THE OHIO STATE UNIVERSITY EXTENSION

FACT SHEET

Agriculture and Natural Resources

PP401.02

This is the second fact sheet in a series of nine designed to provide an overview of key concepts in plant pathology. Plant pathology is the study of plant disease including the reasons why plants get sick and how to control or manage healthy plants.

Diagnosing Sick Plants

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Diagnosing Plant Diseases

Proper diagnosis is a critical step in the control of plant diseases. Before you can establish what control strategies should be taken, you must first determine the exact culprit and rule out all other possibilities. It can be difficult and confusing at times, but the following five-step approach should help simplify the task.

1. **Define the problem**. Determine that a problem actually exists. Start by correctly identifying the host plant and becoming familiar with its normal or healthy state and characteristics. Make sure to take seasonal effects into account. For example, in Ohio a maple tree develops fall coloration and begins losing leaves in October. Losing leaves in June is therefore abnormal. Know your plant hosts and how they change with the seasons. Only then can you determine that a problem exists.
2. **Examine the entire garden, landscape, or woodland area**. Don't jump right into examining the affected individual plant or area. Take stock in what the entire plant community looks like. Once you have done this, focus your attention on the affected plant(s). Even then, however, look at the entire plant first before going directly to the sick part of the plant. Check out the leaves, stems, roots, fruit, and flowers if appropriate. This may be easier said than done, especially when it comes to large specimens like a 50-foot oak tree.
3. **Look for patterns**. Is only a single plant affected? Is the potential disease restricted to a certain area or single species? Are the symptoms randomly distributed or can you see any distinct patterns or clear lines of differentiation between healthy and affected plants? Using these questions we can classify these patterns into two categories: uniform or non-uniform. Uniform damage patterns are over a large area or on several plants. This indicates that a nonliving source was the likely cause, such as mechanical, physical, or chemical factors. Non-uniform damage patterns are random and only on a few plants. This specifies that the cause was a living factor, like a pathogen or insect.
4. **Consider time**. Ask questions about how the damage developed. Did it appear suddenly or over time? Has the damage spread or stayed in the same location? Progressive development and spread over time often indicates damage caused by pathogens. In contrast, damage that does not spread and where there are clear lines of delineation separating sick plants from healthy plants, typically indicates damage caused by an abiotic factor. The science of how disease develops over time is called epidemiology. Refer to the Disease Progress Curve in figure 2. The more time that passes, the more severe the disease will be.
5. **Gather information and determine cause of plant damage**. Gather as much information as possible about the plant, such as cultivar or variety, age, recent fertilizer or pesticide applications, cultural practices used, recent weather trends, irrigation practices, any information available about the history of the site, and how the damage progressed over time. Collect as much information as possible to help you develop a solid mental picture of what has led to the damage you are observing. Look for evidence of pathogen activity. Specifically, look for key diagnostic signs or symptoms that are characteristic of known plant pathogens or insects.

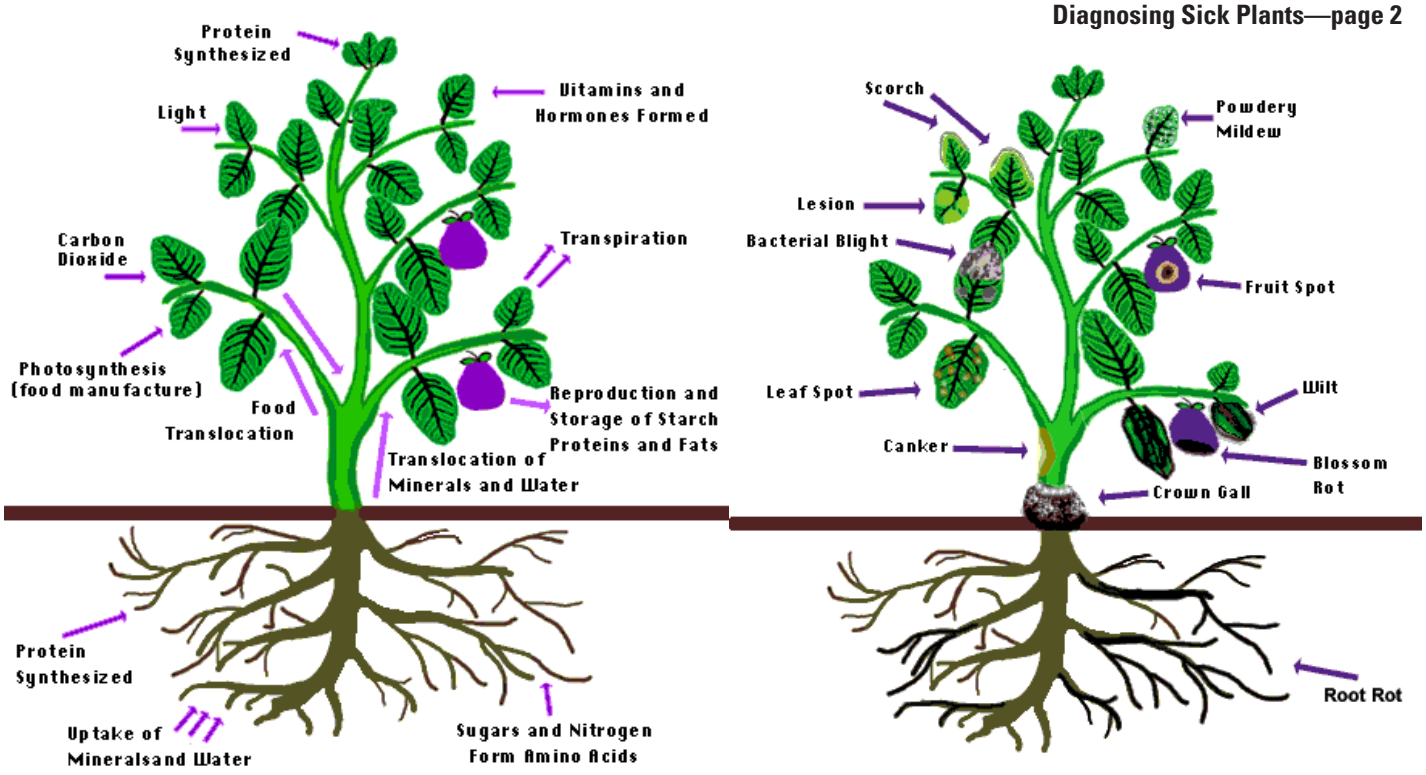

Figure 1. Healthy plant versus sick plant. Note the differences between the two.
(Source: Department of Plant Pathology, The Ohio State University)

1. ***Distinguish among living factors***

   Pathogens (symptoms and signs of specific diseases)

   Insects, mites, and other animals (symptoms and signs of insect or animal damage, like feeding sites)

2. ***Distinguish among nonliving factors***

   Mechanical factors (example: lawn mower damage to tree)

   Physical factors

   - Temperature extremes (too hot or too cold)
   - Light extremes (too sunny or too shady)
   - Oxygen and moisture extremes (too wet or too dry)

   Chemical factors

   - Analyze damage patterns in plantings (single plant or entire field)
   - Injury patterns on individual plants
   - Pesticide (too much pesticide)
   - Nutritional disorders (example: low iron can cause chlorosis)

If after you have gathered sufficient background information and nothing strikes you as being obvious, such as a chemical misapplication or hail damage, and you have eliminated the possibility of pathogens and insect pests, retrace your steps and focus your diagnosis on abiotic factors. You may want to start by checking with diagnosticians at your OSU Extension county office. Consider contacting and coordinating with the clinician before sending samples, and whenever possible include photographs or digital images to aid the diagnostician in his or her task. Visit the C. Wayne Ellett Plant and Pest Diagnostic Clinic web site for more information on diagnostic procedures: http://ppdc.osu.edu.

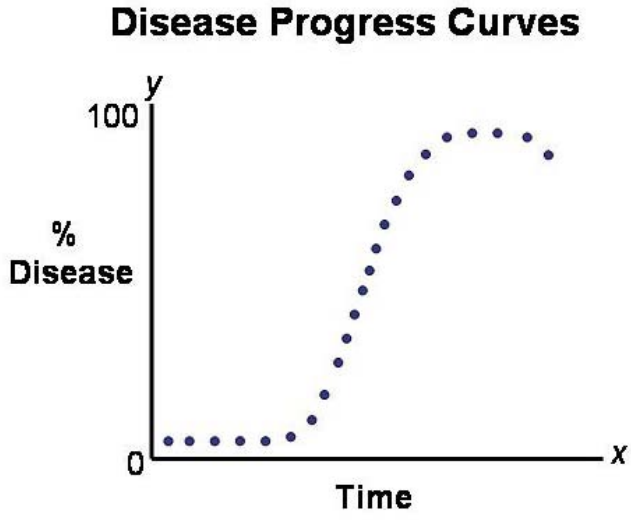

Figure 2. Disease progress curves are a graphical representation of how a disease develops over time.
(Source: Michael J. Boehm, Department of Plant Pathology, The Ohio State University)

20 Questions to Ask When Diagnosing a Sick Plant

1. What is the plant?
2. What does a healthy plant look like?
3. What are common problems for the plant? (Example: What diseases is the plant known to get? Does it always need a lot of sun or shade?)
4. What do you see that looks abnormal? (Example: Is the plant wilting? Is the soil dry?)
5. What is the overall health of the plant? (Example: Is it only part of the plant that is sick or the entire plant?)
6. What exactly do you see? (Example: What are the signs and symptoms?)
7. What do you see on the other plants surrounding it? (Example: Are other plants sick too?)
8. What is the site? (Example: What does the environment around the plant look like?)
9. Who knows about the plants? (Example: Who has access to the plants? Does someone specific watch over the care of the plants?)
10. When did the symptoms first appear? (Example: How long have the symptoms been there?)
11. What is the horticultural history? (Example: When was it first planted there?)
12. What is the environmental history? (Example: Is the site known to be really wet or really dry?
13. What does the client think the problem is? (Example: Did the client apply too much fertilizer or water the plant too much?)
14. What diagnostic tools are useful?
15. What additional resources are available?
16. How do you take samples?
17. What other information do you need to help you find the problem?
18. What is your diagnosis?
19. What is the significance of the problem?
20. What are your recommendations? (Management strategies or control measures.)

For detailed information on each of the IPM strategies, see the fourth fact sheet in this series, "Keeping Plants Healthy: An Overview of Integrated Plant Health Management" (PP401.04).

Introduction to Plant Disease Series

PP401.01: Plants Get Sick Too! An Introduction to Plant Diseases

PP401.02: Diagnosing Sick Plants

PP401.03: 20 Questions on Plant Diagnosis

PP401.04: Keeping Plants Healthy: An Overview of Integrated Plant Health Management

PP401.05: Viral Diseases of Plants

PP401.06: Bacterial Diseases of Plants

PP401.07: Fungal and Fungal-like Diseases of Plants

PP401.08: Nematode Diseases of Plants

PP401.09: Parasitic Higher Plants

These fact sheets can be found at OSU Extension's "Ohioline" web site: http://ohioline.osu.edu. Search for "Plant Disease Series" to find these and other plant pathology fact sheets.
