

Production of hydrolytic enzymes in rice (*Oryza sativa* L.) roots inoculated with N₂-fixing bacteria

ABSTRACT

An experiment was conducted to determine the production of hydrolytic enzymes endoglucanase (EG) and endopolymethylgalacturonase (EPMG) in rice (*Oryza sativa* L.) roots inoculated with N₂-Fixing bacteria. Screening for hydrolytic enzymes by N₂-Fixing bacteria, using the plate method showed that nine out of 12 bacterial strains were positive for carboxymethylcellulose (CMC) and pectin reactions. Three of the isolates, Sb34, Sb41 and Sb42 were inoculated to MR219 rice seedling. The bacterial population and the production of hydrolytic enzymes were monitored for 45 days of plant growth. The scanning (SEM) and transmission electron microscopy (TEM) were used to observe bacterial colonization on plant roots. In general, the populations of inoculated diazotrophs were higher in the rhizosphere than the endosphere. There were significant effects of different diazotrophs inoculations on the rice rhizosphere and endosphere populations. Plants inoculated with diazotrophs showed significantly higher specific enzyme activities and soluble proteins compared to the non-inoculated control. SEM and TEM observations revealed the abilities of the diazotrophs to colonize the surfaces and interior of the roots. Inoculation significantly increased root growth of rice with substantial increase in root length, volume and surface area in the inoculated plants.

Keyword: Rice (*Oryza sativa* L.); Endoglucanase (EG); Endopolymethylgalacturonase (EPMG); N₂-Fixing Bacteria