

Isolation of phosphate solubilizing bacteria from soil and its application in plant growth promotion: As a green approach

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Phosphate is an essential nutrient for plant growth, playing a significant role in different physiological and biochemical processes. Phosphate-solubilizing bacteria (PSB) have emerged as eco-friendly and sustainable alternatives to chemical fertilizers, enhancing soil fertility and promoting plant growth. PSB convert the insoluble phosphate into the soluble form by using different mechanisms. The aim of the present study is to assess the application of PSB as a biofertilizer. Pikovskaya's agar medium was used to isolate PSB strains. Isolated bacteria strains were labeled as PSB-A, PSB-B, and PSB-C. The effects of isolated bacteria strains were determined using a pot experiment. Gram stain, motility test, starch hydrolysis test and catalase tests were done as biochemical tests. Isolated bacteria strains were inoculated into the prepared potting medium, which consisted of soil and compost in a 1:1 ratio. The effect of PSB strains on plant growth was studied using *Vigna radiata* (Mung bean). Plant growth parameters (Shoot and Root length) were recorded after 21 days. The bacterial concentration on plant growth was determined as an optimization study. PSB strains inoculated pots showed a significant increase for both shoot and root lengths in comparison to the control ($n = 9$, $p < 0.05$). Potting media consisting of PSB-A showed the best results; the highest root length (6.9 ± 0.8 cm) and the highest shoot length (27.8 ± 2.1 cm). The optimization study proved that there is a significant effect of the concentration of microbial biomass on plant growth. Hence, isolated PSB-A, PSB-B, and PSB-C are recommended as suitable biofertilizer strains for potting medium.

Keywords: Biofertilizer, PSB strain, Phosphorus, Plant growth

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