Invasive, Emerging and Common Diseases Caused by *Phytophthora* and Others

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Causes of Plant Problems Per 100 Samples

- **38% Abiotic**
  - Drought: 11
  - Other Environmental: 5
  - Nutrient: 3
- **57% Biotic**
  - Insect/Mite: 24
  - Fungi: 22
  - Bacteria: 8
  - Virus: 1
  - Nematode: 1
  - Algae: 1
  - Others: 5
Canker diseases of trees
  - Phytophthora diseases, including SOD and the like
  - Bacterial bleeding canker
  - Cytospora canker disease
  - Bacterial wetwood (slime flux)

Leaf rust, leaf blight, and leaf spot

Grapevine bacterial leaf scorch – Pierce’s disease

Potential pathway for disease introduction

IPM strategies
Phytophthora

- Trees
- Shrubs
- Crops
- Vegetables

- Stem rot (canker)
- Leaf blight
- Fruit rot
- Dieback
- Collar rot
- Crown rot
- Root rot

Drawings from APSnet and Wikipedia
Sudden Oak Death

A *Phytophthora* Bleeding Canker Disease
Bleeding canker on lower trunk

Sudden Oak Death on Coast live oak

Host Range:
46 natural hosts
90 associated hosts
Maple Bleeding Canker

Sap oozing symptom

*Phytophthora cactorum*

Photos by Shouhua Wang
Maple Bleeding Canker

Maple / *Phytophthora* disease

Bacterial Infection

Photos by Shouhua Wang
Birch Bacterial Infection

Maple Phytophthora

Photos by Shouhua Wang
Predisposition by stresses
Infection by pathogens
Chronic decline or acute death

Stem Canker

Photos by Shouhua Wang
Signs of Cytospora Canker

Quaking aspen / Cytospora canker

Mountain ash / Cytospora canker

Photos by Shouhua Wang
Cytospora Canker on Maple

Photos by Shouhua Wang
Canker Symptoms

- Gum exuding
- Crack
- Dots
- Sooty
- Dots
- Discoloration
- Staining
- Callus
Cottonwood in Las Vegas

Wetwood and soft wood rot disease

Elm tree in Reno

Photos by Shouhua Wang
Cottonwood Rust

Photos by Shouhua Wang
Cedar-hawthorn rust
Daylily rust
Peppermint rust
Sagebrush rust
Service berry broom rust

Rust Diseases

Photos by Shouhua Wang
Aspen and poplar shoot blight, *Venturia populina*

Shepherd's crook leaf and shoot blight, *Venturia tremulae* Aderh.

Fire Blight-Like Symptom

Leaf and Shoot Blight on Poplar
Elytroderma blight on Jeffrey pine

Photos by Shouhua Wang
Screwbean Mesquite Dieback Caused by *Phleospora prosopidis*

*Photos by Shouhua Wang*
Pierce’s Disease on Grape

Initial symptom

Progressive symptom

Severe symptom

Photos by Shouhua Wang
Immature death of plants  Sign of Pathogen

*Phytophthora* Blight of Pumpkin

Photos by Shouhua Wang
Azalea Infected by *Phytophthora* Disease

Photos by Shouhua Wang
Integrated Pest Management (IPM)
- Early detection and monitoring
- Identification of pests or disease causing agents
- Understand the biology of pests (life cycle)
- Use one or more of following management strategies
  - Preventive measures
  - Cultural control
  - Physical or mechanical control
  - Biological control
  - Chemical control
- Build a system to achieve long-term effectiveness.
Chemical Control

- Diagnose the problem before treatment
- Differentiate abiotic disorders and infectious diseases
- Know four major pathogen groups and insect pests
- Use non-chemical approaches first
- Use chemical control as the last resort
- Select right timing for chemical control
<table>
<thead>
<tr>
<th>Pesticide Type</th>
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<td>Insecticide</td>
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<td>Algacide</td>
<td>Algae</td>
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<td>Defoliants</td>
<td>Leaves</td>
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Timing for Fungal Disease Control

Disease: Net blotch of barley

Courtesy of R. Hoenisch
Brown rot disease

Disease Cycle and Chemical Control Points

Protectant

flower buds and blossoms

Eradicant

sporodochia on mummies and branch cankers

fruit - preharvest

Eradicant (bleach)

fruit - postharvest

Protectant

may alternate between systemic and nonsystemic protectants

In courtesy of R. Hoenisch

Eradicant

Courtesy of R. Hoenisch
Need Help in Plant Diseases and Other Disorder?

Call: 775-353-3765
Email: shwang@agri.nv.gov
Website: http://agri.nv.gov/Plant/Plant_Pathology/Plant_Pathology_Home/