
ANTHRACNOSE

Integrated Pest Management for Home Gardeners and Landscape Professionals

Anthracnose is a group of diseases that cause dark, sunken lesions on leaves, stems, flowers, and fruits. Anthracnose infects many deciduous and evergreen trees and shrubs and in some regions also infects fruits, vegetables, and turfgrass.

Often called leaf, shoot, or twig blight, tree anthracnose results from infection by fungi including *Apiognomonium er-rabunda*, *A. veneta*, *Colletotrichum gloeo-sporioides*, *Discula fraxinea*, the *Glomerella* species, the *Gnomonia* species, some *Marssonina* species, and *Stegophora ul-mea*, depending on the tree attacked. It can noticeably blight some trees such as sycamore, ash, oak, and evergreen elms. Infections on deciduous plants are more severe in areas where prolonged spring rains occur after new growth appears. Anthracnose fungi need water in order to disseminate and infect; they don't spread in dry conditions.

IDENTIFICATION AND DAMAGE

Anthracnose symptoms vary with the plant host, weather, and the time of year infection occurs. The fungi affect developing shoots and expanding leaves. Small tan, brown, black, or tar-like spots appear on infected leaves of hosts such as elm or oak (Fig. 1). Dead leaf areas can be more irregular on other hosts such as ash (Fig. 2), while sycamore anthracnose lesions typically develop along major leaf veins (Fig. 3). If leaves are very young when infected, they can become curled and distorted with only a portion of each leaf dying.

Generally, mature leaves are resistant to infection, but when conditions are favorable, spotty lesions can occur. Heavily infected leaves fall prematurely throughout the growing season, and

sometimes trees become completely defoliated. New leaf growth usually occurs after an early drop.

Anthracnose also can attack and kill twigs and branches. On some trees, cankers—sunken, infected areas with swollen edges—develop on twigs, branches, and the trunk, occasionally resulting in girdling (the destruction of the nutrient and water conducting tissues all the way around a branch or twig) and dieback. Regrowth from lateral buds can give branches a gnarled or crooked appearance (Fig. 4). If defoliation, branch dieback, or cankering doesn't occur every year, anthracnose won't seriously harm plants. In California, anthracnose rarely causes permanent damage to plants except for Chinese elm trees, which develop especially large cankers (Fig. 5).

LIFE CYCLE

Anthracnose fungi occur primarily on leaves and twigs (Fig. 6). On deciduous trees these fungi overwinter in infected twigs or dead leaf litter. In spring the fungi produces numerous microscopic spores that spread via splashing rain or sprinkler water to new growth where they germinate, entering leaves and newly expanded twigs. If moist conditions prevail, a successive generation of spores occurs in the infected parts of new leaves. On evergreen species such as Chinese elm, the fungus can occur year-round on leaves and twigs, but on most deciduous trees the progress of the disease slows and becomes negligible during hot, dry weather.

MANAGEMENT

With careful management, some cultivars of susceptible landscape plants can be grown at a high level of aesthetic quality, despite the presence of



Figure 1. Black leaf spots caused by Chinese elm anthracnose.



Figure 2. Terminal dieback and partly killed Modesto ash leaves due to ash anthracnose.



Figure 3. Anthracnose symptoms on a sycamore leaf.

anthracnose. For new plantings, choose varieties that are resistant to these fungi. Space the plants far enough apart to maximize air circulation and increase sunlight, both of which facilitate faster drying of leaf surfaces when trees are fully grown.

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Once symptoms develop or become severe, anthracnose can't be effectively controlled during the current season. Rake and dispose of fallen leaves and twigs during the growing season and in fall. Prune during winter to increase air circulation in the canopy and remove the previous season's infected twigs and branches. Some pesticides are available to prevent anthracnose infections, but they don't reliably control the disease. However, some preventative treatments have been shown to work best on Modesto ash; see the section on Fungicide Applications.

Environmental factors also play an important role in managing anthracnose. Pay close attention to past and current conditions such as rain and irrigation to determine if either favors anthracnose development. Dry spring weather could mean that disease management isn't necessary. A wet spring or an irrigation system that wets the foliage could result in a disease outbreak that might warrant using control measures.

Resistant Varieties

Avoid planting highly susceptible species including Modesto ash (*Fraxinus velutina* variety *glabra*), American sycamore (*Platanus occidentalis*), and the London plane tree (*P. acerifolia* or *P. hybrida*). Although anthracnose doesn't affect California sycamore (*P. racemosa*) in the southern part of the state, it does infect this tree in the north, so it is better to avoid planting it in this region. The ash varieties Moraine and Raywood and the Evergreen (Shamel) ash are more resistant to anthracnose than other varieties. For evergreen Chinese elm, plant the more resistant Drake cultivar instead of True Green or Evergreen. Table 1 shows the relative susceptibility of some landscape trees to anthracnose.

When planting London plane, also called plane tree, decide whether anthracnose or powdery mildew resistance is more beneficial based on prevailing environmental conditions at that site and the planned pruning method; see Cultural Practices. For instance, the Bloodgood London plane tree cultivar is resistant to the fungus

that causes anthracnose but not to the one that causes powdery mildew. On the other hand, the anthracnose susceptible Yarwood cultivar is resistant to powdery mildew.

Cultural Practices

When feasible, prune and destroy or bury infected twigs and branches during fall or winter. Severe pruning of larger diameter branches is not a good practice for most types of trees, because it triggers the bushy growth of watersprouts, which are poorly attached to the trunk and become susceptible to diseases such as powdery mildew. To stimulate vigorous growth of trees suffering severe affects of anthracnose, fertilize after the leaves open and spring rains have stopped. Avoid irrigation systems that wet leaves.

While pollarding—severe pruning that removes all of the previous year's growth—isn't recommended for most trees, you can use this method on London plane trees to control anthracnose, because it removes pathogen-infected shoots. However, pollarding increases susceptibility of London plane trees to



Figure 4. Sycamore limbs distorted by anthracnose infection.



Figure 5. Chinese elm anthracnose cankers.

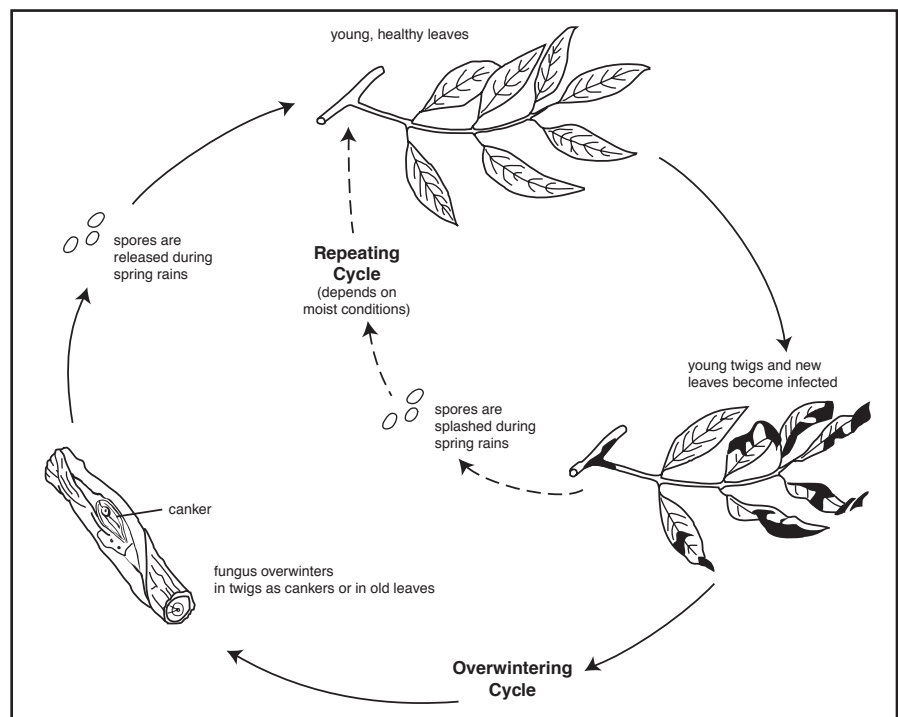


Figure 6: Anthracnose disease cycle on Modesto ash.

powdery mildew and reduces branch strength, because it stimulates the growth of new shoots and foliage. If you regularly pollard London plane trees, Yarwood is a good choice, because it is highly resistant to powdery mildew.

Fungicide Applications

Some fungicides provide a degree of control on Modesto ash if you thoroughly spray all new growth as buds begin to open in spring. Apply the spray before rainy periods, because fungicides can protect only healthy tissue and don't eradicate existing infec-

tions. If no rains are predicted, you can delay this application. If moist weather prevails, the plant might require additional applications at intervals of about 2 weeks to protect newly exposed growth. Complete spray coverage is crucial in preventing the disease.

The most effective fungicides for control are the protective fungicide chlorothalonil (e.g., Ortho Max Garden Disease Control), copper sprays (e.g. Bordeaux mixture), propiconazole (e.g. Banner Maxx), and the systemic fungicide thiophanate-methyl (e.g., Cleary's 3336, which is available for professional

use only). Chlorothalonil and thiophanate-methyl offer the greatest control in Modesto ash. Proper timing of application is critical for all fungicides.

Complete coverage of large, tall trees is difficult to achieve; spraying is not very efficient and might not be justified or feasible. While control might occur in some situations, anthracnose can return annually and warrant a continued, preventative spray program. Fungicide applications for anthracnose control generally aren't an option for hosts other than ash.

Table 1.
Susceptibility of Some Landscape Tree Cultivars to Anthracnose.

Susceptible	Resistant or Less Susceptible
Ash (<i>Fraxinus</i> species)	
Modesto (<i>F. velutina</i> 'Modesto')	Evergreen/Shamel (<i>F. Uhdei</i> 'Shamel') Moraine (<i>F. holotricha</i> 'Moraine') Raywood (<i>F. oxycarpa</i> 'Raywood')
Chinese Elm (<i>Ulmus parvifolia</i>)¹	
Evergreen True Green	Drake
Dogwood (<i>Cornus</i> species)	
Chinese dogwood (<i>C. kousa</i> 'Chinensis') Flowering (<i>C. florida</i>): many cultivars Pacific (<i>C. nuttallii</i>)	Bunchberry (<i>C. canadensis</i>) Carnelian cherry (<i>C. mas</i>) Chinese dogwood (<i>C. kousa</i>): many cultivars Flowering (<i>C. florida</i>): Appalachian Spring, Spring Grove, Sunset Japanese cornel (<i>C. officinalis</i>)
Oak (<i>Quercus</i> species)²	
White oak (<i>Q. alba</i>)	Pin oak (<i>Q. palustris</i>)
Privet (<i>Ligustrum</i> species)³	
Common privet (<i>L. vulgare</i>)	Amur (<i>L. amurense</i>) Ibota (<i>L. obtusifolium</i>) Regal (<i>L. obtusifolium</i> 'Regelianum')
Sycamore (<i>Platanus</i> species)	
American sycamore (<i>P. occidentalis</i>) California sycamore (<i>P. racemosa</i>) London plane (<i>P. acerifolia</i>): Yarwood ^{4,5}	London plane: Bloodgood ⁵ , Columbia, Liberty
<p>¹ All cultivars appear resistant in warm interior areas of California, where Chinese elm anthracnose is uncommon. ² Individual oak species and trees vary in their susceptibility. ³ The anthracnose-causing fungus <i>Glomerella cingulata</i> severely blights and cankers common privet in the Eastern United States. It infects other hosts in California but is not common or doesn't occur on privet. ⁴ Anthracnose usually doesn't damage regularly pollared Yarwood, a method of severe pruning that removes all of the previous year's growth. ⁵ Yarwood is resistant to powdery mildew, while Bloodgood is susceptible to powdery mildew.</p>	

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Pesticides applied in your home and landscape can move and contaminate creeks, rivers, and oceans. Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits or vegetables ready to be picked.

Do not place containers containing pesticide in the trash or pour pesticides down the sink or toilet. Either use the pesticide according to the label, or take unwanted pesticides to a Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Household Hazardous Waste Collection site nearest you. Dispose of empty containers by following label directions. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

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