

Growth Enhancement and Root Colonization of Rice Seedlings by Rhizobium and Corynebacterium spp.

ABSTRACT

Diazotrophs form natural association with rice plant. An in vitro experiment was conducted to study the colonization and association of Sb16 and Sb26 diazotrophic strain (previously isolated from rice rhizosphere) on two rice genotypes namely Mayang Segumpal and MR219. Root colonization was observed under scanning and transmission electron microscope. After 5 days of inoculation diazotrophs colonized on the surfaces and internals of lateral roots, root hairs and epidermal cells of the rice roots. Sb16 (*Rhizobium* sp.) formed aggregated cells and produced mucilaginous materials that may be involved in their attachment on roots. Rice seedlings inoculated with diazotrophs produced significantly higher biomass compared to control and 35 kg ha⁻¹ of nitrogen treatments. The diazotrophs association increased rice seedlings root and shoot biomass. Mayang Segumpal rice colonized by *Rhizobium* sp. (SB16) content higher tissue nitrogen (4.47%) and increased plant biomass by 36% over the non-inoculated control and 22% over 35 kg ha⁻¹ of N fertilizer. While the MR219 rice inoculated with *Corynebacterium* sp. contained 4.30% tissue N and increased 32% of plant biomass over non-inoculated control and 21% over 35 kg N ha⁻¹. The study showed that inoculation with diazotrophic strains (Sb16 & Sb26) improve plant growth including tissue nitrogen content of rice and differences in the association between diazotrophs and rice genotypes.

Keyword: *Corynebacterium*, Diazotrophs, Nitrogen, *Rhizobium*, Rice, Root colonization