Verticillium Wilt of Shade Trees

Verticillium wilt is one of the most common and destructive diseases of shade and ornamental trees in Indiana. Redbud and hard maple trees are especially susceptible. In addition, Verticillium wilt attacks more than 80 other different tree species and many other plants, such as potato, tomato, rose, lilac, and snapdragon. In all, more than 300 plant species have been reported susceptible to this disease. Yews and conifers do not appear to be susceptible.

Symptoms

During midsummer, leaves turn yellow at the margins, then brown and dry. Sudden wilting of leaves on one or several branches may occur. Frequently, the foliage on only one side of a tree wilts. The wood under the bark of wilting branches is discolored in streaks. The discoloration will vary from bright olive-green (maples) to chocolate-brown (redbud), depending upon the tree species and how long it has been infected. The discoloration might occur as distinct bands, streaks, or flecks in the sapwood. To examine for discolored sapwood, cut into the outer sapwood at the base of branches showing leaf wilt; also examine the outer rings of wood at the cut end of a pruned branch for signs of discoloration.

Host susceptibility and environmental conditions influence severity of symptom development. Trees under drought, nutrient, or salt stress are more extensively invaded by this pathogen. An infected tree may die in a single season or linger on for many seasons, with branch after branch dying and being invaded by decay or canker fungi.

Cause

The soil-borne fungus, *Verticillium albo-atrum*, causes Verticillium wilt. Infection occurs through the root system. The fungus is an excellent soil inhabitant, and produces resting structures that can survive in soil for many years. The fungi that grow from these structures can directly penetrate roots of susceptible host plants. Growth within the host occurs within the water-conducting tissues, resulting in blockage of water movement from the roots to the foliage.

The tree responds to infection by plugging some water conducting vessels with gums and other materials, which further restricts water flow.

Fig. 1 - Sudden wilting and browning of foliage on one side of the tree is typical of Verticillium wilt.

"If a tree or shrub dies from Verticillium, never replant a susceptible tree or shrub back in the same location."

Fig. 2 - Cross-sections of Redbud stems infected with verticillium show brown solid bands in individual wood rings.

Management

Do not replant susceptible species where Verticillium killed a susceptible host plant. If Verticillium wilt has been diagnosed in a landscape site, it is best to replant with a resistant plant since the soil can be contaminated with the Verticillium fungus for a long time. Replanting maples or other susceptible plants in areas where wilt has destroyed previous trees is inviting recurrence of the trouble. NOTE: Yews and conifers are resistant to Verticillium wilt. Redbud and smoke tree are especially susceptible. Refer to tables for a listing of resistant and susceptible trees and shrubs.

When a tree or shrub exhibits mild symptoms, don't be too quick to remove the plant. Prune out affected limbs and water and fertilize to maintain tree vigor. In some cases these tactics may **delay** progression of the disease for a number of years; however, infection is not cured since the disease originates in the roots.

Verticillium wilt resistant woody plants

Apple	Holly	Pear
Beech	Honey locust	Poplar
Birch	Hornbeam	Pine
Crabapple	Juniper	Rhododendron
Dogwood	Katsura tree	Spruce
Fir	Larch	Sweet gum
Firethorn	Linden	Sycamore
Ginkgo	Mountain ash	Walnut
Hackberry	Mulberry	Willow
Hawthorn	Oak	Yew
Hickory	Pawpaw	Zelkova

Verticillium wilt susceptible woody plants

Ash	Elm	Rose
Azalea	Golden rain tree	Russian olive
Barberry	Honeysuckle	Sassafras
Boxwood	Horse chestnut	Serviceberry
Brambles	Japanese pagoda tree	Smoke tree
Buckeye	Lilac	Sumac
Black gum	Kentucky coffee tree	Tree-of-heaven
Black locust	Magnolia	Tulip tree
Box elder	Maple	Tupelo
Catalpa	Osage orange	Viburnum
Cherry & other Prunus	Persimmon	Weigela
Cork tree	Privet	Yellow wood
Currant	Redbud	

Fig. 3 - Redbud trees infected with Verticillium will have chocolate-brown streaking in the sapwood.

The first and most important step before managing a tree disease is to accurately diagnose the problem. With an inaccurate diagnosis, more harm than good could be done, not to mention the wasting of both time and money.

This publication is just one of several available online from Purdue Extension that addresses diseases found on landscape trees in Indiana. If your tree does not have symptoms similar to those described in this publication, please check the others.

Also, for more detailed photographs of disease symptoms, consider purchasing Common Tree Diseases of Indiana (BP-63). It presents information about the six most common tree diseases seen in Indiana. It is available from the Purdue Extension Media Distribution Center. The publication is $5 and can be ordered by calling 1-888-EXT-INFO.

If you are still in doubt as to the cause of the problem, consult a professional such as the Extension Educators at your local Purdue University Cooperative Extension Service office or Purdue University's Plant Pest and Diagnostic Laboratory (P&PDL).

To submit a plant sample to the P&PDL for diagnosis, obtain a sample submission form from your local Purdue Extension office, from the P&PDL office (1-888-EXT-INFO), or from the P&PDL Web page www.ppdl.purdue.edu/. Detailed instructions for submitting most types of samples are included on the back of the forms.

Submit a sample that is representative of the problem and shows the varying degrees of symptoms. Send several branches (even large ones) showing the symptoms and a detailed description of the problem and other useful information about the site, the age of the tree or shrub, and the date of planting. Photographs are very helpful.

Send the sample and submission form by first-class or overnight mail early in the week to:

Plant & Pest Diagnostic Laboratory
Purdue University
1155 LSPS
West Lafayette, IN 47907-1155

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