RESEARCH PAPER | Asian Journal of Bio Science, Volume 8 | Issue 1 | April, 2013 | 63-68
Received : 26.12.2012; Revised : 15.02.2013; Accepted : 17.03.2013

Screening of diazotrophic bacterial communities from wild rice (*Oryza indica*) and cultivated rice (*Oryza sativa*) and their plant growth promoting activities

C. SARATHAMBAL[1], K. ILAMURUGU[1], S. ARUN[2] AND L. SRIMATHI PRIYA[1]

[1]Department of Agricultural Microbiology, Tamil Nadu Agricultural University, COIMBATORE (T.N). INDIA
[2]Department of Soil Science and Agricultural Chemistry, Tamil Nadu Agricultural University, COIMBATORE (T.N.) INDIA

Email: saratha6@gmail.com; ilamuruguk@gmail.com; arun99005@gmail.com; agrisriya@gmail.com

A study was undertaken to screen the free living, culturable diazotrophic bacteria from wild rice (*Oryza indica*) and cultivated rice (*Oryza sativa*) and their plant growth promoting activities. Out of forty eight diazotrophic isolates, thirty eight isolates recorded positive growth in N-free medium which were further analyzed for total nitrogen and ammonia. Based on total nitrogen and ammonia production, twenty eight diazotrophic isolates were selected for nitrogenase activity. The highest nitrogenase activity was exhibited by isolate GDR16 (4134±56.6 nm of ethylene mg^{-1} $protein^{-1}$ hr). For PGPR activity 11 isolates from *O.indica* and 9 isolates from *O.sativa* with elite nitrogenase activity were selected for PGPR as well as mineral solubilization studies. Out of these 20 diazotrophic isolates, 11 isolates showed IAA production. The maximum amount of IAA was produced by CBE1 (35.5 ±1.14µg ml^{-1}). The highest amount of GA was produced by GDR13 (21.7±0.19 µg ml^{-1}), followed by GDR 7 which produced 18.4±0.23 µg ml^{-1}. The maximum siderophore production was recorded with CBE1 (43.94 ±0.64µg mg^{-1} dry weight of cell of catechol type). With respect to mineral solubilization, 17 were able to solubilze the insoluble phosphorus and 7 were able to solubilze the zinc. The results of the present study showed the diazotrophic bacteria associated to both wild and cultivated rice and it having variety of plant growth promoting substances in considerable amounts apart from diazotrophy.

Key words : Rice, Diazotrophs, *Oryza indica, Oryza sativa*, PGPR

How to cite this paper : Sarathambal, C., Ilamurugu, K., Arun, S. and Priya, L. Srimathi (2013). Screening of diazotrophic bacterial communities from wild rice (*Oryza indica*) and cultivated rice (*Oryza sativa*) and their plant growth promoting activities. *Asian J. Bio. Sci.*, **8** (1) : 63-68.

INTRODUCTION

Rice (*Oryza sativa* L.) is the staple diet of over 40 per cent of the world's population making it the most important food crop currently produced (Hossain and Fischer, 1995). Much of this rice is grown in countries where rapidly growing populations, coupled to limited amounts of land and scarce resources, make high yields per hectare with reduced inputs essential to avoid food shortages. Rice shows a remarkable diversity because of its long history of cultivation and because of its selection under various climatic, edaphic and biotic environments in geographically diverse areas (Lu and Chang, 1980). It is arguably the most important crop among the world's inhabitants, that enhances nitrogen fixation during the rice root-bacterial association under flooded soil conditions and attracted a great deal of interest for a long time. Crop productivity is based on numerous variables including weather, soil type, moisture and nutrients. One of the most important factors in the generation of high yields from modern rice crops is the nitrogen fertilizer, without which yield of the present varieties is drastically limited. Inspite of biological nitrogen fixation in wetland rice fields contributes significantly to the long term fertility of these systems (Roger and Ladha, 1992).

Based on these studies, several species of diazotrophs, such as *Klebsiella* (Ladha *et al*., 1983; Fujii *et al*., 1987), *Alcaligenes* (You and Zhou, 1989) and *Azospirillum* (Baldani and Dobereiner, 1980) have been isolated from the rhizosphere of wetland rice. In contrast, wild species of *Oryza indica* (wild rice) grow in marshlands of the tropics and subtropics where most of these survive as perennial plants (Sato, 1994). Therefore, wild rice are likely to harbour unique populations of bacteria that differ from those in extensively bred modern varieties of rice subjected to the application of various