THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

Plant and Pest Diagnostic Clinic: Your Partner in Plant Health Disease, Pests and Disorders in 2024

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MASTER GARDENERS LUNCH & LEARN NOVEMBER 19TH 2024

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C. Wayne Ellet Plant Diagnostic Clinic

The Clinic is part of the National Plant Diagnostic Network (NPDN)
- NPDN is divided in five regions (70 + laboratories nationwide)
- NPDN provides a Core standard and accreditation

- Accreditation includes:
  - Validated protocols and SOPs
  - Shared best practices for diagnostic workflow
  - Participation in cutting edge characterization for new and emerging disease

https://www.npdn.org/

https://www.npdn.org/

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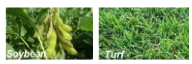
Who We Are – The Clinic Structure

PPDC
CFAES WOOSTER Campus

PPDC
CFAES Columbus Campus



Francesca Rotondo PPDC Director and Plant Diagnostician
Therese Miller Plant Diagnostician
Suranga Basnagala Entomology Coordinator and Diagnostician

Zak Ralston Nematode analysis

Todd Hicks Turf diagnostics

State Extension Specialists

A. Sanabria Wooster | P. Paul Wooster | M. Ivey Wooster | F. Hand Columbus | H. Lopez-Nicora Columbus

https://ppdc.osu.edu

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Our Clientele

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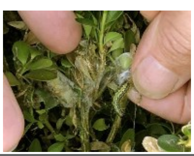
The Importance of the Diagnostics

- We diagnose plant diseases so timely action can be taken to reduce the impacts
- We report something unusual and unfamiliar, or possibly a new disease or invasive species
- Identify and contain outbreaks of significant diseases
- Import/export of agriculture goods



Box Tree Moth

Spotted Lantern Fly

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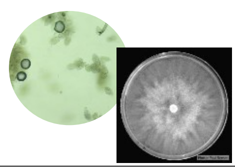
The Diagnostic Triage

- Visual analysis of the samples
- Microscopical observation
  - Bacterial streaming
  - Tape mount
- Culturing
- Moist chamber
- Biochemical Tests



20.00 dollars fee/sample

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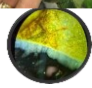
Advanced Diagnostics

Nucleic acid-based analyses

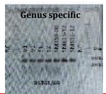


Bacterial streaming

Immuno-assays

Immunostrip assay
Genus specific

DNA-based assay



35.00 dollars fee/sample

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A Good Diagnosis starts with a Good Sample

https://ppdc.osu.edu/submit-sample

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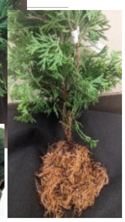
The Right Sample



- Collect whole plants whenever possible (including roots)
- Samples should be representative
- Choose plants that show a range of symptoms
  - ideally showing the early to middle stages of the problem
  - includes healthy tissue whenever possible
- Dig down into the surrounding soil about 6 to 8 inches

Do not submit only dead material

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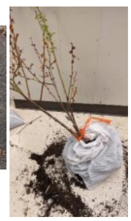
Sample Preparation



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Sample Preparation

For branches/twigs

- include multiple branches
- Select branches showing the symptoms and the transition zone .
  - the transition zone is the area between dead and healthy plant tissue

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The Submission Form is Important

PLANT AND PEST DIAGNOSTIC CLINIC

- Description of the problem
- When the symptoms started
- Is this the first time that the disease is observed?

  If not, information about previous IPM approach
- Distribution, severity, Incidence
- Soil/media type, drainage and weather condition

https://ppdc.osu.edu/forms/plant-diagnostic-form

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Submission

- Pack the plant in a box that large enough to hold the entire plant
- Add the **Plant Diagnostic Form** in a separate plastic bag
- Seal the box and ship using **next day** delivery service

The submission form is important

https://ppdc.osu.edu/forms/plant-diagnostic-form

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Visual observations – Signs and Symptoms

- Bacterial ooze
- Bacterial streaming
- Odor

- Wilting
- Cankers
- Soft tissue
- Spots
- Watersoaking
- Halos-chlorotic

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Scouting and Diagnosis

Start with symptoms

- Scout on a regular basis
- Check both side of the leaves
- Scout areas that have higher humidity

https://www.vegetables.bayer.com/us/en-us/resources/disease-guides.html

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Root Rot Diseases – Symptoms and Signs

- Root and crown rots
- Discolored roots
- Yellowing, stunting and wilting

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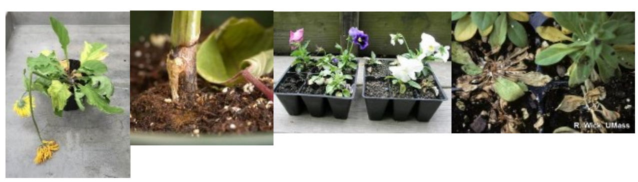
Root Rot Diseases – Symptoms and Signs



Phytophthora root rot

Rhizoctonia root rot

Black rot

White mold

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Foliar Pathogens

Obligate pathogens

Gray Mold (*Botrytis cinerea*) | Powdery mildews | Downy mildews | Rusts

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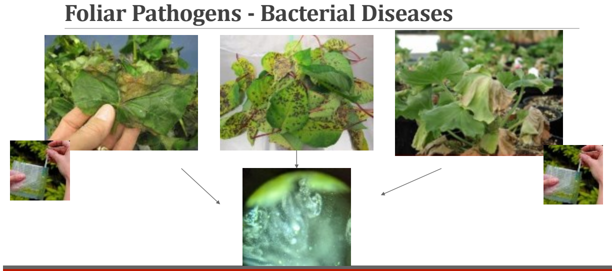
Foliar Pathogens - Bacterial Diseases



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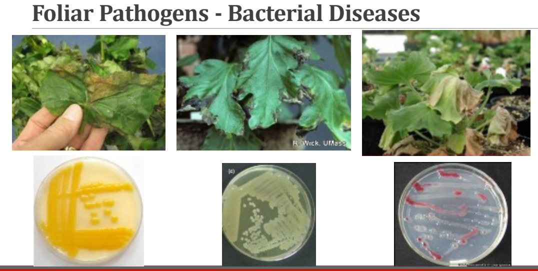
Foliar Pathogens - Bacterial Diseases



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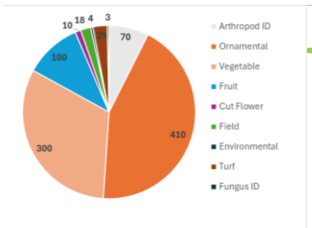
Our Patients so far



	Host	N
	Oak	70
	Maple	30
Deciduous	Redbud	7
	Dogwood	7
	Elm	6
	Hemlock	7
	Juniper	10
	Spruce	33
Evergreen	Arborvitae	25
	Fir	9
	Taxus	15
	Pine	11
	Boxwood	50

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The Weather

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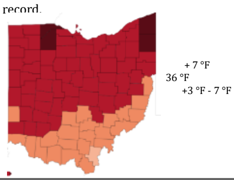
It has been a Warm(er) and Wet(ter) Winter

- Ohio warmest winter since 1895.
- Temperatures in February had an average temperature of 41.1°F.
- Great Lakes Ice Coverage record low of 2.7% in mid-February.
- February's precipitation was in the driest third of the historical record.
- The overall winter season was among the wettest third

Conifer Needle Cast Diseases

- Needle Cast infection occurs best during warm wet weather
- The fungus overwinter on living and recently killed needles
- spring through early fall, spores spread to via splashing water



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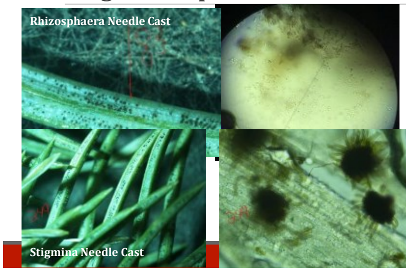
Diagnostic Updates – Conifers and Needle Cast



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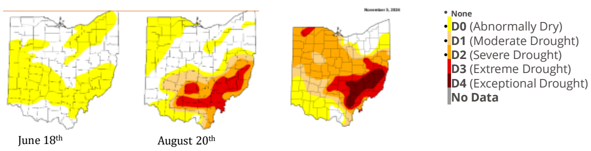
It has been a Dry Summer

- Severe impact on agriculture
  - Reduced yield
- Severe impact on tree and shrubs in landscape
  - 50 sample affected by drought



https://droughtmonitor.unl.edu/Maps/

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Diagnostic Updates – Arborvitae

Diagnostic samples (18)

- Tip blight
- Spider mite
- Environmental stresses
  - compacted soils
  - excessive dryness in the root zone
  - soil pH (ideal 6.5-8)

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Diagnostic Updates – Maple

Diagnostic samples (14)

- One sample with Phomopsis dieback
- Verticillium wilt and bacterial leaf scorch were never detected

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Spider Mites

Cultural Control

- Use a forceful jet of water (syringing) to dislodge spider mites and
- Inspect new plants for mites

Biological Control

- Introduce predatory mites
- Avoid pesticides

Chemical Control

- Soft Pesticides: insecticidal/miticidal oils and soaps
- Miticides: labeled specifically for spider mites (e.g., abamectin, bifenazate).
- Rotate mode of actions.

https://ohioline.osu.edu/factsheet/HYG-2012-11

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Scale on Conifers

- EHS
  Overwintered eggs/female hatch in early spring
- Fried egg scale
  Overwinter as immature female
- Two generations
  - Overlapping for EHS
  - EHS more difficult to control
- The feeding activity (piercing-sucking) cause the progressive death of the needles.

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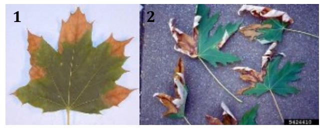
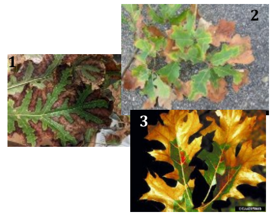
The Look-alikes: Environmental Stress or Disease?





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The Look-alikes: Environmental Stress or Disease?

Environmental scorch

Bacterial leaf scorch

Oak wilt

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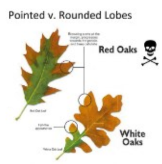
Oak wilt (*Bretziella fagacearum*)

- Infects the vascular system of oak trees,
- Transmitted by sap beetles,
- Red oak group is the most susceptible:
  - dull green or bronze
  - water-soaked leaves that wilt from tips and edges, yellow/brown, curl, and drop
  - vascular streaking
  - rapid progression



https://extension.umn.edu/plant-diseases/oak-wilt-minnesota

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Diagnostic Updates – Oaks and Oak Wilt

	Positve	Negative	Total
Red Oak	9	9	18
White oak	1	5	6
Oak (Species not indicated)	0	5	5
Total	10	19	29

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The Right Sample for Testing

- Choose branches that are 1-2 inches in diameter and show signs of wilting or discoloration. 6-8 inches long
- Ensure these sections include both symptomatic and healthy-looking tissue
- Sterilize cutting tools with a bleach solution or alcohol between
- Place the branches in a plastic bag.
- Keep them cool!

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Diagnostic Updates – Phytoplasma

- Obligate parasite
- Phloem limited
- Non-culturable
- Cause disease in >200 plant species
- Transmitted by phloem feeding insects, grafting and dodder
    - Leafhopper
    - Planthopper
    - Psyllids

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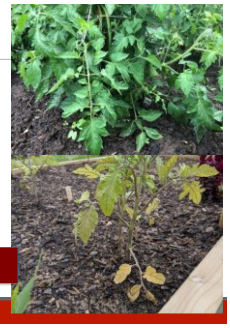
Diagnosing abiotic disorders

Observe symptoms

Look for patterns

Examine growing conditions

Eliminate pathogens as cause



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Diagnostic Updates – Herbicide Damage

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Diagnostic Updates – Herbicide Damage

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Diagnostic Updates – How are the Boxwoods?

50 sample in 2024 vs130 in 2023

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The Pests

Mites damage

Psyllid damage

Leafminer damage

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Volutella Blight and Stem Canker (*Volutella buxii*)

In the spring, leaves turn red, then bronze and finally yellow

- Infected branches die back.
- Loose bark and girdling
- Discoloration of the wood.
- Salmon pink fruiting bodies

- Remove fallen leaves and diseased leaves and diseased branches
- Thin the canopy to improve the light penetration and air circulation
- Sanitation of the tools
- Fungicide applications

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Was it the Perfect Storm in 2023?

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Digital Diagnostics – Plant Diseases & Disorders

Tell us the story:
Surroundings / **neighboring plants**
Whole plant
Close ups of the symptoms and eventual pests
Take as many pictures as you can

https://ppdc.osu.edu/digital-samples

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Arthropod ID

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Arthropod - Physical samples

Soft-bodied – 70% ethanol does not always work
Can ship alive – caterpillars
collect several specimens

Hard-bodied - 70% ethanol
In a sealed plastic bag/container

Mailing – crushed proof package

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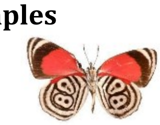
Arthropod - Physical samples



Fragile insects – In a crush-proof box

Hard to see – Collect to a container in 70% ethanol, clear sticky tape, sticky traps.

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Digital Diagnostics - Arthropod




- Include as many photos as possible
  - from different angles
- Clear, well-focused photos
  - Choose the right light (flash not ideal)
- Area where it was seen
  - plant damage
  - distribution of symptoms

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Contact and Information

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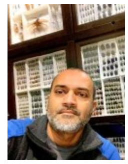

Feedback Please!

Website and email :
ppdc.osu.edu
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