BARTLETT TREE RESEARCH LABORATORIES
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Technical Report

Verticillium Wilt on Woody Ornamentals in the Landscape

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Verticillium wilt is a vascular disease that affects a wide variety of plant species including **many woody trees and shrubs, herbaceous ornamentals, weeds, vegetables and agronomic crops**. Among shade trees, **maples** are particularly susceptible and hence the name "Maple Wilt" often has been applied to this disease by arborists. Verticillium wilt has virtually a worldwide distribution and is found in all fifty states of the U.S.; however, it is generally most severe in cool climates such as the Northeast, Middle Atlantic States and Midwest. On woody plants, this disease causes injury ranging from inconspicuous twig dieback and reduced growth, to rapid decline and death of entire plants. Disease severity is dependent on several factors including host species, amount of pathogen inoculum present and certain environmental factors.

SYMPTOMS

Initial symptoms of Verticillium wilt usually are visible as sudden wilting, browning and shedding of leaves on one branch or one area of the crown. These symptoms may spread gradually throughout the crown (Figure 1). Wilting and defoliation may be followed by twig and branch dieback, but resistant species may recover and refoliate. Severely affected trees may eventually succumb to the disease. Delayed budbreak, sparseness of the crown, reduced twig growth and early fall coloration frequently are associated with chronic forms of the disease. Affected trees or affected areas of the crown may fail to leaf out in the spring. Elongated cankers occasionally develop on branches and the trunk due to death of the cambium.

Figure 1. Verticillium wilt on maple.
Figure 2. Sapwood staining associated with Verticillium wilt.

Internally, the sapwood in symptomatic branches and in the roots and lower bole usually exhibits a distinct discoloration (Figure 2). The discoloration usually is not contiguous around the entire ring of sapwood, but rather occurs as streaks separated by clear sapwood. The streaks vary from green to brown to nearly black, depending on the host species affected.

CAUSAL AGENTS

Verticillium wilt is caused by two species of fungi; *Verticillium albo-atrum* and a related species *Verticillium dahliae*. The fungi are soil inhabitants that are capable of surviving long periods in the soil as a resting stage called a microschlerotium. The fungi can also survive in roots of both susceptible and non-susceptible plants. Infection occurs primarily through wounds in roots or possibly by direct penetration of healthy roots. Wounds in twigs and branches also may serve as suitable

infection courts. Following infection, the fungi colonize the vascular system, which interrupts translocation of water and nutrients, resulting in wilt symptoms.

Resting structures of Verticillium spp. are disseminated by flowing water such as irrigation water, and also may be windblown for considerable distances. Movement of infested soil on equipment, foot traffic and in root balls or "bare root" nursery stock is another frequent means of pathogen dispersal. Contaminated pruning tools may be responsible for new infections.

FACTORS INFLUENCING DISEASE DEVELOPMENT AND SEVERITY

Verticillium wilt is most widespread on many vegetable and agronomic crops. Planting susceptible ornamentals adjacent to these crops or on land where these crops were previously grown, such as home vegetable gardens, will increase the likelihood of the disease. Extended periods of drought and applications of high nitrogen fertilizers will increase disease severity. High populations of plant parasitic nematodes also will increase disease incidence and severity by providing wounds that can serve as entrance points for the pathogens.

CONTROL

***Preventive**:* The incidence of Verticillium wilt on woody ornamentals in the landscape can be minimized through cultural practices designed to maintain plant vigor including periodic fertilization, pruning, and irrigation during dry periods. Fertilization should be undertaken with a complete fertilizer (containing nitrogen, phosphorus and potassium), which preferably contains a slow release form of nitrogen. Avoid planting susceptible ornamentals adjacent to vegetable gardens and agricultural fields or in areas where these crops were once grown. Do not replant a susceptible species where a previous planting has succumbed to the disease. Consult Technical Report entitled “Verticillium Resistant Species” for a list of susceptible and resistant woody plants.

***Therapeutic**:* Plants exhibiting symptoms of Verticillium wilt should be sampled for verification of the disease through laboratory analysis. Collect twig or trunk sapwood samples from wilted and stained living areas of the tree or shrub and forward these to the Bartlett Research Laboratories.

Branches that have died from Verticillium wilt should be removed. When feasible, prune back affected limbs and branches beyond the last observable evidence of sapwood staining. Disinfect tools with a dilute liquid bleach or alcohol solution before pruning healthy trees. Fertilization as described for preventative control and irrigation during dry periods will aid recovery of diseased plants. Plants seriously declining from Verticillium wilt usually do not respond to therapeutic treatment and removal may be necessary.