

ASSESSMENT OF PHOSPHATE SOLUBILIZATION OF *RHIZOBIA* ISOLATED FROM *Sesbania grandiflora*

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Rhizobia exhibit the ability to solubilize phosphate (P) in the soil apart from their primary function of nitrogen fixation. Hence, this study assessed and characterized *Rhizobia* isolates from *Sesbania grandiflora* root nodules for their potential in P solubilization. Two experiments were conducted under laboratory conditions arranged in a Complete Randomized Design with three replicates to isolate and identify the most effective P solubilizer. All data were analysed using analysis of variance, and means were separated using the LSD test. The trap plant method isolated four bacterial strains (a, b, c, d) from root nodules. They were initially identified based on morphology and authenticated through Gram staining, Acid-alkaline tests, CRYMA, and BRYMA tests. The most effective *Rhizobia* for P solubilization was identified based on the Phosphorus Solubilization Index (PSI) and total solubilized P in Pikovaskya (PVK) solid and liquid media. Subsequently, optimization of PVK liquid media was conducted using the most effective isolate, testing various carbon (C), nitrogen (N), and phosphorus (P) sources. For media optimization, the four isolates were considered separate treatments and a control with no strains. According to the results, initial isolates were confirmed as *Rhizobia* based on colony morphologies. All isolates were gram-negative and exhibited acid production, further authenticated as *Rhizobia*. The significantly ($p<0.05$) highest PSI was recorded with isolate “c” and it also exhibited the highest ($p<0.05$) solubilized P. The PVK medium was optimized for isolate “c” and Potassium di-hydrogen phosphate (35.1 ± 0.46 ppm), Glucose (25.47 ± 0.49 ppm), and Ammonium sulphate (3.20 ± 0.17 ppm) were identified as the best C, P, and N sources, respectively, for achieving significantly higher solubilized P with *Rhizobia* “c”. Finally, it can be concluded that *Rhizobia* “c” is an effective P solubilizer. However, further studies are needed to evaluate the performance of *Rhizobia* “c” before introducing it as a P-solubilizing inoculum.

Keywords: Media optimization, Phosphorous solubilization, P solubilizing inoculum, *Rhizobium*