

The biochemical characteristics of phosphate bacteria capable of increasing soil phosphorus bioavailability in Andisols

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Abstract	<p>N-Acyl Homoserine Lactone (N-AHL) has been known as the quorum sensing (QS) signals that control phosphate bacteria (PB) activities in enhancing soil phosphorus (P) availability. This study was aimed at determining: 1) the bacteria biochemical characteristics capable of soil P solubilizing, 2) the N-AHL production types and 3) the best plant roots extract as a N-AHL source. The PB species were determined using 16S rRNA analysis. The determination of the organic acids, phosphatase, phytase, N-AHL and dissolved P was carried out using HPLC, para-Nitro Phenyl Phosphate (pNPP), Na-phytate and spectrophotometry methods, respectively. The PB isolates obtained were classified as <i>Pseudomonas trivialis</i>, <i>P. putida</i> and <i>P. fluorescens</i>. The PB secreted citric, lactic, malonic, oxalic and acetic acids amounting to 156.25 mg. kg⁻¹. The PB phosphatase and phytase activities ranged from 12 to 47 mg PO₄³⁻ dm⁻³ h⁻¹. The P solubilized in the PB Pikovskaya inoculated was greater with the amounts between 147.66 and 194.61 mg P kg⁻¹ as control compared (31.06 mg P kg⁻¹). The PB inoculation also produced greater mineralized organic P (63.69 mg P kg⁻¹) than the control (23.7 mg P kg⁻¹). The PB secreted N-AHL greatest was butanoyl-AHL (C-4-AHL). The 30% of root extract corn seemed to be the best source of N-AHL as it could increase P dissolution even 300% in comparison with control variant.</p>
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