

UNIVERSITI TEKNOLOGI MARA

**ASSESSMENTS OF KARAS
(*Aquilaria malaccensis*)
PERFORMANCE IN DIFFERENT
AGROFORESTRY SYSTEMS IN
REMBAU, NEGERI SEMBILAN**

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ABSTRACT

Concerns about decline in soil fertility and long term productivity of tree plantations have promoted interests in agroforestry practices. Agroforestry is a land-use management system in which trees are grown around or among crops or pastureland. Karas (*Aquilaria malaccensis*) also known as gaharu, is a tree species that was planted widely in recent years for its wood product which was believed to be quite profitable. The lack of information on the performance of Karas in agroforestry system in Malaysia has led to this research. There were four objectives for this research. The first objective is to determine the tree growth performance in different components of agroforestry system. The second and third objective is to assess the soil fertility status and foliar nutrients, respectively under different components of agroforestry system which can be related to tree growth performance. Finally the last objective is to study the effects of intercropping in different components of agroforestry system on soil fertility and foliar nutrients. In this study, Karas trees were planted in three components (monoculture, intercropped with lemongrass and intercropped with guava) in a Karas farm in Rembau, Negeri Sembilan. After 5 years the effects of components on the survival, tree growth, foliar nutrients and soil properties were assessed. From the result of this study, it was found that in term of growth, Karas intercropped with guava shows a better performance as compared to Karas monoculture and Karas intercropped with lemongrass due to the litterfall from guava trees that provides enhancement to the soil fertility. In terms of soil fertility, nitrogen, potassium, magnesium and cation exchange capacity were significantly higher in Karas monoculture as compared to the other components due to lack of nutrient competition. For foliar analysis, phosphorus, calcium, manganese, zinc and boron were significantly higher in Karas intercropped with guava as compared to the other components. From the redundancy analysis, it was found that the cumulative percentage variance of species environment for the first two axes for the effect of intercropping system on soil fertility and foliar status were 99.8% and 87.7%, respectively. This suggesting that the intercropping system has a strong influence on the soil fertility and foliar status where selection of trees and crops might affects soil and foliar status positively, or vice versa. For the conclusions, agroforestry system has no significant difference on the survival of Karas tree. Generally, Karas agroforestry systems improving a few soil and foliar nutrients. While the plantations are still young, it is evident that improved growth performance of Karas was demonstrated in the Karas intercropped with guava component.

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CHAPTER ONE

INTRODUCTION

This chapter provides the background and rationale for the study. The overview highlights the definition of agroforestry systems and some parameters that associated with an optimization of the systems while agroforestry practices are not new in Malaysia. Little information can be found about this practice, especially when involves in Karas (*Aquilaria malaccensis*). Such data are required in order to assist Karas farmers, where they can earn some benefits while waiting the output to be harvested which takes about five to six years. Planting fruit trees like banana or guava might help to reduce the burden carried by the smallholder farmers. The selection of tree combination is crucial so that it would not affect the growth of Karas trees. Therefore, growth and soil fertility parameters are important aspects that must be investigated in order to achieve an optimum Karas agroforestry system.

1.1 RESEARCH BACKGROUND

Agroforestry can be defined as a collective name for land-use systems involving trees combined with crops and/or animals on the same unit of land which combines production of multiple outputs with protection of the resource base (Nair, 1991). The practice places emphasis on the use of native, multipurpose trees and shrubs and is particularly suitable for low input conditions and fragile environments. It involves an interaction of socio-cultural values more than in most other land-use systems. It is structurally and functionally more complex than monoculture.

In Malaysia, commercial agroforestry was first started in 1950s through the Taungya system (Ahmad Fauzi & Huda Farhana, 2006). Taungya is a short-term agricultural inter-cropping in the forest plantation and as a method to control shifting cultivation. Approaches to increase land productivity through maximizing of land use in sustainable manner have been introduced by the Malaysian Rubber Board (MRB) to the rubber smallholders to aid them especially when the low production periods and during the replanting of the rubber trees (Ahmed Azhar, Norman, Suhaimi, & Wan Hanisah, 2008). On the other hand, one of the potential areas for agroforestry that