DIAGNOSIS AND PLANT DISORDERS

IAA ADVANCED PHC TRAINING PROGRAM

General Field Diagnostics

- **Biggest challenge facing arborists is lack of information!**
  - History of the site?
  - Early symptoms?
  - Construction, excavation, chemical treatments?
  - Time factor?

You Have to Think Like a Detective

General Diagnosis

- **Living or biotic plant problems**
  - **Infectious -** can spread from one plant to another
  - Plant pathogens
  - Insects and mites
  - Small and large animals
  - Birds

General Diagnosis

- **Nonliving or abiotic plant problems**
  - **Non-infectious** - does not spread from one plant to another
  - Physical factors (weather)
  - Mechanical factors (wounding of tree)
  - Chemical factors (pesticide drift)
  - Nutrient factors (iron chlorosis)

Steps in Proper Plant Problem Diagnostics

- **Step #1:** Accurately identify the plant
- **Step #2:** Look for patterns of abnormality
  - **Non-uniform damage patterns** are usually caused by living factors
  - **Uniform damage patterns** are usually caused by nonliving factors
- **Step #3:** Carefully examine the site

Sap-Sucker Damage

Steps in Proper Plant Problem Diagnostics

- **Step #4:** Note the color, size, and thickness of the foliage
- **Step #5:** Check the trunk and branches
- **Step #6:** Examine the roots and root collar

Important Points to Remember!!

- A good portion of all plant problems result from adverse cultural and environmental conditions
- Most plant disorders are caused by a complex or combination of nonliving stresses and living contributors
- Be consistent in your field diagnosis and try to follow a set protocol

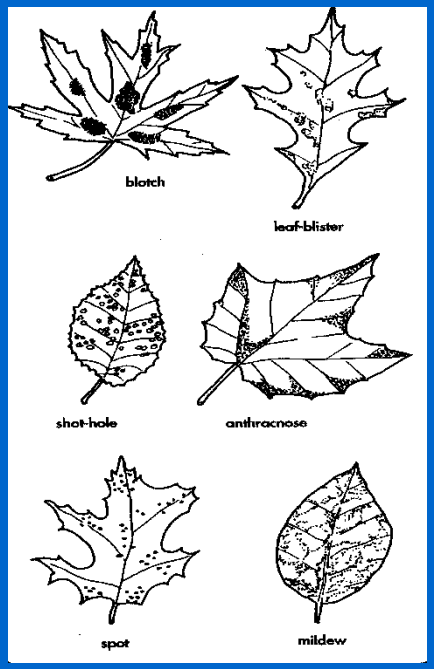
Symptoms

- **Symptom** - the effect a causal agent has on a plant and how that plant respond to the disorder
  - Chlorosis
  - Wilting
  - Leaf scorch
  - Dieback and blights
  - Poor vitality/growth
  - Stunting-distortion
  - Needle-cast of conifers
  - Death

Signs

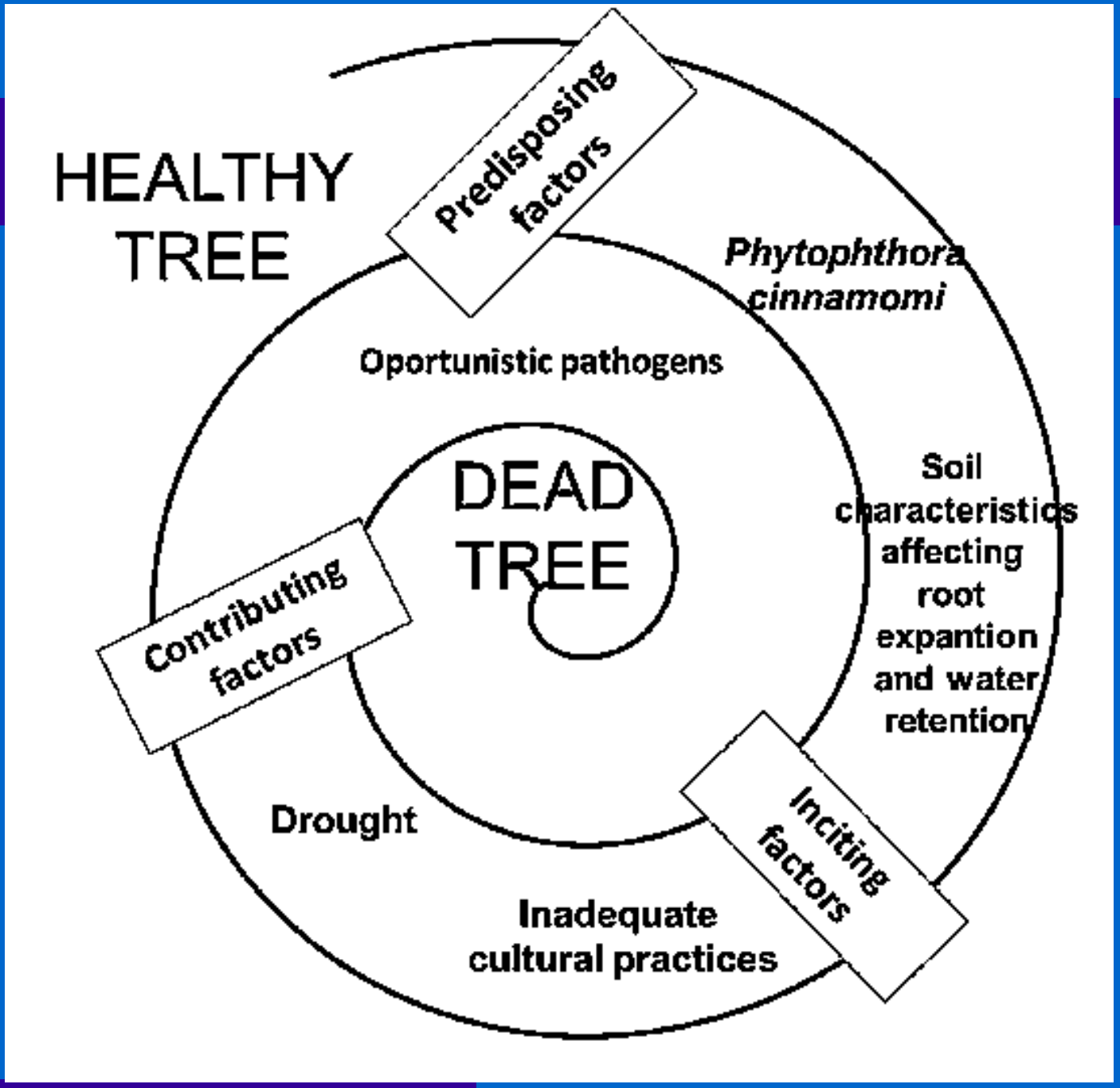
- **Sign** - direct indicators of primary or secondary causal agents or something "left behind" by the agent
  - Conks or fruiting bodies of fungi
  - Spores and cankers
  - Insect frass
  - Emergence holes
  - Insect caste skins
  - Tents/Webs
  - Insect egg masses

Common Woody Plant Problems



Tree Stress Factors

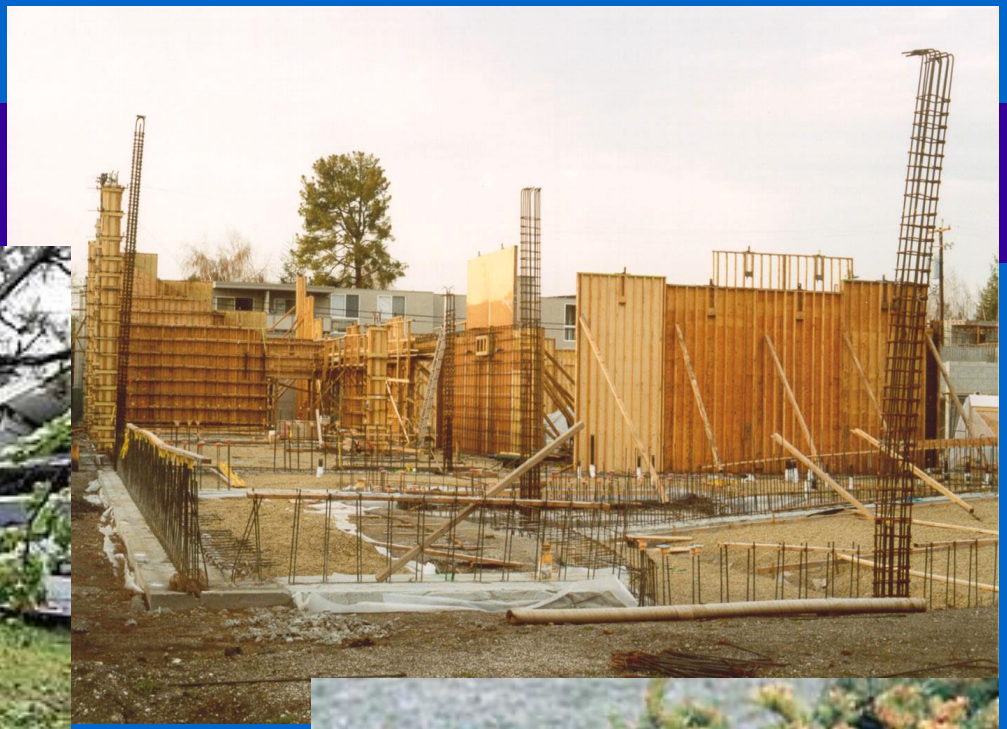
- **Stress** - any condition that causes a decline in tree health
  - **Chronic stress** - long term effects (i.e. nutrient problems, pH, weather)
  - **Acute stress** - sudden and causes immediate damage (i.e. spring frost or freeze, chemical injury)
  - **Stress is not be irreversible, but may be hard to alleviate**


HEALTHY TREE
Predisposing factors
Phytophthora cinnamomi
Oportunistic pathogens
DEAD TREE
Soil characteristics affecting root expantion and water retention
Contributing factors
Drought
Inciting factors
Inadequate cultural practices

Abiotic Plant Disorders

- **Disorders that affect the normal growth and health of a tree**
- **Soil and site problems**
  - Root problems
  - Soil compaction
- **Physical and mechanical injury**
  - Sudden events like storms

- **Long-term physiological disorders**

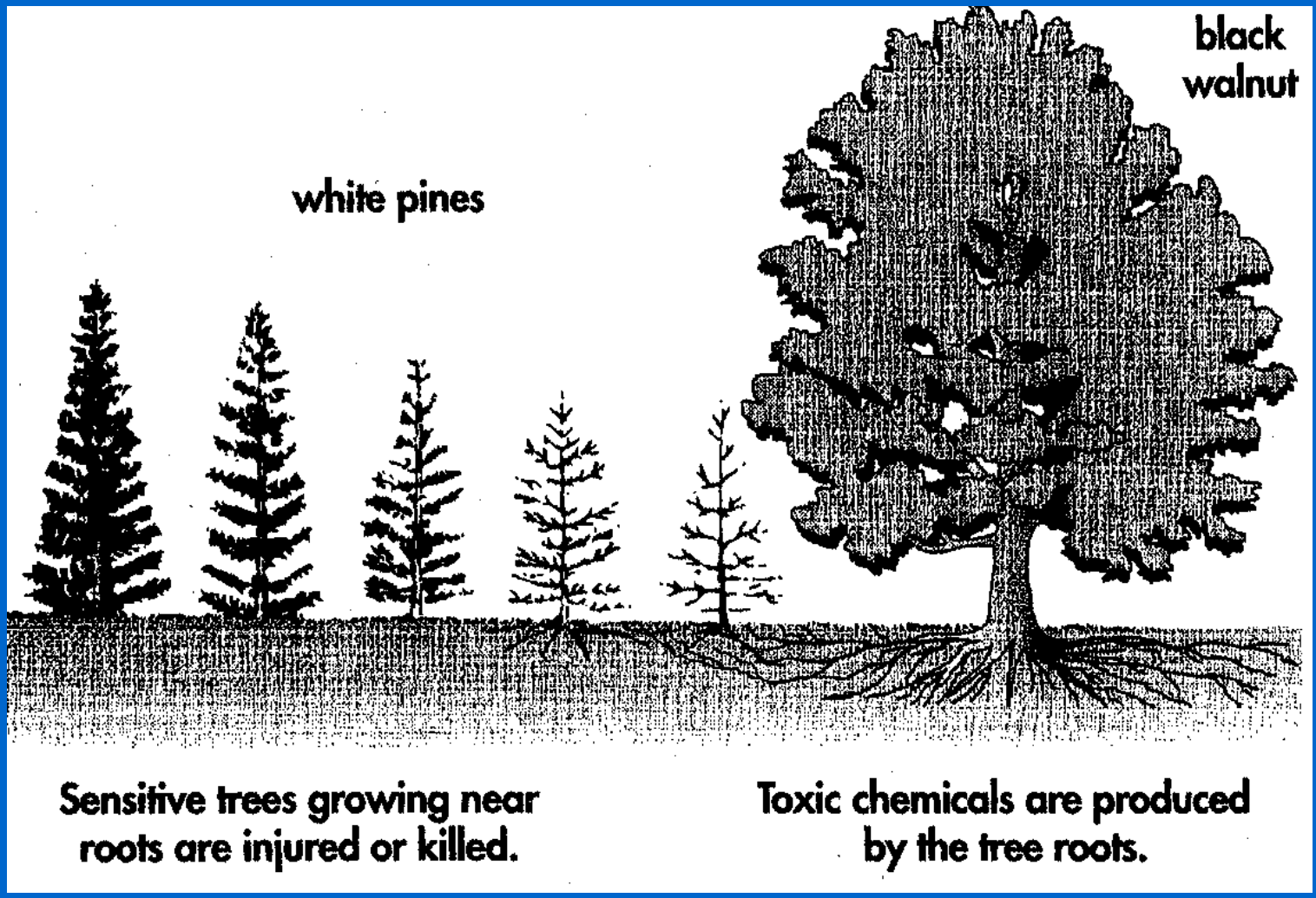


Abiotic Disorders

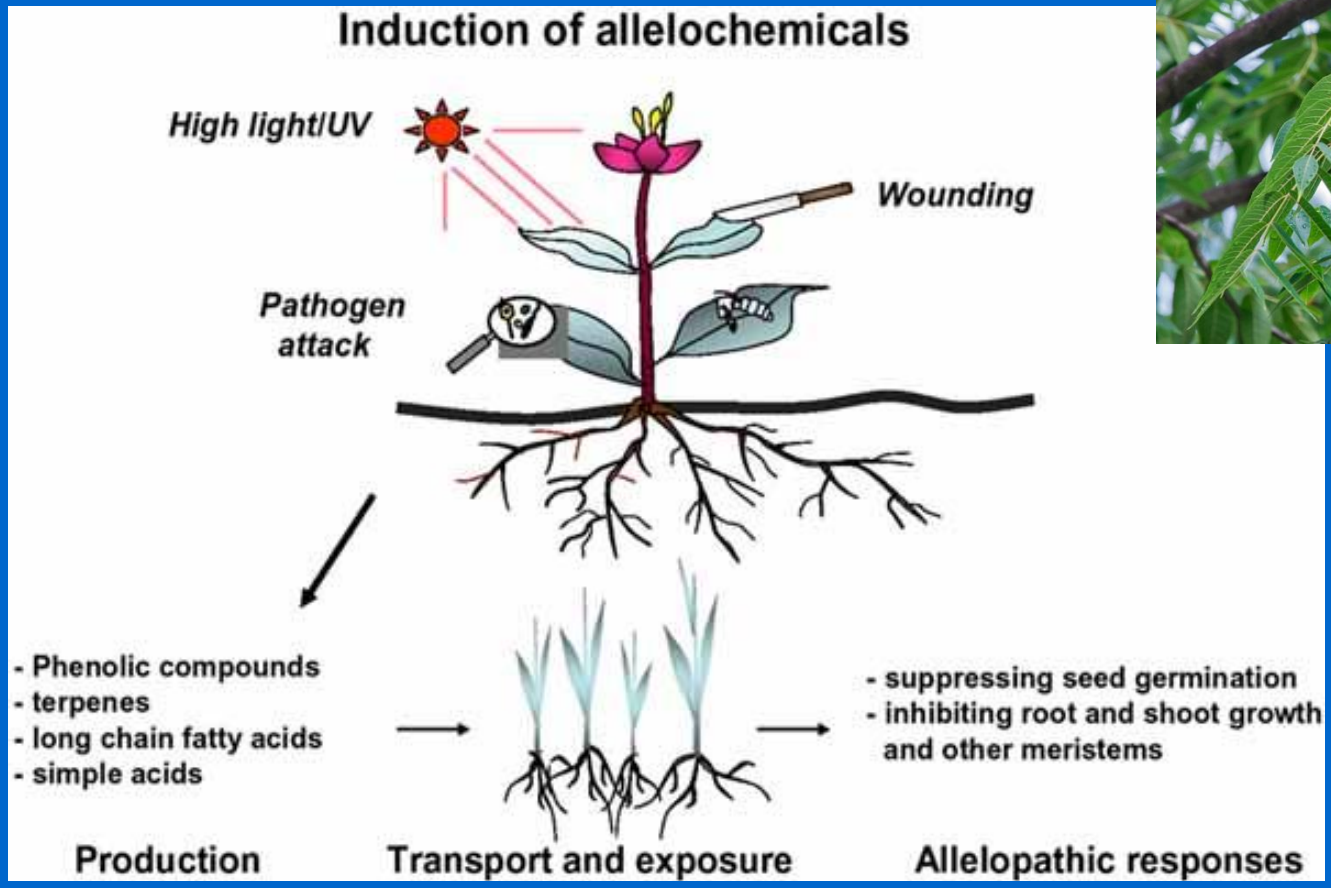
- **Temperature extremes**
  - Drought
  - Scorch
  - Frost cracks and sunscald

- **Competition and allelopathy**
  - **Allelopathy** - chemical inhibition of growth and development of one plant by another (i.e. black walnut, sugar maple, black locust, hackberry, cherry)

Allelopathy



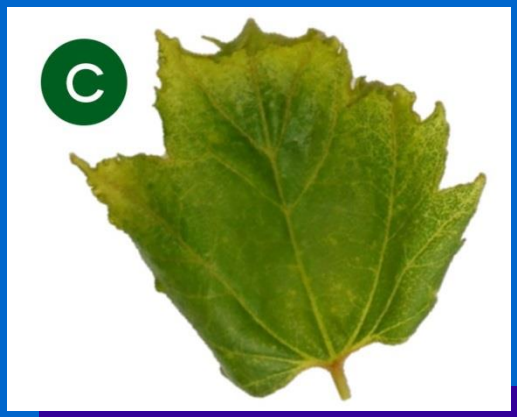
Allelopathy



Abiotic Disorders

- **Pollution damage**
  - **Acute toxicity** - exposure to high concentration over a short period of time
  - **Chronic injury** - longer exposures over time at lower concentrations
  - **Major pollutants** include:
    - Sulfur dioxide
    - Ozone
    - Fluoride
    - PAN (peroxyactyl nitrates)
  - **Chemical injury**
    - Herbicides such as 2,4-D and dicamba

Response of peach (A), pin oak (B), maple (C), elm (D), and grape (E) to dicamba or dicamba + glyphosate resulting from chemical drift



Symptoms Associated with Growth Regulators by Root Uptake

Biotic Disorders: Insects and Mites

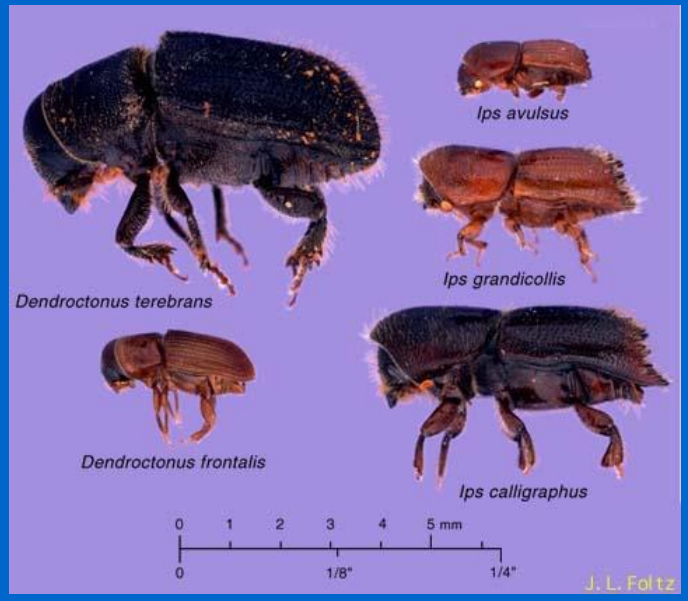
- **Leaf feeding insect pests**
  - "Consumers"
  - Tent and web-makers
  - Skeletonizers
  - Leafminers
  - Knotchers

Biotic Disorders: Insects and Mites

- **Sap-feeding insect pests**
  - Aphids
  - Plantbugs and leafhoppers
  - Scales
  - Mites

Biotic Disorders: Insects and Mites

- **Wood-boring and feeding insects**
  - Clear-wing moth borers
  - Beetle borers
  - Bark Beetles



Biotic Disorders: Insects and Mites

- **Wood-boring and feeding insects**
  - Shoot and stem borers
  - Carpenter ants
  - Termites

Insects as Vectors of Pathogens

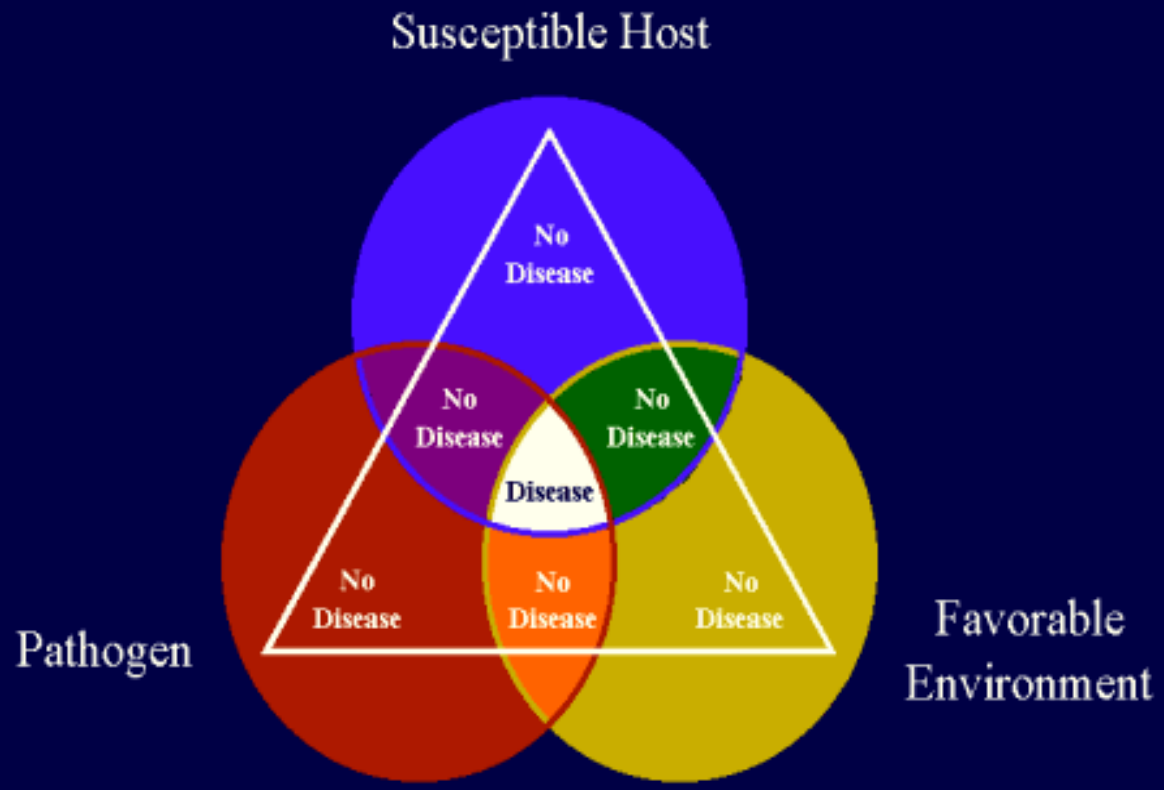
- **Bark beetles**: DED and blue stain fungus
- **Aphids and leafhoppers**: bacteria and viruses
- **Pine sawyer beetle**: pinewood nematode
- **Honey bees**: fireblight

Diseases

- **“The Disease Triangle”**
- Most pathogens are host specific
- Defoliation, wilts, needle casts, galls, death
- **Vast majority of diseases are caused by fungi**
- Bacteria, viruses, and phytoplasma-like-organisms (PLO’s) also cause disease

Plant Diseases

The Disease Triangle



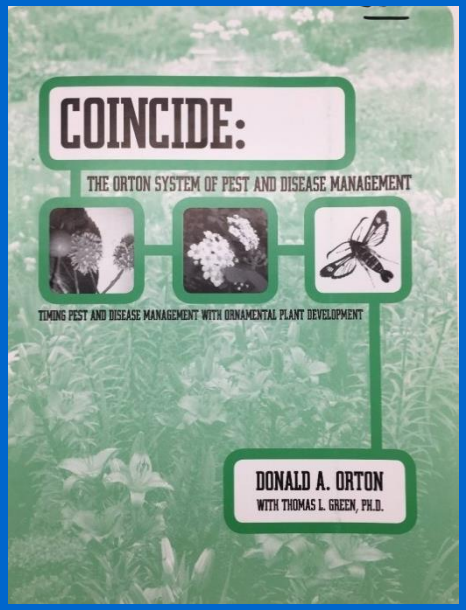
Wildlife and Animal Damage

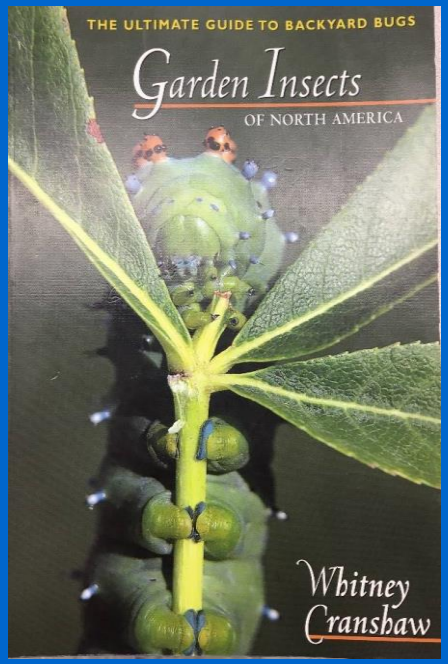
- Slugs
- Small Animals (Rodents)
- Large Animals (Deer, Beaver)
- Birds

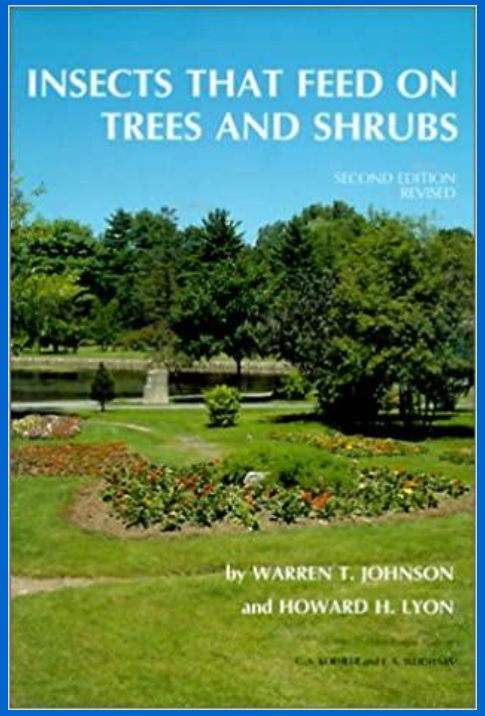
“Pulling it all Together”

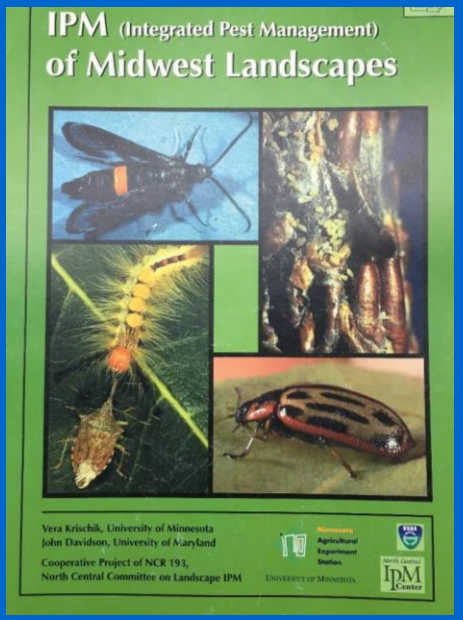
- Use your clues for assistance in identifying the **specific causal agent(s)**
  - Reference books
  - Specialist-entomologist, pathologist, etc.
  - Laboratory results

Suggested References









“Pulling it all Together”

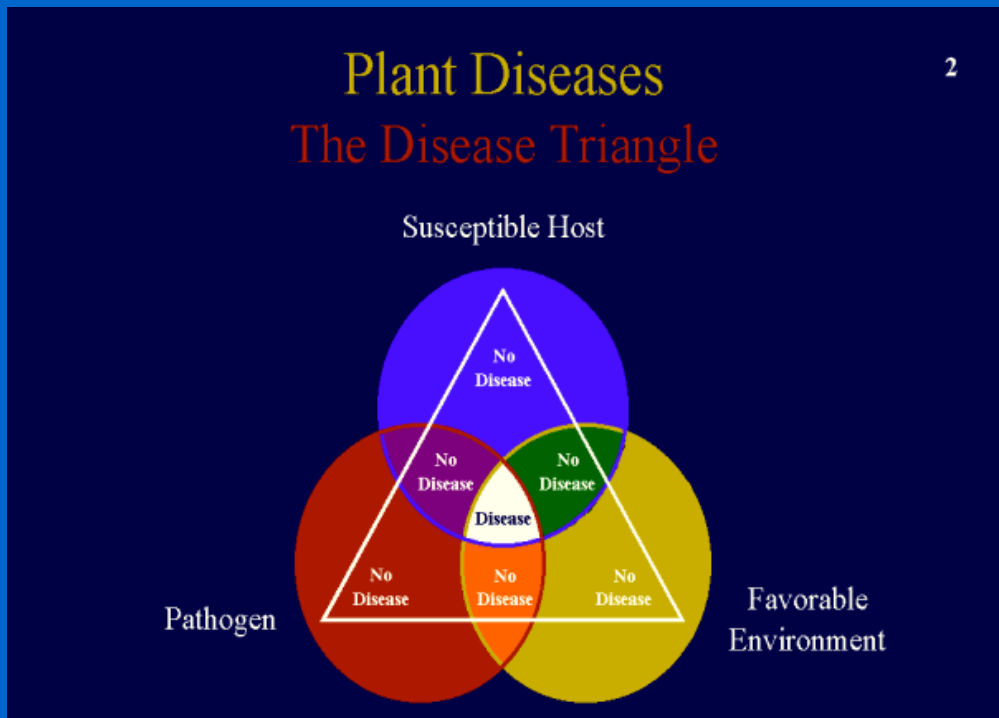
- Use your clues for assistance in identifying the **specific causal agent(s)**
- Be a detective
- Due your “homework”
- Ask good questions
- Look for signs and symptoms
- Process of elimination
- Consult the “experts”
- Be persistent and logical

Getting Additional Help

- **Laboratory diagnosis** may be needed in some cases
- Most land-grant universities have diagnostic clinics
- **Take good, fresh samples** that are representative of the problem

SUMMARY

- General diagnosis
- Symptoms and signs
- Tree stress
- Abiotic disorders
- Biotic disorders
- Getting help



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