

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.

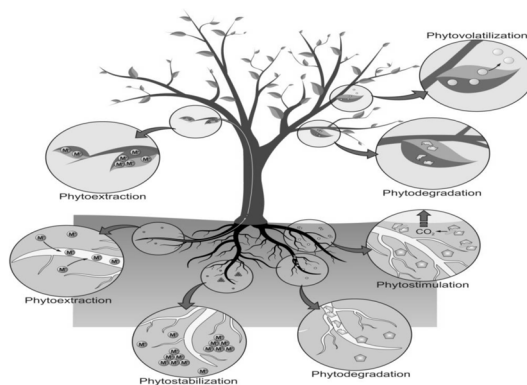
INTRODUCTION

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 pesticides.

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

DOI: 10.4018/978-1-5225-9016-3.ch001

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 human 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 bioavalibility (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.

5 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/introduction-to-phytoremediation/241164

Related Content

Enhancing the Resiliency of Smart Grid Monitoring and Control

Wenbing Zhao (2019). *Advanced Methodologies and Technologies in Engineering and Environmental Science* (pp. 132-143).

www.irma-international.org/chapter/enhancing-the-resiliency-of-smart-grid-monitoring-and-control/211868

Participation Framework to Sustainability: The Undercurrents in Bottled-Water Production and Consumption

Taksina Chai-Ittipornwong (2017). *Reconsidering the Impact of Climate Change on Global Water Supply, Use, and Management* (pp. 272-293).

www.irma-international.org/chapter/participation-framework-to-sustainability/171261

VGI in the Geoweb: An Experiment to Test Data Reliability

Michael Buzzelli, David Brown, Kenwoo Lee and Justin Mullan (2019). *Environmental Information Systems: Concepts, Methodologies, Tools, and Applications* (pp. 1223-1233).

www.irma-international.org/chapter/vgi-in-the-geoweb/212991

GIS Approach for Collaborative Monitoring and Prediction of Environmental Noise in Urban Areas

Juan H. Juarez, Marco A. Moreno and Miguel J. Torres-Ruiz (2019). *Environmental Information Systems: Concepts, Methodologies, Tools, and Applications* (pp. 1510-1536).

www.irma-international.org/chapter/gis-approach-for-collaborative-monitoring-and-prediction-of-environmental-noise-in-urban-areas/213006

Formation and Predictive Assessment of Drained Lands Water Regime of Ukraine Polesie Zone

Nataliia Prykhodko, Roman Koptiuk, Lyudmyla Kuzmych and Anna Kuzmych (2023). *Handbook of Research on Improving the Natural and Ecological Conditions of the Polesie Zone* (pp. 51-74).

www.irma-international.org/chapter/formation-and-predictive-assessment-of-drained-lands-water-regime-of-ukraine-polesie-zone/324031