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COMPARATIVE EFFECTIVENESS OF ACC-DEAMINASE AND/OR N FIXING RHIZOBACTERIA IN RICE (*ORYZA SATIVA L.*)

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Abstract

Plant growth promoting rhizobacteria (PGPR) are beneficial bacteria, which can enhance the growth of the plants, when applied to the crops. The study aimed to identify and select important rhizobacterial strains by using 1-aminocyclopropane-1-carboxylate ACC enrichment technique and examine their inoculation effects on the physical, chemical and enzymatic growth parameters of rice. For this a pot experiment was conducted and six PGPR isolates were used. Inoculation with rhizobacterial isolates increased all the measured physical, chemical and enzymatic growth parameters compared to control (CK). However, the AN1 isolate had a highest effect, and significantly ($P < 0.05$) increased the root length (3.8-fold), shoot length (3.4-fold), seedling fresh (3.3-fold) and dry (4.5-fold) weight, chlorophyll a (4.2-fold), chlorophyll b (3.6-fold), carotenoid contents (5.1-fold), plant macronutrient uptake i.e. N (5.0-fold, 5.4-fold), P (4.5-fold, 3.6-fold), K (4.3-fold, 3.4-fold), Ca (3.7-fold, 3.5-fold) and Mg (3.0-fold, 4.0-fold) in shoot and root, plant micronutrient uptake i.e. Zn (5.6-fold, 8.1-fold), Cu (5.0-fold, 5.1-fold), Fe (4.7-fold, 5.6-fold) and Mn (4.2-fold, 4.7-fold) in shoot and root and plant antioxidant enzymes i.e. glutathione S-transferase (6.8-fold), peroxidase (6.1-fold) and catalase (7.1-fold) respectively. Our results suggested that inoculation of agricultural crops with PGPR is a very useful approach to increase the plant growth. The ACC enrichment technique is an efficient approach to select promising PGPR. The PGPR containing both ACC-deaminase and N fixing ability are more effective than PGPR containing either ACC-deaminase or N fixing activity alone for growth promotion of crops.

Key words: ACC-deaminase, auxin, ethylene, N fixation, PGPR, rice

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