Phytoremediation of Iron Cyanide Complexes by Willow. (S11-ebbs153002-Oral)

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Abstract:

Cyanides are common contaminants at many former industrial disposal sites, particularly those with wastes from electroplating, aluminum smelting, ore heap leaching, precious metal mining, and manufactured gas plants (MGP). Cyanide in soil and aqueous systems typically occurs as transition metal complexes that are resistant to microbial degradation. However, these compounds can degrade upon exposure to UV light, releasing free cyanide into the environment. An integrated approach was used to assess the phytoremediation potential of iron cyanides. Results indicate that a willow clone from an MGP site can transport cyanogenic nitrogen, suggesting that phytoremediation of these recalcitrant compounds is possible. A stable isotope approach (15N-labeled ferrocyanide) was used to assess the transport and biochemical fate of cyanogenic nitrogen from complexed iron cyanide within the plant. Cyanogenic compounds are ubiquitous in plants as a nitrogen source, a defense compound (cyanogenic glycosides), and a by-product of ethylene synthesis. A characterized pathway for cyanide detoxification has been identified in plants that converts cyanide to amino acids. One goal of the current research program is to determine whether this pathway is involved in the assimilation of complexed cyanides. The data acquired will be important in assessing potential regulatory considerations related to the biological fate of complexed metal cyanides in plants and the utility of phytoremediation for this contaminant.

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