

General Tips on Identifying Plant Diseases

1. Look for symptoms on all parts of plants. Don't just focus on first symptom seen.
 - a. Examine leaves (young and old; both surfaces), stems, flowers, fruit, and growing points. Note shape and appearance of leaf spots. Location of affected tissue on fruit can be important.

Leaf spots tend to have angular shape with some diseases including some downy mildews because these pathogens are not able to move through major veins. *Alternaria* fungi often produce round spots with target appearance that develops as the pathogen progresses. Leaf spots caused by pathogens sometimes have a wilted or yellow border reflecting pathogen growth into new tissue whereas spots due to injury have a sharp border between affected and healthy tissue.
 - b. If affected plants are stunted or wilted, look at roots and cut open stems (including below ground portion) to see if there is discoloration anywhere. Location (xylem vs phloem) and extent of discoloration (just at crown vs extending up stem) can be important for diagnosis. Is plant completely wilted or just one side of plant or leaves?

With *Verticillium* wilt (in eggplant in particular), often wilting and yellowing starts on one side of leaf or plant reflecting this fungus being present and blocking xylem vessels supplying water only on that side.
2. Look at distribution of symptoms on plant.
 - a. Are leaf symptoms mostly on old leaves, young leaves, or evenly distributed?

Old leaves can be affected first because they are most susceptible to the pathogen, it is splashed to these leaves from the soil where it is surviving, or due to conditions being more favorable for the pathogen (leaves low in the canopy stay wet longer).
 - b. Do symptoms appear to be progressive, or do they indicate one-time injury?

Almost all plant pathogens spread causing new symptoms in a planting over time (polycyclic). A cycle from infection to propagules (spores, bacterial cells) produced and ready to spread can be just a few days with bacteria; about a week is common with fungal and oomycete pathogens. Additionally, disease leaf spots expand over time. When spots are due to injury (storm damage, phytotoxicity from excessive dose, pesticide incompatibility, herbicide drift) or abiotic cause (ozone), they typically appear suddenly and do not increase over time.
3. Look at distribution of affected plants in a planting.
 - a. Are symptoms throughout the planting? Or are affected plants individual or in groups? Are these in a low area?

Individual affected plants is common initially with viruses, then neighboring plants may become affected as the virus is spread by insects or handling plants, and can also occur with seed-borne pathogens. Wet soil is favorable for Oomycete pathogens that infect roots (*Pythium*, *Phytophthora*) and cause Phytophthora blight.

- b. Are other plants including weeds also affected?

Abiotic factors, such as soil pH extremes, lightning, nutrient deficiency/toxicity, and herbicide drift, often affect multiple plant species.

- 4. Look for signs of a fungal or Oomycete pathogen, which are the structures it makes, typically in leaf spots, to spread or survive for a future planting. Observing these confirms the diagnosis. A hand lens will be helpful.

- a. Are spores present? Fruiting bodies? Sclerotia?

Early morning is the best time to look for spores as some pathogens (e.g. downy mildews) produce them overnight, then they are dispersed by wind during the day.

Signs of the pathogen can be induced to develop by incubating affected tissue in a closed plastic bag on damp paper towel for 12 to 24 hours ideally in dark.

Fruiting bodies have spores inside, for example pycnidia produced by *Septoria*.

The white mold fungus produces sclerotia typically on the surface of affected tissue (e.g. cabbage, lettuce, beans) and sometimes inside stems (e.g. pepper, tomato).

- 5. Make detailed notes about symptoms and environment as well as distribution on and among plants. Take photographs with camera or cell phone to document symptoms.

- a. Are plants in full sun or partial shade?

- b. Is soil very wet or very dry?

- 6. Look at photographs of disease symptoms posted on the web. Photographs and information about diseases of vegetables and herbs are at

<https://www.vegetables.cornell.edu/pest-management/disease-factsheets/>;
strawberries are also at <http://blogs.cornell.edu/livegpath/gallery/>

If you cannot determine what is affecting your plants, contact your local extension specialist and send photographs. If you need to submit a sample to your state diagnostic laboratory, ship overnight promptly after collecting. Don't expose to excessive heat (closed vehicle) or cold (refrigerator) beforehand. Whole plant is ideal when size permits. Keep soil off of leaves with foliar diseases when the whole plant is submitted by putting the root ball in a small bag kept closed with an elastic band, twist tie or tape around the plant crown, or by putting it in the corner of a large bag that will encompass the entire plant and similarly confining the roots and soil. Enclose whole plant in a plastic bag with some air space. When shipping leaves, typically they arrive in best condition when put on damp (not wet) paper towel in a ziplock bag, but wrapped in dry paper is often better with bacterial diseases. Ship in a box not an envelope. But first, check with the laboratory for their recommendations on what to send and how to package it.

Disease occurrence is being monitored for following important diseases. When you see on your plants, please take photos to document and report at website where you can upload your photos:

Downy mildew of basil. <https://basil.agpestmonitor.org>

Downy mildew of cucumber, squash and other cucurbits. <http://cdm.ipmpipe.org/>

Late blight of tomato and potato. <http://www.usablight.org/>

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