The Potency of Ulin (*Eusideroxylon zwageri* T. et. B) for Supporting Banjarese Building Construction in “Wetland Architecture”

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ABSTRACT

Environmental condition of around rivers and swamps causes the Banjarese people to build settlements use ulin (*Eusideroxylon zwageri* T. et. B.). Using ulin has become their culture, because they believe the building will be stronger. In fact the potential ulin from year to year continues to decline, because the growth is not proportional to the speed of ulin needs for construction, thus it is becoming scarce. This research was conducted in Kabupaten Tanah Laut and Kabupaten Kotabaru. The method used survey with purposive sampling (large of sample plot 100 m x 100 m which each plot divided into 25 sub-plots of 20 m x 20 m). All growth stages of ulin were inventoried and in each plot found ulin measured micro climate and collected sample of soil. Normally ulin can grow well on un-fertile soil, but micro climate like primary forest or old secondary forest. Potential ulin in both Kabupaten per hectare is very low. The amount of natural regenerations ranged from 3-5 individuals/ha for seedling and 3-46 individuals/ha for sapling. Number of poles found in both locations are ranged 5 – 6 individuals/ha, and not found tree stage. Restrictions on harvesting and conservation of ulin are urgently needed in South Kalimantan.

Keywords: ulin, wetland, potency, Banjarese building, construction

INTRODUCTION

Ironwood (*Eusideroxylon zwageri* T. et. B.) is locally known as ulin, belian, or tembelian. This heaviest and most durable native species known as Indonesian ironwood, have been used since hundred of years by community around the forest for various purposes such as wooden roof known as “siraf”, doors, floors, frames of doors and windows, bridges, platform for small harbor, and ornaments in front of a house.

Since past time, all Banjarese activities depend on river even to this day. One of prominent is the dependence of economic activities such as trade, livelihoods, and transportation. Environmental condition or habitat of the rivers and swamp have been shaped the culture of Banjarese and known as the river-culture community. For this reason, all elements of Banjarese culture can be traced the with relation to the river environment (Muchamad and Mentayani, 2010).

Physically, the wetland environment affects the system of building construction. The effects of wetland environment on the building can be seen in some parts of the house of Banjarese in the “wetland architecture” (Muchamad and Mentayani, 2010). The contruction of the foundation of Banjarese houses, especially the high ridge house, is a form of physical culture of people living within the wetland (swamp). For a lighter weight of building, kacapuri foundation system is used. This system uses a smaller block of wood, generally ironwood (ulin), because this wood is very strength and high durability. For wall construction and roof are made of ironwood as well.

In order to keep the sustainable of ulin, the Government of Indonesia prohibits large forest concession holders to cut this particular species and only local people are given permission to cut the trees with diameter more than 60 cm. However due to lack of control and high demand of local market and export, many trees below allowable diameter were still cut. At present, the potency and distribution of ulin is alarmingly getting lesser (Effendi, 2004). Due to very slow growth, at

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present, no investor is interested in establishing large scale ulin plantation even though the price is as high as Rp. 1,000,000,- (US\$ 1,200) per m³ at local market.

The objective of this study is to obtain data and information on ulin natural regeneration, potency, and structure composition of stand around ulin in South Kalimantan. This study can become information the real condition of ulin in field, especially in South Kalimantan.

MATERIALS AND METHODS

The locations of study are Kintap, Tanah Laut District and Serongga, Kotabaru District, South Kalimantan. Ulin grows naturally in both locations where included in lowland old secondary forest. The topography of the areas is undulating and hilly. Ulin can grow naturally at an altitude of up to 400 m above sea level (Heyne, 1987).

A plot at KPTH Kintap tropical forest measuring 1 ha (100 m x 100 m) was divided into 25 sub-plots (20 m x 20 m each). The same number and size of plots was established in Serongga tropical production forest. The totals of plots are 2 plots or 50 sub-plots. The slope of plot 1 is relatively flat and plot is 2 of 18%.

In both plots are mapped the distribution of regenerations and mature trees of ulin as well.

To describe the real habitat of ulin the micro climate was measured in the plots. To know the fertility of soil for each plot, soil chemical analysis was done.

RESULTS

Description of ulin habitat.Based on soil analysis, the soil pH under ulin trees is considered as acidic with pH ranged from 4.25-4.31 (H₂O). The content of organic matter is 0.55-1.19%. Based on USDA classification, the soil texture belong to dusty clay loam (DCL). Result of research in East Kalimantan that ulin grows at the pH 5.2-5.8 and organic matter content ranged from 1.83-3.21%, respectively (Effendi, 2004), meanwhile ulin grows in soil having sandy loam texture with low soil fertility in South Sumatra (Nugroho et al., 2006).

Result of measured of micro climate under the forest stands, the regeneration of ulin found with temperature of 27.12°C – 31.00°C, humidity of 66.43%-83.76%, and light intensity of 323,95 – 1767,43 lux or 3.24%-8.84%. In East Kalimantan regeneration of ulin found at temperature of 27,1-29,9°C, humidity 69,2-95,3%, and light intensity 321,0-737,3 lux (Sidiyasa, 2011). These results show that regeneration of ulin need shading for life.

Normally, the natural regenerations were found under tree crown projection. Ulin is included as gap opportunist species, meaning that the young regenerations need shading and the mature trees of ulin need enough light for life.

Table 1. Measurement of micro climate where ulin regeneration was found

Location	Temperature (°C)	Humidity (%)	Light Intensity (lux)	Light Intensity (%)
Kintab	27,12	83,76	323,95	3,24
Kotabaru	31,00	66,43	1767,43	8,84

Table 2. Number of individuals of ulin in each growth stage at Kintap and Serongga plots

Growth Stage	Kintap (Tanah Laut Regency)		Serongga (Kotabaru Regency)	
	Plot 1 Number of individual (n/ha)	Plot 2 Number of individual (n/ha)	Plot 1 Number of individual (n/ha)	Plot 2 Number of individual (n/ha)
Seedling	4	-	5	3
Sapling	46	24	19	3
Pole	5	6	5	-
Tree	-	-	-	-

Information: Kintap; plot1: slope of 0-5% , plot2: slope of 18.15%, Serongga; plot1 and plot2: slope of 0-5%

Table 3. Volume of ulin for pole stage and tree stage

Location	Volume of pole (m ³)	Volume of pole (m ³)	Volume of tree (m ³)	Volume of tree (m ³)
	Plot 1	Plot 2	Plot 1	Plot 2
Kintap (Tanah Laut Regency)	1,62	0,71	nf	Nf
Serongga (Kotabaru Regency)	0,21	0,56	0,99	nf

nf: not found

Table 3 shows that the potency of ulin is very low and ranged from 0.21 m³ to 1.62 m³ per hectare of pole stage and 0.99 m³ per hectare of tree stage. Most of stumps found in both location is with diameter below 60 cm. The potency and population of ulin decreased significantly because illegal logging activities are still common in these locations.

Increase demand of ulin wood for various purposes has resulted in tree felling in natural

forest without considering its sustainability. Felling of ulin was conducted not only in production forest but also in protected forest. Although some regulation concerning the prohibition of logging ulin has been made by both central and local government, ulin illegal logging is still continuing.

Implication to Building Construction.

Environmental condition of rivers and swamps causes problem for Banjarese who want to build settlement. The construction materials entirely use local materials that can overcome the problems caused by water, so they use ulin and galam as an option on the potential local wood (Muchamad & Mentayani, 2010). But increase the demand of ulin for building settlement is not balance with growth rate of ulin and low of awareness of local people to fell based on limit diameter (> 60 cm). Some policies should be made by both the central and local government for the sustainability of ulin.

Figure 1. Diameter distribution of ulin di Kotabaru District

Until present day that is very difficult to find log of ulin on limit diameter (> 60 cm). Result of survey from Faculty of Forestry Unlam at tropical production forest (135 ha) in Kotabaru district shows that ulin with limit diameter of 60 cm – 70 cm found only 5 individuals. Potential stands of ironwood in the logged forest is quite small with an average of 1 tree / ha for the class of diameter > 60 cm and 2 trees / ha for >50 cm diameter classes. For the 10-30 cm diameter class is

average of 4 trees / ha and diameter classes > 30 cm averaged 3.4 trees /ha. The average of increment for ulin is ranged from 0.19 to 0.27 cm / year and volume increment between 0,146 to 0,523 m³/ha (Wahjono & Imanuddin, 2011).

Total of needs for the entire sawmill industry in South Kalimantan average 50,20 m annually. Raw material of ulin that still exists today is estimated to come from East Kalimantan and Central Kalimantan, because

the areas of tropical forest in both provinces are larger than South Kalimantan but geographically closest.

DISCUSSION

Result of research shows the population of ulin keep decreasing. The amount of natural regeneration ranged from 3-5 individuals/ha for seedlings and 3-46 individuals/ha for sapling. The natural regeneration for ulin is very low, because it is often lose the competition with other vegetations or very close of crown shading projection. According of Sidiyasa et. al. (2009), low of regenerations is caused by attacking of pests (especially squirrels and raccoons) that eat the young seeds. In East Kalimantan, many of fallen fruit were eaten by porcupine while the other got rotten due to diseases and fungi (Effendi, 2004).

The natural regeneration of a species is very important for its sustainability especially its quantity, quality, and distribution. Lack of natural regenerations is increasing scarcity of ulin. According to the Directorate General of Forest SK No.200/Kpts-IV/1994, the number of individual of seedlings in order to maintain the sustainability of potential stand a minimum of 1000 stems / ha and for the sapling stage is 240 stems / ha.

The pole stage of ulin is very rarely found in both locations. Number of poles found in both locations are ranged 5 – 6 individuals/ha, and both locations were not found tree stage of ulin. According to Sidiyasa (2009), pole stage of ulin at several locations in Kalimantan were about 41-65 individuals/ha.

CONCLUSIONS

1. Banjarese people in South Kalimantan need ulin (ironwood) to build a house and has become a culture especially those residing in the wetlands, but the potential ironwood till today is very low, so it is necessary to substitute alternative wood.
2. Technical management to preserve and cultivate ulin is needed to avoid extinction.

3. Commitment from all stakeholders (government, employers, and community) to preserve ironwood, and strengthened low enforcement for illegal loggers are needed.

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