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Phosphate solubilization and chromium (VI) remediation potential of *Klebsiella* sp. strain CPSB4 isolated from the chromium contaminated agricultural soil

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Abstract

In this study, an effort was made to identify an efficient phosphate solubilizing bacterial strain from chromium contaminated agricultural soils. Based on the formation of a solubilized halo around the colonies on Pikovskaya's agar amended with chromium (VI), 10 strains were initially screened out. Out of 10, strain CPSB4, which showed significantly high solubilization zone at different chromium concentrations, was selected for further study. The strain CPSB4 showed significant plant growth promotion traits with chromium (VI) stress under in-vitro conditions in broth. The plant growth promotion activities of the strain decreased regularly, but were not completely lost with the increase in concentration of chromium up to 200 mg L^{-1}. On subjected to FT-IR analysis, the presence of the functional group, indicating the organic acid aiding in phosphate solubilization was identified. At an optimal temperature of 30 $^{\circ}$C and pH 7.0, the strain showed around 93% chromium (VI) reduction under in-vitro conditions in broth study. In soil condition, the maximum chromium (VI) reduction obtained was 95% under in-vitro conditions. The strain CPSB4 was identified as *Klebsiella* sp. on the basis of morphological, biochemical and 16S rRNA gene sequencing. This study shows that the diverse role of the bacterial strain CPSB4 would be useful in the chromium contaminated soil as a good bioremediation and plant growth promoting agent as well.

Keywords: Bioremediation; chromium stress; FT-IR; *Klebsiella* sp.; phosphate solubilization; plant growth promotion