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Isolation, identification and characterization of phosphate solubilizing bacteria from rhizosphere soil of Aloe vera and *Vigna unguiculata*

H. J. M. Pasindu Chamikara* and E. A. A. D. Edirisinghe

Department of Microbiology, Faculty of Science,
University of Kelaniya, Sri Lanka
*pasindu.chamikara12@gmail.com

Phosphorus (P) is an essential element, which is next only to nitrogen, influencing plant growth and productivity. Unlike nitrogen, this element is not acquired through biochemical fixation, but comes from other sources to meet plant requirements. Phosphorus compounds in the soil can be categorized into three groups, including inorganic phosphate compounds, organic phosphate compounds of soil humus and organic/inorganic phosphate compounds associated with cells of living matter. Some of these are in insoluble form and some of them are in soluble form. Plants can absorb only the soluble part and soluble forms are infrequent than insoluble forms in soil. Phosphate Solubilizing Bacteria (PSB) can convert either insoluble organic phosphate or insoluble inorganic phosphate into soluble orthophosphates. They make phosphorus available for plants from insoluble organic and inorganic complex phosphorus sources by solubilization and mineralization. PSB were isolated from rhizosphere soil of *Aloe vera* and *Vigna unguiculata*, collected from Kuliyapitiya. Visual detection and even semi-quantitative estimation of the phosphate solubilization ability of microorganisms were carried out using serial dilution and spread plate method using Pikovskaya's Agar (PVK agar) medium. It showed clear zones around the microbial colonies in media containing insoluble mineral phosphates as the single P source. PVK agar plates were observed after incubating for 5 days and PSB strains were selected from the plates. Then selected strains were re-cultured in PVK agar medium. Then plates were observed after 5 days incubation and confirmed the PSB by clear zone formation. Morphological characterization of colonies was done by observing the appearance of colonies in PVK agar medium. Microscopic characterization was accomplished by Gram staining, motility test and endospore staining. Further biochemical tests and molecular biological tests were performed for further identification. Here, twenty-nine biochemical tests were carried out according to Cowan and Steel's manual. And molecular biological 16S rRNA sequencing was carried out for the confirmation of identified strains from biochemical tests. According to the results obtained, isolated strains were identified as *Pseudomonas aeruginosa*, *Achromobacter xylosoxidans* from *Aloe vera* and *Pseudomonas fluorescens*, *Bacillus subtilis* from *Vigna unguiculate*.

Keywords: Phosphate solubilizing bacteria, *Pseudomonas*, *Bacillus*

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