

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/327107314>

Effects of Soil Compaction and Relative Light Intensity on Survival and Growth Performance of Planted *Shorea macrophylla* (de Vriese) in Riparian Forest along Kayan Ulu River, Saraw...

Article in *International Journal of Forestry Research* · August 2018

DOI: 10.1155/2018/6329295

CITATION

1

READS

48

4 authors:



Aina Nadia Najwa Mohamad Jaffar

University Malaysia Sarawak

3 PUBLICATIONS 2 CITATIONS

[SEE PROFILE](#)



Mohd Effendi Wasli

University Malaysia Sarawak

37 PUBLICATIONS 189 CITATIONS

[SEE PROFILE](#)



Mugunthan Perumal

University Malaysia Sarawak

21 PUBLICATIONS 26 CITATIONS

[SEE PROFILE](#)



Hamsawi Sani

University Malaysia Sarawak

10 PUBLICATIONS 37 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Limestone Restoration Ecology [View project](#)



Ecological Study on Soil Dynamics and Tree Growth Performance of Indigenous Species under Rehabilitation in Sarawak, Malaysia [View project](#)

Research Article

Effects of Soil Compaction and Relative Light Intensity on Survival and Growth Performance of Planted *Shorea macrophylla* (de Vriese) in Riparian Forest along Kayan Ulu River, Sarawak, Malaysia

Aina Nadia Najwa Mohamad Jaffar ¹, Mohd Effendi Wasli,¹ Mugunthan Perumal ¹, Jonathan Lat,² and Hamsawi Sani¹

¹Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia

²Forest Department of Sarawak, Wisma Sumber Alam Petra Jaya, 93660 Kuching, Sarawak, Malaysia

Correspondence should be addressed to Aina Nadia Najwa Mohamad Jaffar; ainanadianajwamj94@gmail.com

Received 12 January 2018; Revised 5 July 2018; Accepted 29 July 2018; Published 19 August 2018

Academic Editor: Qing-Lai Dang

Copyright © 2018 Aina Nadia Najwa Mohamad Jaffar et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

A study was conducted in riparian forest along Kayan Ulu River, Sarawak, Malaysia, to investigate the effects of soil compaction and relative light intensity (RLI) on survival and growth performance of planted *Shorea macrophylla*. The study sites were stands reforested in different years (1996: SPD96; 1997: SPD97; 1998: SPD98; 1999: SPD99). The survival, growth performance, soil compaction, and RLI were measured. SPD96 trees had the highest survival (84%) and showed the most favourable growth. Average height, mean annual increment in height, and RLI were highest in SPD97 while mean annual increment in volume was highest in SPD98. Soil compaction in SPD98 and SPD99 was higher as compared to SPD96 and SPD97. This was due to the compacted soils caused by anthropogenic activities and natural causes (wet soils) in riparian forest along Kayan Ulu River at shallow depth. High survival and favourable growth performance of *S. macrophylla* were influenced by the edaphic factor with special reference to less compacted soils and high RLI. Stepwise multiple regression demonstrated significant effects of soil penetration resistance at the depth of 0-30 cm and RLI on mean annual increment in diameter. Further ecological studies on other environmental factors should be implemented to draw up a Dipterocarp planting scheme for the future restoration of riparian ecosystem.

1. Introduction

Southeast Asia's tropical rainforest which includes a portion of Borneo Island is considered as one of the world's biodiversity hotspots [1]. However, the richness of species in the tropical rainforest is undergoing disturbance due to the overexploitation of forest resources for various land uses such as shifting cultivation, conversion for lands to agriculture, illegal logging activities, and clearance of forest area for development purposes. Collectively these extinction instances of endangered species, disruption in the carbon cycle which might lead to global climate change, expansion of degraded lands, and reduction of soil productivity may negatively affect the ecological health of the tropical forest [2].

Considering such a situation, it is crucial to conserve forest resources in a sustainable manner [3]. Efforts such as reforestation program by enrichment planting in the State of Sarawak, Malaysia, have been established by the Forest Department of Sarawak in collaboration with the international non-governmental organizations (NGOs) from Japan. Reforestation via plantation forestry through the planting of high-quality indigenous species such as Dipterocarps is considered as one of the ways to recover the original forest ecosystem [4]. The success of reforestation depends largely on factors such as soil conditions in the area, optimum sunlight exposure, water quality, and regulation of climate. Enrichment planting is the most common technique used on degraded forests without eliminating the existing valuable