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PHYTOTOXIC EFFECT OF LEAD ON THE GERMINATION OF ALFALFA SEEDS INOCULATED WITH NEW BACTERIAL ISOLATES

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Background: Contaminated soils pose one of a major environmental problem. This problem affects human health directly or indirectly, and may be partially addressed by new phytoremediation technology. The use of plants and soil microorganisms for the removal of heavy metals from polluted soils has become an important experimental and practical approach over the last 20 years.

Objectives: Isolation and selection of bacteria with high tolerance to lead (Pb) in the substrate was the main objective of this research. Plant growth promoting characteristics of the isolates and their effect on alfalfa seed germination were also tested.

Methods: Toxic effect of lead on the cultivation of newly isolated rhizobacteria and alfalfa seed germination (*Medicago sativa* L.) was examined. Isolates and seeds were treated with different lead (II) acetate trihydrate solution ($\text{Pb}(\text{CH}_3\text{CO}_2)_2 \cdot 3\text{H}_2\text{O}$), individually. Strains ability to produce PGP substances (siderophores, HCN, enzymes-amylases, cellulases, proteases, lipases) were tested in vitro. Seed germination index and effect of the isolates on root length and shoot height under stress conditions were analyzed.

Results: Eighteen isolates from alfalfa rhizosphere and root nodules were isolated and preliminary characterized as *Bacillus* spp. (7), *Rhizobium* spp. (10) and *Azotobacter* spp. (1). *Bacillus* sp. AMBK1 and *Rhizobium* sp. AMR7 with the highest metal tolerance and good PGP potential were used for seed inoculation, seed germination and plant nodulation testing. Seed inoculation with AMBK1 isolate improved root length and shoot height from 16 to 27% at all tested metal concentrations. *Rhizobium* isolate AMR7 was able to nodulate alfalfa under these stress conditions.