Chapter 7
Phytormediation Efficiency Increased by Using Plant Growth Promoting Bacteria (PGPB) and Chelates

ABSTRACT

In this chapter, the authors give information about the plant-growth-promoting bacteria and chelating agents removing high number of contaminants with the help of phytoremdiation technology. To the best of the authors' knowledge, this is the first chapter about heavy metal contamination in groundwater and soil removing by microbes and chelates.

INTRODUCTION

Phytoremediation is a cost-effective method for the remediation contaminated sites. In the present review, our major objective is to concisely evaluate the progress made so far in improvement of phytoremediation efficiency using different tools. The current discussion is about plant growth promoting bacteria (PGPB), chelating agents for improvement of phytoremediation efficiency. This chapter discusses about the background, concepts and current future trends in phytoremdiation technology. Soil is one of the most important elements necessary for human survival and development with the increased industrilization and urbanization source. Heavy metals contaminants have

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happen to a severe problem to human health, and extensively severly affected to the environment that face very vast problem in world. Soil contamination basically most affected to the agriculture and increase with the urbanization problem; so it is well invested that all country will focus to solve these problems very soon otherwise it will pay extensively very high cost with human health. In 1980 many efforts were undertaken by European countries and also for US Congress Passed the Comprehensive Environment Response and Compensation and Liability. In the 1990s, Britain also passed the Environmental Protection Act for the same purpose here we discuss but compared with the developed countries, research and investments are not encouraged in developing countries such as India and China". Several remediation technologies are used such as land fill, excavation, thermal treatment, retrieval by means of electricity and leaching of acids but those are not suitable due to their high cost and very less effective, and less reliability on the specific metal contamination with site and its properties. The technology basically employs physical, chemical and biological remediation for removing contaminants.

PHYSICAL REMEDIATION

Physically remediation is the enhancement process for soil without addition of any other compounds such as 'chemicals. This method is useful for minute contaminated soil and done by surrogating contaminated soil and by thermal desorption method. The replacement of polluted soil aims to reduce the concentration of a pollutant in a particular area and to the improve soil quality by physical remediation method (Zhang et al., 2004). The soil replacement is divided into three steps: replacement, importing, spading. In soil replacement method, the polluted rhizosphere is replaced by new soil, applicable only in a very small area; new soil should be treated properly for remediation. In soil spading (the area of unhygienic soil is dug deeply and the noxious wastes) are spread completely into the subterranean sites to achieve dilution and natural remediation process. A great deal of clean and pure soil is imported and mixed properly into the polluted soil to cover it completely and the concentration of pollution is ultimately reduced. However this method have a large functioning capacity to remove contaminants, second one is cost deal method; suitable for small area pollution (Zhou et al., 2004). Heavy metal can be removed from the surface and remain in a very minute amount for thermal desorption which is based on the instability of noxious wastes. Thermal desorption can be further classified into high temperature