

# Verticillium Wilt of Raspberry

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**V**erticillium wilt is one of the most serious diseases of raspberry. This disease is caused by a soilborne fungus and reduces raspberry yields by wilting, stunting, and eventually killing the fruiting cane or the entire plant. The disease is usually more severe in black than in red raspberries. Blackberries are also susceptible to the disease, but seldom suffer severe losses.

Verticillium wilt is usually a cool-weather disease and is most severe in poorly drained soils and following cold, wet springs. The appearance of symptoms on new canes frequently coincides with water stress caused by hot, dry midsummer weather.

## Symptoms

The symptoms usually appear on black raspberries in June or early July, and on red raspberries about a month later. The lower leaves of diseased plants may at first appear to have a dull green cast as compared to the bright green of normal leaves. Starting at the base of the cane and progressing upward, leaves wilt, turn yellow, and drop. Eventually, the cane may be completely defoliated except for a few leaves at the top. Black raspberry canes may exhibit a blue or purple streak from the soil line extending upward to varying heights. This streak is often not present or difficult to detect on red raspberries. The final effects of the disease are observed on fruiting canes that were infected the year before. In the spring, many of the diseased canes will be dead. Others will be poorly developed and have shriveled buds. The

new leaves are usually yellow and stunted. Infected canes may die before fruit matures, resulting in withered, small, and tasteless fruit.

## Causal Organism

Verticillium wilt is caused by the fungus, *Verticillium albo-atrum*. It is a very common soilborne fungus, and has been reported to cause wilt on more than 160 different kinds of plants including strawberries, eggplant, tomatoes, potatoes, stone fruits, and peppers. The *Verticillium* fungus overwinters in the soil and plant debris as dormant mycelium or black, speck-sized bodies called microsclerotia. The fungus can survive in the soil for many years. When



Figure 1. Verticillium wilt of black raspberry.



Figure 2. Infected canes often develop a bluish-black discoloration.

conditions are favorable, the microsclerotia germinate and produce threadlike fungus filaments (hyphae). These hyphae can penetrate the root directly, but invasion is aided by breaks or wounds in the roots. Once inside the root, the fungus grows into the water-conducting tissue (xylem). The destruction of water-conducting tissues prevents the movement of water from the roots to the rest of the plant; thus, the plant eventually dies. The fungus produces microsclerotia in infected tissues. When these tissues die and are returned to the soil, the disease cycle is completed.

### Control

Applications of fungicides are ineffective in control. Soil fumigation has provided excellent control in some

locations but is generally very expensive. Reintroduction of the pathogen into fumigated soils, accompanied by a rapid buildup in pathogen populations, is a major concern with using soil fumigation. Rotations (3- to 4-year) with nonsusceptible crops have been recommended for control in Canada but were not effective in California.

Only disease-free nursery stock from fields known to be free of *Verticillium* should be used to establish new plantings.

Satisfactory resistance in commercial raspberry cultivars is not available. It is generally recommended that raspberries not be replanted in an area where the disease has been a problem. If they are replanted in an infested site, soil fumigation should be considered.

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