



Verticillium wilt

O & T Guide OD-5

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Hosts: Verticillium wilt is caused by two species of soil-borne fungi, *Verticillium dahliae* and *Verticillium albo-atrum*. *V. dahliae* is the most common species found in New Mexico. These fungi are found worldwide in all soil types and can affect more than 300 species of woody and herbaceous plants. Some of the more susceptible tree hosts include ash, catalpa, elm, maple, pistachio, redbud, Russian olive and fruit trees.

Symptoms: The external symptoms of Verticillium wilt vary, but usually the leaves on an entire plant, or on one or more limbs on one side of a plant, suddenly wilt. An overall yellowing of the foliage sometimes precedes this wilting. The wilted leaves may either drop prematurely or remain attached to the branches. Some trees, such as ash, may defoliate while they are still green, before noticeable yellowing or wilting occurs. Other external symptoms include: decline in twig growth and dieback of individual twigs and branches, leaf curling, leaf scorch, abnormal reddening, and sparse crowns with small leaves. *Verticillium* species exist in many different genetic strains (called races) that vary in their aggressiveness and host range. Thus, a plant can be infected with a mild strain and exhibit chronic mild to moderate symptoms over a long period. Or, a plant can be infected with a severe strain and be killed within one growing season. Either way, the disease is ultimately fatal. The

rate at which infected trees decline is also related to the age of the plant at the time of infection. Young trees typically die within one year, where mature trees may decline more slowly over several years. The internal symptom of Verticillium wilt is discoloration of the vascular tissue (sapwood). This symptom is typically most visible after the plant has shown advanced stages of wilt. The discoloration in most woody species is medium to dark brown, but in some plants the streaks may be olive green, greenish black, bluish, or purplish. Vascular discoloration can be used to help distinguish plants affected by abiotic stresses which cause similar symptoms from those affected by *Verticillium*. However, it should not be relied on for diagnosis as other pathogens can also cause this symptom and vascular discoloration does not always occur. Diagnosis of the disease should be confirmed with laboratory analysis.



Close-up of wilted limb on a catalpa infected with *Verticillium*. Photo: J Nickel, Albuquerque Master Gardener.



Catalpa infected with *Verticillium*. Photo: J. Nickel, Albuquerque Master Gardener.



Vascular discoloration caused by *Verticillium*. Photo: University of Kentucky.

Conditions for Disease: *Verticillium* is a soil-borne fungus that invades trees through the root system. The fungus usually enters through wounds, although a weakened tree is often invaded directly. The fungus grows in the roots, and can spread up the tree by spores transported in the xylem. *Verticillium* produces enzymes and toxins that can affect host cells distant

from the infection site. Therefore, it is not always possible to isolate the pathogen from symptomatic tissue. When a plant dies, the fungus can survive in the roots and trunk for many years and can survive in soil by producing resting structures called microsclerotia. The most common means of spread is through the movement of infested soil or infected plant material.

Trees stressed by adverse conditions that affect root health such as drought, freeze damage and wounding, are most susceptible to the disease.

Verticillium is active when soil temperatures are between 65-85°F. The optimum temperature range for fungal growth is 65-72°F.

Management: Prevention is the best method for managing *Verticillium* wilt in trees and shrubs. Never plant susceptible trees in soils where other plants are known to have died from the disease. Infested areas should be replanted with immune or tolerant species. Gymnosperms, such as pine and spruce, are immune to the disease. Some of the more tolerant woody plant species include, apples, crabapples, mountain ash, boxwood, pyracantha, sweet gum, honey locust, oaks, pears, poplars, sycamores, flowering quince, and willows. Trees suffering from a chronic infection may benefit from good cultural practices. For example, a balanced fertilizer (10-10-10) may help alleviate symptoms in infected trees. Avoid the use of high-nitrogen fertilizers. Infected trees should be watered appropriately to prevent drought stress, and dead branches should be removed and burned. Avoid wounding the roots or the trunk when planting, cultivating, or mowing. Fungicides are not effective for control of this disease.

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