



***GROWTH PERFORMANCE OF Shorea leprosula AND Hopea odorata IN
DEGRADED LOWLAND AREAS, EIGHT YEARS AFTER PLANTING AT
AYER HITAM FOREST RESERVE***

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By

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ABSTRACT

Rehabilitating riparian buffer is a key to restoring natural stream functions and aquatic habitats. However, studies in this area are still lacking, especially in forest recovery and rehabilitation. Therefore, a study was carried out to evaluate the growth performance of two indigenous species namely *Shorea leprosula* and *Hopea odorata*. The line planting technique was employed with a planting distance of 2 m × 2 m. The survival rate percentage and growth performance (diameter and height) were analyzed. The results showed that *S. leprosula* and *H. odorata* recorded a high survival rate of 100% (*S. leprosula*) and 95% (*H. odorata*). For diameter increment, *S. leprosula* recorded bigger absolute growth rate of diameter increment at 0.9 mm than *H. odorata* (0.7mm). In term of height increment, *S. leprosula* attained higher absolute growth rate of height increment with 6.0 cm than *H. odorata* (4.0 cm). Based on the Independent-sample t-test conducted, the results for both species were not significantly different. This study indicated that both *S. leprosula* and *H. odorata* can be planted in lowland areas which are close to riparian zone for rehabilitation purpose based on their survival rate.

ABSTRAK

Pemuliharaan kawasan riparian adalah untuk memulihkan fungsi aliran semulajadi dan habitat akuatik. Walau bagaimanapun, kajian mengenai kawasan ini masih kurang, terutamanya dalam membaik pulih hutan dan pemuliharaan. Oleh itu, kajian telah dijalankan untuk menilai prestasi pertumbuhan dua spesies asli iaitu *Shorea leprosula* dan *Hopea odorata*. Teknik garis penanaman digunakan adalah dengan jarak tanam 2 m × 2 m. Peratusan kadar kemandirian hidup dan prestasi pertumbuhan (ukur lilit dan tinggi) dianalisis. Keputusan menunjukkan bahawa *S. leprosula* dan *H. odorata* mempunyai kadar kemandirian hidup yang tinggi iaitu 100% (*S. leprosula*) dan 95% (*H. odorata*). Untuk peningkatan diameter, *S. leprosula* mencatatkan kenaikan kadar pertumbuhan diameter mutlak yang lebih tinggi pada 0.9 mm daripada *H. odorata* (0.7 mm). Sementara itu, dari segi peningkatan ketinggian, *S. leprosula* mencapai peningkatan kadar pertumbuhan tinggi mutlak yang lebih tinggi pada 6.0 cm daripada *H. odorata* (4.0 cm). Berdasarkan Teknik Uji-T Sampel Bebas yang dijalankan, keputusan bagi kedua-dua spesies adalah tidak signifikan. Kajian ini menunjukkan bahawa *S. leprosula* dan *H. odorata* boleh ditanam di kawasan-kawasan tanah rendah yang berdekatan dengan zon riparian untuk tujuan pemulihan berdasarkan kepada kadar kemandirian hidup mereka.

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APPROVAL SHEET

I certify that this research project entitled “Growth performance of *Shorea leprosula* and *Hopea odorata* in degraded lowland areas, eight years after planting at Ayer Hitam Forest Reserve” by Husna Izzati binti Hasanuddin 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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CHAPTER ONE

INTRODUCTION

1.1 Background of Study

The greatest single cause of deforestation is the clearance of land for agriculture, which is proceeding most rapidly in countries with the highest biodiversity (Balmford & Long, 1994). Enrichment planting is one of the effective methods for 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 Southeast Asia.

In the forest of Malaysia, there are some hilly areas have been protected as water catchment areas. However, the natural forest of the riparian zones in tropical rainforest, especially in Malaysia is having a significant environmental damage caused by the oil palm plantation sector. Malaysia is known as the second largest oil-palm producer in the world which is along the economic prosperity this palm oil sector brings to the country. One of the most prevalent among them is the destruction of riparian zones, where the planting of the oil palm trees often stray all the way up to the river bank (Zainudin *et al.*, 2013). In Malaysia, a desk study has revealed a range of width riparian areas from as little as 15 m to as wide as 100 m or more depending on the intended function (NAHRIM, 2010). Both manuals maintain that riparian corridors should be managed by retention of existing plants or replanting if disturbed with appropriate native species. Replanting of the trees is most important to the degradation riparian areas.

Rehabilitating riparian buffers is keys to restoring natural stream functions and aquatic habitats. When riparian corridors are properly managed, they make substantial and positive contributions to clean water, as well as to ecosystems and human health (Mah & Bustami, 2012). After too much logging areas, most of the timber harvesting activity is occurs in the hill and lowland forest and the riparian zones in production forest in Malaysia are legally protected.

1.2 Background of Ayer Hitam Forest Reserve

Ayer Hitam Forest Reserve is the important support facility for education, research and extension. It is benefits for UPM students especially students that studies in forestry, environment, zoology and botany. AHFR is originally about 3500 hectares in the area of Puchong, Selangor which connected nearer to Kuala Lumpur city. However, the AHFR was selectively logged several times (1936-1965). Many areas in AHFR have been disturbed also include the stream areas. Currently, the total forest area is 1176.1 ha which includes compartments 1, 2, 12, 13, 14 and 15. There are three major rivers in AHFR which are Sg. Rasau, Sg. Bohol and Sg. Biring. The areas along the river are called riparian areas which have once affected by the logging activities. The larger mammals also disappeared and reduced in number after the reducing size of AFHR. AHFR is a logged-area forest which is in the recovery process. Rehabilitation of AHFR needs proper management practices to upgrade the environment of the forest continuously.

AHFR are shrinking and smaller. Even though many species have extinct and endangered in AHFR, there are still much beautiful flora and fauna left in AHFR. A total of 430 species of fruit trees, 127 timber species and 98 species of medical plants are reported from AHFR (Faridah-Hanum *et al.*, 2001). A total of 232 species of vertebrates including mammals, birds, reptiles, amphibians, and fishes also can be found in AHFR. Furthermore, AHFR represents the only lowland tract left within the metropolitan area of Kuala Lumpur (Faridah-Hanum & Khamis, 2004).

1.3 Problem Statement

Riparian zones are the land adjacent to streams and rivers. It has been degraded throughout much of the world (Richardson, 2007). The importance of riparian zones are in preventing erosion, protecting water quality, providing habitat and wildlife corridors, and maintaining the health of in-stream biota (Goodwin *et al.*, 1997; Richardson, 2007). Studies on riparian vegetation in other tropical forest areas are quite common such as in India (Sunil *et al.*, 2010), South America (Bueno *et al.*, 2012) or Africa (Sambare *et al.*, 2011) but very few in South East Asia, particularly in Malaysia. Therefore, this study in the lowland area which is close to the riparian area was carried out to investigate the successful and the improvement of the rehabilitation on the lowland-riparian area. This study was carried out to determine growth performance of *S. leprosula* and *H. odorata* in degraded lowland areas at Ayer Hitam Forest Reserve, which are *S. leprosula* and *H. odorata*. This study also aims to correlate the environmental factors with the potential of the species growth on lowland site.

1.4 Objective

The aim of this study was to evaluate the growth performance of indigenous species (*Hopea odorata* and *Shorea leprosula*) in degraded lowland areas, eight years after planting.



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