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THE ROLE OF PEIPHYTES IN INFLUENCING INSECT DIVERSITY AND FRUGIVORES ABUNDANCE COMMUNITIES, IN DIFFERENT OIL PALM PLANTATIONS

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ABSTRACT

Oil palm plantations are essential to the world's agricultural business, yet they are frequently criticised for their harmful effects on biodiversity. Epiphytes that inhabit the oil palm trunks in oil palm plantations are essential in maintaining insect and frugivore diversity. This research examined the diversity and abundance of epiphytes, insects that inhabited the epiphytes, and the relationship between the frugivores and epiphytes abundance of different plantation management practices. Three different landscapes, the fringe, the middle, and the inner of oil palm plantations, were chosen at two different oil palm plantations in Banting, Malaysia. The diversity and abundance of epiphytes were quantified on 30 selected oil palm trees (70% epiphytes coverage) across trunk zones along designated landscapes. At the same time, the samplings were conducted for insect communities using a sweep net and handpicking. Frugivore diversity was monitored using mist nets for 10 sampling nights. A total of 18 epiphyte species from eight genera were identified. There were 1187 epiphytes from 15 species and seven genera recorded in Plantation 1, while 1142 individuals from 12 species and seven genera were recorded in Plantation 2. *Nephrolepis biserrata* and *Davallia denticulata* were the two most dominant epiphyte species recorded in both plantations. The distribution of epiphytes differed between the landscapes, the zones, and plantations. In Plantation 1, 136 insects were collected from 11 insect orders (32 families and 22 genera), and 94 insects were captured from nine orders (25 families and 37 genera) in Plantation 2. Family Formicidae was the most abundant family recorded in both plantations. The abundance of insects collected in Plantation 1 was not significantly different ($P = 0.35$), while the abundance of Plantation 2 was significantly different ($P = 0.01$). The abundance of insect communities did not differ significantly between the two plantations ($P = 0.07$) and regression analysis showed no significant relationship between epiphyte abundance and insect communities. In addition, 123 frugivores from Class Aves and Class Mammalia were captured in both plantations. Only two frugivores were recorded in Plantation 1, and 121 frugivores in Plantation 2. The most abundant species in Plantation 2 was *Cynopterus sphinx,* with 61 individuals. The abundance of frugivores between landscapes in Plantation 2 did not differ significantly, while the test cannot be conducted in Plantation 1 due to the small sample size. However, there was a significant difference in the frugivore abundance between Plantation 1 and Plantation 2 using the Generalized Linear Model test. For the relationship between the frugivores and the fruiting epiphytes, regression analysis showed a non-significant relationship in both plantations. The differences in the abundance of frugivores between the two plantations can be attributed to variations in tree height, inter-tree spacing, and the availability of water sources. Other management approaches, such as epiphyte clearing and landscape design between the two plantations, most likely contributed to the differences in epiphyte abundance, insect species composition, and the number of frugivores captured. In conclusion, this study emphasized the relevance of epiphytes as important microhabitats within oil palm plantations since they provide a habitat for insects and frugivore activities.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Oil palms (*Elaesis guineensis)* are a family of stem-less, monocot plants vital to humans and biodiversity, especially in the tropics (Cosiaux et al., 2018). The oil palm tree is a multipurpose crop that positively affects the socio-cultural activities of the area's civilians (Awalludin et al., 2015). Oil palm trees also benefit the cosmetic and food industries (Corley & Tinker, 2003). The process of oil palm production started in Kuala Lumpur in 1952, producing various daily-use products such as cooking oil, margarine, soap, and detergent (Rasiah & Shahrin, 2006). There is a high demand for palm oil globally, which has had a good impact on Malaysia's export flows. The oil palm plantations have a substantia effect on economic development in tropical and low-living countries (Sheil et al., 2009).

The oil palm industry in Malaysia, Indonesia and Thailand contributes over 88% of global palm oil production, making this region a key economic contributor (Murphy et al., 2021). The study of Shigetomi et al. (2020) stated that Indonesia is the world's largest commodity of palm oil and contributes to global palm oil production. Malaysia produced more than 19.8 million tons of crude palm oil in 2015, becoming the second largest producers of palm oil (Mahlia et al., 2019). The percentage of oil palm tree cover was the highest in Malaysia from 2000 to 2012 (Li et al., 2020).

Due to that, the expansion of oil palm plantations in Malaysia has caused concerns about biodiversity loss and deforestation (Sheil et al., 2019). The conversion of natural forest affected the species diversity and species richness of animals (Syahza &Irianti, 2021). Malaysia is actively trying to mitigate the adverse effect on the conversion of forest to oil palm plantation. One of the ways to reduce the loss of species diversity due to the expansion of oil palm plantation is to maintain the other vegetation like the epiphytes on the oil palm tree trunks in the plantations (Einzmann&Zotz, 2016).

Epiphytes are plants that grow on other plants without harming the host plants (Benzing,1990). The retention of epiphytes in oil palm plantations is one of the agroforestry practices that are important for biodiversity and ecological balance within