

Tacoma Smelter Plume Chinese Brake Fern Phytoremediation Study 2005 Study Intro

NOTE: This information is from a 2005 website and may be out of date.

The Department of Ecology is conducting a two-year study of the Chinese Brake fern and its ability to remove arsenic from soil. This webpage provides information about the study, and how you might help.



Introduction

Ecology is conducting a two-year study of the Chinese Brake fern (*Pteris vittata*). This special fern is known to take arsenic from the soil into its fronds at very high rates—over 100 times what is in the soil in a short time! These lean, green, cleaning machines may provide an efficient and cost-effective method to make soils safer within the [Tacoma Smelter Plume site](#).

Phytoremediation Study

The Chinese Brake fern is native to China and was introduced into the United States as an ornamental plant. The ferns prefer warmer, wetter climates like Florida. Several studies in the United States show these plants have an amazing ability to remove arsenic from soil. In one study, the plants reduced the soil concentration of arsenic by 10 parts per million (ppm) within a few months.

We want to know if these ferns will remove the heavy metal contamination left by smelter emissions, and if they will grow in our cooler climate. Some of the questions we want to answer include:

- How much arsenic is removed from the soil by the ferns?
- Will the ferns also remove lead and cadmium, or do these metals interfere with arsenic removal?
- How well will these ferns survive in Western Washington?
- How much pampering do they need (such as water, mulching, or weeding)?



- Are the ferns invasive in Washington? We believe they are not invasive to Washington, as they prefer warmer climates, but we need to know for sure.
- Do animals or insects forage on ferns, and if so, do the ferns pose a hazard to wildlife?
- What are the disposal options for the fronds? **(They can't be composted!)** Are arsenic concentrations so high that the fronds can't go to a regular landfill?

In collaboration with the Vashon Island School District, King County Parks and Recreation Division, and Pierce County Metro Parks, Ecology will answer these questions.

Study Locations

Ecology planted these ferns in five test plots on Vashon-Maury Island near the Chautauqua Elementary School and at Dockton Park (map on page 3), and two test plots in north Tacoma at the Point Defiance Park and Metro Parks maintenance facility.

We selected these test plots because arsenic concentrations are elevated in the surface soil, and the locations represent a range of conditions—different arsenic concentrations, shade versus full sun, and ease of access for care.

The arsenic levels range from generally low at the school locations to moderately high in the woods at Dockton Park and Point Defiance Park.

The test plots are 10 to 12 feet square—fenced and posted with warning signs to keep animals and people away from these poisonous plants.

Staff from Public Health— Seattle & King County and Tacoma-Pierce County Health Department are helping with soil and frond sampling – collecting soil and frond samples at least annually. We will publish a final report of our findings in June 2007, and will provide periodic updates as the study progresses.



Volunteers

Ecology is looking for volunteers to help tend the plots. We need assistance with regular watering and weeding, and general observations. If you are interested in volunteering, please contact Norm Peck, Department of Ecology, by phone at (509) 454-7837 or email Norm.Peck@ecy.wa.gov.

For More Information

Go to <http://www.edenspace.com>, for further information about these ferns and their use in removing arsenic from soils. Or type Chinese Brake Fern in your internet search engine.

The phytoremediation study design provides more details of our study. For further information, please contact Norm Peck at (509) 454-7837 or email Norm.Peck@ecy.wa.gov.

Phyto Fern Plots: General Location Map

