

PHYTOREMEDIATION: AN ECOLOGICAL SOLUTION TO CLEAN-UP THE ENVIRONMENT

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ABSTRACT

There is a major international concern over the widespread contamination of soils and associated ground water by organic substances and heavy metals. The development of methods to remediate these contaminants has been a significant research interest for several decades. However, during the last two decades, phytoremediation has emerged as a focus for remediation of these pollutants because of its low cost, low energy requirement and promising research observing removal of organic substances and heavy metals from contaminated sites and associated ground water. This cost-effective plant-based approach to remediation takes advantage of the remarkable ability of plants to concentrate elements and compounds from the environment and to metabolize various molecules in their tissues. In recent years, knowledge of the physiological and molecular mechanisms of phytoremediation began to emerge together with biological and engineering strategies designed to optimize and improve the technique further. Phytoremediation has been studied extensively in research and small-scale demonstrations, but full scale applications are currently limited in number. However, some field trials confirmed the feasibility of using plants for environmental cleanup. In this paper an attempt has been made to evaluate the current progress and trends in the area of phytoremediation of organic substances and heavy metals to improve the technique further and to extend its use to clean up the environment. Advantages and disadvantages of phytoremediation in comparison with available technologies for remediation are

provided and emphasis has been given on the most developed subsets of phytoremediation technology and on the biological mechanisms that make phytoremediation work. There is an immediate need to pursue both fundamental and applied research to extend the potential use of phytoremediation. Further development and research in the area may lead to wider acceptance and use of phytoremediation at field level.