Isolation and Identification of Efficient Phosphate Solubilizing Bacteria from Soil and Its Effect on Growth and Yield of *Zea mays*

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Phosphorus is an essential element for plant growth and development. However, phosphorous is highly insoluble and unavailable to the plant uptake when phosphate anions react with Ca^{2+}, Mg^{2+}, Fe^{3+} and Al^{3+}. Phosphate solubilizing microbes can solubilize unavailable forms of phosphorous and make them available to the plants. The present study aimed at identifying the phosphate solubilizing bacteria and evaluates their performance in *Zea mays* plants. Bacteria were isolated from rhizosphere soil of *Zea mays* variety *Bhadra* and screened for P solubilizers on Pikovaskaya's (PVK) agar plates using phosphate solubilizing index. Molecular identification of the isolates were performed using 16S rRNA gene sequencing. A pot experiment with CRD design and three replicates was conducted with the following treatments. T1- soil, T2- soil + compost, T3- soil + compost + microbes, T4- soil + compost + biochar, T5- soil+ compost+ biochar + microbes, T6 – soil + ERP (Eppawala Rock Phosphate), T7- soil + ERP + compost, T8- soil + ERP +compost+ microbes, T9- soil + ERP + biochar, T10- soil + ERP + biochar + microbes. Growth and yield parameters of maize plants were measured. Data were analyzed by SAS statistical package and mean separations was done by Duncan's multiple range test at 5% significant level. Out of 13 strains isolated, PSM I had highest phosphate solubilizing index (2.43) and was selected for pot experiment. The strain was identified as *Streptomyces naganishii* by 16S rRNA gene sequencing. Application of soil + compost + biochar + ERP + microbe treatment resulted the highest growth and yield data. Yield per plant was higher in *S. naganishii* inoculated treatments namely T3, T5, T8 and T10 compared to their non-inoculated treatments (T2, T4, T7 and T9). Higher 100 seeds weight was shown by T3 (31.4 g), T5 (30.8 g), T8 (32.0 g) and T10 (33.1 g) than non- inoculated treatments. In conclusion the identified phosphate solubilizing bacteria *S. naganishii* can be utilized successfully to increase the growth and yield of *Zea mays*.

Keywords: Phosphate solubilization, *Streptomyces naganishii,* Rhizosphere, *Zea mays*