Diversity, dominancy and density of Tree Stage Plants of Sriwijaya University Forest Area Indralaya

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Abstract. There have been various environmental changes that have occurred within the Unsri campus area. After more than 30 years due to various factors such as the existence of human intervention activities has made swamp area narrow and will have an impact on changing diversity especially swamp edge tree vegetation in the Unsri campus area, it is necessary to conducted research that aimed to know diversity, dominancy and density of tree stage plants at Sriwijaya University campus area forest. Eight plots (10x10 m²) had been made and all the trees with more than 10 cm diameter were counted. Simpson formula of dominancy and diversity were used and found index of dominancy 0.65 and diversity index is 0.35. Furthermore, density of trees is 31/800 m squares. Low index of diversity is caused by poor of species (two species Acacia mangium dan Melaleuca cajuputi).

1. Introduction

In responding to various developments in environmental problems it is necessary to design various programs for assessing and managing an area. The area of the Campus Sriwijaya University of Inderalaya (Unsri) with an area of around 712 hectares is located 38 km from Palembang and is at altitude of 5 m above sea level. this includes lowland areas consisting of terrestrial areas and swamp areas that represent the characteristics of wetlands [1].

From the results of the study of the environmental impact of Unsri the new campus in the Indralaya, OKI. By the Center for Environmental Studies Unsri in 1981 the vegetation was dominated by Melaleuca sp., Fagraea sp., Tristania sp., and Schima sp. and there is no information found on the type of Acacia mangium [2].

There have been various environmental changes that have occurred within the campus Unsri area after more than 30 years due to various factors such as the existence of human intervention activities, opening new land for oil palm plantations, experimental land, building construction has made swamp area narrow and will have an impact on changing diversity especially swamp edge tree vegetation in the Unsri campus area, changes in association from Melalueca sp. to Acacia sp. For this reason, it is necessary to conducted research that aims to determine the diversity, dominance and density of tree-level plants in the swamp forest of the campus area of Sriwijaya University.

2. Methods

The research has been carried out from August 2018 and located research on the edge vegetation in the swamp area of Firdaus Park Sriwijaya University. Collecting data was by direct observation with procedures which survey made first and eight plots with 10 x 10 m size were placed systematically at roadside in Firdaus Park, about 200 m from water body. The plots are made with transect lines and all trees are measured at breast height (DBH). Trees means all plants with breasts as high as more than 10 cm. List of species with the number made later. Diversity index was obtained by parameters of species...
richness and proportion of abundance of each species in a habitat are calculated formula in Krebs [3]. The formula used is equation (1). The criteria for diversity index is if the value of $H' > 3$ then species diversity is high or abundant, if the value of $1 \leq H' \leq 3$ then species diversity is moderate and if the value of $H' < 1$ then species diversity is small or low [4]. The Dominance index formula refers to the Simpson dominance index with criteria $(C < 0.5)$: no type dominates and $(C \geq 0.5)$: there are types that dominate [5]. The formula used in equation (2) and density is the number of individuals of a species divided by the area of the whole plot.

$$H' = \sum Pt \ln Pt$$

$$C = \sum (n_i/N)^2$$

Figure 1. Research Location in Sriwijaya University Inderalaya (S : 03°13'44,8" and E ;104°39'09,5")

3. Results and Discussion
From the results of the research that has been done, the results are as follows:

| Parameter of Observation | Value   | Category   |
|--------------------------|---------|------------|
| Diversity Index          | 0.35    | Low$^{(a)}$|
| Dominance Index          | 0.65    | High$^{(b)}$|
| Density                  | 31/800 m squares | -         |

$^{(a)}$Notes are category diversity index by Fachrul
$^{(b)}$Category Dominance index by Odum

Trees diversity index in located in the vegetation in the swamp area of Sriwijaya University, is low, 0.35 because of species number of trees is two only (Melaleuca cajuputi and Acacia mangium), and dominancy index quite high, 0.65, because of Acacia mangium trees number so high in location research with density 31/800 m squares area. From the results of research by Marisa and Estuningsih
regarding the types of plants in the Sriwijaya University campus Indralaya, there was 46 species belong to 22 family, and no *Acacia mangium*, after 26 years from the research the area of the study was dominated by *Acacia mangium*. This is caused *Acacia mangium* is a type of legum that grows fast, does not require high growth requirements.

*Acacia mangium* is one of the most commonly used fast-growing tree species in plantation development programs in Asia and the Pacific. The advantages of this type are rapid tree growth, and its tolerance ability to various types of soil and environment [6]. *Acacia mangium* can adapted well to various types of soil and environmental conditions. *A. mangium* can grow rapidly in locations with low soil nutrient levels, even in acidic soils and this species grows well in laterite soils, namely soils with high iron oxide and aluminium [7]. This type is a type of pioneer that can regenerate naturally in a disturbed location. Gunn and Midgley [8] reported that *Acacia mangium* grew abundantly in forest forests after disturbances, along roads and traces of shifting cultivation in Indonesia and Papua New Guinea.

*Acacia mangium* is a species from the humid tropical lowland zone. This type can tolerate pH levels between 4.5 and 6.5, at the mangrove area, in swamp forests, shared rivers and in the lowlands that are often found in the Aru Islands, Irian Jaya, Seram, Sula Islands Indonesia; Papua New Guinea Province; and northeast Queensland, Australia. Sometimes this species is also found predominantly in primary and secondary forests, grasslands, savanna forests, on floodplains that are always inundated and along mangrove forests, which are sometimes also with *Melaleuca* and *Rhizophora* species [9].

If we look at the measurement of soil pH in the study area ranging from 5 to 5.5, it means that the soil conditions sufficient to support the growth of *Acacia mangium*. Gelam (*Melaleuca cajuputi*) are found in peat swamp forests are affected by the tidal ebb and flow. This type of fire climax classified as pioneer species, which after forest fires will only increase seed germination, because fire can clean up litter and dormant seeds of other plant species which become competitors [10].

4. Conclusions
There is a change in the pattern of tree stands around the swamp area of Firdaus Park Sriwijaya University Indralaya, namely changes in association from *Melaleuca* sp. to *Acacia* sp. especially *Acacia mangium*.

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