HIGHLIGHTS OF THE 2010 SEASON

Sharon M. Douglas

The Connecticut Agricultural Experiment Station

New Haven, CT

WEATHER!

- 2010 is quite a contrast to conditions of 2009.

WEATHER

Year	Growing Degree Days (GDD)	Precipitation
2009	Below 30-yr- avg	At 30-yr-avg
2010	~3 wks ahead of 30-yr-avg	Well below 30- yr-avg

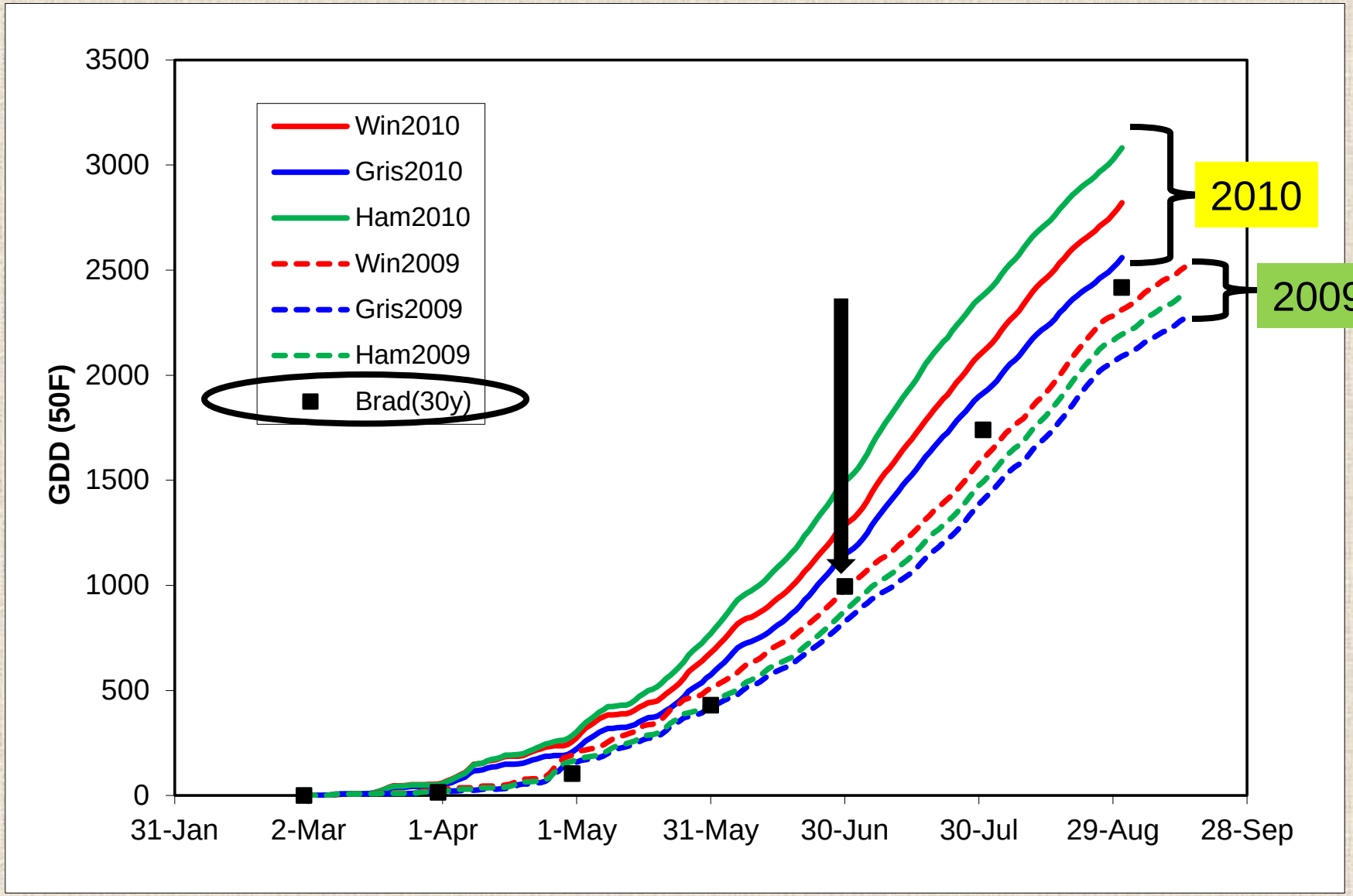
2009

Cool, cloudy, wet

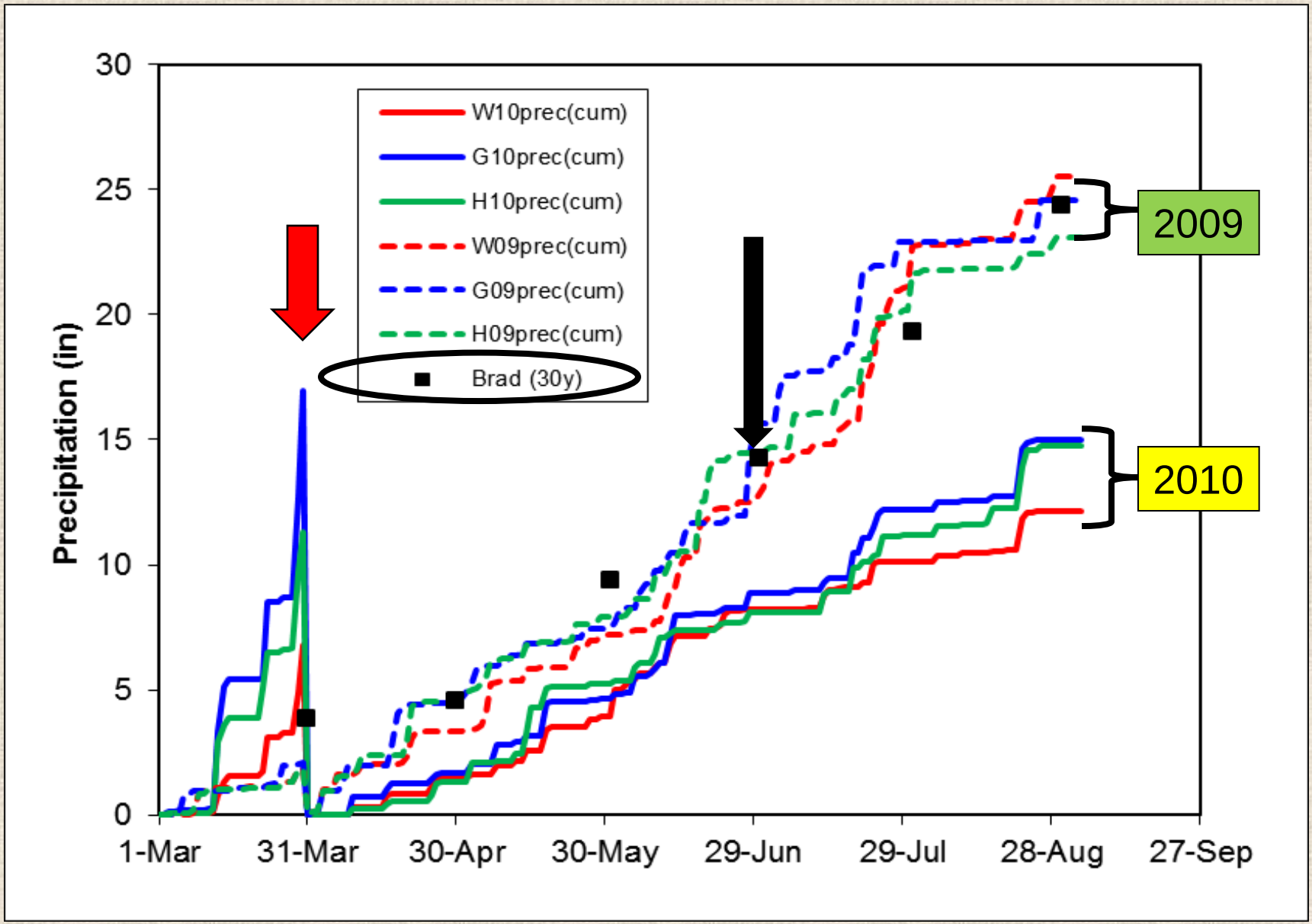
2010

Hot, sunny, dry

GDD 2009 and 2010



Precipitation 2009 and 2010



HEAT AND DROUGHT STRESS

- Cause:
  - Lack of rainfall combined with multiple, prolonged periods of high temperatures (90's).
- Symptoms:
  - Premature leaf drop, early fall color, branch dieback.
  - Increased planting and transplant failures.

Scorch

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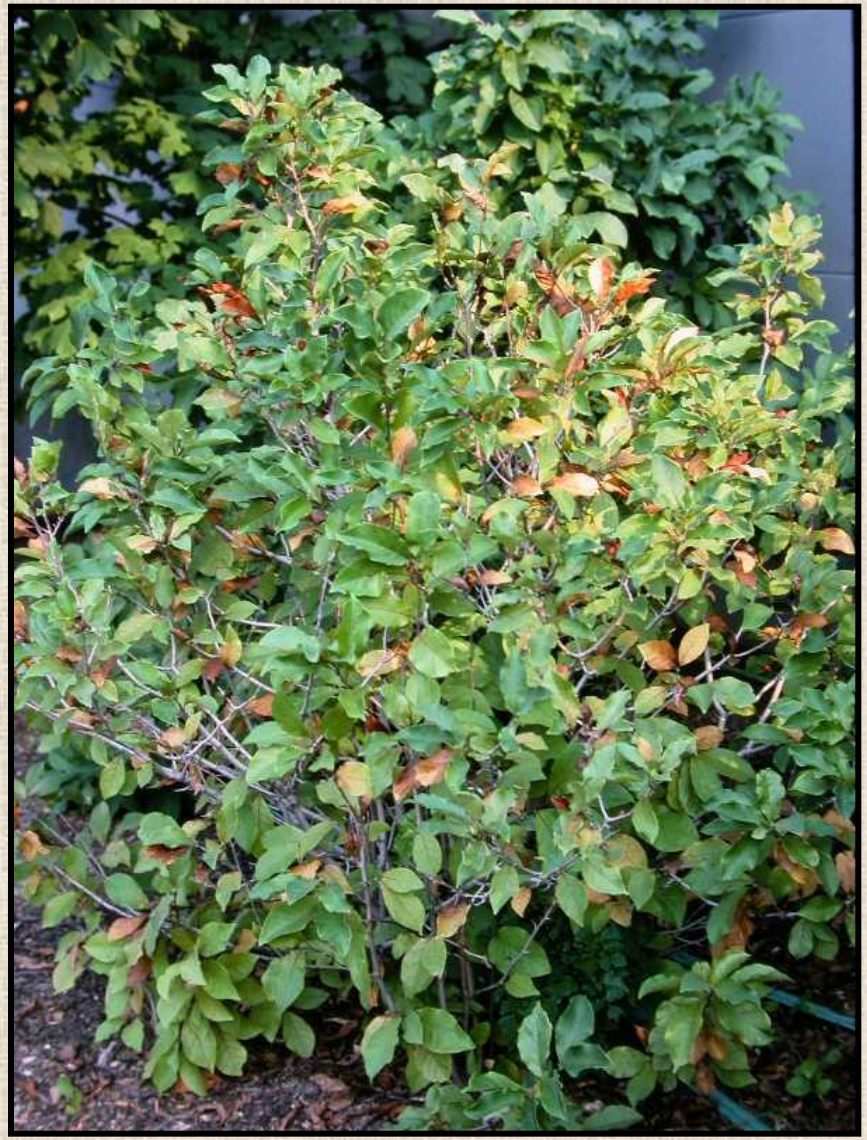
Scorch and Wilting

Premature Fall Color and Browning



PHYTOTOXICITY

- Herbicides
- Pesticide Sprays
  - Mainly oil sprays on conifers and broadleaf evergreens.

Herbicide Damage

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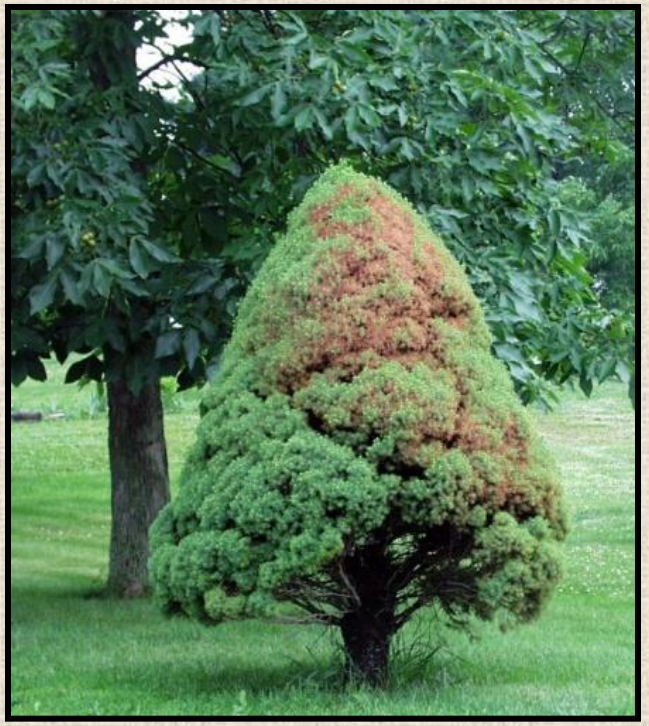
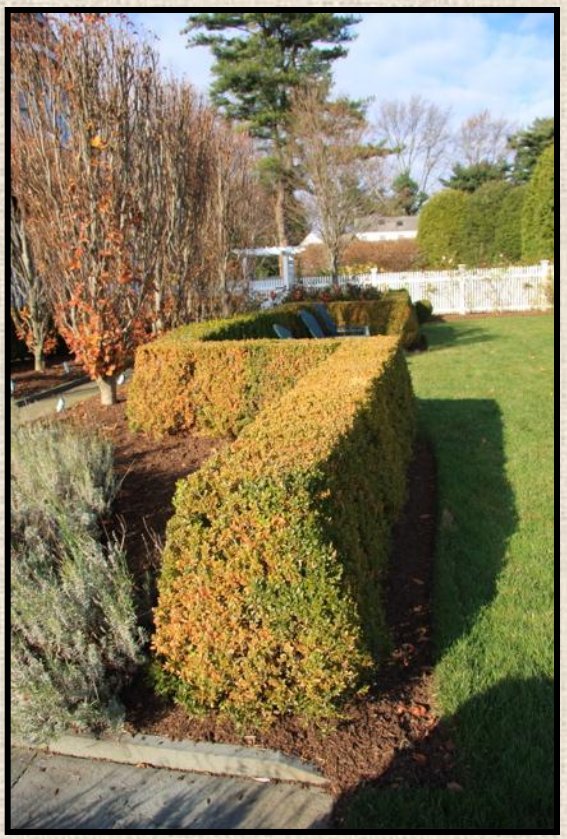
Herbicide Damage

Phytotoxicity





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BIOTIC DISEASES

- Despite the hot, dry conditions of 2010, many of the diseases observed this year can be attributed to:
  - Inoculum buildup and carry-over from the cool, wet conditions of 2009.
  - Enough moisture in Spring 2010 to result in infection.
  - Mainly on deciduous plants or broadleaf evergreens.
  - Powdery mildews, leaf spots, rusts, and anthracnoses.

CONIFER DISEASES

- Symptoms visible this spring were the result of infections that occurred during last year's cool, cloudy, wet weather.
- Gradual and subtle build-up over the past few years.
- Too early to assess damage, since symptoms are just beginning to develop.
- Premature needle drop for conifers can be more stressful than premature leaf drop for deciduous trees and shrubs.

CONIFER DISEASES

PINE DISEASES:

- Canavirgella Needlecast
- Ploioderma Needlecast

DOUGLAS-FIR DISEASES:

- Rhabdocline Needlecast
- Swiss Needlecast

SPRUCE DISEASES:

- Repeating Spruce Needle Rust
- Rhizosphaera Needlecast

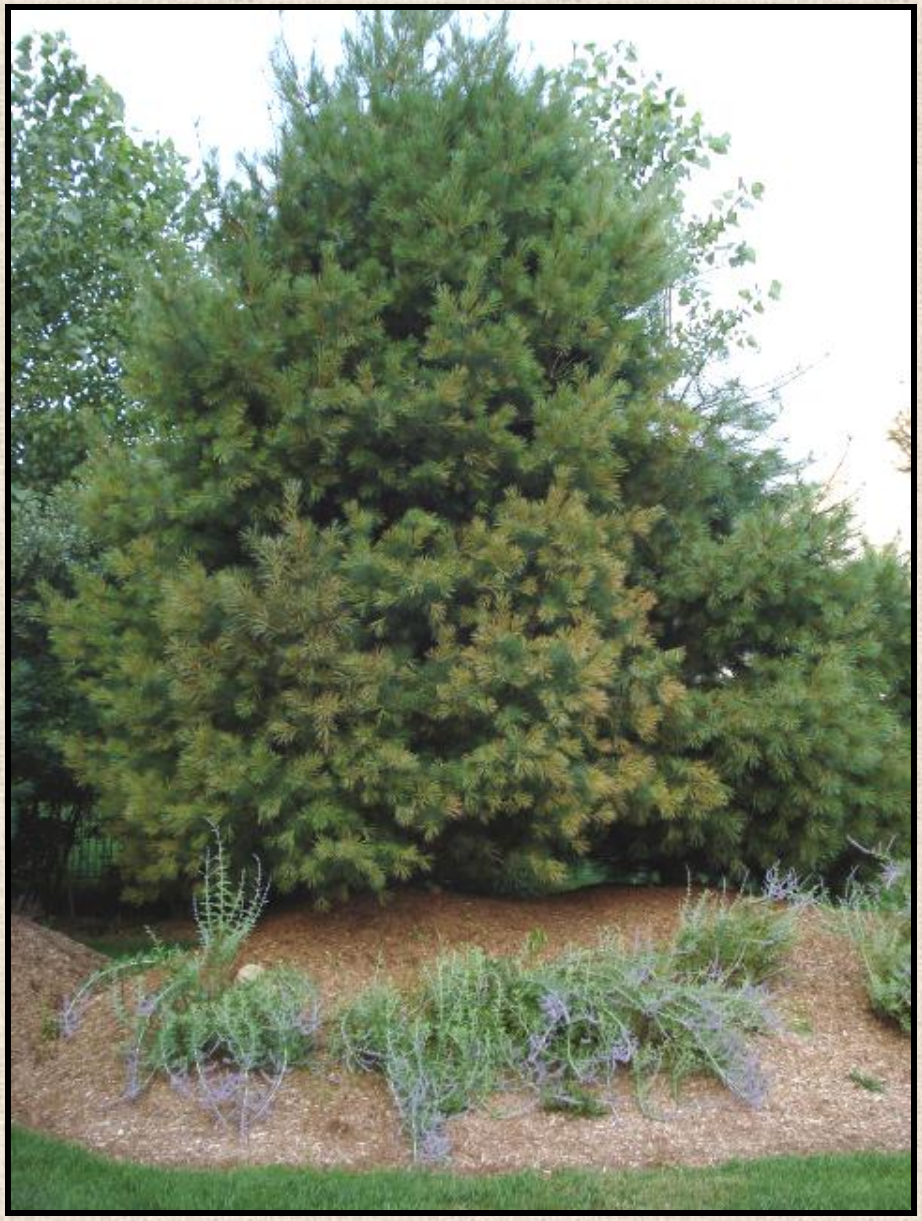
CANAVIRGELLA NEEDLECAST

- Causal Agent: *Canavirgella banfieldii* (fungus)
- Hosts: Eastern white pine (and Macedonian white pine)

Canavirgella Needlecast

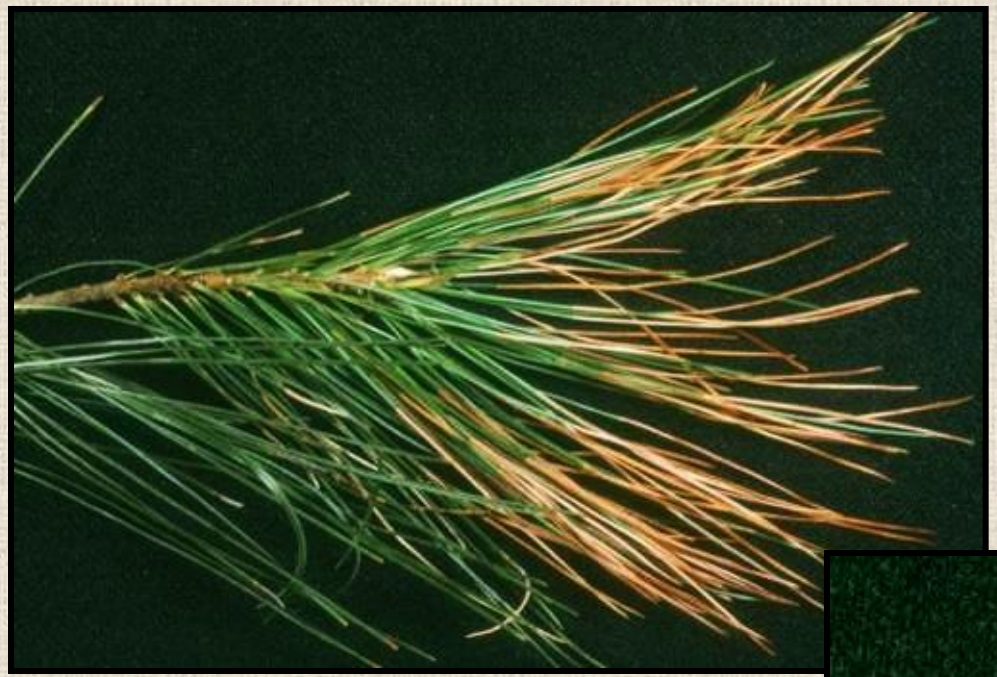
- First report in US was in Pennsylvania in 1996.
  - Previously confused with acute ozone injury, stress, and other needlecast diseases.
- First detected in Connecticut in 1998.
- ***Unusually widespread throughout New England and CT in 2010.***

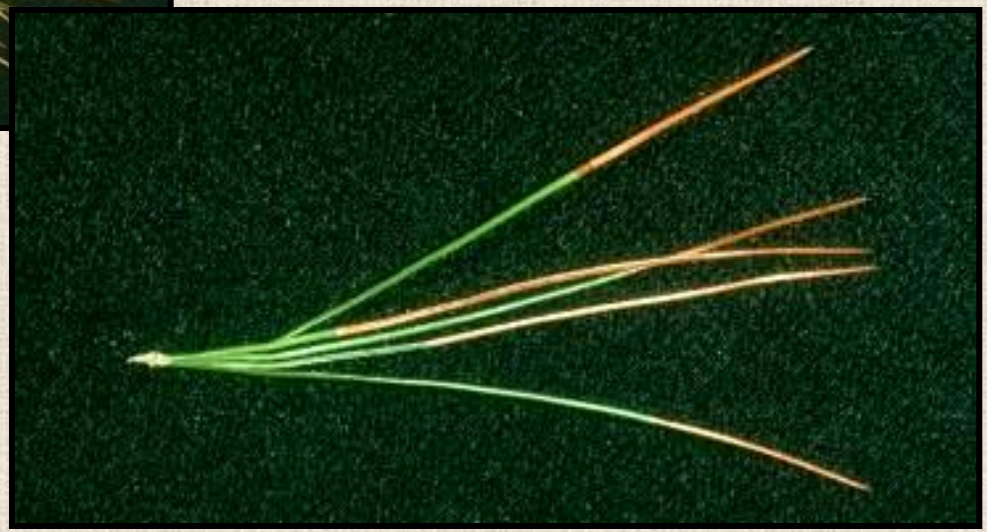
Infected tree appears off-colored.



Off-colored 1 yr needles.

Diagnostic symptoms-not all needles within a fascicle are infected.





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First fruiting bodies to develop appear as oval, raised, blister-like structures.

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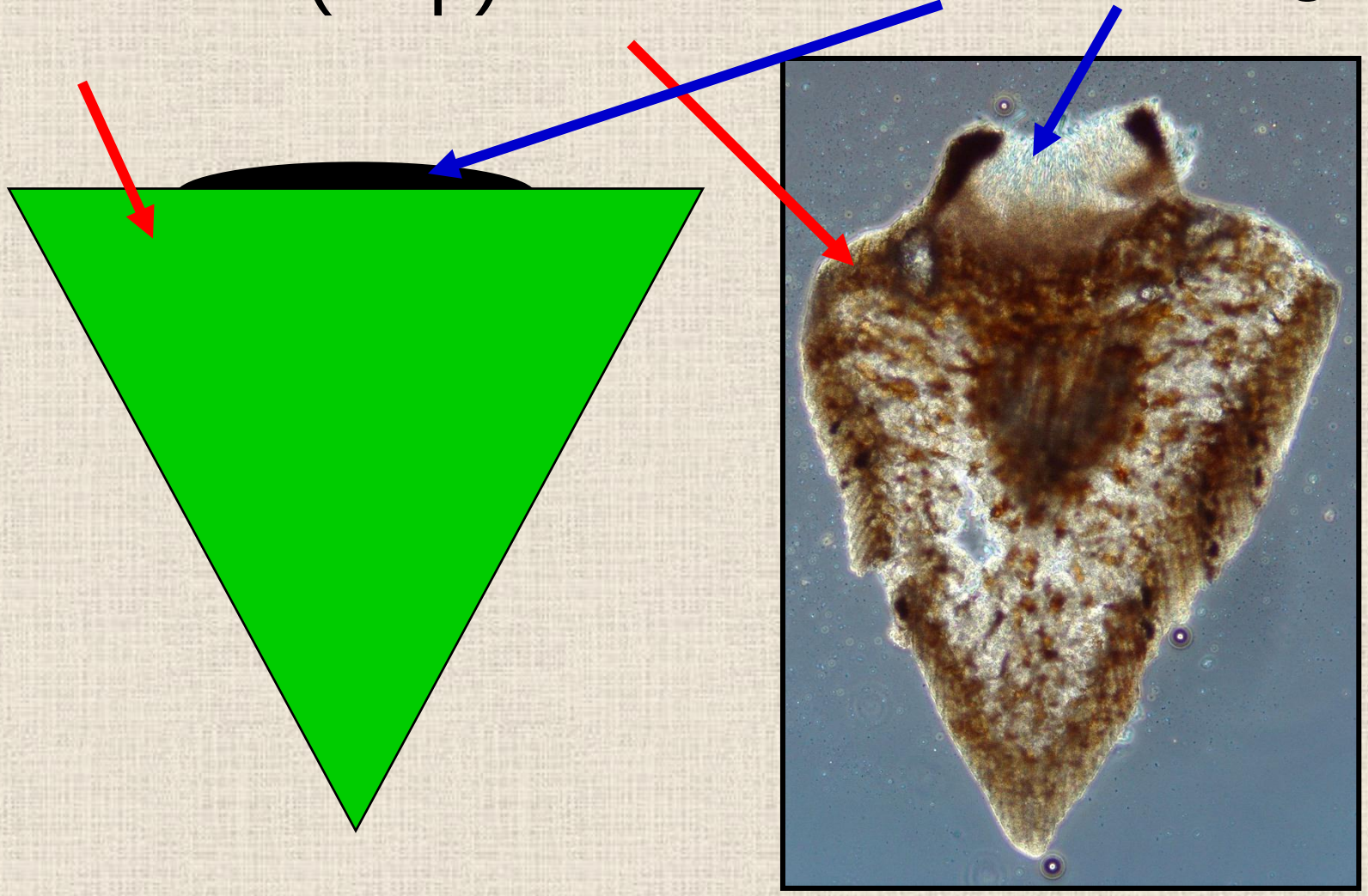
Cross Section of a Pine Needle

Adaxial (Top) Surface

2nd Fruiting body



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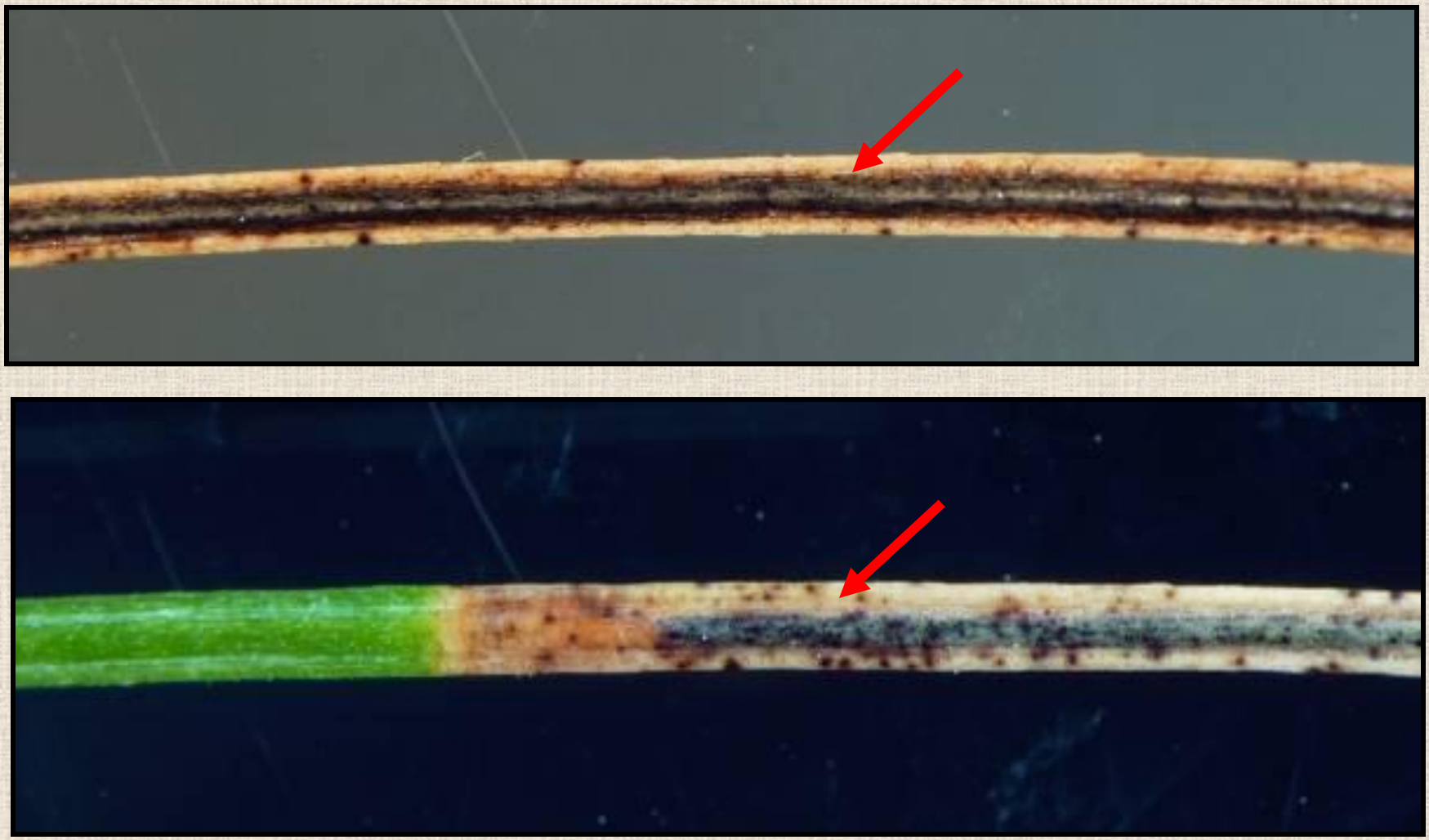
A second type of shiny, black fruiting body develops in late spring.



Diagnostic shiny, blackened stripes on adaxial surfaces of infected needles.

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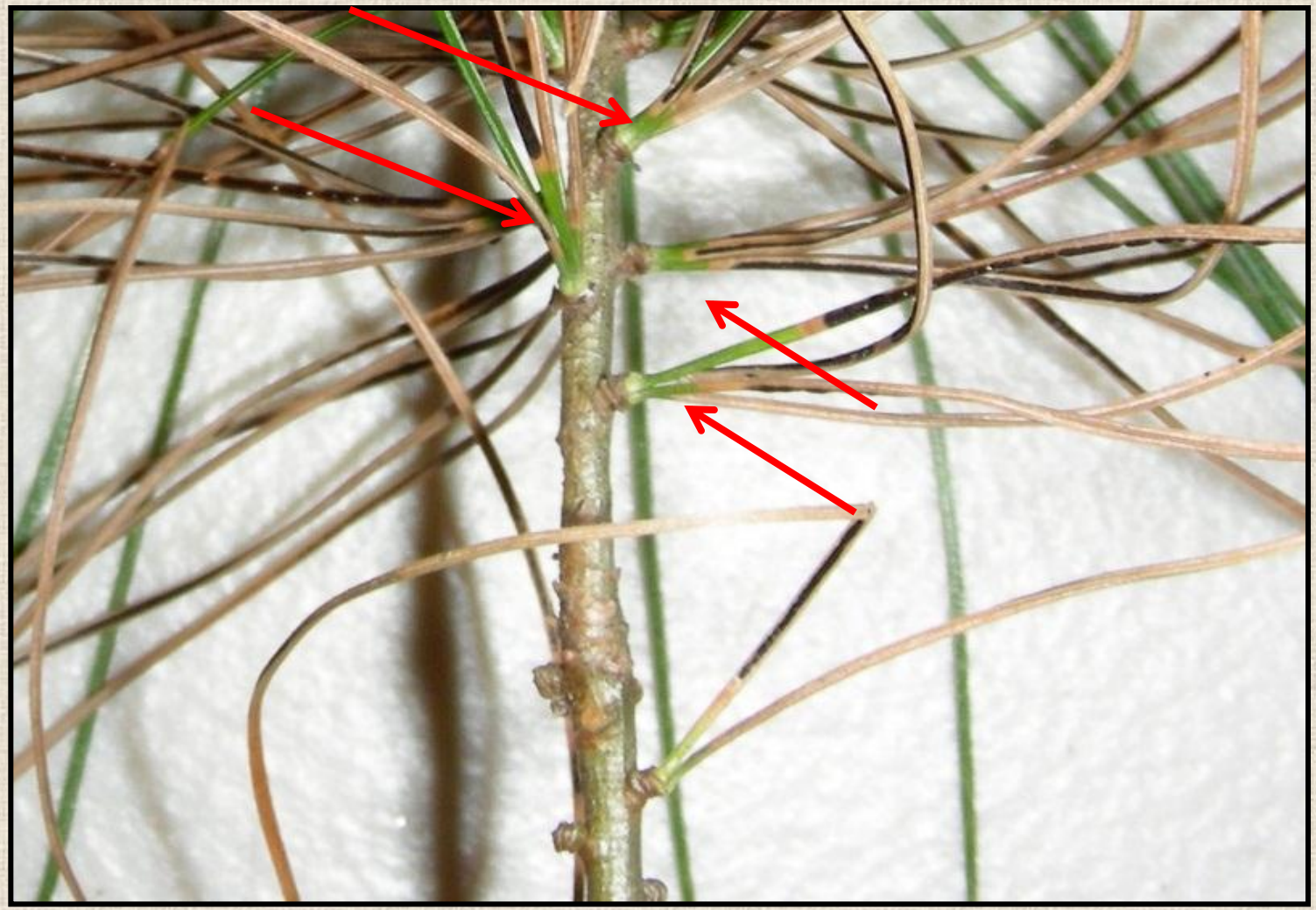
Bases of infected needles remain green.



PLOIODERMA NEEDLECAST

- Causal Agent: *Ploioderma lethale* (fungus)
- Hosts: two- and three-needle pines, esp. Austrian and Japanese black

Plioderma Needlecast of Pine

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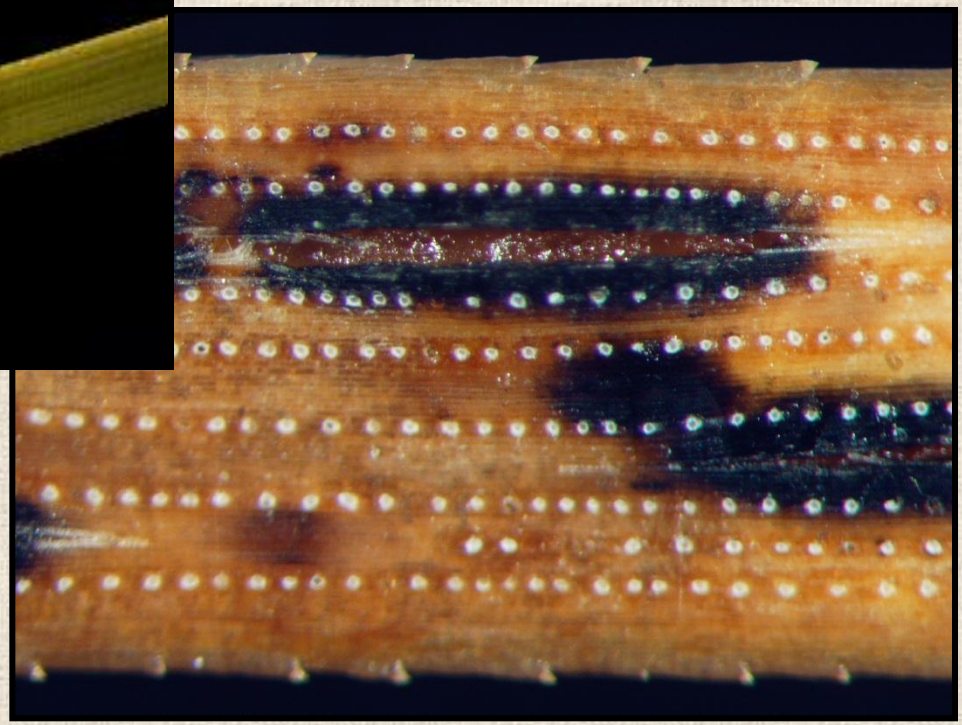
Infected needles turn reddish brown, then tan. Bases of these needles remain green.

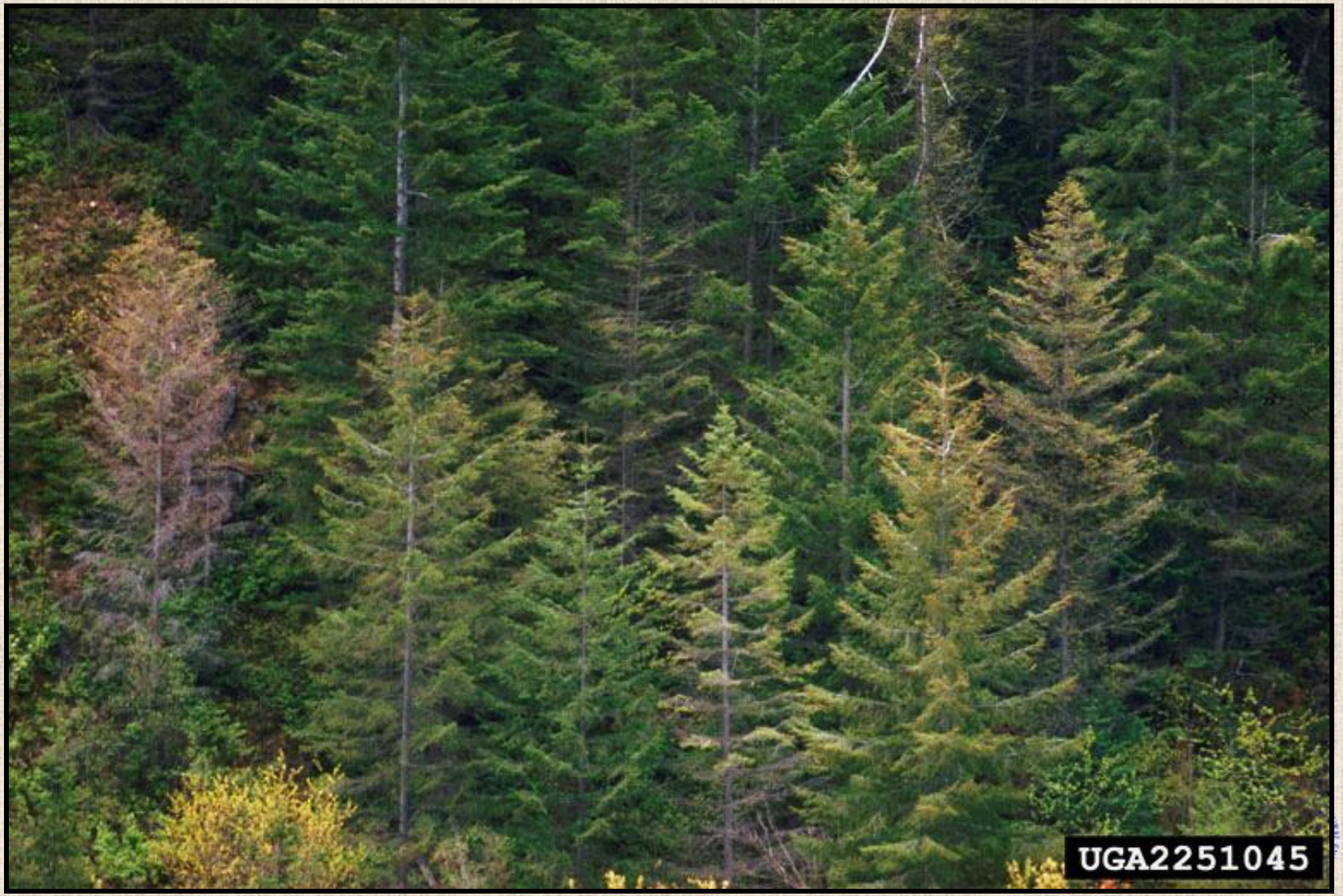
Diagnostic black fruiting bodies develop in tan portions of infected needles.



SWISS NEEDLECAST

- Causal Agent: *Phaeocryptopus gaumanni* (fungus)
- Host: Douglas-fir

Infected trees are off-colored.



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One-year needles are mottled and yellow.

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Infected needles are off-colored.

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Fruiting bodies emerge through stomates of infected needles.

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RHABDOCLINE NEEDLECAST

- Causal Agent: *Rhabdocline* spp. (fungus)
- Hosts: Douglas-fir

Rhabdocline Needlecast

Early Rhabdocline Symptoms: Chlorotic Spots in Late Summer

Look-Alike: Cooley Adelgid Feeding Damage

Needle bending and discoloration (yellow spots).

Diagnostic banding pattern in late winter or early spring.

Spring symptoms- diagnostic brown bands on needles.

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Diagnostic symptoms-lower epidermis splits longitudinally.

Bare twigs after needles drop in spring.

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RHIZOSPHAERA NEEDLECAST

- Causal Agent: *Rhizosphaera kalkhoffii* (fungus)
- Hosts: blue spruce, sometimes white spruce; occasional hosts are pine, true fir, and Douglas-fir

Rhizosphaera Needlecast

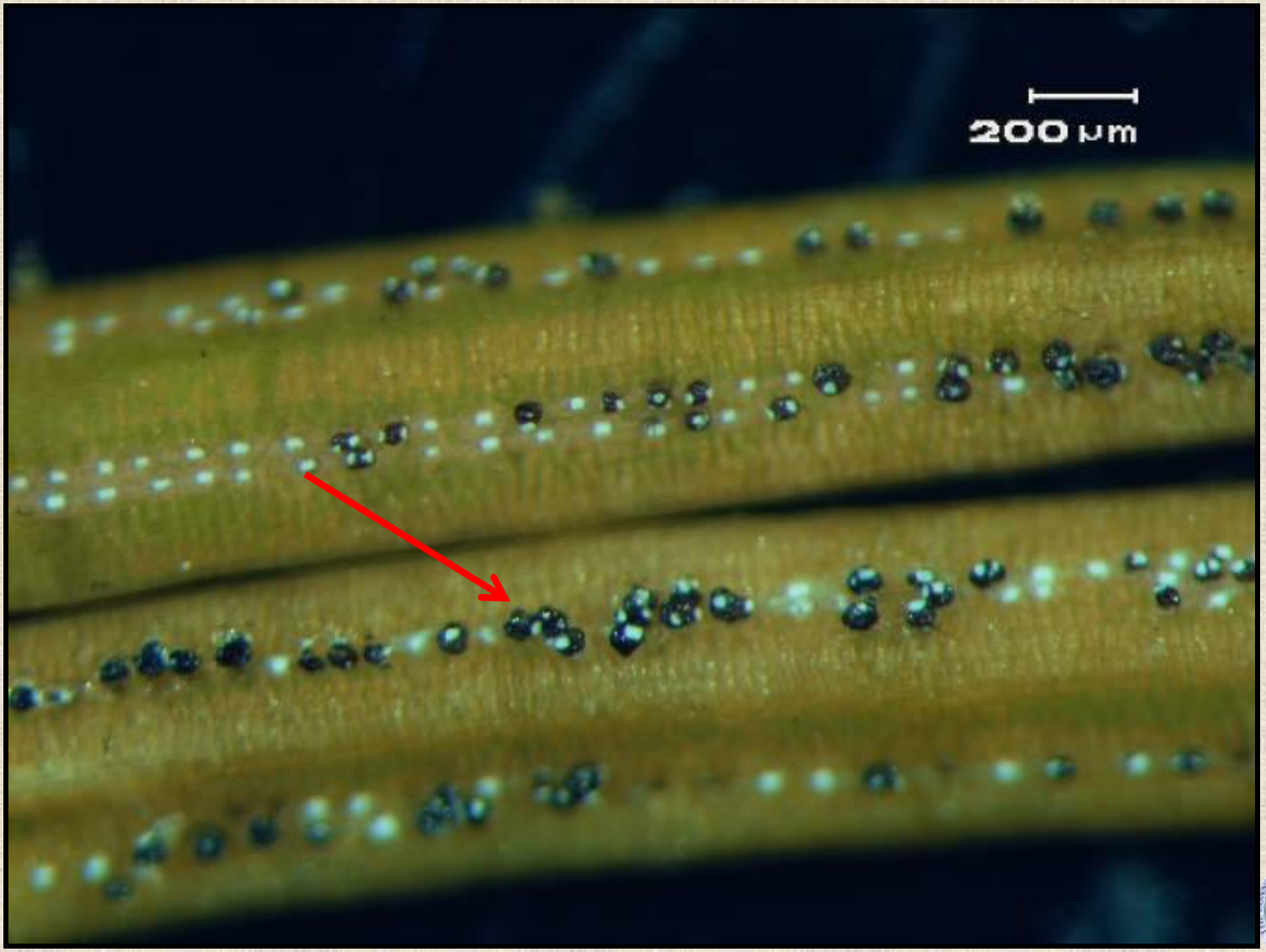
Symptoms on 1 yr needles in late winter.

Discolored 1 yr needles in late spring.

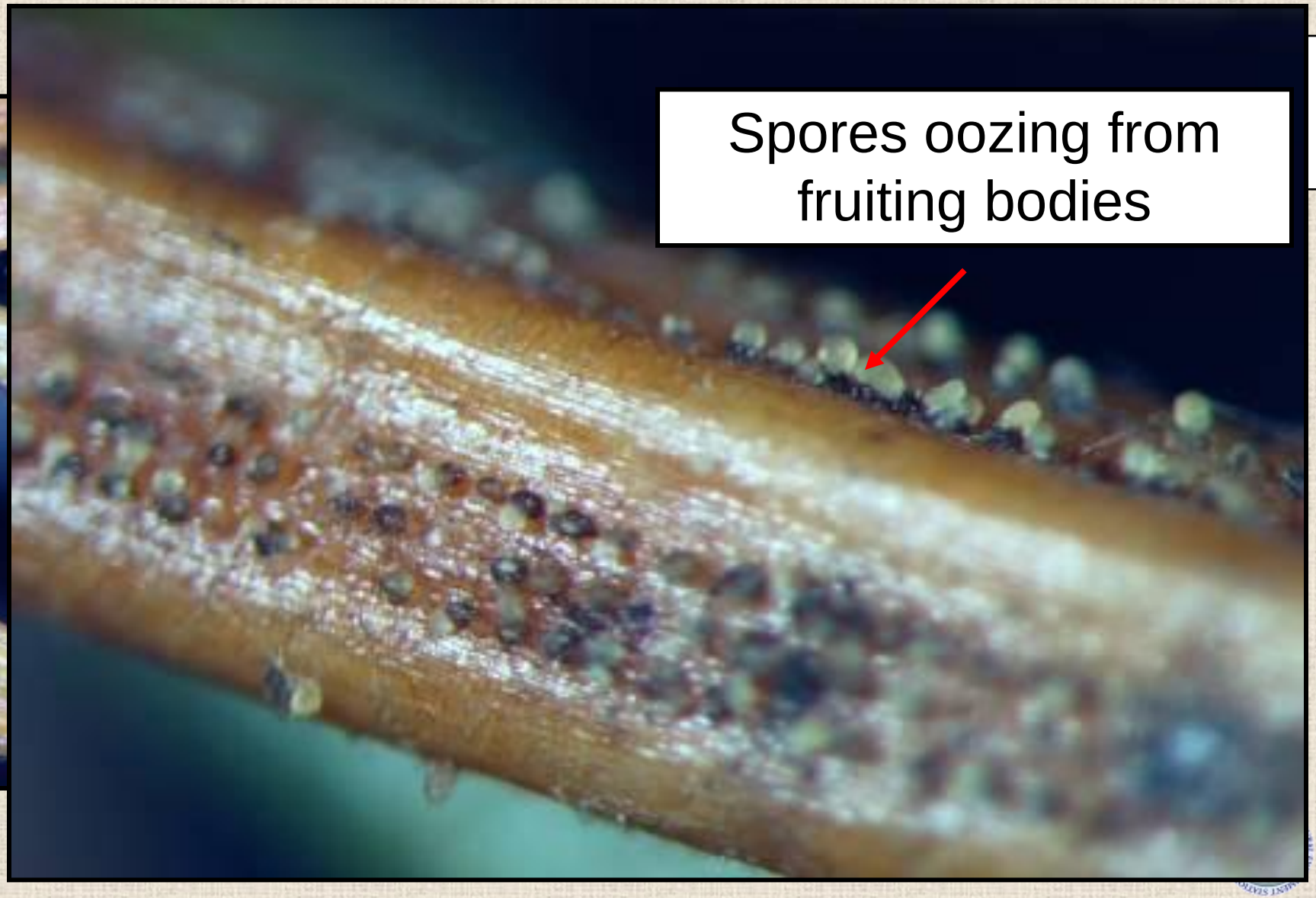
Spring symptoms on 1 yr needles--most symptomatic needles have dropped.

Fruiting bodies on infected needles.

Close-up of fruiting bodies.



Infected needles produce spores.



AUTOECIOUS (REPEATING) SPRUCE NEEDLE RUST:

- Causal Agent: *Chrysomyxa weirii* (fungus)
- Hosts: white, black, and blue spruce
- No alternate hosts.

Early symptoms of infection are chlorotic spots in late winter; they develop into blisters in spring.

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Blisters (pustules) break open on 1-yr needles in spring.

Management of Conifer Diseases:

- Use pathogen-free stock and maintain tree vigor.
- Remove severely symptomatic trees.
- Practice good sanitation.
  - Prune and remove any dead or dying branches.
- Use resistant varieties when possible.
  - Species and seed sources can vary.

Management of Conifer Diseases (cont'd):

- Fungicide sprays.
  - In *all* cases, coverage is **very** important!
  - Begin applications when new growth is emerging (~½" long).
  - Sprays should continue at label intervals until needles are fully elongated and conditions are no longer favorable for disease.

Management of Needle Diseases (cont'd):

- Rhabdocline and Swiss Needlecast-
  - Chlorothalonil (Daconil 2787, Daconil Ultrex, Chloronil 720, Concorde DF), chlorothalonil + fenarimol (TwoSome), thiophanate methyl + chlorothalonil (Spectro 90 WDG), and mancozeb (Protect, Mancozeb, Dithane).
- Rhizosphaera Needlecast-
  - Chlorothalonil (Daconil 2787, Daconil Ultrex, Chloronil 720, Concorde DF), chlorothalonil + fenarimol (TwoSome), and mancozeb (Protect, Mancozeb, Dithane).

Management of Conifer Diseases (cont'd):

- Repeating Spruce Needle Rust-
  - Although not specifically listed on the label, chlorothalonil (Daconil 2787, Daconil Ultrex, Chloronil 720, Concorde DF) is labeled for spruce and effective for control.
- Canavirgella and Ploioderma Needlecasts-
  - Although not specifically listed on the label, Chlorothalonil (Daconil 2787, Daconil Ultrex, Chloronil 720, Concorde DF) and mancozeb (Protect, Mancozeb, Dithane) are labeled for pine and effective for control.

Fact Sheets.
Presentation will be posted on:

www.ct.gov/caes/pdio