Characterization of rhizobacteria isolates from soil and nodules

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Abstrak

The plant growth promoting rhizobacteria (PGPR) is a group of bacteria capable of colonizing plants roots, thereby developing a system and improving plants growth and yield. The objectives of the study is to characterize the PGPR activities of several bacterial isolates {in-vitro screening), to examine their activities in stimulating soybean growth (in-vivo screening), and to identify the bacterial species. These were isolated from nodules and soil samples collected from Mount Pancar in Bogor, West Java Province as well as from Bangkirai Hill and Wain River in East Kalimantan, Indonesia. The in-vitro PGPR activity characterization includes the N-fixing ability, ACC-deaminase, indole acetic acid (IAA) production, cellulolytic activity, P-solubilization, Phosphomonoesterase (PME-ase), and nifH-gene detection. The in-vivo PGPR activity with the greenhouse assay was conducted on soybean plant {Glycine max L.). All bacterial isolates were identified using molecular methods based on nucleotide sequence generated from 16S rRNA gene. Three isolates of soil and nodule bacteria with 7 characteristics of PGPR (N2 fixation, ACC-deaminase, cellulolytic activity, IAA production, solubilization index, P available, and PMEase activity) were successfully identified. These isolates were B045 {Klebsiella variicola InaCC B827), B116 (Klebsiella sp. InaCC B833), and B210 {Mangrovibacterplantisponsorlaa.CC B841). The greenhouse assay showed that the plant height, plant dry weight and number of flowers in soybean seedlings significantly increased with Bradyrhispbium sp. strain 4167, then with Klebsiella sp. InaCC B833 and Mangrovibacterplantisponsor InaCC B841. These bacterial isolates which were characterized and screened in-vitro for PGPR potentials and their representative isolates which were identified by 16S rRNA sequence analysis are key factors for selecting PGPR isolates to be commercialized later as bio-stimulant.