

Role of phosphate solubilizing bacteria on rock phosphate solubility and growth of aerobic rice.

ABSTRACT

Use of phosphate-solubilizing bacteria (PSB) as inoculants has concurrently increased phosphorous uptake in plants and improved yields in several crop species. The ability of PSB to improve growth of aerobic rice (*Oryza sativa* L.) through enhanced phosphorus (P) uptake from Christmas island rock phosphate (RP) was studied in glasshouse experiments. Two isolated PSB strains; *Bacillus* spp. PSB9 and PSB16, were evaluated with RP treatments at 0, 30 and 60 kg ha⁻¹. Surface sterilized seeds of aerobic rice were planted in plastic pots containing 3 kg soil and the effect of treatments incorporated at planting were observed over 60 days of growth. The isolated PSB strains (PSB9 and PSB16) solubilized significantly high amounts of P (20.05-24.08 mg kg⁻¹) compared to non-inoculated (19-23.10 mg kg⁻¹) treatments. Significantly higher P solubilization (24.08 mg kg⁻¹) and plant P uptake (5.31 mg plant⁻¹) was observed with the PSB16 strain at the highest P level of 60 kg ha⁻¹. The higher amounts of soluble P in the soil solution increased P uptake in plants and resulted in higher plant biomass (21.48 g plant⁻¹). PSB strains also increased plant height (80 cm) and improved root morphology in aerobic rice. The results showed that inoculation of aerobic rice with PSB improved phosphate solubilizing activity of incorporated RP.

Keyword: Aerobic rice; *Bacillus* spp.; Christmas island rock phosphate; Phospahte solubilizing bacteria.