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**ISOLATION AND CHARACTERIZATION OF BACTERIA FROM PADDY
(*Oryza sativa*) FIELDS**

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Paddy (*Oryza sativa*) cultivation is integral to Sri Lanka's agriculture, as rice is the staple food of the country. Wide variety of microorganisms are in the Paddy *Jaffna, Sri Lanka* rhizosphere which play an important role on paddy growth and soil fertility. Modern paddy cultivation heavily relies on chemical fertilizers, which degrade soil health and productivity. This study was conducted to isolate and characterize plant growth-promoting rhizobacteria from local paddy fields. Soil samples were collected from Vaddakachchi Ramanathan farm and Paranthan rice research station in Kilinochchi district. Through serial dilution and plating in nutrient agar medium, 24 distinct bacterial isolates were obtained. Purified isolates were subjected to functional characterization for nitrogen-fixing ability, phosphate-solubilization ability, and plant growth promotion using a seed germination assay. Results revealed that isolate B1 showed significantly highest nitrogen fixing ability, followed by B8, A5, and A2. The phosphorus solubilization ability is less in all the strains and ranged below 1ppm. The seed germination test revealed that bacterial inoculation positively influenced paddy seed germination and seedling growth. The bacterial isolates B1, B8, B14, A2, and A5 showed higher seed germination percentage and vigour index compared to the control. Therefore, isolates B1, B8, A2 and A5 have the potential to be used as biofertilizers to improve crop productivity. This study indicates the potential of indigenous soil bacteria in enhancing plant growth-promoting traits. Further studies are needed to explore other plant growth-promoting traits and validate their effect in field conditions.

Keywords: Nitrogen fixing ability, Phosphate-solubilizing ability, Plant growth-promoting rhizobacteria, Germination assay