

Environmental Cleanup

Introduction

Heavy metals are very poisonous to plant life. Contaminated soil can cause plants to grow slowly, stunt their growth and even destroy them. Although there are other methods of removing the contaminants, such as removing the soil all together and depositing a fresh layer of uncontaminated soil, they produce a lot of waste and are very costly. Phytoremediation offers an inexpensive way to help clean up the soil that doesn't produce a large amount of waste.

What is Phytoremediation?

Phytoremediation is a process where metals are taken into the roots of plants and deposited throughout the entire plant. It has been found that different plants are better at absorbing different materials. In addition to different plants, adding certain chemicals, such as EDTA and citric acid, can also affect this process by dissolving the metals and allowing them to be more easily taken into the roots.

What is BNL doing?

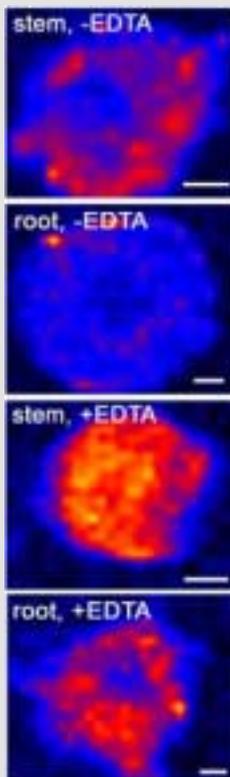
Through the research of scientist like Mark Fuhrmann, BNL is attempting to help clean up the environment. Heavy metals, such as cesium, copper, chromium and zinc, can contaminate soils making plant growth very difficult. With the use of a new technique being currently researched at BNL, phytoremediation, scientists hope to soon be able to draw these metals out of the soil cheaply and easily.

How is the synchrotron light used?

After the experimental plants are given time to grow, they are taken to the NSLS. Using high intensity X-rays scientists are able to determine where the greatest concentrations of different metals are located. This helps scientist to determine if different plants are good absorbers of different substances.

How will this help lower soil contaminations?

After the heavy metals have been removed from the soil and deposited in the roots and stems, the entire plant is easily removed. Removing the contaminated plants then lowers the levels of the contaminants. The plants are then heated until they turn to ash but at low enough temperature to keep the metals solid. This helps reduce the amount of waste produced.



X-ray images showing the lead concentration in the stem and root of tobacco. EDTA aids in the uptake of lead into the plant. The lower concentration in the root and the higher concentration in the stem show that tobacco is an efficient plant for removing lead from the soil.

Fast Facts

- Heavy metal contamination in soil can reduce plant growth and yield.
- If crops are grown in a contaminated field, the heavy metals can be passed to whatever organism consumes the plants.
- Consumption of heavy metals in plants can be toxic to humans.
- Different metals can cause different problems. For example, lead and mercury can cause mental retardation; lead can also cause brittle bones.