



# DON'T HAVE A PLANT M.D.?

## Here's how to determine what's ailing them

By Karen Panter

Your tomatoes have developed strange-looking yellow spots on their leaves.

The irises have leaves with funny waves in them.

And the crabapples have odd-looking patches on the fruit.

Where do you start to determine the causes of these ailments?

Trying to diagnose plant problems on one's own can be tricky, but, if you follow some general guidelines, it's not impossible. Keep in mind the probability of diagnosing a problem based on only one or two symptoms is very low. Totally different factors can cause similar symptoms on the same plant. Looking at the plant alone usually does not tell the full story.

### Is There *Really* a Problem?

Determine if there truly is a problem. Identify the plant and learn its characteristics and normal growth patterns. Compare the damaged plant with a healthy one of the same species ([plantfacts.osu.edu](http://plantfacts.osu.edu) is a good online plant

photograph source) and variety. Some plants are naturally variegated or have different pigmentation during various parts of their life cycles. Differences in color may not necessarily indicate a problem.

### Signs Versus Symptoms

Next, distinguish between *signs* and *symptoms*. A sign is the presence of the actual insect, mite, or fungus. An example would be seeing a pear slug munching on the leaves of your favorite sand cherry in the back yard. Another example would be seeing the white, powdery mycelium characteristic of powdery mildew.

A symptom is the plant's reactions to a pest or pathogen. Concentric rings of dead tissue will form on impatiens leaves in response to the presence of the impatiens necrotic spot virus. The foliage on an ash tree wilts no matter how much water is applied. Tips of apple or pear tree branches will blacken and curl in response to bacteria-caused fireblight. Keep in mind many factors produce similar symptoms, so, relying on symptoms alone

often does not produce a definite diagnosis.

Now step back and look at the whole plant. Oftentimes, the plant part showing symptoms is not the plant part that has been damaged. For example, damage to root systems of trees frequently results in foliar symptoms such as wilting or premature leaf drop. In this case, the primary problem is with the roots and not the leaves.

### Living Versus Non-living Causes

The next step is to look for patterns in the damage to the plant. This is where *biotic* and *abiotic* causes

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# The Diagnostic Process

- ◆ Is it really a problem?
  - Find out what a normal plant of this type looks like. See a list of references in the sidebar on page 15.
  - Check the whole plant and its surroundings.
- ◆ Look for patterns. Is it one plant? More than one species?
  - Non-uniform or irregular damage is usually caused by a living or biotic factor.
  - Uniform damage patterns indicate nonliving or abiotic issues.
- ◆ How long did it take for the damage to show up?
  - If progressive, it's probably an insect or disease.
  - If it hasn't spread or occurred suddenly, it was probably environmental or cultural.
- ◆ Identify the possible cause.
  - Possible living factors
    - ◇ Signs and symptoms of disease-causing pathogens
    - ◇ Signs and symptoms of insects, mites, or other animals
  - Possible non-living factors
    - ◇ Mechanical
      - \* Construction
      - \* Excavation
    - ◇ Environmental or physical
      - \* Temperature extremes
      - \* Moisture extremes
      - \* Improper light for the plant
    - ◇ Cultural or chemical factors
      - \* Nutritional disorders
      - \* Pollutant or pesticide phytotoxicities
  - Use references or labs to help determine the exact cause of the problem.
- ◆ Put all this information together to determine probable causes.

come into play. What's the difference? Simply put, biotic problems are caused by living organisms such as insects, mites, nematodes, fungi, or bacteria. Abiotic problems are far more prevalent in our Wyoming climate and have non-living causes such as improper temperatures or irrigation, nutrient deficiencies, and mechanical damage.

Note that biotic problems are more random and less organized than abiotic problems. There is usually no uniform pattern. For example, if scattered damage in the plant canopy is seen, it's possible there is a foliar or aerial problem and not involving roots. However, if scattered branches gradually decline and eventually die, there is a strong possibility a canker pathogen, shoot blight, or borers may be causing the problem. Living organisms will usually damage foliage or needles in random ways and not in patterns.

Problems caused by cultural or environmental (abiotic) issues tend to affect all plants in the same area pretty much the same way. For example, damage from a chemical may appear on all leaves of the same age. Or, all the foliage on one side of a plant may be affected, as happens with sunscald on the southwest side of trees. Also, damage will generally appear on more than one type or plant species.

## The Time Frame

Another factor in the diagnostic process is whether the damage occurred suddenly or gradually. Sudden declines in plant health are typically caused by nonliving factors such as frost or chemical drift. Plants that show gradual declines have generally been attacked by a living factor. Wilt diseases and damage from root weevils are examples.

## Getting Closer to a Diagnosis – Biotic Cause

So, you think you've narrowed the problem down to a biotic factor caused by some six- or eight-legged creature or evil fungus. How do you know which?

Problems caused by pathogens can be fairly distinctive. Fungal diseases often show signs of thread-like mycelium



and fruiting bodies. You may need a hand lens or microscope to see these, however. Bacterial diseases may have characteristic water-soaked lesions associated with them. Viral diseases often cause foliar distortion, stunting, or leaf yellowing.

Problems caused by insects or mites will also show typical damage depending on the culprit and their feeding habits. Chewing insects such as caterpillars or leaf beetles can consume parts of or entire leaves. Sucking insects like aphids and whiteflies leave behind a stippled or mottled appearance on the foliage. Heavy infestations of spider mites will be evident from webbing, and slugs can skeletonize leaves and leave behind slimy trails wherever they go.

### Getting Closer to a Diagnosis – Abiotic Cause

What if you think it's an abiotic problem? How do you determine the cause? These can be put into three general categories: mechanical, environmental, or cultural.

With mechanical damage, there may have been

recent construction, excavation, or paving activities close by. Suspect mechanical damage if there are broken stems, branches, and torn leaves.

Environmental or physical factors include temperature extremes, flooding, high wind, and high or low light levels. High temperatures

often cause wilting while exposure to overnight frost can cause blackening of foliage tips. High winds can dry plants out very quickly – particularly evergreens during winter. Exposure to high light levels can cause wilting and burning of the foliage with brown tips showing up on the leaves.



### Resources available to help diagnose plant problems:

University of Wyoming Cooperative Extension Service, [www.ces.uwyo.edu](http://www.ces.uwyo.edu).

*Sustainable Horticulture for Wyoming – a Master Gardener Handbook*, December 2004, available through the College of Agriculture and Natural Resources Resource Center, (307) 766-2115, or through the UW CES Web site.

*Insects and Diseases of Woody Plants of the Central Rockies*, Bulletin 506A, May 2000, Colorado State University Cooperative Extension, available through the CSU Cooperative Extension Resource Center, (877) 692-9358, [www.ext.colostate.edu](http://www.ext.colostate.edu).

PlantFacts Web site: [plantfacts.osu.edu](http://plantfacts.osu.edu)

Brenzel, K.N. (ed.). (2001). *Sunset Western Garden Book*. Menlo Park, CA: Sunset Publishing Company.

Dirr, Michael A. 1998. *Manual of Woody Landscape Plants*. Stipes Publishing LLC, Champaign, IL.

Armitage, Allan M. 1989. *Herbaceous Perennial Plants*. Varsity Press Inc., Athens, GA.

Cranshaw, Whitney. 2004. *Garden Insects of North America*. Princeton University Press, Princeton, NJ.

UW CES Soil Testing Laboratory, (307) 745-4825, [ces.uwyo.edu/Soil\\_Main.asp](http://ces.uwyo.edu/Soil_Main.asp).

UW CES entomology, (307) 766-2508, [ces.uwyo.edu/Entomology.asp](http://ces.uwyo.edu/Entomology.asp).

UW CES commercial horticulture, (307) 766-5117, [ces.uwyo.edu/CommercialHorticulture.asp](http://ces.uwyo.edu/CommercialHorticulture.asp).

UW CES pests and pesticides, [ces.uwyo.edu/Pest.asp](http://ces.uwyo.edu/Pest.asp).

UW CES weed management, [ces.uwyo.edu/weed\\_Main.asp](http://ces.uwyo.edu/weed_Main.asp).



Cultural or chemical factors include improper irrigation or pesticide application, exposure to air pollutants, and nutritional disorders. Erratic or insufficient irrigation is quite common leading to death of upper plant parts or even the whole plant. Spray drift from herbicide applications is, unfortunately, very common. Every herbicide has its distinctive mode of action with accompanying symptoms. Air pollutants in urban areas often cause injury to some types of plants, and nutritional problems often

arise in our poor Wyoming soils because of high pH, poor soil quality, and poor irrigation water quality. Every nutrient essential for plant growth and development has its own specific deficiency (and toxicity) symptoms – some of which mimic pathogens.

### Still Not Sure?

Consider this: in Wyoming's climate, the vast majority of times the problem will be cultural or environmental and not caused by an insect or disease. Avoid the temptation

to blame a plant's poor health on a critter of some sort. Also, avoid the temptation to look up the possibilities in one-book-fits-all-locations references. Plants, insects, mites, and disease-causing pathogens have very individual geographic distributions and environmental requirements. The pest you find in that problem-solver might not even be found in Wyoming.

### There is Help!

If help with the diagnostic process is needed,

contact a local office of the University of Wyoming Cooperative Extension Service (UW CES). Contact information is at <http://ces.uwyo.edu/Counties.asp>. Extension educators and Master Gardeners can help sort through issues to determine a probable cause as well as offer remedies. There are also numerous specialists on the UW campus in Laramie to help with more specific issues.

And remember, the culprit just might be you.

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