

Gluconic acid production by bacteria to liberate phosphorus from insoluble phosphate complexes

ABSTRACT

Ten indigenous bacterial isolates were identified as efficient mineral phosphate solubilisers namely 7 strains of *Klebsiella pneumoniae*, 2 strains of *Enterobacter aerogenes* and 1 strain of *Pseudomonas aeruginosa*. All the ten strains were able to dissolve calcium phosphate (Ca-P), ferric phosphate (Fe-P) and aluminium phosphate (Al-P) efficiently. STMP5B 8 (*Klebsiella pneumoniae*) could be designated as the best mineral P solubiliser for all the three insoluble mineral phosphates as it exhibited high solubilisation capacity for Ca-P, Fe-P and Al-P whereas STMP5B 6 (*Enterobacter aerogenes*), STMP5B 4 (*Enterobacter aerogenes*) and STMP5B 8 (*Klebsiella pneumoniae*) were regarded as good gluconic acid producing bacteria. A strong correlation of 0.795, significant at the level of 0.01 was observed between gluconic acid concentration and calcium phosphate solubilisation. The detection of pyrroloquinoline quinone (pqq C) gene in eight of the bacterial isolates indicates that direct oxidation pathway was used during the biosynthesis of gluconic acid with the aid of pyrroloquinoline quinone cofactor.

Keyword: Organic acid; Phosphate solubilising bacteria; Gluconic acid; Pyrroloquinoline quinone (pqq C) gene