



AVRDC - The World Vegetable Center

Fact Sheet

Tomato Diseases

Bacterial Wilt

Ralstonia solanacearum (= *Pseudomonas solanacearum*)

Most severe in tropical and subtropical climates with high rainfall and warm temperatures



Symptoms

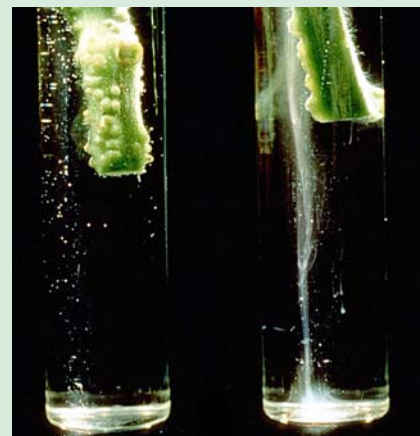
Wilting first appears on the youngest leaves of plants during hot daytime temperatures. The infected plants may recover, temporarily, in the evening, when temperatures are cooler. A few days later, a sudden and permanent wilt occurs.

The roots and lower portion of the stem have a browning of their vascular system. The invaded roots may rot due to infection from secondary bacteria. Diseased stems that are cut and placed in a small container of water will show yellowish or grayish bacterial ooze coming from the cut end.

When conditions are less favorable for disease development (for example, cool and dry), the infected plants may only show signs of stunting, and adventitious roots may develop on the main stems. The lower leaves will turn yellow before wilting symptoms occur.

Symptoms of this disease are distinguished from those of bacterial canker, which causes leaf chlorosis, stem cankers, and "bird's eye" spots on fruits. Bacterial wilt symptoms are distinguished from those of *Fusarium* wilt because of the rapidity of the wilt, under favorable conditions, for the former, and the drier, firmer stem rot of the latter.

How to Identify Bacterial Wilt



Plants wilt, first on the lower leaves during a hot day and then recovering at night. A few days later, a sudden and permanent wilt occurs (left photo). Look for brown discoloration of the vascular system (middle photo). An ooze will flow from a cut, infected stem (compare uninfected versus infected stems in right photo).

Conditions for Disease Development

Soil is the primary source of the disease. The bacterium can survive in soil for extended periods without a host plant. This bacterium exists as a group of variants or races, each of which attack certain plant groups. Major host plants include potato, tobacco, eggplant, banana and plantain; secondary hosts include pepper, peanut (groundnut), sweet potato, and many weeds.

The bacterium can survive in diseased crop debris. The bacteria are released from the roots of the affected plant into the soil and can infect neighboring plants.

Colonization of weeds by *R. solanacearum* affects the degree of carryover of inoculum. Many weeds may harbor the bacteria in the roots yet show no symptoms.

The bacterium enters tomato tissue through wounds on the roots arising from: cultivation, natural wounds at emergence of lateral roots, insect chewing or feeding damage, and nematode feeding. When the diseased plant is removed from the field, the infected root pieces that remain in the soil provide bacteria for infection of new tomato roots.

The dispersal of bacteria is by furrow irrigation or surface water, cultivation, transplanting, wounding and pruning. Infested soil transported with seedlings or with farm implements, or infected seedlings are a source of long-distance dispersal of the bacterium.

High temperatures (for example, 30–35 °C) and high soil moisture favor disease development. High soil moisture increases the survival of the pathogen, its rate of infection and development, and its spread through the soil. Bacterial wilt is a greater problem in heavy soils and in low-lying areas that can retain soil moisture for long periods. This bacterium exists as a group of variants or races each of which attack certain plant groups.



Control

Avoid contaminated land. Suitable rotations can only be determined through local experience because of the diversity of *R. solanacearum* strains and races, and the many agro-climatic zones where reports occur. Rotations of several years duration with maize, cotton, soybeans, grasses, and rice are used in various areas.

Eradicate weed hosts. Remove wilted plants, root debris and volunteer hosts, and burn them to reduce spread of the disease from plant to plant.

Disinfect tools when used in an infested field. Wash with water or bleach or sterilize by flame. Wash the soles of shoes after working in an infested area. Work in the infested portion of a field after working in the non-infested areas.

For transplant production, use disease-free transplants, pasteurized soil medium, or fumigated plant beds. Use proper sanitation measures for transplant production, and avoid damage to roots during transplanting.

Grafting susceptible tomato varieties onto the rootstock of resistant eggplant lines is widely practiced in developed countries of Asia.

There are tomato varieties with some tolerance to bacterial wilt. Variations in race and strain of *R. solanacearum* make it difficult to utilize these varieties in some regions. Consult with your local extension agent to determine if these are available and suitable for your region.

Control root-knot nematodes and root-feeding insects since they may help the disease to establish and spread.



Bacterial wilt is a soil-borne disease that is especially damaging under hot, wet conditions. Some tomato varieties show resistance, but the complexities and numerous strains of the disease make it difficult to ensure complete genetic resistance. The disease can be managed by grafting tomato scions onto bacterial wilt-resistant eggplant rootstocks (left). Raised beds (right) can improve drainage and help reduce problems.

For more information on the production of tomato and other vegetables, go to <www.avrdc.org>.