confusa. By referring to the highest percentage of T. itama with about 59 %, it was thought that based on the field observation, the species acted as pollinator for M. malabathricum where they feed on the pollen of the flowers and the pollen therefore attached on their abdomen and legs. The tropical carpenter bee, X. latipes, is a species of carpenter bee widely dispersed throughout Southeast Asia. This bee inhabits forests in warm tropical climates and constructs nests by burrowing into wood. The finding of Xylocopidae family as one of the pollinators on the plant is
supported by Gonzalez et al. [8] when their studies in Singapore, found that X. latipes and X. confusa are both the most frequent visitors on M. malabathricum. Moreover, the other species from Hymenoptera order that were found on M. malabathricum was Nomia iridescent. Tropical rainforest is one of the habitats for Nomia sp. that belong to Apidae family [9]. Nomia sp. also recorded as the other visitor in the Oriental Region was particularly tropical and subtropical [10]. It was identified that Nomia sp. pollinated the plant species that were on the forest floor, in the under storey or in forest gaps with relatively long floral tube, and this was exactly where and what M. malabathricum were found and looks like [11]. Another species from Apidae family that was found on M. malabathricum is Amegilla zonata (L.), also known locally as the Blue-banded bee. It was a medium-large, pubescent, long-tongued and solitary bee [12]. The Amegilla sp. had already been established as the various other pollinators of a wide range of crops [12]. Therefore, a conclusion can be made that A. zonata was actually one of the pollinators for M. malabathricum.

The family of Formicidae has three species that were found associating with M. malabathricum. The first species was Camponotus japonicus normally known under the common name Japanese carpenter ant, is a species of ant native to East Asia. It is black, and one of the largest ants. Camponotus japonicus was found on the flower part of M. malabathricum and according to Inouye [13], ants were normal visitor to any plants, but they were regarded as nectar thief since they were not involving with pollination because of their morphological limit such as smallness, winglessness, smooth integument and frequent grooming but study done by Sugura, Miyazaki and Nagashi [14] found that C. japonicus were able to pollinate an orchid species, Epipactis thunbergii. They officially remove the pollen from the anther and brought the pollen to the stigma of the flower and they frequently visited the orchid species up to 40 % compared to the hover flies, the principle pollinators of the E. thunbergii only 10 to 20 % of its visitation frequency on the flower. The second species from Formicidae was Lasius fuliginosus. This species of ant were widely distributed in Europe and Asia [15]. Lasius fuliginosus can be found lived in urban places but at the green areas only such as parks [16]. Therefore, that was the reason for L. fuliginosus can be found on the area where M. malabathricum were lived since the sampling site was near to a developed places that have building and road. Besides that, L. fuliginosus is a strongly competitive species, they are able to successfully compete for area and food sources. Their food sources were honeydew at the trees and aphids [17]. Solenopsis invicta, red imported fire ant was known to be a common urban pest ant in Malaysia [18] feed on the nectar of Passiflora ambigu and it was a study done by Lanza et al. [19]. Furthermore, the study showed that it is an example of plant adaptation to avoid herbivore from eating the plants by attracting ant protectors [20], therefore, it might be the same reason of S. invicta existed on M. malabathricum to serve as protectors from any herbivore attack.

The Hemiptera recorded only two species namely Cyrtolobus ovatus and Chlorochroa sp. The percentage of C. ovatus from Membracidae family that were found visited on M. malabathricum was 78 % (seven individuals) and Chlorochroa sp. (Pentatomidae) was 22 % (two individuals). Sum up the total individuals of Hemiptera order found on M. malabathricum were only nine individuals and it was indicate that Hemiptera order was the lowest ranking in term of individual's number of total insects captured.

The C. ovatus, the common name was treehoppers and also known as thorn bugs are members of the family Membracidae, a group of insects related to bugs are members of the family Membracidae, a group of insects related to

8. Conclusion

A total of 214 individuals comprising from 3 order and 7 families with identification up to genus-species level for 15 species have been collected in this study. It was resulted that the most frequent visitor for Melastoma malabathricum was order Hymenoptera, from the species; Trigona itama. It was stated that the percentages of Hymenoptera captured were 91 % compared to the other order; Coleoptera (5 %) and Hemiptera (4 %). Also, this study was compared to the research by Nur Athirah et al. [5] and project done by Min & Wayne [32]. Last but not least, there was significant different for total insects visited on M. malabathricum for three months based on the p-value obtained (P = 0.01) that was lower than α value, 0.05 (p < 0.05).
References