Abstract

In the present study 14 bacterial strains were isolated from the rhizospheric soil of potato, wheat, and maize plants, mineral soil, and compost on the basis of their qualitative and quantitative screening. These strains solubilized phosphate in the range between 200 ± 0.01 µg/ml to 1597 ± 0.04 µg/ml in NBRIP broth medium. Among 14 isolates, 10 isolates tested positive for IAA production in TY broth. The isolates produced IAA in the range between 27 µg/ml to 94.25 µg/ml. HPLC analysis depicted the presence of organic acids e.g. lactic, acetic, formic and citric acid etc. The isolate A6 was selected as the most efficient PSB strain on the basis of quantitative screening, IAA production, and organic acid production. 16S rRNA sequence analysis depicted A6 strain as *Lysinibacillus macroides*. The maximum phosphate solubilization by *Lysinibacillus macroides* was achieved utilizing 20 g/L sucrose as carbon source, 0.1 g/L tryptone as nitrogen source, 7 g/L tri-calcium phosphate as phosphorus source, pH 7, 35ºC temperature, and incubation time of 9 days. *Lysinibacillus macroides* showed a significant increase in plant height (about 2.94 ± 0.04 cm), root dry biomass (about 56.14%), shoot dry biomass (about 77%), and also caused an increase in the number of leaves (about 4 leaves per plant), root length (about 89%) and shoot length (about 87%), when compared with the control. Therefore, it can be utilized as a potential biofertilizer that can help move sustainable agriculture forward by lowering the need for chemical fertilizers.