Why is my Tree Dying?

Bigleaf maple (*Acer macrophyllum*)

March 2020

Common cause(s): not determined, possibly changing climate and/or insect feeding damage

Symptoms: leaf margin scorch, yellowing leaves, reduced leaf size, wrinkled or misshaped leaves, crown thinning, gradual top-down dieback, epicormic branching

Top dieback (top) and leaf scorch (bottom)

Summary

Bigleaf maple started a noticeable decline in some westside areas of Oregon and Washington starting around 2010. The most severe bigleaf maple decline has been observed in the Puget-Willamette lowlands, at low elevation sites in the Cascade foothills and east-slope Coast Range, and along the Columbia River Gorge.

Common pests

Many fungal diseases (*Pythium*, *Phytophthora, Verticillium, Armillaria, Neonectria* and *Nectria, Ganoderma, Anthracnose, Xylella,* etc.) may be present in bigleaf maple but they are often secondary, infrequent/periodic, or slow-acting. In sampling, no diseases appeared consistently enough at decline sites to think they may be the primary causal agent, although they do add stress to already declining trees. Large populations of leafhoppers have been found on declining bigleaf maples where trapping efforts have taken place. Leafhoppers are insects that pierce into leaves to feed on sap and can vector disease. In addition, damage caused by feeding alone can cause symptoms such as leaf margin scorch, yellowing and leaf stunting. To determine if controlling leafhoppers might have an impact, trees at two decline sites were treated with a systemic insecticide and others were left as untreated controls. Treated trees showed evidence of improved health (increased leaf production, production of normal size leaves, absence of leaf margin scorch) relative to the non-treated controls in years 1 and 2 after treatment, which may implicate leafhoppers as a potential cause for decline. Larger-scale sampling will be necessary to assess the potential impact of these leaf hoppers on bigleaf maple.

Cast skins (main) from leafhopper (inset)

Maple may also be attacked by various other wood or foliage-feeding insects but most of these are either periodic, short-term pests or secondary pests that mostly attack stressed and already dying trees.

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Why am I seeing this now?

Changing climate alone may be repeatedly stressing trees and/or altering the suitability of some habitats that support bigleaf maple. Observations and growth ring analysis indicates that drier sites or summer conditions negatively correlate with bigleaf maple growth. Most of Oregon has been in a drought since 2012, and climate predictions indicate a continuation of higher temperatures and inconsistent precipitation. Further, in recent years, bigleaf maple has had highly productive seed crops, which can be an indicator of a stress response that elicits allocation of resources to reproductive tissues rather than to growth. Evidence points to negative impacts of drought on bigleaf maple growth but it may also be weakening defenses that typically keep leafhopper damage at a tolerable level. Warmer, drier conditions may also be triggering increases in leafhopper populations.

Where should I grow bigleaf maple?

Bigleaf maple can grow successfully under a wide range of conditions. From shallow, rocky soils to deep, organic rich soils in cool coastal areas to warm and drier habitat found in California's north valley. This species can tolerate intermittent flooding. Despite this wide range in site tolerance, maples growing on poorer sites (droughted, shallow soils) seem to be in steeper decline. Alternate species for bigleaf maple include white oak and incense cedar in drier areas and alder, ash or cottonwood in wetter areas.