EFFECTS OF FERTILIZERS ON GROWTH PERFORMANCE OF Aquilaria malaccensis AT AYER HITAM FOREST RESERVE, SELANGOR

NATASYA AMIRA AMIRUDIN

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EFFECTS OF FERTILIZERS ON GROWTH PERFORMANCE OF *Aquilaria malaccensis* AT AYER HITAM FOREST RESERVE, SELANGOR

By

NATASYA AMIRA AMIRUDIN

A Project Report Submitted in Partial Fulfillment of Requirements for the Degree of Bachelor of Forestry Science in the Faculty of Forestry Universiti Putra Malaysia

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DEDICATION

SPECIALLY AND SINCERELY DEDICATED TO

My supervisor

Assoc. Prof. Dr. Mohamad Azani Bin Alias

My beloved father and mother

Amirudin Lokman

Siti Rabiah Frans@Junaidi

My brother and sister

Azrul Nizamsya Amirudin

Naziera Syazwanie Amirudin

And to all my fellow friends and course mates of Bachelor of Forestry Science.

Thank you for your encouragement support, guidance, and advices.

May Allah bless all of us.

ABSTRACT

The planting of *Aquilaria malaccensis* has increased in Malaysia due to the value and usage of this plant. *A. malaccensis* also known as *Karas*, had lot of the benefits in term of medicine, religious usage and fragrant usage. This research was done to determine the effect of fertilizers on the growth performance of seedlings of *Aquilaria malaccensis*. This study was done at Ayer Hitam Forest Reserve, Selangor under the shade of *Acacia mangium*. In this study, NPK 15-15-15 was applied to the seedlings of one year old *A. malaccensis* at different rates of 50 g, 100 g, and 150 g, and the control was 0 g of fertilizer. The application of NPK 15-15-15 were done twice during this study. The growth parameters measured were the total height and diameters of the seedlings. Totalheight and diameter taken for six months, from October 2017 until March 2018. Results from this research showed that there were positive effects of growth performance of *A. malaccensis* from the application of NPK 15-15-15 towards the increment of total height and diameter. The results from both parameters showed that the higher rate of fertilizers which 150 g were more suitable for the growth of *A. malaccensis*. For recommendation, the study on application on different weight of fertilizer must be done to ensure either 150 g is the best rates of fertilizers or is there any rate of fertilizer are more suitable for growth of *A. malaccensis*.

ABSTRAK

Penanaman *Aquilaria malaccensis* semakin meningkat di Malaysia disebabkan ketinggan nilai dan kegunaan daripada tumbuhan ini. Spesies yang dikenali sebagai Karas mempunyai pelbagai kegunaan dalam bidang perubatan, keagamaan dan pembuatan wangian. Kajian ini dijalankan untuk melihat kesan pertumbuhan daripada aplikasi pembajaan kepada anak pokok *Aquilria malaccensis*. Kajian ini telah dijalankan di Hutan Simpan Ayer Hitam, Selangor di bawah teduhan *Acacia mangium*. Dalam kajian ini, baja NPK 15-15-15 diaplikasikan kepada pokok *A. malaccensis* yang berusia satu tahun pada kadar 50 g, 100 g dan 150 g dan plot kontrol adalah 0 g. Aplikasi baja NPK 15-15-15 dijalankan adalah sebanyak dua kali sepanjang kajian ini iaitu daripada Oktober 2017 sehingga Mac 2018. Keputusan kajian ini menunjukkan kesan positif terhadap pertumbuhan *A. malaccensis* daripada aplikasi baja NPK 15-15-15 terhadap jumlah ketinggian dan diameter *A. malaccensis*. Keputusan daripada kedua-dua parameter menunjukkan kadar baja tertinggi iaitu 150 g adalah lebih sesuai untuk pertumbuhan *A. malaccensis*. Sebagai cadangan, kajian terhadap kesan baja yang mempunyai kadar baja yang lebih tinggi patut dijalankan untuk memastikan sama ada 150 g adalah jumlah baja yang terbaik untuk pertumbuhan *A. malaccensis* atau terdapat kadar baja yang lebih sesuai.

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APPROVAL SHEET

I clarify that this research project report entitelld “Effects of Fertilizers on Growth Performance of *Aquilaria Malaccensis* at Ayer Hitam Forest Reserve, Selangor.” has been examined and approved as a partial fulfilment of degree of Bachelor of Forestry Science in the Faculty of Forestry, Universiti Putra Malaysia.

……

Assoc. Prof. Dr. Mohamad Azani Bin Alias

Faculty of Forestry

Universiti Putra Malaysia

(Supervisor)

……

Prof. Dr. Mohamed Zakaria Hussin

Dean

Faculty of Forestry

Universiti Putra Malaysia

Date : June 2018

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CHAPTER ONE

INTRODUCTION

1.1 Background

Malaysia is one of the 17 countries that known as the 'megadiversity' because the responsible towards the conservation on the natural resources. Malaysia has large areas of forest that contains more than 50 000 species of plants that can be found lowland forest area to the deep interior of forest (Napis, Salleh, Itam & Latiff, 2001)

Each plant species from natural forest contains their beneficial function either for the timber production or non-timber forest production. Example of forest products for non-timber production are trees that produce resins, essential products and oils that used for the domestic and industrial purpose. One of the most fascinating plant that known as producer of non-timber forest product which are essential products is *Aquilaria* sp., or famous as the product of *gaharu* (Mamat et. al, 2007).

Aquilaria sp. are Indomalesia tree which produce resin, fragrant and highly valuable heartwood. *Aquilaria* sp. also have few names from different language such *aloeswood, eagle wood, agarwood, gaharu, oud, kalambac, chen xiang, jinkoh* and *gridsanah*. In Malaysia, the tree *Aquilaria* sp. commonly called as Karas (Nor Azah et al., 2008). This species in the

genus *Aquilaria* from the family Thymelaeaceae have many benefits including the medicinal use and for fragrant products. Besides, few usage of Agarwood also include the wood carved into sculptures, beads and boxes. (Barden *et al*. 2000). The production of the resin of Agarwood are due to the response of the tree by the injury on the trunk.

Aquilaria sp. widely distributed in South and South-East Asia that can be found in 10 countries which are Bangladesh, Bhutan, India, Indonesia, Iran, Malaysia, Myanmar, Philippines, Singapore and Thailand (Oldfield et al. 1998). *Aquilaria* sp. can adapted into different habitat such rocky, sandy or limestone area, well-drained slopes and land near the swamp (Akter & Antana ,2008)

There are five species from genus *Aquilaria* recorded in Peninsular Malaysia and all are believed could produce the resins. They are including *A. Malaccensis , A. microcarp, A.hirta, A. rostrara , and A. beccariana* and most of them are in the medium grade. The most popular and general species of Agarwood in Malaysia is *A. Malaccensis* which also known as *A. agallocha* in India (Chang et al., 2001). *Aquilaria malaccencis* is non timber forest production. In Malaysia, the plantation of *A. malaccencis* are increase day by day because of the value of the *gaharu* from *A. malaccencis*. *Gaharu* known as the most expensive and highly prized commodities. (Barden et al., 2000) .The price of *gaharu* are depending on the grade and the quality.

Since the past thousand years, the demand towards the Agarwood was high due to the usage and benefits. Thus the overharvesting towards the *Aquilaria* sp. occurred. Nowadays, only few old growth of Aquilaria sp. trees exist in the natural forest especially in Southern Asian country (Espinoza *et al*., 2014). Meanwhile, the demand on the exploring cultivation of the *Aquilaria* sp. trees and Agarwood is predicted increase. The concerns are to ensure the maintaining source of the Aquilaria sp. will keep restore and thus more conservation and preservation efforts must be done (Akter et. al, 2013). To have a better quality of planting *Aquilaria* sp. and the production of Agarwood, the good management practices towards *Aquilaria* sp. are so important (Mamat et al., 2007).

Management of plantation of *Aquilaria* sp. are including the good propagation techniques, land preparation, suitable pattern and spacing which is 2 m x 2 m spacing and other silvicultural treatments. The other silvicultural trearment including the pruning, weeding and the application of fertilizers on the tree (Ahmad, 2016).

1.2 Problem Statement

Agarwood plantation has been establish in 1982 at the Bukit Lagong forest reserve, Selangor, Peninsular Malaysia (Lok and Ahmad Zuhaidi, 1996). However, the stand of *Aquilaria* sp. has been driven endangered due to human harvest of the wood due to highly in demand of the *Gaharu*. In the other side, *A. malaccensis* are not dominant species in the natural forest. Thus, the plantation of Agarwood has been started back and highly get attention from several parties.

Aquilaria malaccensis can be planted either in open area or the shaded area. In this study, the *A. malaccensis* planted under the *Acacia mangium*, which mean the *Acacia mangium* tree will provided the shade to the *A. malaccensis*. Thus, in order to make sure the growth the *A. malaccensis* need to be fertilized once or twice or more per year to stimulate growth at the early stage. The fertilizer NPK 15-15-15 used to keep the *A. malaccensis* healthy and grow vigorously. Therefore research need to focus on the effect of fertilizer on growth performance of *A. malaccensis* .

This study, focus on effect of fertilizer application with different rate of fertilizer needed for growing of *A. Malaccensis.* The planting manual of *A. malaccensis* stated that the best about of fertilizer needed *for A. malaccensis* is 50 g per tree but a study had been done stated that 50 g is not enough especially if the *A. malaccensis* planted under the shaded.

1.3 Objectives Of Study

The general objective is to determine the growth performance of the seedlings of *Aquilaria malaccensis* . While the purpose of knowing the growth performance of the *A. malaccensis* is to determine the best rate of fertilizer application for *A. malaccensis* that will affect the growth performance of *A. malaccensis*.

1.4 Scope and Limitation of the Study

The Study scope is to determine the best fertilizer's rate for growth performance of *Aquilaria malaccensis* after fertilizing with this below criteria :

1. Measure the diameter and height of seedlings.
2. Data taken and measured for six months.

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