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Characterization of plant growth promoting bacteria isolated from *Megathyrsus maximus* rhizosphere; potential candidates for biofertilizers

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Certain groups of bacteria live in rhizosphere are beneficial for plant growth, protect from disease and abiotic stress. Therefore, this group of bacteria are called plant growth promoting rhizobacteria (PGPR). *Megathyrsus maximus* is a grass species, commonly found in Sri Lanka, is used as a fodder grass. This grass grows well under very harsh conditions and in nutrient poor soils. One of the reasons may be due to the microbial communities living in the root system which support acquiring minerals thereby capable to withstand under stress conditions. Therefore, the main objective of this study was to isolate bacteria from the rhizosphere of *M. maximum* and characterize the traits that are important for plant growth. In total, 36 bacterial isolates were isolated from exo-rhizosphere and six bacterial isolates from endo-rhizosphere. Differential abilities of bacterial isolates in nitrogen fixation, capacities of Zn, K and phosphates solubilizations, and IAA production *in vitro* were investigated in this study. Five exo-rhizospheric and one endo-rhizospheric isolate (E6) were found as good Zn solubilizers in ZnO and $ZnCO_3$ supplied as insoluble Zn sources. It was found that R19 showed significantly higher Zn solubilizing activity (100.78 mg/L) in ZnO supplemented broth whereas R24 showed the highest value (133.06 mg/L) in $ZnCO_3$ supplemented medium. Out of them three isolates were able to solubilize potassium in mica supplemented medium and the highest potassium solubilization was reported by R24 (23.41 mg/L) followed by E6 (21.81 mg/L). R19, R24 and E6 showed the highest phosphate solubilizing index. In total, seven isolates showed significantly higher nitrogen fixing ability in NFb medium. The highest amount of IAA (39.37 mg/L) was produced by bacterial isolate R24, followed by E6 (7.43 mg/L) and R8 (7.289 mg/L). According to our knowledge this is the first report of isolation and characterization of PGPR bacteria from grass species solubilizing Zn, potassium and phosphate along with other plant growth promoting traits such as nitrogen fixation and IAA production in Sri Lanka. These bacteria would be best candidates to develop as biofertilizers to be used in agriculture specially for fodder production.

Keywords: Grasses, mineral solubilization, plant hormones, PGPR

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