A2617

Tomato disorders: Fusarium and Verticillium wilts

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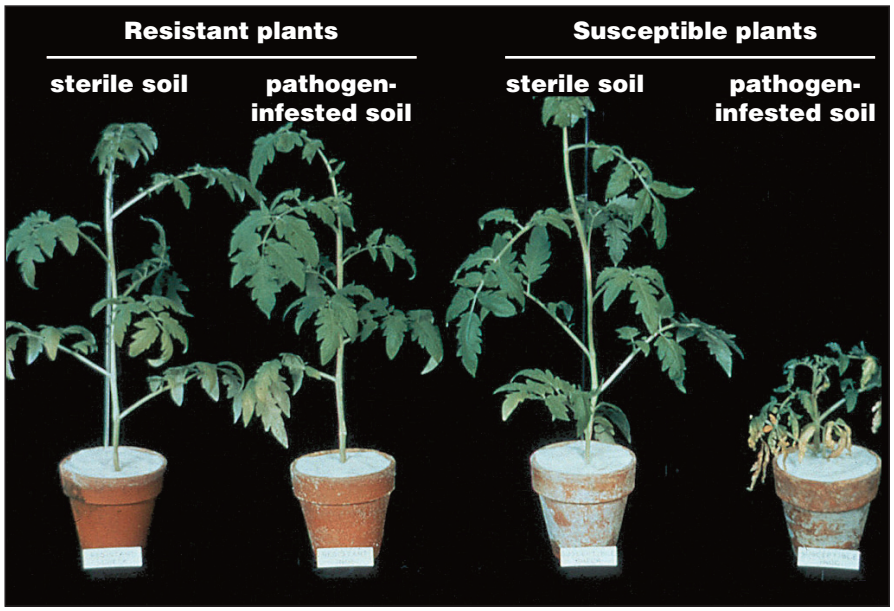
Fusarium and Verticillium wilts once routinely devastated tomato crops. However, the availability of resistant tomato varieties has all but eliminated the problem. In Wisconsin, Verticillium wilt tends to be the more common and serious disease.

Symptoms and effects

Fusarium wilt first appears near mid-growing season after the plant begins to flower. The oldest leaves turn yellow and begin to droop. Often, only the leaves on one side of the stem turn yellow, and wilting only occurs during the hottest part of the day. As the disease progresses, yellowing and wilting continue up the stem until all of the foliage is killed and the stem dies. If the disease attacks the plant early in the season and the air temperatures are above 82°F for a long period, there may be little or no normal fruit. On plants attacked later in the growing season, the lower fruit clusters may be normal, but fruit growing on the upper part is small and inferior. The stem of a wilted plant shows no soft decay, but if sliced, brown discoloration of the water-conducting tissue is evident between the pith and the outer green part of the stem. In severely wilted plants, discoloration may extend the length of the plant.



Resistant plants grow equally well in sterile soil and in soil infested with Fusarium and Verticillium pathogens. While susceptible plants grow well in sterile soil, they are severely stunted when grown in infested soil.

Verticillium wilt may also initially affect one side of infected plants or leaflets on one side of a compound leaf. The older leaves turn yellow, then gradually wither and drop. As the wilt progresses, the plant is defoliated and stunted, and much of the crop is lost due to sunscald and yellow shoulder. Like Fusarium, careful inspection of a slit stem will show tan streaks in the water-conducting tissue just below the stem surface. This discoloration is most pronounced near the soil line, but sometimes extends all the way up.

You can identify these diseases with reasonable accuracy in the field, especially if you slit the stem and examine it for discoloration. However, the symptoms of the two diseases are so similar that identifying the exact organism can be done with certainty only in the laboratory. Tomatoes grown near walnut or butternut trees may exhibit external symptoms similar to Fusarium and Verticillium wilt as a result of exposure to soil-borne toxins produced by these tree species. Plants affected by the toxins show no internal streaking.

Disease cycle

Fusarium wilt is caused by the fungus *Fusarium oxysporum* f.sp. *lycopersici*. This species affects only tomato plants. By contrast, two species of *Verticillium* cause wilt:

V. albo-atrum and *V. dahliae,* with the latter having a host range of nearly 200 plant species.

Fusarium is a warm-weather disease while Verticillium wilt is more prevalent in cool weather. Both pathogens are soil-borne and can remain in the soil for many years. Infection occurs when the fungus enters root wounds caused by cultivation, secondary root formation, and nematode feeding.

The Fusarium and Verticillium pathogens are primarily introduced to fields through infested transplants or seed. Within a field, the diseases move from area to area on reused stakes and by wind, splashing rain, and farm machinery.

Control

The best strategy is to plant varieties that are resistant to Fusarium and Verticillium. There are many tomato varieties with resistance to both—these are noted in seed catalogs and variety descriptions as VF varieties. Some are also resistant to root knot nematodes and are described as having VFN resistance.

Crop rotation out of susceptible species for 5–7 years will reduce the build-up of the pathogens in the soil. Because the fungi can survive in infected debris, remove and destroy all infected plant tissue.

Grow seedlings on clean soil, or buy from growers who practice good sanitation and grow the plants in a disease-free planting medium. Soil pasteurization can reduce the incidence of disease.

There is no practical or cost effective chemical control for either of the wilt diseases. For details about soil fumigants, refer to Extension publication *Commercial Vegetable Production in Wisconsin* (A3422).

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