

Grower 101: Diagnosing Plant Diseases of Floricultural Crops

Powdery mildew on sweet pea. (Photo courtesy of Bridget White)

Need help identifying some common greenhouse diseases? Here are the most common problems.

By Robert Wick

An accurate diagnosis of disease is important for several reasons. Bacterial diseases are not controlled with fungicides, and some bacterial diseases are easily mistaken for fungal diseases. Some fungicides have a narrow spectrum of activity. In addition, if you know the disease, you can usually find information regarding the environmental conditions necessary for disease development. You could also find out if the pathogen was seed-borne or soil-borne and whether other crops in the greenhouse may also be susceptible.

The ability to make an accurate diagnosis on-site is dependent on a disease that has unique symptoms. Also, the grower needs to have previously identified the problem or have a good illustration or written description to make proper identification. There are a number of diseases that can be easily identified on-site, and there are many that can only be diagnosed in a university or private diagnostic lab.

Damping-off and Root Rots. Of all of the diseases, damping-off and root rot are the most difficult to identify on-site, most often because wilting, stunting or nutrient deficiency in the

leaves distract growers from the root system that is causing the problems. Pythium and Rhizoctonia are the two most common causes, but they usually do not leave any clues as to their identity. Also, they have a wide host range, so the plant on which they occur does not supply a clue. When Rhizoctonia is causing web blight, you can see the brown strands of mycelium on the diseased plants. Webbing occurs when temperature and humidity are high. There are test kits available that can allow you to make an accurate on-site identification of Pythium, Phytophthora and Rhizoctonia. Environmental controls: Destroy entire plant and its soil; improve media drainage; use new containers; plant at appropriate depth.

Soft-Rots. Cuttings have a large wound on the base and can be very susceptible to Erwinia soft rot, especially when temperatures are in the 90s and there is plenty of water. When Erwinia is the cause, the base of the cuttings become soft and slimy. If the cuttings are diseased but remain firm, something else is the cause.

Poinsettias are subject to a rapidly developing soft rot by the fungi *Rhizopus choenophora* and the bacterium Erwinia. These can be

pests & diseases

difficult or impossible to identify on-site, but there are no fungicides or bactericides that will help. Simply discard the plants.

Bacterial Blight of Geranium. Bacterial blight of geranium is caused by *Xanthomonas*. Wilted plants will not have root rot or stem canker (unless there are several diseases occurring). At first, one or two leaves will become soft and droop. Root rot or high soluble salts can also cause wilt but usually the whole plant wilts. Another good indication of *Xanthomonas* is leaf spots, but leaf spots do not always occur.

Ralstonia (Pseudomonas) solanacearum can also cause a systemic wilt of geranium but does not cause leaf spots. We rarely see *Ralstonia* in geranium in New England, but we had several cases in 1999. *Xanthomonas* only infects geranium but *Ralstonia* infects a variety of ornamentals and vegetables (as well as tobacco and banana).

Bacterial Leaf Spots. Bacterial leaf spots can look very similar to fungal leaf spots but when you hold them up to the light (as if to see the light through the leaf), bacterial spots usually have a translucent



Top Left: Fungal *Alternaria* on *impatiens* (photo courtesy of Ann Chase); Top right: *INSV* on *cyclamen* (Photo courtesy of Steve Nameth); Middle: *Phytophthora* on *spathiphyllum* (Photo courtesy of Ann Chase); Bottom: *Botrytis* on *forget-me-not*. (Photo courtesy of Bridget White)

look to them. On geraniums, you may see a halo around the spot. Bacterial spots on impatiens can be distinguished from *Alternaria* leaf spot because *Alternaria* causes the leaf to become yellow. *Pseudomonas syringae* and *P. cichorii* cause leaf spots on geranium. Spotted leaves will look similar to those caused by *Xanthomonas*, but the leaves will not wilt. Geranium leaves will turn yellow and dry up after being infected but will not wilt. One way to distinguish bacterial leaf spots from fungal leaf spots is to consider the environment. Bacteria usually flourish under hot temperatures; fungi prefer cooler conditions. Environmental controls: Remove damaged leaves when dry and destroy leaves; keep plants as dry as possible; use drip irrigation; provide adequate spacing.

Fungal Leaf Spots and Blights. There are many fungi that cause spotting of floricultural crops. With experience, some can be recognized but many cannot be identified on-site. *Alternaria* on zinnia, impatiens and gomphrena is relatively easy to identify. *Botrytis* is easy to identify when it is producing its crop of gray spores. On fuchsia, *Botrytis* causes cankers, which usually do not develop spores, but cankers on fuchsia are almost always caused by *Botrytis*. Environmental Controls: Remove damaged leaves when plants are not wet and destroy leaves; use drip irrigation; space for good air circulation.

Powdery Mildew. This disease is easy to identify because of the powdery crop of spores it produces on the leaf surface, which makes most any infected plant unsaleable. In most cases, powdery mildew develops on the top side of the leaf and has a similar appearance on host plants, but on poinsettia and a few other plants, mildew will also grow on the bottom. Powdery mildew rarely kills plants but can result in lower leaf drop. Occasionally, plants will develop purplish discolorations as a result of severe infestation. African violet, begonia, dahlia, gerbera, hydrangea,

kalanchoe and pansy commonly develop powdery mildew. On kalanchoe, powdery mildew can be difficult to recognize because only a fine webbing will develop.

Environmental controls: Use resistant varieties; avoid crowding plants; grow plants in full sun if possible; keep plants as dry as possible.

Rusts. Like powdery mildew, rust diseases are easy to identify. The rust fungi produce pustules of spores on the bottom side of the leaf and pale spots on the upper

leaf surface. The pustules contain masses of rusty to orange-colored spores. Snapdragon, fuchsia, carnation and geranium are among the plants susceptible to rust diseases. To diagnose rust diseases,

rub infected leaves on a sheet of white paper; the rust-colored streaks left behind by spores are diagnostic for rust. Environmental controls: Remove damaged leaves when plants are dry and discard

leaves; keep plants dry; avoid crowding plants.

Fusarium and Verticillium Wilt. Diseases caused by these fungi usually affect only part of the plant at first. Foliage on the affected

stems will wilt and usually become yellow. There may or may not be discoloration in the vascular tissue (cutting into the stem will reveal a dark stain). It is difficult to diagnose these diseases with much confidence in the field. With cyclamen, several leaves will turn yellow. When you cut through the corm (cut the top off) you will see a dark band of vascular tissue that corresponds with where the yellowed leaves were. These two vascular wilt fungi are not commonly seen in greenhouses. When they do occur, it is usually on chrysanthemum, cyclamen or basil. Environmental controls: Destroy entire plant and soil; improve soil drainage; use new soil.

Viruses. Virus diseases can be either very distinctive or impossible to recognize. The most common virus in greenhouses is impatiens necrotic spot virus (INSV). While not all plants are hosts, the host list is at least 500 species long. The symptoms vary considerably from plant to plant but once you can recognize INSV on a specific plant, you can usually identify it the next time it occurs on the same host. Very reliable test kits that are easy to use are available for testing INSV on-site.

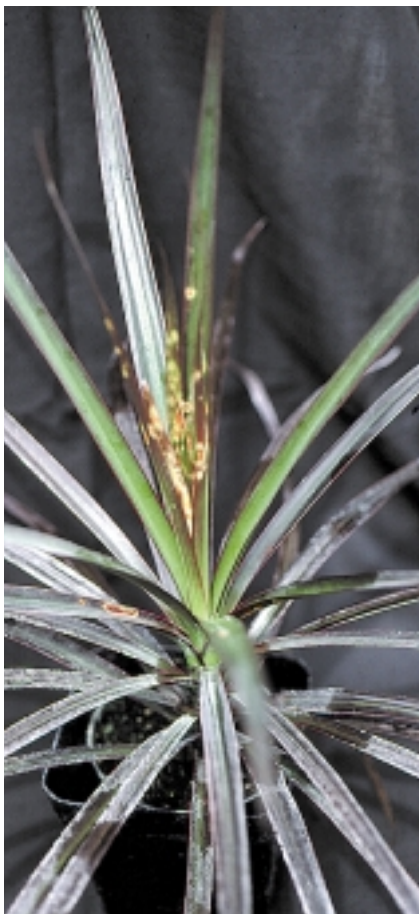
Other viruses can produce distinct symptoms but, for the most part, cannot be reliably diagnosed outside of the lab. Viruses should be identified accurately because they are carried by different insect vectors and have different host ranges. Environmental controls: Destroy symptomatic plants; keep insect and mite pests under control; control weeds.

DIAGNOSTIC KITS AND SERVICES

Identification of diseases caused by fungi, bacteria and INSV. Plant Disease Diagnostic Lab, Department of Microbiology, Fernald Hall, University of Massachusetts. Call Rob Wick, (413) 545-1045.

Identification of viruses of all kinds. Agdia Testing Services. 30380 County Road 6, Elkhart, IN 46514. (800) 622-4342.

On-site test kits for Xanthomonas camptestrus pv. pelargonii, INSV and TSWV. Agdia Testing Services. 30380 County Road



Top: *Erwinia* on cyclamen; Bottom: *Fusarium* leaf spot on red-edge dracaena. (Photos courtesy of Ann Chase)

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On-site test kits for *Xanthomonas camptestr* pv. *pelargonii*, INSV and TSWV. These kits were developed by Hydros Environmental Diagnostics Corporation, Falmouth, Mass., and are available through Griffin Greenhouse Supply, 1619 Main St., Tewksbury, MA 01876. (978) 851-4346.

Additional kits for *Pythium*, *Phytophthora* and *Rhizoctonia* are available directly from Hydros Environmental Diagnostics Corporation. (508) 540-2229.

On-site test kits for *Pythium*, *Phytophthora* and *Rhizoctonia*. Neogen Inc., 620 Leshar Place, Lansing, MI 48912. (517) 372-9200. 