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SCREENING OF GROWTH PROMOTIONAL TRAITS OF FIVE METAL RESISTANT PGPR – POSSIBLE USES FOR PHYTOATTENUATION OF ZN AND CD CONTAMINATED LAND

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Maize is a fast-growing and high yield crop with both energy value and phytoattenuation potential. Plant growth promoting rhizobacteria (PGPR) constitute a biological alternative to enhance plant establishment in stressing environments such as heavy-metal contaminated soils. Although PGPR are able to produce metabolites such as indole-3-acetic acid (IAA), 1-aminocyclopropane-1-carboxylic (ACC) deaminase, siderophores, HCN and ammonia, these beneficial traits for the plant may be disrupted or decreased by metal exposure. In this study, five PGPR (*Pseudomonas fluorescens*, *Pseudomonas reactans*, *Ralstonia eutropha*, *Cryseobacterium humi* and *Agrobacterium tumefaciens*) were screened for those traits and for phosphate solubilization ability in the presence of different Cd/Zn concentrations. Furthermore, the effects of their inoculation on maize germination and seedling growth were assessed at different concentrations of Cd and Zn – 10, 30, 50 and 100 mg L⁻¹, and 100, 250, 500 and 1000 mg L⁻¹, respectively.

Results showed that generally with increasing metal concentration bacteria exhibited less ability to produce plant growth promoting substances, with some of the tested bacteria suffering a strong impact of metal concentration in their promotional traits. Nevertheless, generally, high production levels of ammonia, HCN and siderophores were found. ACC-deaminase and IAA levels were different between PGPR strains when exposed to the same metal level, showing dissimilar sensibilities of these mechanisms to the heavy metals. However, neither bacterial inoculation nor metal concentration had a significant effect on the germination rate of maize. Only *Pseudomonas fluorescens* was able to solubilize phosphate at all tested Cd concentrations and up to 250 mg Zn L⁻¹. Root and shoot elongation generally decreased with increasing metal levels, but vigor index showed that, generally, PGPR inoculation had a positive influence on plant growth parameters, increasing metal tolerance.

Results suggest that PGPR can be exploited to promote maize biomass production and tolerance in moderately contaminated land. Such knowledge may provide a new insight and ground our choices concerning beneficial(s) microorganism(s) potentially suitable for microbial assisted phytoattenuation.