

# The Effect of Plant Growth Ameliorant Against Pioneers in the Land of Used Media Coal Mine in the Nursery

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**Abstract:** *Open pit mining activities can have negative impacts on the environment. The impact of mining activities of which are topsoil disappearance, soil compaction and nutrient imbalance. The soil will cause the plant revegetation difficult to survive on mined land. This study aims to determine the growth of tree seedlings: (a) sengon, (b) Trembesi, (c) Jabon tree, (d) mahogany, (e) ketapang, and (f) Agarwood, the former land of coal mines being treated ameliorant form of manure goat and rice husk as pembenah soil. the treatments were 50% of the land of the former coal mine + 25% + 25% goat manure husk. After the treatment given to each of the planting medium, the medium is incubated for 15 days. the analysis includes the initial soil pH, macro nutrients (N, P, K). After completion of incubation, the media planted tree seedlings: (a) sengon, (b) Trembesi, (c) Jabon tree, (d) mahogany, (e) ketapang, and (f) Agarwood age 1 month. the variables observed Percentage of life, stem deformation, deformation of roots, stems robustness and compactness roots. Observations show on the observation of 12 weeks after the treatment produces an average percentage of 99.17% life, Deformation straight rods on the criterion of 90%, Deformation criteria roots straight 80%, while 85% .The robustness stems and roots compactness of 100%. Thus giving treatment ameliorant form of goat manure and rice husk as soil quality improvement mixed into the former coal mine land can be developed as a replacement of top soil on the rehabilitation of former coal mining laban.*

**Keywords:** Ameliorant, pioneer plants, mined land

## 1. Introduction

An increase in mining activity has increased the issue of environmental damage and serious consequences on the local and global environment. The most serious impacts of mining and broad is the degradation of land, soil instability, water contamination, air pollution, climate change, in addition to changes in topography and hydro-geological conditions (Bell)

Open pit mining activities can negatively impact the environment, covering the top soil and sub soil is mixed, so the low soil organic matter and soil quality to decline. In addition, mining causes soil to become acidic, uneven land, a lot of holes that eventually filled by acid mine drainage, soil pores bit, high-density land and water permeability to small. Event land reclamation of mining with revegetation plant begins with preparing the seeds are adaptive to these conditions, in order to obtain seeds adaptive when it will be planted on the land of former coal mine then prepared media seedlings are from the land of the former coal mine by ground reformer so that seed quality good and adaptive when planted in the land former coal mines for reclamation purposes.

The soil reformer with organic fertilizer and rice husk is expected to increase soil fertility. Moreover, the addition of organic fertilizers and soil media rice husk into a former coal mine is expected to become a better growth media for plants that will be used for mine site revegetation, which will accelerate reclamation efforts.

The choice of plants is an important stage in the activities of the former coal mine site revegetation as it aims to select the type of plants adapted to the conditions of land to be revegetated (Yassir and OMON. 2009). Revegetation of

mined land is expected to maintain the genetic integrity of local populations and preventing the occurrence of invasive species of exotic species or non-local. Although ecology of local plant species can adapt to the local climate, but there are some species that are not able to adapt to the soil conditions. This is because the soil conditions of each site is different. The existence of this limiting factor it is necessary to study further with a test in advance of planting in the nursery.

Pioneer tree species were selected in this study are six types of pioneer they are: (a) sengon, (b) a trembesi tree, (c) Jabon tree, (d) mahogany, (e) ketapang, and (f) Agarwood. The purpose of research is to determine the growth of tree seedlings of: (a) sengon, (b) the trembesi, (c) tree jabon, (d) mahogany, (e) ketapang, and (f) Agarwood, at the former land of coal mines being treated ameliorant form of manure goats and charcoal husk as pembenah soil. the treatments were 50% of the land of the former coal mine + 25% manure goat + 25% charcoal. The variables observed percent survival, robustness stems and roots deformation, compactness roots based on the criteria of various parameters (criteria of parameters) by Manik (2007).

## 2. Materials and Methods

This research was conducted in August 2016 - December 2016 in Test Jambi University Faculty of Animal Farm. Media is composed of land taken from the land after coal mining. Six types of pioneer plant seeds each 80 seeds, rice husk, goat manure, soil ex-mine coal, base fertilizer NPK, polybag, sieves, scales, shovels, gembor, shade.

The study design was completely randomized design with a treatment plant species Treatment plant species consists of six pioneer species locally established tree seedlings(a)

seigon, (b) a trembesi tree, (c) Jabon tree, (d) mahogany, (e) ketapang, and (f) Agarwood aged 1 month

Data percentage of survival and plant height were analyzed by analysis of variance (F test). If there is a significant difference between the treatment will be followed by a further test of Tukey HSD. Prior to analysis of variance, the data were tested normality. If the data is not a normal distribution, then the data is transformed using logarithms. Furthermore stem and root Deformation, stems robustness and compactness roots visually observed and observed at the end of the study (12 MSP) based on the criteria of various parameters (Criteria of parameters) by Manik (2007). To be implemented be descriptive. The data obtained were processed with tabulation and descriptive analysis.

Plant seeds are prepared from the six local pioneer species obtained from local seed breeder. Media former coal mine soil mixed with manure goat and rice husk with a ratio of 2: 1: 1. After completion incubated for two (2) weeks, media planted tree seedlings: (a) seigon, (b) trembesi, (c) Jabon tree, (d) mahogany, (e) ketapang and (f) Agarwood aged 1 month. Further media seedlings given the basic NPK fertilizer each 5 grams.

Observations carried out periodically and the data collected include rate of survival. Percent of living is the percentage of plants that live on the number of crops grown. Observations were carried out twice a week for 12 weeks after treatment (MSP) to the percentage of life, Deformation rod and roots, robustness stems and compactness roots observed done visually observed at the end of the study (12 MSP) based on the criteria of various parameters (Criteria of

parameters) by Manik (2007). Besides, soil chemical properties at the beginning of the planting well documented. Soil samples were taken at the beginning of the planting. Analysis of soil chemical properties conducted at the Laboratory of Soil Science Faculty of Agriculture, University of Jambi.

### 3. Results and Discussion

The result showed that the application of ameliorant the pioneer plants provide a good influence as the data in the following table:

**Table 1:** The average number of plants per treatment and the percentage of plant life.

Plant Varieties	Average number of Plants	Percentage of Plant Life (%)
<i>Sengon</i>	20 a	100 (%)
<i>Ketapang</i>	20 a	100 (%)
<i>Mahoni</i>	20 a	100 (%)
<i>Trembesi</i>	20 a	100 (%)
<i>Jabon</i>	20 a	100 (%)
<i>Gaharu</i>	19.5 a	97,5 (%)

**Table 2:** Average plant height at each treatment

Treatment (Plant Varieties)	Average Plant height (cm)
Jabon	90a
Sengon	80 b
Ketapang	60 c
Trembesi	56 cd
Mahoni	53 d
Gaharu	52 d

**Table 3:** Percent average deformation of stems and roots observations onMSP pionir12 plants in nurseries.

Plant Varieties	Deformation of the Stem			Roots Deformation				
	(%)			(%)				
	Strength stemp	(J shape	Irregular	Straight	Ratheroblique	Curve	Bow	Spiral
<i>Sengon</i>	90	10	0	80	0	20	0	0
<i>Ketapang</i>	80	20	0	80	10	10	0	0
<i>Mahoni</i>	100	0	0	90	10	0	0	0
<i>Trembesi</i>	80	20	0	80	10	10	0	0
<i>Gaharu</i>	80	0	20	80	10	10	0	0
<i>Jabon</i>	100	0	0	90	10	0	0	0
<b>Average</b>	88,33	8,33	3,33	83,33	8,33	8,33	0	0

Based on observations indicate that these types of pioneer tree seedlings: (a) seigon, (b) Trembesi, (c) Jabon tree, (d) mahogany, (e) ketapang, and (f) Agarwood are the kinds of potential to be developed in support of the restoration on lands with severe impairment as the mining areas as percentage of living is relatively good. in this study, the type of Ketapang, Mahogany, Trembesi has the percentage of survival of 100% at 6 months (12 MSP) and unchanged from

the age of 3 months (1 MSP). Plant these pioneers also have growth deformation of the trunk, deformation roots, rods the robustness with criteria erect and compactness roots compact. it shows that tanamn seigon, tamarind, jabon, mahogany, ketapang and aloes planted on media seedling soil former coal mine by ground reformer goat manure and rice husk growth is very good.

**Table 4:** Percent Average Robustness Trunk, Compactness Rooting Observations On Some Plants Pioneers 12 MSP In the Nursery

Name of Plant	Bark strengthness			Root compound			
	(%)			(%)			
	Strength	Rather oblique	Oblique	Compact	Barst	Break	Free
<i>Sengon</i>	80	20	0	100	0	0	0
<i>Ketapang</i>	90	10	0	100	0	0	0
<i>Mahoni</i>	80	20	0	100	0	0	0
<i>Trembesi</i>	80	0	20	100	0	0	0
<i>Gaharu</i>	80	20	0	100	0	0	0
<i>Jabon</i>	100	0	0	100	0	0	0
Average	85,00	11,67	3,33	100	0	0	0

In general Jabon plant and *Mahoni* are two types of local plants that provide the most good growth response. The success of growth is determined by internal factors (genetic and hormonal) and external factors (climate and site quality) (Daniel et al, 1987). According Gunawan. (2009), the land of the former coal mine when the addition of other elements such as compost, there will be an acceleration of growth in some tree species. There are a few trees planted by adding compost elements, was very influential in the growth, such as the type of Red *Balau* or *Balangeran* (*Shorea balangeran*), which is a tree that can be grown in open fields and critical.

Setiadi research results and Setiawan (2011) on mined land that has grown some natural pioneer (*Macaranga* sp) through the process of natural succession proved better able to accelerate the improvement of microclimate and soil chemical properties such as soil acidity.

## 4. Conclusions and Recommendations

### 4.1 Conclusion

Based on the results of research and discussion that has been done can be concluded as follows: (1) observations show in the 12 weeks after treatment produces an average percentage of 99.17% life, (2) deformation of the stem in a straight 90% criterion, deformation criteria roots straight is 80%, while stem robustness is 85% and compactness root of 100%, and (3) the type of plants that have survival rates above 90% is considered to adapt to extreme environmental conditions.

### 4.2 Recommendations

Suggested giving treatment ameliorant form of goat manure and rice husk as soil reformer mixed into the former coal mine land can be developed as a replacement of top soil on the rehabilitation of former coal mining laban.

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