

Advanced Master Gardener Training

The Science (and Art) of Plant Disease Diagnosis

Brian D. Hudelson

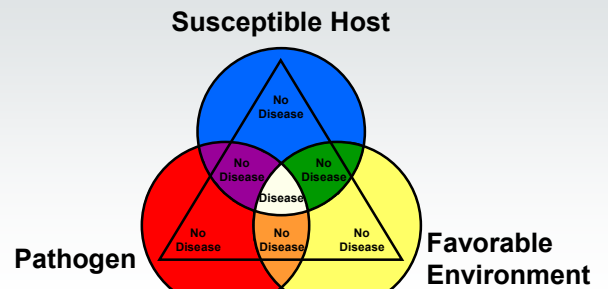
Department of Plant Pathology

University of Wisconsin-Madison/Extension



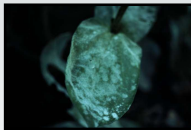
1

Plant Disease Diagnosis The Disease Triangle

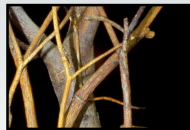


2

Plant Disease Diagnosis “Easy Money Diseases”



Powdery Mildew



Golden Canker



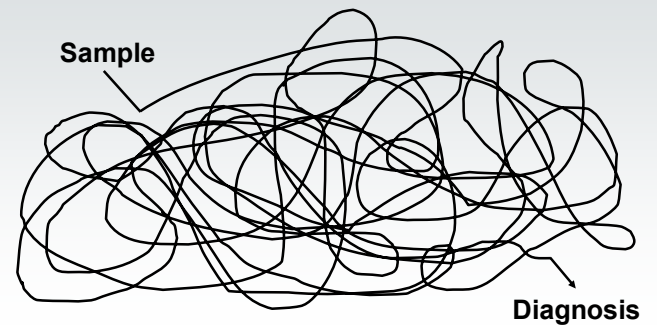
Cedar-Apple Rust



Black Knot

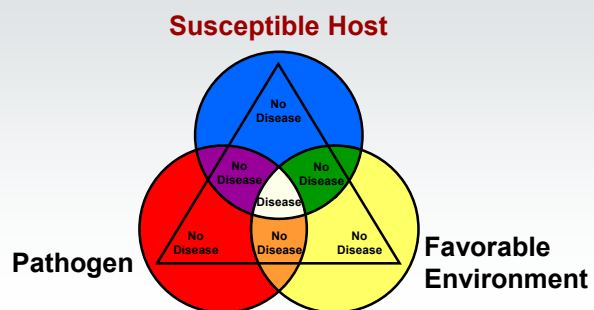
3

Plant Disease Diagnosis “The Rest . . .”



4

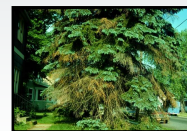
Plant Disease Diagnosis The Disease Triangle



5

Plant Disease Diagnosis Susceptible Host

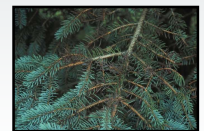
Colorado Blue Spruce



Cytospora Canker



Spruce Needle Drop



Rhizosphaera Needle Cast

6

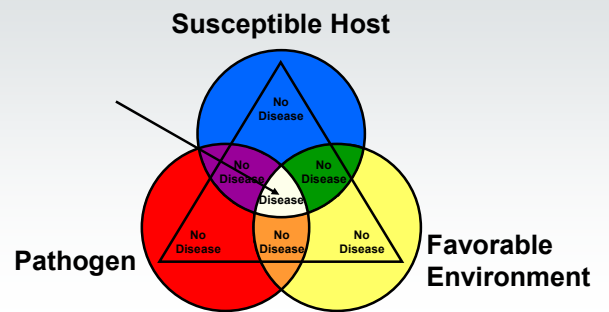
Plant Disease Diagnosis Susceptible Host

Varietal Differences



7

Plant Disease Diagnosis The Disease Triangle



8

Plant Disease Diagnosis Symptoms

Necrotic Symptoms



9

Plant Disease Diagnosis Symptoms

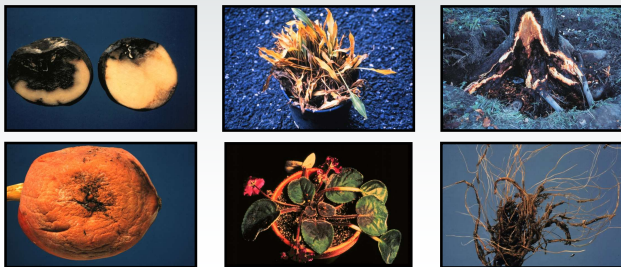
Necrotic Symptoms



10

Plant Disease Diagnosis Symptoms

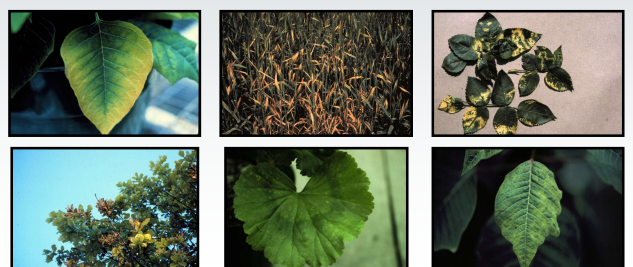
Necrotic Symptoms



11

Plant Disease Diagnosis Symptoms

Discolorations



12

Plant Disease Diagnosis Symptoms

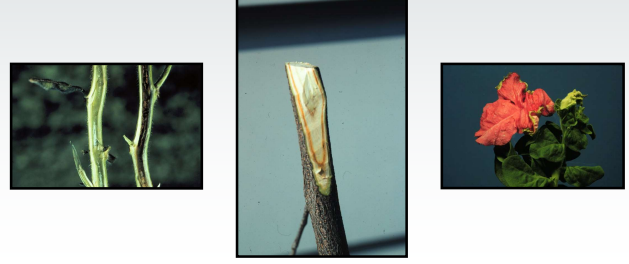
Discolorations



13

Plant Disease Diagnosis Symptoms

Discolorations



14

Plant Disease Diagnosis Symptoms

Overgrowth Symptoms



15

Plant Disease Diagnosis Symptoms

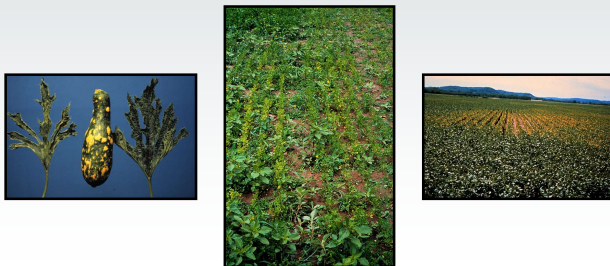
Overgrowth Symptoms



16

Plant Disease Diagnosis Symptoms

Undergrowth Symptoms



17

Plant Disease Diagnosis Symptoms

Wilt Symptoms



18

Plant Disease Diagnosis Symptoms

Spatial Patterns



19

Plant Disease Diagnosis Symptoms

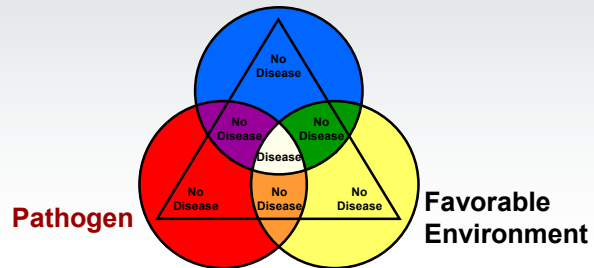
Temporal Patterns



20

Plant Disease Diagnosis The Disease Triangle

Susceptible Host



21

Plant Disease Diagnosis Pathogens

Macroscopic Examination



22

Plant Disease Diagnosis Pathogens

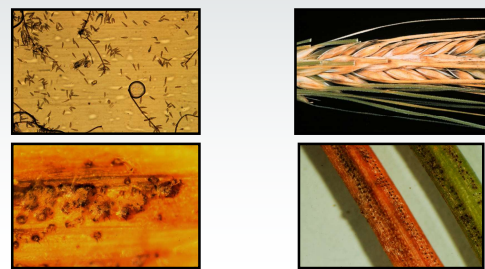
Microscopic Examination



23

Plant Disease Diagnosis Pathogens

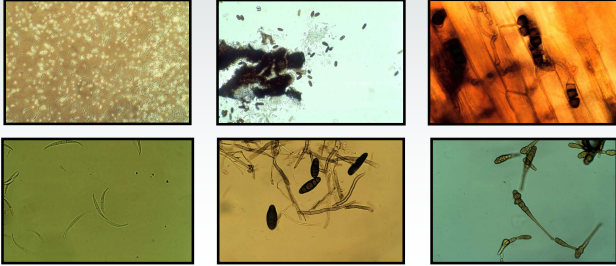
Microscopic Examination



24

Plant Disease Diagnosis Pathogens

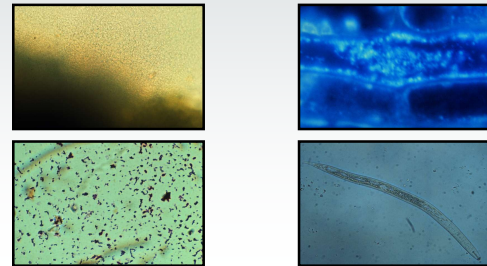
Microscopic Examination



25

Plant Disease Diagnosis Pathogens

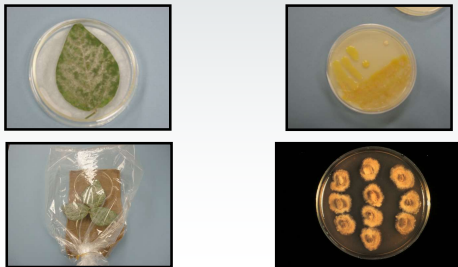
Microscopic Examination



26

Plant Disease Diagnosis Pathogens

Incubations and Isolations



27

Plant Disease Diagnosis Pathogens

Bioassays



28

Plant Disease Diagnosis Pathogens

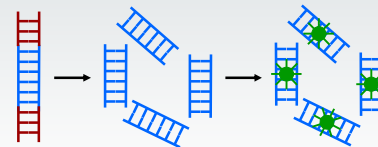
Serological Techniques



29

Plant Disease Diagnosis Pathogens

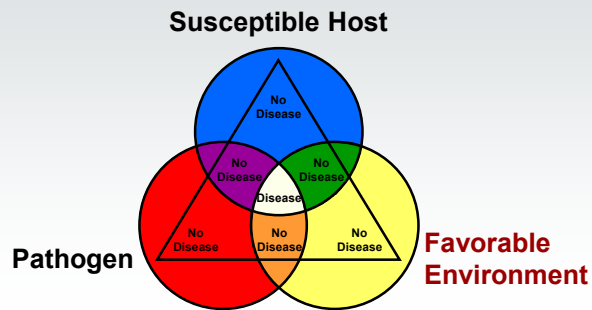
DNA-Based Techniques



```
CCCTCAAGGCCGACGCTTAGCTCGGCCGCAAGCATACGACTCGGTGCAATGAGCATAGGTTCCAAGCATAGAAGCCCTAGGCG
CAATGTCTGGTGTGATCGTGCCTGGGGGGAGGATAAATGAGTAACCTGCAGTACTGCAACATTTTCTCGTCCGAAATCAACACTT
ATCTTCTCCATTCTGTGAACCTGTTAATAGATATGGAACCTGGGCTACTATACAGCTACCGGAGTTTCTTACGCGGGCGCATAGAGT
CGGCCCATAGATGAAGTGGGGTAGCAGTCCGCTTAGTGCCGTATAGAATGTCACGTCAGGACGATATCGTCCAACTCGAA
CTGCCGCTTTGATGGGTCCGGAATAATAAGTCCGGGGTCCATGTACGCCAATTCTGGTATCAATATAGATCACAGTTCTTCCCTAACG
GTGTGCTGTACAGTCCATGCAATAAACGGTCCATCCCATAGTTTCTGGCTTGAACAGATTGGGCATTGCGACTATCAATGTCTCAT
TTAGCAGCAGTTGAGAGCGCAGCTCATGGAATTTCCAGCCTAGCAAGCATCGGAATTGTATGCACGCAAACTATGCCGTAAGCTA
```

30

Plant Disease Diagnosis The Disease Triangle



31

Plant Disease Diagnosis Favorable Environment

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

32

Plant Disease Diagnosis Favorable Environment

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

33

Plant Disease Diagnosis Favorable Environment

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

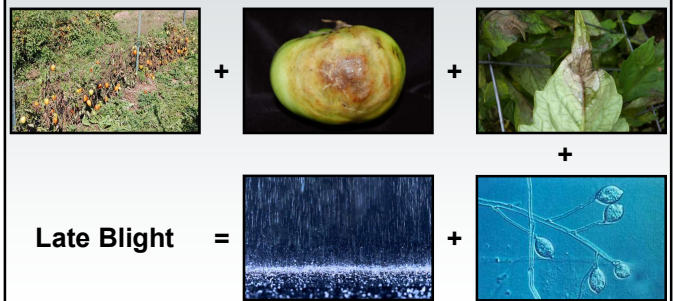
34

Plant Disease Diagnosis Favorable Environment

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

35

Plant Disease Diagnosis Putting It All Together



36

Plant Disease Diagnosis Putting It All Together



37

Plant Disease Diagnosis New Diseases



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

38

Plant Disease Diagnosis Abiotic Disorders



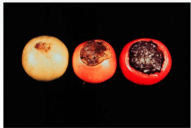
Chlorosis



Imprecis Injury



Salt Damage



Blossom End Rot



2,4-D Injury



Urine Damage

39

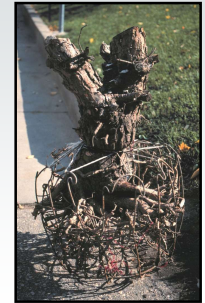
Plant Disease Diagnosis Abiotic Disorders



Cold Injury



Drought Stress



Improper Planting



Heat Injury



Winter Injury

40

Plant Disease Diagnosis Non-Diseases



Maple Eyespot Gall



Stink Horns



Broad Mite Injury



Slime Mold

41

Plant Disease Diagnosis Where to Go for Help

Plant Disease Diagnostics Clinic
Department of Plant Pathology
University of Wisconsin-Madison
1630 Linden Drive
Madison, WI 53706-1598
(608) 262-2863
pddc@wisc.edu
<https://pddc.wisc.edu>
Follow on Facebook and Twitter @UWPDDC

42