

Bacterial Wilt of Tomato

As the temperature increases, people may start noticing some of their tomato plants wilting in the sun. Sometimes these plants will recover overnight only to wilt again each afternoon regardless of the water provided and the healthy state of other tomato plants nearby. At this point, a grower should start considering the possibility of bacterial wilt disease being involved.

1. A wilting tomato plant suffering from bacterial wilt.



Photo by Sherrie Smith, University of Arkansas Division of Ag

Bacterial wilt is a plant disease caused by bacteria belonging to the *Ralstonia solanacearum* species complex. These bacteria can infect a wide variety of plants, including ornamentals and solanaceous vegetable crops such as tomato, pepper, potato, and eggplant. In Arkansas, we most often find it in tomato plants.

The first symptom one might notice is the plant wilting in the afternoon sun while other tomato plants are not. The youngest leaves may be the first to start wilting. A tomato plant may perk back up by the next day only to wilt again in the sun. The wilting and recovery cycle happens because the bacteria partially clog the flow of water up the plant. When the demand for water is low, the partially clogged vascular system can still keep

up, but in the middle of the day when the demand for water is high, the system is too blocked up to provide water to the leaves fast enough. With bacterial wilt, it does not matter how much water is available to the plant because the flow of water is limited by the size of the vascular paths leading up to the leaves.

It doesn't take long before the bacteria block the water pathways so much that the plant permanently wilts. Basically, the bacteria are rapidly multiplying within a plant's waterways, gumming up the system. When the waterways are gummed up enough, the plant dies. The amount of time between first noticing the plant wilting and the death of the plant tends to be quick with this disease. Tomato plants suffering from bacterial wilt will retain the green color of their leaves rather than yellowing or browning. This characteristic can be helpful in differentiating bacterial wilt from other vascular wilts of tomato, which tend to cause yellowing or browning of leaves in addition to leaf wilting. The stem, particularly near the soil line, may show a brown canker as the disease progresses.

**2. Brown vascular discoloration within the tomato stem near the soil line
(Left image)**

**3. Bacteria streaming from the base of a tomato stem with bacterial wilt.
(Right image)**



Photo by Sherrie Smith, University of Arkansas Division of Ag

If you cut open the tomato stem near the soil line, you will also tend to see browning inside the stem tissue that may continue down into the root system. This internal browning is not diagnostic of bacterial wilt, as several tomato diseases can cause browning inside the stem at the soil line. To more clearly determine if *Ralstonia spp.* bacteria are the cause of the wilting symptoms you are observing, cut off the tomato stem at the soil line and place that stem in a clear container full of water. Wait 3-5 minutes and then shine a light behind the container. If you see a milky fluid flowing from the stem into the water, then your tomato has bacterial wilt. The milky stream flowing from the cut stem into the water consists of bacterial cells oozing from the tomato vascular tissue.

Bacterial wilt disease develops most readily in moist soils when temperatures reach over 85°F (30°C). The bacteria infect the tomato roots through microscopic injuries that were caused by transplanting, insects, nematodes, emerging lateral roots, and/or other handling of the plants and the surrounding soil. Moving infected soil, handling infected plants near or below the soil line, and water flowing from infected plants can all spread the disease in a garden or field.

If you work in an area with diseased plants, be sure to thoroughly sanitize your tools and the soles of your shoes. Dispose of any plants you suspect have this disease, including roots and plant debris. Either double bag the materials or immediately burn them in a fire. When the growing season has ended, one should plow the crop residue of plants that didn't show disease symptoms into the soil immediately following harvest to encourage rapid decomposition and reduce places for the bacteria in the soil to shelter over the winter.

In areas where you know *Ralstonia spp.* bacteria are present, do not plant tomatoes or other susceptible crops. While tomato plants shouldn't be planted at all where you know the bacteria is present, planting tomatoes late in the season will cause even worse symptoms than if they are planted at the regular time. A minimum of two to three years growing other crops in that location is ideal. Preferably, rotate to crops that can't get bacterial wilt disease such as corn, wheat, beans, peas, cabbage, cauliflower, or broccoli. Contaminated irrigation water can be cleansed of *Ralstonia spp.* by adding either 100 parts per million of hydrogen peroxide to the water or 1.3 parts per million of chloride dioxide. Soil that cools below 39°F (4°C) will have reduced amounts of the bacteria to infect plants in the following year, but even a small amount of *Ralstonia spp.* bacteria can multiply very quickly within a susceptible host.

There are no chemical treatments to protect or treat a plant suffering from bacterial wilt disease. Resistant cultivars exist, and if you know you have a preexisting problem with *Ralstonia spp.*, it would be wise to use those resistant cultivars. It should be noted that

resistance doesn't mean immunity to bacterial wilt disease, and the effectiveness of resistant cultivars may be limited due to the wide genetic diversity within the *Ralstonia solanacearum* species complex. Varieties known to have some resistance to *Ralstonia* spp. include Florida 7514, Heatmaster, Invincible, Kewalo, Momotaro, and Tough Boy. You can also try grafting your favorite tomatoes to resistant rootstock. Resistant tomato rootstocks include Armada, Bowman, Shin Cheong Gang, RST-04-105-T, and RST-04-106-T.