

Evaluating Native and Naturalized Plant Species for the Phytoextraction of DDT and Dieldrin at a National Park in Ontario, Canada

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Background/Objectives. Dichlorodiphenyltrichloroethane (DDT) and dieldrin are two organochlorine pesticides (OCPs) that were produced and used in Canada until the 1990s. These pesticides were sprayed in large quantities for pest reduction and have persisted within soils, water bodies and sediments for decades. Previous agricultural practices have resulted in elevated levels of DDT and dieldrin that exceed Canadian soil quality guidelines at Point Pelee National Park (PPNP) in Leamington, Ontario, Canada. Park staff are seeking remediation strategies to remove these contaminants in a cost-efficient manner, while promoting sustainable practices and reducing the impact on the environment.

Approach/Activities. Phytoremediation is an environmentally feasible technique that uses natural plant processes to remove contaminants such as OCPs from soil. Previous studies identified two areas of PPNP with particularly high contamination of OCPs that were then selected and used as field test plots for a phytoremediation study. Within the two plots, nine native and naturalized plant species were planted and evaluated for their effectiveness at extracting OCPs via phytoextraction. Plant and soil samples were analyzed via gas chromatography with a ^{63}Ni electron capture detector (GC/ECD).

Results/Lessons Learned. Two plant species, *Andropogon gerardii* (big bluestem) and *Bromus inermis* (smooth brome), were found to be particularly good at phytoextracting DDT and dieldrin from the contaminated field test plots. Based on its large biomass production, *A. gerardii* was further studied in the greenhouse at the Royal Military College of Canada (RMC) to determine its ability to remediate varying soil concentrations of DDT and dieldrin. Additionally, harvested plant material was gathered and the effectiveness of composting as a cost-effective disposal method was investigated. Our results indicate that phytoextraction using *A. gerardii*, in combination with other native and naturalized plant species, followed by harvest and composting of plant biomass is a viable and cost-effective technique for remediating OCP-contaminated sites at PPNP, and by extension will likely prove to be an optimal green remediation strategy for other organochlorine-contaminated sites.