

Abstract 55 – Paper ID: 076**Microbial Biotechnology Approach: Synergistic Plant Growth Promoting Rhizobacterial Consortia for Sustainable Chakhao Cultivation**

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Abstract

Rhizobacterial communities associated with Chakhao (black scented rice) remain largely underexplored, particularly regarding their potential to enhance crop growth and vigor. In this study, special emphasis was placed on identifying a compatible and efficient PGPR consortium capable of improving plant development. Among the screened isolates, *Enterobacter cloacae* SAY12 exhibited the strongest plant growth–promoting profile, showing positive responses across all evaluated PGP attributes, including phytohormone production, nutrient mobilization, and siderophore activity. *Bacillus subtilis* SAK2, while also demonstrating notable growth-promoting traits, was further recognized for its ability to provide disease protection, displaying inhibition levels of 65% against *Rhizoctonia solani*, 64% against *Fusarium oxysporum*, and 41% against *Curvularia oryzae*.

Growth optimization and compatibility assays revealed that the SAY12–SAK2 combination formed the most synergistic consortium when compared to other PGPR groupings. This compatible pair significantly enhanced seed germination under sterile blotting paper conditions and improved early plant growth in nutrient-enriched agar medium. Plants treated with the consortium consistently outperformed uninoculated controls, showing increased vigor, better root–shoot development, and stronger establishment. These findings highlight the consortium of SAK2 and SAY12 as a promising bioinoculant for boosting growth, productivity, and overall plant health in Chakhao rice.

Keywords: Chakhao, Bacterial Consortium, PGPR, Biocontrol, Bioinoculant, Sustainable agriculture