Diagnosis & Control of Problems on Idaho Urban & Woodland Trees

Yvonne C. Barkley
Associate Extension Forester
University of Idaho
• **Control:**
  – The best way to control tree problems is to prevent them
  – The aim in controlling a pest problem is to bring the damage below the economic threshold
  – Control of insect & disease problems is achieved by breaking the life cycle
• **Common control methods include:**
  – cultural controls
  – chemical controls
  – biological control
• **Cultural controls:**
  – plant selection
  – proper planting
  – nutrition
  – sanitation
  – pruning
    • prune during dry weather
    • clean tools between every plant or between every cut
    • sterilize pruning tools with a 10% bleach solution (1 part bleach to 9 parts water) or winter strength windshield wiper fluid
    • bleach will make tools rust
• **Chemical controls:**
  – Always recommend cultural controls along with chemical controls
  – Only recommend chemical controls listed in the PNW Management Handbooks
  – Also available on-line at:
    • Insects - http://insects.ippc.orst.edu/pnw/insects
    • Diseases - http://plant-disease.ippc.orst.edu/index.cfm
Biological Control:

- Is the reduction of pest populations by natural enemies and typically involves an active human role.
- Natural enemies of insect pests, also known as biological control agents, include predators, parasitoids, and pathogens.
Causes

- **Primary cause** is the reason a plant is susceptible to damage. This includes anything that would stress a plant such as adverse weather, drought stress, nutrition deficiencies, etc. Primary causes are usually physiological or chemically related. Primary causes may result in a decline in vigor, but are usually not the cause of death.

- **Secondary causes** are usually insects or diseases. These vectors are successful in gaining entry into a plant because it is stressed or has a wound. Secondary causes are what usually caused mortality.
• **Plant problems fall into two main groups** – those that are caused by:
  
  – **Living organisms:**
    • Insects
    • Diseases
  
  – **Non-living agents:**
    • Physiological causes
    • Chemically related events
• **Diseases are caused by one of three vectors:**
  – Fungi
  – Bacteria
  – Viruses
• **Fungi:**
  
  – are microscopic, non-photosynthetic plants
  
  – sometimes beneficial to man; used industrially to produce antibiotics, cheeses, and wines
  
  – are an important component of natural nutrient cycles
  
  – as a group, cause more disease problems than other vectors
• **Fungi:**
  – live in the air, on fallen debris, or in cankers and wounds on plants
  – spread by the movement of wind and water
  – gain entry through natural openings such as stomata and wounds; are also able to penetrate healthy tissue in the right conditions
  – conditions include free moisture or high relative humidity; poor air circulation; warm temperatures
• **Bacteria:**
  – are among the smallest living organisms
  – are non-photosynthetic
  – some species are beneficial:
    • aid in decomposition and soil building
    • enable legume to convert gaseous N to a form available for plant use
    • have industrial uses
• **Bacteria:**
  
  – live in soil or on plant refuse
  
  – are spread by rain, man, animals, insects, equipments, and plants
  
  – cannot actively penetrate tissue; enter through natural openings such as stomata and through wounds
  
  – begin to reproduce once it enters plant, killing cells as it goes
  
  – some produce toxins that result in abnormal growth
  
  – others poison plant tissues or plug vascular tissues and cause wilt
• **Viruses:**
  – are infectious agents too small to be seen with an ordinary microscope
  – are parasitic on plants and animals, including humans
  – # of known virus diseases in woody plants small; includes tobacco mosaic virus and tobacco ring spot virus

• **Viruses** are spread from plant to plant by:
  – mechanical transmission (pruning or grafting)
  – nematodes
  – fungi
  – insects
• **Insects fall into five main groups:**
  - Foliage feeders (needle miners, case bearers)
  - Borers (bark, twigs, shoots, & roots)
  - Piercing & sucking insects (aphids, thrips, mites, adelgids, mealybugs)
  - Gall makers
  - Nematodes
Physiological problems are caused by non-living agents, such as:

- adverse weather conditions
- nutrient deficiencies
- poor soil drainage
- plant suitability
- mechanical injury
- pesticide misapplication
• In general, physiological problems:
  – are uniform throughout the plant
  – will affect most or all plants in a landscape
  – will lack evidence of a living organism
• Pesticide misapplication (direct or indirect) is a common problem.
• **Making a diagnosis:**
  - Helpful to have a general understanding of a variety of disciplines, such as botany, entomology, horticulture, plant pathology and physiology, forestry, soils, hydrology and pesticide use
  - Key point of a good diagnostician are:
    • Good judgment and common sense
    • An inquisitive mind
    • A willingness to seek help
• Identify the plant
• Gather information.
  – The client
  – Weather conditions (past and present)
  – Surrounding areas
  – Symptoms
• What did you miss? (Don’t bluff!)
• Diagnosis and control recommendations
• **Symptoms** can occur on:
  – leaves
  – leaves and branches
  – plants with no leaves
  – roots
• **Symptoms on leaves:**
  – Start by looking for abnormalities in size, color, glossiness, texture and shape
• Leaf spots
• Blotches
• Needles casts & blights
Causal agents can create similar symptoms.

- For example, this tree had red spots with yellow hallows. This symptom can be caused by an insect, a disease, or physiological cause (acid rain).
• **Pattern of symptoms**
  - Top down vs. bottom up

*Rhizosphaera needle cast*

*Phosphorus deficiency*
• Scorch & wilts
  – can be caused by hot dry winds in the spring when leaves are tender
  – or by disease such as Dutch elm disease
  – pesticide misapplication
• **Frost damage**
• Bud damage due to low spring temperatures vs. insect damage
• Yellowing of leaves and/or veins is often associated with mineral deficiencies or toxicities.

• Can also be associated with:
  – soil sterilants
  – viral diseases
  – spider mites
  – pesticides
  – air pollutants

Iron chlorosis
Major changes in leaf structure can be caused by:

- nutrient unavailability
- poor soil aeration
- root injuries
- disease
- mites
- pesticide misapplication
• **Symptoms on leaves & branches**

  Look for:
  – small holes
  – scars
  – ridges
  – bumps
  – pitch oozing
  – swelling

  *Nectria canker*
Red turpentine beetle & bear damage

White pine blister rust
• Extensive browning &/or broken branches:
  – cankers
  – storm or mechanical damage
  – insect girdling
• **Cankers:**
  – sunken or raised areas on branches & trunks, indicating injury to tissue underneath
  – infections can be secondary
• **Cankers can be caused by:**
  – bacterial or fungal infections
  – high/low temperatures
  – mechanical damage
Fungal/bacterial damage = gradual changes

Temperature/mechanical/insect damage = well defined changes
• Rapid browning & leaf drop usually due to trunk or root-related problem
• Causes include:
  – canker
  – mechanical damage
  – borers
  – girdling
  – wilt diseases
Examination of the inner bark will tell you if the plant is *dead or alive*:

- brown & dry = dead
- green to white & moist = alive
- streaking suggests presence of wilt fungus like DED
• *Roots* should be firm & creamy in color:
  – brown = dead tissue
  – spongy = decay
• *Tops dying* out are often an indicator of bark beetle attack
A stress cone crop produced on a tree with thinning foliage and shortened terminal growth is an indication of root disease.
• Fruiting bodies and basal cankers
Factors most commonly involved in the *rapid death* of a tree include:
- infection by wilt fungi
- mechanical injury
- rodent damage
- gas line leaks
- lightening
- toxic chemicals
• Causes for *progressive decline* include:
  – girdling roots
  – decay
  – poor soil type
  – poor drainage
  – lack of nutrients
  – soil grade changes
  – improper planting