

Plant Diseases

Tomato Wilt Problems

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There are many possible causes of wilting of tomato plants. Successful treatment of the problem depends on accurate diagnosis and appropriate preventive measures. Some of the major causes of wilting are discussed below.

Fusarium Wilt

The first symptom of fusarium wilt is yellowing of the lower leaves, often on only one side of the plant. The yellowed leaves gradually wilt and die. In some instances, the entire plant may decline and die. A brown discoloration of the vascular (water-conducting) system may be seen by cutting the stem open with a knife.

Fusarium wilt is caused by a fungus, *Fusarium oxysporum* f. sp. *lycopersici*, that enters the plant through the roots and grows up through the vascular tissue. The fungus destroys cells of the vascular tissue, causing starvation in nearby branches of the plant. Fusarium wilt is more serious if root-knot nematodes are present, since their root feeding causes the plant to be more susceptible to the fungus.

The fusarium wilt fungus may be introduced to soils in several ways, such as wind, water, animals or equipment. These fungi become established readily in most soils and can remain in the soil for years.

Control

The most effective means of control is the use of resistant varieties. Refer to Table 1 for recommended commercial varieties. There are three strains, or forms, of the fusarium wilt fungus, called races 1, 2 and 3. The races are numbered in order of their discovery. Many varieties other than those in Table 1 are resistant to fusarium wilt. Read the catalog description when purchasing seeds.



Figure 1. Wilting caused by the southern blight fungus.

If a site is known to have fusarium wilt, maintain soil pH between 6.5 and 7.0. Use nitrate nitrogen fertilizer rather than ammoniacal nitrogen.

Verticillium Wilt

Verticillium (“vert”) wilt is favored by cool temperatures, so this disease is a threat mainly in East Tennessee. The verticillium wilt fungus, *Verticillium albo-atrum*, causes disease in the same manner as the fusarium wilt fungus. The margins of lower leaves are initially wilted, yellowed and necrotic, often in a V-shaped pattern. The symptoms may sometimes be confused with those of bacterial canker or early blight. Plants may wilt slightly during the day and recover at night. The plant becomes stunted and the fruit are small.



Control

Refer to Table 1 for recommended commercial varieties with resistance to verticillium wilt. In addition, any variety whose name is followed by the “V” is resistant to verticillium wilt, race 1. Although a resistance-breaking form, race 2, of the vert wilt fungus has been described, it is not known to occur in Tennessee.

Clean all soil and debris from machinery used in an infested field before moving the machinery to another field. Susceptible varieties should not be planted in an infested field unless the field has first been fumigated or placed into a five-year rotation with corn or grasses.

Root-Knot

Wilting of tomato plants can be the result of an impaired root system caused by the root-knot nematode, *Meloidogyne incognita* or *M. hapla*. This is a wormlike microorganism that feeds on the roots, causing galls, loss of feeder roots and induction of fungal root decay. Infected plants may be stunted and off-color.

Refer to Extension publications SP277-T, *Managing Nematodes in Commercial Vegetables*, and SP341-L, *Nematode Control in the Home Garden*, for additional information on nematodes and their control. Table 1 lists commercial tomato varieties that are resistant to root-knot.

Southern Blight

Southern blight is characterized by rapid wilt and death of the entire plant (Figure 1). The causal fungus, *Sclerotium rolfsii*, attacks many other field and vegetable crops in addition to tomatoes. The fungus attacks the stem near the soil line and forms a white mold. Later in the season, mustard-seed-like structures called sclerotia appear on the mold. The sclerotia are white, tan or brown and are diagnostic for the disease. The fungus overwinters in the upper 2 or 3 inches of soil; it will not survive at greater depths.

Control

1. Crop rotation with corn or other grass crops.
2. Deep (8-12 inches) fall plowing with a moldboard plow. Do not use a rotary tiller. Do not bring the buried plant debris back near the soil surface during the current season by cultivation.
3. Do not “dirt” the plants (throw soil against them by cultivation).
4. If southern blight is expected to be a problem, use Terraclor 75WP in the transplant water at the rate of 3 pounds per 100 gallons water, using one-half pint per plant. The Terraclor solution should be agitated often to maintain a uniform suspension.

Bacterial Wilt

Bacterial wilt, also known as southern bacterial wilt, is characterized by rapid collapse and death of the entire plant. A cut through the stem near the ground reveals a

darkened, water-soaked center (pith and vascular tissue). In later stages, the stem may become hollow.

Bacterial wilt is most serious in moist, warm, high pH, low-fertility soils. Severity is increased by root injury from cultivation, nematodes or any other physical means.

The causal organism, *Ralstonia (Pseudomonas) solanacearum*, can persist on many weeds or even in fallow soil. Spread into uninfested fields can occur through transplants, tools or drainage water from adjacent infested land.

Control

Few resistant varieties are available. Crop rotation is of minimal value because of the survival ability of the organism. Other control practices include:

1. Avoid sites in which the disease has been a problem in the past.
2. Remove and destroy infected plants promptly.
3. Control nematodes, avoid root injury, maintain proper pH and nitrogen levels, and avoid hot, wet soils if bacterial wilt has been a problem.
4. Fumigation with chloropicrin will provide some control.

Walnut Wilt

Wilting of tomato plants may occur when they are planted near walnut or butternut trees. Large amounts of a substance called juglone are released into the soil from the root systems of these trees. Symptoms of walnut wilt include vascular discoloration, similar to that of verticillium and fusarium wilts.

Control

Avoid planting tomatoes near walnut or butternut trees. Plants should be planted at a distance from the tree greater than the height of the tree.

Spotted Wilt

The tomato spotted wilt virus causes a disease sometimes referred to as spotted wilt. This disease occurs erratically but can sometimes cause devastating losses in some Tennessee tomato fields. Purple to bronze “freckles” and rings appear on leaves, stems and fruit. Leaves may be pale and plants stunted. Younger leaves are often affected, which distinguishes spotted wilt from early blight disease. The virus is transmitted by tiny insects called thrips, but insecticide use is only partially effective in reducing spread. There are a few resistant varieties (see Table 1).

“Wilt-Resistant” Varieties

As with any plant, tomato plants can wilt as a result of too little water in the tissues. Several factors other than the diseases mentioned above can cause such wilting. Examples are drought and drowning, which can cause root injury. It is important to note that so-called wilt-resistant varieties are resistant only to fusarium and/or verticillium wilt, not to wilting caused by water deficiency.

Table 1. Disease Reactions of Some Commercial and Home Garden Tomato Varieties in Tennessee

Variety	Fusarium Wilt			Verticillium Wilt, Race 1	Southern Root-Knot Nematode	Spotted Wilt
	Race 1	Race 2	Race 3			
Determinate						
Amelia	X*	X	X	X		X
BHN-444	X	X		X		X
Carolina Gold	X	X		X		
Celebrity	X	X		X	X	
Empire	X	X		X		
Floralina	X	X	X	X		
Florida 47	X	X		X		
Mountain Fresh	X	X		X		
Mountain Fresh Plus	X	X		X	X	
Mountain Pride	X	X		X		
Mountain Spring	X	X		X		
Olympic	X	X		X		
Pik Red	X			X		
Royal Flush	X			X		
Sebring	X	X	X	X		
Sunbeam	X	X		X		
Sunguard	X	X	X	X		
Sunpride	X	X		X		
Indeterminate						
Better Boy	X			X	X	
Big Seven	X			X	X	
Jet Star	X			X		
Lemon Boy	X			X		
Sunray	X					
Traveler 76	X			X		
Cherry Type						
Cherry Grande	X			X		
Mountain Belle	X			X		
Small Fry	X			X	X	
Roma Type						
Hybrid 882	X	X		X		
Plum Dandy	X			X		

* "X" indicates a moderately high to high level of resistance to the disease.

A UT Extension Reminder —

Small Batch Preparation Of Fungicides

Many pesticide labels express rates as amount per 100 gallons of water. These rates are not suitable for small-acreage growers, who often wish to apply pesticides in small sprayers. Conversion of pesticide rates is different for liquid pesticides than for dry pesticides.

Liquid Pesticides: This simple rule of thumb holds for all liquid pesticides.

1 pint per 100 gallons = 1 teaspoon per gallon

Dry Pesticides: Dry pesticides are measured by weight rather than volume. Pesticide densities can vary widely from one product to another, so the weight of a tablespoon of one product can be quite different from that of another. Do not attempt to convert pounds per 100 gallons to tablespoons per gallon, unless you know the density of the product. Some dry pesticide labels tell how much to use in a gallon of water.

Precautionary Statement

To protect people and the environment, pesticides should be used safely. This is everyone's responsibility, especially the user. Read and follow label directions carefully before you buy, mix, apply, store, or dispose of a pesticide. According to laws regulating pesticides, they must be used only as directed by the label.

Disclaimer Statement

Pesticides recommended in this publication were registered for the prescribed uses when printed. Pesticide registrations are continuously being reviewed. Should registration of a recommended pesticide be cancelled, it would no longer be recommended by The University of Tennessee.

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