



Diseases of Shade and Ornamental Trees

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Shade trees and small ornamental trees may be affected by plant diseases. Most are simply aesthetic problems and cause no long-term damage to the tree. Some diseases can seriously disfigure trees, while others are lethal.

Anthracnose

Anthracnose diseases attack the foliage and twigs of trees in late spring and early summer. Cool, wet weather favors infection and spread of these diseases. Ash, dogwood, maple and sycamore may be damaged by anthracnose diseases caused by a variety of fungi. The canopy of affected trees may be visibly thinned. Angular leaf spots, dead leaf tissue delineated by veins, twig dieback and cankers on small branches are common. Repeated defoliation may weaken trees and lead to death.

◆ Anthracnose diseases of maple and ash occur sporadically and are seldom a serious threat. Ash anthracnose may cause 50 percent defoliation within a few days of infection.



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Leaf blotch fungal disease on buckeye.

◆ Dogwood anthracnose and sycamore anthracnose may occur annually and weaken or kill infected trees. Dogwood anthracnose is much more damaging to flowering dogwood growing as an understory tree in full shade.

◆ Spot anthracnose occurs throughout the range of flowering dogwood. Small, red lesions appear on bracts of flowers and later on leaves. Although, it may deform flowers and leaves, spot anthracnose does not lead to defoliation or death.



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Spot anthracnose on dogwood leaves.

Leaf Blister/Curl

Leaf blister and leaf curl refer to foliar diseases in which young, expanding leaves are infected. Symptoms include raised blisters for oak leaf blister and fleshy, distorted leaves for peach leaf curl. Affected leaves usually remain on the tree and function normally.

Leaf Spots

Numerous fungal leaf spot diseases affect trees and a few bacterial leaf spot diseases:

- ◆ *Scab* is a disease of crabapple. Olive-brown spots develop on the leaves and fruit of susceptible crabapple cultivars. Scab may cause severe defoliation and loss of vigor.
- ◆ *Tar spot* is a disease of maple where the fungal pathogen looks like a raised, tar-like substance on the upper surface of infected leaves. Tar spot occurs on sugar and silver maple, but is not a serious threat to either.
- ◆ *Bull's eye leaf spot* may be found on maple, magnolia, sassafras and other trees. Target-shaped spots with concentric rings appear on leaves. This disease may cause premature leaf drop.
- ◆ *Leaf blotch* is a fungal disease of horse-chestnut and buckeye. Irregular leaf spots and symptoms that mimic leaf scorch (marginal leaf burn) appear in mid to late summer. Ohio, red and yellow buckeye are susceptible to leaf blotch; however, bottle brush buckeye is moderately resistant.
- ◆ *Shot hole diseases* of ornamental cherry may be caused by fungi or bacteria. The symptoms appear as circular lesions in which the diseased tissue falls out of the leaf, causing a "shot hole" effect. These diseases are worse during wet weather or on trees irrigated with overhead irrigation.
- ◆ Miscellaneous leaf spot diseases caused by fungi such as *Phyllosticta* and *Septoria* are sometimes found on trees as diverse as Japanese maple, magnolia, birch, flowering dogwood and sourwood. An extremely wet spring can trigger infection and spread of these fungi. Damage is often cosmetic and the effects of these diseases are minimal unless the damage occurs annually and results in premature defoliation.

Needlecast

Conifers such as pine, spruce and fir may be attacked by needlecast diseases that result in severe needle drop. Most needlecast diseases attack older needles. Infected trees may have brown needles in the interior of the tree's canopy. Symptoms often develop at the base of the canopy and move upward. Once needles are cast, infected trees generally have thin canopies. Black, fungal-fruited bodies are easy to observe on infected needles within the canopy or on needles that have been cast.

Powdery Mildew

White-to-gray powdery fungal growth blankets the leaves of trees infected with powdery mildew. This disease may be observed on oaks, tulip poplar, sycamore, crabapple and dogwood. Shade trees such as oak and tulip poplar are not seriously injured by powdery mildew since it appears in late summer or early fall. Powdery mildew is more than just an aesthetic problem for flowering dogwood, as it appears in early summer and reduces shoot growth and trunk caliper.

Sooty Mold

Black fungal growth on the upper surfaces of leaves and branches is usually associated with sooty molds. These fungi live on the excrement or "honey dew" of aphids or scale insects. Trees with sooty mold should be closely examined for insect infestations.

Rusts

Several rusts affect shade and ornamental trees:

- ◆ *Pine needle rust* appears in late spring on Eastern white pine on last year's needles. Although widespread on the needles of isolated trees, it is not considered a serious threat, as the damage occurs before current season's growth.
- ◆ *Cedar-apple rust* may be found on apple, crabapple and Eastern red cedar. Each spring spores are released from galls on cedar that infect the leaves and fruit of flowering crabapple. Later in the summer a different spore is produced on the leaves of crabapple that infect single needles of cedar. These infected needles will swell into galls that will release spores during warm, wet weather in the spring. Highly susceptible cultivars of crabapple such as 'Bechtel's' may be seriously damaged, but you will find only scattered yellow-to-gold leaf spots on most susceptible cultivars. Cedar-apple rust may cause premature leaf drop on some cultivars.
- ◆ *Cedar-hawthorne rust* can cause severe deformation of the leaves, twigs and fruit of hawthorne. As with cedar-apple rust, infective spores from Eastern red cedar infect all aboveground parts of hawthorne. Orange-to-salmon colored spores are produced from tubes on infected fruit and twigs.

Canker Diseases

Localized infection on the trunk or branches of trees is usually the result of canker diseases. Cankers may appear as sunken areas or swollen areas on infected branches. Most canker diseases are caused by fungi, but there are a few bacterial canker diseases. The fungi that cause canker diseases will often colonize the bark of newly planted trees under water stress. If a canker disease girdles the entire branch or trunk, all growth beyond the canker will die.

◆ *Botryosphaeria canker* is a common disease causing branch dieback on trees as diverse as ash and Leyland cypress. Trees affected by drought stress are particularly susceptible. Sunken cankers are the most common symptom on broadleaf trees and bleeding, resinous cankers may be found on the branches and trunks of conifers.

◆ *Endothia canker* is often associated with oaks infested with obscure scale. Bright orange fruiting bodies of the fungus are easily spotted on cankered branches.

◆ *Nectria canker* is a perennial canker that may be found on dogwood, linden and black walnut. Callus tissue forms at the margin of the canker each year. As this is repeated over several years, concentric rings of callus tissue are visible at the site of infection. When the canker girdles the trunk, all the tissue above the canker dies.

◆ *Seiridium canker* is quickly becoming a serious disease on Leyland cypress. Trees growing on dry sites are more susceptible to this disease. The symptoms are very similar to botryosphaeria canker. Severely affected trees are so disfigured that they need to be replaced.

◆ *Black knot* is an important disease of ornamental plum and black cherry. Black, rough galls or “knots” form on the branches of the host. Infection usually occurs on succulent growth in the spring by spores spread by air currents from nearby trees with black knot.

◆ *Fire blight* is a bacterial disease that can cause severe damage to crabapple, pear and serviceberry. Bacteria may be spread at flowering in the spring by insect pollinators. Infected shoots die so quickly that several inches of the twig may collapse, forming a “shepherd’s crook” symptom. Diseased shoots may be killed back to larger branches where cankers form. The bacterium overwinters in these cankers.

Vascular Wilts

Several diseases affect the conductive tissues of trees that transport water, nutrients and complex sugars produced in photosynthesis. Once these pathogens invade this conductive or vascular tissue, they severely reduce the flow of water and anything that may be transported. Most trees infected by vascular wilt diseases decline and die after several years.

◆ *Verticillium wilt* is a fungal disease that can attack many trees, with maples being the most important hosts. Verticillium is soil-borne and may persist many years in the absence of a host. The fungus usually enters through wounds in the roots and then moves through the vascular system. Symptoms can be quite variable, but yellow leaves are often followed by wilting and death of entire branches. Occasionally, the entire crown may wilt and die. Green-to-brown discoloration may be found in the outer sapwood of some tree species.

◆ *Dutch elm disease* is one of the best known diseases that affect shade trees. The pathogen was introduced into this country in the 1930s. Dutch elm disease destroyed millions of American elm that were planted in a virtual monoculture along city streets. It is spread by elm bark beetles and through root grafts from diseased to healthy trees. Symptoms include wilting, yellowing and browning of leaves. As with verticillium wilt, brown discoloration may be observed in the sapwood of infected branches. Infected trees may die within a few weeks of infection.

◆ *Bacterial leaf scorch* attacks mature pin oak, but also infects red maple, sycamore, mulberry and elm. The bacterium-like pathogen is spread by leaf hoppers that have acquired the pathogen from an infective host. Leaf scorch is the first symptom observed. Diseased trees may decline for several seasons so that leaves are only found on the trunk and large branches near the interior of the crown.

Phytophthora Root Rot

Root rot diseases may stunt the growth of trees and in some cases be lethal. Fir, spruce, pine, Leyland cypress, dogwood and maple are all hosts of phytophthora. This fungus is a “water mold” that is favored by wet, poorly drained soils. Also, excessive irrigation favors disease development. Infected trees may have yellow needles or leaves that are smaller than normal. Dark, decayed roots may be found on diseased trees.

Table 1. Disease Resistant Shade/Ornamental Trees

Botanical name	Common Name	Resistant to:	Comments
<i>Acer plantanoides</i> 'Columanare compacta', 'Jade Glen', 'Parkway'	Norway Maple	Verticillium wilt	Other resistant tree species include: most conifers, katsura, dogwood, ginkgo, sweetgum, honey locust, crabapple, sycamore, oak, pear, birch, hackberry, zelkova, hawthorne, walnut and willow.
<i>Cornus florida</i> 'Appalachian Spring'	Flowering Dogwood	Dogwood anthracnose	Dogwood species resistant to dogwood anthracnose are <i>Cornus alternifolia</i> , <i>C. amomum</i> , <i>C. mas</i> .
<i>Cornus florida</i> 'Cherokee Brave'	Flowering Dogwood	Powdery mildew	Deep pink bracts with a white center.
<i>Cornus kousa</i>	Kousa Dogwood	Powdery mildew	Many <i>C. kousa</i> cultivars are resistant to powdery mildew and dogwood canker that affect <i>C. florida</i> .
<i>Cornus kousa X florida</i> hybrids 'Aurora', 'Constellation' and 'Stellar Pink'	Stellar Dogwood	Powdery mildew	Named cultivars are moderately resistant but not immune to powdery mildew.
<i>Malus</i> species	Crabapple	Cedar-apple rust, fire blight, scab, powdery mildew	A partial list of disease resistant cultivars include: 'Adams', 'Adirondack', 'Centurion', 'Donald Wyman', 'Indian Summer', 'Molten Lava', 'Red Jewel', 'Sargent', 'Sugar Tyme', and 'White Cascade'.
<i>Platanus X acerifolia</i> 'Bloodgood', 'Columbia', 'Liberty'	London planetree	Anthracnose	Good replacement for native sycamore.
<i>Pyrus calleryana</i> 'Bradford', 'Capitol', 'Chanticleer', 'Whitehouse'	Ornamental Pear	Fire blight	'Aristocrat' and 'Redspire' are moderately susceptible to fire blight.
<i>Ulmus americana</i> 'Jefferson', 'New Harmony', 'Valley Forge'	American Elm	Dutch elm disease (DED)	Available after 2001, cultivars are tolerant but not immune to DED.
<i>Ulmus parvifolia</i> 'Allee', 'Athena'	Chinese/Lacebark Elm	Dutch elm disease	Also shows resistance to elm leaf beetle.
<i>Ulmus</i> hybrids 'Pioneer', 'Homestead', 'Frontier', 'Patriot'	Hybrid elm	Dutch elm disease	Tolerant but not immune to DED.

Disease Management

The following management strategies will help you minimize or eliminate damage from diseases that affect shade and ornamental trees.

- ◆ The best way to prevent epidemics such as Dutch elm disease is to plant a dozen or more tree species that are well adapted to your area. Using one tree species as a street tree can lead to disaster if a lethal disease appears in a planting of shade trees.

- ◆ Purchase disease-free trees from a reputable nursery or garden center. Trees should be free of cankers, galls and other wounds to the trunk or branches. Trees should conform to all standards for nursery stock (canopy shape, root ball size, etc.) published by the American Nursery and Landscape Association.

- ◆ Use disease-resistant tree species or cultivars to avoid endemic diseases. For example, there are a number of crabapple cultivars resistant to diseases (Table 1). Also, you may replace a tree that was killed by verticillium wilt with a resistant tree species.

- ◆ Choose a good planting site. In areas where dogwood anthracnose is prevalent, avoid planting dogwood as an understory tree. Trees that are susceptible to root rot should only be planted in well-drained soils.

- ◆ Mulch and irrigate young trees to prevent infection from canker-causing diseases.

- ◆ Prune out cankers caused by fire blight and other diseases, galls (black knot) and obviously dead branches. Trees with trunk cankers or severely affected black knot may have to be removed.

- ◆ Rake and destroy or thoroughly compost leaves from trees with anthracnose or leaf spot diseases to prevent fungal pathogens from overwintering in leaf litter on the ground.

- ◆ Dormant sprays of select fungicides may prevent diseases such as peach leaf curl or oak leaf blister.

- ◆ Fungicide sprays may be used to control foliar diseases of high-value trees or trees with a history of disease. Fungicides generally have to be applied before and during infection. Since most fungicides act as a protectant, little control should be expected after symptom development. In certain cases, fungicides may be injected into shade trees to prevent infection from diseases such as Dutch elm disease. While worker exposure is decreased by injecting the fungicide into root flares at the base of the trunk, the tree is wounded during the process. As with foliar applications, trunk injections generally have to be repeated indefinitely and should be viewed as a regular maintenance item and not a one-time treatment to cure a particular disease. Trees of low value or little historical significance that are defoliated annually by foliar diseases may be good candidates for replacement with disease-resistant species or cultivars. For specific information about chemical control of tree diseases contact your county Extension office, Division of Forestry office or a professional arborist certified by the International Society of Arboriculture.



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Bacterial leaf scorch, a vascular disease of pin oak.



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Tendrils of cedar apple rust gall.



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Powdery mildew on yellow-poplar or tulip tree leaves.



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Fire blight on crabapple leaves.



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Seiridium canker disease on Leyland cypress.



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Anthracnose symptoms on maple leaves.

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