



The Plant Doctor's LANDSCAPE TIPS

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VERTICILLIUM WILT OF TREES & SHRUBS

TABLE #1

Woody Trees and Shrubs Susceptible to Verticillium Wilt

Viburnum
Barberry
Wiegela
Honeysuckle
Rose
Azalea
Gooseberry
Currant
Spirea
Daphne
Photinia
Privet
Lilac & Sumac
Elm
Ash
Buckeye
Horse Chestnut
Catalpa
Maple
Locust
Elder
Smoketree
Russian Olive
Osage Orange
Redbud
Sassafras
serviceberry
Tree-of-Heaven
Tulip Tree
Yellowwood
Magnolia & Cherry
(and other stone fruits)

TABLE #2

Woody Trees and Shrubs that Exhibit Resistance to Verticillium Wilt

All Gymnosperms
(Fir, Ginkgo, Spruce,
Pine, Taxus, Larch,
Arborvitae, etc.)
All Monocots (grasses)
Apple and Crabapple
Mountain Ash
Beech
Birch
Boxwood
Butternut
Chestnut
Dogwood
Firethorn
Hawthorn
Sweetgum
Hackberry
Hickory
Holly
Katsura tree
Linden
Honey Locust
Oak
Paw Paw
Pear
Plane Tree/Sycamore
Poplar
Quince
Rhododendron
Walnut
Willow
Zelkova

INTRODUCTION:

Verticillium Wilt, caused by the soil borne fungi *V. albo-atrum* and *V. Dahliae*, is a serious vascular disease of many woody and herbaceous plants. Many food crops such as tomato, potato, eggplant, raspberry, and strawberry are affected. Many woody trees and shrubs utilized in our landscapes are also affected. Verticillium Wilt is rarely a serious factor in natural woodlots or forests. Table #1 contains a brief list of woody plants that are known to be susceptible to Verticillium Wilt. Table #2 contains a list of woody plants that tend to be resistant to Verticillium Wilt.

It is interesting to note that some species of "resistant" plants are occasionally found to exhibit Verticillium infections but may be listed as susceptible or resistant . . . examples: linden and dogwood.

SYMPTOMS & DISEASE CYCLE:

Symptoms of Verticillium Wilt can be mild to severe. Most often, certain branches or sections of trees or shrubs may wilt, exhibiting branch dieback (Photos 1 & 2). Remission of symptoms may occur or wilt may proceed to other branches in succeeding years. Sometimes the entire plant may succumb within a year or two. Mild symptoms may include sparse foliage, leaf curling, scorch symptoms



Photo 1: Typical symptoms of Verticillium Wilt include lopsided dieback, such as those exhibited by this Smoketree (*Cotinus*), year after year.



Photo 2: This catalpa tree exhibits the typical symptoms of Verticillium Wilt, but no vascular streaking could be found. The tree completely recovered the following season. The cause of the "dieback" was believed to be a temporary reaction to something toxic such as a vehicle's exhaust or chemical exposure.

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Photo 3: Foliar symptoms of Verticillium Wilt are quite varied but may include wilt (death), scorch, discoloration, etc.

(marginal browning Photo 3), stunted annual growth, small yellowing foliage, partial defoliation and abnormal seed production. Verticillium Wilt is sometimes found in conjunction with such issues as Maple Decline. Often, cambial tissues killed by Verticillium may be invaded by other opportunistic fungi or pests. Symptoms of Verticillium Wilt may mimic other issues such as winter injury, construction damage, salt toxicity, drought, soil saturation, decline and other cultural and environmental factors.

Vascular discoloration ("streaking") in cambial tissues is often a good diagnostic symptom of Verticillium Wilt infections (Photos 4 & 5). The vascular streaking may vary in color from green, yellowish, brown and black, depending on species of plant. Chronic infections may result in prominent cross-section discoloration (Photo 6). Some species of plants such as ash may not always exhibit prominent streaking. While streaking may be fairly diagnostic, it is sometimes advisable to follow up suspicions of Verticillium Wilt with a lab culture.

Verticillium is a soil-borne fungus, meaning it is capable of surviving as a saprophyte for many years in the soil. Verticillium infections of roots are favored by stress (example: drought) or by injury (Photo 6). After infection, the fungus may move through the vascular systems where, as with Oak Wilt or Dutch Elm Disease, it may be impeded by the plant's own defensive mechanisms (chemical tyloses, etc.). Verticillium may also infect weeds, enabling the fungus to maintain a healthy, viable presence in the soil. Plants killed by the fungus fall to the soil where decomposition occurs. After killing a plant, small dark survival structures known as microsclerotia are formed; these microsclerotia help the fungus survive long periods as well as aid in dispersal by wind or soil movement.

VERTICILLIUM WILT MANAGEMENT:

Even though Verticillium Wilt is often viewed as difficult to manage, there are a variety of tools that may help us to challenge this sometimes devastating disease.

Plant Health: Cultural factors that promote vigor and good growth in plants may help an infected plant "outgrow" the disease. Avoid stress by providing adequate moisture and nutrition (fertilizer).

Avoid Wounding Roots: It is not uncommon for many landscapes to host annual and perennial beds in the vicinity of



Photo 4 & 5: Typical "streaking" induced by Verticillium in plants....both in cross-section (Photo 3) and longitudinally (Photo 4). Check for Verticillium in cross-section by cutting a branch or longitudinally by scraping to bark to expose the cambial tissues.



Photo 6: Due to continuous cropping and other cultural practices (cultivation), nursery plants may be infected by Verticillium fungi. Chronic infections result in extensive cross-sectional discoloration. The only clue of a Verticillium Wilt infection of this tree, ready for transplant, was some dieback at the top.

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tree and shrubs (Photo 7). The more the soil is disturbed and root damage occurs in the vicinity of susceptible plants, the greater the likelihood of Verticillium Wilt infections.

Utilize Resistant Plants: When trees or shrubs are killed by Verticillium, one of the most effective disease management strategies is to use resistant species of plants.

Soil Replacement: In rare cases where Verticillium has killed a tree, it may be practical to simply replace the soil with soil that is not contaminated by Verticillium species. Such situations may include, for example, a client's demand for the highly susceptible Japanese maple in a particular location. This may be a very iffy proposition.

Plant Examination: Because Verticillium Wilt is very common in the continuously cropped nursery setting (Photo 6), it would be prudent to examine plants very closely prior to purchasing potentially infected plants for installation in the landscape.

Chemical or "Natural" Treatments: Although some arborists, landscapers and suppliers claim success for Verticillium Wilt by chemical or natural, biological treatments, whether they are applied as soil amendments or by trunk injections, the author has not witnessed any conclusive, scientific evidence to recommend such procedures on a regular basis except for a trial and error attempt at Verticillium Wilt remediation. 

For more information, please feel free to email David Roberts at robertsd@msu.edu or contact a professional plant health care provider. The author, MSU and MGIA do not endorse any particular products. If using pesticides, be sure to read and follow label directions.



Photo 7: Continuously injuring the roots of trees and shrubs increases the chances of Verticillium Wilt infections. The property owners of this old landmark oak in Ann Arbor, Michigan, plant annuals adjacent to the trunk of the tree every spring. Luckily oaks are not considered a prime host for Verticillium, but oaks are a host for Phytophthora (collar rot).