2024 PDDC Plant Disease Talks

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

Plant Disease Diagnosis

“Easy Money Diseases”

Powdery Mildew
Black Knot
Golden Canker
Tar Spot
Elderberry Rust
Cedar-Apple Rust

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

No Disease

Plant Disease Diagnosis

Susceptible Host

Colorado Blue Spruce

Cytospora Canker
Spruce Needle Drop
Rhizosphaera Needle Cast
Plant Disease Diagnosis
Susceptible Host

Varetal Differences

Plant Disease Diagnosis
The Disease Triangle

Susceptible Host
Pathogen
Favorable Environment

Plant Disease Diagnosis
Symptoms

Necrotic 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
Pathogen
Favorable Environment

Plant Disease Diagnosis
Pathogens
Macroscopic Examination

Plant Disease Diagnosis
Pathogens
Microscopic Examination
Plant Disease Diagnosis

The Disease Triangle

Susceptible Host

Pathogen

Favorable Environment

Plant Disease Diagnosis

Favorable Environment

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

Plant Disease Diagnosis

Favorable Environment

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

Plant Disease Diagnosis

Favorable Environment

• 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

Plant Disease Diagnosis

Putting It All Together

Late Blight

Drought

+ Late Blight

++

Heating systems
**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**

**Abiotic Disorders**

- Chlorosis
- Imprelis Injury
- Salt Damage
- Blossom End Rot
- 2,4-D Injury
- Urine Damage
- Cold Injury
- Drought Stress
- Heat Injury
- Winter Injury
- Improper Planting

**Non-Diseases**

- Maple Eyespot Gall
- Stink Horns
- Broad Mite Injury
- Slime Mold

**Where to Go for Help**

Plant Disease Diagnostics Clinic
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