

Characterization of Plant Growth Promoting Indigenous Bacteria Isolated from Rare earth Mineral Deposit of Coastal Region of Indian Rare Earth Ltd, Odisha

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ABSTRACT

Natural geochemistry of earth surface is the most dynamic, diverse and important for species survival and its evolution. Biogeochemical transformation of toxic natural elements by indigenous microorganisms mostly by plant growth promoting (PGP) bacteria proves to play a significant role in homeostasis of earth's surface chemistry and potential for making it suitable for agricultural production and reducing toxicity by amending organic matter to it. In the study we have isolated ten indigenous bacterial isolates from heavy mineral (rare earth mineral) deposit of coastal region of Indian rare earth ltd, Ganjam, Odisha. All the isolates were characterized for their potential role in plant growth-promotion in terms of production of ammonia, indole acetic acid (IAA), phosphate-solubilization ability, extracellular lytic enzymes, siderophore production, multi-heavy metal resistance and identified by morphological, biochemical and phylogenetic approach.

Almost all belong to *Bacillus* Sp. with three of them identified as *Staphylococcus* sp. 50% of the isolates were able to produce indole acetic acid (IAA) in the range of 2.10- 19.25 mg L⁻¹ with L-tryptophan. Six of the strains (60%) were able to solubilize insoluble calcium phosphate by changing medium pH, where IREB-9 found to be most potent as it showed highest solubilization index (90%). All the strains were positive for ammonia production and four with siderophores. 80% of the strains showed amylase activity, followed by cellulase, lipase, Chitinase and DNase.

All isolates were resistant against streptomycin, Chloramphenicol, nalidixic acid and polymixin- B, and among various heavy metals tested, except Hg, minimum inhibitory concentration (MIC) was found to be high for all. All the autochthonous bacterial strains showed all the agriculturally important traits that could improve plant cover and soil health in the same environment or can be used in other contaminated environment in future.

Keywords: Rare earth mineral, Indigenous bacteria, *Bacillus* sp., Plant growth promotion, Heavy metal, Contaminated environment