

DAVEY



Hone Your Diagnostic Skills

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Diagnosis Objectives



- Identify Problem(s)
- Determine the Severity of Problem(s)
- Formulate Management Options
- Communicate Options to Client

Diagnosis

Identify the Problem



- **Define the Problem**
 - » **Identify Host Species**
 - Genus?
 - Which species
 - Why is this Important?
 - » **Normal vs. Abnormal**
 - Consider variation within a species



Diagnosis

Identify the Problem



- **Consider the “Big Picture”**
 - » Evaluate the tree as part of its environment
 - » Typically, a tree’s environment is having an effect on its health
 - Sun/shade
 - Limited root area
 - Drainage issues
 - » Can you see something here that might be contributing to the thin, distorted foliage of these trees?

Diagnosis

Identify the Problem

- **Look for Patterns**

- » **Patterns over Space**

- **Uniform Patterns**

- **Usually Abiotic**

- **Non Uniform**

- **Usually Biotic**

- **In General, biotic injury develops less uniformly than does abiotic**

- » **Site history can be very important, especially for abiotic issues**



Diagnosis

Identify the Problem



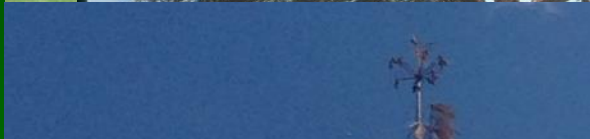
- Look for patterns over space within plant as well

- » Scattered
- » Bottom- up
- » Top down
- » Whole plant
- » Single branch



Diagnosis Identify the Problem

- Look for patterns over time
 - » Progressive spread of symptoms
 - Usually biotic
 - » Sudden, isolated or non-progressive
 - Usually abiotic



Diagnosis

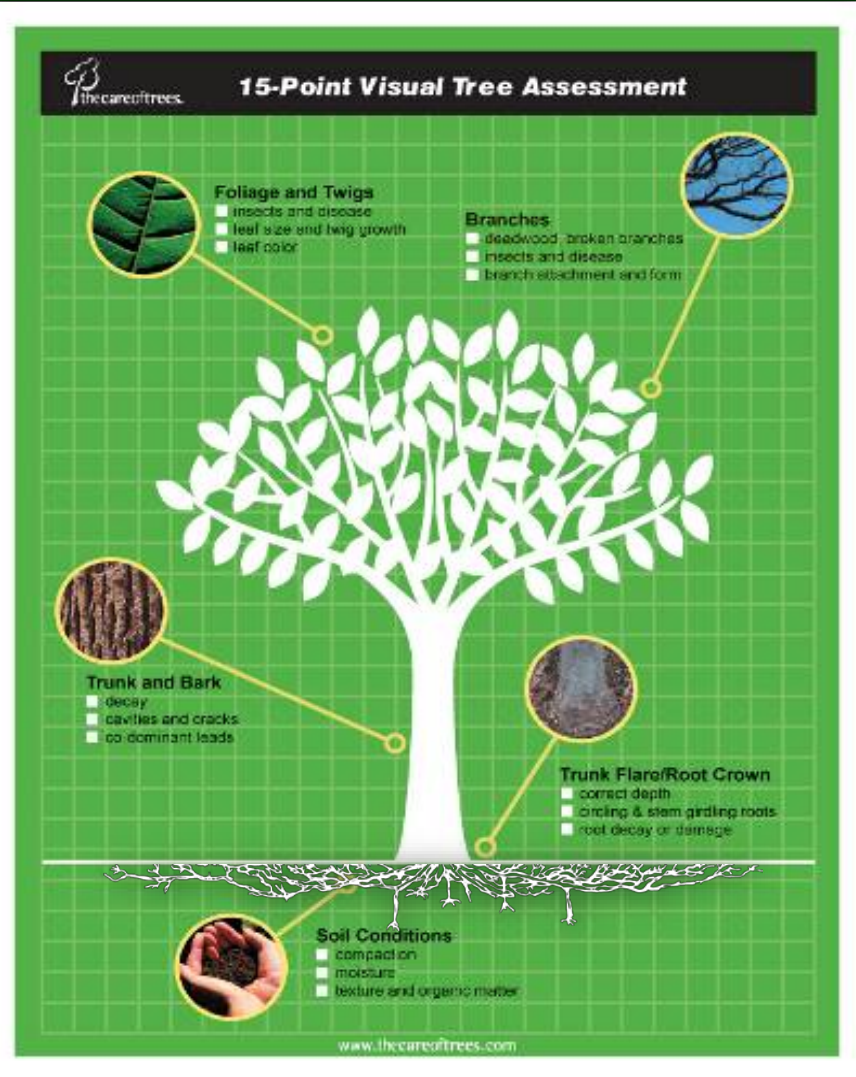
Identify the Problem

- Look for short term patterns over time as well



Diagnosis

Identify the Problem



- Check the entire tree (as best you can)
 - » Foliage
 - » Branches
 - » Trunk
 - » Root Collar
 - » Roots/Soil Conditions
 - » It is easy to miss clues if you are not thorough!
- To “Assume” too quickly can:
 - » Make an ass out of u and me!

PHC Opportunity Flowchart

Maintenance Procedures

Least Number of Options

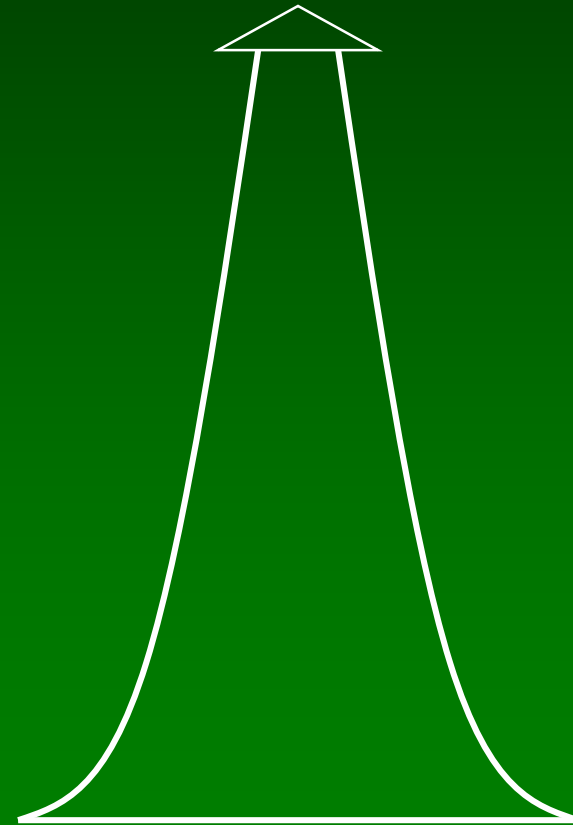
Installation Procedures

Specimen Selection

Site Preparation

Landscape Design

Greatest Number of Options



Diagnosis (What do we look for?)

- **Symptoms** “clues”
 - » How the tree responds to the presence of the pest or problem
 - » Can have many causes
- **Signs** “hard evidence”
 - » Direct indications of the pest or problem
- **Site/Tree history**
 - » This is very important for abiotic issues

Diagnosis Terminology



- **Symptoms**

- » How the tree responds to the presence of the pest or problem

- **Gummosis**

- Sap leaking from trunk

- **Chlorosis**

- Yellowing foliage

- **Dieback**

- Twigs and small branches dying back to larger branches



Diagnosis Terminology



- **Symptoms**

- » How the tree responds to the presence of the pest or problem

- **Canker**

- Dead area of wood part of trunk or branch

- **Decay**

- Rotting wood tissue

- **Leaf Spot**

- Dead areas , usually regular in size and shape, found on leaf tissue



Diagnosis Terminology



- **Symptoms**

- » How the tree responds to the presence of the pest or problem

- **Leaf Blotch**

- Larger and more irregular than leaf spots

- **Wilt**

- Drooping of leaves and shoots

- **Witches' Brooms**

- Development of multiple, secondary shoots



Diagnosis Terminology



- **Symptoms**

- » How the tree responds to the presence of the pest or problem

- **Vascular Streaking**

- Discoloration of vascular tissues

- **Blight**

- Twigs and small actively growing branches dying from the tip back

- **Scorch**

- Browning around leaf margins

Water Relations Scorch

- Usually marginal and crosses over veins rather than interveinal
 - » Anything that restricts water flow into leaf or encourages too much water from leaving leaf
 - » Often one sided



Nutritional Scorch



- **Result of a nutrient that is limiting**
 - » **Marginal, but usually has an interveinal aspect**

Pathological Scorch



- **Associated with a vascular wilt disease**
 - » DED
 - » Oak wilt
 - » Verticillium wilt
- **Bacterial Leaf Scorch**
 - » East and SE US
- **Often a mix of symptoms with normal, semi-scorched, and fully scorched (brown) leaves on same plant**

Diagnosis Terminology



- **Signs**

- » Direct evidence of the causal agent(s)

- Actual pest
 - Periodical cicada
- Fruiting structure
 - Sulfur fungus
- Laboratory culture
 - Dutch elm disease

Diagnosis Terminology

Signs

- » Direct evidence of the causal agent(s)
 - Insect product
 - Eastern tent caterpillar web
 - Larval tunneling and emergence holes
 - Emerald ash borer
 - Fungal structures
 - Armillaria “shoe strings” and mats



Diagnosis Terminology

- Causal factors resulting in plant injury
 - » Abiotic Factors (Non-Living)
 - Physical Factors
 - Temperature, soil, water, wind, light, etc.
 - Mechanical Factors
 - Wounds, wires, buried flare, etc.
 - Chemical Factors
 - Chemical phytotoxicity, pollutants
 - » Biotic Factors (Living)
 - Diseases
 - Foliar, shoot and root
 - Vascular
 - Cankers
 - Arthropods (Insects, mites)
 - Defoliators (consume foliage)
 - Sap sucking (bronzed or distorted foliage)
 - Borers (dieback)
 - Parts or products of arthropods (galls, tents, skins, honeydew, etc.)
 - Vertebrates (Deer, rodents, etc.)
- Remember, each of these factors is affecting the plant through
 - » **Photosynthesis**
 - » **Respiration**
 - » **Transpiration**
 - » **Absorption**
 - » **Translocation**
 - » **Growth and Development**
 - » **Defense**

Causal Factors

Abiotic Examples



- **Physiological Disorders**

- » **Inhibit natural processes within the tree**

- Excess water can drown roots
- Too much shade can cause needle loss
- Soil compaction limits root growth

Causal Factors

Abiotic Examples



- **Mechanical Factors**
 - » **Actual injury to plant**
 - **Wire staking left after planting**
 - Disrupt water and nutrient transfer
 - **Lawnmower Blight**
 - Damages trunk
 - **Stem girdling roots**
 - Crush vascular tissues

Causal Factors

Abiotic Examples

- **Chemical Injury**

- » Typically the result of pollutants or misapplied pesticides

- **Road salt runoff**

- Kills roots and interferes with water uptake

- **Pollutants**

- Sump pump discharge with high phosphates

- **Pesticide injury**

- Lawn herbicide picked up by tree through root



Consider Natural Events



- **Natural conditions/events are often misdiagnosed by folks who should know better**

- » **Variegated/colored foliage**
- » **Seasonal needle cast**
- » **Branch shutdown**
- » **Stress induced foliage drop**



Diagnosis Flow Model

- **Deduce causes(s) of injury from observations**
 - » **Personal knowledge**
 - » **Information from homeowner/property manager**
 - » **Opinions of others**
 - » **References**
 - » **Laboratory Analysis**
- **Formulate management options**
- **Communicate options to client**

You May Need to be in the Right Place at the Right Time



The Answer Often Originates in the Past
You may, or may not, have that information



Remember!

- Sometimes, we will never come up with a solution!

