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## Fungi

Of all the plant pathogens, fungi are the ones you'll deal with most frequently. Some fungi are beneficial to plants, by breaking down decomposing plant material in soil, helping plants improve the uptake of nutrients, and suppressing the development of other fungi that cause plant diseases. Therefore, the use of certain pesticides and soil sterilization discourages the beneficial fungi in the soil. Conversely, the use of compost teas to create or feed the beneficial fungi can help protect a plant's roots.

**What you see (most common for us):**

### Apple Scab

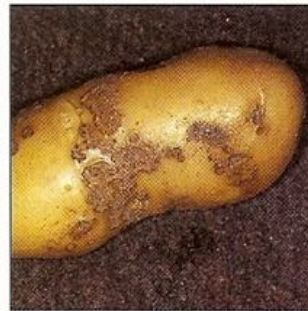


*Symptoms on apple*



*Symptoms on apple*

### Scab



*Symptoms on potato*

**Apple Scab** symptoms first appear on leaves as olive green spots that gradually turn black. Leaves may be deformed or smaller than normal and may drop prematurely. Brown or black spots may also appear on the fruit, which later turn into raised, brown, corky areas.

Apple scab can be prevented by planting resistant cultivars, as well as raking up and disposing of fallen leaves, which carry over-wintering spores. Apple scab is most prevalent in cool, moist summers because the spores spread rapidly in wet weather. In spring, regular copper, sulfur or lime-sulfur sprays may prevent fungi from infecting young leaves and fruit, reducing damage and chance of recurring later in the season.

**Scab** begins as small brown spots on the tubers or roots of Potatoes, beets, radishes and other root crops. These areas enlarge and run together, producing russetting and rough, corky areas. These spots are usually just on or below the surface, so crop is still edible, although visually unappealing.

Scab fungi thrive in light, sandy soils with a neutral or alkaline pH. Lowering the soil pH to below 5.2 will reduce the chance of disease. Start with certified disease-free potatoes. Rotate crops and plant resistant cultivars. Keep the soil evenly moist.

## Black Spot



*Symptoms on rose*

The disease appears as circular black spots on infected Rose leaves. The spots usually have fringed or indistinct margins and are often surrounded by a ring of yellow tissue. Severely infected leaves may fall early. Black spot fungus thrives in moist conditions. Avoid wetting plant leaves when watering and prune plants to increase air circulation. Once symptoms appear, black spot is very difficult to control. Remove and destroy infected leaves and canes. A mix of 1 teaspoon baking soda in 1 quart water may help to control the disease, spray infected plants thoroughly.

## Powdery Mildew



*Symptoms on pumpkin*



*Symptoms on zinnia*

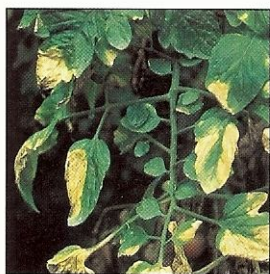
## Downy Mildew



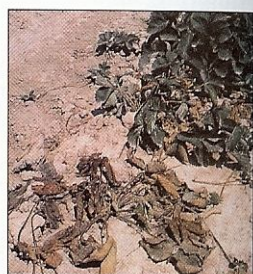
*Symptoms on grape*

**Mildews** include downy & powdery. Infection results in spots or white patches on leaves, shoots and other plant parts. Downy appears on the underside of leaves and can kill plants rapidly. Powdery mildew is seen on the tops of leaves and commonly causes poor growth and lower yields, but seldom kills the plant. Fuzzy gray mold is the more minor problem of Botrytis rot.

## Verticillium Wilt



*Symptoms on tomato*



*Symptoms on strawberry*

## Fusarium Wilt



*Symptoms on tomato*

Fungal wilts damage a wide range of plants, plugging up the plant's water-conducting vessels and causing leaves to wilt and die. Symptoms usually first appear on the lower or outer parts of the plant, as yellow leaf patches that turn brown and often spread to cover whole leaves. The interior of the stem near the base may be discolored. Leaves often fall early, and the plants die. Verticillium wilt is more common in cool weather in temperate areas like ours. There is no cure for fungal wilt, so the most effective control is the use of wilt-resistant cultivars. Soil solarization may help.

## Early Blight



*Symptoms on tomato*

## Late Blight



*Symptoms on potato*

**Blights** include early & late, which attack tomatoes and their relatives. The fungi can damage or kill leaves and cause rot in the fruit or tubers.

### How they spread:

Spore production gives fungi the ability to travel great distances and can easily be picked up and carried by water, animals, or touching plant to plant. That is why you should always make sure to disinfect pots, tools, and hands before touching other plants if you suspect contamination.

### How to Prevent:

Besides selecting plants that are resistant to fungal diseases, you can lessen the chance of infection by the following steps. Spores germinate best when surrounded by warm (and sometimes cool) temps and water. Although you can't control the temperature, you can minimize the times a plant is wet by choosing a well-drained, upland planting site with lots of sunlight and good air movement/breeze. Space plants and prune excess foliage to allow air and sun to reach leaves following rain or morning dew. Crop rotation is best preventative for soilborne pathogens, particularly for tomato family (eggplants, peppers). Growing in containers allows more control of location and starting with new pots & soil.

### How to Control:

Even taking preventative steps can't reduce all chances of incidence, so you will probably have need to treat symptoms. For airborne fungi (mildews), which produce symptoms on above-ground plant parts, picking off the infected part can help reduce the spread of the disease. Also spraying plants with a compost tea (solution made by soaking finished compost in water) not only provides important nutrients to plants, it also serves as a natural fungicide (see below for details). If a plant is seriously infected, remove the entire plant. Place the infected pieces or plants in the center of a hot compost pile, or place in sealed containers and dispose of them with household trash. For serious outbreaks, you may choose a homemade or commercial organic fungicide. Home remedies include baking soda spray for black spot on roses and garlic spray for a range of fungal problems.

Soilborne fungi are the most difficult to control. If possible, dig up and dispose of infected soil. Or try solarizing your soil by laying a sheet of clear plastic over the moistened area and letting the sun "cook" the soil for a minimum of a month in Summer. Be sure to remove any old plant residue, water thoroughly before covering with plastic. Keep in mind this only treats the top 3-5" of soil, so you won't want to disturb the soil more than necessary, thereby bringing up possibly infected soil. Also, many of the good fungi can be killed along with the bad, so make sure to top-dress your crops with a microbe-rich material such as finished compost, which will benefit the lower sections of plants (which when splashed by rain) as well as the soil.

For more info, see **The Organic Gardener's Handbook of Natural Insect and Disease Control**