Siderophore production by streptomycetes-stability and alteration of ferrihydroxamates in heavy metal-contaminated soil.

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Details

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Abstract

Heavy metal-contaminated soil derived from a former uranium mining site in Ronneburg, Germany, was used for sterile mesocosms inoculated with the extremely metal-resistant Streptomyces mirabilis P16B-1 or the sensitive control strain Streptomyces lividans TK24. The production and fate of bacterial hydroxamate siderophores in soil was analyzed, and the presence of ferrioxamines E, B, D, and G was shown. While total ferrioxamine concentrations decreased in water-treated controls after 30 days of incubation, the sustained production by the bacteria was seen. For the individual molecules, alteration between neutral and cationic forms and linearization of hydroxamates was observed for the first time. Mesocosms inoculated with biomass of either strain showed changes of siderophore contents compared with the non-treated control indicating for auto-alteration and consumption, respectively, depending on the vital bacteria present. Heat stability and structural consistency of siderophores obtained from sterile culture filtrate were

shown. In addition, low recovery (32 %) from soil was shown, indicating adsorption to soil particles or soil organic matter. Fate and behavior of hydroxamate siderophores in metal-contaminated soils may affect soil properties as well as conditions for its inhabiting (micro)organisms.

Involved units

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