Diagnosis of Plant Health Problems

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In order to accurately diagnose plant health problems, certain questions need to be answered, often in a stepwise, logical manner. As follows are steps that are helpful in the diagnosis of these problems.

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

II. STEPS IN DIAGNOSIS:

1. Is the plant’s growth normal?
   --What is the plant? The correct identification of the plant to genus, species, and cultivar (if possible) will help to determine the normal characteristics of the plant in question.
   --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?

2. Is there a pattern to the distribution of abnormal plants or symptoms?
   --How many plants are affected? Are they of different species?
   --Are they located in a field, glasshouse, landscape, forest, indoors in a house, etc.?
   --If symptoms are abnormal, look for a pattern. Is it associated with drainage patterns, soil type, etc.?
   --How much of the plant is involved (whole plant versus plant part, new growth or growing tip versus older tissues)?

3. What part(s) of the plant is affected?
   --If leaves, which ones (old versus new growth, top versus bottom)? Could be caused by insect, disease, management practices, or weather.
   --If stem (canker, wound, discoloration), could be caused by insect, disease, weather, or management practices. Look at the condition of the wood by cutting into it. Is the cambium healthy and green or is it discolored and dry? Check condition of buds to see if they are viable and green.
   --If roots (discolored, lesions, stunting, malformed, poor development and...
growth), could be insect, disease, management, weather, site, or soil characteristics.

--If whole plant, 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.

4. **What are the symptoms?**

Symptoms of disease can be defined as the external and internal reactions or alterations of a plant as a result of a disease (e.g., wilt, leaf spot, blight).

**MACROSCOPIC SYMPTOMS:**

What is visible from general observation and examination?

**A. Common Symptoms:**

*Leaf Spot:* spots of dead tissue on the foliage; the size, shape, and color may vary with the causal agent, but are usually limited to a small portion of the leaf.

*Leaf Blotch:* dead areas of tissue on the foliage, irregular in shape, and larger than leaf spots.

*Blight:* dieback of a major portion of a plant, especially young, growing tissues.

*Scorch:* browning and death of indefinite areas along the leaf margins and between the veins.

*Wilt:* drooping of leaves or shoots, often due to lack of water.

*Canker:* localized dead stem tissue, often shrunken and discolored.

*Stunting:* reduced plant growth.

*Gummosis:* exudation of sap or gum from wounds or other openings in the epidermis.

*Rust:* orange or reddish-brown pustules on leaves, or galls and cankers on stems caused by certain fungi.

*Gall:* swollen plant tissue that may be induced by insects, fungi, bacteria, or nematodes.

*Chlorosis:* yellowing of normally green tissues due to lack of chlorophyll.

*Necrosis:* death of tissue.

*Dieback:* large portion of dead tissues; usually used in reference to woody ornamentals.

*Mildew:* white or grayish fungal growth on the surface of plant tissues, usually leaves or tender shoots.

*Vascular Discoloration:* darkening or streaking of the plant’s vascular elements.

*Damping-Off:* collapse and decay of seedlings before or after emergence from the soil.

*Witches’ Broom:* abnormal development of multiple secondary shoots, forming a broom-like effect.

**B. IF Chlorosis:**

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

**C. IF 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).

**D. IF 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, environmental, disease, insect.

**E. IF 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).

**MICROSCOPIC SYMPTOMS AND SIGNS:**
This step is done if macroscopic observations suggest additional examination is necessary. Start by examining affected parts with a dissecting scope and move to a compound light microscope, if necessary. Look for fruiting structures (signs of the disease agent) or evidence of insects or insect activity.

**Leaves/Stems:**
IF leaf spots, lesions or cankers, look for fungal growth.
IF fungal growth is present, or if lesions look bacterial, make a slide and examine under a compound scope; look for spores, any characteristics of a fungus, or bacterial ooze.
IF fruiting structures are present, crush, make a slide, and examine with a compound scope.
IF no spores are mature, place tissue or plant part in a moist chamber to force spore formation or maturation or to induce sporulation of any fungi that might be present.

**Roots/Crown:**
IF off-colored, crush roots or section crown tissues and make a slide; examine under a compound scope for obvious pathogen structures such as oospores, or for bacterial cells or bacterial streaming, etc.
IF no fungi or bacteria are present, look for soluble salts problem; look at soil type and management or cultural practices.
IF no direct evidence of a biotic agent (but you still feel a fungus or bacterium is associated with the problem), set up cultures on PDA, Acid PDA, or H2O agar after a thorough washing of the plant tissue in running tap water for 15-20 minutes.
IF FUNGI ARE PRESENT, USE REFERENCES FOR HELP IN IDENTIFICATION.

5. **What were the past management practices, weather conditions, soil type, site, etc.?**

**ASK QUESTIONS!!!!!**

Ask about soil, watering procedures, fertilizers, pesticides, age of plants, how long symptoms have been occurring, etc.
Many times, you will be putting pieces of a puzzle together by trying to interpret damage from years past or growing conditions/stresses.

**Summary**
What is wrong with my plant? How does one determine what disease is responsible for a failing plant? This fact sheet discusses the questions that need to be answered and the steps necessary for accurate diagnosis of plant diseases.