Winnebago County PHA Training

The Science (and Art) of Plant Disease Diagnosis

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Plant Disease Diagnosis
The Disease Triangle

Susceptible Host
Pathogen
Favorable Environment

No Disease
No Disease
No Disease
No Disease
No Disease
No Disease

Plant Disease Diagnosis
“Easy Money Diseases”

Powdery Mildew
Golden Canker
Cedar-Apple Rust
Black Knot

Plant Disease Diagnosis
“The Rest . . .”

Sample
Diagnosis

Plant Disease Diagnosis
The Disease Triangle

Susceptible Host
Pathogen
Favorable Environment

No Disease
No Disease
No Disease
No Disease
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Plant Disease Diagnosis
Susceptible Host

Colorado Blue Spruce
Cytospora Canker
Spruce Needle Drop
Rhizosphaera Needle Cast
Plant Disease Diagnosis

Susceptible Host

Varietal Differences

Plant Disease Diagnosis

The Disease Triangle

Susceptible Host

Pathogen

Favorable Environment

No Disease

No Disease

No Disease

No Disease

No Disease

No Disease

Plant Disease Diagnosis

Symptoms

Necrotic Symptoms

Plant Disease Diagnosis

Symptoms

Necrotic Symptoms

Discolorations

Plant Disease Diagnosis

Symptoms

Necrotic Symptoms

Plant Disease Diagnosis

Symptoms

Discolorations
Plant Disease Diagnosis

Symptoms

Discolorations

Overgrowth Symptoms

Undergrowth Symptoms

Wilt Symptoms
Plant Disease Diagnosis
Symptoms
Spatial Patterns

Plant Disease Diagnosis
Symptoms
Temporal Patterns

Plant Disease Diagnosis
The Disease Triangle
Susceptible Host
Favorable Environment
Pathogen

Plant Disease Diagnosis
Pathogens
Macroscopic Examination

Plant Disease Diagnosis
Pathogens
Microscopic Examination

Plant Disease Diagnosis
Pathogens
Microscopic Examination
Plant Disease Diagnosis
Pathogens

Microscopic Examination

Incubations and Isolations

Serological Techniques

DNA-Based Techniques

Bioassays
Plant Disease Diagnosis
The Disease Triangle

Favorable Environment

• Collect information on weather
  – Rainfall vs. drought
  – Driving vs. gentle rain
  – Humidity
  – Hail
  – High winds
  – Hot vs. cold temperatures

Susceptible Host

Pathogen

No Disease

No Disease

No Disease

No Disease

No Disease

Disease

No Disease

Disease

No Disease

No Disease

No Disease

No Disease

No Disease

Disease

Favorable Environment

Plant Disease Diagnosis
Favorable Environment

• Collect information on weather
  – Snow cover
  – Ice sheets
  – Freezing and thawing
  – Fall/winter transitions

• Collect information on soils
  – Clay vs. sandy
  – Well vs. poorly drained
  – Flat vs. sloped
  – Fertility and pH

Plant Disease Diagnosis
Favorable Environment

• Collect information on chemical sources
  – Fertilizer applications
  – Pesticide applications
  – Air pollutant point sources
  – Heating systems

Putting It All Together

Drought

Diplodia Tip Blight
Plant Disease Diagnosis
Putting It All Together

Koch’s Postulates
• Link a pathogen with symptoms on a given host
• Isolate the pathogen in pure culture
• Inoculate plants and reproduce symptoms
• Re-isolate the pathogen from inoculated plants

Plant Disease Diagnosis
New Diseases

Plant Disease Diagnosis
Abiotic Disorders
Chlorosis  Imprelis Injury  Salt Damage
Blossom End Rot  2,4-D Injury  Urine Damage

Plant Disease Diagnosis
Abiotic Disorders
Cold Injury  Drought Stress
Heat Injury  Winter Injury  Improper Planting

Plant Disease Diagnosis
Non-Diseases
Maple Eyespot Gall  Stink Horns
Broad Mite Injury  Slime Mold

Plant Disease Diagnosis
Where to Go for Help

Plant Disease Diagnostics Clinic
Department of Plant Pathology
University of Wisconsin-Madison
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