

DISEASES AND PESTS OF NORTHWEST NATIVE PLANTS

Clay Antieau, MS, PhC
Botanist, Horticulturist,
Science Communicator

Sr. Environmental Analyst
City of Seattle Dept. of
Construction and Inspections

WSU Extension
Urban IPM and
Pesticide Safety Education

2018-2019 Recertification Program



GREATER CAMAS
(*Camassia leichtlinii*)

OR

***AN OVERVIEW OF SIGNIFICANT OR INTERESTING
DISEASES AND PESTS OF NORTHWEST NATIVE
PLANTS IN CULTIVATED LANDSCAPES,
EXCLUSIVE OF WOOD ROTTS,
SILVICULTURALLY IMPORTANT ROOT DISEASES,
AND ECOLOGICALLY CATASTROPHIC
INSECT INFESTATIONS***

**WSU Extension
Urban IPM and
Pesticide Safety Education**

2018-2019 Recertification Program

DISCLAIMERS

- 1. Clay is neither plant pathologist nor entomologist!**
- 2. Diagnosis of plant disease can be complex and difficult. Most problematic diagnoses should include consultation with professional plant pathologists.**
- 3. Diagnosis of insect damage can be complex and difficult. Most problematic diagnoses should include consultation with professional entomologists.**

RESOURCES

HERBARIA

- **University of Washington Herbarium**
<http://biology.burke.washington.edu/herbarium/imagecollection.php>
particularly “Image Gallery” link for plant photos

DIAGNOSTICS

- **Pacific Northwest Insect Management Handbook**
<https://pnwhandbooks.org/insect>
- **On-line Guide to Plant Disease Control**
<https://pnwhandbooks.org/plantdisease>
- **Johnson, W.T. and H.H. Lyon. 1991. *Insects That Feed on Trees and Shrubs*, 2nd ed., Cornell University Press.**
- **Analytical Laboratories and Consultants Serving Agriculture in the Pacific Northwest. [WSU Extension Bulletin EB1578E (Daniels 2003)]**
<http://analyticalabs.puyallup.wsu.edu/analyticalabs/instructions>
- **WSU Cooperative Extension *Puyallup Plant Clinic*, 7612 Pioneer Way East, Puyallup, WA 98371-4998. Fees required. 253-445-4582**
<https://puyallup.wsu.edu/plantclinic/>

GOALS FOR THIS SESSION?

1. Have good working definition of native plants
2. Know symptoms, importance, and treatment of common diseases and pests afflicting native plants. Focus on cultural controls (due primarily to level of concern and lack of pesticide registration)
3. Cover some alternative plant selections, when available and appropriate

NATIVE PLANTS

Plants found in a **specific area** prior to **Euro-Asian settlement (approximately 1850 in the Pacific Northwest¹)**, and which grow and reproduce without the aid of humans

¹ Donation Land Act of 1850: orderly and legal ownership of property in Oregon Territory; granted every white settler and "American half-breed Indian" above the age of 18 already living in the Territory a free half-section of land (if single) or a full section (640 acres, if married), with half in the wife's name. Residence and cultivation for four years was required. Settlers arriving after 1850 were granted half a section if married, or one-quarter of a section if single.

See also: Homestead Act of 1862; Railroad Land Grant Act of 1866

MAKAH OR OZETTE OR “INDIAN” POTATO

Introduced to NW Coastal Peoples by Spanish explorers in 1700's



DISEASES OF NORTHWEST NATIVE PLANTS

RUSTS:

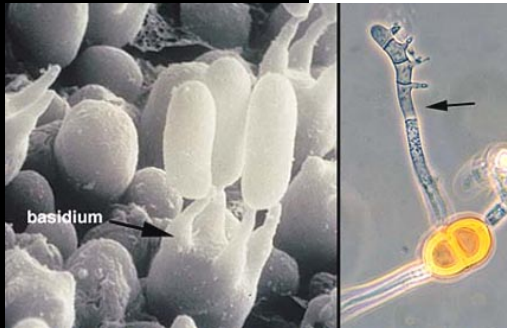
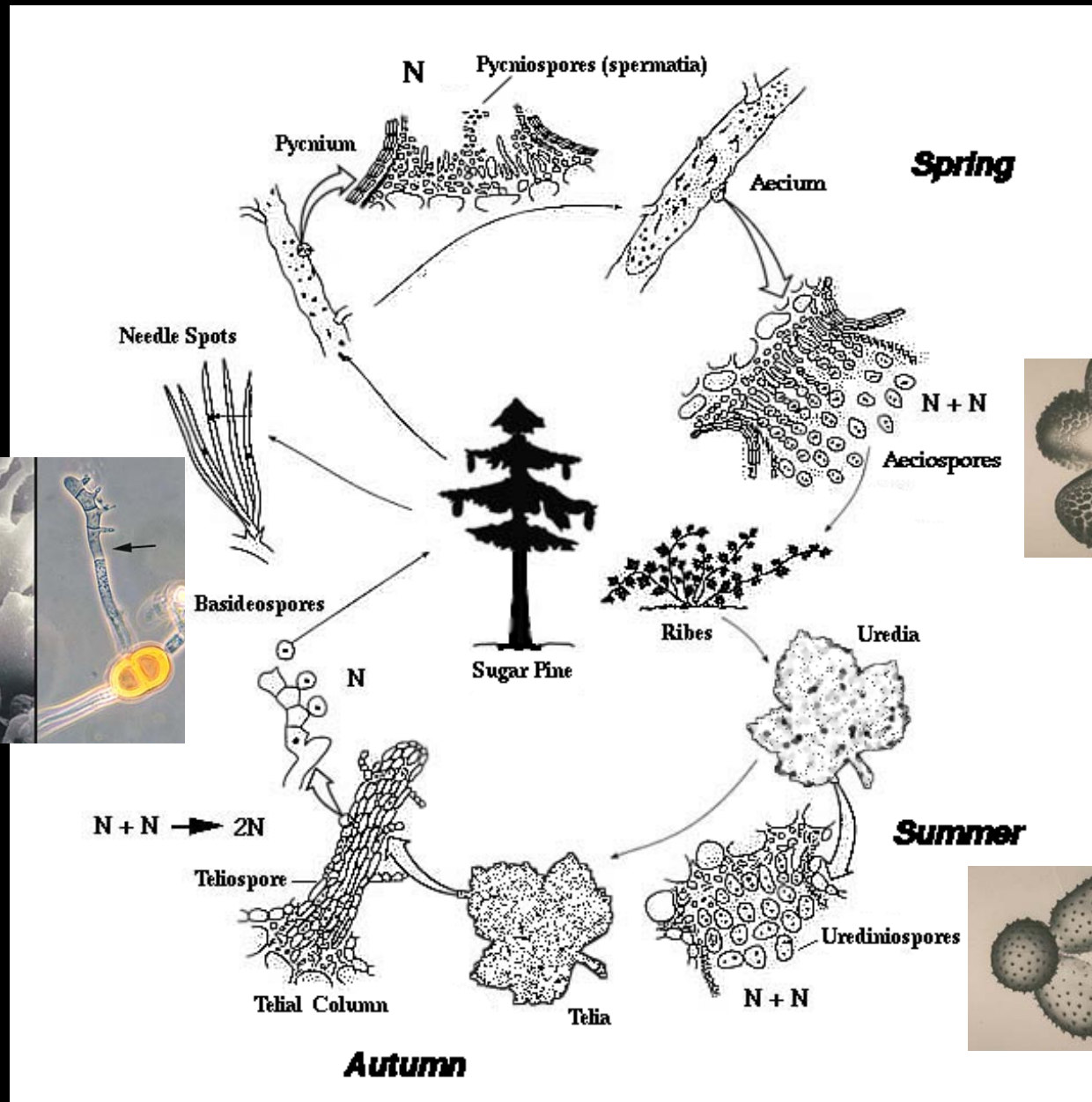
a large group of specialized fungi obligately parasitic on ferns, gymnosperms, and angiosperms

Basidiomycota (“club fungi”), Puccinales (syn. Uredinales): most rusts require two host species to complete their sexual life cycle (2+ years) and (usually) produce four different types of spores



rust on soy (*Glycine max*)

WHITE PINE BLISTER RUST LIFE CYCLE (2+ years)



WESTERN WHITE PINE
(Pinus monticola)



white pine blister rust
(Cronartium ribicola)



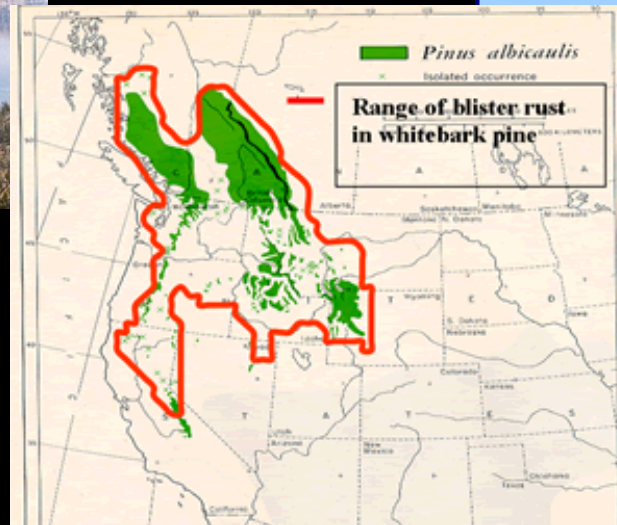
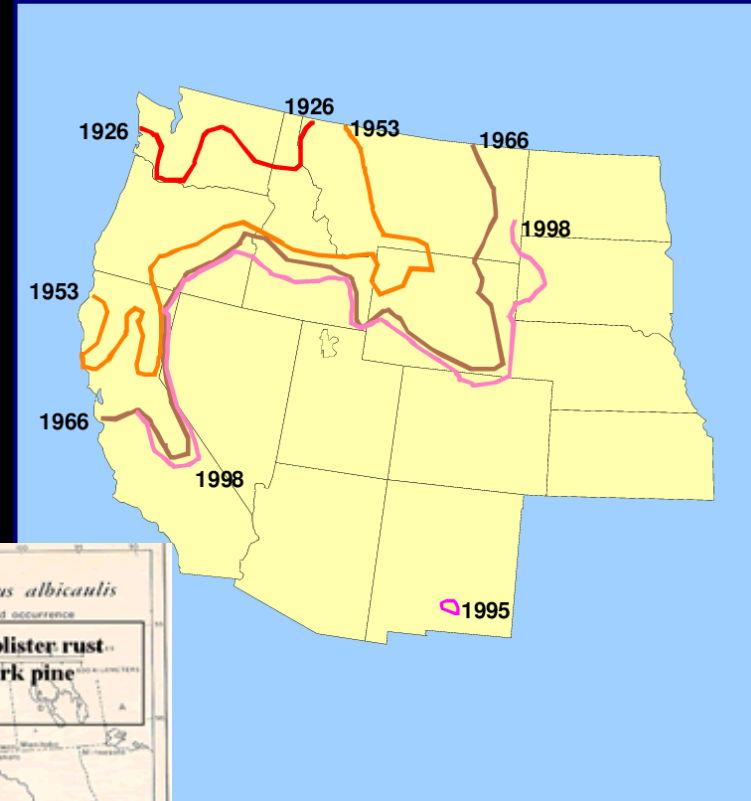
← ...on *Ribes*

Pedicularis spp.??
Castilleja spp.??

WESTERN WHITE PINE (*Pinus monticola*)

and now

WHITEBARK PINE (*Pinus albicaulis*)



white pine blister rust
(*Cronartium ribicola*)

MANAGEMENT RECOMMENDATIONS

White Pine Blister Rust (*Cronartium ribicola*)

LEVEL OF CONCERN: High

CULTURAL CONTROL:

- pruning naturally regenerated white pine 8-10 feet up from the ground decreased blister rust mortality by nearly 50% over 20 Years
- plant resistant stock
- do not plant white pine near cultivated or native currants / gooseberries

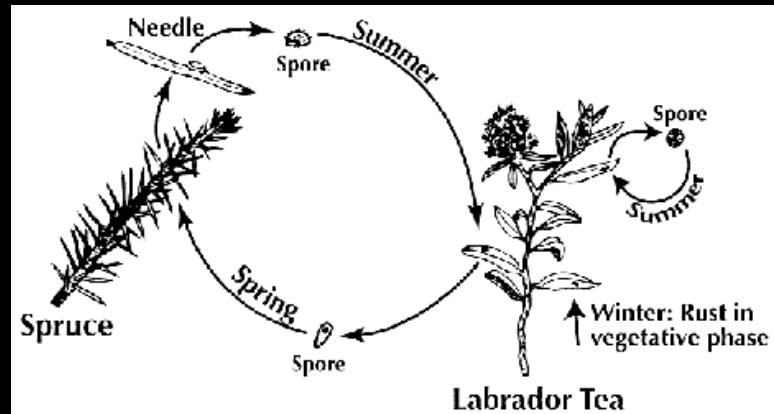
CHEMICAL CONTROL:

See *OSU On-line Guide to Disease Control*

<https://pnwhandbooks.org/plantdisease>



SITKA SPRUCE (*Picea sitchensis*)



aecia on grand fir (Ceska)



...on Labrador-tea

Spruce-Labrador-tea rust (*Chrysomyxa ledicola*)

MANAGEMENT RECOMMENDATIONS

Spruce-Labrador Tea Rust (*Chrysomyxa ledicola*)

LEVEL OF CONCERN: Low

CULTURAL CONTROL: None

CHEMICAL CONTROL: None recommended

**EVERGREEN and
RED HUCKLEBERRIES**
(*Vaccinium ovatum*; *V. parviflorum*)



Aecia on grand fir



**Telia on evergreen
huck (witches'
brooms)**



fir rust
(*Pucciniastrum goeppertianum*)

MANAGEMENT RECOMMENDATIONS

Fir Rust (*Pucciniastrum goeppertianum*)

LEVEL OF CONCERN: Low

CULTURAL CONTROL:

Prune out and destroy witch's brooms on *Vaccinium*; do not compost

CHEMICAL CONTROL:

See *OSU On-line Guide to Disease Control*
<https://pnwhandbooks.org/plantdisease>

WESTERN SERVICEBERRY
(*Amelanchier alnifolia*)



serviceberry rust
(*Gymnosporangium* spp.)

Alternate Hosts: *Thuja*, *Juniperus*



MANAGEMENT RECOMMENDATIONS

Serviceberry Rust (*Gymnosporangium* spp.)

LEVEL OF CONCERN: Low

CULTURAL CONTROL:

do not plant serviceberry near junipers or redcedars

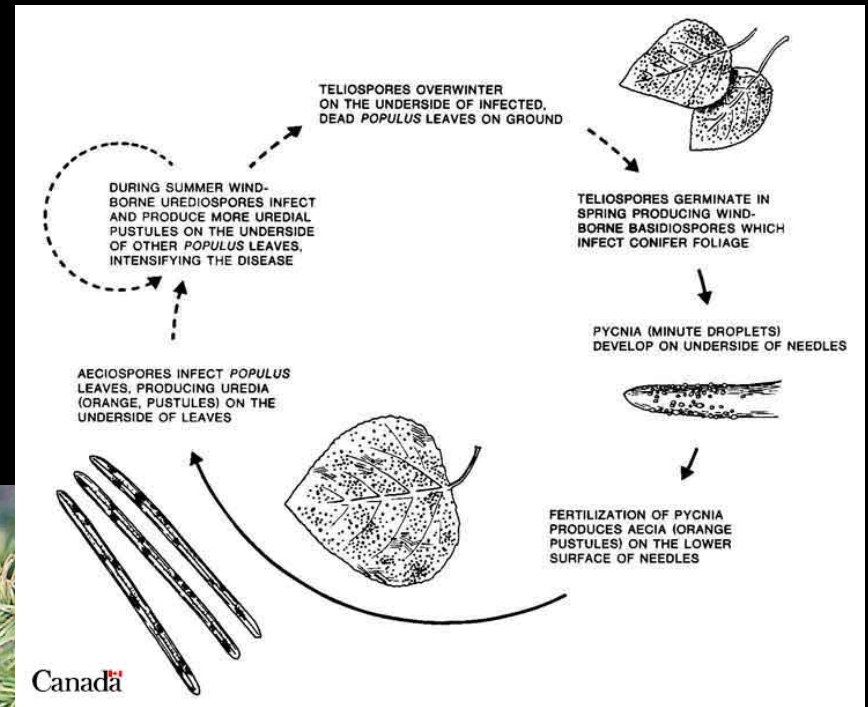
CHEMICAL CONTROL:

See *OSU On-line Guide to Disease Control*
<https://pnwhandbooks.org/plantdisease>

COTTONWOOD (*Populus balsamifera* and hybrids)



Cottonwood Rust
(*Melampsora* species)



Alternate Hosts:
conifers

MANAGEMENT RECOMMENDATIONS

Cottonwood Rust (*Melampsora* species)

LEVEL OF CONCERN: Low

CULTURAL CONTROL:

CHEMICAL CONTROL:

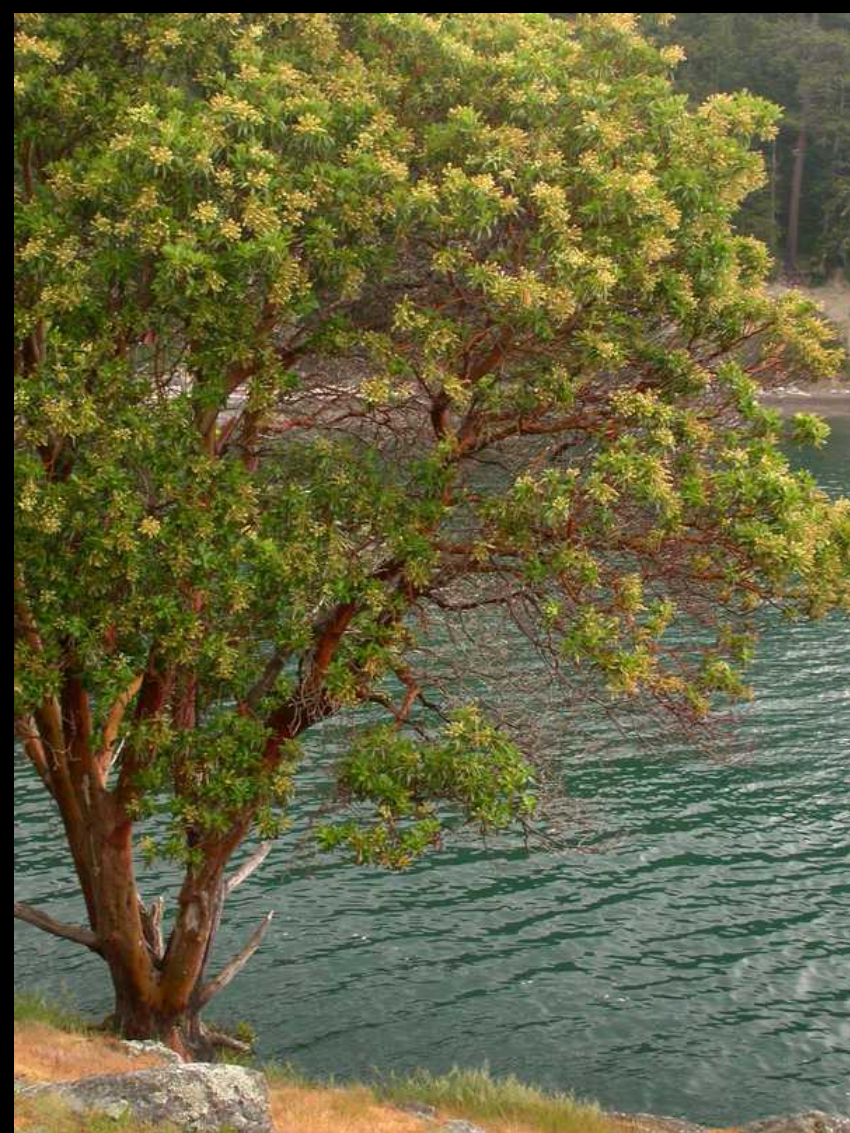
See *OSU On-line Guide to Disease Control*

<https://pnwhandbooks.org/plantdisease>

**DISEASES OF
OF NORTHWEST NATIVE PLANTS**

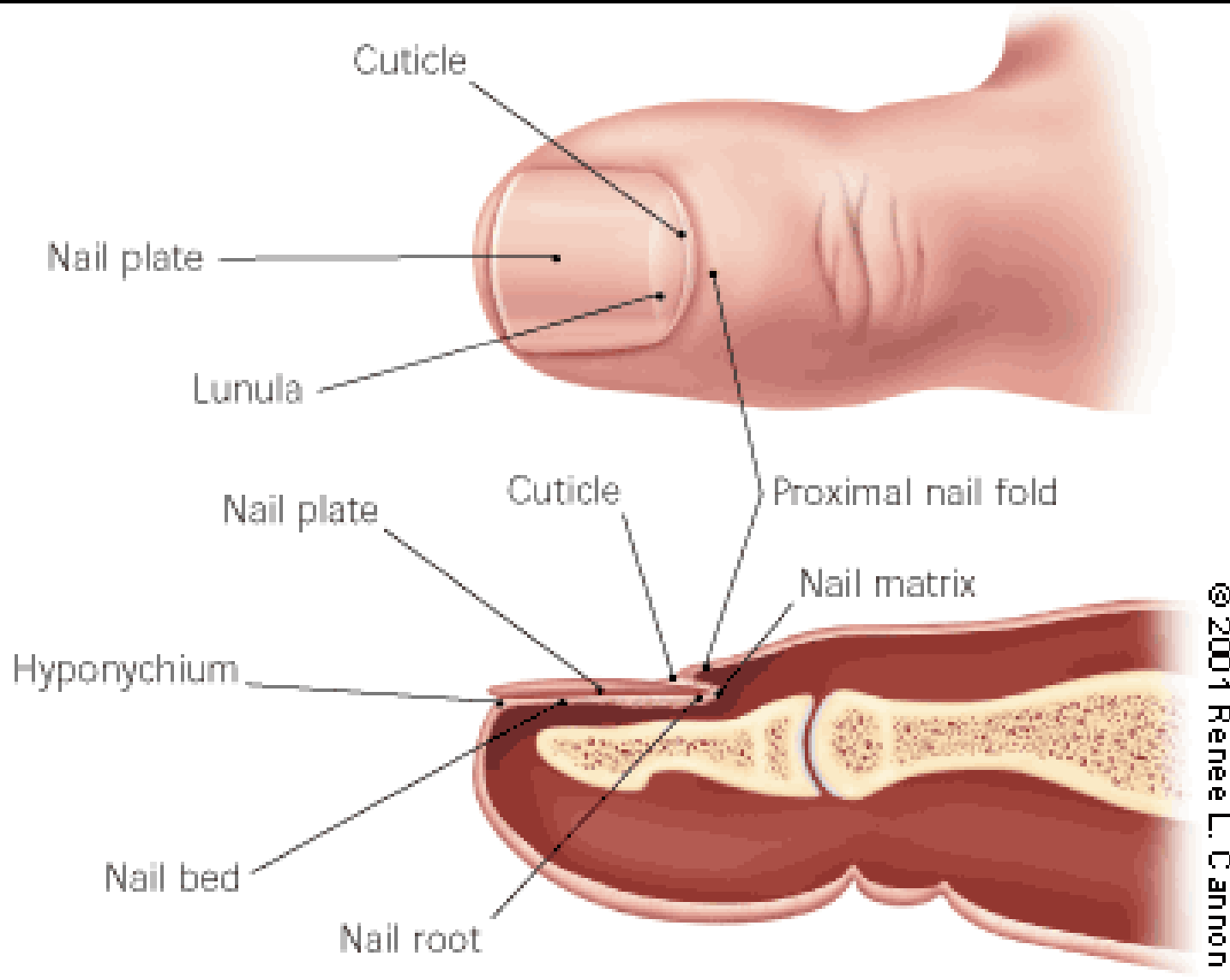
ANTHRACNOSE FUNGI

MADRONE (*Arbutus menziesii*)



- madrone canker (*Nattrassia mangiferae*)
- die-back (*Fusicoccum aesculi*)
- madrone leaf spot (*Mycosphaerella arbuticola*, *Coccomyces quadratus*, *Rhytisma arbuti*, et al.)

TOENAIL FUNGUS DISEASE (*Nattrassia mangiferae*)



MANAGEMENT RECOMMENDATIONS

Madrone Anthracnose (leaf spot, twig dieback, canker)

LEVEL OF CONCERN: High

CULTURAL CONTROL:

- Avoid wounding trees
- Avoid disturbing root zone with grade changes and compaction
- Avoid shading trees
- Plant only in well drained areas; correct drainage if necessary
- Do not irrigate
- Prune out and destroy cankered or dead branches
- Remove, destroy infected plants / fallen plant debris (leaves, twigs)

CHEMICAL CONTROL:

See *OSU On-line Guide to Disease Control*

<https://pnwhandbooks.org/plantdisease>



ALTERNATE???
Golden chinquapin
(*Chrysolepis chrysophylla*)

**WESTERN DOGWOOD
(*Cornus nuttallii*)**



**Anthracoese
(*Discula* spp. and others)**

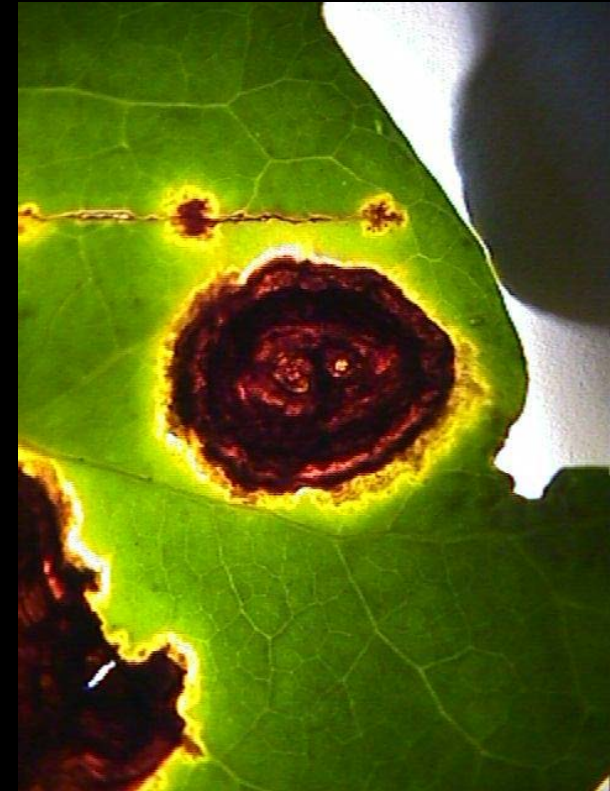
DIAGNOSING BACTERIAL VERSUS FUNGAL SPOTS AND LESIONS



Fungal Lesions on
Western Dogwood



Fungal Lesion on
Grape



Bacterial Lesions
on English Ivy

MANAGEMENT RECOMMENDATIONS

Dogwood Anthracnose (*Discula* spp.)

LEVEL OF CONCERN: High

CULTURAL CONTROL:

- Avoid wounding trees
- Avoid disturbing root zone with grade changes and compaction
- Avoid shading trees
- Plant only in well drained areas; correct drainage if necessary
- Do not irrigate
- Prune out and destroy cankered or dead branches
- Remove, destroy infected plants / fallen plant debris (leaves, twigs)

CHEMICAL CONTROL:

See *OSU On-line Guide to Disease Control*

<https://pnwhandbooks.org/plantdisease>



ALTERNATE???
***Cornus* x 'Eddie's White Wonder'**

**DISEASES OF
OF NORTHWEST NATIVE PLANTS
ROOT DISEASE (SOIL-BORNE) FUNGI**

PORT ORFORD-CEDAR
(*Chamaecyparis lawsoniana*)



Root rot (*Phytophthora lateralis*; *P. cinnamomi*)

MANAGEMENT RECOMMENDATIONS

Phytophthora Root Rot (*Phytophthora lateralis* and *P. cinnamomi*)

LEVEL OF CONCERN: High

CULTURAL CONTROL:

- Do not plant in soil with poor drainage or in areas that receive drainage from roads
- Plant healthy seedlings in soil known to be free of the pathogen
- Prevent wounding at the base of trees or to roots from construction or landscaping operations
- Avoid extensive gardening (mulching and planting susceptible flowering plants) underneath (may hasten disease development)
- Do not transfer soil from diseased areas to uncontaminated areas

MANAGEMENT RECOMMENDATIONS (cont'd)

Phytophthora Root Rot (*Phytophthora lateralis* and *P. cinnamomi*)

LEVEL OF CONCERN: High

CULTURAL CONTROL:

- Promptly remove and destroy dead and dying trees to help protect other trees in the area
- Plant resistant species in contaminated ground
- Plant resistant *C. lawsoniana* (forest restoration stock now available)

CHEMICAL CONTROL:

See *OSU On-line Guide to Disease Control*

<https://pnwhandbooks.org/plantdisease>



ALTERNATE??

**INCENSE-CEDAR
(*Calocedrus decurrens*)**

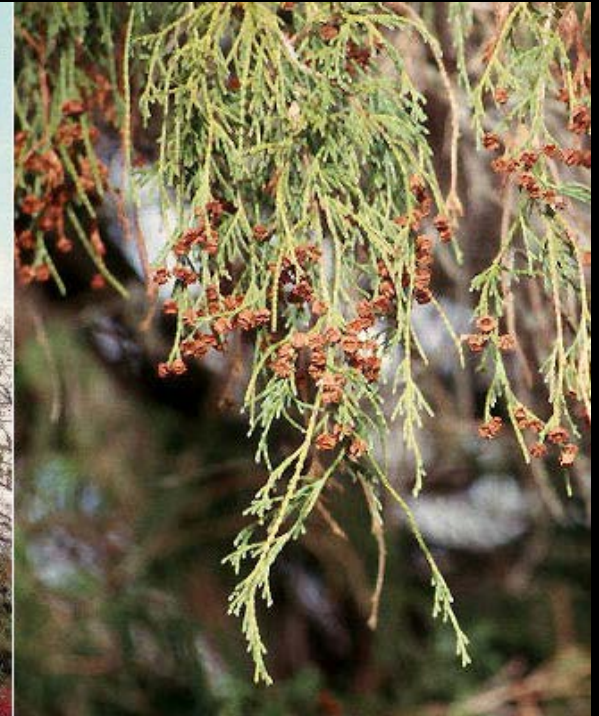
ALTERNATES??

Alaska yellow-cedar (*C. nootkatensis*);
intermediate in susceptibility

Other species of *Chamaecyparis* are
considered resistant including
C. obtusa , *C. pisifera*.



Chamaecyparis nootkatensis



Chamaecyparis pisifera 'Filifera'

OREGON-BOX
(Paxistima myrsinites)



phytophthora root rot

MANAGEMENT RECOMMENDATIONS

Root Rot (*Phytophthora* spp.) on Oregon Box

LEVEL OF CONCERN: Low

CULTURAL CONTROL:

- Plant in soil with excellent drainage; prefers shade
- Avoid extensive gardening/cultivation in root zone
- Do not transfer soil from diseased areas to uncontaminated areas

**DISEASES OF
NORTHWEST NATIVE PLANTS
FUNGAL LEAF SPOT DISEASES**

OREGON ASH
(Fraxinus latifolia)



Leaf spot
(Mycosphaerella fraxinicola
and M. effigurata)

William Jacobi, Colorado State
University, Bugwood.org

MANAGEMENT RECOMMENDATIONS

Oregon Ash Leaf spot (*Mycosphaerella fraxinicola* and *M. effigurata*)

LEVEL OF CONCERN: Low

CULTURAL CONTROL:

Rake and destroy fallen leaves

CHEMICAL CONTROL:

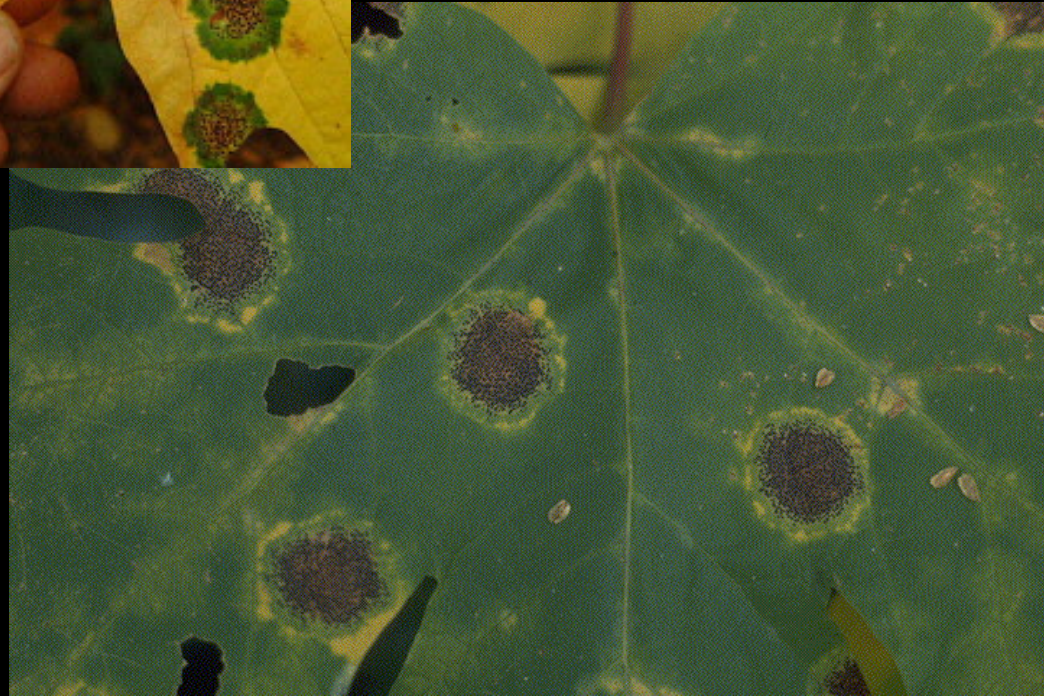
See *OSU On-line Guide to Disease Control*

<https://pnwhandbooks.org/plantdisease>

**BIG-LEAF MAPLE
(*Acer macrophyllum*)**



**Tar Spot
(*Rhytisma punctatum*)**



MANAGEMENT RECOMMENDATIONS

Tar Spot (*Rhytisma punctatum*)

LEVEL OF CONCERN: Low

CULTURAL CONTROL:

Rake and destroy fallen leaves

CHEMICAL CONTROL:

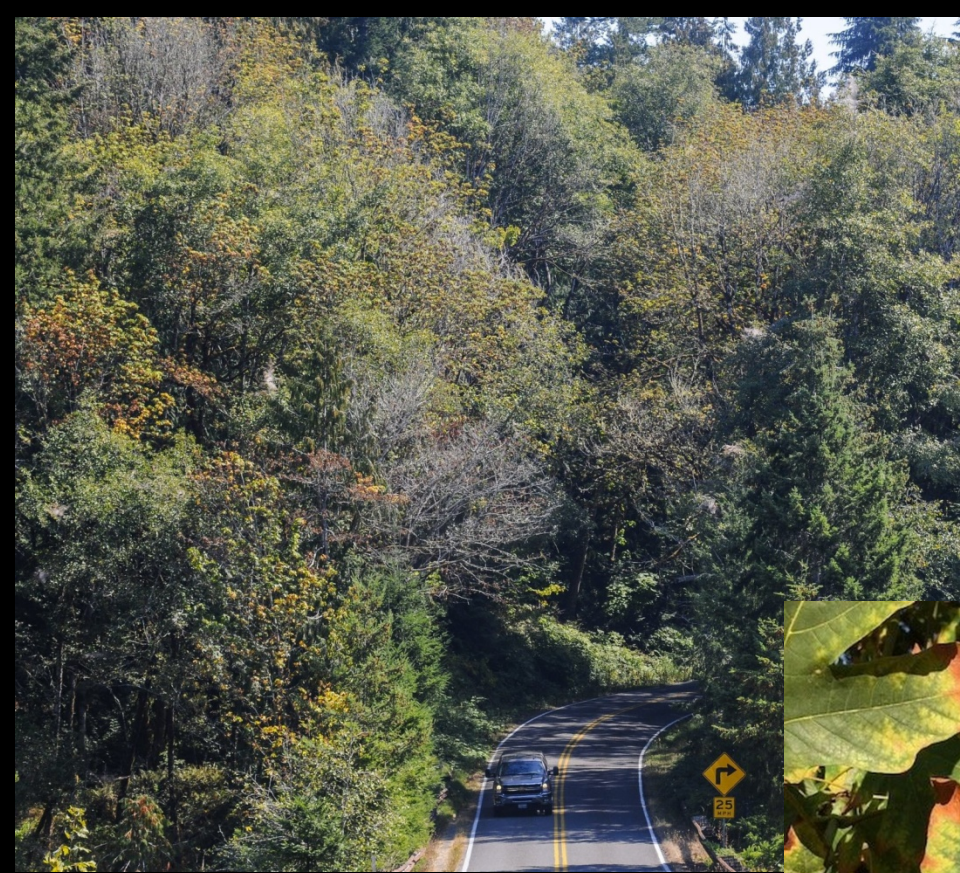
See *OSU On-line Guide to Disease Control*

<http://plant-disease.ippc.orst.edu/disease.cfm>

See *OSU On-line Guide to Disease Control*

<https://pnwhandbooks.org/plantdisease>

BIG-LEAF MAPLE (*Acer macrophyllum*)



Craig Sailor / The News Tribune (Tacoma)



**Big-leaf Maple Decline
(???)**



Peter Haley / The News Tribune
(Tacoma)



KINNIKINNICK
(*Arctostaphylos uva-ursi*)



Leaf Spot
**(*Chrysomyxa arctostaphyli*, a rust;
Phyllosticta amicta; *Cryptostictis arbuti*)**

SALAL
(*Gaultheria shallon*)



Bloedel Reserve, Bainbridge Island, WA



Leaf Spot

**[*Dasyschypha* sp., *Mycosphaerella gaultheriae*
(very common), *Pestalopezia* sp., and several
Phyllosticta spp.]**

MANAGEMENT RECOMMENDATIONS

Leaf Spot [*Dasyschypha* sp., *Mycosphaerella gaultheriae* (very common), *Pestalopezia* sp., and several *Phyllosticta* spp.]

LEVEL OF CONCERN: Medium

CULTURAL CONTROL:

- **Remove infected, dead, and dying leaves on and near plants**
- **Avoid irrigation**
- **Space plantings and prune to improve air circulation**
- **Brush-cut salal to ground every couple of years to keep shoots vigorous and to remove old, disfigured leaves.**

CHEMICAL CONTROL:

None Recommended

MANAGEMENT RECOMMENDATIONS (cont'd)

Leaf Spot (*Chrysomyxa arctostaphyli*, a rust; *Phyllosticta amicta*; *Cryptostictis arbuti*)

LEVEL OF CONCERN: Medium

CULTURAL CONTROL:

- Plant resistant kinnikinnick cultivars such as 'Massachusetts' strain
- Avoid overhead irrigation
- Remove and destroy infected leaves from plants, where practical
- Space plantings and prune to improve air circulation
- Avoid planting in moist, shady areas

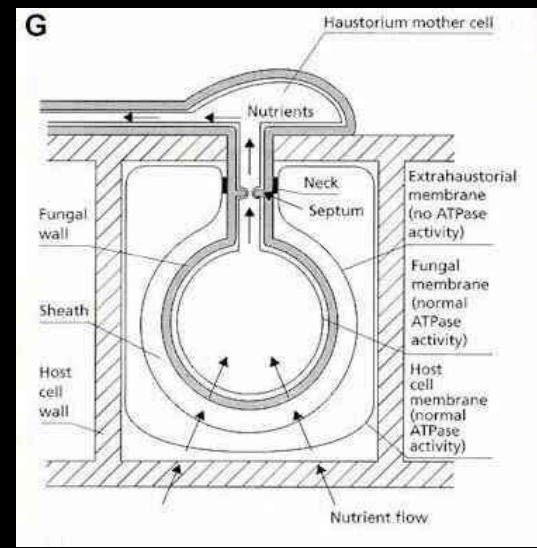
CHEMICAL CONTROL:

None Recommended

**SOME ADDITIONAL MISCELLANEOUS
FUNGAL DISEASES OF
NORTHWEST NATIVE PLANTS**

POWDERY MILDEW

[*Phyllactinia guttata* (maple, alder, hazel);
Podosphaera clandestine (snowberry)]



Bigleaf maple (*Acer macrophyllum*)



**Snowberry
(*Symphoricarpos alba*)**

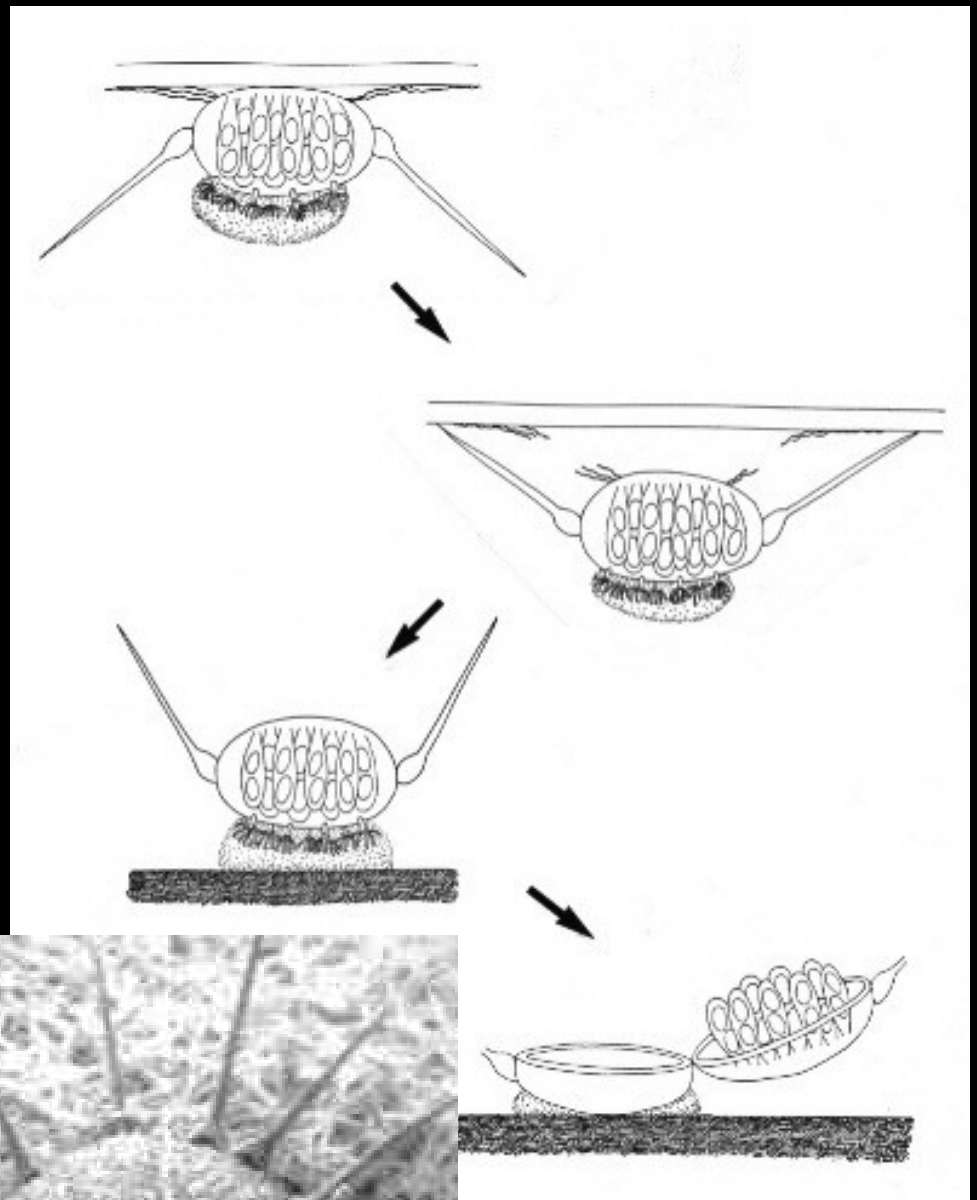
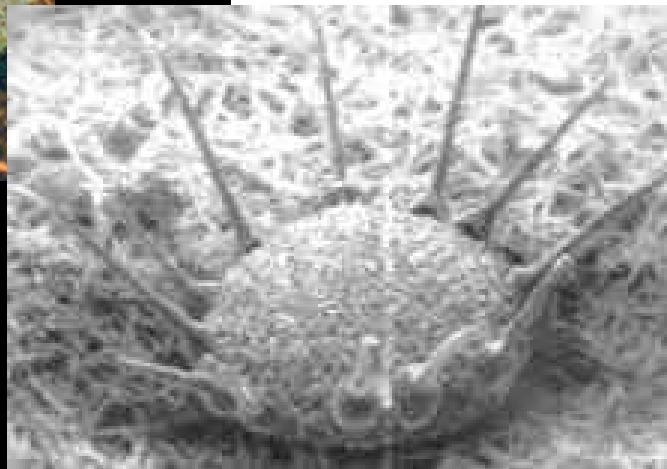
Kaligreen®:
a potassium bicarbonate fungicide

POWDERY MILDEW

Phyllactinia spp.



Red Alder
(*Alnus rubra*)



ascocarp (ascomatum; ascoma; perithecium) with unique appendages

BRANCH DIEBACK

Phytophthora sp. ??

Botryosphaeria ribis ??

Kinnikinnick

(*Arctostaphylos uva-ursi*)

Manzanita

(*Arctostaphylos* spp.)

Salal

(*Gaultheria shallon*)



ALTERNATIVES???

EVERGREEN STRAWBERRY
(Fragaria chiloensis)



**DISEASES OF
OF NORTHWEST NATIVE PLANTS**

BACTERIAL DISEASES

ASPEN
(*Populus tremuloides*)



canker (*Valsa sordida* and others)

MANAGEMENT RECOMMENDATIONS

Canker (*Valsa sordida* and others)

LEVEL OF CONCERN: Medium

CULTURAL CONTROL:

- Avoid wounding trees (e. g., line-trimmers)
- Keep trees growing vigorously
- Prune off and destroy cankered branches
- Sterilize pruning tools before and during pruning

CHEMICAL CONTROL:

None Recommended

**DISEASES OF
NORTHWEST NATIVE PLANTS**

**PHYSIOLOGICAL
OR ABIOTIC DISEASES**

ILL-ADAPTED-NESS

Subalpine fir
(*Abies lasiocarpa*) →

Pacific silver fir
(*Abies amabilis*)

Lyall larch
(*Larix lyalli*)

Western larch
(*Larix occidentalis*)

White rhododendron
(*Rhododendron
albiflorum*)



**CONIFER CROWN
DIEBACK**

**Douglas-fir
(*Pseudotsuga menziesii*)**

**Western redcedar
(*Thuja plicata*)**



REDCEDAR FLAGGING

Western redcedar
(*Thuja plicata*)



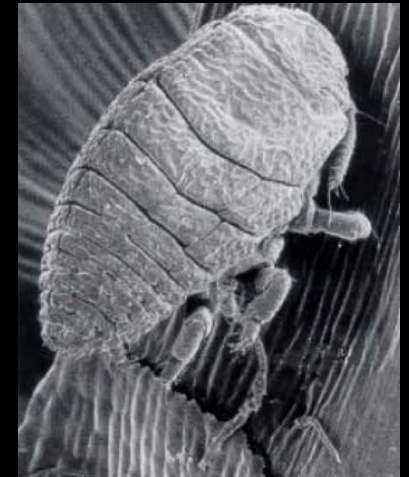
INSECT PESTS OF NORTHWEST NATIVE PLANTS

SITKA SPRUCE (*Picea sitchensis*)



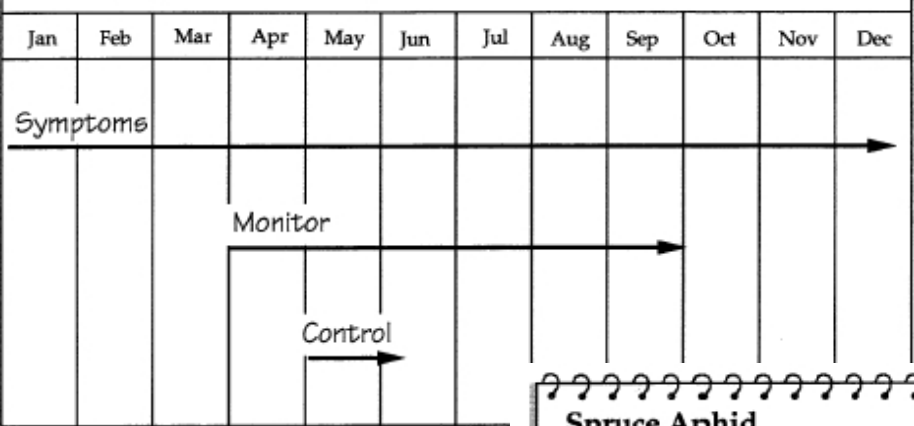
**Cooley spruce gall adelgid
and spruce aphid**

WESTERN HEMLOCK
(Tsuga heterophylla)

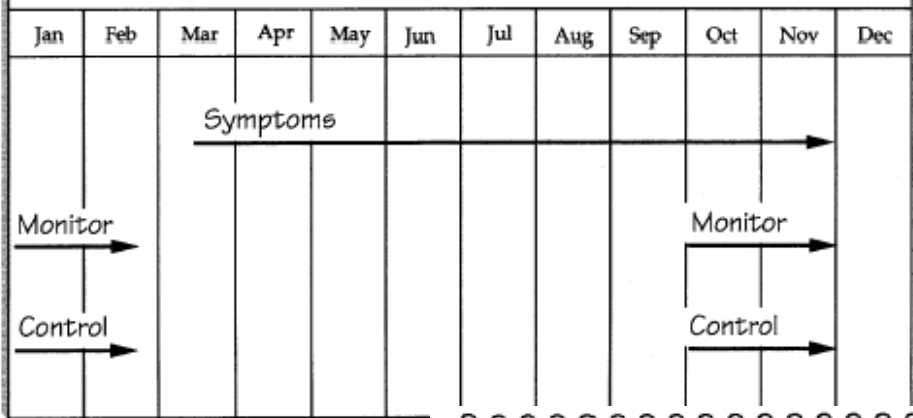


hemlock woolley adelgid

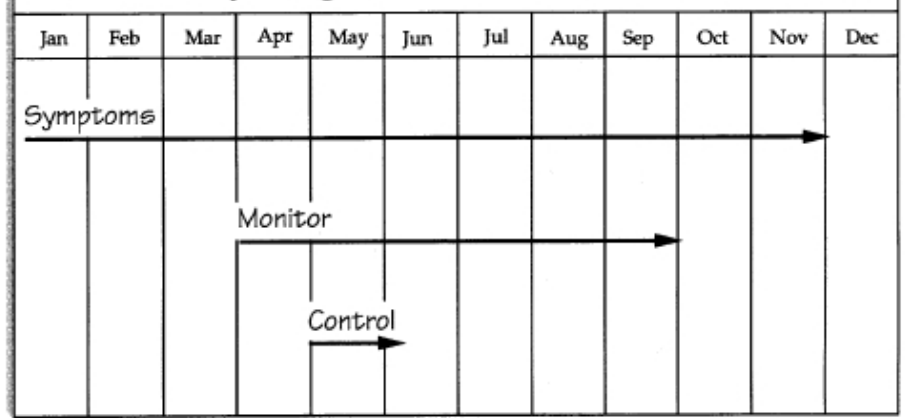
Cooley Spruce Gall Adelgid



Spruce Aphid



Balsam Woolly Adelgid



CUPRESSUS AND JUNIPERS (*Cupressus*, *Juniperus*, and *Thuja*)



cypress tip moth

SUSCEPTIBILITY OF CUPRESSACEAE TO CYPRESS TIP MOTH IN CALIFORNIA (Univ. of California)

Least Susceptible:

Juniperus chinensis var. *sargentii* 'Glauca'

J. scopulorum 'Erecta Glauca'

J. chinensis 'Kaizuka'

Thuja plicata

Moderately Susceptible:

J. sabina 'Arcadia' and 'Tamariscifolia'

J. virginiana 'Prostrata'

J. chinensis 'Pfitzerana Aurea'

More Susceptible:

J. virginiana 'Cupressifolia'

J. chinensis 'Pfitzerana' and 'Robust Green'

Chamaecyparis lawsoniana 'Allumii'

Most Susceptible: *Thuja occidentalis*

POPLARS AND WILLOWS (*Populus* and *Salix*)



340-16



340-21

Poplar and willow borer
***Cryptorhynchus* spp.**

**OREGON WHITE OAK
(*Quercus garryana*)**



© Mark Leppin



**Oregon Oak Gall Wasp
(*Besbicus mirabilis*), adult**

NATIVE PLANT LITERATURE

Franklin, J. and C.T. Dyrness. 1988. Natural Vegetation of Oregon and Washington. Oregon State University Press.

Jacobson, Arthur Lee. 2001. Wild Plants of Greater Seattle. Self-published.

Kozloff, Eugene N. 2005. Plants of Western Oregon, Washington, and British Columbia. Timber Press.

Kruckeberg, Arthur. 1982. Gardening with Native Plants of the Pacific Northwest; an Illustrated Guide. University of Washington Press.

Pojar, Jim and Mackinnon, Andy. 1994. Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia and Alaska. Lone Pine Publishing.

Turner, Mark and Gustafson, Phyllis. 2006. Wildflowers of the Pacific Northwest. Timber Press.

DISEASES AND PESTS OF NORTHWEST NATIVE PLANTS

Clay Antieau, MS, PhC
Botanist, Horticulturist,
Science Communicator

206-615-1393

clayton.antieau@seattle.gov

WSU Extension
Urban IPM and
Pesticide Safety Education

2018-2019 Recertification Program



GREATER CAMAS
(*Camassia leichtlinii*)