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AMBROSIA BEETLE'S (COLEOPTERA: CURCULIONIDAE) OCCURRENCE AND DIVERSITY IN FOREST PLANTATIONS IN WESTERN SARAWAK, MALAYSIA

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ABSTRACT

Ambrosia beetles (Coleoptera: Curculionidae) are wood-boring beetles that play an important role in temperate forests. They live symbiotically with microorganisms such as fungi that can cause plant wilt and death. In Sarawak, Malaysia, the ambrosia beetles have been found attacking exotic tree species such as *Acacia mangium*, *Acacia crassicarpa* and *Eucalyptus pellita* in some forest plantations. This research aimed to investigate the occurrence of the ambrosia beetles and determined their diversity in forest plantations located in western Sarawak, Malaysia. This research was conducted in exotic plantations at Licence Planted Forest 42 (LPF42), Sampadi, Lundu, and Sabal Model Forest, Simunjan from January 2022 until October 2022. A total of 20 units of modified intercept panel traps baited with 70% ethanol were used in each study site to trap the adult ambrosia beetles. The occurrence and diversity of ambrosia beetles were later analysed using Palentological Statistics Software (PAST). As a result, a total of 170 ambrosia beetles representing 12 species of Scolytinae and two species of Platypodinae were collected. There are seven species comprising 129 individuals of ambrosia beetles collected at LPF42 and 11 species comprising 41 individuals at Sabal Model Forest, respectively. The Shannon-Wiener and Simpson's indices showed the greatest values in Sabal Model Forest (1.45 and 0.58 respectively), meanwhile, in LPF42 (0.50; 0.28) indicated a range of low to medium species diversity but low species evenness in both study sites. In general, *Xylosandrus crassiusculus* was dominant in both sites with a total capture of 141 individuals (82.94%). Overall, this study provided baseline information on ambrosia beetle occurrence and their diversity in forest plantations in western Sarawak.

Keywords: Abundance, fungus-farming beetle, pest, weevil, *Xylosandrus crassiusculus*

ABSTRAK

Kumbang Ambrosia (Coleoptera: Curculionidae) adalah Kumbang Pengorek Kayu yang memainkan peranan penting dalam hutan temperat. Kumbang ini hidup secara simbiosis dengan mikroorganisma seperti kulat yang boleh menyebabkan tumbuhan layu dan mati. Kumbang ambrosia di Sarawak telah ditemui menyerang spesies pokok eksotik seperti *Acacia mangium, Acacia crassicarpa* dan *Eucalyptus pellita* di beberapa ladang. Kajian ini bertujuan untuk mengkaji taburan kumbang ambrosia dan menentukan kepelbagaian kumbang ambrosia di ladang yang terletak di bahagian barat Sarawak, Malaysia. Kajian ini telah dijalankan di ladang iaitu di Licence Planted Forest 42 (LPF42), Sampadi, Lundu, dan Sabal Model Forest, Simunjan dari Januari 2022 sehingga Oktober 2022. Perangkap panel pintasan yang diubah suai dan menggunakan etanol 70% sebagai umpan digunakan untuk menangkap kumbang ambrosia dewasa. Taburan dan kepelbagaian kumbang ambrosia selanjutnya dianalisis menggunakan perisian *Palentological Statistics* (PAST). Hasilnya, sejumlah 170 kumbang ambrosia mewakili 12 spesies Scolytinae dan dua spesies Platypodinae telah dikumpulkan. Terdapat tujuh spesies yang terdiri daripada 129 individu kumbang ambrosia masing-masing dikumpulkan dari LPF42, manakala 11 spesies daripada 41 individu dari Hutan Model Sabal. Indeks Shannon-Wiener dan Simpson menunjukkan nilai tertinggi di Hutan Model Sabal, (masing-masing 1.45 dan 0.58), sementara itu di LPF42 (0.50; 0.28) menunjukkan julat kepelbagaian spesies rendah hingga sederhana tetapi kesamarataan spesies rendah di kedua-dua lokasi kajian. Secara amnya, *Xylosandrus crassiusculus* mendominasi di kedua-dua lokasi kajian dengan jumlah tangkapan 141 individu (82.94%). Secara keseluruhannya, kajian ini memberikan maklumat asas mengenai kehadiran kumbang ambrosia dan kepelbagaian mereka dalam ladang di barat Sarawak.

Kata kunci: Kelimpahan, kumbang penternak kulat, serangga perosak, kekabuh, *Xylosandrus crassiusculus*

INTRODUCTION

The ambrosia beetle belongs to the Curculionidae family in the Coleoptera, found in either the Scolytinae or Platypodinae subfamilies of weevils, and exhibits an obligatory association with nutritional fungal symbionts (Hulcr et al. 2015). While most ambrosia beetles are benign and of little economic significance as wood-boring insects, there are also members of this group that possess invasive tendencies and can cause substantial damage to trees (Hulcr et al. 2007). The majority of ambrosia species target dying or deceased trees, with a select few posing a threat to healthy trees (Sittichaya et al. 2019). These beetles create tunnels within the xylem, where they introduce symbiotic fungi. Consequently, they are commonly referred to as fungus-farming beetles, engaging in a symbiotic relationship with microorganisms such as fungi, bacteria, and yeast. This symbiosis can result in plant diseases that lead to wilting and eventual demise of the affected plants (Tarno et al. 2016). The ambrosia beetle is linked to a diverse range of fungi (Harrington 2005).

Scolytinae represents the more prevalent group, while Platypodinae is less common, as identified by Kirkendall et al. (2015). There are over 6,000 species of Scolytinae and around 1,400 species of Platypodinae documented, with the majority of these species being native to tropical or subtropical regions (Kirkendall et al. 2015; Sitompul et al. 2023). These ambrosia beetles play a pivotal ecological role and primarily serve as decomposers of wood in forest