

Isolation and partial characterization of plant growth promoting endophytic diazotrophic bacteria from selected rice cultivars

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Rice is the staple diet in countries where rapidly growing populations, coupled to limited amounts of land and rare resources. Nitrogen fertilizer is one of the most important factors in the generation of high yields from rice. To avoid shortcomings of industrial fertilizer, biological nitrogen fixation by diazotrophic microorganisms in rice can be implicated. In this study, an attempt was made to isolate Endophytic Diazotrophic Bacteria (EDB) from different rice varieties, to estimate their abundance and to determine their morphological and biochemical characteristics. Two traditional rice varieties (Herath Banda and Madathawalu) and two new improved rice varieties (BW 364 and BW 372) were used. Shoot and root samples were collected from each variety. They were surface sterilized and inoculated into nitrogen-free semi-solid Nfb and LGI media to estimate population size of EDB by using MPN (Most probable number). The pellicle forming bacteria were isolated onto the same corresponding solid media and morphological and biochemical characteristics were determined for all bacterial isolates. In biochemical characterization, mineral phosphate solubilizing activity and quantitative analysis of Indole Acetic Acid (IAA) production were most specifically tested. The highest EDB population (8.20×10^3 MPN per kilogram fresh weight) found in shoots of Madathawalu. Nineteen nitrogen-fixing bacteria were isolated from all the rice varieties, belonged to species *Enterobacter intermedius*, *Serratia fonticola*, *Azomonas insignis*, *Vibrio campbellii*, *V. diazotrophicus*, *Azospirillum irakense*, *A. amazonense*, *A. brasilense*, *A. lipoferum*, *Azoarcus communis* and genera *Azovibro*, *Flavobacterium*, *Beijerinckia* and *Herbaspirillum*. Three diazotrophic isolates produced 2.08 to 63.87×10^{-6} kg l^{-1} of IAA in the presence of tryptophan. The highest IAA content was produced by the diazotrophic bacterium IN007 (*Enterobacter intermedius*) which was also the best mineral phosphate solubilizer among other diazotrophs isolated. Herath Banda, Madathawalu, BW 364 and BW 372 harbored 2, 9, 3 and 5 bacterial isolates respectively out of 19 isolates identified.