



## Characterization and Evaluation of Two Bacterial Isolates for their Plant Growth Promoting Abilities on Rice Grown under Selected Agro Ecological Regions of Low Country Wet Zone of Sri Lanka

L.G.I.Chathurika<sup>a</sup>, I. Mandic-Mulec<sup>b</sup>, E.P.Greenberg<sup>c</sup>, G.Senanayake<sup>d</sup>, and S.Geekiyana<sup>d</sup>

<sup>a</sup> Faculty of Graduate Studies, University of Ruhuna, Sri Lanka.

<sup>b</sup> Biotechnical Faculty, University of Ljubljana, Slovenia.

<sup>c</sup> Department of Microbiology, University of Washington, USA.

<sup>d</sup> Faculty of Agriculture, University of Ruhuna, Sri Lanka.

### Abstract

The necessity of alternative fertilizers has emerged as an alarming problem in Sri Lankan agriculture. The lack of knowledge on the suitability of plant growth-promoting (PGB) bacteria for different agro-ecological regions is a major concern in developing alternative biofertilizers for Sri Lankan rice cultivation. The objective of this study is to characterize two bacterial isolates (I-1 and I-2) for their PGP abilities and evaluate their potential on improved rice in greenhouse and field conditions in the Low Country Wet Zone (LCWZ) of Sri Lanka. According to biochemical characterization, both bacterial isolates exhibited potential for PGP abilities, including phosphate solubilization, protease activity, and catalase activity. Both isolates were endophytes according to Scanning Electron Microscopic images. Sri Lankan improved rice variety Bg 300 significantly responded to both bacteria inoculation under *in vitro* conditions. The above experiment was extended under greenhouse conditions with three improved rice varieties of Bg 300, Bg 379/2, and at 308. Bacteria inoculated Bg 379/2 reported significantly lower days to flower, while Bg 300 and Bg 379/2 produced the highest number of grains per first panicle ( $134 \pm 7.25$  and  $157 \pm 11.2$ ) compared to the control plants ( $105 \pm 6.58$  and  $132 \pm 2.94$  respectively) under greenhouse condition. The above experiment was further extended to the field level with improved rice variety Bg 300 in two locations. The experiment was carried out with treatments of I-1 inoculation, I-2 inoculation, recommended dose of inorganic fertilizer (F), and the recommended dose of inorganic fertilizer with each isolate (I-1+F and I-2+F) and non-inoculated non-fertilized condition respectively. Bacteria inoculation (I-1 and I-2) positively responded to the yield of rice variety Bg 300 in the tested fields. Further, bacteria inoculation could replace inorganic fertilizer for the yield of rice variety Bg 300 in the tested fields in the LCWZ (WL1 and WL2). Therefore, the findings of this study will be useful in developing a biofertilizer for LCWZ in the future.

Keywords: *Low Country Wet Zone, Inorganic Fertilizer, Plant Growth Promoting Bacteria, Rice, Yield*

Corresponding Author: [sudarshanee@agbio.ruh.ac.lk](mailto:sudarshanee@agbio.ruh.ac.lk)