

Efficacy of different arbuscular mycorrhiza in promoting growth of *Albizia saman* in coal mine spoil: a prospect in restoring mined tropical forest, Indonesia

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**Abstract** The extensive open cast coal mining under forest area brings consequences in the large environment degradation, induces soil degradation, forms a huge quantity of mined spoil, and may contribute to climate change in Kalimantan, Indonesia. Establishment of spontaneous natural vegetation is difficult in coal mine spoil-bank due to its diversity in soil characteristics. Reforestation by application of fertilizer is commonly used. However, the high cost fertilizer and its long term negative effect on environment may not be effective in economic perspective. Native tropical tree and fast growing species, *Albizia saman*, is potential to promote the first rotation of reforestation. Selected native arbuscular mycorrhizal (AM) fungi play an important role on plant growth in soil condition. This study aimed to clarify the effect of native and non-native AM fungi in maintaining growth of *A. saman* in spoil-bank of open cast coal mining. Seedlings were inoculated with or without native AM fungi, *Acaulospora* sp., *Glomus* sp.1, and *Glomus* sp.2, and non-native AM fungi, *Gigaspora decipiens*, in sterilized spoil-bank and grown in greenhouse for three months. Seedling height, diameter, leaf number, shoot dry weight, root fresh weight, shoot N, P, K, and Ca concentrations were measured two months after sowing. *Acaulospora* sp. colonized plant 83%, *Glomus* sp.1 90%, *Glomus* sp.2 93%, and *G. decipiens* 38%. Though all colonization of AM fungi increased shoot dry weight, colonization by native AM fungi tended to have higher shoot dry weight than non-native AM fungi. All native AM fungi increased root fresh weight, shoot P concentration, shoot P, K, and Mg content. All colonization of AM fungi increased shoot N uptake. This result indicates that application of native AM fungi is prospective for tropical reforestation in open cast coal mining area by improving nutrient uptake and accelerating plant growth, and therefore may reduce the need of fertilizer application.

**Keywords** native AM fungi, coal mine spoil, reforestation, *Albizia saman*, Indonesia