Maple Leaf Scorch (MLS) On Bigleaf Maple In California – 1964 to 2020

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United States Department of Agriculture

Range of ***Acer macrophyllum,*** Big-leaf maple

Year	Section	Pages	Descriptions in California Pest Conditions Report by year
1964	Unknown Diseases	14	*"Bigleaf maple appeared to have a blight that inhibited full leaf development and caused a browning of the leaf margins. Sometimes only at the terminal growth was affected but in other trees the entire leaf compliment was dwarfed. This blight in varying degrees of intensity was reported from central Oregon to Yosemite National Park."*
1983	Abiotic Disease	11	Bigleaf maple in Trinity Co. reported with abiotic weather injury
1984	Abiotic Disease	12	Bigleaf maple in Trinity Co. reported with abiotic weather injury
1985	Foliage Diseases	14	Bigleaf maple in Plumas, Tulare Co. reported with leaf scorch
1986	Foliage Diseases Abiotic Diseases	12, 15	Bigleaf maple in Plumas, Trinity, Mariposa, Marin Co. with leaf scorch (*"recurrent situation", "more severe in certain years",* unknown cause)
1987	Abiotic Diseases	11	Bigleaf maple in Trinity, Shasta Co. reported with abiotic unknown injury
1988	Foliage Diseases	12	Bigleaf maple throughout its range reported with maple scorch. Xylem-limited bacteria suspected, but not recovered by Food&Ag Lab
1989	Foliage Diseases	12	Bigleaf maple throughout its range reported with maple scorch. Xylem-limited bacteria suspected, but not recovered by Food&Ag Lab
1990	Foliage Diseases	25	Bigleaf maple in Trinity, Shasta, Siskiyou Co. reported with maple scorch
1991	Foliage Diseases Unknown Insects	33, 22	Bigleaf maple in Trinity, Shasta, Siskiyou Co. reported with maple scorch and with unknown leafhopper (*"Leafhopper abundance was associated with severity of leaf scorch… less severe at higher elevations"*)
1996	Insects	12	Glassy-winged sharpshooter (*Homalodisca coagulate)* established in SoCal as possible *Xylella* vector. *Xylella* does not yet occur in California.
1998	Foliage Diseases	9	Bigleaf maple in Plumas, Sierra Co. reported with desiccation injury
2000	Insects Wind desiccation	13 15	Maple leafhopper scorch reported in Shasta, Siskijou Co. Maple leaf scorch damage reported in Plumas, Sierra, Butte Co.
2001	Insects Wind desiccation	13 17	Maple leafhopper scorch reported in Shasta, Siskijou Co. Maple leaf scorch damage reported in Plumas, Sierra, Butte Co.
2002	Insects	10	Maple leafhopper scorch reported in Shasta, Siskijou Co. Eel River drainage also. High levels of maple leaf scorch reported in Plumas Co.
2003	Insects	10,11	Maple leafhopper scorch reported in Shasta, Siskijou, Trinity Co. Eel and Van Duzen Rivers also. High levels of maple leaf scorch (MLS) reported in Plumas, Sierra. Co. Deer Ck. and Meadow Valley also. *"Several years of leaf scorch…contributing to branch and maple mortality."*
2004	Abiotic Diseases	14	*"Maple leaf scorch, sometimes attributed to leafhoppers and bacteria, was very prevalent"* … in Sacramento and Trinity River drainages. MLS also in Indian Ck, Meadow Valley, Feather River, Deer Creek and N. Yuba River drainages. No leafhoppers associated with symptoms in Plumas, Sierra Co.
2005	Insects	27	MLS abundant from Trinity /Shasta Co. south to El Dorado Co. "Hopper burn". Indian Ck, Feather R, Meadow Valley, N. Yuba R, Deer Ck. 20 bigleaf maples tagged along Hwy 49 and monitored during 2005. Leaf hoppers, aphids and fruiting bodies of anthracnose
2007	Abiotic	46	MLS still along Indian Ck, Berry Ck, Feather R, Meadow Valley, N. Yuba R, Deer Ck, Janesville Grade. In Sierra, Plumas, Lassen Co. *"May be a physiological response to tree age and inter-tree competition." "The cause of the scorch is still being investigated."*
2008	Diseases	35-36	MLS maples tested positive for *Xylella fastidiosa* at Rutgers University. *"Nearly every tree throughout the range of big leaf maple in northeastern California exhibited symptomatic foliage."*
2009	Leaf Scorch	38-39	MLS observed along Hwy 36 W of Mineral and along Quincy-Oroville Hwy in addition to same areas in Plumas and Sierra Co. observed in previous years. Also along Hwys 299 and 96 W & NW of Redding. Samples sent to Rutgers U.
2010	No Report		2009 MLS samples were positive for *Xylella fastidiosa.* Report results in 2011.
2011-12	Diseases		*Xylella fastidiosa* found by PCR assay in 11 out of 208 MLS samples
2013	Disease	38	Bigleaf maple throughout northern CA. Rutgers U. found *Xylella fastidiosa* in 11 of 108 leaf samples in 2012. UC Riverside found half the samples tested positive for *Xylella spp. using ELISA*. Systemic insecticide reduced scorch
2014	Disease	7	Bigleaf maple throughout northern CA. Thought to be caused by *Xylella fastidiosa* and maybe xylem-feeding insects
2015	Diseases	15	MLS still a problem and thought to be caused by *Xylella fastidiosa* and maybe xylem-feeding insects; with drought contributing. Little success with lab screening
2016	Diseases	22	MLS in most locations thought to be caused by insects and low soil moisture. Early heavy MLS thought to be caused by *Xylella fastidiosa.* Early light MLS thought to be caused by low soil moisture. DNA testing unsuccessful.
2017	No Report		No MLS monitoring done
2018	Diseases	20	MLS still along Highways 3, 36, 50, 70, 89, 96 and 299. Trees with heavy MLS for many years have dead branches. Cause unknown, bacterium suspected.
2019	Disease		MLS still along Highways 3, 36, 70, 89, 96 and 299. Tar Spot of Maple along Highways 49 and 50. Multiple causes suspected: *Xylella fastidiosa*, root disease, insects and low soil moisture

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1998
Hwy 89
Indian Creek
7 22 '98

Cause of MLS:

Unknown!

? Climate change - drier soils ?

? *Xylella fastidiosa* bacteria ?

(vectored by xylem feeding insects)

? Xylem-feeding insects ?

? Insects + bacteria ?

? Root Disease ?

? Combination of the above ?

? Other ?

Maple Leaf Scorch

Reported in California in 2014

Bill W /7/2014

LEGEND

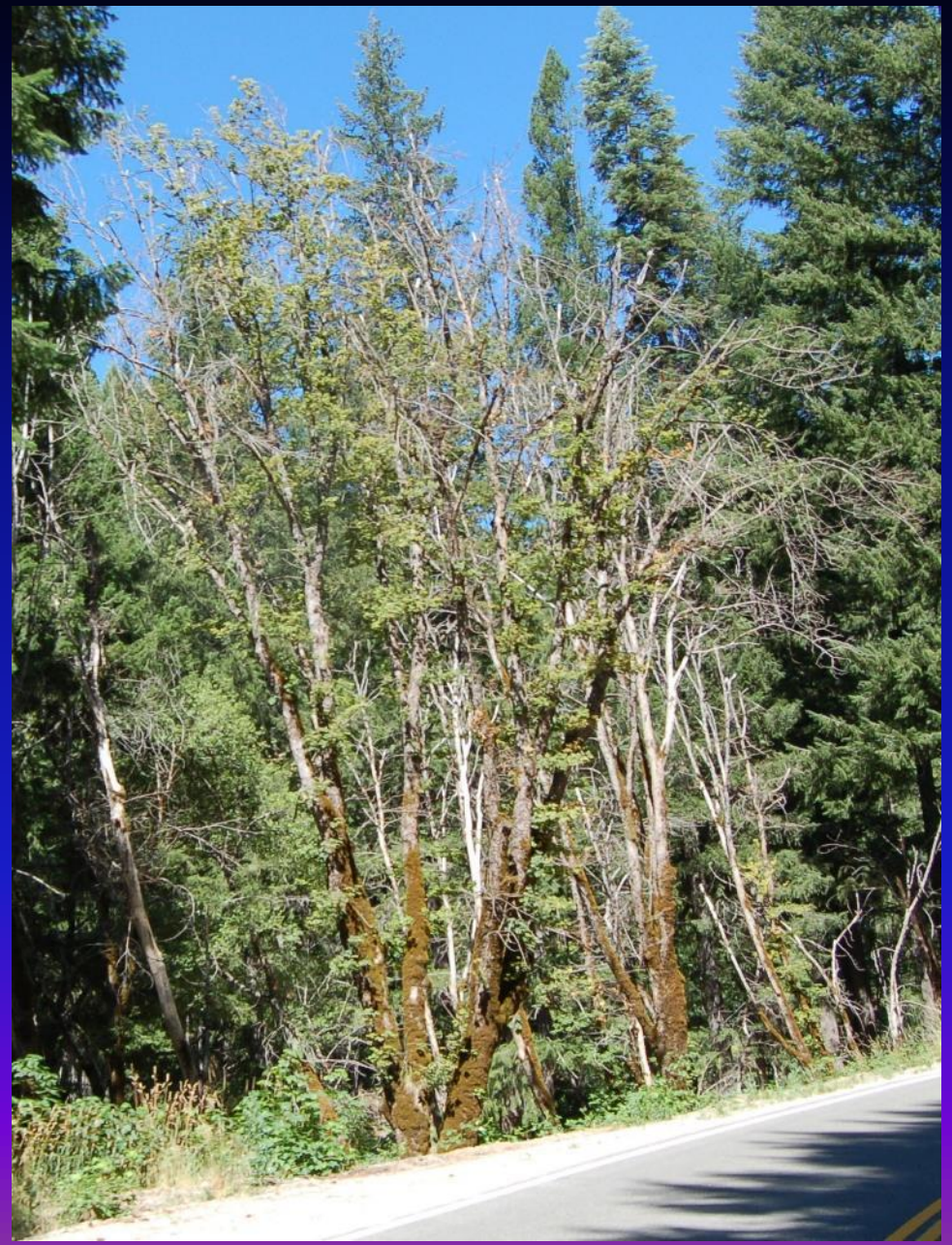
RED = Heavy Scorch

YELLOW = Light Scorch

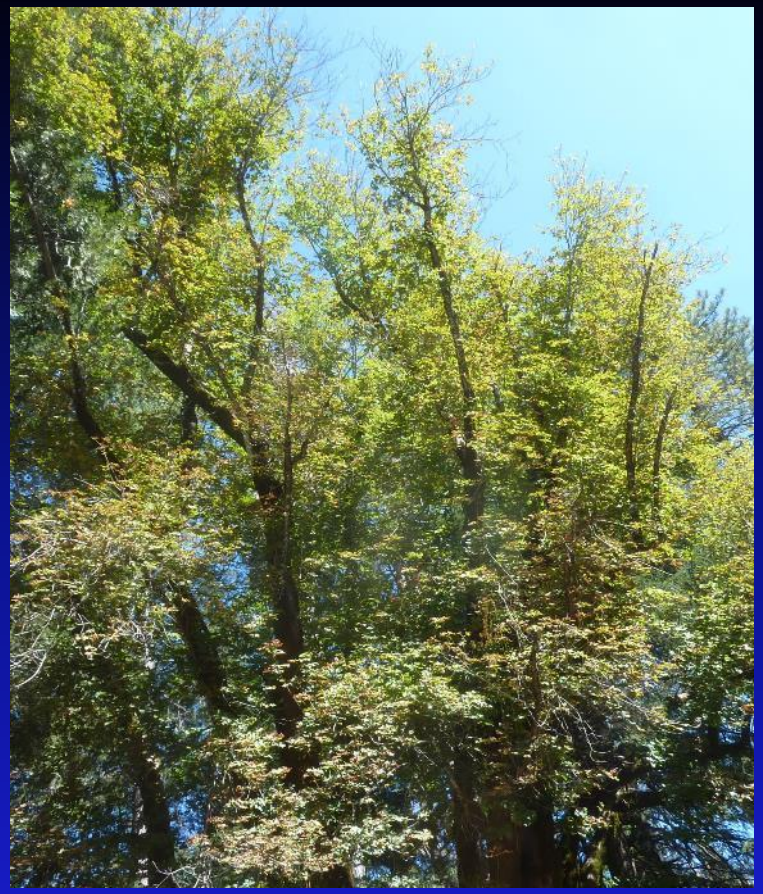
Hwy 20, Near Junction with Interstate 80 – Low Soil Moisture?

Hwy 49, ~5 Miles North of Nevada City

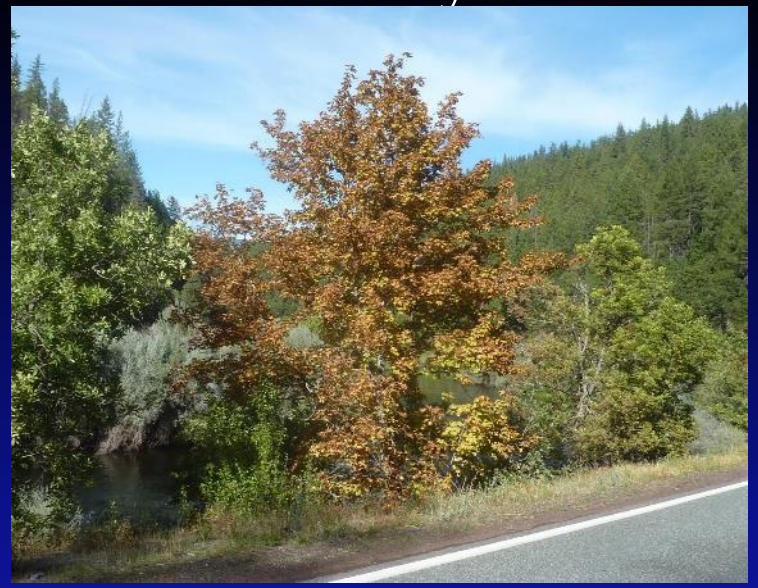
Hwy 49 – Large Bigleaf Maples with MLS (since 1964?) – *X. fastidiosa?*



I-5 Near Dunsmuir – Low Soil Moisture? Insects? *Xylella?*

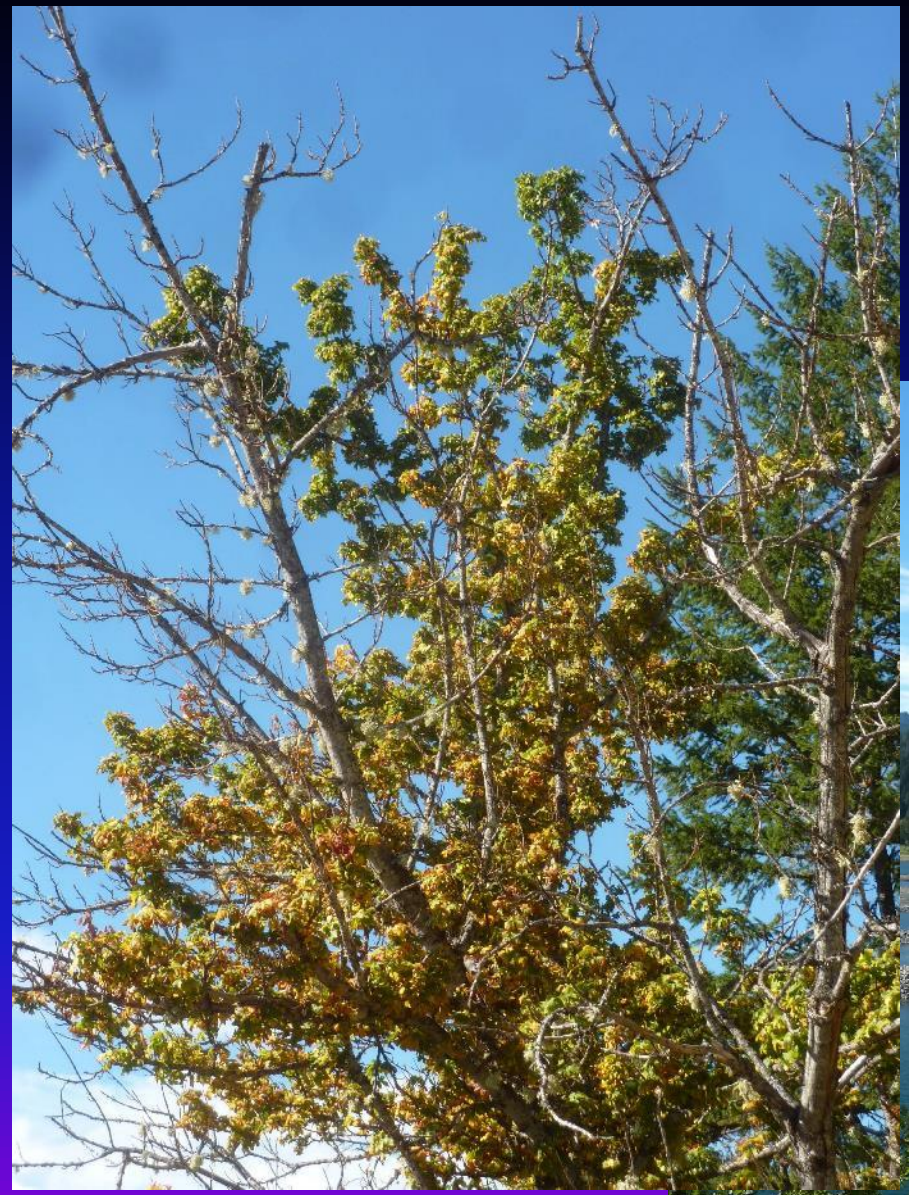


Hwy 96 Klamath River –Soil Moisture? *Insects?*



Hwy 3, North of Trinity Lake – Low Soil Moisture & Insects?

No. Trinity Lake on Rd to French Gulch– *X.f.?* Soil Moisture?



Hwy 3, Southeast of Trinity Lake – Low Soil Moisture & Insects?

Hwy3, 10miles E of Hayfork-Soil Moisture? Insects? Root Disease? *X.f.*?

Hs 49 & 50 – New in 2019: Tar Spot of Maple, *Rhytisma punctatum*

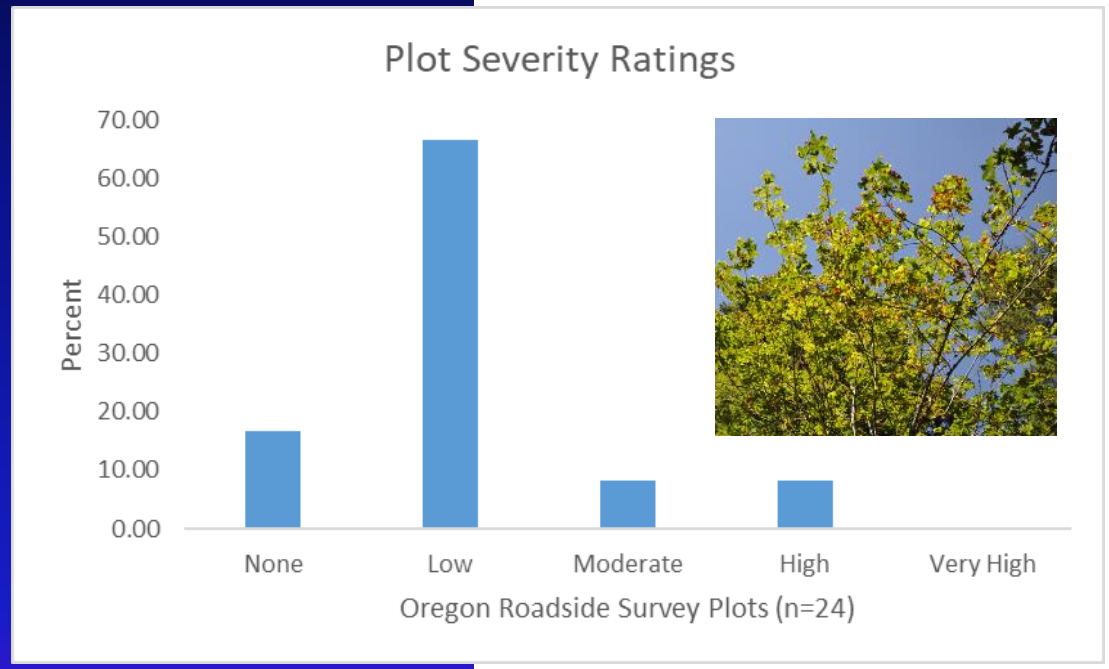
(Just East of Sierra City on Hwy 49 & just West of Pollock Pines on Hwy 50)

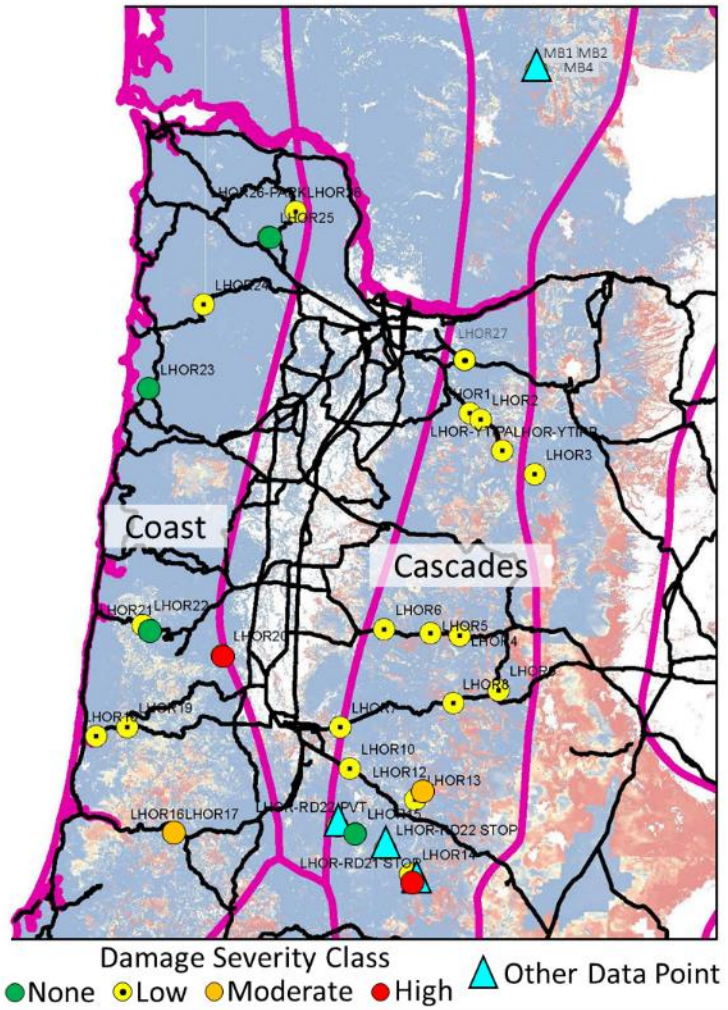
Tar spot is an example of a widespread ecological niche in fungi, the endophytes ("endo-" = "within", "-phyte" = "plant"). *Rhytisma punctatum* forms small stroma, each bearing a single apothecium which matures in the Spring when spores are released.

“Maple Decline” Studies in WA & OR

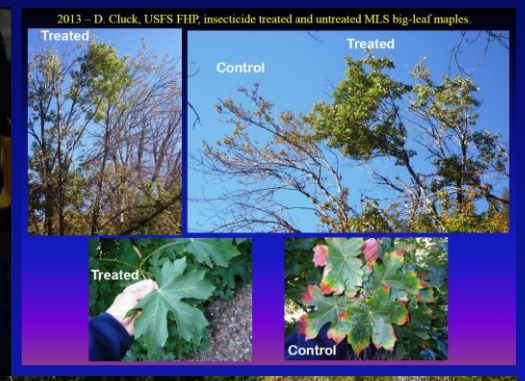
2018 NW Oregon Roadside Survey of Bigleaf Maple

Leafhopper tree damage was widespread and mostly low severity across the study area





Imidacloprid Injection Study, 2016-18



Results indicate that *E. elongata* may play a significant role in maple decline

Treatment Control

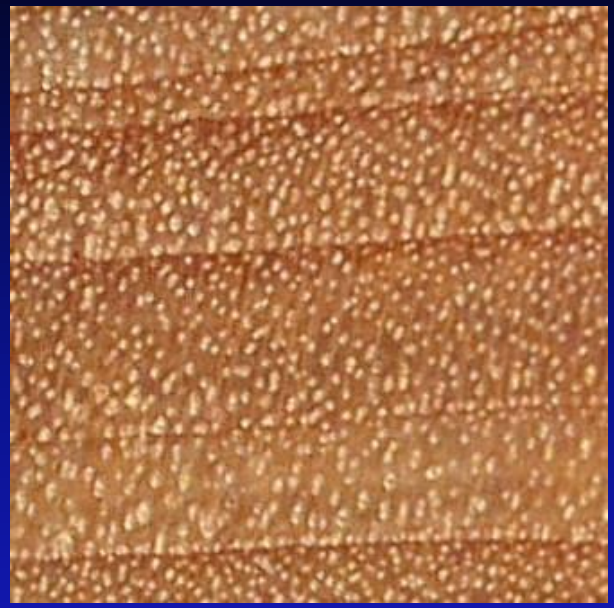
Imidacloprid Injection Study

2018 = Third year of data collection

Jake Betzen MS Thesis, UW 2017-2018

Data indicates bigleaf maple prefers cooler, moister summers, and that hotter, drier summers are detrimental.

- Ring widths of bigleaf maple were negatively correlated with summertime temperatures, vapor pressure deficits, and drought.
- Summer mean, minimum, and maximum temperatures were negatively correlated with ring width, indicating that bigleaf maple grows more in years with cooler summers.



Bigleaf maple growth rings
from:http://www.hobbithouseinc.com/personal/woodpics/_anatomy/diffuse%20porous/maple/_maple.htm

R6 - Working Hypothesis

- Climate change (warmer and drier) is the primary driver of widespread maple decline.
- Native *Empoasca enlongata* leafhoppers are favored by a warmer, drier climate and are a significant amplifying factor, especially in areas with droughty or shallow soils or sites with high levels of solar exposure.
- Other disturbance agents such as Armillaria root disease, foliar diseases, and other sucking insects sometimes may contribute locally to maple decline but are not significant on a large scale.

2021 California MLS Studies?

- New FS pathologists in No. and So. California
  - Ashley Hawkins – Redding
  - Charlie Barnes – San Bernardino
- CDFA Testing for *Xylella fastitiosa* DNA

Bye !

Bye !