

# Tree stand floristic dynamics in secondary forests of different ages in Sarawak, Malaysia

KARYATI<sup>1</sup>✉, ISA B. IPOR<sup>2</sup>, ISMAIL JUSOH<sup>2</sup>, MOHD. EFFENDI WASLI<sup>2</sup>

<sup>1</sup>Faculty of Forestry, Universitas Mulawarman. Jl. Ki Hajar Dewantara, Gunung Kelua, Samarinda 75123, East Kalimantan, Indonesia.  
Tel.: +62 541 35089, Fax.: +62 541 732146, ✉email: karyati@fahatan.unmul.ac.id

<sup>2</sup>Faculty of Resource Science and Technology, Universiti Malaysia Sarawak. 94300 Kota Samarahan, Sarawak, Malaysia

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**Abstract.** Karyati, Ipor IB, Jusoh I, Wasli ME. 2018. Tree stand floristic dynamics in secondary forests of different ages in Sarawak, Malaysia. *Biodiversitas* 19: 767-773. Succession is a series sequential processes of the development of floristic community which involves changes in community structure, species composition and diversity over time. The information on tree stand floristic dynamics of various stages of succession in secondary forests in Malaysia is currently lacking. This study was conducted to determine tree stand structure, floristic composition, and species diversity in various stages of secondary forest development in the study areas. A total of 997, 1,842, and 834 tree stems with diameter at breast height (DBH) of  $\geq 5$  cm were recorded in one-hectare-plots of 5, 10, and 20 year old secondary forests, respectively. The ten most common species in 5 and 10 year old of secondary forests consisted mostly of light demanding species. In the 20 year old secondary forest, these species did not exist. *Macaranga gigantea* was the most dominant tree species in the 5 and 10 year old secondary forests in terms of basal area and volume per hectare. The most common species, based on density, basal area, volume, and Importance Value Index (IVI), in the 20 year old secondary forest was *Adinandra dumosa*. The diversity and richness indices of the 10 year old secondary forest were the highest among all study sites.

**Keywords:** Floristic composition, diversity, secondary forest, vegetation structure, succession

**Abbreviations:** DBH: Diameter at Breast Height; BA: Basal Area; V: volume; *H'*: Shannon-Wiener's diversity index; *D*<sub>s</sub>: Simpson's dominance index; *J'*: Pielou's evenness index; *R*: Margalef's richness index; ISS: Sørensen similarity index

## INTRODUCTION

The primary forests of Sarawak are shrinking due to the combination of logging and shifting cultivation. They are replaced by secondary forests with lower stature and altered species composition (Primack and Hall 1992; Jomo et al. 2004). Human disturbances bring negative effects to forest and cause lower species diversity and simplified community structure (Dianpei et al. 2004). Following field abandonment, secondary forest develops naturally (Van Do et al. 2010). Secondary forests are identified by their structure and extent of vegetative cover, as well as their composition in terms of dominant and secondary species (Mittelman 2001; Van Breugel et al. 2006). Without additional disturbances, secondary forests will undergo succession and develop into forests with structure similar to that of the original forests (Kartawinata et al. 2001). The dynamics at several temporal periods of forest disturbances determine plant diversity within a regenerating fallow (Lawrence 2004). Brearley et al. (2004) stated that fifty-five years of succession is insufficient for the recovery of the most primary forest species. The secondary forests are especially vital in conserving biodiversity because they provide the last remaining corridors (Mittelman 2001). Karyati et al. (2013) reported that plant seedlings and saplings in 3 and 5 year old secondary forests in Sabal area of Sarawak were dominated by light demanding and fast growing species, such as *Melastoma malabathricum* L.,

*Ploiarium alternifolium* Melchior, and *Ficus aurata* Miq. as well as *Dillenia* spp. and *Macaranga* spp. *Dillenia suffruticosa* Martelli was also a common species in both 10 and 20 year old secondary forests.

Information on the capability of abandoned land after forest disturbance in providing ecological functions is vital in order to ease the pressure on the natural forest ecosystem as an ecotone for balancing the tropical forest ecosystem. Many studies had been done on the floristic composition and stand structure of the tropical forest in Borneo Island, but few similar studies have been done in various stages of secondary forests in Sarawak.

This study was conducted in order to determine the community structure, floristic composition, and species diversity of tree stand in secondary forests of different ages during early secondary succession process at abandoned lands.

## MATERIALS AND METHODS

### Study sites

The study was carried out in three stages of fallows (period of abandonment), namely 5 year old, 10 year old, and 20 year old secondary forests in Sabal, Sri Aman, Sarawak, East Malaysia (Figure 1). The geographic locations of these sites are 01°04'43.3"N 110°59'02.0"E, 01°03'55.9"N 110°55'51.4"E, and 01°03'59.3"N