Plant Disease
Introduction

Larry A. Sagers
Utah State University Extension Regional Horticulturist
Plant Pathology Basics

- **Disease**
  - Anything that interferes with normal plant function
Plant Pathology Basics

• Biotic
  – Caused by living organism (pathogen)
Plant Pathology Basics

• Abiotic
  - Caused by non-living factor
Non-Infectious Diseases

- Also known as non parasitic, abiotic or nonpathogenic diseases
Non-Infectious Diseases

- Caused by such things as:
  - Unfavorable weather
  - Mechanical damage
  - Nutrient deficiency
  - Excess salts
  - Chemical toxicity
  - Water excesses or deficiencies
Non-Infectious Diseases

Unfavorable weather
Non-Infectious Diseases

Mechanical damage
Non-Infectious Diseases

Nutrient deficiency
Non-Infectious Diseases

Excess salts
Non-Infectious Diseases

Chemical toxicity
Non-Infectious Diseases

Water excesses or deficiencies
Non-Infectious Diseases

- Most diseases belong to this group
Non-Infectious Diseases

• There are no chemical controls for noninfectious diseases.
Infectious Diseases

• Also known as parasitic, biotic or pathogenic diseases
Infectious Diseases

• Pathogens grow within plant tissue and disrupt function
Infectious Diseases

• May spread to new plants
Infectious Diseases

- Main concern of pesticide users is to reduce spread
- Many diseases have no chemical controls
Infectious Agents in Plants

• Classes of infectious agents
  - Fungi
  - Bacteria
  - Viruses
  - Phytoplasmas
  - Nematodes
  - Parasitic seed plants
Fungi

• Lack chlorophyll
• 100,000 species
• Reproduce by spores
• Saprophytes decompose dead organic matter
• Parasites attack other organisms
Coryneum Blight
Bacteria

- Small one celled organism
- Divide very rapidly
- Causes relatively few tree diseases
- Chemical control requires bactericides
Fireblight on crabapple
Viruses

• Must reproduce in living cells
• Must be transmitted mechanically by insects propagation or handling
• Only visible with electron microscopes
• No practical chemical controls
Virus on Lilac
Phytoplasmas

• Discovered relatively recently
• Diseases previously were thought to be caused by viruses
• Organisms like a bacteria without a cell wall
Western X of Cherry
Nematodes

- Small eel-shaped worms
- Usually problems in warmer areas
- Most feed on roots
- Attack many plants
- Not all nematodes attack plants
Root Knot Nematode Lesions
Parasitic seed plants

- These plants produce seed
- They are vascular plants
- Controls are difficult
- Some contain chlorophyll others do not
- Some are semi parasitic
Dwarf Mistletoe
Mistletoe
Dodder
SIGNS AND SYMPTOMS

• SIGNS
  - Structures of the pathogen that occur in connection with the disease - example: Mildew
Sign of Disease
SIGNS AND SYMPTOMS

• SYMPTOMS
  - Evidence of sickness or injury that shows up in the plant -- dead spots in leaves, rotten spots in fruits, etc.
Symptom of Disease
Disease Development

• Three factors necessary for disease development
  - Susceptible host
  - Presence of pathogen
  - Favorable environmental conditions

• “Disease triangle”
Plant Disease Development

All three factors must exist for disease to occur:

- Pathogen
- Host Plant
- Suitable Environment
Disease Development

• Pathogens must complete their life cycle including
  - Production of offspring
  - Dispersal of offspring
  - Infection of new plants
  - Rest period

• If pathogen life cycle is incomplete, disease is halted
Disease Development

- Pathogens must complete their
- Inoculation
  - Dispersal of offspring
- If pathogen life cycle is incomplete, disease is halted
Disease Development

• Pathogens must complete their
• Incubation
  – Germination and growth
• If pathogen life cycle is incomplete, disease is halted
Disease Development

- Pathogens must complete
- Infection
  - Infection of new plants or getting their water and nutrients from their host plant

If pathogen life cycle is incomplete, disease is halted
Disease Development

• Two basic patterns of disease development
Disease Development

- Some plant diseases spread slowly to new hosts and do not spread widely during a single growing season
  - Fungal spores, nematode cysts, bacteria
Disease Development

- Other diseases are capable of spreading very rapidly in one season
  • Stem and leaf rusts, blights of potato and tomato, other leaf-spot diseases.
Necrotic

- NECROTIC -- degeneration and death:
  - Degeneration symptoms (dying cells)
  - Yellowing (localized, generalized)
  - Water-soaked areas
  - Wilting or flagging
  - Necrotic symptoms (dead cells)
Degeneration symptoms (dying cells)
Yellowing (localized, generalized)
Water-soaked areas
Wilting or flagging
Necrotic symptoms (dead cells)
Scorch or burn (sudden death and browning of large areas)
Streaks and stripes (long, narrow, necrotic lesions along leaf veins)
Blight (foliage or blossoms killed suddenly)
Net necrosis (irregular interlocking necrotic lines)
Blast (blighting or sudden death of young flowers, buds, or fruit)
Die-back (dying back from the tip of branches woody plants)
Spot (circular, dead areas on foliage)
Shot hole (circular holes from dropping out of necrotic tissue)
Pitting (dying of tissue under intact epidermis of fruits and tubers)

- Rot (dead tissue in a more advanced stage of degeneration)
Rot (dead tissue in advanced stage of degeneration)
Mummification (dried, rotted fruits that turns dark and wrinkled)
Canker (sunken necrotic lesions on stems, tubers or roots)
Damping-off (rot at the base of plant stems so the plant falls over)
Leak (soft rot in that juices leak out)
Bleeding (sap flow of from wounds, often with a fermented odor)

- Scald (blanching of the epidermis and adjacent tissues, resulting in a pale or dirty brown color)
Scald (bleaching of the skin to a pale or dirty brown color)
Gummosis (diseased cells which oozes viscid gum)
Resinosis (abnormal exuding of resin)
Impeded Growth

• Symptoms from over- or under-development
Chlorosis (no development of green color as in yellows or mosaics)
Abortion or atrophy (halt in the development of a fruit)
Growth Suppression
(complete prevention of development of organs)
Etiolation (spindly growth)
Dwarfing (rosetting or underdevelopment of plant parts)
Abnormal organs (development of organs usually not present)

- Premature growth (development of shoots from buds that should remain dormant)
Premature growth (growth of buds that should remain dormant)
Tissue transformation
(change of tissues from one kind to another)
Abnormal coloration (unusual colored tissues)
Gigantic growth (tumor, callus, or gall formation)
When to Use Pesticides

• Ask yourself the following
  - Is an infectious disease involved?
  - What's causing the disease?
  - Is a chemical application called for?
  - What kind of chemical should I use?
  - How and when should I apply the chemical?

• Pesticides won’t cure every problem