

PURDUE  
EXTENSION



PLANT AND PEST  
DIAGNOSTIC  
LABORATORY

# A Decade of Diagnosis: Plant Problem Trends

Tom Creswell

Plant Disease Diagnostician, Lab Director

# What can we learn from the past?

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## Trends:

- Weather related problems
- Emerging diseases
- Changing plant selections

## Caveats:

- Data from samples not surveys
- Data may not apply generally

# Abiotic problems (= Disorders): Caused by non-living factors

- Temperature and moisture extremes
- Nutrient imbalances
- Pesticide injury
- Improper cultural practices
- Genetic factors

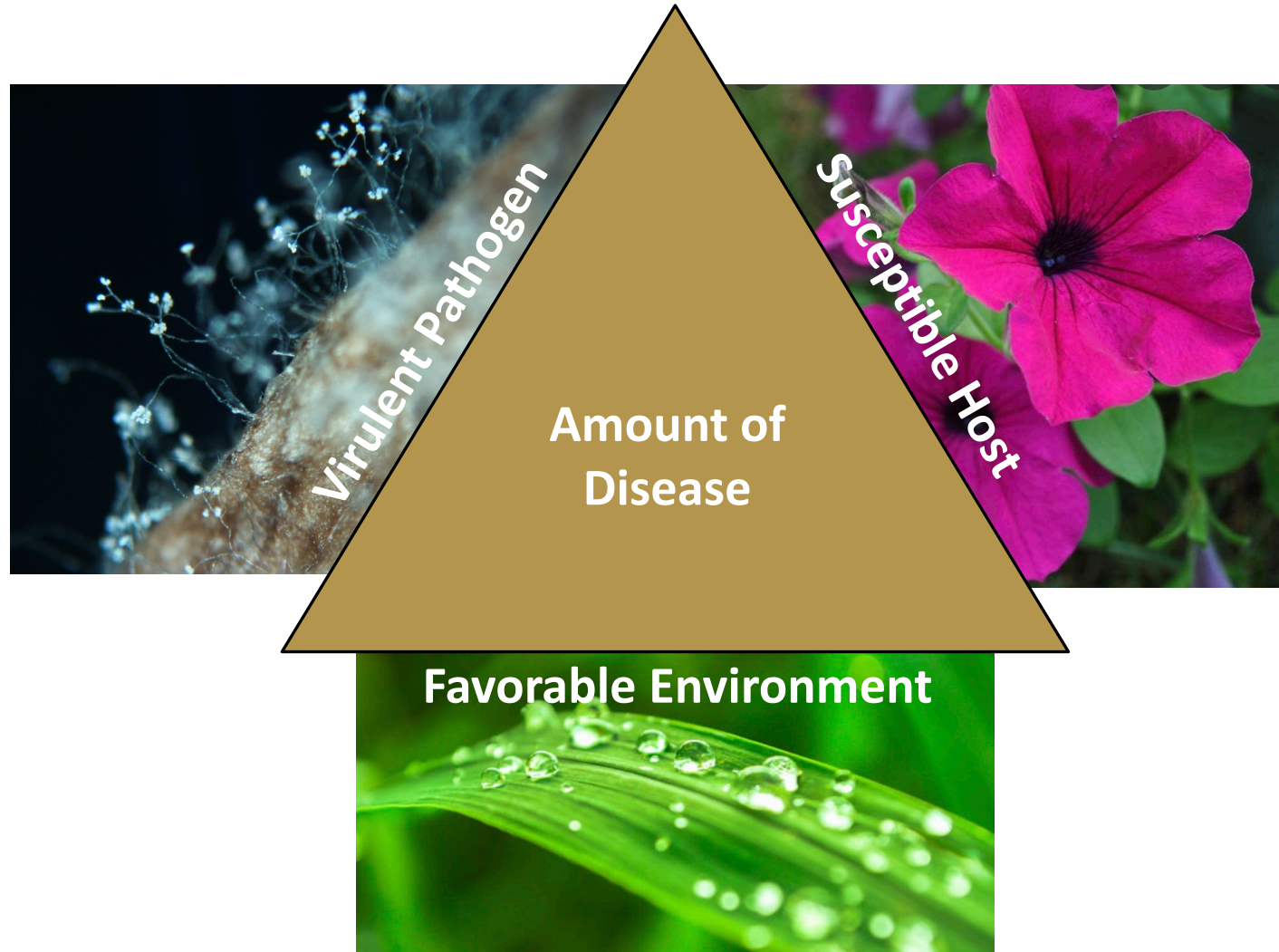
# Biotic problems (= Diseases): Caused by pests and pathogens

**Examples  
of causes:**

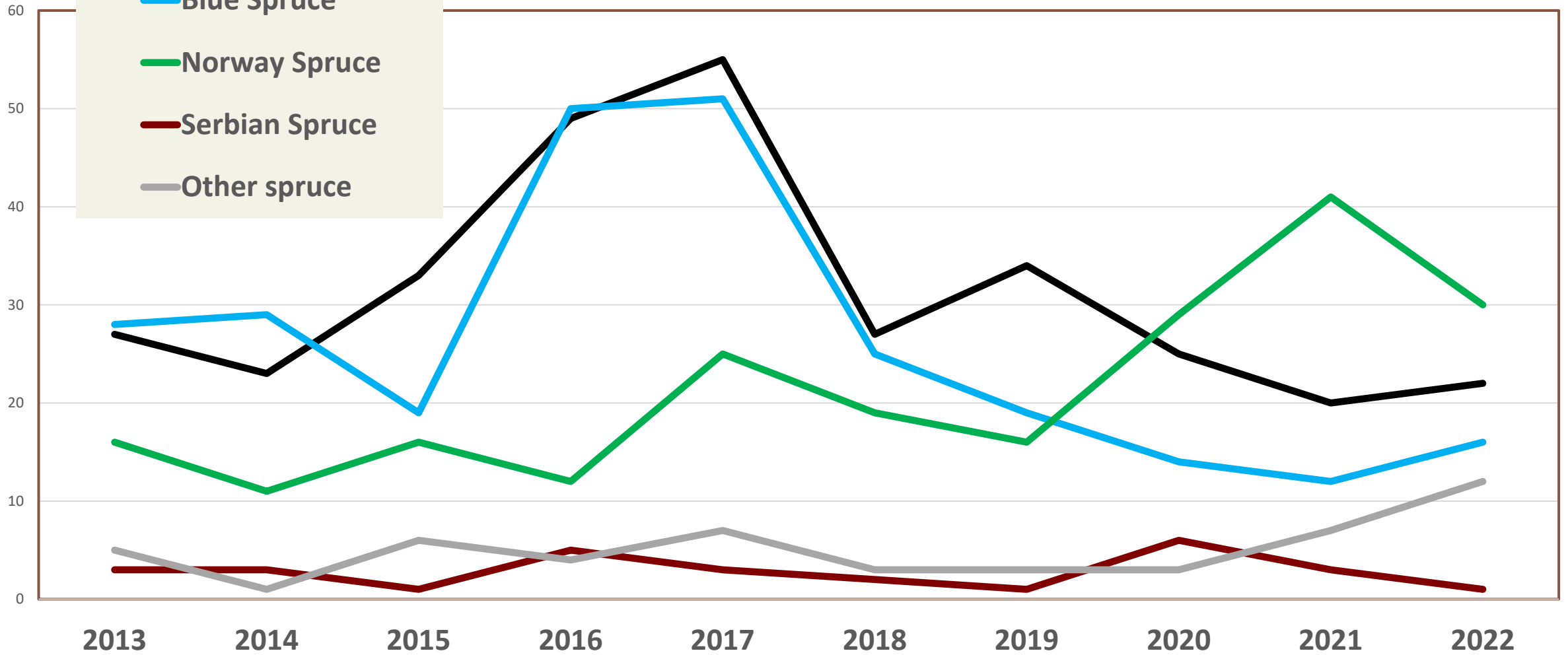
- Fungi
- Bacteria
- Viruses
- Nematodes
- Phytoplasmas
- Parasitic plants

**Plant Pathogens**

# Plant Disease Triangle

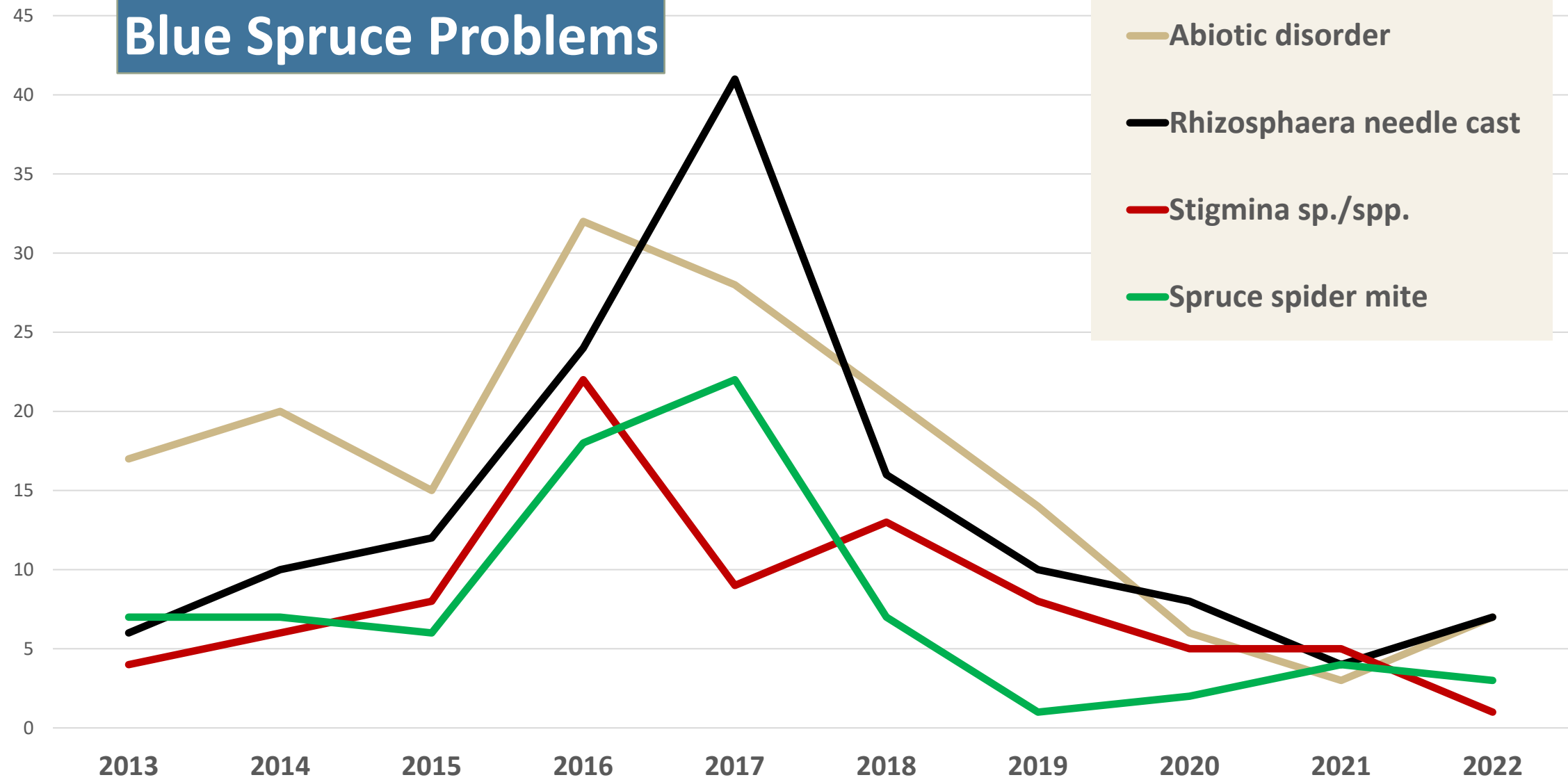


# 10-year Spruce Totals



# Blue Spruce Problems

- Abiotic disorder
- Rhizosphaera needle cast
- Stigmina sp./spp.
- Spruce spider mite



The trouble with a Blue Spruce is THAT...





....it eventually becomes a RAT!



BLUE SPRUCE  
*Picea pungens*  
PLANTED APRIL 11, 1984  
TO HONOR THE 40<sup>TH</sup> BIRTHDAY OF  
SMOKEY BEAR

# Rhizosphaera Needlecast

Blue Spruce  
Other spruce  
Fraser Fir  
Canaan Fir



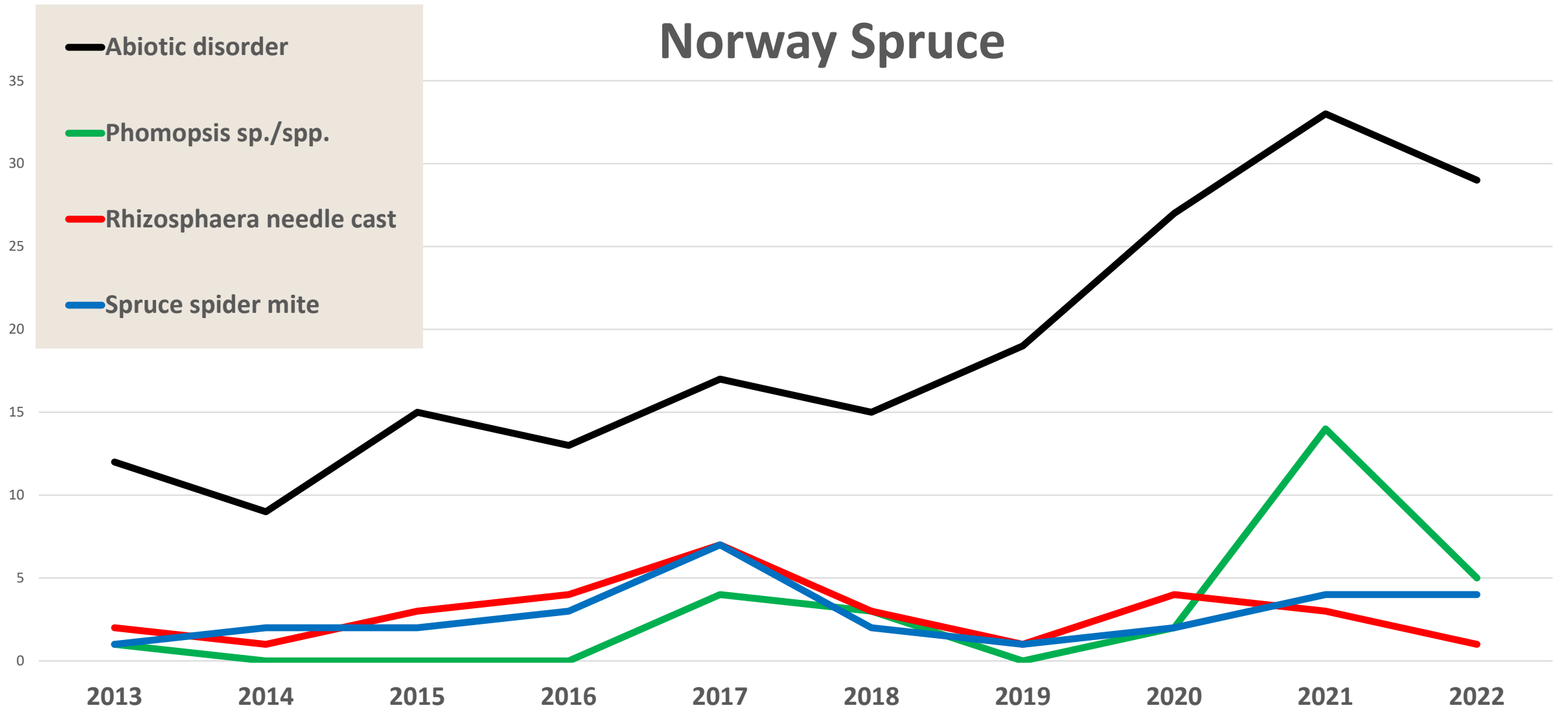
# AND Stigmina Needlecast AND Spruce Spider Mite



## Management:

- Avoid Blue spruce
- Remove heavily infected trees
- Prune for air movement
- Fungicide/Miticide sprays

# Norway Spruce



# Norway Spruce



- Abiotic stress / drought
- Phomopsis dieback
- Rhizosphaera needle cast
- Spruce spider mite

# Norway Spruce



Phomopsis dieback



# Norway Spruce

## Phomopsis dieback



5337099

Bruce Watt

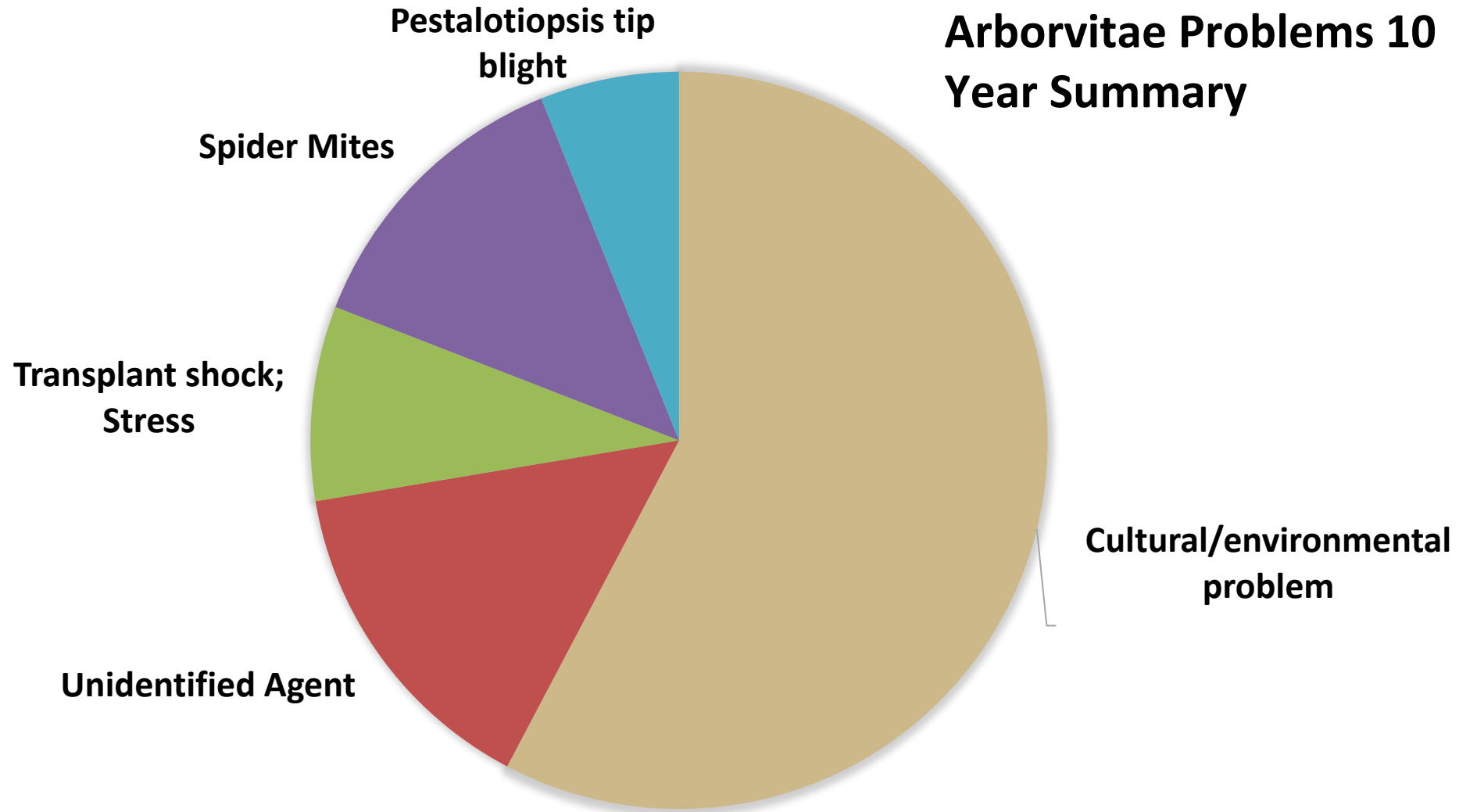
5528659

Drought Stress  
Can manifest as death from top down





# Arborvitae Problems 10 Year Summary



# Arborvitae Problems



Transplant Stress



Planted Too Deep

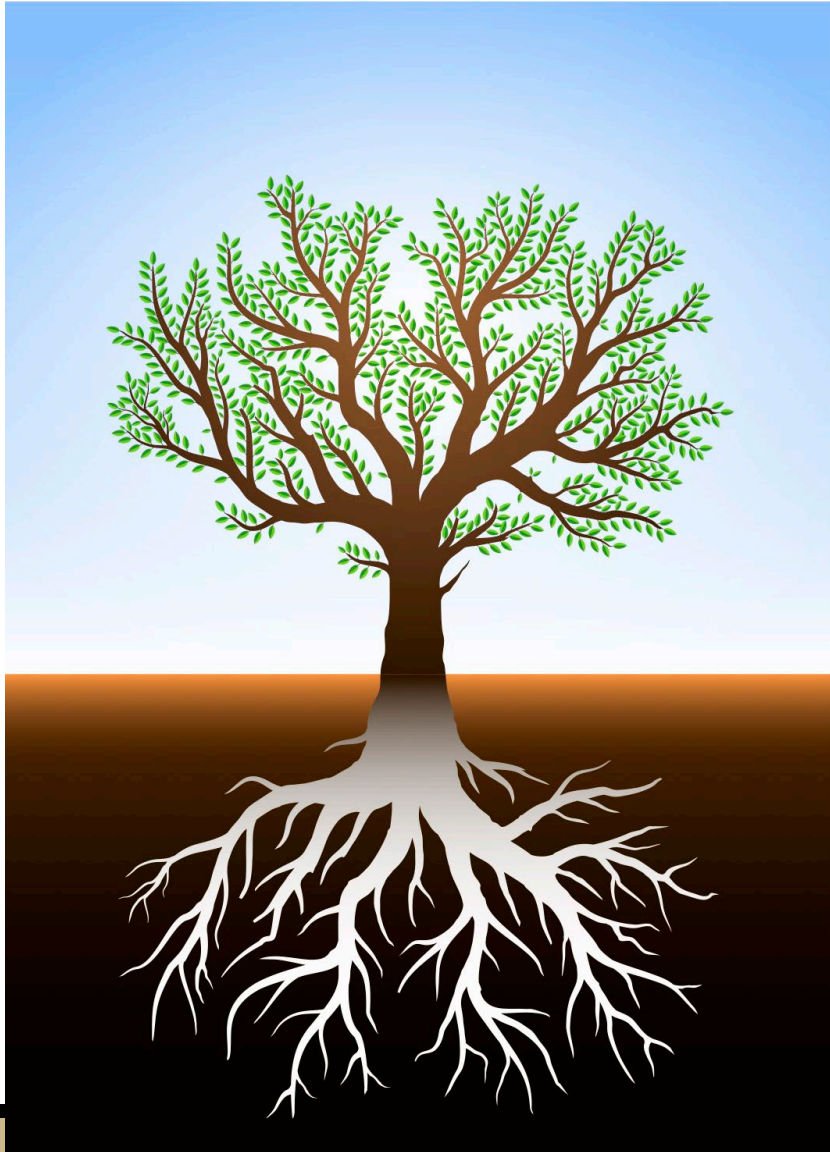
## Arborvitae Problems – Wrong Place





Arborvitae Problems - Drought

# Drought Stress

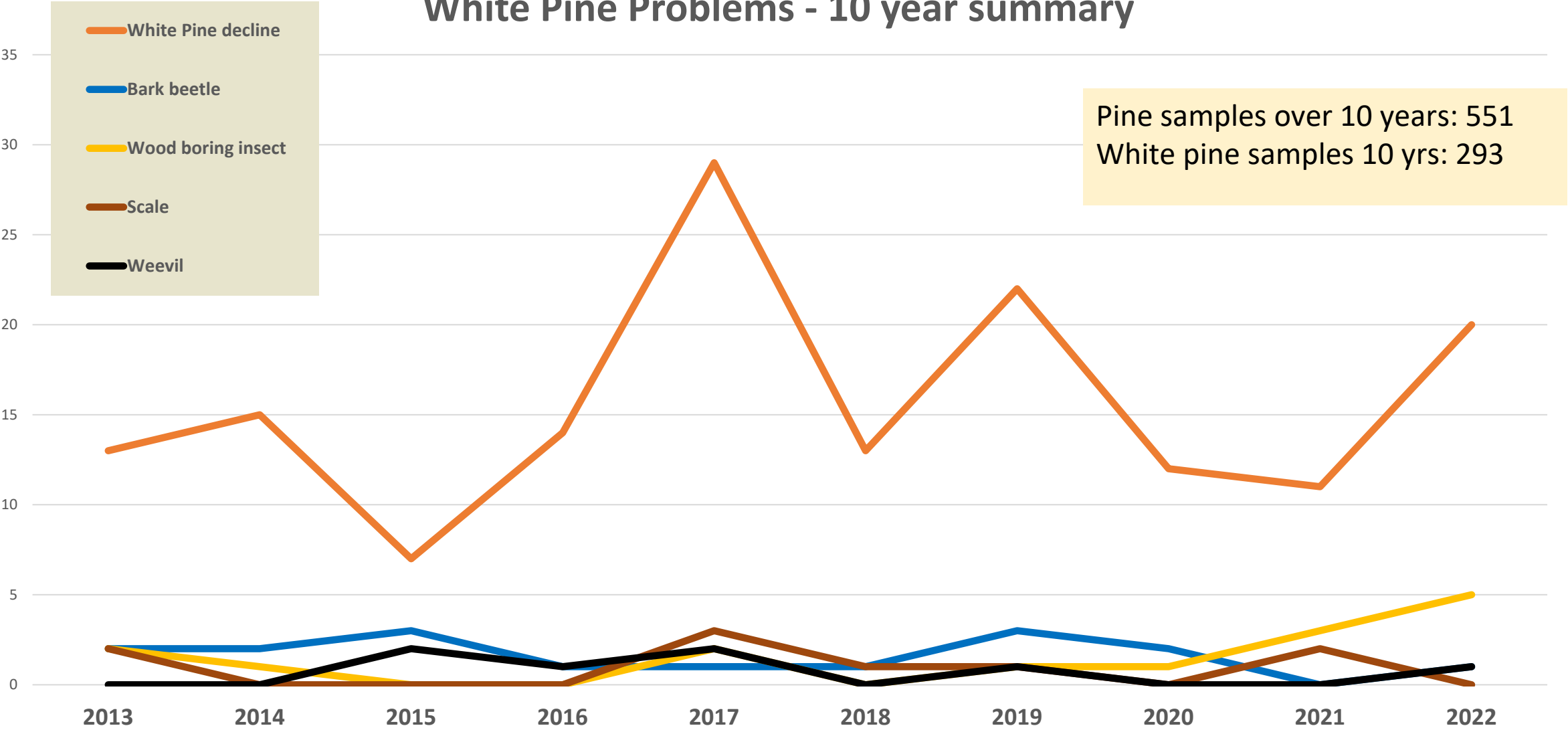


- Severity depends on tree species
- Larger trees lose more water
- A tree with 75,000 leaves may transpire > 50 gal/day
- Lindsey Purcell's – 5 + 5 rule for water: 5 gals + 5 gals/inch diameter trunk



Arborvitae Problems - Bagworms

# White Pine Problems - 10 year summary



# White Pine Decline





# White Pine Decline



# White Pine Decline

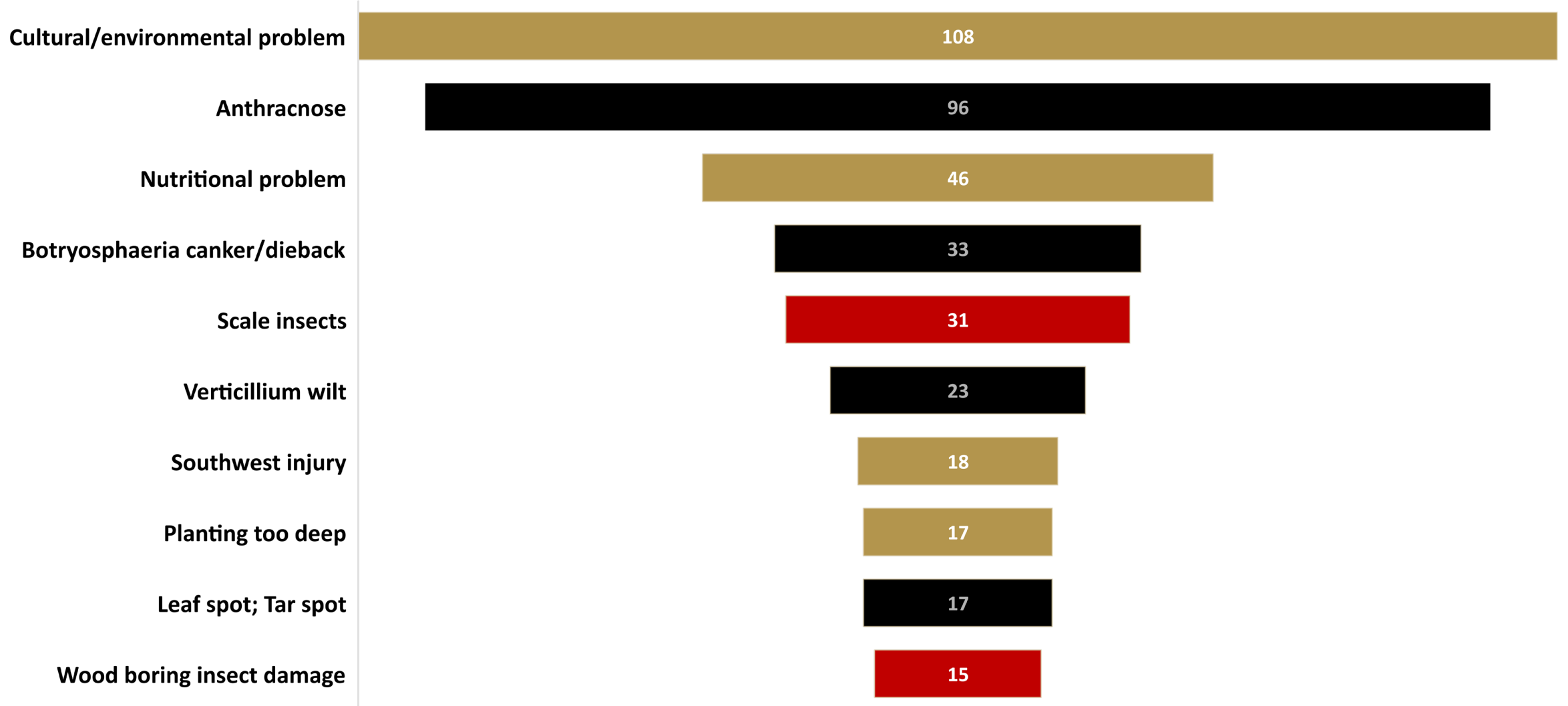
Weevil and borer attracted to trees in decline



# White Pine - Borers



# Maple Problems 10 Year Totals



# Maple – Anthracnose



# Maple – Nutritional Problems

- Stunting – Small leaves
- Overall yellowing, low vigor

## *Possible Causes:*

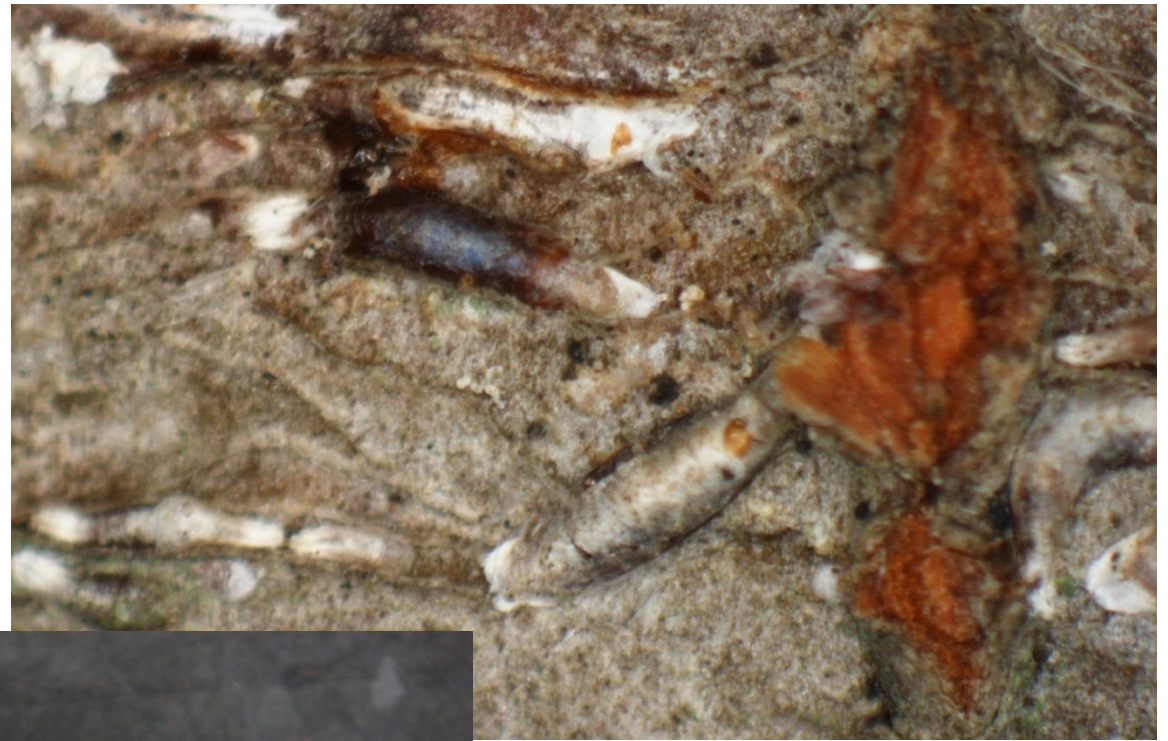
Fe or Mn deficiency  
due to high pH soil



# Maple – Scales



Japanese  
maple scale



Oystershell  
scale

# Verticillium Wilt – Maple



Gone

Going

Going

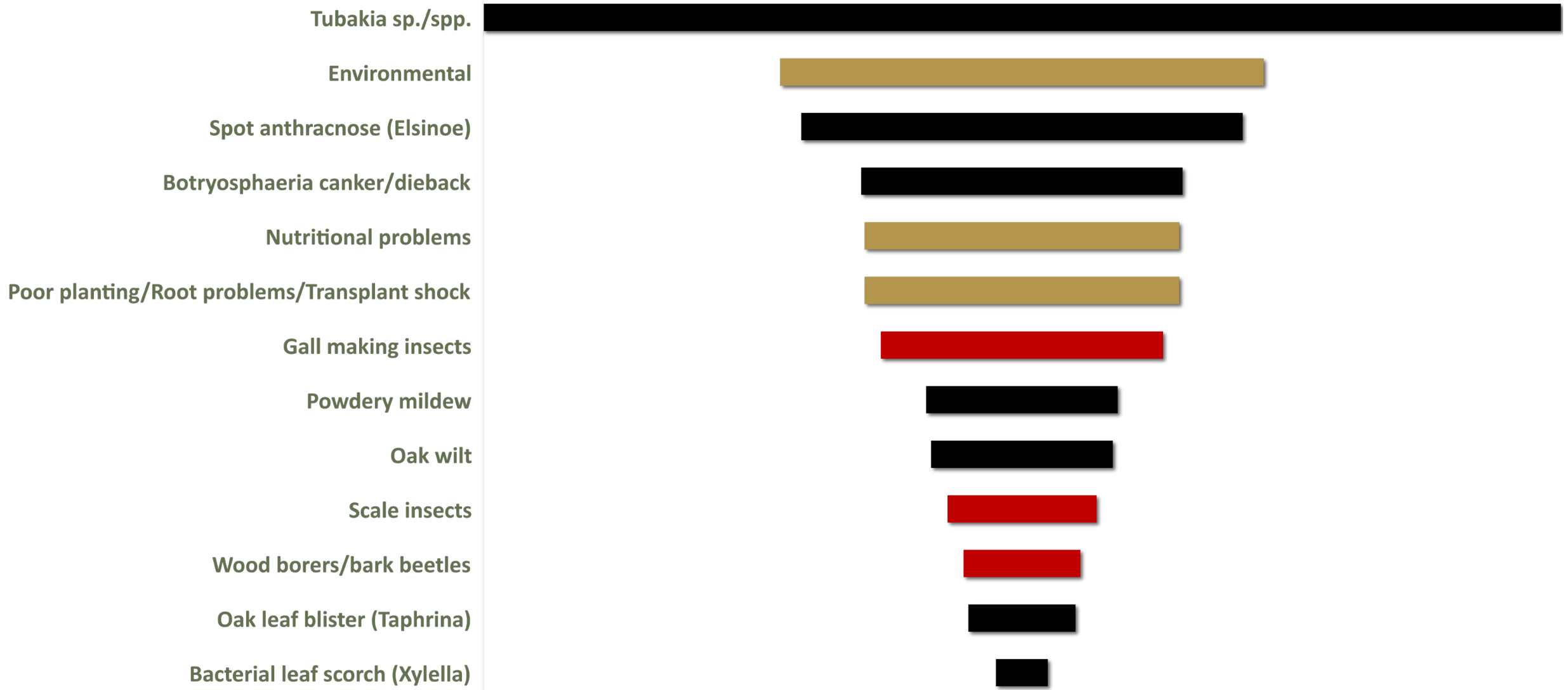




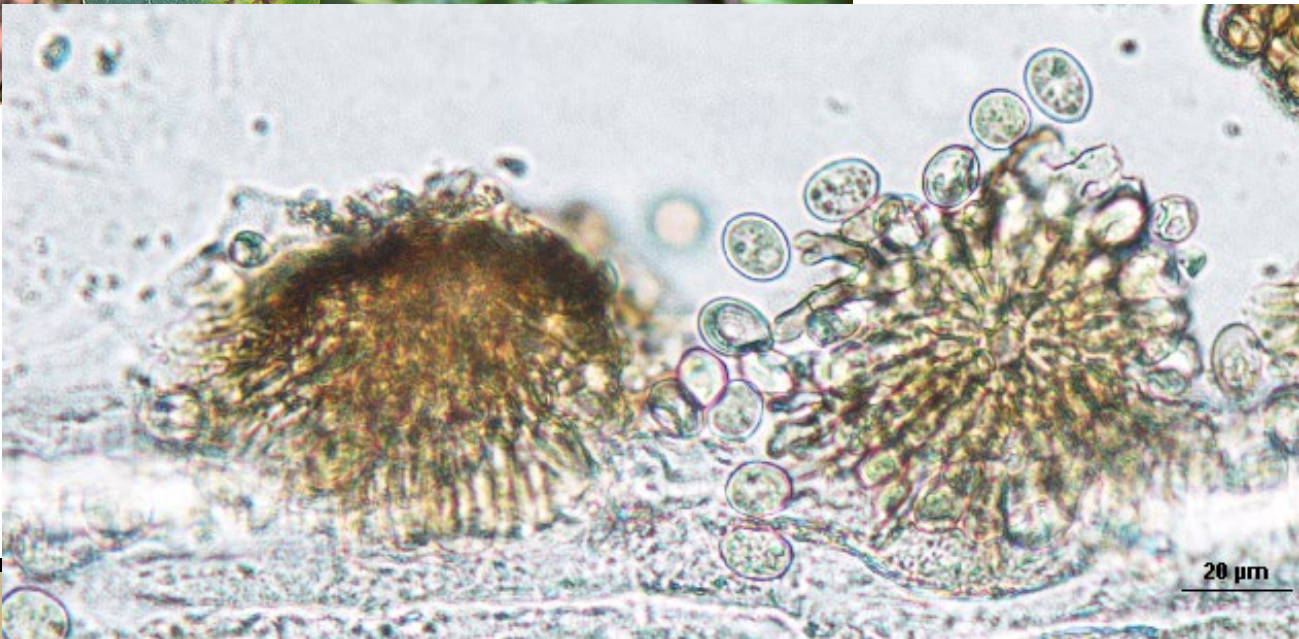
## Verticillium Wilt

Getting the right sample requires time and patience.  
Isolation results in 10 days to 2 weeks

# Oak Problems 10 Year Totals



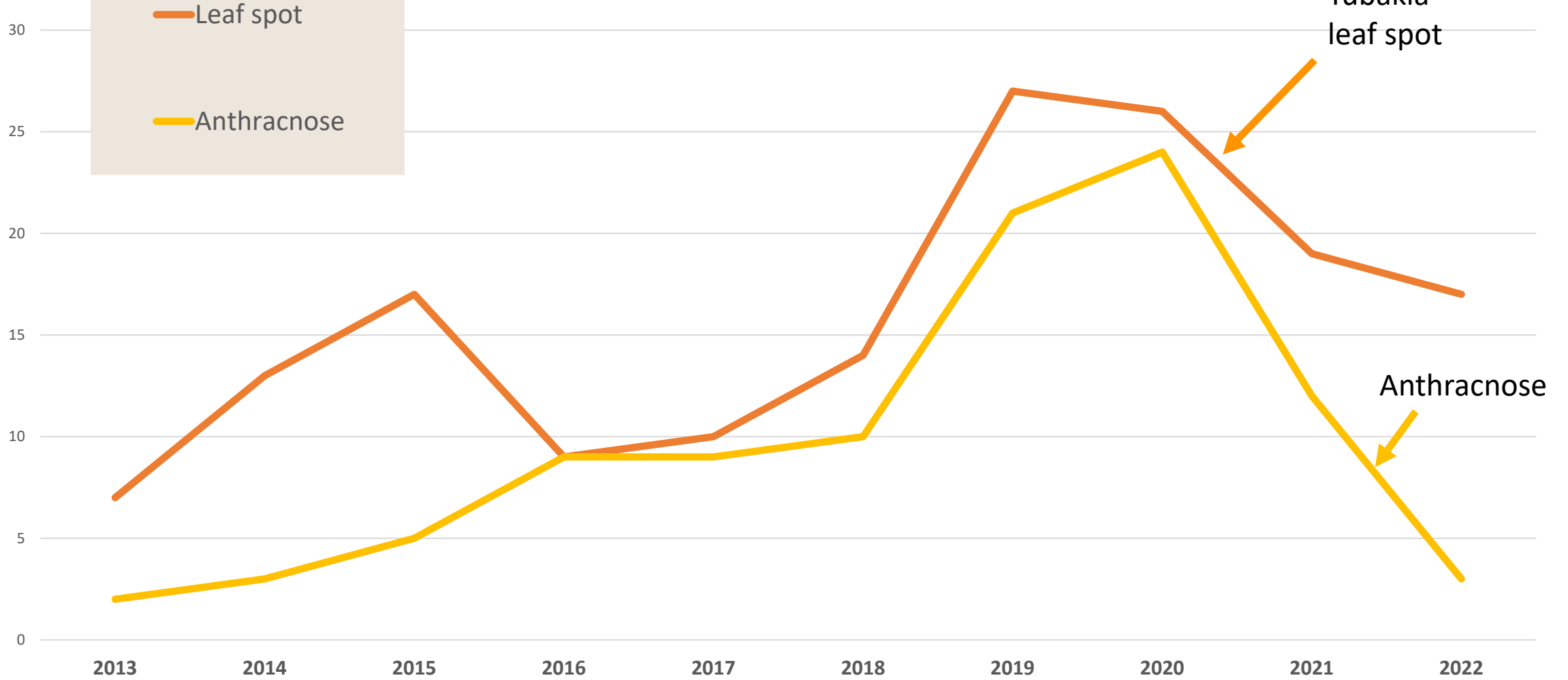
# Tubakia leaf spot



# Oak Anthracnose



# Red Oak Problems – 2013-2022



Tubakia  
leaf spot

Anthracnose

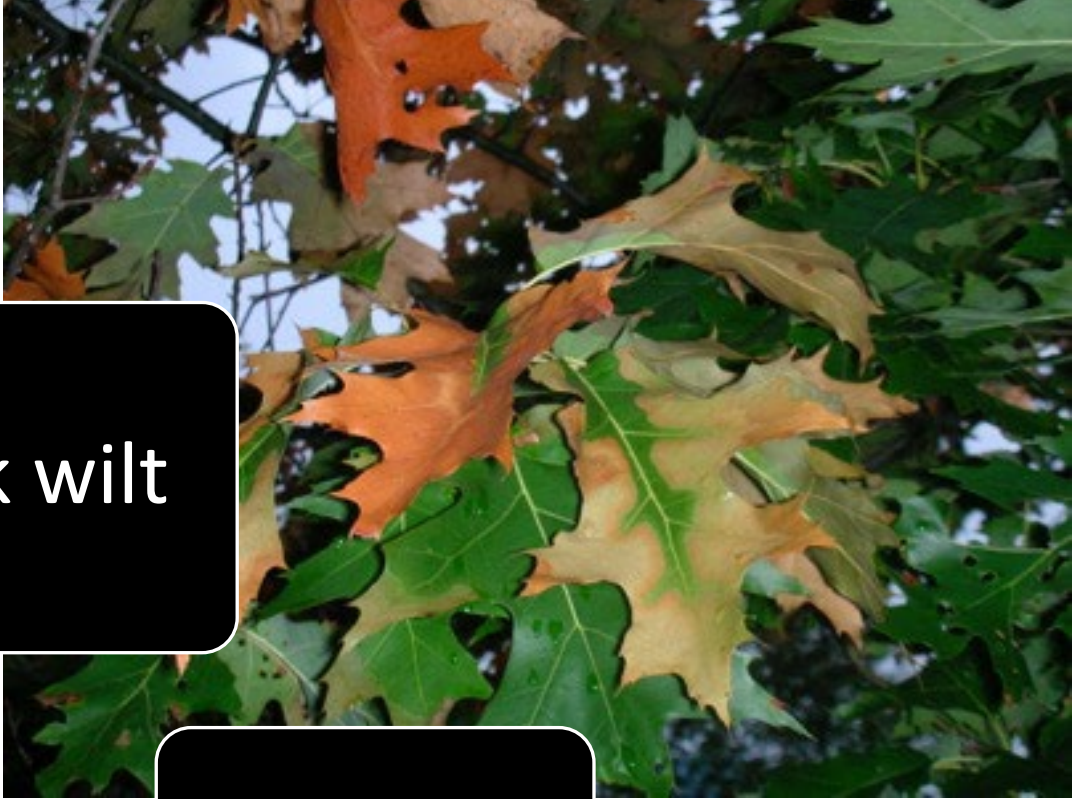
2012

Drought Years

Drought Years



Abiotic  
Stress



Oak wilt

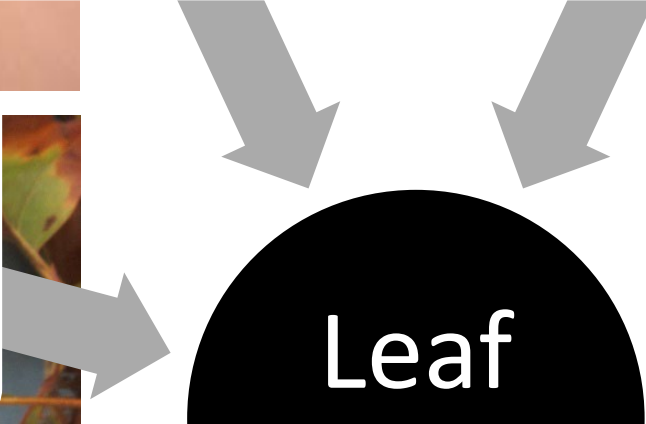


Bacterial  
Leaf  
Scorch



Bur oak  
blight

Leaf  
Scorch





Oak  
Root Stress/Abiotic



## Bacterial Leaf Scorch

*Xylella fastidiosa*



# Botryosphaeria Canker and Kermes Scale

## Northern red oak – ‘flags’



# Botryosphaeria Canker on Oak



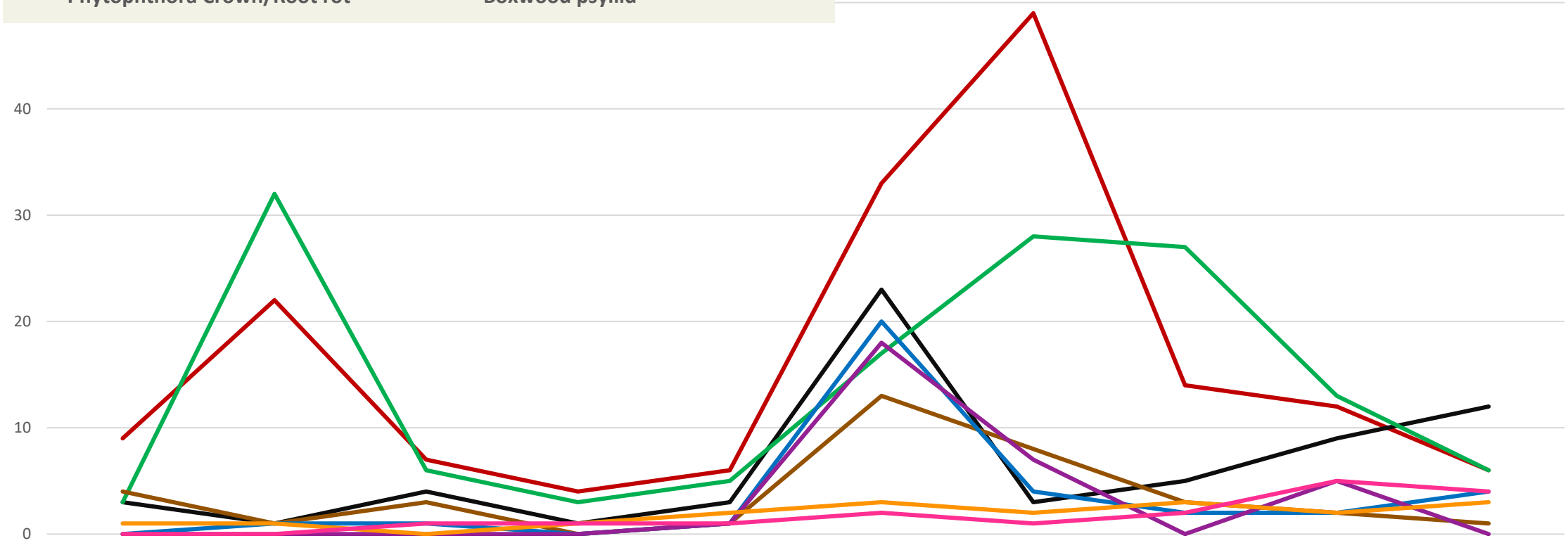
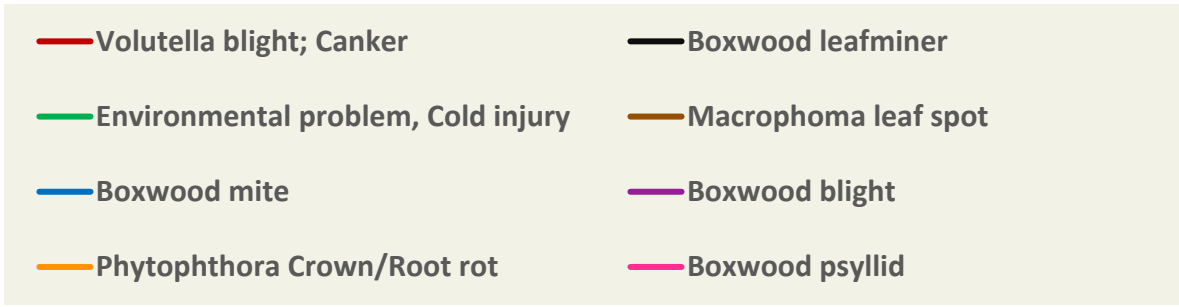


Oak Wilt : *Bretziella fagacearum*  
Spread by root grafts and insects  
attracted to wounds



Oak Wilt: Confirmation by PCR  
and isolations: \$50

# Boxwood Problems - 10 Year Summary



YEAR	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Samples	36	78	42	28	41	161	137	84	92	71

# Boxwood Problems – 10 Year Summary



Voutella dieback



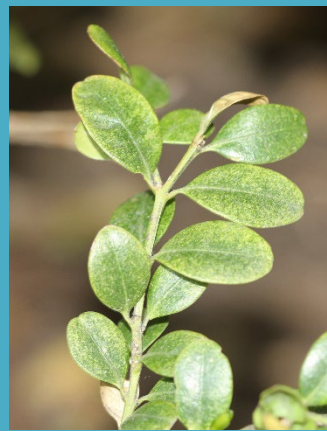
Cold/Winter damage



Boxwood leafminer



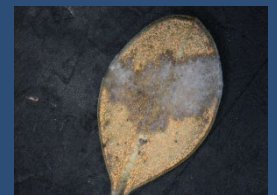
Macrophoma leaf spot



Boxwood mite



Phytophthora root rot



Box blight



Psyllid

# Volutella Blight



Note – Leaves stay attached with Volutella blight!



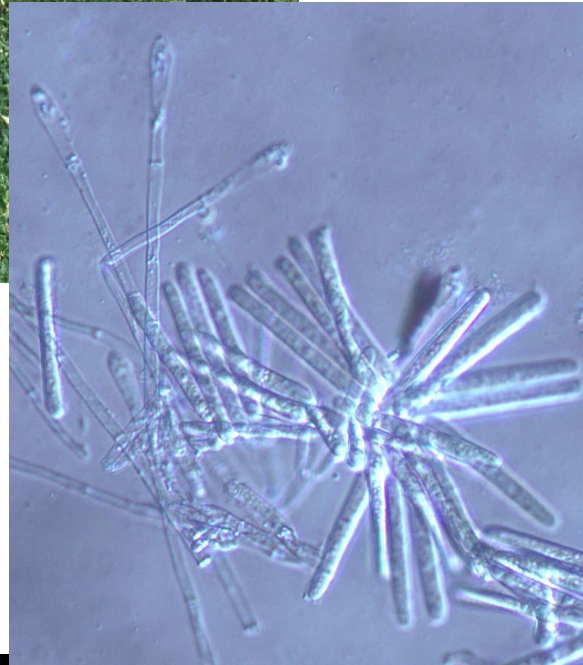
# Boxwood Blight, caused by the fungus *Calonectria pseudonaviculata*



October 2011 confirmed in CT and NC for the first time in the US



# Boxwood blight in the landscape



K. Ivors, NC State University

Calonectria  
Boxwood Blight



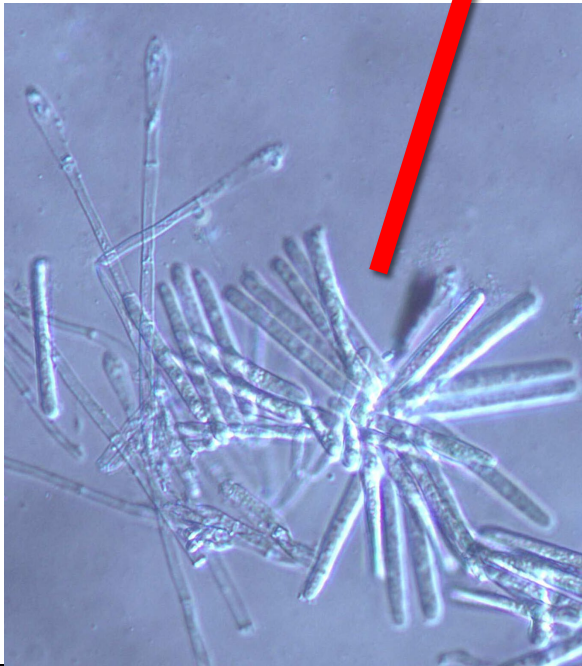
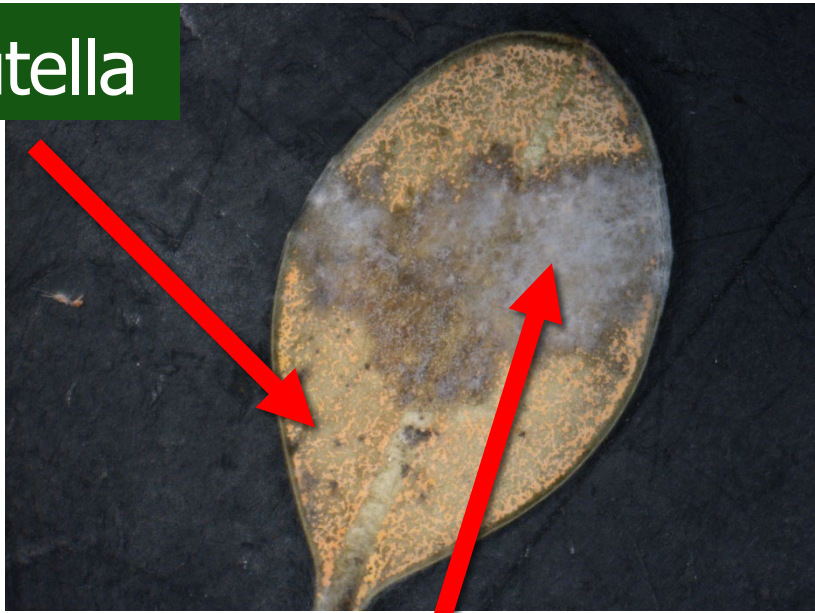
White spore structures  
(Boxwood Blight)

Volutella  
Blight

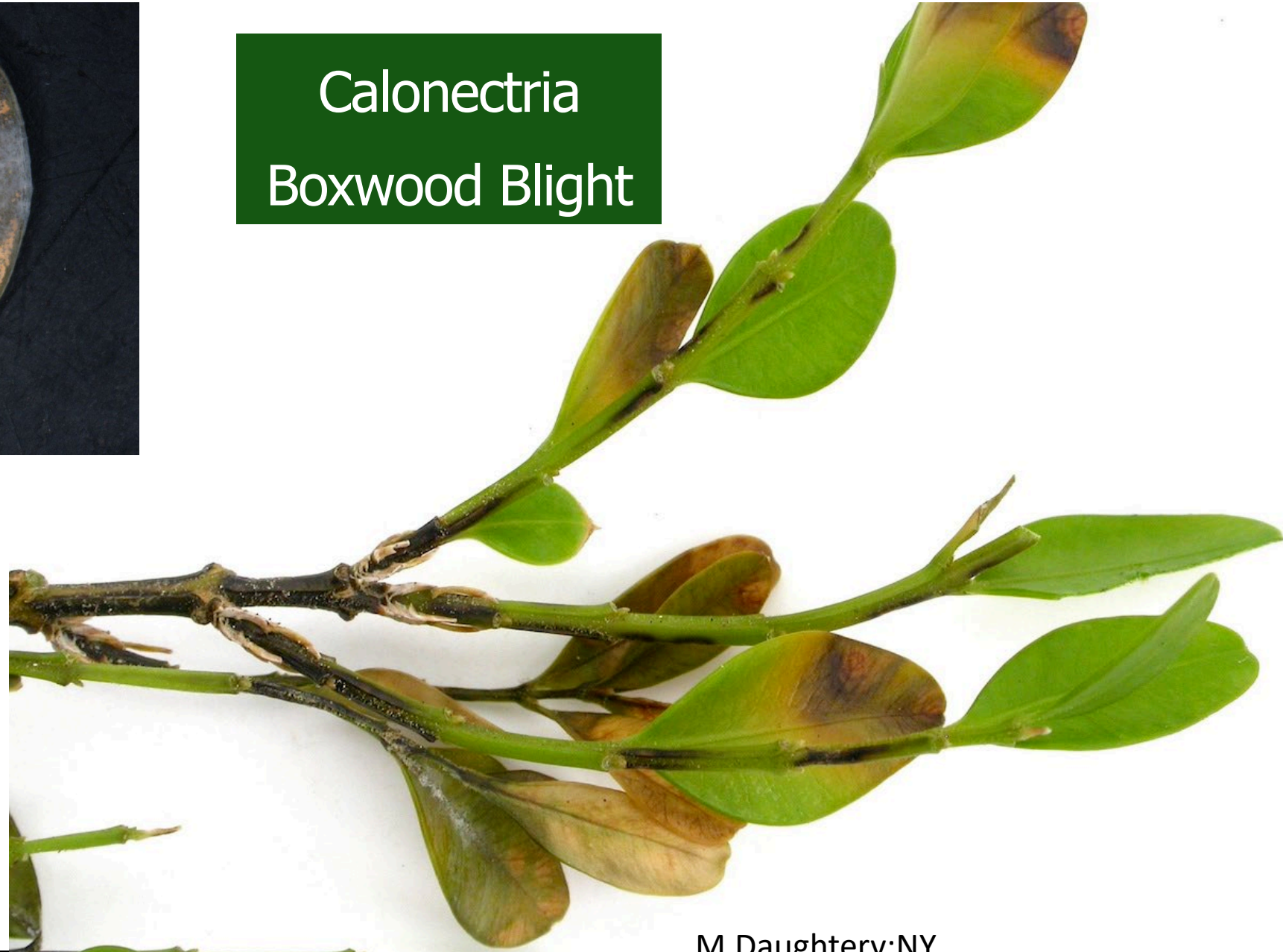


Pinkish-orange spore structures  
(Volutella)

Volutella



Calonectria  
Boxwood Blight



M.Daughtery;NY

# Boxwood Phytophthora crown rot



Diagnosis of  
Phytophthora  
root/crown rot  
requires root sample,  
or whole plant (ideal)



# Phytophthora – The Plant Destroyer

- Water mold – loves water and moisture
- Diagnosed on 80 different host plants over 10 years
- Can be very difficult to manage once present – Soil-borne
- Causes multiple problems:
  - Bleeding cankers and trunk staining
  - Foliar/stem Blighting
  - Root and Crown rot





American Beech

Phytophthora Bleeding Stem Canker



# Phytophthora Bleeding Stem Canker



Maple





Diagnosis of *Phytophthora* stem canker requires bark chip samples. Time consuming, risk of harming tree further.

Small chips, 1"x1-2". Shallow, just the bark.



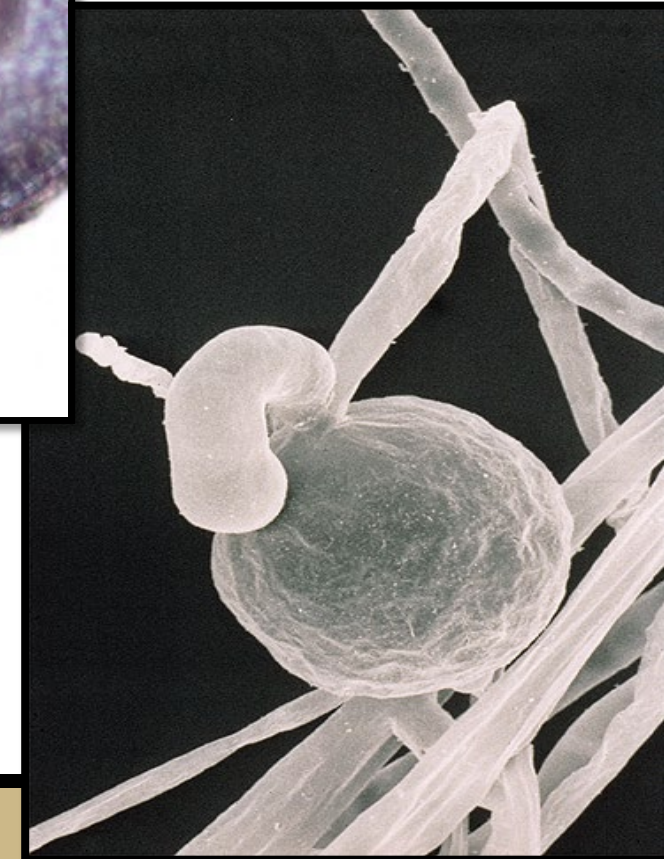
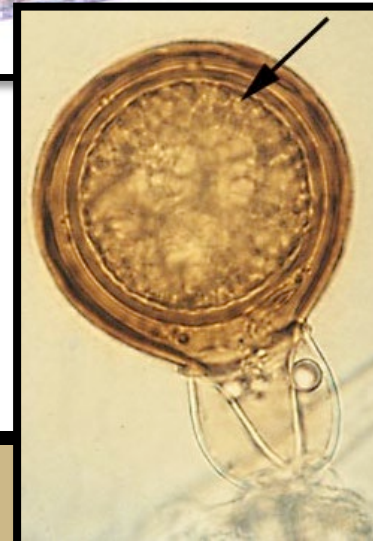
Petunia –  
Phytophthora root rot



Phytophthora aerial blight - Vinca

# Pythium – Kicking plants when they are down

- Water mold, like Phytophthora
- If you have soil you may have Pythium
  - Wide host range
  - Can be pathogens or can just be there
  - Pathogenic types mainly infect at root tips
- Symptoms often include
  - General Yellowing
  - Wilting
  - Discolored Roots
  - Rat-Tails



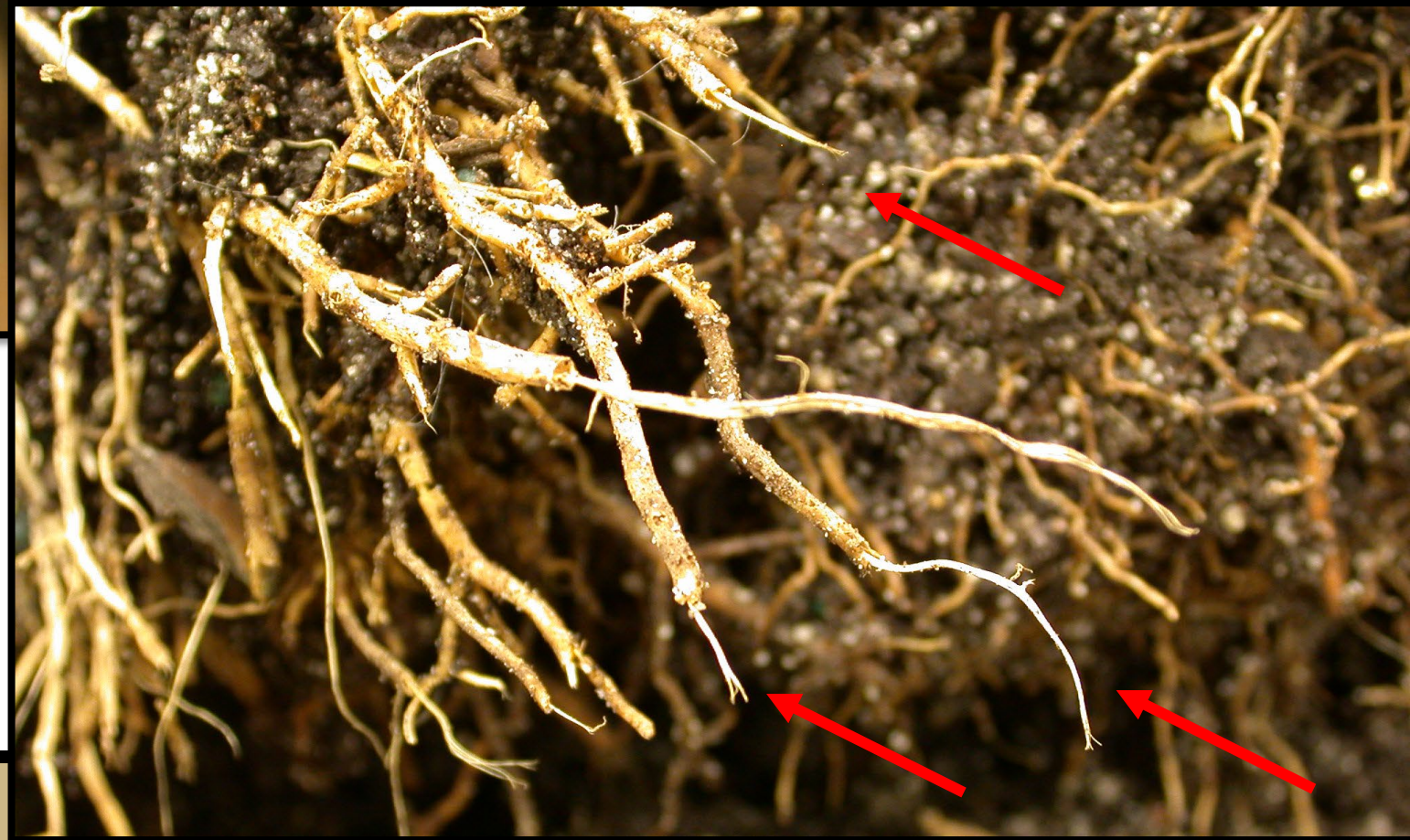


Pythium root rot  
on petunia





Outer cortex of roots sloughs off, leaving “threads” or “rat tails” behind



Pythium Root Rot  
(*Pythium* sp.)

# Pythium and Phytophthora Control

- Provide good drainage
- Avoid over-watering
- Remove infected plants to reduce spread (Where possible)
- Do not over-fertilize
- Avoid plant stress
- Fungicides: limited use in landscape
  - Only in high value beds
  - Only if drainage is good

# LANDSCAPE REPORT

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Timely Information for Gardeners and Green Industry Professionals

# PURDUE PLANT DOCTOR

PLANT PROBLEM DIAGNOSIS ▾ ABOUT US LANDSCAPE REPORT

Welcome to the Purdue Plant Doctor.

Enter the name of the plant, plant problem, pest,  
or disease,

or click your way to identify and manage your pest or disease.



Broadleaf Trees,  
Shrubs, and  
Vines



Evergreen Trees  
and Shrubs



Flowers



Beneficials

<https://purdueplantdoctor.com/> Diagnosis Tools





## Symptoms and Signs for Plant Problem Diagnosis – An Illustrated Glossary

Authors:  
Janna Beckerman  
and Tom Creswell  
Department of Botany  
and Plant Pathology,  
Purdue University



Figure 1. In hot, wet summer months, annual vinca (*Catharanthus roseus*) often falls victim to *Phytophthora nicotianae*.

PLANT PATHOLOGY IN THE LANDSCAPE SERIES

## Phytophthora Diseases in Ornamentals

## Tree Diseases: Oak Wilt in Indiana

Tom Creswell

Gail Ruhl

Janna Beckerman

Cliff Sadof

Purdue Botany and Plant Pathology — [ag.purdue.edu/BTNY](http://ag.purdue.edu/BTNY)

Purdue Entomology — [ag.purdue.edu/ENTM](http://ag.purdue.edu/ENTM)

### Introduction

Oak wilt is a fatal disease of red and black oak trees in Indiana and other Midwest states. While there is no cure for infected trees, you can keep oak wilt from spreading by taking appropriate preventive measures. This publication describes the symptoms of oak wilt disease, its cause, and management options that are available.

### Symptoms

Indiana has at least 17 oak species, which are commonly classified into two



Photo by Gail Ruhl

**Figure 1.** These branches and leaves show symptoms of oak wilt.

# Boxwood Blight

Gail Ruhl

Tom Creswell

Janna Beckerman

Purdue Botany and Plant Pathology - [ag.purdue.edu/BTNY](http://ag.purdue.edu/BTNY)

### Introduction

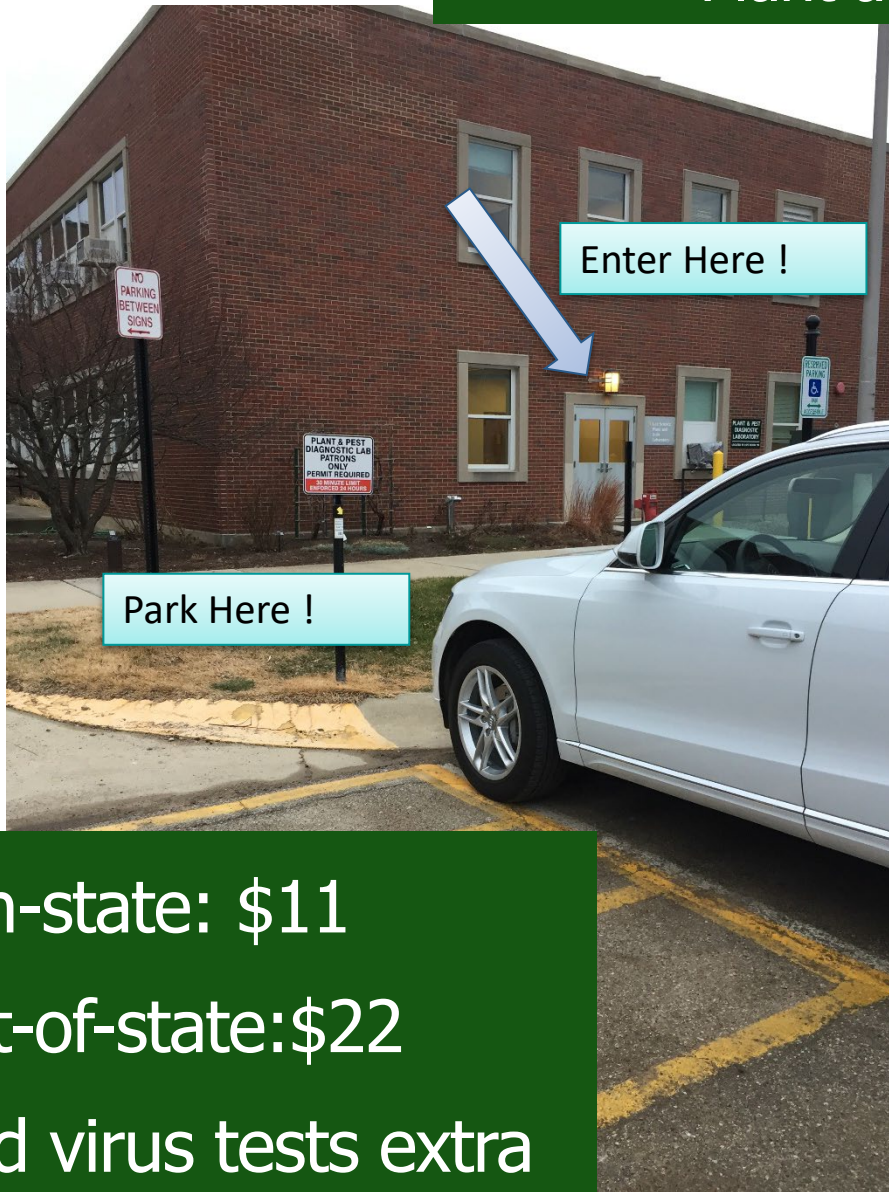
Boxwood blight is a fungal disease caused by *Calonectria pseudonaviculata* (previously called *Cylindrocladium pseudonaviculatum* or *Cylindrocladium buxicola*).

This fungus is easily transported in the nursery industry and can be moved on infected plants that do not show any symptoms at the time of shipment as well as on shoots of infected boxwood greenery tucked into evergreen Christmas wreaths.

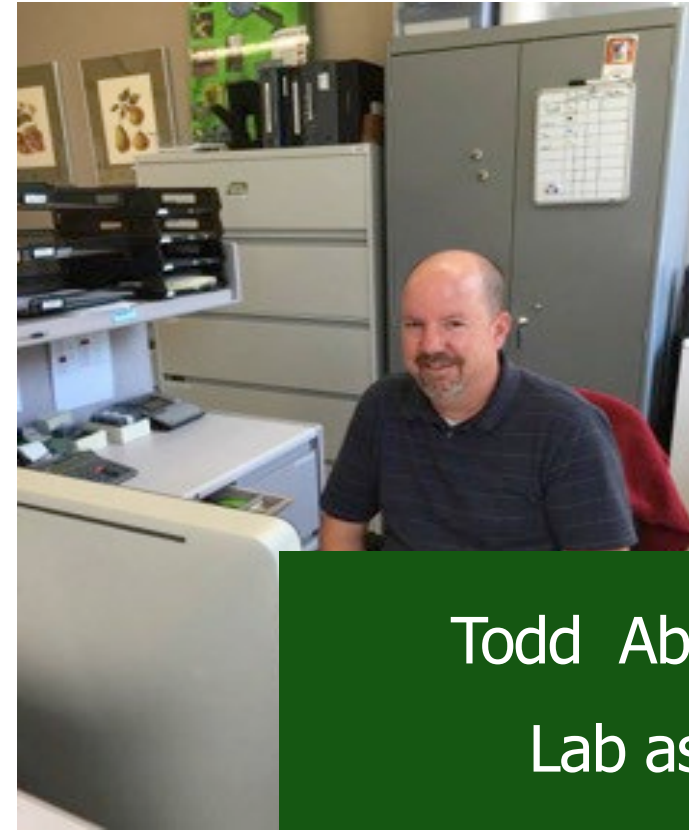


**Figure 1.** The spots on these leaves are typical of early stage boxwood blight. Photo by M. Daughtrey, New York.

PPDL Room 116 ;  
Plant and Soils Building (LSPS)



In-state: \$11  
Out-of-state:\$22  
PCR and virus tests extra



Todd Abrahamson  
Lab assistant  
765-494-7071  
[www.ppdl.purdue.edu](http://www.ppdl.purdue.edu)

# Sampling Tree/Shrub Problems

Send enough material, Not just dead stems

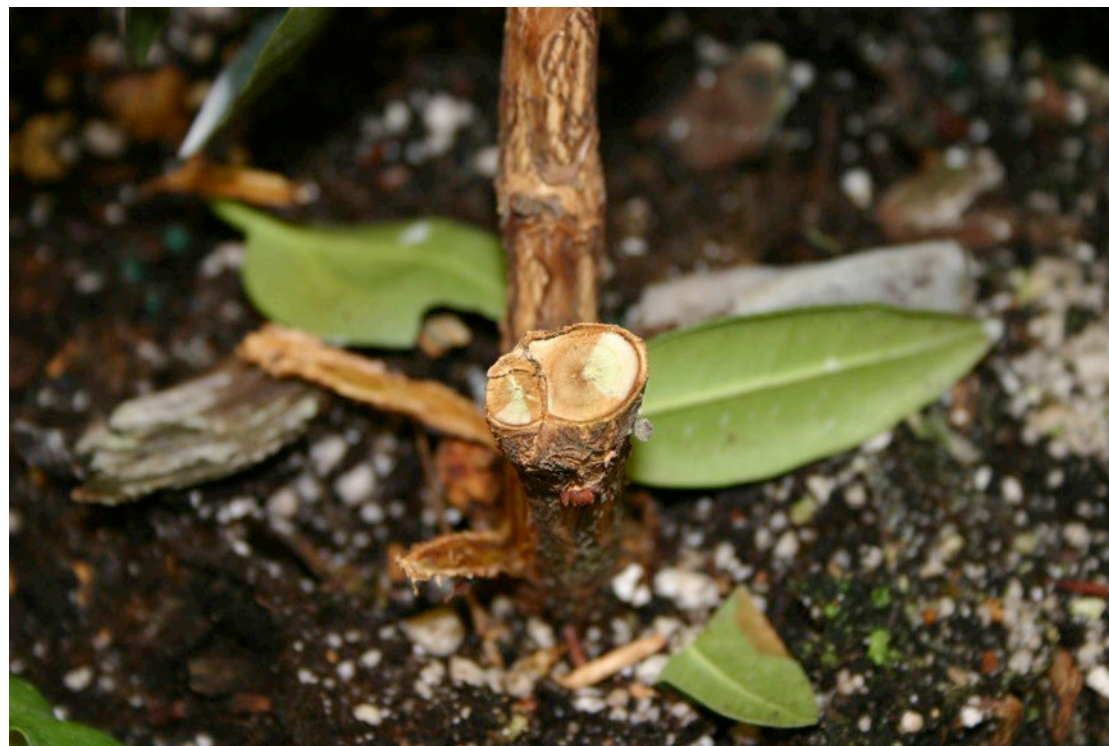
**SEND THIS**



**NOT THIS**

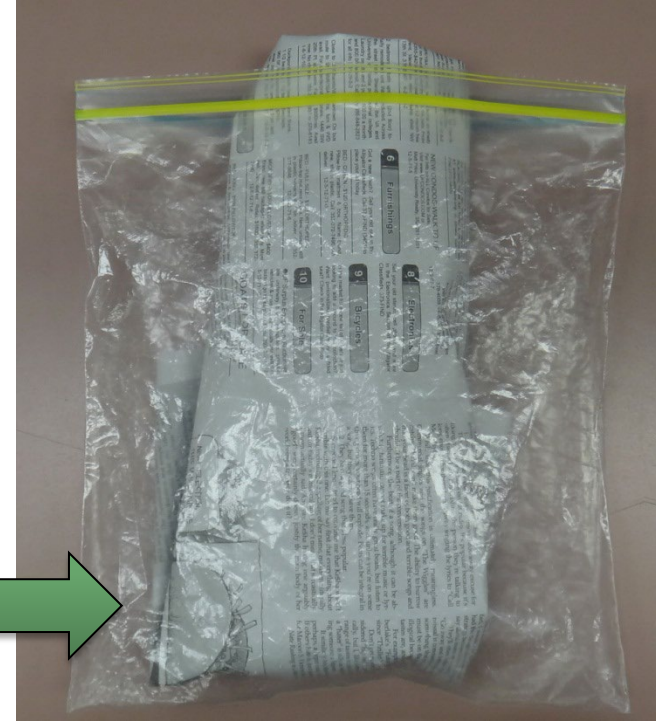
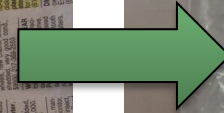
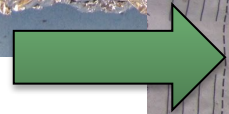


Botryosphaeria Dieback  
Rhododendron



# Submitting Small Plants

Wrap small plants/seedlings in heavy foil, then newspaper, then a plastic bag.



# Good Packaging/Shipping

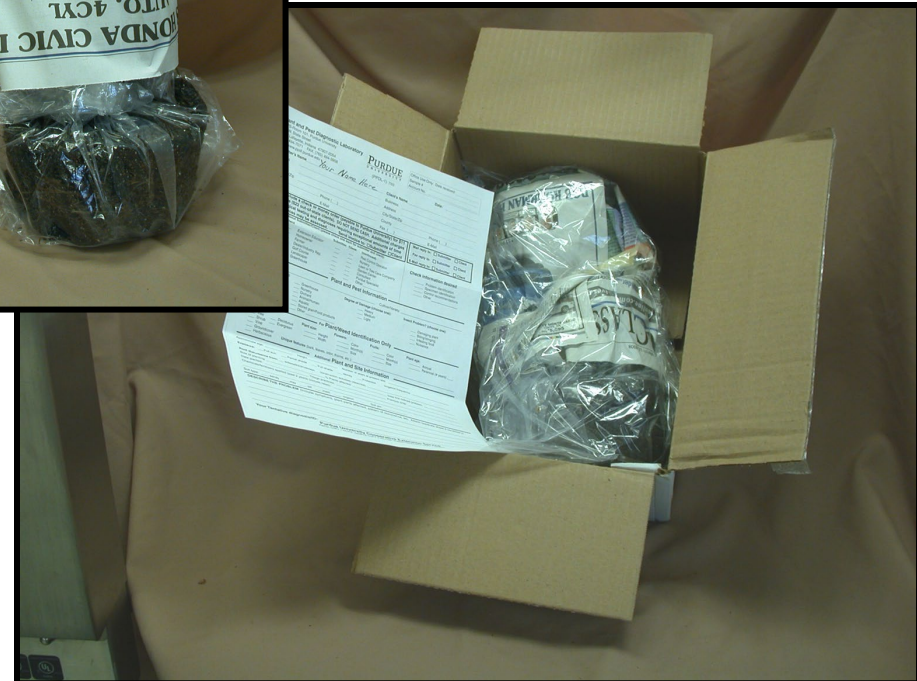


Plastic bag around root system

Wrap top in paper, then cover with bag



Packed in sturdy box to prevent crushing



# Packaging and Shipping Blunders



Don't add water or wet paper towels

Don't ship on Friday

Ship overnight if perishable (mushrooms for ID, fruits, urgent samples)



College Home	Physical Sample
	Photo Sample
	Turf Sample
	Services and Fees



# Fillable PDF Form

**Plant & Pest Diagnostic Laboratory**  
 LSPS – Room 116, Purdue University  
 915 W State St, West Lafayette, IN 47907-2054  
 765-494-7071 FAX: 765-494-3958  
<http://www.ppdl.purdue.edu>



(PPDL-1-W) 1/14

Office Use Only: Date received: _____
Sample #: _____
Account #: _____
Date: _____

**Submitter's Name** \_\_\_\_\_  
 Business \_\_\_\_\_  
 Address \_\_\_\_\_  
 City/State/Zip \_\_\_\_\_  
 County \_\_\_\_\_ Phone \_\_\_\_\_  
 Fax \_\_\_\_\_ Email \_\_\_\_\_

**Client's Name** \_\_\_\_\_  
 Business \_\_\_\_\_  
 Address \_\_\_\_\_  
 City/State/Zip \_\_\_\_\_  
 County \_\_\_\_\_ Phone \_\_\_\_\_  
 Fax \_\_\_\_\_ Email \_\_\_\_\_

Please include a check or money order (payable to Purdue University) for \$11 per sample (\$22 out-of-state clients). <b>DO NOT SEND CASH.</b> Send invoice to <input type="checkbox"/> Submitter <input type="checkbox"/> Client	<input type="checkbox"/> Perform only routine diagnosis (\$11 in-state/\$22 out-of-state)	Mail reply to: <input type="checkbox"/> Submitter <input type="checkbox"/> Client Fax reply to: <input type="checkbox"/> Submitter <input type="checkbox"/> Client Email reply to: <input type="checkbox"/> Submitter <input type="checkbox"/> Client <input type="checkbox"/> Copy Extension Educator
	<input type="checkbox"/> Please notify submitter if additional fees for advanced testing are needed	
	<input type="checkbox"/> Perform additional advanced testing if necessary (up to \$50)	

**Information about Submitter/Client (please check one each for submitter and client)**

<b>Submitter</b>	<b>Client</b>	<b>Submitter</b>	<b>Client</b>	<b>(continued)</b>	<b>Check information desired:</b>
_____	_____	_____	_____	Extension Educator	_____ Problem identification
_____	_____	_____	_____	Homeowner	_____ Specimen identification
_____	_____	_____	_____	Farmer	_____ Control recommendations
_____	_____	_____	_____	Dealer/Industry Rep.	_____ Other _____
_____	_____	_____	_____	Golf Course	
_____	_____	_____	_____	Landscaper	
_____	_____	_____	_____	Greenhouse	

**Plant and Pest Information**

Plant or Host: \_\_\_\_\_ Cultivar/Variety: \_\_\_\_\_  
 Location (choose one):  
 In dwelling  Greenhouse

# Insect Identification

Location

Degree of infestation

Insect activity

Host plant or site

Who/when collected

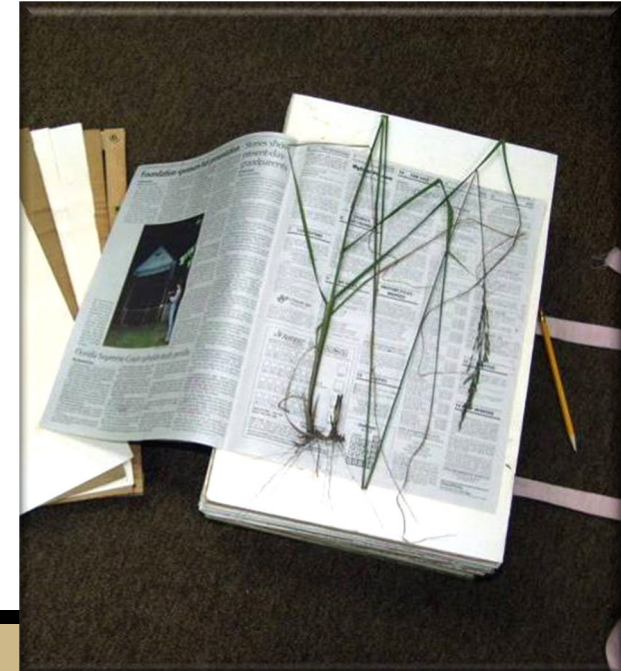
Send In vials with  
rubbing alcohol or on  
plant tissue



# Submitting Plant and Weed Samples for Identification

## Info Needed

- Location, plant age
- Whole plant if possible
- Stems- including terminal portion
  - leaves attached to stems
  - Need Flowers or fruit/seeds if at all possible
- Press and dry if not sending immediately



Photos are often helpful  
email to: [ppdl-samples@purdue.edu](mailto:ppdl-samples@purdue.edu)  
or use web upload tool:

