23. Anthracnose

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Hosts

By definition, anthracnoses are leaf and twig diseases caused by a number of different but closely related fungi, all of which produce conidia in blister-like fruiting bodies called acervuli. Many anthracnose fungi are classified as ascomycetes and belong to genera including *Apiognominia, Gnomonia, Gnomoniella,* and *Glomerella.* The conidial states (anamorphs or asexual stages) are classified as coelomycetes and belong to genera including A*ureobasidium, Colletotrichum, Cryptocline, Diplodina, Discella,* and *Discula.*

Each anthracnose fungus is specific to the host tree it affects. For example, the oak anthracnose fungus infects oak trees only and will not spread to other tree species. Although these fungi are host-specific, several different anthracnose fungi can infect a single tree host. For example, several different anthracnose fungi can affect maple.

Anthracnose diseases have a very broad host range and affect many hardwood tree species in the United States. Symptoms are most severe on American sycamore, ash, maple, white oak, and black walnut. The disease is less common and damaging on hosts including birch, catalpa, elm, hickory, linden, bur, red and black oak, pecan, and yellow-poplar.

Distribution

Anthracnose diseases of hardwood seedlings occur throughout the range of the host species.

Damage

Anthracnose diseases may cause partial or complete defoliation of seedlings, resulting in a decrease in growth and vigor. Mortality of infected plants is rare. Anthracnose symptoms are more severe in years that have extended cool, wet spring weather.

Diagnosis

Symptoms vary with the tree host affected and the timing of the year the disease is observed. Symptoms are confined to the leaves on most tree hosts. However, on sycamore and oaks, the fungi may also affect buds, twigs, and shoots, and cause shoot blight, twig cankers, and branch dieback. On black walnut and hickory, the nuts may be affected.

Symptoms on infected leaves appear as dead areas (lesions) that range in size from small discrete spots (fig. 23.1) to medium size lesions (fig. 23.2) to large, irregular blotches (figs. 23.3 and 23.4). Lesions vary in color, and range from

Figure 23.1—*Small, discrete spots on maple.* Photo by Jill D. Pokorny, USDA Forest Service.

Figure 23.2—*Medium-sized lesions on black walnut.* Photo by Jill D. Pokorny, USDA Forest Service.

Figure 23.3—*Large, irregular leaf blotch lesions on white oak.* Photo by Joseph O'Brien, USDA Forest Service, at http://www.bugwood.org.

Figure 23.4—*Large, irregular leaf blotch lesions on maple.* Photo by Jill D. Pokorny, USDA Forest Service.

Figure 23.5—*Vein-associated leaf blight lesion on sycamore.* Photo by Clemson University, USDA Cooperative Extension Slide Series, at http://www.bugwood.org.

black to reddish brown to tan. On sycamore (fig 23.5) and maple (fig. 23.6) trees, lesions often develop and extend along the leaf veins and midrib. Individual lesions may coalesce and cause large areas of the leaf to die, resulting in an overall wilted or scorched appearance to the leaves. Most infected leaves and leaflets fall prematurely.

When seedlings are infected early in the spring, the emerging leaves are often killed, turn black, and resemble damage caused by frost. If infection occurs during leaf expansion, growth of the infected tissue slows or stops as the rest of the leaf continues to expand. As a result of this unequal growth, the leaf tissue around the lesion becomes distorted and puckered (fig. 23.7). As leaves mature, they tend to become more resistant to infection and individual lesions are typically smaller in size.

Figure 23.6—*This lesion developed and expanded along a major leaf vein on maple.* Photo by Jill D. Pokorny, USDA Forest Service.

Figure 23.7—*Ash leaves exhibiting distorted and puckered growth adjacent to a large lesion.* Photo courtesy of the Plant Disease Clinic, University of Minnesota.

Blister-like fruiting bodies, called acervuli, form within the lesions on leaves, twigs, and fruit. They are particularly abundant on leaf veins and can be seen easily with a 10x hand lens (fig. 23.8). They vary in appearance from brown to pinkish in color. The pinkish color, when present, is that of conidia being produced in mass, within a mucilaginous matrix.

Biology

All fungi that cause anthracnose diseases have similar life cycles and require water from rain, dew, or fog to infect a tree. Because of these parameters, anthracnose is usually most severe in years with extended rainy weather periods in the spring and early summer. Disease development often subsides during summer months when environmental conditions become hot and dry.

Figure 23.8—*Closeup of acervuli (brown dots) on and beside leaf veins on the lower leaf surface of a lesion on white oak.* Photo by Paul Bachi, University of Kentucky Research and Education Center, at http://www.bugwood.org.

Anthracnose fungi overwinter in infected leaf-and-twig debris on the ground or in cankered twigs and branches on the tree. During rainy periods in the spring, these fungi discharge large numbers of microscopic spores of the sexual state, called ascospores. The spores are spread by wind or splashing rain onto young, developing leaves of host seedlings. If the leaf surfaces remain wet for several hours, the spores germinate and produce lesions on the new leaves.

On most tree hosts, the fungi will produce secondary spores, called conidia, within the lesions that form on the leaves. Conidia are produced in large numbers and are also spread from leaf to leaf by wind and splashing rain. If rainy periods occur during the summer and fall, rapid increase and spread of anthracnose can occur by means of these secondary conidial spores. In some cases, such as maple anthracnoses, only conidial spores are present and the sexual states that produce ascospores, if any, are unknown.

Control

Prevention

Avoid this disease by planting anthracnose-resistant species or varieties when available. Some cultivars of London plane such as Columbia, Liberty, and the older Bloodgood, have a high level of resistance to anthracnose and are preferred. In the case of oaks, the red oak group is more resistant than the white oak group.

Cultural

Avoid close spacing and overhead irrigation of cuttings and young trees. Eliminate the overwintering fungus in plant materials in and around the nursery. Rake leaves and prune out severely infected twigs and branches to reduce the overwintering population of anthracnose fungi. Destroy infected material by burning or other appropriate means.

Chemical

Anthracnoses can be controlled with properly timed applications of a suitable fungicide. For effective control, fungicides must be applied before the disease appears in the spring. Apply the first spray at bud break, and repeat applications at 7- to 14-day intervals during cool, wet weather. Refer to the chemical labels for specific information.

To reduce chances for pathogens to develop chemical resistance, it is best to rotate the use of several different fungicides within the chemical spray program. Selected fungicides should have different modes of action and be applied in a rotational order.

Selected References

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