AVRDC - The World Vegetable Center

Fact Sheet

Pepper Diseases

Bacterial Wilt

Ralstonia solanacearum (=Pseudomonas solanacearum)

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

Symptoms

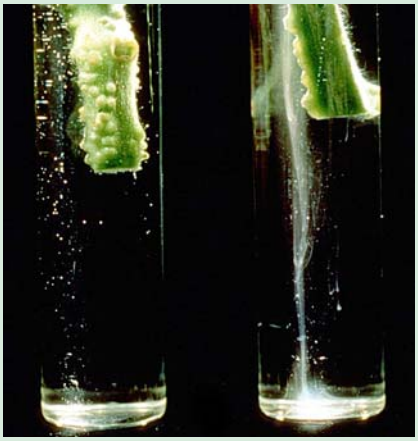
The disease occurs in scattered plants or groups of plants in the field. Wilting begins with the youngest leaves during warm or hot weather conditions during the day. The plants may recover, temporarily, in the evening under cooler temperatures. A few days later a sudden, permanent wilt occurs. The wilted leaves maintain their green color and do not fall as the disease develops.

The roots and lower part of the stem have a browning of the water-conducting portion (i.e. vascular system) of the plant. The invaded roots may rot due to infection from secondary bacteria. Diseased roots or stems that are cut and placed in a small container of water will show a steady, yellowish or gray bacterial ooze coming from the cut end. This bacterial ooze is a key feature in diagnosing this disease. Such oozing is not found with Fusarium-infected plants, which die more gradually and have a drier, firmer stem rot than bacterial wilt-infected plants. Bacterial wilt is distinguished from Phytophthora blight by the extensive darkening of the external part of the lower stem in the latter case.

How to Identify Bacterial Wilt

Sudden wilting, no yellowing

Healthy (left) and infected (right) plants; notice the internal discoloration of infected vascular tissue and external rotting of roots



Bacterial ooze from infected tomato stem (right); the left stem is healthy

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Conditions for Disease Development

Soil is the primary source of disease. The bacterium can survive in soil for extended periods without a host plant.

The bacterium can also survive in diseased crop debris. The bacteria are released from the roots of the affected plant into the soil and can infect neighboring plants. Many weeds may harbor the bacteria in the roots yet show no symptoms.

The bacterium enters pepper tissue through wounds on the roots arising from cultivation, natural wounds at emergence of lateral roots, insect feeding, 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 roots. The bacterium disperses through furrow irrigation or surface water, cultivation, transplanting, cutting/wounding, and pruning. Infested soil may be transported with seedlings, farm implements, or shoes of farm workers. Seed transmission in pepper is not considered important.

High temperatures (eg. 30–35°C) and high soil moisture favor disease development. High soil moisture increases the survival of *R. solanacearum* in soil, the rate of infection, the disease development after infection, and the number of bacterial cells released from the host into the soil. Bacterial wilt is a greater problem in heavy soils and in low-lying areas that can retain soil moisture for long periods.

Control

Use an integrated approach to control this disease since the organism has many strains/races and a very wide host range (for example, tomato, potato, tobacco, eggplant, banana, plantain, peanut, sweet potato, and many weeds). Avoid use of contaminated water for irrigation. Do not irrigate a field with water containing run-off from other affected fields. Avoid contaminated land. If possible, plant during the cooler parts of the growing season.

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. Clean farm equipment after working in an infested field. Disinfest 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. Avoid movement of infested soil or contaminated plant material into the nursery bed. Use proper sanitation measures for transplant production, and avoid damage to roots during transplanting.

Soil amendments may reduce bacterial wilt in some locations. Consult with your local extension agent to determine possible treatments that may reduce the disease in your location.

Sources of resistance have been identified in sweet bell pepper. 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.

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

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