

SESSION TWO ORAL PRESENTATION C

Effect of Charcoal Application to Early Growth Stage of *Acacia mangium*

Chairil A. Siregar¹, Nobuo Ishibashi², Tsuyoshi Kato³, Herianto⁴, Kazuya Ando⁵

1,4 Researcher, Forest and Nature Conservation Research & Development Center, Forestry Research Development Agency (FORDA), Ministry of Forestry, Indonesia

2,3,4 Expert, Carbon Fixing Forest Management Project between between JICA and FORDA

Abstract

Charcoal is one of the important energy sources in the developing countries. Additionally, it is effective not only in carbon fixation and inactivation in the atmosphere but also in environmental conservation when used as an agent such a soil conditioner or growth accelerator of plants. However the utilization of charcoal in forestry sector, especially industrial plantation, has not been introduced due to absence of the available information. If the technique of charcoal application as soil amelioration is developed, it may contribute greatly to the establishment of plantation in severe soil conditions.

Acacia mangium, the species used in this study, is one of the most important species grown in industrial plantations in Indonesia. Although *A. mangium* has the better adaptation to most of Indonesian climate, the techniques for planting in degraded land such as alang-alang grassland have not been established.

Glasshouse research was designed to examine the effectiveness of charcoal incorporation to marginal soils on the growth of 6-month-old *Acacia mangium*. Charcoal treatments were 0, 10, 15 and 20% (v/v). Representative samples of Orthic Acrisol (Very fine, mixed, semiactive, isohyperthermic, Typic Paleudult) were collected from B horizon. Soil samples were ground to pass a 5 mm sieve and thoroughly mixed before potting. Soil samples of 4000g (air dry) were weighed into individual pots. A completely randomized design with four replications was employed to examine the effect of charcoal application on the plant growth and some important soil chemical properties.

Charcoal additions to soil significantly increased height and diameter of seedlings in comparison to a control. Increasing the amount of charcoal higher than 10% level, however, have little effect on growth. The root weight had no difference between with and without charcoal application. Morphologically, the plants showed changes with or without charcoal application: with charcoal application, the ratio of the above- to below-ground biomass significantly increased. On the other hand, the ratio of stem and root weight to leaf significantly decreased.

Charcoal treatment significantly increased soil pH, soil C organic, HCl 25 %-extractable P, HCl 25 % and Bray-extractable K, exchangeable bases (Ca, Mg, Na, and K), percentage of base saturation, and significantly decreased KCl 1 N-extractable Al³⁺ and H⁺.

This study indicated that charcoal application at rate of 10 % would be adequate to improve soil nutrients availability, and hence significantly induce a better plant growth response.