

Phytophthora ramorum Survey and Monitoring in Western Washington

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Example of general forest survey area

Introduction

Phytophthora ramorum, the causal agent of Sudden Oak Death (SOD), ramorum leaf blight, and ramorum dieback, is responsible for killing native oak and tanoak trees in California and Oregon. Western Washington is at high risk for SOD due to the presence of known *P. ramorum* hosts in the natural environment, suitable climatic conditions (extended periods of moist weather and mild temperatures), and the presence of nurseries receiving positively identified *P. ramorum* host stock. While Washington's native oak species (Oregon White Oak) is not threatened by *P. ramorum*, Pacific madrone, maple, cascara, huckleberry, rhododendron, grand fir, and Douglas-fir are some of the susceptible native hosts. Nursery perimeter, general forest, and aquatic surveys were conducted in years 2003 through 2006 to detect *P. ramorum* in western Washington.



Example of general forest survey area

Methods: Nursery Perimeter and General Forest Surveys

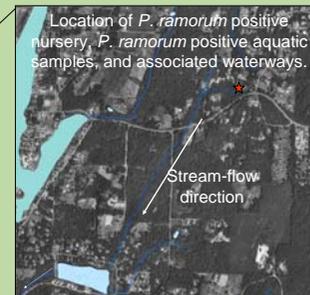
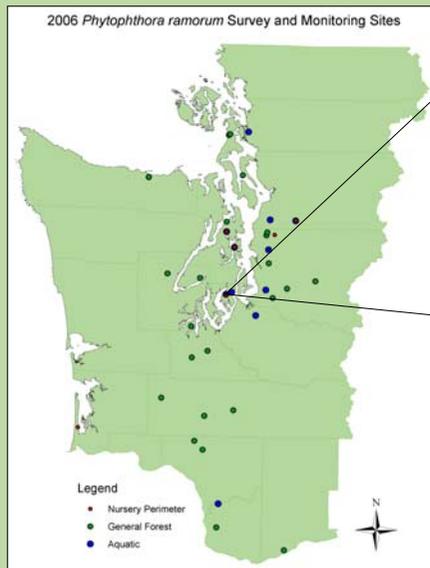
- ◆ Sampling protocol developed by FHM, USDA Forest Service
- ◆ Perimeters of nurseries with *P. ramorum* positive plant stock surveyed
 - four 100-m long transects
 - distributed along perimeter
- ◆ High-risk general forest environments surveyed
 - four 100-m long transects
- ◆ Known and potential hosts examined for *P. ramorum* symptoms along each transect
- ◆ Symptomatic tissues (leaves and twigs) collected
- ◆ Samples sent to labs in WA and OR
 - screened for *P. ramorum* using PARPH-V8 selective medium and/or molecular analysis

Methods: Aquatic Surveys

- ◆ Located in seasonal or perennial streams
 - established in early to late spring
 - moderate-sized watershed tributaries, 2005
 - nearby *P. ramorum* positive nurseries, 2006
- ◆ Two *Rhododendron* leaf traps at each site
 - 5 leaves in each trap (see photo below)
- ◆ old leaves and traps replaced with new leaves and traps every 1-2 weeks
- ◆ Samples sent to WA Dept. of Agriculture
 - screened for *P. ramorum* using PARPH-V8 selective medium and molecular analysis



Two leaf traps, each containing five *Rhododendron* leaves, were placed in each survey stream



**P. ramorum* Positive Results

- ◆ 8 positive *P. ramorum* samples from one stream
 - ephemeral stream running into salt water
- ◆ Vegetation sampled around stream
 - all *P. ramorum* negative
- ◆ Soil sampled along/within stream
 - samples in analysis process
- ◆ Cooperative project with WA DNR and WA Dept. of Agriculture

Results

- ◆ *P. ramorum* positive samples in one stream, 2006*
- ◆ all other nursery perimeter, general forest, and aquatic samples *P. ramorum* negative

Months of Survey	Year	Number of Survey Locations			Number of Samples Collected
		Nursery Perimeter	General Forest	Aquatic	
January - present	2006	6	24	11	343
March - Oct.	2005	1	29	10	309
Sept. - Oct.	2004	18	14	0	167
March - June	2004	42	7	0	144
June July	2003	33	5	0	108
Totals		100	79	21	1071

Discussion

In January, 2006, *P. ramorum* was found outside of a Washington nursery previously identified as containing *P. ramorum* positive nursery stock. Until this time, *P. ramorum* had not been detected in nursery perimeter, general forest, or aquatic surveys. The organism was brought to the Washington nurseries on plants (mostly camellia, rhododendron, pieris, and viburnum) shipped from other states. The infected plants were destroyed and underlying soils were fumigated within the nurseries to prevent further spread of the pathogen. The positive *P. ramorum* aquatic survey results indicate that the above mentioned eradication efforts are not adequate for preventing the spread of this organism from nurseries. *P. ramorum* has not been detected in any other nursery perimeter, general forest, or aquatic survey samples collected in Washington state.