

Structure and tree species composition of forest fringe of a forest fragment in an oil palm plantation at Suai, Sarawak, Malaysian Borneo

CLAUDIA LENNYA JANA, ISMAIL JUSOH*

Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia
Tel.: +60-82-582990, Fax.: +60-82-583160, *email: jismail@unimas.my

Manuscript received: 31 May 2021. Revision accepted: 28 June 2021.

Abstract. Jana CL, Jusoh I. 2021. Structure and tree species composition of forest fringe of a forest fragment in an oil palm plantation at Suai, Sarawak, Malaysian Borne. *Biodiversitas* 22: 3013-3019. Forest fragments in oil palm plantations are remnants of the original forest tract with various sizes and shapes after clearing forested lands for crops and roads. Fragmented forests usually created forest fringe or edge habitats that differ in light intensity, temperature, humidity, heavy rainfall, and strong winds from its core. The study was aimed to determine the structure and tree species composition of the forest fringe of a fragmented forest in an oil palm plantation Suai, Sarawak. This study established a total of 24 sampling plots within the forest fringe. Tree enumeration and species identification were conducted in all sampling plots to all trees with a diameter at breast height 5 cm and higher. A total of 59 families comprised of 274 species and 948 trees individuals were recorded. The aboveground biomass stand at 260 Mg ha⁻¹. Species *Elateriospermum tapos* was predominant, and family Dipterocarpaceae dominated the forest fringe. Based on the calculated indices, species diversity and richness were considered high, while the dispersion of individual trees was random but unevenly distributed. Natural regeneration in the forest fringe is sustainable. The forest structure and species composition are intact, and without significant disturbance, the whole forest fragment is self-sustain.

Keywords: Disturbance, forest edge, forest remnants, natural regeneration, species diversity

INTRODUCTION

Forest fragments of different sizes and shapes are common in oil palm plantations. It occurs during the plantation establishment phase, where it causes biodiversity loss (Shevade and Loboda 2019). The process starts with timber harvesting of primary or secondary forests, subsequently clear-felled most forested areas for oil palm plantation and roads, leaving scattered tracts of standing trees (Bakewell and Donysius 2014). According to Haddad et al. (2015), this forest fragmentation process is considered a major threat to biodiversity. Many oil palm plantation companies have gazetted the forest fragments as High Conservation Value (HCV) forests to support the conservation initiatives.

Generally, large forest fragments contain a relatively uniform core that provides sufficient conditions for tree communities to sustain themselves (Patrício et al. 2019). However, as fragments, original areas of natural habitat have cleared, the impacts on tree diversity and forest sustainability remain unknown. The edge effect could adversely affect the core areas, especially when the ratio of edge habitat to core habitat is significant as in linear-shape fragments. Many species naturally occur in the core habitat. They cannot survive near the edges of the habitat due to unfavorable conditions like light levels, temperature, humidity, and susceptibility to wind disruption. Destruction and alteration of habitat due to forest fragmentation is the most significant single threat to biological diversity worldwide (Mullu et al. 2016). It caused a loss in

Cypripedium calceolus population (Orchidaceae) in the Adamello-Brenta Natural Park, North Italy (Perazza and Decarli 2020), increased in mortality of large trees (Bulafu et al. 2013), and high degradation of the population tree structure and regeneration (Gebeyehu et al. 2019).

Some birds are sensitive to increased wind, sunlight intensity, and air temperature to avoid nesting in an edge habitat (Laurance et al. 2011). A shift in bird species may occur due to environmental change in forest habitat, which may jeopardize the balance of avifauna communities and increase their vulnerability (Simanov and Matantseva 2020). Forest fringe can be the significant factor contributing to the reduced distribution and abundance of wildlife species attributed to proximity to the road that increased the risk of mortality due to roadkill and other anthropogenic pressure (Mohd-Azlan et al. 2020). There is an increase of human-bear conflict in the areas within a three-kilometer buffer between forest edge and settlements (Letro et al. 2020).

Fragmentation consequentially causes the creation of fringe or edge habitats. Forest fringe or forest edge is 100 m from the edge towards the interior of a fragmented forest (Aragón et al. 2015). This form of the belt up to 100 m in width bordering the fragmented forest with open vegetation outside forest fragments results in distinct microclimate differences compared with the core or interior forest. Altered microclimatic conditions may benefit invasive, pioneer, and weedy species (Mullu 2016).

Alien plants can be host to pests and diseases transmitted to forest fragments, affecting the survival of