Assessing the role of Verticillium wilt in Bigleaf Maple (*Acer macrophyllum*) dieback in Western Washington

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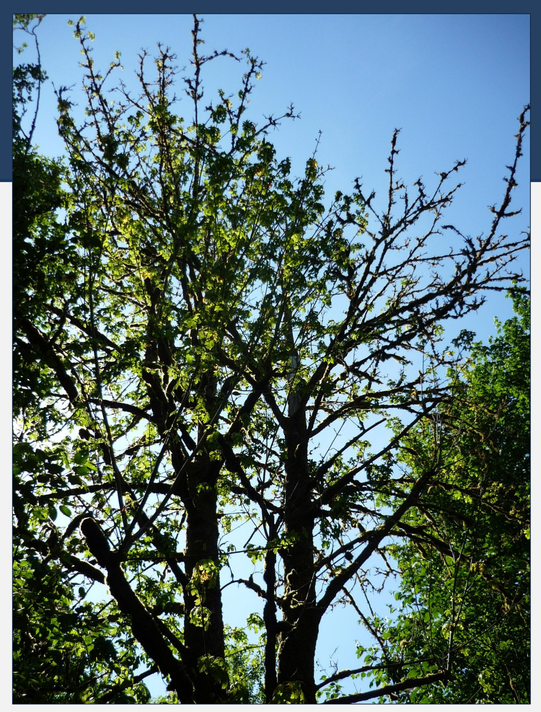
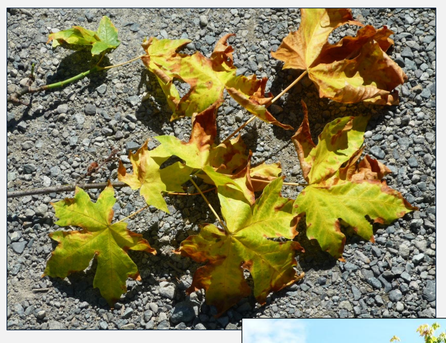


Introduction

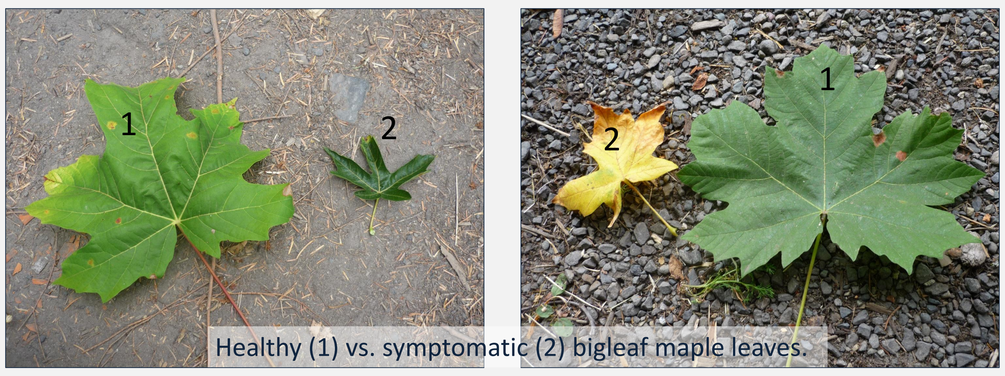
Bigleaf maples are an important ecosystem component in the forests of western Washington, providing shade, food, habitat and structural diversity in riparian and upland areas. Over the past several years, concerned landowners, the general public and forest land managers have contacted University of Washington, WA Dept. of Natural Resources (DNR) and US Forest Service (USFS) forest health specialists about increased levels of bigleaf maple decline and dieback observed in western Washington. Symptoms included yellow flagging of large branches, small leaf size, and partial or entire crown dieback. A limited number of site visits and drive-by observations were made without any conclusive evidence about what was causing the dieback.

Verticillium albo-atrum and *Verticillium dahliae*, causal agents of Verticillium wilt, are reported as damaging agents of bigleaf maple (Minore and Zasada 1990). *V. albo-atrum* and *V. dahliae* are soilborne fungi that invade the xylem of host trees and can cause leaf drying, leaf curling, defoliation, wilting, dieback and tree death (Sinclair et al. 1987). This project investigated whether or not Verticillium wilt was the primary cause of bigleaf maple decline and dieback in western Washington.



Objectives

1) Evaluate the extent of bigleaf maple decline and dieback in western Washington
2) Determine if *Verticillium spp.* is the primary causal agent of bigleaf maple dieback
3) Identify other abiotic factors associated with dieback and decline



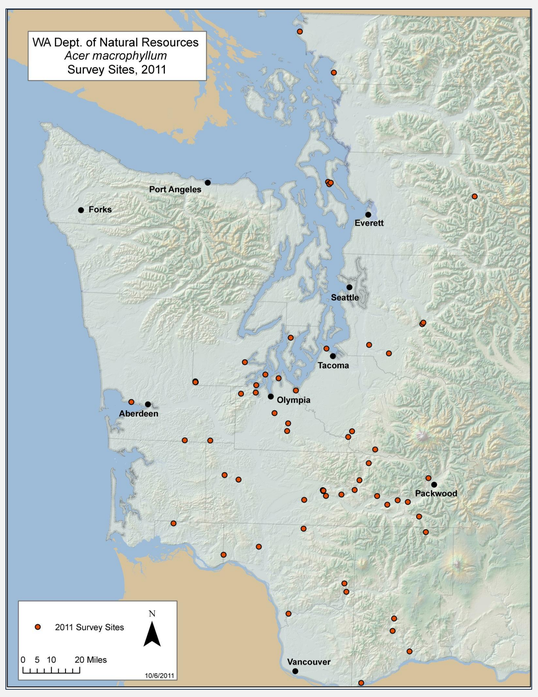
Healthy (1) vs. symptomatic (2) bigleaf maple leaves.

Methods

- 61 sites (see map to right)
  - Surveyed in July – August, 2011
- Symptomatic bigleaf maple – site center
  - Site characteristics recorded: GPS coordinates, elevation, slope position, aspect, basal area and soil type
  - Individual tree characteristics recorded: host condition (live, dead), crown class, crown density, crown dieback, growth habit and DBH
  - Stress or morality agents on site noted
- Branch samples collected from symptomatic tissue
  - up to 5 from each tree
- Branch samples sent to Washington State University Puyallup Plant & Insect Diagnostic Lab for processing
  - Ethanol water agar and incubation methods
  - Microscopically examined for *Verticillium albo-atrum* and *Verticillium dahliae*

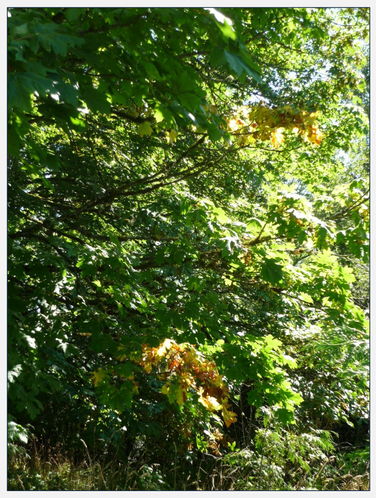
Results

- All samples were negative for *Verticillium albo-atrum* and *V. dahliae*
- 15% symptomatic trees had signs of other root diseases
  - 11% *Armillaria* spp.
  - 3% *Ganoderma* spp.



Bigleaf maple survey sites for Verticillium wilt, 2011.

Symptomatic bigleaf maple sampled for Verticillium wilt (photos left and right).



Discussion

Based on our 2011 sampling and results, we conclude that the dieback occurring in bigleaf maple in western Washington is being caused by something other than Verticillium wilt. None of the samples we submitted for analysis were positive for *Verticillium* spp. Signs of other root diseases were found in a portion of the trees surveyed, but these results do not suggest that either Armillaria or Ganoderma root diseases are the primary causal agents of bigleaf maple dieback in western Washington.

Dialogue among DNR and USFS forest health specialists in California, Oregon and Washington about the bigleaf maple dieback issue, has raised awareness of another pathogen affecting bigleaf maple in California. *Xylella fastidiosa,* a bacteria, is causing maple leaf scorch in northeast California (Woodruff 2011). *Xyllela fastidiosa* is transmitted from diseased to healthy plants by insects with piercing and sucking mouthparts. The bacteria is limited to the xylem and can cause blockage in the water conducting system of the plant. Samples from Washington were sent for *Xyllela* analysis and results were positive. More intensive sampling for *X. fastidiosa* may occur in 2012.

References

Minore, D. and J.C. Zasada. 1990. *Acer macrophyllum*. Pp. 33-40 in R.M. Burns and B.H. Honkala (technical coordinators) Silvics of North America, Vol. 2. Agri. Handbook 654, USDA For. Serv., Washington, D.C.

Sinclair, W. A., H. H. Lyon, and W. T. Johnson. 1987. Diseases of trees and shrubs. Cornell. University Press, Ithaca, New York. 574 p.

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