

Optimization for Rock Phosphate Solubilization by Phosphate-Solubilizing Bacteria isolated from *Oryza Sativa* Rhizosphere

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Rock Phosphate (RP) is a cheap, phosphate-rich source but due to its lack of water solubility its use is limited in rice cultivation as a Phosphorus (P) fertilizer. However, certain bacteria in rice rhizosphere have shown the capability of solubilizing RP and supplying P to rice plants. Under certain conditions, the rate of releasing P could be low and these parameters should be optimized to obtain the full capacity of microorganisms as P biofertilizers. This study was undertaken to identify efficient RP solubilizing bacteria isolated from rice rhizosphere and the effects of parameters such as RP concentration, particle size, C:N ratio, chelation, mixed cultures, P source and Nitrogen source on their ability to solubilize RP.

A pool of 165 naturally colonizing bacteria in rice plants isolated previously were screened for their RP solubilizing ability using solid and liquid modified PVK (Pikovskaya) selective media, containing RP as the sole P source. The observed highest P solubilizing strains, numbers 36 and 52, were tested along with a reference P- solubilizing strain, EP-11, which was isolated previously from Eppawala RP mines. The results showed that optimum RP concentration for strain 36 was 10.0g L⁻¹ and 5.0g L⁻¹ for strain 52. The content of soluble P gradually decreased with a larger particle size of RP with all the isolates. The highest content of soluble P was achieved when C:N ratio was 50:1, EDTA concentration was 2.0 mg ml⁻¹, and Nitrogen source was NH₄NO₃ for both strains 36 and 52. However under the mixed cultures of strains 36 and 52, the solubilized P concentration was much lower (16.91 mg L⁻¹) than their individual P solubilization levels. The optimization of these parameters would be important in achieving the maximum P solubility if strains 36 and 52 were to be developed in to P biofertilizers.

Key words: Rock phosphate (RP), Rice, Phosphate-solubilizing bacteria, soluble phosphorus (P)

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