

# DISEASE IDENTIFICATION, DIAGNOSIS, AND MANAGEMENT



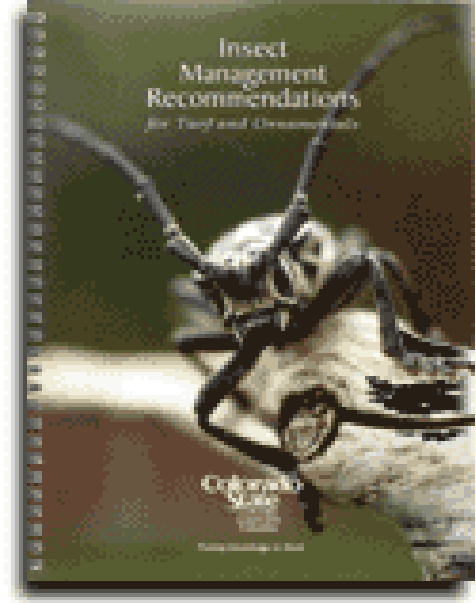
# WORDS TO KNOW

- **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.



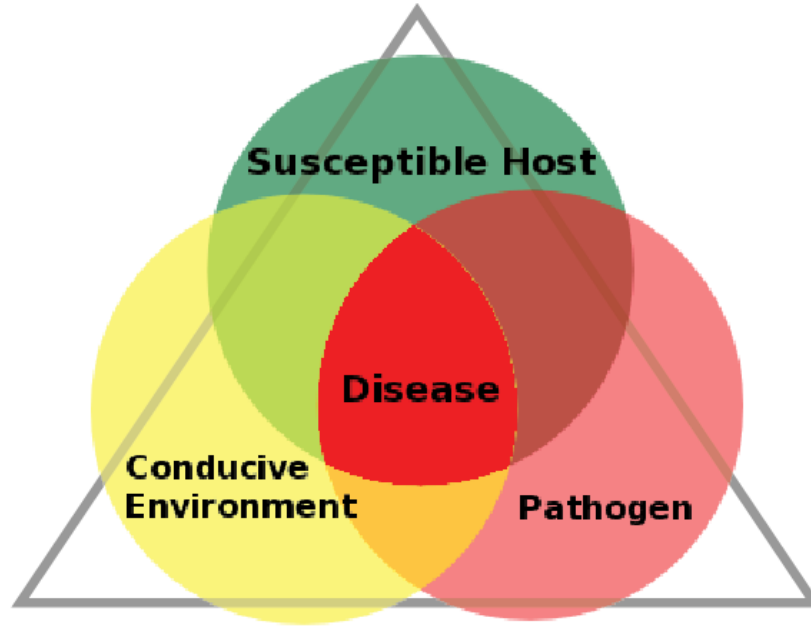
# DISEASE VS. INJURY

## 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](http://www.apsnet.org)



# CAUSES OF DISEASE

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



# BIOTIC CAUSES OF DISEASE

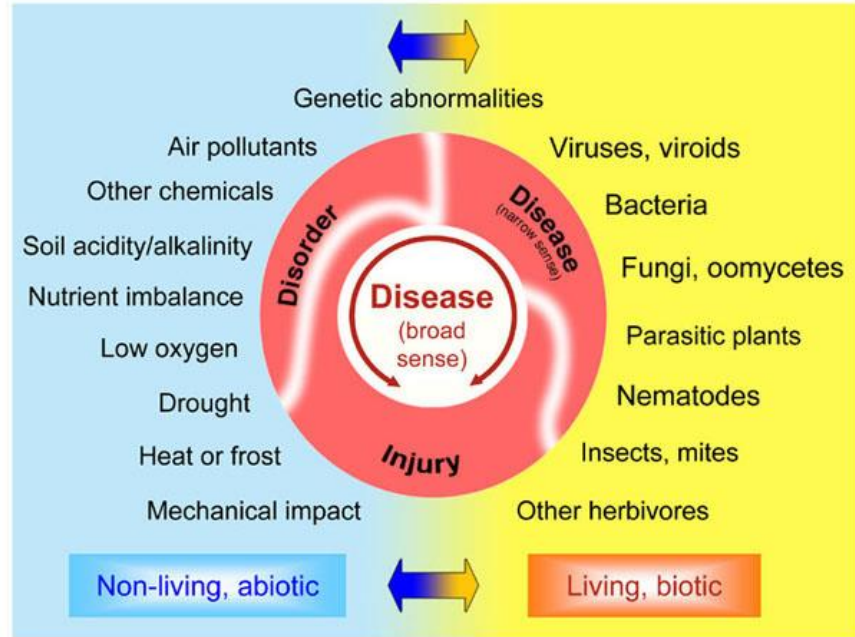
- Fungi
- Bacteria
- Virus
- Viroids
- Nematodes
- Parasitic Plants





# 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



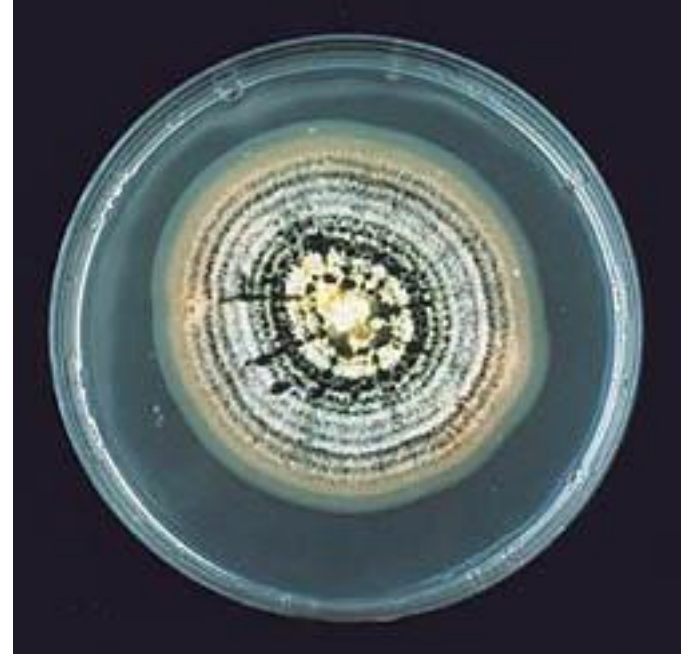
# PATHOGEN: FUNGI

- 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:

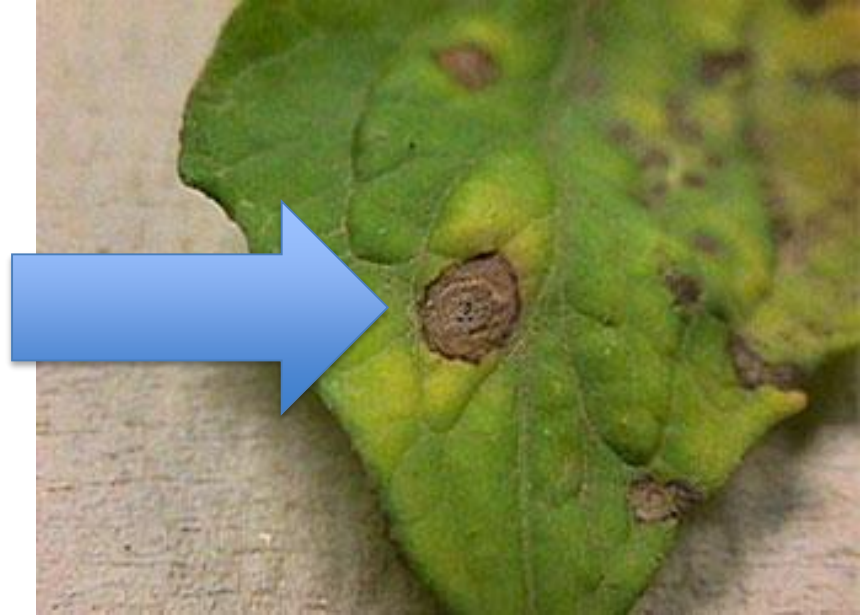
- Fruiting bodies.
  - Reproductive structure of fungi
    - Rust
    - Pycnidia
    - Smut
- Mildew.
- Conks.



# 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:

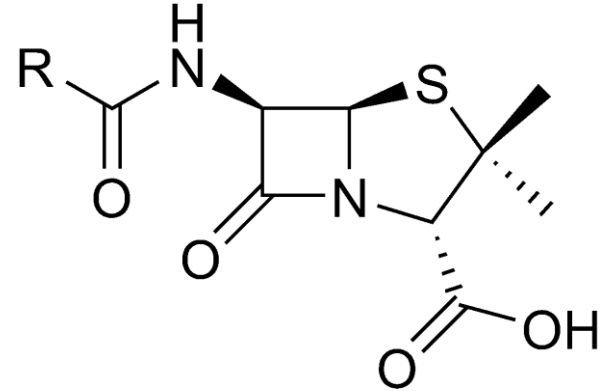
- Angular leaf spots.
- Yellow halo around dying cells.
- Water soaking.
- Soft Rots (associated with odor).
- Witches broom.
- Also causes similar symptoms as fungus: Canker, gall, vascular wilt, necrosis, yellows, scorch.



# 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.

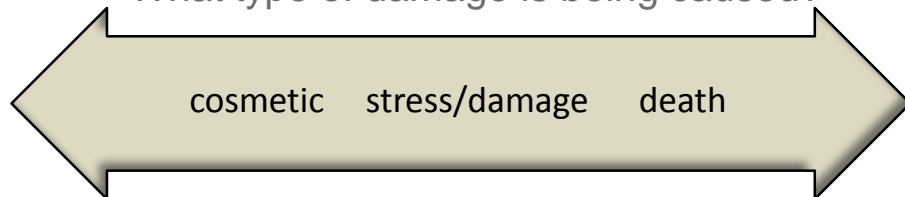
Step 4. Evaluate what management options are effective.



# 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?

