

A2 LEVEL

Environmental Technology

# Phytoextraction

For first teaching from September 2014

For first award in Summer 2015



environmental  
technology

## Phytoextraction



### Specification Content

#### Students should be able to:

- Describe how plant species can be used as an alternative method to extract metal from metal ore mine tailings by the process of phytoextraction, for example using white mustard to extract copper or sunflower to extract gold;
- Demonstrate the use of Indian mustard in decontaminating metal contaminated soil;



### Course Content

#### Phytoextraction

This is essentially phytoremediation where the desired outcome is that metal can be collected and concentrated for use. In other words we are using the plant's hyperaccumulation ability to 'mine' the metal. The plant would be grown on the contaminated site and when harvested the plant material would be dried, possibly burned in a controlled environment, and metal extracted from the ash in a commercially viable way to produce a high grade saleable material.

The rate of removal can be increased by adding chelating chemicals to the treatment area to make the metal more soluble and therefore more available to the plant. Chelation is the name of the process by which a metal is surrounded and then chemically bonded to an organic compound. The danger with this is that the metal will also be made more likely to enter ground water. Therefore where this is used

land farming techniques would be employed where the solid is moved on to impermeable areas on the site and spread out. Then the seeds of the hyperaccumulator such as White Mustard can be sown. When the plants have become established then the chelating chemicals can be sprayed on the area from time to time to benefit the uptake. More copper can be accumulated from this method than by simply sowing the seed on to the contaminated ground. Even simply ploughing or turning over the ground prior to sowing will further increase the degree of uptake as the ploughing will aerate the soil and open up the soil texture which will improve plant growth rate, and therefore increase the metal accumulation rate.



### Pupil Activity

Using the link [www.itrcweb.org/miningwaste-guidance/to\\_phytotech.htm](http://www.itrcweb.org/miningwaste-guidance/to_phytotech.htm) prepare a list of the advantages and limitations of phytoextraction as a mining technique.



