GROWTH PERFORMANCE OF PLANTED Shorea roxburghii IN DEGRADED AREA AT AYER HITAM FOREST RESERVE, SELANGOR

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By

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ABSTRACT

The enrichment planting has been found to be an effective technique for rehabilitation of forest. However, not many species are able to withstand adverse weather condition at the planting area and information on growth performance of *Shorea roxburghii* planted under different canopy is still lacking. This study was carried out on a degraded area at Ayer Hitam Forest Reserve, Puchong Selangor to evaluate the growth performance and survival rate of *S. roxburghii* under different shadings. The line planting technique was applied with planting distance of 2 m × 2 m both in Plot A (Open area) and Plot B (Shaded area). The studies showed that *S. roxburghii* recorded the higher survival percentage in Plot A compared to Plot B. For diameter increment, trees in Plot A recorded bigger diameter increment at 1.80 mm compared to trees in Plot B (1.10 mm) for the seven month period. In term of height increment, Plot A showed a larger value (9.00 cm) than height increment in Plot B. There was no significant difference ($p>0.05$) in height and diameter increment between Plots A and B. The study showed that *S. roxburghii* recorded better growth performance under open area and the species can be considered as a species to be applied in enrichment planting in degraded areas. Rehabilitation or enrichment planting helps to restore the productivity of planted forest in terms of biological parameters.

ABSTRAK

Penanaman pengayaan telah didapati teknik yang sangat berkesan untuk pemulihan hutan. Walau bagaimanapun, tidak banyak spesis yang mampu menahan keadaan cuaca yang buruk di kawasan yang ditanam, dan maklumat tentang prestasi pertumbuhan *Shorea roxburghii* yang ditanam di bawah kanopi yang berlainan masih kurang. Kajian ini dijalankan di kawasan terdegradasi di Hutan Simpan Ayer Hitam, Puchong Selangor untuk menilai prestasi pertumbuhan dan kadar kemandirian *S. roxburghii* di bawah teduhan yang berbeza. Teknik penanaman garis telah digunakan dengan jarak penanaman 2 m × 2 m di Plot A (kawasan terbuka) dan Plot B (Kawasan tertutup). Kajian menunjukkan bahawa *S. roxburghii* mencatatkan peratusan kelangsungan hidup yang lebih tinggi di Plot A berbanding Plot B. Untuk penambahan diameter, pokok-pokok di Plot A mencatatkan peningkatan diameter lebih besar pada 1.80 mm berbanding dengan pokok-pokok di Plot B (1.10 mm) sepanjang tempoh tujuh bulan. Dari segi kenaikan ketinggian, Plot A telah menunjukkan nilai yang lebih besar (9.00 cm) daripada kenaikan ketinggian dalam Plot B.Tiada perbezaan ketara ($p > 0.05$) pada peningkatan ketinggian dan diameter antara Plot A dan B. Kajian menunjukkan bahawa, *S. roxburghii* mencatatkan prestasi pertumbuhan yang lebih baik di kawasan terbuka, dan spesies ini boleh dianggap sebagai spesies yang akan digunakan dalam penanaman pengayaan di kawasan yang terdegradasi. Penanaman pemulihan atau pengayaan membantu memulihkan produktiviti hutan ditanam dari segi parameter biologi.

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APPROVAL SHEET

I certify that this research project entitled “Growth performance of planted *Shorea roxburghii* in degraded area at Ayer Hitam Forest Reserve, Selangor” by Nor Aznida Binti Darus has been examined and approved as a partial fulfillment of the requirements for the degree of Bachelor of Forestry Science in the Faculty of Forestry, Universiti Putra Malaysia.

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INTRODUCTION

1.1 General

Ayer Hitam Forest Reserve (AHFR) is one of the three remaining lowland dipterocarp forests in the Klang Valley and surrounded by residential area as well as other economic development which has made it isolated from other neighbouring forests. AHFR was gazetted as a Forest Reserve in 1906 with an area of 4270.7 hectares comprising 22 compartments. However, since the 1980's AHFR had been reduced to 1248 ha with only six compartments remaining, namely Compartments 1, 2, 12, 13, 14 and 15. Almost 70% reduction of the initial total area of AHFR was mainly for agriculture, residential areas and new townships. The last logging activities in this forest took place in 1954. The floristic data for AHFR was well documented by Faridah-Hanum *et al.* (2001) and Faridah-Hanum & Philip (2006).

This forest has served as a last bastion for the conservation of the indigenous fauna and flora. AHFR is recovering but slowly and has good regeneration potential. Now, several rehabilitation activities have been undertaken as an extension of the harvesting activities for the purpose of improving the functions of the forest resources. Enrichment planting is one of effective methods in rehabilitating or reforesting degraded tropical forest, especially with the use of indigenous tree species that provide benefits such as timber, food and medical products in the Southeast Asia (Appanah & Weinland, 1993).

Indigenous tree species are expected to produce high-value timber, which are important for commercial products and local consumption. Styger *et al*. (1999) have shown that the slower growth rates of indigenous plant species can support their adaptation to the local environmental conditions and thus be beneficial to further plant succession. Although many experiments have been conducted to develop suitable enrichment planting techniques in the area, the rate of growth and survival of planted seedlings significantly differed among the species even in the same taxonomic group. Moreover, light conditions which strongly influences plant growth performance and adaptation, in the target degraded forest is highly variable.

These results indicate that to improve enrichment planting, species-specific ecological traits, especially adaptation and growth performance for light condition need to be considered. In general, most of the reforestation efforts with indigenous tree species have been carried out using the four planting techniques which is open planting, planting with nurse tree, under shaded planting and line planting. For tropical rain forest species, partial shade has been shown to be the best growth environment, albeit inter-species differences in shade responses (Ashton 1995; Tennakoon *et al*. 2005)

Light is an absolute requirement for plant growth and development. However, different plants have optimum requirements and both deficient and excessive light intensities and injurious. It is necessary to consider specific species favourable light condition effective enrichment planting in secondary forest. However, various light condition from strong light condition in large canopy

gaps to dark under canopy conditions usually exist in degraded tropical secondary forest (Whitemore, 1998).

Moreover, the response to light environment differs significantly between species and little information is available about growth responses to the light condition in degraded secondary forest (Kenzo *et al*., 2007). The amount of light the plant receives will drastically affect its growth cycle, as it is being deprived of the ingredients necessary to feed it. Some plants required more light to continue to grow and stay healthy. Some plants even require a varied period of shade or darkness in order to finish their development. They required a length of darkness for their blooms to develop into large spectacular visions. Luckily, most plants and shrubs that we buy today come with labels that tell us the best growing conditions and amount of light they required.

1.2 Problem Statement

Planting of indigenous trees is considered to be an effective rehabilitation method for such degraded tropical rain forests. These tree species provide benefits such as timber, food and medical products. Environmental characteristics such as microclimate and light conditions play essential roles in the ecosystems of tropical rain forests and are also important for the performance of planted seedlings in the field. Strong direct sunlight cause high mortality in seedlings, sometimes ending in the failure of reforestation in tropical areas.

The indigenous tree species of the *S. roxburghii* has been choosing for enrichment planting in forest rehabilitation. This study will assess the growth performance of *Shorea roxburghii* which has been planted under different light condition.

1.3 Objective

The objective of this study is to examine the growth performance of *Shorea roxburghii* under different light condition.

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