



# Anthracnose

## Integrated Pest Management for Home Gardeners and Landscape Professionals

**A**nthrachnose (Figure 1) is a term used to loosely describe a group of related fungal diseases that typically cause dark lesions on leaves. In severe cases it may also cause sunken lesions and cankers on twigs and stems. Anthracnose affects many deciduous and evergreen trees and shrubs and can also infect vegetables, flowers, fruit, and turfgrass in some regions in California.

Because the disease often starts on leaves and twigs of trees, it is sometimes called leaf, shoot, or twig blight. The list of fungi that cause anthracnose is extensive, with each species typically attacking one or only a few closely related host species. Some of the more commonly encountered species in California are listed in Table 1.

### IDENTIFICATION AND DAMAGE

Generally, a disease is called anthracnose if the fungus produces spores in a fruiting body called an acervulus. These fungi can noticeably blight some trees such as sycamore, ash, oak, maple, and evergreen elms. Infections on deciduous plants are more severe in areas where prolonged spring rains occur after new growth appears. Anthracnose-causing fungi require water to disseminate and infect; they can't spread in dry conditions.

Anthracnose symptoms vary by plant host and due to weather conditions. On landscape trees, the fungi infect developing shoots and expanding leaves. Small beige, brown, black, or black spots later appear on infected twigs of hosts such as elm, oak, and sycamore. Dead areas on leaves can be more irregular on hosts such as ash, maple, and willow (Figure 2), while sycamore and oak anthracnose lesions typically develop along major leaf veins (Figure 3).

If leaves are very young when infected, they can become curled and distorted with only a portion of each leaf dying. Anthracnose diseases often defoliate trees from the ground up,



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



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

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leaving a rim of undamaged foliage at the top of the tree.

Mature leaves are generally 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 leaves drop prematurely.

In severe cases, notably on Chinese elm and some ash cultivars, anthracnose can sometimes attack and kill twigs and branches. Cankers—sunken, infected areas with swollen edges—may 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 (Figure 4). Anthracnose doesn't seriously harm trees unless defoliation, branch dieback, or cankering occurs every year. In California, anthracnose rarely causes permanent damage to trees except for Chinese elm trees, which can develop large branch and trunk cankers, especially in areas with relatively higher humidity, in trees with particularly dense, compact canopies, or both (Figure 5).

## LIFE CYCLE

On landscape plants, anthracnose fungi occur primarily on leaves and twigs (Figure 6). On deciduous trees, these fungi overwinter in infected twigs or dead leaf litter. In spring, the fungi produce numerous microscopic spores that spread via splashing rain or irrigation water to new growth where they germinate, entering leaves and newly expanded twigs. If moist conditions prevail, a successive generation of spores is produced from the infected parts of new leaves.

On irrigated evergreen species such as Chinese elm and coast live oak, 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 aesthetically pleasing despite the presence of anthracnose. For new plantings, choose cultivars that are resistant to anthracnose-causing fungi, and space the plants far enough apart to maximize air circulation and increase sunlight.

Some pesticides are available to prevent anthracnose infections, but they don't reliably control the disease. Preventative treatments have been shown to work best on Modesto ash; see the section on Chemical Control.

Once symptoms develop or become severe in a growing season, anthracnose can't be effectively controlled.

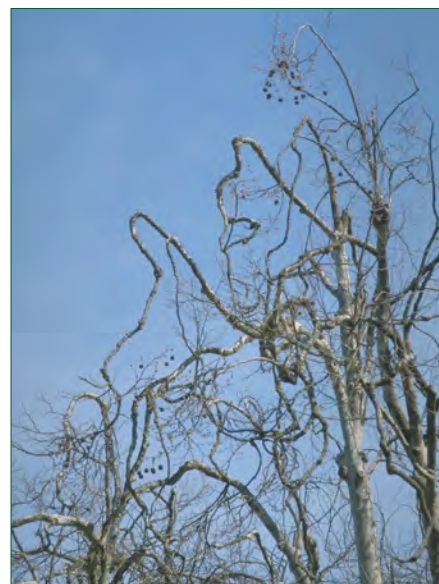
Environmental factors also play an important role in managing anthracnose. Monitor current conditions such as rain and irrigation to determine if either favors anthracnose development. Dry spring weather could mean that disease management isn't necessary. A wet spring or an irrigation system that wets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

### Resistant Cultivars

Avoid planting highly susceptible species including Modesto ash (*Fraxinus velutina* 'Modesto'), American sycamore (*Platanus occidentalis*), and some cultivars of the London plane tree (*Platanus x hispanica*) such as Yarwood. California sycamore (*Platanus racemosa*) is very susceptible to anthracnose which disfigures the tree, giving it a twisted appearance. Trees usually survive these attacks but may lose apical control temporarily, resulting in increased lateral growth and decreased height. Among ash trees, the cultivars Moraine, Raywood, and the Evergreen Ash (Shamel) are more resistant to anthracnose than others. For Chinese elm, plant the more resistant Drake



**Figure 3. Anthracnose symptoms on a sycamore leaf.**



**Figure 4. Sycamore limbs distorted by anthracnose infection.**



**Figure 5. Chinese elm anthracnose cankers.**

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 needed 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 fungus that causes powdery mildew. On the other hand, the anthracnose-susceptible cultivar Yarwood is resistant to powdery mildew.

### Cultural Practices

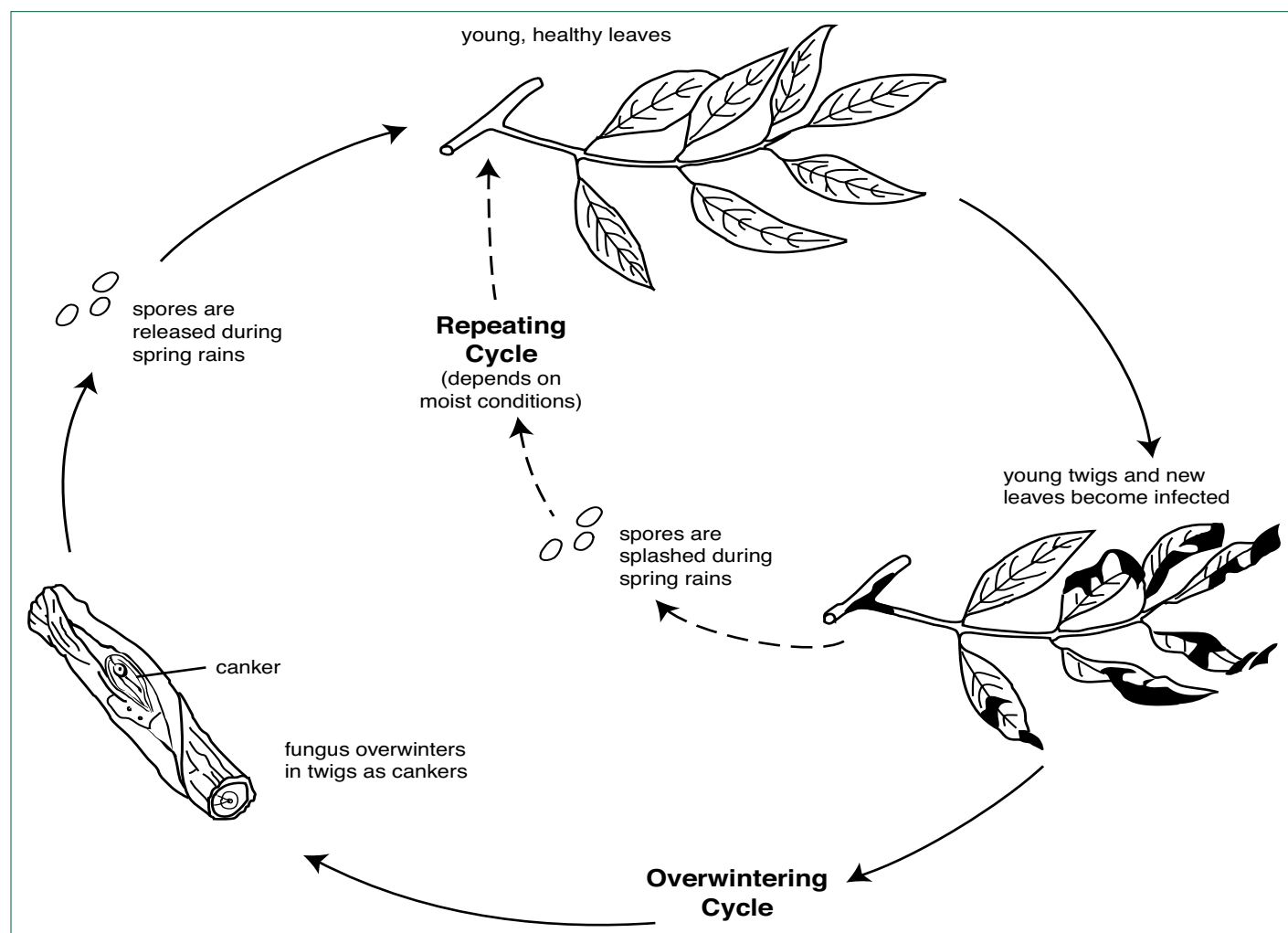
**Pruning.** Prune and destroy or bury infected leaves, twigs, and branches during fall or winter. Severe pruning of larger diameter branches is not a good practice for most trees, because it triggers bushy watersprouts, which are poorly attached to the trunk and are susceptible to diseases such as powdery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

**Sanitation.** 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 dead and diseased twigs and branches.

When planting, 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.

Sycamores are often pollarded. Pollarding is a practice where trees are severely pruned to remove all of the previous year's growth. Pollarding isn't recommended for most trees but can be useful for London plane trees to control anthracnose since the practice removes all pathogen-infected shoots. However, pollarding increases susceptibility of London plane trees to powdery mildew because it stimulates the growth of new shoots and



**Figure 6. Anthracnose disease cycle on Modesto ash.**



foliage. If you wish to annually pollard London plane trees, the cultivar Yarwood is a good choice, because it is highly resistant to powdery mildew.

## CHEMICAL CONTROL

Several fungicides are available that provide varying degrees of anthracnose control on Modesto ash. Fungicides can protect only healthy tissue and don't eradicate existing infections. Complete spray coverage and timing are crucial in preventing the disease. Thoroughly spray all new growth as buds begin to open in spring. Apply pesticides before rainy

periods. If no rains are predicted, you can delay this application. If moist weather prevails, additional applications may be required at intervals of about 2 weeks to protect new growth.

The most effective fungicides for control are the protective fungicides containing chlorothalonil e.g., Daconil), copper sprays containing copper diammonia diacetate (e.g., Liquicop), propiconazole (e.g., Banner Maxx II), and the systemic fungicide thiophanate-methyl (e.g., Cleary's 3336, for professional use only). Chlorothalonil and thiophanate-methyl offer the greatest control in Modesto ash. Always follow label directions.

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 work well on ash but their efficacy has not been proven on other species in California.



**Table 1. Susceptibility of some landscape tree cultivars to anthracnose.**

Tree genus	Susceptible varieties	Resistant varieties	Anthracnose pathogen
Ash ( <i>Fraxinus</i> spp.)	Modesto ( <i>F. velutina</i> )	Evergreen/Shamel ( <i>F. uhdei</i> ), Moraine ( <i>F. holotricha</i> ), Raywood ( <i>F. oxycarpa</i> )	<i>Apiognomonia errabunda</i>
Chinese elm cultivars ( <i>Ulmus parvifolia</i> )	Evergreen, True Green	Drake	<i>Stegophora ulmea</i>
Dogwood ( <i>Cornus</i> spp., <i>Cornus</i> hybrids, and their cultivars)	Chinese dogwood ( <i>C. kousa</i> ): some cultivars, flowering dogwood ( <i>C. florida</i> ): many cultivars, Pacific dogwood ( <i>C. nuttallii</i> )	Bunchberry ( <i>C. canadensis</i> ), cornelian cherry ( <i>C. mas</i> ), Chinese dogwood ( <i>C. kousa</i> ): many cultivars, flowering dogwood ( <i>C. florida</i> ): some cultivars, dogwood hybrids ( <i>C. kousa</i> x <i>C. florida</i> ): some cultivars, Japanese cornel ( <i>C. officinalis</i> )	<i>Discula destructiva</i>
Maple ( <i>Acer</i> spp.)	Japanese maple and its cultivars ( <i>A. palmatum</i> )	Evergreen maple ( <i>Acer paxii</i> ), bigleaf maple ( <i>A. macrophyllum</i> ), silver maple ( <i>A. saccharinum</i> )	<i>Discula</i> spp., <i>Kabatiella apocrypta</i>
Oak ( <i>Quercus</i> spp.)	Black oak ( <i>Q. kelloggii</i> ), coast live oak ( <i>Q. agrifolia</i> )	Blue oak ( <i>Q. douglasii</i> ), canyon live oak ( <i>Q. chrysolepis</i> ), pin oak ( <i>Q. paulustris</i> ), valley oak ( <i>Q. lobata</i> )	<i>Apiognomonia quercina</i> , <i>Cercospora polytricha</i> , <i>Colletotrichum gloeosporioides</i> , <i>Cylindrosporium kelloggii</i> , <i>Dicarpella bina</i> , <i>Marssonina martinii</i> , <i>Pseudomassaria agrifolia</i> , <i>Tubakia californica</i>
Sycamore ( <i>Platanus</i> spp. and cultivars)	American sycamore ( <i>P. occidentalis</i> ), California sycamore ( <i>P. racemosa</i> ), London plane ( <i>P. acerifolia</i> ) 'Yarwood'	London plane ( <i>P. acerifolia</i> ) cultivars 'Bloodgood', 'Columbia', 'Liberty'	<i>Apiognomonia veneta</i>

Notes about Table 1:

All cultivars of Chinese elm appear resistant in warm interior areas of California, where Chinese elm anthracnose is uncommon.

Consult reputable nurseries for dogwood cultivar susceptibility.

Individual oak species and trees vary in their susceptibility.

Anthracnose usually doesn't damage regularly pollarded Yarwood. Yarwood is resistant to powdery mildew, while Bloodgood is susceptible to powdery mildew.

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Pesticides are poisonous. Some pesticides are more toxic than others and present higher risks to people, nontarget organisms, and the environment. A pesticide is any material (natural, organic, or synthetic) used to control, prevent, kill, suppress, or repel pests. "Pesticide" is a broad term that includes insecticides, herbicides (weed or plant killers), fungicides, rodenticides, miticides (mite control), molluscicides (for snails and slugs), and other materials like growth regulators or antimicrobial products such as bleach and sanitary wipes that kill bacteria.

Always read and carefully follow all precautions and directions provided on the container label. The label is the law and failure to follow label instructions is an illegal use of the pesticide. Store all chemicals in the original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, and animals. Never place pesticides in food or drink containers. Consult the pesticide label to determine active ingredients, correct locations for use, signal words, and personal protective equipment you should wear to protect yourself from exposure when applying the material.

Pesticides applied in your garden and landscape can move through water or with soil away from where they were applied, resulting in contamination of creeks, lakes, rivers, and the ocean. Confine pesticides to the property being treated and never allow them to get into drains or creeks. Avoid getting pesticide onto neighboring properties (called drift), especially onto gardens containing fruits or vegetables ready to be picked.

Do not place containers with pesticide in the trash or pour pesticides down the sink, toilet, or outside drains. Either use all the pesticide according to the label until the container is empty or take unwanted pesticides to your local Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Hazardous Waste Collection site nearest you. Follow label directions for disposal of empty containers. 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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