

Potential of Lead Tolerant and Mobilizing Fungus for Plant Growth Promotion through Plant Growth Promoting Activity; A Promising Approach for Enhance Phytoremediation

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Abstract : The potential of fungal isolates to be used in phytoremediation of widespread lead contaminated soil has been evaluated in this study. Five different fungal isolates (*Trichoderma harzianum*, *Penicillium simplicissimum*, *Aspergillus flavus*, *Aspergillus niger* and *Mucor* spp.) were obtained and tested for their tolerance to increasing concentration of lead (Pb) i.e. 100, 200, 300, 400 and 500 mgL⁻¹ on PDA and PDB culture experiment. All strains were tolerant up to 500 mgL⁻¹ following sequence; *A. flavus* > *A. niger* > *Mucor* spp. > *P. simplicissimum* > *T. harzianum*. Further the isolates were then monitored for possible effect on Pb solubility/mobility through soil incubation experiments and characterized for essays including pathogenicity, germination and root elongation and plant growth promoting activities including IAA (indole acetic acid), phosphorus solubilization and gibberellic acid (GA3) production. Results revealed that fungal isolates have positive effect on Pb mobility in soil and plant biomass production. Pb solubility was significantly ($P > 0.05$) increased in soil upon application of *Mucor* spp. *P. simplicissimum* and *T. harzianum*. when compared to control. Among different strains three isolates (*Mucor* spp., *P. simplicissimum* and *T. harzianum*) were nonpathogenic because no inhibitory effect of fungus was observed to plant growth when exposed to these strains in root shoot elongation essay. Particularly *T. harzianum* and *P. simplicissimum* showed great ability to increase root length by 1.1 and 1.3 folds and shoot length by 1.47 and 1.5 folds respectively under Pb stress (500 mgL⁻¹). Significantly high production of IAA was observed in *A. niger* (26.7 µg/ml), Phosphorus solubilization was observed in *T. harzianum* (9.15 µg/ml) and GA3 production was observed in *P. simplicissimum* (11.02 µg/ml). From results it is concluded that *Mucor* spp., *P. simplicissimum* and *T. harzianum* have potential to increase Pb mobility and improving plant growth under highy Pb contamination, therefore can be used in microbially assisted phytoremediation of Pb contaminated soil.

Keywords : Pb tolerant fungus, Pb mobility, plant growth promoting activities, indole acetic acid (IAA)

Conference Title : ICPTM 2017 : International Conference on Phytoremediation, Technologies and Methods

Conference Location : New York, United States

Conference Dates : June 04-05, 2017