

Effect of selected bacteria isolates on the yield of three improved Rice (*Oryza sativa*) varieties under greenhouse condition

L.G.I. Chathurika¹, G. Senanayake², E.P. Greenberg³, Mandic Mulec Ines⁴ and S. Geekiyanage^{2*}

¹Faculty of Graduate Studies, University of Ruhuna, Mapalana, Sri Lanka

²Department of Agricultural Biology, Faculty of Agriculture, University of Ruhuna, Mapalana, Sri Lanka

³School of Medicine, University of Washington, Seattle, USA

⁴Department of Food Science and Technology, Biotechnical Faculty, University of Ljubljana, Večna pot 111, 1000 Ljubljana, Slovenia

Abstract

Rice (*Oryza sativa*) supplies the staple food for nearly 50% of the global population. Higher rice production for increasing population is achieved through intensive agricultural practices including the use of chemical fertilizer. Excessive use of chemical fertilizers has adverse effects on human health and the environment. Plant Growth Promoting Bacteria (PGPB) are an alternative to the chemical fertilizer. Determination of the efficient PGPB for selected crops is essential for improvement of their productivity. The objective of this study was to determine the effect of two selected bacteria isolates of rice (I-1 and I-2) on the crop duration and yield of three improved rice varieties under greenhouse condition. The Experiment was conducted at Faculty of Agriculture, University of Ruhuna, Mapalana (in ecological zone WL2), from August to December 2018 at average monthly temperatures of 33.23 °C±1.59, 34.16 °C±3.79, 35.26 °C±3.26, 33.8 °C±1.6 and 32.4°C±1.79. Surface sterilized seeds of three improved rice varieties Bg 300, At 308 and Bg 379/2 were inoculated using the two bacteria isolates, I-1 and I-2. The treatments were laid in a completely randomized design (CRD) with five replicates. The days to flowering (DF) of each treatment were recorded and the number of grains per first panicle (GP) was measured as a yield component. Data was analyzed using SAS software for ANOVA and Duncun's Multiple Range Test (DMRT) for mean separation. The plants of Bg 300 and Bg379/2, inoculated with I-1, reported significant low DF as 114.5±1.25 and 112.5±0.86 in contrast to those of control plants of 117.5±0.5 and 118.5±1.22 DF, respectively. The Bg379/2 plants inoculated with I-2 (of 114.5±0.25 DF) also flowered early in contrast to control plants. Plants of Bg 300 and Bg 379/2 with I-1, produced the highest GP as 134±7.35 and 157±11.2, respectively over those of the control plants of Bg 300 and Bg 379/2 (105.75±6.98 and 132±2.94 respectively). Bacteria inoculation did not affect DF and GP in the variety At 308 indicating the differences in varietal responses on the inoculation. Variety and location interaction must be investigated for I-1 under field conditions for its utilization as a bio-fertilizer for rice in the future.

Keywords: Plant Growth Promoting Bacteria, Rice, Yield

*Corresponding Author: sudarshanee@agbio.ruh.ac.lk