

THE FATE OF SOIL-INOCULATED ACTINOMYCETES IN RICE RHIZOSPHERE AND RHIZOPLANE

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Actinomycetes, filamentous Gram-positive bacteria, play a vital role in the rhizosphere by fostering plant growth through diverse mechanisms, such as nutrient solubilization, synthesis of plant growth-promoting hormones, and acting as antagonists of plant pathogens. Ten rhizospheric actinomycete isolates (T1-T10) which were confirmed for their capacity to fix nitrogen and solubilize phosphate in vitro were tested for their survival in paddy soil after inoculation. A pot experiment was conducted in a completely randomized design using three replicates per treatment under greenhouse conditions. Two-week-old rice seedlings (Bg 360) were grown in pots with sterilized paddy soil and then inoculated either separately with ten isolates or collectively as a consortium of all ten isolates. All eleven treatments were tested compared to the non-treated control. Starch casein agar medium supplemented with nystatin and nalidixic as the antibiotics was used to enumerate actinomycetes in paddy rhizosphere and rhizoplane following the dilution plate technique with enumeration was conducted up to eighth-week post-inoculation. Growth parameters including root volume, shoot length, and dry and fresh weights of shoots and roots were measured in the sixth week after seeding. Statistical analysis for both parametric (ANOVA) and non-parametric (non-parametric ANOVA) methods was performed using SAS Studio. Results revealed a decline in colony-forming units (CFUs) for all isolates except T3 and T11 over time in both rhizoplane and rhizosphere. However, T3 and T11 did not exhibit a significant reduction in CFUs ($p>0.05$) in the rhizosphere throughout the study. Rice plants inoculated with T3 exhibited significantly higher performances for all tested growth parameters. The root volume was elevated in both treatments inoculated with T3 alone, and those inoculated with the consortium. In conclusion, this study underscores the importance of the T3 strain and consortium comprising all ten isolates of actinomycetes in promoting plant growth performance, highlighting their potential for application in rice cultivation.

Keywords: Colony-forming units, Isolate consortium, *Oryza sativa*, Rhizosphere dynamics