

# Parasitic Diseases of Tomato

COLLEGE OF AGRICULTURAL, FOOD, AND ENVIRONMENTAL SCIENCES

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Parasitic diseases reduce tomato quality and yield in Minnesota every year. Because the importance of tomato diseases cannot be predicted from one year to the next, you must take certain precautions every year to ensure maximum fruit production with minimum disease occurrence. These precautions are:

- Plant resistant varieties with good horticultural characteristics. See *Disease-Resistant Vegetable Varieties*, FO-2412-C.
- Purchase disease-free transplants from a reliable source. Certain tomato diseases can be introduced to your garden on transplants and cause trouble that year and in succeeding crops.
- Maintain a disease control program throughout the growing season.
- Establish good cultural and sanitation practices such as proper soil preparation, fertilizing, and watering, as well as early detection and removal of diseased leaves and plants.
- Rotate crops yearly to help minimize root rot diseases caused by soilborne pathogens.

## Chemicals suggested for use against tomato diseases

Chemical Group	Common Name	Some Trade Names
A <sup>a</sup>	mancozeb	Dithane M-45, Dithane DF Manzate 200 DF, Penncozeb 80 WP, Penncozeb 75 DF
	maneb	Maneb 80 WP Manex *Maneb Tomato and Vegetable Fungicide
	mefenoxam	Ridomil Gold EC, Ridomil Gold WSP
	chlorothalonil	*Daconil 2787 Bravo 500, Bravo 720 *Ortho Multipurpose Fungicide *Lawn and Garden Fungicide
B <sup>b</sup>	copper fungicides	Kocide 101, Kocide DF, Kocide LF Basicop *Liquid Copper Fungicide *Bordeaux Mixture

\*Fungicides available in small containers for homeowner use.

<sup>a</sup> Group A-Chemicals most effective against fungal diseases.

<sup>b</sup> Group B-Chemicals most effective against bacterial diseases, but also control many fungal diseases. These are the only chemicals available to organic growers.

## Suggested Spray Program for Disease Control

After transplants are well established in the garden (2-4 weeks after transplanting), begin a spray program to minimize the introduction and/or spread of common tomato diseases.

You must use two different fungicides to control the broad range of diseases that attack tomatoes. In the table, spray chemicals are grouped into two categories. Group A

chemicals are most effective against fungal diseases; Group B chemicals are effective against bacterial diseases but control many fungal diseases as well. These are the only chemicals available to organic growers.

Best disease control is often obtained by alternating applications, on a 7 to 10 day schedule, with one chemical from each group. Read the fungicide label carefully to determine specific crop usage, rate, and frequency of application.

Check label directions for compatibility before mixing insecticides with fungicides. Do not use a sprayer that previously contained a hormone-type substance like 2,4-D—tomatoes are very sensitive to these chemicals. Rinsing with water will not remove these chemicals.

## Diseases Controlled by the Spray Program

### Early Blight

Early blight, caused by *Alternaria solani*, is a common tomato disease in Minnesota. The fungus causes a spotting of leaves and fruits and, in severe cases, defoliation. You can readily identify the dark brown or black leaf spots by their concentric rings in a target pattern. Early blight is a mid- to late-summer disease.

### Late Blight

Late blight, caused by *Phytophthora infestans*, is favored by cool nights and moderately warm days with abundant moisture. During favorable weather conditions the disease can infect an entire planting within a few days. Heavily infected plants look like they have frost damage. Symptoms include (1) water-soaked leaf spots that enlarge rapidly in moist weather and (2) a white downy fungus growth on the underside of leaves. Fruit symptoms are illustrated in **figure 1**.

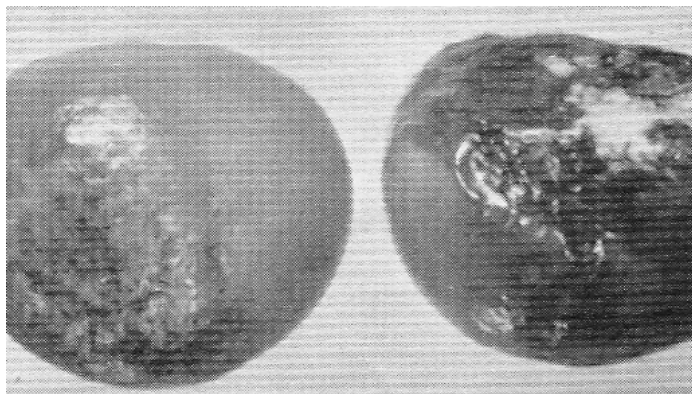


Figure 1. Tomatoes showing the discoloration and wrinkled appearance associated with late blight infection.

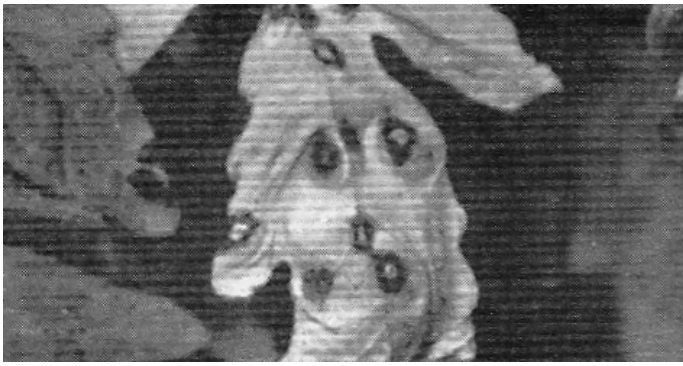


Figure 2. Septoria leaf spot of tomato.

### Septoria Leaf Spot

Another common tomato disease, Septoria leaf spot, is caused by *Septoria lycopersici*. This disease generally does not appear until after fruit set. Infection can occur on stems, petioles, leaves (see figure 2), and fruit. Defoliation is common after a heavy infection.

### Bacterial Speck and Spot

Bacterial speck, caused by *Pseudomonas syringae* pv. *tomato*, is found on leaves and is most noticeable on fruits (see figure 3). Only young, green fruits are susceptible. Severe losses occasionally occur, especially on early crops.

Bacterial spot, caused by *Xanthomonas campestris* pv. *vesicatoria*, also is more noticeable on fruit but may seriously injure leaves. Infected green fruits have slightly raised spots that are 1/8 to 1/4 inch in diameter and brown with rough surfaces. Ripe fruits are not infected.

Both bacterial diseases often infect plants in the seedling stage; spread to green fruits takes place during wet weather. Copper-containing fungicides help hold this spread in check.

**Read the pesticide label and follow the instructions as a final authority on pesticide use.**



Figure 3. Tomatoes showing symptoms of bacterial speck.

## Diseases Not Controlled by Spray Program

### Bacterial Canker

Initial symptoms of bacterial canker, caused by *Clavibacter michiganense*, are wilting and curling of leaves on part of the plant. Later these leaves turn brown but do not fall. Disease symptoms spread throughout the plant in a few days or over several weeks. Plants may die prematurely.

Other disease symptoms include longitudinal stem cracks (2-3 inches) and small (1/8 inch) fruit spots with persistent white halo-like margins. To control this disease, destroy infected plants and obtain transplants from a different source the following year.

### Fusarium Wilt

Initial symptom of Fusarium wilt, caused by *Fusarium oxysporum* f. *lycopersici*, is wilting of the oldest leaves. Frequently, the leaves on only one side of the stem turn yellow first, followed by yellowing and wilting of younger

leaves and resulting in death of the plant. If plants are infected early in the growing season, and if warm air temperatures are rather high for an extended period, little or no normal fruit will be produced. Older plants infected with Fusarium wilt will sometimes produce normal clusters of fruit on the lower portion of the plants, but fruit produced in the upper portion will be small and inferior.

When a wilted plant is removed and the stem sliced near the soil line, a brown discoloration of the woody tissue can be seen between the pith and the outer, green part of the stem. The brown discoloration can extend to the top of the plant if wilting is severe.

### Verticillium Wilt

Initial symptoms of Verticillium wilt, caused by *Verticillium albo-atrum* and *V. dahliae*, are yellowing of older leaves and wilting of young shoots during the day with recovery at night. Plants infected with *Verticillium* species are uniformly affected, whereas leaves of *Fusarium*-infected plants wilt and turn yellow on one side of the stem. Yellow blotches appear on the lower leaves; in time these areas turn brown, resulting in dead tissue. Infected plants are often defoliated and stunted and much of the crop is lost due to sunscald. Inspection of a sliced stem near the soil line will reveal brown streaks in the water-conducting tissue of the plant. However, the discoloration rarely extends to the top of the plant.

Laboratory diagnosis is necessary to determine with certainty which organism is causing the disease.

Control of *Fusarium* and *Verticillium* is difficult since both organisms can survive in soil for an indefinite length of time. Crop rotation of at least four to six years may be helpful for control of both diseases, but the most effective method is to plant disease-resistant varieties.

### Soil Rot

Fruits in contact with soil may be attacked by the soil-borne fungus *Rhizoctonia solani*, which causes soil rot (see figure 4). Supporting plants to keep fruit off the ground almost eliminates this disease.



Figure 4. Tomatoes showing symptoms of soil rot.

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