

Solubilization of Different Phosphate Forms by Phosphate Solubilizing Bacteria Isolated from Aerobic Rice

ABSTRACT

Phosphorus solubilizing bacteria (PSB) are known to be able to solubilize different forms of inorganic phosphates. An in vitro study was conducted to determine the solubilization of phosphorus from inorganic phosphates in three broths containing tricalcium phosphate (NBRIP broth), aluminum phosphate (PDYA-AIP broth) and Christmas island rock phosphate (CIRP broth) by using PSB strains isolated from aerobic rice field. There were differences of bacterial growth found in different forms of phosphate containing media. In general, bacterial populations were higher in NBRIP and CIRP broths and lowest in PDYA-AIP broth. PSB-15 strain showed the highest population in NBRIP, while PSB-10 in CIRP broth. No bacterial growth occurred in PDYA-AIP broth. P solubilizations by the different bacterial strains were significantly influenced by the sources of P used in the broths. Inoculation of NBRIP broth with PSB 10 solubilized the highest P (40.56%), While comparatively lower P was solubilized by the bacteria in CIRP broth. Low amount of soluble P was present in PDYA-AIP even though there was no bacterial growth. Significantly highest pH decrease was found in CIRP broth followed by NBRIP broth, while no pH change occurred in PDYA-AIP broth. The P solubilization rate of different phosphate forms in the broth followed first order kinetics. P solubilization correlated positively with bacterial population and negatively correlated with culture pH. The PSB strains isolated from aerobic rice rhizosphere were able to solubilize P from tricalcium phosphate and rock phosphate, but not from aluminum phosphate.

Keyword: Aerobic rice, Aluminum phosphate, Inorganic phosphate, Christmas island rock phosphate, Phosphate solubilizing bacteria, Tricalcium phosphate