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**Synergistic Effects of *Rhizobium* sp., *Thelephora* sp. and
Arbuscular Mycorrhiza Inoculation in Improving Seedling Growth
of *Paraserianthes falcataria* (L.) Nielsen**

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Abstract

Paraserianthes falcataria (L.) Nielsen, in Indonesia called “Sengon“ is a leguminous tree species widely grown for timber and used in reboisation programme in Indonesia. It is a valuable multipurpose tree for the humid tropics. One of the fastest growing of all tree species, it is used for pulp and other wood products, fuelwood, ornamental plantings and shade for coffee, tea, cacao and cattle and has good effect in the protection of soil by erosion. However, the quality of seedlings that produced by the farmers is still low. The application of beneficial microorganism is an interesting alternative to improve the seedling growth and might be an alternative or supplement to chemical fertilisers and fungicides. In this study, the synergistic effect of indigenous *Rhizobium* sp., *Thelephora* sp. and arbuscular mycorrhiza (AM) inoculation on improving seedling growth of *P. falcataria* plants was investigated in a greenhouse experiment.

Single *Paraserianthes* seeds were cultivated in pots each of which containing 2 kg sterile soils/sand mixture (3:1) with and without *Rhizobium* sp. (1 g nodule per 10 ml with concentration of application 20 ml per pot), *Thelephora* sp. (1 g fruit body per 10 ml with concentration of application 20 ml per pot), *Glomus* sp. (250 g infected soil per pot) or none of both as control. 50 N, 50 P, 100 K, 50 Mg kg⁻¹ soils were fertilised.

Soil inoculation with the selected *Rhizobium* sp., *Thelephora* sp. and *Glomus* sp. strain significantly improved the seedling growth of *Paraserianthes*. Seedling height and diameter stem of *Paraserianthes* was positively affected by both microorganism. The seedling biomass production of *Paraserianthes* was positively affected by both inoculums and was even higher in the combination of both inoculations compare to single application and untreated control. Moreover, roots of *Paraserianthes* were not only healthier but also showed a significantly higher percentage of AM infection in combination treatment of both inoculums, indicating the sinergism between both microorganisms. The level of AM-propagules in the soils were not generally low but rather indirectly as consequence of poor root development. The results suggest that both microorganisms are suitable as bioeffector agents that may ameliorate plant growth and health

Keywords: *Glomus* sp., leguminous tree, *Paraserianthes falcataria*, *Rhizobium* sp., *Thelephora* sp., arbuscular mycorrhiza