ENHANCING GROWTH OF PLANTED RHIZOPHORA SPP. USING ORGANIC FERTILIZER

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ABSTRACT

Erosion is a normal phenomenon at the seashore, particularly due to strong current. Various attempts were made by respective parties to save the eroded coastline. Planting Rhizophora spp. is a common effort carried out by local authorities in those places. This study is carried out to measure the plant growth due to application of organic fertilizer. Wildings were collected in surrounding areas and planted in the mudflat. Survived wildings were treated with organic fertilizer and their growth was compared to planted seedlings without the treatment. Preliminary results of this study will be highlighted in this paper and shown in the form of picture and graphs.

Keywords: Rhizophora, organic fertilizer, height increment.

INTRODUCTION

Mangrove forest ecosystems are an important habitat for various species of animals that are potentially a tourist attraction spots due to the biodiversity richness. They provide a wide range of ecological services that protect the coast from erosion, buffer adjacent marine ecosystems (often coral reefs) from terrestrial inputs, and are nursery grounds for important commercial fish species and habitats for migratory birds. The mangrove forest is considered to be one of the most productive ecosystems in the world and has a strong ecological, economic and cultural importance (Goessens et al., 2014). Eventhough mangrove ecosystems are rich in carbon, they are actually often poor with nutrient content (Chen and Ye, 2014).

Rhizophora spp., especially Rhizophora apiculata (Bakau minyak) is a tropical mangrove tree, categorized as true mangroves that are limited to the mangrove environment. Mangrove planting (especially Rhizophora spp. /Bakau) can restore mangrove forest ecosystems. According to Ng & Sivasothi (1999), it is gregarious on the deep soft mud of estuaries flooded by high tides. The trunk can be used for making good quality charcoal, high-quality timber and fuel woods, for piling and the bark used for tanning. This species is sometimes used for mangrove restoration.

This species subjected to risk from coastal development and extraction at the extremes of their distribution, and are likely to be contracting in these areas more than in other areas. Continued monitoring and research are recommended, as well as the inclusion of mangrove areas in marine and coastal protected areas (Duke et al., 2010). Hence, as a conservation measure, fertilizer study is carried out to enhance the plant growth for Rhizophora reestablishment in a degraded area. The study is aiming to enhance growth performance of Rhizophora at the early planting stage. This is important to enable the plant to survive the harsh condition of the seashore against strong wave and high tides. This paper is reporting results of the first four months after planting establishment.
The objective of this study is to find a method to speed up an early growth of mangrove trees planted behind the wave breaking structure built in Tanjung Piai, Johor. The scope of this project is to cultivate of the mangrove plant community in the mud flat behind the wave breaking structure. Components consisting the establishment of mangrove seedlings, planting and collecting data for analysis of the result.

SITE DESCRIPTION

*Rhizophora* spp. planting was carried out in the mudflat of Tanjong Piai Johor, (Figure 1). It is located at the most southern tip of Asia continent. Tanjong Piai is part of the larger South-west Johor wetlands, which well recognized as Ramsar Site designated on 31st January 2003. Tanjung Piai has suffered from coastal erosion for many years and the area has been identified as one of the critical areas for coastal erosion under a National Coastal Erosion Risk Study. In recent years, the erosion has escalated significantly, where the mangroves are being uprooted thus exposing the shoreline. Therefore, an effort to restore the mangroves here is much required to ensure ecological integrity and characteristics of this Ramsar Site remain lasting. Hash and extreme conditions at this areas required human intervention to enhance growth performance of planted trees especially at early stage.

![Figure 1: Location of the study plot](image)

TREATMENTS

The two months old wildings were uprooted from nearby area and planted as nurse plant. A month afterward two treatments were applied to the *Rhizophora* spp. The treatments are fertilized and control (not fertilised) consists of 3 blocks each. The stock transferred to planting media contain the mixture of marine mud only for not fertilized plants and organic materials (3 kg chicken dung) for fertilized plants which was prepared in the biodegradable gunny sack. These planting materials were planted at 2 x 2 m spacing. Results were measured in terms of plant height increment (cm) and number of leaves.
Treatment
Treatment 0 : Control (No fertilizer)
Treatment 1: Fertilized (Organic fertilizer)

RESULTS AND DISCUSSION

Result showed that plant height and new buds grow according to the treatments. The fertilized trees show faster growth compared to not fertilized trees (Figure 3). The mean height increment of the trees increase 46 cm in the first 4 months after fertilization. Meanwhile for the trees without fertilization, its height shows increment with an average of 30 cm after 4 months being planted. Result showed that fertilization begin to give an effect from the first month after application.
Early observation showed that fertilized plant had faster leaf formation compared to the not fertilized tree (Figure 4). The mean increment of fertilized trees almost doubles 3 months after fertilization. The leaf formation is expected to be more prolific as the biological process reacted uniformly. The plants without fertilizer also showing some increment, however, the progress is slower compared to a fertilized trees.

![Mean Leaves Number of *Rhizophora* sp.](chart)

**Figure 4: Mean leaves number of *Rhizophora* spp.**

Figure 5 shows the picture of leaves comparison between not fertilized and fertilized plant after two months of treatment being applied. The fertilized plant has more leaves and higher compared to not fertilized tree.

![Leaves of the plant a) not fertilized and b) fertilized](images)

**Figure 5: Leaves of the plant a) not fertilized and b) fertilized**
CONCLUSION
This study showed that fertilizer treatments were able to speed up plants growth as early as 3 months after fertilization as shown in terms of higher metabolism rates. However, inappropriate fertilizer placement will cause scorching for the young plants and perished. In the long term, organic fertilizer treatment did help enhancing plant growth of the Rhizophora spp. This study successfully contribute in rehabilitating the mangrove area in the southernmost tip of mainland Asia.

REFERENCES