

DISEASE IDENTIFICATION, DIAGNOSIS, AND MANAGEMENT



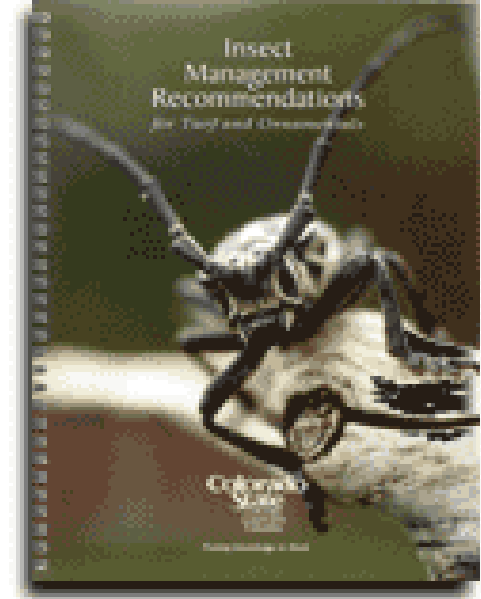
WORDS TO KNOW

- **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.



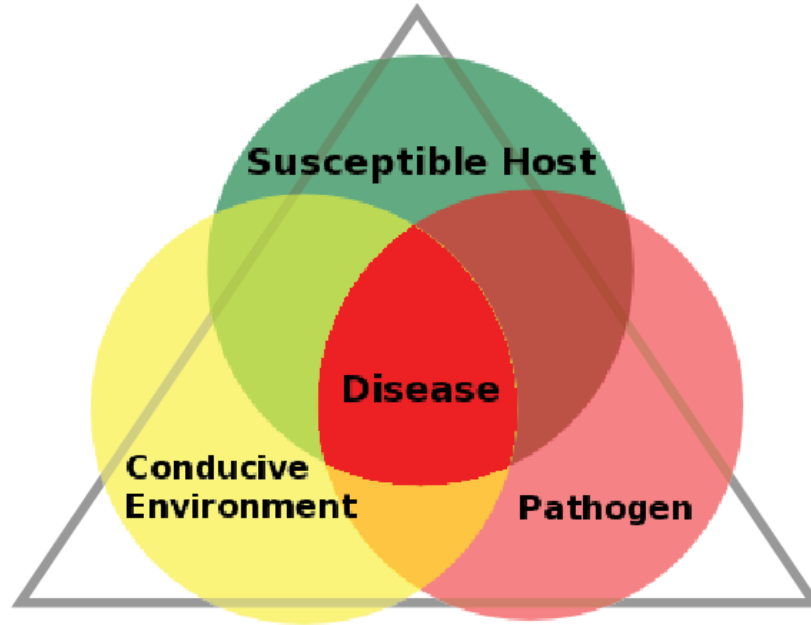
DISEASE VS. INJURY

Disease

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



DISEASE TRIANGLE



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.



Wilt. Source www.apsnet.org



CAUSES OF DISEASE

- **Biotic**
 - Infectious and transmissible.
- **Abiotic**
 - Non infectious, non-transmissible.



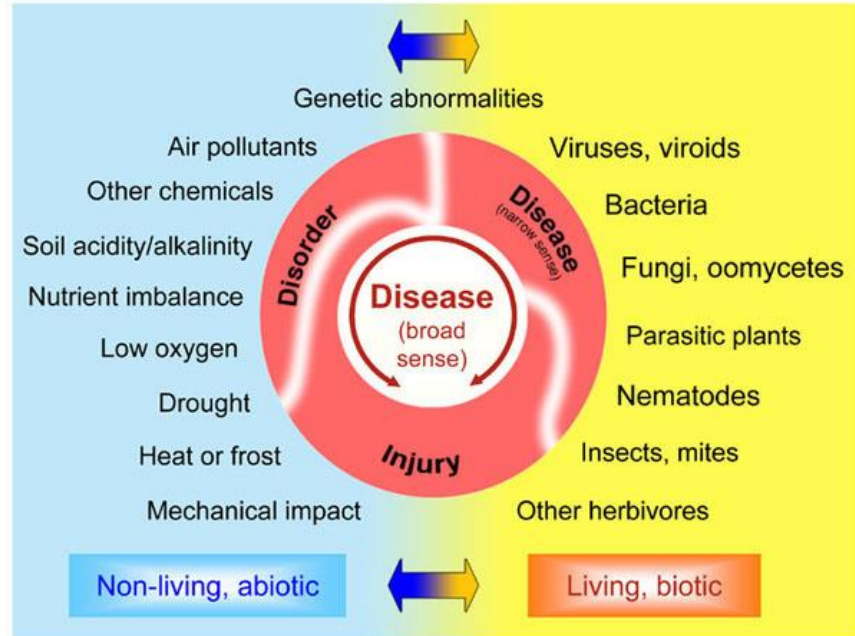
BIOTIC CAUSES OF DISEASE

- 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

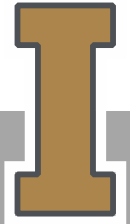
Yellows

Downy Mildew

Powdery Mildew

Rust

Smuts



PATHOGEN: FUNGI

- 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:

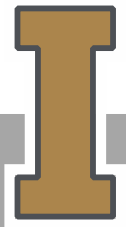
- Fruiting bodies.
 - Reproductive structure of fungi
 - Rust
 - Pycnidia
 - Smut
- Mildew.
- Conks.



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:

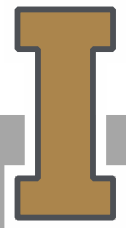
- Ooze. (Caused by EPS.)
- Bacterial streaming.



PATHOGEN: BACTERIA

Symptoms:

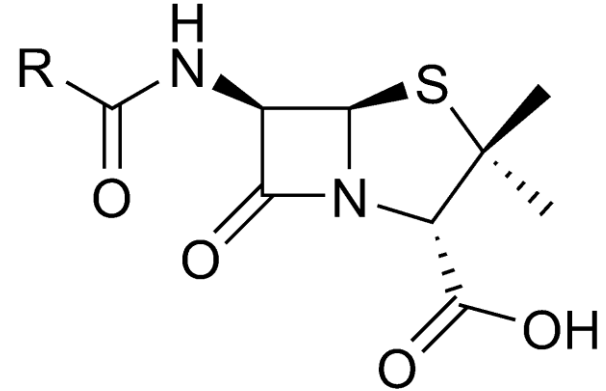
- Angular leaf spots.
- Yellow halo around dying cells.
- Water soaking.
- Soft Rots (associated with odor).
- Witches broom.
- Also causes similar symptoms as fungus: Canker, gall, vascular wilt, necrosis, yellows, scorch.



PATHOGEN: BACTERIA

Management:

- Difficult and complex!
- Disease resistance to antibiotics?
- Use plant materials resistant to pathogens.
- Crop rotation.
- Eradication/exclusion.



PATHOGEN: VIRUS/VIROIDS

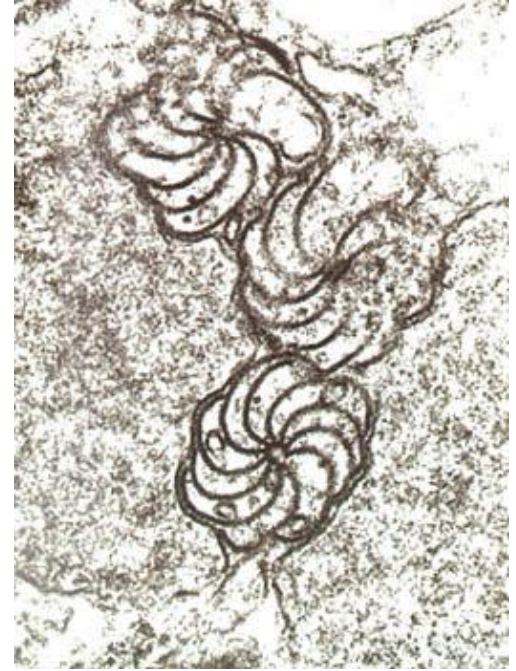
Submicroscopic, intracellular, obligate parasite consisting of a core of infectious nucleic acid (either RNA or DNA) usually surrounded by a protein coat.



PATHOGEN: VIRUS/VIROIDS

Signs:

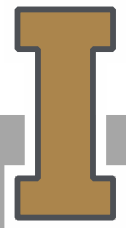
Inclusion bodies.



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.



THE DIAGNOSTIC PROCESS

- 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.



THE DIAGNOSTIC PROCESS

Management

Step 3. Evaluate if management efforts are warranted.

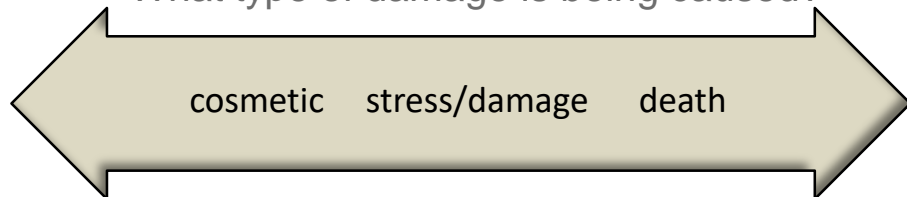
Step 4. Evaluate what management options are effective.



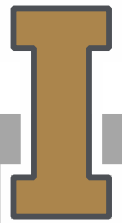
THE DIAGNOSTIC PROCESS

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?

