



AVRDC - The World Vegetable Center

# Fact Sheet

## Pepper Diseases

# Verticillium Wilt

*Verticillium albo-atrum, V. dahlia*

Found worldwide

## Symptoms

Affected plants are often scattered sporadically in the field. Disease symptoms on pepper produced by both fungi are similar.

Symptoms are not usually seen until several weeks into vegetative growth. In early stages the edges of the leaves will roll inward with some foliar wilting. The plant may recover from wilting during the night when temperatures are lower and there is less water stress. Initially, there is some slight stunting and a slight yellowing of the older, lower foliage. The disease symptoms move up the plant.

As the disease develops, the leaves show more



yellowing, and they may drop off, and the plant shows permanent wilting with stunting. There is a dark brown discoloration present in the vascular section of the stem that extends from the soil line up the stem into the lower branches of the plant. The affected roots do not show any external symptoms, in contrast to infection by *Phytophthora capsici*, where roots show external dark discoloration.

## Conditions for Disease Development

*V. dahlia* is favored by moderate-to-high temperature

## How to Identify Verticillium Wilt



Gradual wilting of plant; yellowing of lower leaves



Internal discoloration of vascular tissue, yet surface root tissue appears healthy

while *V. albo-atrum* is favored by cooler temperature. Both fungi survive in soil and crop debris as specialized structures called *microsclerotia*. These structures enable the fungus to tolerate extreme environmental conditions and lie dormant in the soil for many years in the absence of a susceptible host. In the presence of moisture, root exudates of susceptible plants stimulate the germination of microsclerotia.

The fungus directly penetrates the roots and moves through the root tissue to the water-conducting vessels. These become plugged with the fungus, causing plants to wilt.

The fungus is disseminated with infected transplants, irrigation water, wind, on particles of infested soil on farm implements, machinery, vehicles, and on worker shoes.

Attack of pepper roots by nematodes will hasten Verticillium wilt development.

## Control

Sanitation is crucial since once the fungus is introduced into the field it may remain indefinitely. If possible, where limited infection occurs, destroy infested plant material (including root tissue) after harvest to reduce populations of the fungus. Eliminate weeds in the production field that may serve as symptomless hosts for the fungus or other susceptible crops that may contribute to bridging the period between susceptible pepper crops. Clean farm utensils and equipment when moving from one field to another. Wash the soles of shoes after working in an infested area. Work in healthy fields first before working in affected fields.

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. Treat surfaces with a disinfectant before placing flats there.

Temporary flooding will reduce populations of microsclerotia. Do not irrigate a field with water containing runoff from other affected fields.

Use a long rotation of 3–4 years, including rice, broccoli, corn or sorghum, to allow plant residues to decompose in the soil and to reduce fungal populations in the soil. Avoid use of tomatoes, potatoes, eggplant, or strawberries in the rotation scheme.

Pre-plant soil solarization alone or combined with fumigation, especially using fumigants containing chloropicrin, will reduce fungal populations. This is especially effective in nethouse, greenhouse or rain shelter production. Maintain a high level of plant vigor with appropriate fertilization and irrigation to keep plants less susceptible.

Avoid contaminated land. Keep seedling and crop production fields away from previous fields infested with Verticillium.

Resistant pepper cultivars are not available.

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

**For more information on the production of pepper and other vegetables, go to <[www.avrdc.org](http://www.avrdc.org)>.**