Phytoremediation Research at the University of Washington

Phytoremediation, the use of plants to clean up toxic compounds in contaminated environments, has been shown in the last five years to be a very economical method for treating soils contaminated with metals. Now phytoremediation is also being applied to the cleanup of organic contaminants, such as oil contamination of soil and industrial chemicals in groundwater. In 1997, researchers at the College of Forest Resources and the Department of Biochemistry at the University of Washington discovered that poplar trees can remove and destroy chlorinated toxic compounds from water. The final products of this process are harmless water, carbon dioxide, and salt. This discovery means that trees can be used to treat contaminated soils and groundwaters at a much lower cost than conventional methods.

Background

The last quarter century has seen a massive effort to clean up contamination left over from 200 years of industrial development. Some severely contaminated sites have been cleaned up at great cost. Marginally contaminated sites have been left untreated due to the high cost of remediation. However, such low-level sites still pose risks of harm to human health and the environment, if left unaltered. Economic considerations also prevent solutions to the pollution problems of developing countries.

Plants in hood.

Phytoremediation Research

In the last year, University of Washington researchers have produced genetically engineered plants that are able to break down groundwater contaminants 600 times faster than normal plants. Plants like these can provide a breakthrough in lower cost treatment of contaminated soil and water.

It is also important to understand how plants are able to take up and break down toxic chemicals. This knowledge will be used to apply phytoremediation in the most efficient possible manner. Recent laboratory results suggest that plants use mechanisms that are closely related to those in the human body responsible for transforming toxic chemicals.

The research project also extends into the field, where the ability of trees to clean contaminated water pumped out of toxic spill sites in Oregon and Hawaii and to treat shallow contaminated groundwater in Keyport, Washington, is being tested.

In many cases, contamination has effectively destroyed entire ecosystems. In related research, College of Forest Resources scientists have demonstrated that the application of recycled residuals,

Newly-planted trees

Measuring tree growth

including municipal biosolids, can restore ecosystem function to such sites. Cooperation with U.S. EPA to demonstrate and gain acceptance of this technology within the Superfund program is underway with projects at Bunker Hill, Idaho, Leadville, Colorado and Joplin, Missouri.

Remediation research at the University of Washington promises to provide an inexpensive, environmentally benign, and esthethically pleasing procedure for cleaning up the legacy of industrial environmental mismanagement.

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More Information:

http://www.niehs.nih.gov/sbrp/newweb/sbrptdy/phytorem.htm
http://www.frtr.gov/matrix2/section4/4_36.html
December 1997 issue of Scientific American *http://www.sciam.com/1297issue/1297techbus4.html*