



Verticillium Wilt of Landscape Trees and Shrubs

Verticillium wilt, caused by the fungi *albo-atrum* and *V. dahliae*, is a serious vascular disease of hundreds of woody and herbaceous plant hosts. Food crop hosts include everything from raspberries and strawberries to tomatoes and potatoes.

Some of the many common woody ornamental host plants include ash, barberry, catalpa, elm, magnolia, maple, Russian olive, redbud, smoketree, tuliptree, and viburnum. One group of plant not susceptible to Verticillium wilt is all the gymnosperms, including conifers such as pine and spruce. While many landscape plants are affected, Verticillium wilt is not a major problem in natural forested areas.

Diagnostic Symptoms

Wilting of leaves and dieback of branches, often one at a time or on one side of the tree, are the most severe symptoms. This can occur over a number of years, with remission of symptoms in some years, or can rapidly progress to plant death in a year or two (Figure 1). Other symptoms of Verticillium wilt may include marginal browning and scorch of leaves, abnormally large seed crops, small leaves, stunting, poor annual growth, and sparse foliage.



Figure 1. Above ground symptoms of Verticillium wilt on maple.

Sometimes large areas of cambial tissue die from infections by the fungus and opportunistic fungi such as *Nectria* develop in elongated cankers. Late season infections may not be noticeable until plants come out of dormancy, with branch dieback evident.

All of the above symptoms can also be caused by other stress factors. A good field symptom that can set Verticillium wilt apart diagnostically is the discoloration of xylem and cambial tissue, visible as streaks if you cut into the wood. This discoloration is variable for different plants; generally greenish to blackish on maple, yellowish green on smoketree, and brown on ash. This streaking is not totally diagnostic on two counts: 1) other fungi and other factors can cause discoloration; and 2) on some hosts and on youngest twigs, infection is not always accompanied by discoloration. However, vascular discoloration is a good field symptom that can then be followed up for confirmation by a diagnostic lab such as The Ohio State University Plant & Pest Diagnostic Clinic.

Disease Cycle and Conditions Favoring Disease

The Verticillium fungus can survive for many years in soil making effective crop rotation difficult. The fungus infects plant roots through wounds and in some cases direct penetration of root tissue. Verticillium also is transmitted from plant to plant by grafting and budding.

From root infections, the fungus spreads upward in the plant-through the vascular stream. The results of infection are tissue damage and plugging of xylem, robbing stems and leaves of needed water and minerals.

The fungus is returned to the soil as plant parts fall or die, and tiny resistant fungal microsclerotia are spread by wind, in soil and on equipment. Many weed hosts are also susceptible; therefore the cycle of contaminated soil is hard to break. Development of Verticillium wilt is favored by factors that stress roots, including wounding and droughty conditions.

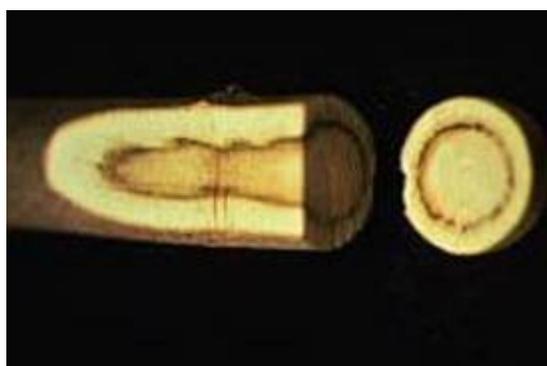
Control

1. **Disease resistance.** - If Verticillium wilt is diagnosed at a particular landscape or nursery site it is prudent to replant into that area with a plant that exhibits resistance to this disease. A few common examples of plants typically free of this disease include: crabapple, mountain ash, beech, birch, boxwood, dogwood, sweet gum, hawthorn, holly, katsura tree, honeylocust, oak, pear, London planetree, and sycamore, rhododendron, willow, and zelkova. The red maple cultivars Armstrong, Autumn Flame, Bowhall, October Glory, Red Sunset, Scarlet and Schlessinger have also been reported as resistant.

2. **Keep plants as healthy-as possible.** - Proper transplanting practices, proper water management to avoid droughts, a good fertility program and pruning out dead branches are all good plant health care management practices. These can help limit infections and help limit the effects of these infections to some extent. Pruning out infected branches is useful as a general horticultural practice for overall plant vigor and aesthetics, but does not eliminate Verticillium from the plant since infections spread from the roots. Fungicides are not effective for control of this disease.



Figure 2. Above ground symptoms of Verticillium wilt on maple.



Sections of maple trunk showing Verticillium wilt discoloration on cambial tissue.

Information obtained through the Ohio State Extension Fact Sheet HYG-3053-96



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