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"Resilience of agricultural systems against crises"

Cultivation on Polluted Areas with Heavy Metals and Naturally Enriched Areas

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Abstract

For many soil metal contaminants, especially Zn and Ni, within a metal contaminated area, hyperaccumulator plants are likely to do well since foliar concentrations will be high.

Cadmium tends to have few effects on plant growth, yet can still exhibit toxicity to animals. While this does not obviate the ecotoxicity of high Cd plants, Cd hyperaccumulators will not be able to grow beyond the area of soil contamination. Thus, escape of Cd hyperaccumulators beyond the area of contamination is not likely to be a concern. These observations suggest that escape from the original site must be assessed based upon both the plant and soil.

Cultivation of hyperaccumulators on naturally enriched areas offers the greatest promise for use in phytomining. Phytomining is a more specific form of phytoremediation where the purpose of metal removal from soil is economic gain. For example, millions of acres of Ni rich ultramafic soil are found around the world. These soils are potentially amendable to Ni phytomining. However, many of these areas are populated by a number of rare and endangered species. For example, serpentine soils in northern California and southern Oregon are populated by rare and endemic species that exist only on these soils. Given the unique flora of enriched soils, concern has been raised that highly competitive and aggressive introduced

hyperaccumulators may displace some of the natural flora. Another method to reduce the potential for escape from the original site of planting is to harvest plants prior to seed set. Most hyperaccumulators set seed in mid summer. Since most hyperaccumulators are perennials, they will typically be harvested at the time of maximum metal accumulation, then plants will continue to grow for an additional harvest the same year or in the following year.

Keywords: Cultivation, heavy metals, Ni, polluted areas, Zn

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