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Evaluation of phosphate solubilizing bacteria by their effects on lead (Pb) toxicity

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Lead (Pb) is regarded as a potent occupational toxin and its toxicological manifestations are well known. When soil is contaminated with lead plants would absorb it as it's a persistent contaminant. This lead poisoning can be detoxified by using physical, chemical and biological methods. Biological detoxification is defined as enzymatic degradation or transformation of toxins that leads to less toxic products. But a complete understanding of how these detoxification mechanisms influence their P solubilization is lacking. Microorganisms play an important role in the environmental fate of toxic metal including Pb with physiochemical mechanisms transformations between soluble and insoluble phases. Such mechanisms are important components of natural toxicity tolerance of heavy metal including Pb. Phosphate Solubilizing Microorganisms (PSMs) have specialized attributes for conversion of insoluble form of phosphate to soluble via methods like solubilization and mineralization. Therefore, this study was conducted to identify the capability of growth of PSMs in the presence of Pb. Agricultural soil was used to isolate the phosphate solubilizing bacteria and isolation was done by using National Botanical Research Institutes Phosphate (NBRIP) medium. 15 phosphate solubilizing bacterial isolates were found and their resistance to Pb was tested in a medium consist with different concentrations of Pb respectively 100ppm, 200ppm, and 400ppm. The survived bacterial strains were used to determine the phosphate solubilization under Pb toxicity. Survived bacterial strains were inoculated into NBRIP broth medium. Phosphorus solubilization, growth and pH were monitored respectively after 1, 3 and 5 days. Among 14 isolates 11 were growth in 100ppm, 10 were growth in 200ppm, and 7 were growth in 400ppm Pb concentration. 7 isolates from 400ppm Pb toxicity were used for further analysis of Phosphorus solubilization. Among them PSB-8 strain has shown a vigorous growth within a maximum Pb toxicity and has solubilized 72.02ppm phosphate under 400ppm Pb toxicity.

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