Advanced Master Gardener Training

Diseases of Evergreens

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Diseases of Evergreens
Rhizosphaera Needle Cast

- Pathogen: *Rhizosphaera kalkhoffii* (*Rhizosphaera* spp.)
- Hosts (major)
  - Colorado blue spruce
  - Other spruces: Engelmann, black, Serbian, Sitka, white (Black Hills)

Diseases of Evergreens
Rhizosphaera Needle Cast

- Hosts (minor)
  - Pines: Austrian, mugo, eastern white pine
  - Douglas fir
  - Hemlock
  - Balsam fir and other firs
- Favorable environment
  - Wet weather
  - High humidity

Diseases of Evergreens
Rhizosphaera Needle Cast

- Control
  - DO NOT plant Colorado blue spruce
  - DO NOT crowd trees when planting
  - Thin healthy branches to increase airflow
  - Prevent tree stress
  - Prune diseased branches

Diseases of Evergreens
Rhizosphaera Needle Cast

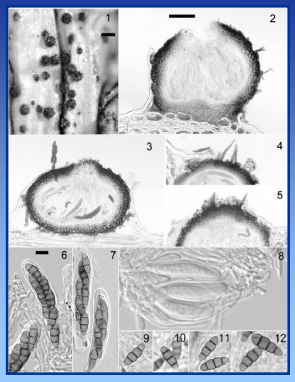
- Control
  - Decontaminate pruning tools
    - 70% alcohol (spray disinfectants)
    - Commercial disinfectants
    - 10% bleach
  - Destroy infected materials
    - Burn (where allowed)
    - Deep bury
    - Hot compost (needles)

Diseases of Evergreens
Rhizosphaera Needle Cast

- Control
  - Use fungicides to prevent infections
    - Copper-containing fungicides, chlorothalonil
    - Alternate active ingredients (FRAC codes)
    - Apply starting at bud break and at 3-4 week intervals thereafter under favorable conditions

Diseases of Evergreens
Spruce Needle Drop

- Pathogen: Setomelanomma holmii (?)
- Hosts
  - Colorado blue spruce
  - Other spruces
- Favorable environment
  - Wet weather (?)
  - Stress (?)



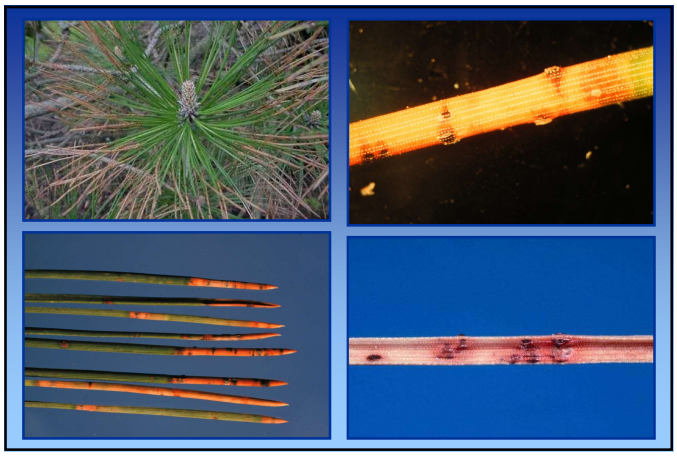
From:
Rossman, A. Y., Farr, D. F., Castlebury, L. A., Shoemaker, R., and Mengistu, A. 2002. Setomelanomma holmii (Pleosporales, Phaeosphaeriaceae) on living spruce twigs in Europe and North America. Can. J. Bot. 80: 1209-1215.

Diseases of Evergreens
Spruce Needle Drop

- Control
  - Unclear
  - Prune diseased branches
  - Decontaminate pruning tools
    - 70% alcohol
    - Commercial disinfectants
    - 10% bleach
  - Prevent tree stress
  - DO NOT use fungicides

Diseases of Evergreens
Dothistroma Needle Blight

- Pathogen: Dothistroma pini
- Hosts
  - Austrian pine
  - Mugo pine
  - Ponderosa pine
- Favorable environment: Wet weather



Diseases of Evergreens
Dothistroma Needle Blight

- Control
  - Plant disease-free trees
  - Plant resistant/immune tree species
  - Destroy infected materials
    - Burn (where allowed)
    - Deep bury
    - Hot compost

Diseases of Evergreens
Dothistroma Needle Blight

- Control
  - Use fungicides to prevent infections
    - Copper
    - Early June
    - Apply 1 treatment, or 2 treatments spaced 3-4 weeks apart

Diseases of Evergreens
Boxwood (Box) Blight

- Cause
  - *Calonectria pseudonaviculata*
  - *Cylindrocladium pseudonaviculatum* (*Cyindrocladium buxicola*)
- Hosts
  - Boxwood
  - Pachysandra
- Favorable Environment: Cool, wet weather

Diseases of Evergreens
Boxwood (Box) Blight

- Control
  - Buy locally produced boxwood
  - Grow resistant varieties
    - 'Green Mound'
    - 'Glencoe' (Chicagoland Green®)
  - Avoid symptomatic plants
  - Keep new plants isolated

Diseases of Evergreens
Boxwood (Box) Blight

- Control
  - Physically separate boxwood plantings
  - Space plants far apart
  - DO NOT overhead water
  - Prune out diseased branches

Diseases of Evergreens
Boxwood (Box) Blight

- Control
  - Disinfest pruning tools and other items
    - 70% alcohol
    - Commercial disinfectants
    - 10% bleach
  - Remove and destroy infected plants
    - Burn (where allowed)
    - Deep bury

Diseases of Evergreens
Boxwood (Box) Blight

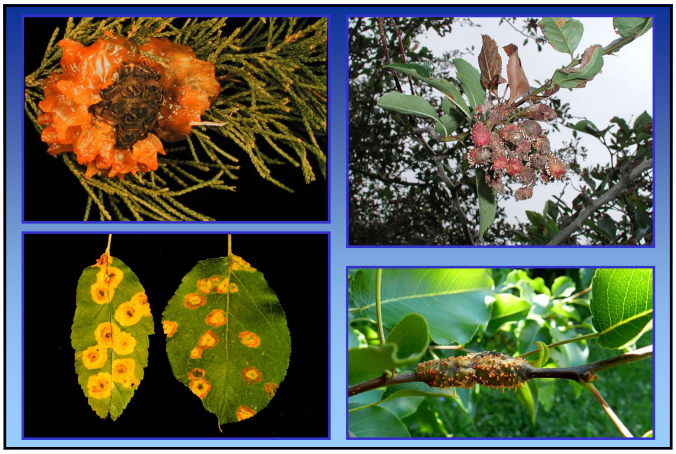
- Control
  - Use fungicides to prevent infections
    - Chlorothalonil, fludioxonil, mancozeb, metconazole, propiconazole, tebuconazole, thiophanate-methyl
    - 7 day application intervals
    - Alternate active ingredients (FRAC codes)
  - Contact the PDDC if you believe you have found boxwood (box) blight!

Diseases of Evergreens
Gymnosporangium Rusts

- Causes
  - *Gymnosporangium juniperi-virginianae* (Cedar-apple rust)
  - *Gymnosporangium globosum* (Cedar-hawthorn rust)
  - *Gymnosporangium clavipes* (Cedar-quince rust)

Diseases of Evergreens
Gymnosporangium Rusts

- Hosts
  - Junipers
  - Woody rosaceous plants (apple, crabapple, hawthorn, quince, pear, serviceberry)
- Favorable environment
  - Cool to moderate temperatures
  - Wet



Diseases of Evergreens
Gymnosporangium Rusts

- Control
  - Grow only the juniper or rosaceous host
  - Use resistant cultivars/varieties
    - "Juniper Diseases" (https://store.extension.iastate.edu/ Product/ Juniper-Diseases)
  - Remove galls

Diseases of Evergreens
Gymnosporangium Rusts

- Control
  - Decontaminate pruning tools
    - 70% alcohol (spray disinfectants)
    - Commercial disinfectants
    - 10% bleach
  - Destroy infected materials
    - Burn (where allowed)
    - Deep bury

Diseases of Evergreens
Gymnosporangium Rusts

- Control
  - Use fungicides to prevent infections
    - Ferbam, triadimefon
    - Alternate active ingredients (FRAC codes)
    - Apply at 7-21 day intervals [mid-May through mid-June (rosaceous hosts), early July through August (juniper hosts)]

Diseases of Evergreens
White Pine Blister Rust

- Pathogen: *Cronartium ribicola*
- Hosts
  - White pine
  - Gooseberry/Currants (*Ribes* spp.)
- Favorable environment: Wet weather

Diseases of Evergreens
White Pine Blister Rust

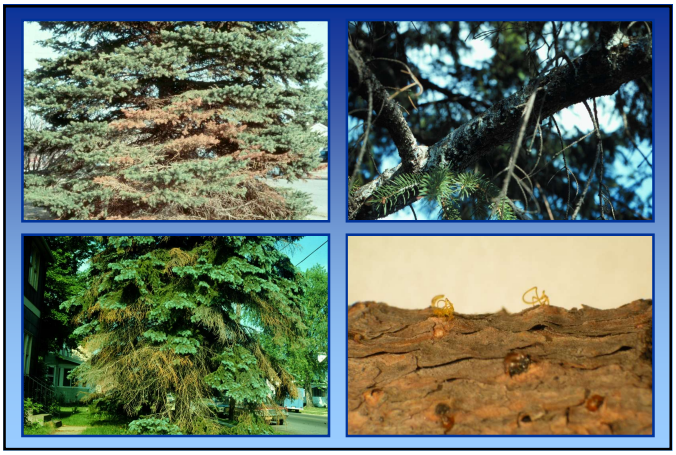
- Control
  - Remove and destroy gooseberries/currants
  - Plant pines other than white pine
  - DO NOT overcrowd white pines
  - Keep weeds under control
  - DO NOT overhead irrigate
  - Scout routinely for disease

Diseases of Evergreens
White Pine Blister Rust

- Control
  - Prune diseased branches
  - Prune healthy branches from the ground up
  - Disinfest pruning tools
    - 70% alcohol
    - Commercial disinfectants
    - 10% bleach

Diseases of Evergreens
Cytospora Canker

- Pathogen: Leucocytospora kunzei
- Hosts
  - Spruces (particularly Colorado blue spruce)
  - Douglas fir
  - Many other conifers
- Favorable environment: Wet weather



Diseases of Evergreens
Cytospora Canker

- Control
  - DO NOT plant Colorado blue spruce
  - DO NOT crowd trees when planting
  - Thin branches to increase airflow
  - Prevent tree stress
  - Prune diseased branches

Diseases of Evergreens
Cytospora Canker

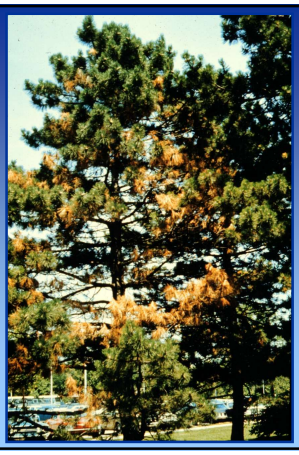
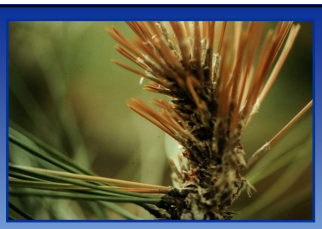
- Control
  - Decontaminate pruning tools
    - 70% alcohol (spray disinfectants)
    - Commercial disinfectants
    - 10% bleach
  - Destroy infected materials
    - Burn (where allowed)
    - Deep bury
  - DO NOT use fungicides

Diseases of Evergreens
Diplodia (Sphaeropsis) Shoot Blight

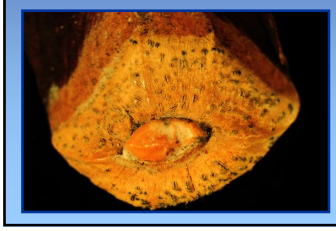
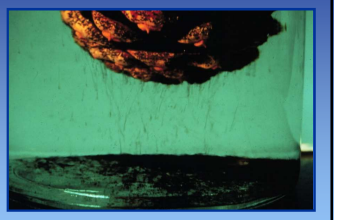
- Pathogen: Diplodia pinea (Sphaeropsis sapinea)
- Hosts (major)
  - Austrian pine
  - Other pines: red, jack, Scots, mugo
- Hosts (minor)
  - Other conifers: cedars, cypresses, firs, spruces, junipers, yews

Diseases of Evergreens
Diplodia (Sphaeropsis) Shoot Blight

- Favorable environent
  - Wet weather (for infection)
  - Drought (for extensive colonization)



Diseases of Evergreens
Diplodia (Sphaeropsis) Shoot Blight

- Control
  - DO NOT plant Austrian pines
  - Prevent tree stress, particularly water stress
  - Thin branches to increase airflow
  - Prune diseased branches

Diseases of Evergreens
Diplodia (Sphaeropsis) Shoot Blight

- Control
  - Decontaminate pruning tools
    - 70% alcohol (spray disinfectants)
    - Commercial disinfectants
    - 10% bleach
  - Remove infected cones (?)
  - Destroy infected materials
    - Burn (where allowed)
    - Deep bury

Diseases of Evergreens
Diplodia (Sphaeropsis) Shoot Blight

- Control
  - Use fungicides to prevent infections
    - Thiophanate-methyl, chlorothalonil
    - Alternate active ingredients (FRAC Codes)
    - Apply from bud break through shoot elongation
    - Apply every 14 days

Diseases of Evergreens
Phomopsis Tip Blight

- Pathogen
  - *Phomopsis juniperovora*
  - *Phomopsis* spp.
- Host: Junipers
- Favorable environment
  - Cool temperatures
  - Wet weather
  - Factors stimulating excessive host growth

Diseases of Evergreens
Phomopsis Tip Blight

- Control
  - Use resistant varieties (https://store.extension.iastate.edu/Product/Juniper-Diseases)
  - DO NOT crowd trees/shrubs when planting
  - Prevent tree/shrub stress
  - Avoid over-fertilization with nitrogen
  - Prune diseased branches
  - Avoid excessive pruning

Diseases of Evergreens
Phomopsis Tip Blight

- Control
  - Decontaminate pruning tools
    - 70% alcohol (spray disinfectants)
    - Commercial disinfectants
    - 10% bleach
  - Destroy infected materials
    - Burn (where allowed)
    - Deep bury

Diseases of Evergreens
Phomopsis Tip Blight

- Control
  - Use fungicides to prevent infections
    - Mancozeb, copper, thiophanate-methyl
    - Alternate active ingredients (FRAC Codes)
    - Bud break through period of rapid growth
    - 7-21 day application interval

Diseases of Evergreens
Root/Crown Rots

- Pathogens
  - *Pythium* spp.
  - *Phytophthora* spp.
  - *Rhizoctonia solani*
  - *Fusarium* spp.
  - *Cylindrocarpon* spp.
- Hosts
  - Any evergreen
  - Yew, fir (especially)
- Favorable environment: Cool, wet soils



Diseases of Evergreens
Root/Crown Rots

- Control
  - Moderate soil moisture
    - Grow trees and shrubs in well-drained sites
    - Use a soil with adequate drainage
    - Improve drainage in poorly drained soils
      - Add organic matter to improve drainage
      - Use raised beds
    - DO NOT overwater
    - DO NOT overmulch

Diseases of Evergreens
Root/Crown Rots

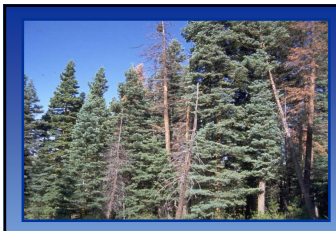
- Control
  - DO NOT move contaminated soil or plants to non-infested areas
  - Decontaminate infested tools, pots, work areas
  - Pretest soils/mulches/composts for the presence of root rot fungi
  - Use a soil-less potting mix for containerized plants

Diseases of Evergreens
Root/Crown Rots

- Control
  - Use fungicides to prevent infections
    - Etridiazole, metalaxyl/mefenoxam, fosetyl-Al, PCNB, thiophanate-methyl, fludioxonil
    - Use granular formulations if possible
    - Use during periods of wet weather
  - Use biopesticides to prevent infections
    - Trichoderma, Gliocladium
    - Use for potted plants

Diseases of Evergreens
Armillaria Root Disease

- Pathogens: Armillaria spp.
- Hosts
  - Many conifers
  - Many deciduous trees and shrubs
- Favorable environment
  - Drought stress
  - Stress due to defoliation
  - Other stresses




Diseases of Evergreens
Armillaria Root Disease

- Control
  - Reduce tree/shrub stress where possible
    - Water adequately
    - Fertilize properly
    - Control foliar pathogens
    - Control foliar insect pests
  - DO NOT wound trees
  - Remove Armillaria-infested materials
  - DO NOT use fungicides

Diseases of Evergreens
Herbicide Injury

- Causes
  - Growth regulator herbicides
    - 2,4-D
    - Dicamba
    - Imprelis!
  - Other herbicides
- Affected plants: Anything and everything

Diseases of Evergreens
Herbicide Injury

- Management
  - Apply herbicides only when needed
  - Follow application directions exactly
  - Apply herbicides only when wind speed is low (< 5 mph)
  - DO NOT apply herbicides too close to nontarget plants
  - Apply herbicides at low pressure

Diseases of Evergreens
Herbicide Injury

- Management
  - Use amine rather than ester forms of herbicides
  - Adequately test herbicides prior to registration!

Diseases of Evergreens
Winter Injury/Winter Burn

- Causes
  - Water stress
  - Extreme winter temperatures
  - Cycling winter temperatures
  - Insufficient snow cover
  - Excessive snow

Diseases of Evergreens
Winter Injury/Winter Burn

- Affected plants
  - Yew
  - Spruce (Alberta)
  - Boxwood
  - Arborvitae

Diseases of Evergreens
Winter Injury/Winter Burn

- Management
  - Water trees and shrubs adequately
  - Plant trees and shrubs
    - Properly
    - In protected locations (sensitive plants)
  - Insulate sensitive plants where possible
  - Pray for
    - Lots of snow
    - A slow, gradual spring warm up

Diseases of Evergreens
Other Abiotic Disorders


Salt Injury


Chlorosis


Construction Injury


Water Stress


Girdling Root


Lawn Mower Injury

Diseases of Evergreens
Non-Diseases


Seasonal Needle Drop


Sooty Mold


Sooty Mold


Seasonal Needle Drop

Diseases of Evergreens
Non-Diseases: Fungi/Fungal Allies

Giant Puffballs

Lichens

Stink Horns

Bird's Nest Fungi

Slime Molds

Diseases of Evergreens
Where to Go for Help

Plant Disease Diagnostics Clinic
Department of Plant Pathology
University of Wisconsin-Madison
1630 Linden Drive
Madison, WI 53706-1598
(608) 262-2863
pddc@wisc.edu
http://pddc.wisc.edu
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