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## HOW TO IDENTIFY PLANT HEALTH PROBLEMS

The process of identifying plant health problems can be simplified by following a logical progression of steps that integrate observations and information regarding the history of the symptomatic plant. These steps are relevant whether you're dealing

with abiotic or biotic causal factors or with trees, shrubs, or herbaceous plants. In order to accurately diagnose plant health problems, it often helps to start by asking some key, but basic questions.

### SOME BASIC QUESTIONS:

1. Is the growth normal?
2. Is there a pattern to the distribution of abnormal plants or symptoms?
3. What part(s) of the plant is affected?
4. What are the symptoms?
5. What were the past management practices, weather conditions, soil type, site?

### THE DIAGNOSTIC PROCESS:

As follows are steps that are helpful in the diagnosis of plant health problems.

#### Step 1. Identify the Plant

- It is important to identify the plant to the **genus** level. In some cases, identification to **species** and even **cultivar** is necessary in order to be able to determine the normal characteristics and attributes of the plant.
- What should the plant look like at this stage of growth or at this time of year? Does it appear to be normal?

- If not, what is abnormal about the plant?

#### Step 2. Determine What is Abnormal

- Check for symptoms and signs of possible agents.
- Symptoms of disease are defined as the external and internal reactions or alterations of a plant as a result of a disease (e.g., wilt, leaf spot, blight).

*Look for Symptoms (Common Abnormalities)-*

- *Leaf spot*- spots of dead tissue on the foliage; the size, shape, and color may vary with causal agent and host; usually limited to small portion of the leaf surface;
  - *Leaf blotch*- dead areas of tissue on foliage; irregular in shape and larger than leaf spots;
  - *Blight*- dieback of a major portion of a tree; rapid yellowing, browning, collapse, and death of leaves, shoots, stems; especially young, growing tissues; usually occurs very quickly;
  - *Scorch*- browning and death of indefinite areas along the leaf margins and between veins;
  - *Wilt*- loss of turgor or drooping of leaves, shoots, or the entire tree due to apparent lack of water;
  - *Canker*- dead area on a stem or branch; can be sunken, swollen, or discolored and are usually distinguished from adjacent healthy tissues by color; can appear on twigs, stems, and main trunk;
  - *Stunting*- reduced plant growth;
  - *Gummosis*- exudation of sap or gum from wounds, cracks or other openings in the bark;
  - *Gall*- a swelling or abnormal growth of plant tissues; can develop on leaves, stems, and roots; may be induced by insects, fungi, bacteria, or nematodes;
  - *Chlorosis*- yellowing of normally green tissues due to lack of chlorophyll;
  - *Necrosis*- death of tissue; necrotic=dead
  - *Dieback*- large portion of dead in a tree; death of the tips of leaves, shoots, and stems; failure of branches to develop, especially in the spring;
  - *Vascular discoloration*- streaking or darkening of vascular tissues;
  - *Witches' broom*- abnormal proliferation of shoots from the same point on a plant resulting in a bushy, broom-like appearance;
- Is there a pattern to the distribution of abnormal plants or symptoms?***
- How many plants are affected? Are they of different species?
  - Where are the plants located? A field, glasshouse, landscape, forest, or indoors in a house etc.?
  - Is there a pattern to plants that are symptomatic? Is it associated with drainage patterns, soil type, etc.?
  - How much of the plant is involved? (whole plant vs. part of the plant, new growth or growing tip vs. older tissues)
- What part(s) of the plant is affected?***
- If leaves are symptomatic, which ones (old vs. new growth, top vs. bottom)?
  - If stems are affected, are there cankers, splits, or oozing?
  - Look at the condition of the wood by cutting into it; Is the cambium healthy and green or is it discolored, brown, and dry? Check the condition of buds to see if they are apparently viable and green.
  - If roots are affected, look for discolorations, lesions, stunting, malformations, poor development and growth.

- If the whole plant is affected, look at type of dieback and associated symptoms; Was it gradual or sudden death? Sudden death often results from transplant shock, environment, misapplied chemicals, etc.
- Some factors for consideration *if* fungicides are to be part of the management program:
  - Is the host plant valuable? How old is the plant (e.g., is it well established, newly transplanted?)
  - Has the disease been properly identified?
  - Is the disease life- or health-threatening or cosmetic?
  - Does the plant have a history of this disease?
  - Are effective, legal treatments available?
  - Will one or two applications be sufficient for control?
  - Have all other options for management of the disease been explored?

***Look for signs of a causal agent-***

- Are there any visible fruiting structures on the affected tissues?
- Is there any oozing along branches or limbs?

**Step 3. Obtain Background Information and History**

- Weather patterns (drought, unusual winter, prevailing winds, exposure, frosts, etc.)
- Soil and site characteristics (soil pH, macro- and micronutrient levels, soil texture, bulk density, organic matter, soil volume and depth, air and water drainage patterns, frost pocket, etc.)
- Cultural practices (watering, fertilizing, pesticide usage, when was it planted, B&B or container grown, planting practices, etc.)
- Genetic characteristics (hardiness, longevity, etc.)
- Other factors (construction, traffic patterns, any under plantings, where was the plant originally grown, air pollution, history of pesticide use, etc.)

**Step 4. Identify the Problem or Collect Samples to Submit to a Specialist**

**For Identification**

- Consult references or submit samples for professional diagnosis

**Step 5. Devise a Management Program (*Tree Health Program*)**

- Program should be based on integrated use of culture, sanitation, resistance, and chemical methods for control.

**EXAMPLES OF SEVERAL POSSIBLE SCENARIOS:**

***IF the tree is chlorotic--***

Look for pattern (nutritional, herbicide, virus); Is the entire leaf affected? (environmental, cultural, chemical, genetic); Are there irregular spots? (virus, insect, chemical)

***IF there is necrosis-***

How extensive is it? (chemical, cultural, environmental, disease); Look for cankers if entire branch is dead; Is the entire leaf brown? Just portions or the margin? Any pattern to necrosis? Spots? (possibly insect, frost, disease).

***IF there is abnormal growth-***

Leaves twist and curl (chemical, insect, disease, mechanical, environmental, frost); Symptoms on stem or witches broom (disease, insect); Whole plant stunted from root damage, poor management, environ., disease, insect.

***IF there are missing or damaged parts-***

- Bark missing- could be deer, rodents, insects, mechanical injury;
- Swelling on trunk- burlap/string still attached to shrub or tree;
- Leaves with holes or notches or skeletonized could be disease, insect, physiological factors;
- Roots- look at color, for any distortion look at structure, growth, size (chemical, insect, disease, culture).

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