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MICROBIAL REMOVAL OF TOXIC METALS FROM A HEAVILY POLLUTED SOIL

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Abstract: Samples of a leached cinnamonic forest soil heavily polluted with uranium and some toxic heavy metals (mainly copper, zinc and cadmium) were subjected to cleaning by means of bioleaching with acidophilic chemolithotrophic bacteria. The leaching of the soil was performed by stimulating the activity of these bacteria to leach and remove the pollutants from the horizon A to the deeply located horizon B_2 in which pollutants were precipitated by stimulating the activity of the indigenous sulphate-reducing bacteria. The treatment was carried out in a green house in which several plots containing 150 kg of soil each were constructed. The effect of some essential environmental factors such as pH, humidity, temperature and contents of nutrients on the cleaning process was studied. It was found that under optimal conditions the content of pollutants were decreased below the relevant permissible levels within a period of 170 days. The soil cleaned in this way was characterized by a much higher production of biomass of different plants (alfalfa, clover, red fescue, vetch) than the untreated polluted soil.

Keywords: soil clean up; soil bioremediation; chemolithotrophic bacteria

1. Introduction

The pollution of waters and soils by toxic heavy metals is a serious environmental problem in many countries, especially in these with intensive industrial development and/or with a large-scale recovery of such metals from the relevant mineral deposits. The pollution is due to