

Plant Pathology Fact Sheet

Verticillium Wilt of Woody Plants

Nicole A. Ward, *Extension Plant Pathologist*
 Cheryl A. Kaiser, *Extension Associate*

INTRODUCTION

Verticillium wilt can affect a wide range of ornamental trees and shrubs, as well as a number of tree fruits and woody small fruits (TABLE 1). Over 400 herbaceous and woody plant species have been reported as hosts for this disease.

SYMPTOMS

Verticillium wilt symptoms may occur on branches scattered over the entire tree or they may be confined to one side (FIGURE 1). In Kentucky, evidence of this disease is usually first observed during periods of drought stress during summer.

Typical symptoms include:

- Sudden wilting and yellowing of leaves
- Leaf scorch, browning (FIGURE 2), and dying of leaves
- Failure of branches to leaf out in spring
- Sparse and/or undersized leaves
- Death of part or all of a tree



FIGURE 1, VERTICILLIUM WILT OF CATALPA. NOTICE THAT MOST SYMPTOMS HAVE DEVELOPED ON THE RIGHT SIDE.

Verticillium wilt also results in discoloration of water-conducting tissues in roots, trunk, and major limbs. Olive-green, brown, or black streaking may be observed in affected branches by peeling away the bark and cutting into the sapwood (FIGURE 3). Often, however, discoloration occurs in limbs some distance back from those branches that actually show wilting symptoms.

Several other diseases and environmental stresses can cause

similar symptoms, so visual appearance alone is insufficient to conclusively diagnose Verticillium wilt. Positive diagnosis requires isolating the fungus from discolored sapwood. Contact your county Extension office for information on submitting samples for verification of this disease.



FIGURE 2. EARLY SYMPTOMS OF VERTICILLIUM WILT INCLUDE BROWNING OF FOLIAGE, PARTICULARLY BETWEEN VEINS AND AT LEAF MARGINS. WILT SYMPTOMS ARE THE RESULT OF RESTRICTED MOVEMENT OF WATER AND NUTRIENTS TO LEAVES AND BRANCH TIPS. **FIGURE 3.** VASCULAR STREAKING BENEATH THE BARK OF A MAPLE BRANCH INFECTED WITH VERTICILLIUM WILT.

CAUSE AND SPREAD

Verticillium wilt is caused by the soil-borne fungus, *Verticillium dahliae*. Infection typically occurs through roots; however, windblown spores may also enter through wounded tissue aboveground.

After entering host tissue, the pathogen invades water-conducting tissues and is transported throughout the tree via the sap stream. As the fungus moves systemically through the plant, infected water conducting tissues die. Water stress and nutrient shortage result, ultimately causing the symptoms described above.

The *Verticillium* fungus can survive in the soil for many years as microsclerotia. These tiny durable resting structures are spread whenever infested soil particles are moved via foot traffic, tools, wind, or water. Germinating microsclerotia are capable of infecting roots of susceptible plants (TABLE 1). Microsclerotia do not survive as well in wet conditions.

DISEASE MANAGEMENT

Verticillium wilt disease cannot be cured, but the life of trees showing mild symptoms can possibly be prolonged with proper tree care:

- Prune and destroy symptomatic twigs and branches. Sanitize pruners between cuts with a commercial sanitizer, 10% Lysol disinfectant, 10% bleach, or rubbing alcohol.
- When disease is detected, apply a fertilizer high in nitrogen to promote tree vigor.
- Water trees liberally as needed during summer, especially the first few years after planting. Research indicates that trees that are watered generously are infected less frequently than those under water stress. Do not overwater.

Trees with severe symptoms cannot be saved.

- Remove and destroy entire affected tree or shrub.
- Replant with resistant plant species (TABLE 2) or cultivars.

ADDITIONAL RESOURCE

Woody Plant Disease Management Guide for Nurseries and Landscapes, ID-88
<http://www.ca.uky.edu/agc/pubs/id/id88/id88.pdf>

TABLE 1. PARTIAL LISTING OF WOODY HOSTS SUSCEPTIBLE TO VERTICILLIUM WILT.

Common name	Genus
Ash	<i>Fraxinus</i>
Azalea	<i>Rhododendron</i>
Barberry	<i>Berberis</i>
Black Locust	<i>Robinia</i>
Brambles (e.g. blackberry)	<i>Rubus</i>
Buckeye	<i>Aesculus</i>
Catalpa	<i>Catalpa</i>
Currant, Gooseberry	<i>Ribes</i>
Elm	<i>Ulmus</i>
Golden Raintree	<i>Koelreuteria</i>
Honeysuckle	<i>Lonicera</i>
Horse Chestnut	<i>Aesculus</i>
Kentucky Coffee Tree	<i>Gymnocladus</i>
Lilac	<i>Syringa</i>
Magnolia	<i>Magnolia</i>
Maple	<i>Acer</i>
Osage Orange	<i>Maclura</i>
Persimmon	<i>Diospyros</i>
Privet	<i>Ligustrum</i>
Redbud	<i>Cercis</i>
Rose	<i>Rosa</i>
Russian Olive	<i>Elaeagnus</i>
Sassafras	<i>Sassafras</i>
Smoke Tree	<i>Cotinus</i>
Stone fruits (e.g. cherry, peach)	<i>Prunus</i>
Tree-of-Heaven	<i>Ailanthus</i>
Tuliptree (tulip poplar)	<i>Liriodendron</i>
Tupelo	<i>Nyssa</i>
Viburnum	<i>Viburnum</i>
Weigela	<i>Weigela</i>
Yellowwood	<i>Cladrastis</i>

TABLE 2. PARTIAL LISTING OF WOODY PLANTS CONSIDERED RESISTANT TO VERTICILLIUM WILT.

Common name	Genus
Apple	<i>Malus</i>
Beech	<i>Fagus</i>
Birch	<i>Betula</i>
Crabapple	<i>Malus</i>
Chestnut	<i>Castanea</i>
Dogwood	<i>Cornus</i>
Firethorn	<i>Pyracantha</i>
Gingko	<i>Gingko</i>
Hawthorn	<i>Crataegus</i>
Hickory, Pecan	<i>Carya</i>
Holly	<i>Ilex</i>
Honey Locust	<i>Gleditsia</i>
Hornbeam	<i>Carpinus</i>
Juniper	<i>Juniperus</i>
Katusuratree	<i>Cercidiphyllum</i>
Linden	<i>Tilia</i>
Mountain Ash	<i>Sorbus</i>
Mulberry	<i>Morus</i>
Oak	<i>Quercus</i>
Pawpaw	<i>Asimina</i>
Pear	<i>Pyrus</i>
Poplar	<i>Populus</i>
Rhododendron	<i>Rhododendron</i>
Sweetgum	<i>Liquidamber</i>
Sycamore	<i>Platanus</i>
Walnut	<i>Juglans</i>
Willow	<i>Salix</i>
Zelkova	<i>Zelcova</i>
Needled evergreens	<i>Picea, Pinus, Taxus, etc.</i>

March 2013

Photos by John R. Hartman, University of Kentucky

Revised from "Verticillium Wilt of Woody Ornamentals" (PPA-18) by John Hartman, 1996

Educational programs of the Kentucky Cooperative Extension Service serve all people regardless of race, color, age, sex, religion, disability, or national origin.