Introduction

1. INTRODUCTION

Metal and organic compounds contaminated soils pose a major environmental and human health hazard. In nature metals are found throughout the earth, in rocks, soils and sediments primarily trapped in some stable form. Yet, through natural processes such as weathering and erosion, small amounts of metals are removed from bedrock and circulate in ecosystems. On other hand, humans have been introducing metals into the environment through combustion of fossil fuels (Coal, oil, natural gas), metal manufacturing plants, mines and smelting of ores, urban, agricultural run-off and sewage effluents. Decontamination of soils polluted with heavy metals and organic compounds is one of the most intractable problems of clean up technology. Techniques currently in use are based on either immobilization in situ or extraction by physiochemical methods. They require sophisticated equipment and are accordingly expensive and appropriate only for small areas where rapid and complete decontamination is required.

Bioremediation, the use of living organisms to treat contaminants, is increasingly favored by both the public and private sectors as an alternative method for remediating contaminated soils due to its low coasts and minimal environmental impact. Bioremediation methods involve both phyto (or green plant based-) and microbial remediation technologies.

Phytoremediation can be characterized as a long term remediation process. In many cases, phytoremediation may be

used as a follow up technique to remediate low level concentrations of contaminants in soil.

Some native plant species are able to accumulate usually high concentrations of potentially phytotoxic elements such as Cd, Co, Ni, Pb, Cu, Mn, Zn and Fe from soil. Much of the optimism that phytoremediation can be developed as a technology is based on a growing list of studies that documented an increase in the disappearance of xenobiotics from soils that have been planted (vs. unplanted)

Microbial remediation of soils contaminated with organic compounds is one of the most effective innovative to come along nowadays. It is routinely applied to soils contaminated with such chemicals as petroleum, hydrocarbons and pesticides.

The present investigation aims at (i) evaluating the potential of maize and geranium plants to uptake and accumulate Fe, Mn, Zn and Cu (which are consider essential micronutrients for plants at certain levels but can become phytotoxic at higher levels) as well as the metal ions with no known physiological function in plants such as Cd, Co, Ni and Pb, (ii) enhancing phytoextraction of heavy metals from contaminated soils by increasing and maintaining the bio-availability of these metal ions in soil solution through application of several soil treatments (elemental sulfur, composted manure and EDTA). Also, bioremediation of soil contaminated with organic compounds was of important concern in this investigation.