

Microbial Processes used for Heavy Metal Remediation

R. Galimska-Stypa
University of Silesia
Katowice, Poland

The processes by which microorganisms interact with toxic metals are very diverse. However, in practice, there are three general categories of biotechnological process for treating soil containing toxic metals: biosorption (bioaccumulation), extracellular precipitation and uptake by purified biopolymers and other specific molecules derived from microbial cells. Biosorption is a physico-chemical process of metal binding to microorganisms and bioaccumulation is an active process using natural or recombinant microbial biomass to absorb metal ions. Among them, the biosorption (bioaccumulation) has been one of the most active processes. The aim of this study was to determine if a bacterial biosorption and bioaccumulation systems could be used to remove metals from polluted soil and whether the organic acids - compounds produced by plants (e.g. carboxylic acids) have effect on these processes. Organic acids of small molecular weight (oxalic and malonic acids) and organic acids, which have a long chain (succinic and glutaric acids), were used. The soil heavy metals-resistant isolates defined as *Pseudomonas* sp. and *Arthrobacter* sp. have the capacity to remove large quantities of Ni, Pb and Cd from Minimal Medium. There was a direct correlation between the chain length of organic acids and the extent of bioaccumulation of Ni and Cd. Generally organic acids with smaller molecular weights were more effective than the organic acids which have a long chain. Such correlation was not observed in case of Pb. The smaller effect on bioaccumulation was observed for *Arthrobacter* sp. in the presence of organic acids than for *Pseudomonas* sp.