Chapter 1
Introduction to Phytoremediation

ABSTRACT

In this chapter, the authors describe phytoremediation technology, which is helpful for remediation of contaminated soil and groundwater. This information can be used for water and soil purification and may contribute to successful transfer of phytotechnologies to the agricultural or commercial sectors.

INTRODUCTION

Phytoremediation is a technology that uses plants for remediating soils and ground water. The processes of phytoremediation include number of techniques (phytodegradation, phytoextraction, phytostabilization, phytovolatilization and phytostimulation) showed in (figure 1). It is currently an exciting area of active research now to clean up the environment. A promising approach to low cost remediation technologies is phytoextraction, the use of plants to clean up polluted soils. Heavy metals are the most important inorganic pollutants, which are not degraded and progressively accumulate in the environment. Heavy metal pollutants are mostly resulting from industries such as; chemical fertilizers, chemical reagents, industry wastes and most important used in agriculture field herbicides and pesticids.

Pollution also comes from long sewage sludge, vehicle exhaust and several sources of waste water and it causes severly effects on plants, animal, soil, human beings and also on beneficial microbes which use for improvement of

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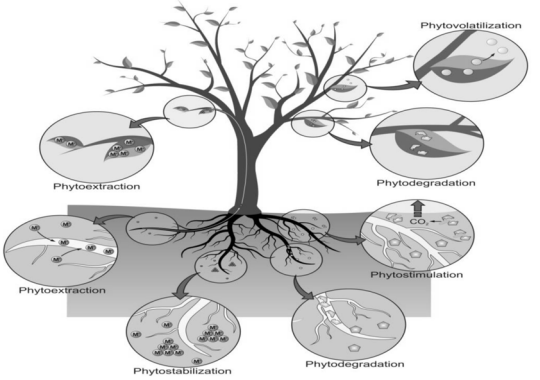
Figure 1. Different kinds of phytoremediation used for cleaning polluted soil and water



crops. These contaminants accumulate in soils and after that crop uptake their contaminants and move into the food chain of humang being and also living organisms (Tak et al., 2013). The mainly general heavy metals (Cd, Cr, Hg, Se, Mn, Ni, Cu, Mg, Pb) significantly effect on environment and ecological evolutionary (Allen, 2014; Orisakwe, 2012). So, plants have the ability to translocate and accumulate metals in their organs and cells; i.e phytoextraction processs. There are different steps that involve in phytoextraction process (i) uptake and bioavalibity (ii) translocate of heavy metals (iii) sequestration of metals in leaves and vacuoles. High amount of heavy metals concentration accumulate in plant organs is not usually a naturally process for favoured reaction some how it's the plant capability to uptake more than other plants. Under conditions dependent mechanism are favoured reactions in specific plants to uptake the nutrients more than limits. In this condition plant defence system mechanism play a role for metabolic, physiological and expressional changes under stressful conditions caused by different pollutants. Studies can be required in details for known hyperaccumulators plants to enhance its phytoremdiation process.