

Detecting and managing SOD in nurseries and landscapes

Marianne Elliott
WSU Puyallup
melliott2@wsu.edu

WASHINGTON STATE
 UNIVERSITY

Sudden Oak Death

- First seen in early 1990s
- Two types of symptoms
 - Canker
 - Foliar blight
- Caused by *Phytophthora ramorum* (Oomycetes)
- Over 70 plant hosts
- Most of the outbreak in central coastal CA



Dead tanoak in Muir Woods NP, CA



Foliar symptoms on Rhododendron

P. ramorum in European forests



Rhododendron ponticum

Red Oak:
Quercus rubra

Beech: *Fagus sylvatica*

These species used
as ornamentals in WA

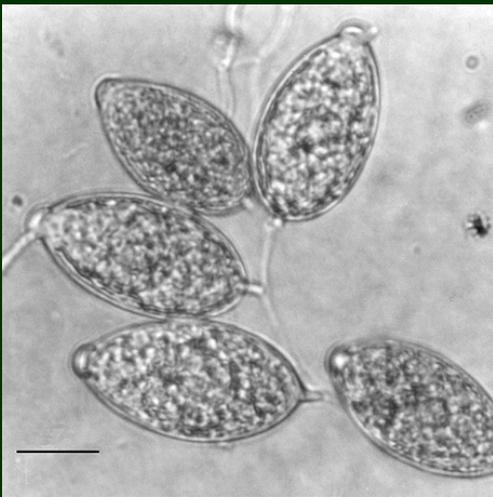
What is *Phytophthora*?

- A very damaging plant disease
- A fungus-like organism related to brown algae
- Microscopic, no visible fruiting bodies, diagnosis based on symptoms

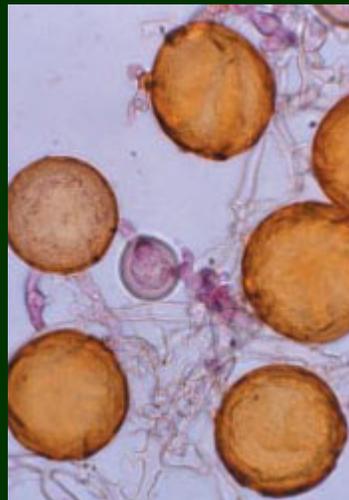


Phytophthora spore stages

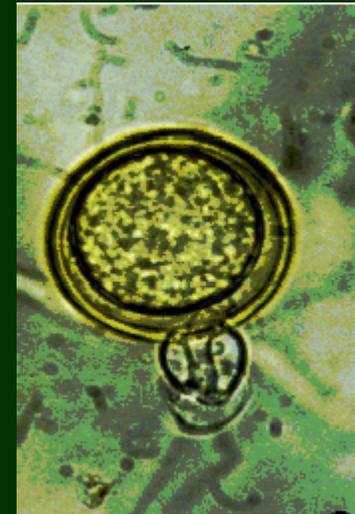
- *Phytophthora* thrives in wet conditions
- *P. ramorum* infections initiated by sporangia and zoospores
- Chlamydospores can persist in soil and leaf litter
- Sexual oospores are resistant to damage



Sporangia containing swimming zoospores



Chlamydospores



Oospores (*P. infestans*)

Important hosts of *P. ramorum* in nurseries

- Rhododendron
- Viburnum
- These genera account for over 90% of the positive finds in Washington nurseries
- Others –
 - Camellia
 - Pieris
 - Kalmia



Symptoms on trees

P. cambivora on Beech

- Bleeding cankers
- Cankers can girdle the tree and kill it
- Host species in Fagaceae: oaks, beech, tanoak
- Other *Phytophthora* spp can cause the same symptoms



P. ramorum on Oak

Similar symptoms

- *Phytophthora* root disease and canker
- *Armillaria* root disease



Bacterial stem diseases

- Bacterial wetwood
- Bleeding stem cankers caused by *Pseudomonas syringae*



Symptoms of *P. ramorum* on Rhododendron

Look-alikes

- Sun scorch
- Other Phytophthoras
- Phomopsis and Botryosphaeria shoot blight

P. ramorum symptoms on rhododendrons in nurseries



Foliar blight

P. ramorum symptoms on native rhododendron



Shoot dieback



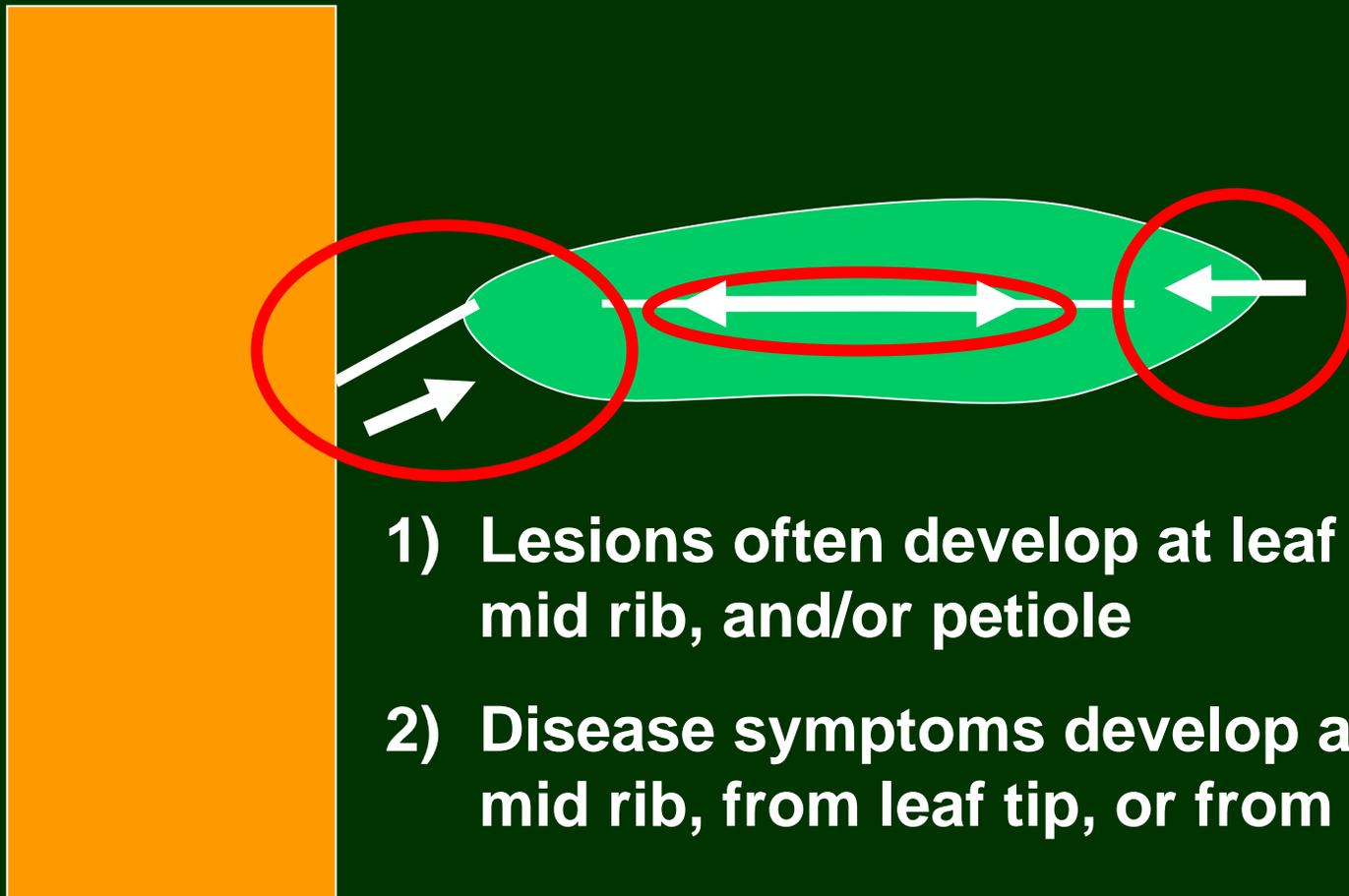
Foliar blight



Foliar blight

Rhododendron macrophyllum

Summary of typical *P. ramorum* symptoms of rhododendrons



- 1) Lesions often develop at leaf tip, mid rib, and/or petiole
- 2) Disease symptoms develop along mid rib, from leaf tip, or from petiole

Sun Scorch of rhododendron



Brown spots not extending along petiole or midrib of leaf

Sun Scorch of rhododendron



Sun scorch, lesion does not extend down leaf midrib



Gray blight can develop on sun scorched rhododendron leaves

Phomopsis and Botryosphaeria shoot blight



Photo: North Carolina Cooperative Extension Service

Wilting
Cankers
Black fruiting
bodies
Brown staining of
wood



Photo: University of Georgia Extension



Photo: Virginia Cooperative Extension

P. ramorum on Camellia

Brown lesions: irregular and restricted to leaf tip



Symptoms on camellia

- Look for lower leaves that have fallen off



Sun Scorch of Camellia



Brown spot not extending along petiole or midrib of leaf

Viburnum



Viburnum tinus "Spring Bouquet"



V. plicatum "Mariesii"

V. davidii



Symptoms

- Stem canker
- Foliage and shoot blight

Grey mold



Botrytis



P. ramorum

Some other hosts



Grand fir



Bigleaf maple



Pacific madrone



Lilac

Management of *Phytophthora* diseases

- Incoming plant material
- Water
- Plant debris
- Chemicals



Plant material

- Check for symptoms
- Do not buy plants from the “clearance rack”. They are there for a reason
- Isolate suspicious or high risk plants for observation



Water management

- Avoid overhead irrigation
- Leaf wetness period should be less than 12h
- Drip irrigation saves water and reduces chance of infection



Water Management

Phytophthora
breeds in
standing water



Plants that tip over into
puddles containing
inoculum (zoospores)
become infected within 10
seconds!



Poor sanitation and plant debris management



Good sanitation and plant debris management



Fungicides – use with caution

- Chemicals will prevent new infections
- Chemicals can mask symptoms in plants that are already infected
- Resistance can develop
 - Metalaxyl
 - Dimethomorph
 - Pyraclostrobin
 - Fenamidone

For more information visit our
website:

<http://www.puyallup.wsu.edu/ppo/sod/extension/index.htm>