Land Reclamation after Coal Mining at PT. Nan Riang Using Mycorrhizae and Organic Compound

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BACKGROUND

The implementation of reclamation land after mining in Indonesia esp. in Jambi is still far below the standard. The most problems of the reclamation activities are poor biological and physical properties of soil and lack of knowledge on the appropriate combination plant species (Bradshaw and Chadwick, 1980). Based on this status the choice of using indigenous mycorrhizae is a promising way to solve the constraints. It may solve and help the plants to cover the problems of growing in the critical soil after mining. The use of organic compound is also possible way for improving the soil quality of land after mining. The combination between mycorrhizae and organic compound will be able to improve the soil properties and plant quality.

OBJECTIVES

The objectives of the research are:

1. To study the bio-physical condition of land after coal mining and ecosystem surrounding mining area as reference site for condition before mining.
2. To isolate and identify the mycorrhizae which live associatively with indigenous plants close to mining area.
3. To study the interaction between mycorrhizae and some selected species namely petai (*Parkia speciosa*), Jelutung (*Dyera lowii*); Karet (*Hevea brasiliensis*) and oil palm (*Elaeis gueniensis*).
4. To study the acceleration on the soil and vegetation properties on the land after mining.

STUDY SITE

PT. Nan Riang, a coal mining company – is under the same group as Humusindo Makmur Sejati. It is located in Muara Tembesi Sub District, Batanghari.

METHODS

The research is divided into several phases

1. Identification on vegetation and physical conditions of soil after coal mining
2. Identification and multiplication of mycorrhizae
3. Experiments on reclamation management
4. Large scale reclamation using selected species and selected treatments

RESULTS

A. Vegetation Analysis

Vegetation analysis had been conducted in the surrounding areas close to mining location. The plot number was 6 with the size of 20 m x 20 m.

Fig. 1. Land condition after mining

Fig. 2. *Dyera sp. - a native species*

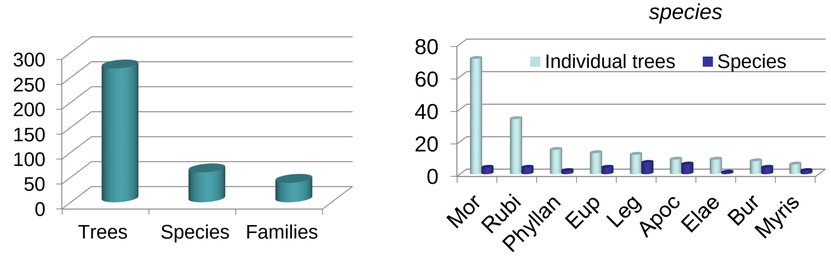

Fig. 3. Tree and species number and most dominance Family

Table 1. List of the most dominance species

Species	Family	N
Sloetia elongata Koord.	Moraceae	23
Porterandia anisophylla (Jack ex Roxb.)	Rubiaceae	8
Artocarpus rigidus Blume	Moraceae	6
Timonius wallichianus (Korth.) Valeton	Rubiaceae	5
Macaranga triloba (Thunb.) Müll.Arg.	Euphorbiaceae	5
Elaeocarpus mastersii King	Elaeocarpaceae	5
Timonius wallichianus (Korth.) Valeton	Rubiaceae	5
Glochidion rubrum Blume	Phyllanthaceae	4
Rhodamnia cinerea Jack	Myrtaceae	4

Fig. 4. secondary forest close to mining area

Fig. 5. Herbarium specimen

B. Identification & multiplication of Mycorrhizae

B.1. Mycorrhizae isolation

Table 2. List of spore number for each host type

Host	Spore Number
Secondary Forest	7.67
Nephelium lappaceum	3.33
Antocephalus cadamba	7.00
Elaeis guinensis	3.00
Eugenia aqua	3.00
Bare land after mining	0.00

50 g of soil sample with three replications for each host

Fig. 6. Landscape after mining

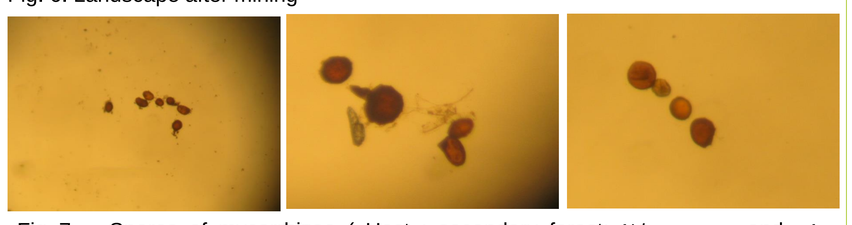

Fig. 7. Spores of mycorrhizae (Host : secondary forest; *N.lappaceum* and *A. cadamba)*

B.1. Mycorrhizae Multiplication

Single spore of mycorrhizae had be cultured in *Pueraria javanica's* roots.

Fig. 8. sub culture of Myco in *P. javanica*

Fig. 9. single spore culture in the root

C. Experiments on reclamation management

The experiment using factorial design: (1) dosage of organic compound (K1: 4 kg and K2: 8 kg) and (2) dosage of NPK (N0: 0 g, N1: 25 g, N2: 50 g, N3: 75 g and N4: 100 g); 3 replications; 30 plots; 9 trees per plot; total of trees 270

Fig. 10. *Mukuna sp.* (3 months after planting)

Fig. 11. *Parkia speciosa* in the field (3 months after planting)

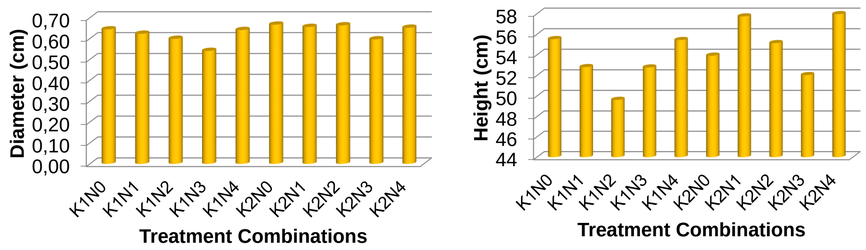

Fig. 12. Mean Diameter and Height of *P. speciosa* (3 months after planting)

- 2015 : One experiment will be developed with Jelutung (*Dyera lowii*) as the main species.
- 2016: The selected and identified mycorrhizae will be applied to the existing experiment.

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