DISEASE IDENTIFICATION, DIAGNOSIS, AND MANAGEMENT
WORDS TO KNOW

- **Pathogen:** Disease-producing organism or biotic agent.
- **Sign:** Indication of disease from direct observation of a pathogen or its parts.
- **Symptom:** Indication of disease by reaction of the host, e.g., canker, leaf spot, wilt.
RESOURCES:

- Insects and Disease of Woody Plants.
- IPM Books.
  - Weeds
  - Insects
  - Disease
- Insect Management Recommendations for Turf and Ornamentals.
DISEASE VS. INJURY

Disease

- Process that develops over time.
- Non-random event.
- Infectious.

Injury

- Event suddenly occurs.
- Random event.
- Not infectious.
DISEASE TRIANGLE

- Susceptible Host
- Disease
- Conducive Environment
- Pathogen
WHAT IS DISEASE?

• Alteration of normal physiological and biological development of a plant that results in abnormal morphological and physiological changes. (Symptoms)

• Alteration results in reduced biomass and/or reproductive output of the plant = reduced yield.
CAUSES OF DISEASE

• Biotic
  • Infectious and transmissible.

• Abiotic
  • Non infectious, non-transmissible.
BIOTIC CAUSES OF DISEASE

- Fungi
- Bacteria
- Virus
- Viroids
- Nematodes
- Parasitic Plants
ABIOTIC CAUSES OF DISEASE

- Temperature.
  - High, low, sudden change.
- Water.
  - Over or under (soil related).
- Soil pH.
- Nutrient deficiencies/imbalance.
- Air pollutants.
- Herbicides!
SYMPTOMS OF PLANT DISEASE

- Color Change.
- Death of tissue.
- Abnormal growth. +/-
- Wilting.
- Defoliation/fruit drop.
- Replacement of plant tissue.
TYPES OF DISEASE

- Canker
- Gall
- Rots
- Decay
- Leaf curl
- Wilts
- Mosaics
- Yellows
- Downy Mildew
- Powdery Mildew
- Rust
- Smuts
Most important group of plant pathogen.
~ 100,000 species of plant pathogens.
~ 8,000 plant pathogens!
Over 70% of all plant disease are caused by Fungi.
PATHOGEN: FUNGI

- Composed of filaments, called **hyphae**, which grow to form webs (**mycelium**) as they seek nutrients from their host.
- Contain cell wall made of chitin.
- Reproductive cells called spores.
- Reproduce sexually and asexually.
- Eukaryotic.
PATHOGEN: FUNGI

Signs:

- Fruiting bodies.
  - Reproductive structure of fungi
    - Rust
    - Pycnidia
    - Smut
  - Mildew.
- Conks.
PATHOGEN: FUNGI

Symptoms:
- Tend to be circular spots.
- Wilt.
- Root rots.
- Powdery/Downy Mildews.
- Rusts.
- Smuts.
**PATHOGEN: FUNGI**

Management:

- Cultural.
  - Increase air circulation.
  - Eliminate water on tissue.
  - Fungicides (Preventative, not curative).
  - Elimination of infected plant parts.
PATHOGEN: BACTERIA

- Microscopic.
- Unicellular prokaryotes.
- Slime layer or capsule. (EPS)
- Motile; often have flagella.
PATHOGEN: BACTERIA

Signs:

• Ooze. (Caused by EPS.)
• Bacterial streaming.
Symptoms:
- Angular leaf spots.
- Yellow halo around dying cells.
- Water soaking.
- Soft Rots (associated with odor).
- Witches broom.
- Also causes similar symptoms as fungus: Canker, gall, vascular wilt, necrosis, yellows, scorch.
PATHOGEN: BACTERIA

Management:
• Difficult and complex!
• Disease resistance to antibiotics?
• Use plant materials resistant to pathogens.
• Crop rotation.
• Eradication/exclusion.
Submicroscopic, intracellular, obligate parasite consisting of a core of infectious nucleic acid (either RNA or DNA) usually surrounded by a protein coat.
PATHOGEN: VIRUS/VIROIDS

Signs:
Inclusion bodies.
PATHOGEN: VIRUS/VIROIDS

Symptoms:
- Lesions
- Stunting
- Dwarfing
- Chlorosis
- Yellows
- Leaf rolling
- Tumors
- Mosaics/Mottles
- Ring banding
- Flower break
- Necrosis
THE DIAGNOSTIC PROCESS

Diagnosis
Step 1. Identify the plant.
Step 2. Identify the problem(s).

Management
Step 3. Evaluate if management efforts are warranted.
Step 4. Evaluate what management options are effective.
THE DIAGNOSTIC PROCESS

Step 1: Identify the Plant!
 Thousands of insects and diseases occur, only a few attack any plant species.
THE DIAGNOSTIC PROCESS

Step 2: Identify the pathogen.

a. **LOOK** – Define the problem by describing signs and symptoms.

b. **READ** – Refer to reference materials describing similar signs and symptoms.

c. **COMPARE** – Determine probable cause(s) through comparison and elimination.
Multiple problems have similar symptoms!

Treatment without correct diagnosis is malpractice!

Ask what is normal, abnormal.

Systematically evaluate the plant:

- Describe symptoms, signs, part affected.
Management

Step 3. Evaluate if management efforts are warranted.

Step 4. Evaluate what management options are effective.
**THE DIAGNOSTIC PROCESS**

**Management**

- What type of damage is being caused?
- Under what situations would management efforts be warranted?
- Are management efforts warranted for this situation?
THE DIAGNOSTIC PROCESS

Step 4.
What management options are effective?

• Cultural.
• Mechanical.
• Chemical.
QUESTIONS?