

## 24. Leaf Spots and Blights

Michelle M. Cram and Will R. Littke

### Hosts

Most hardwood species are affected by one or more fungi or bacteria that cause leaf spots and blights.

### Distribution

Large varieties of fungi and bacteria cause leaf spots and often have wide distribution throughout their host's range.

### Damage

The impact of leaf diseases on seedlings can range from minor loss of leaf area to entire crop loss. Leaf disease incidence can increase dramatically within nurseries due to seedling densities and frequent irrigation in nurseries. Defoliation of young seedlings in nurseries can lead to serious damage and mortality if the seedlings are unable to produce new leaves. Some leaf diseases will also infect the stem causing cankers that can result in stem breakage and mortality. Susceptibility to leaf diseases can vary greatly within a genus (for example, *Populus*). Damage by leaf diseases is typically reduced when resistant genotypes are used.

### Diagnosis

The degree of leaf damage by a pathogen determines if it is characterized as a leaf spot or blight. Leaf spots are discreet necrotic areas a few millimeters to centimeters in size (fig. 24.1). Blight refers to a rapidly spreading leaf disease that kills most of the leaf, often including the stem, resulting in early leaf drop. Leaf spots vary in size, shape, and color depending on the pathogen and host. Most leaf diseases can be identified by the spores produced in fruiting bodies—typically black pycnidia or stromata.

Fungi in the *Phyllosticta* genus cause circular leaf spots that have a dark brown to purple outer ring and a light brown center with pycnidia eventually forming in the center (fig. 24.2). *Septoria* species produce a similar leaf spot (fig. 24.3). Other pathogens such as *Pseudocercospora* species tend to cause angular leaf spots by attacking the tissue between veins (fig. 24.4). Round, thick black structures called tar spot formed by *Rhytisma* species are

common on maple and willow leaves (fig. 24.5). Another type of leaf disease caused by *Taphrina* species produces leaf blisters by stimulating infected cells to enlarge. These blisters begin as yellow bulges (2 to 20 mm) that last for a few weeks, eventually turning brown. Blisters can coalesce, affecting the entire leaf and resulting in defoliation (fig. 24.6).



Figure 24.1—*Tubakia* leaf spot on oak caused by *Tubakia dryina*. Photo by Michelle M. Cram, USDA Forest Service.



Figure 24.2—Leaf spot on red maple caused by *Phyllosticta minima*. Photo by Michelle M. Cram, USDA Forest Service.



Figure 24.3—*Septoria* leaf spot on red alder caused by *Septoria alnifolia*. Photo by Will R. Littke, Weyerhaeuser Company.

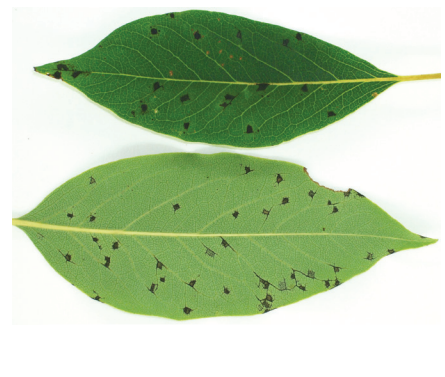


Figure 24.4—Leaf spot on common persimmon caused by *Pseudocercospora fulliginosa*. Photo by Michelle M. Cram, USDA Forest Service.

# Hardwood Diseases

## 24. Leaf Spots and Blights



**Figure 24.5**—Developing stromata of *Rhytisma punctatum* on bigleaf maple. Photo by Will R. Littke, Weyerhaeuser Company.

Bacteria also cause leaf spots and blights and are common on trees in the *Prunus* genus (fig 24.7). Bacterial leaf spots appear as water-soaked dark brown or black spots that can enlarge during wet years leading to early defoliation. Bacterial leaf spots will ooze bacteria if cut and placed under a microscope.



**Figure 24.6**—Leaf blister on black cottonwood caused by *Taphrina populina*. Photo by Will R. Littke, Weyerhaeuser Company.

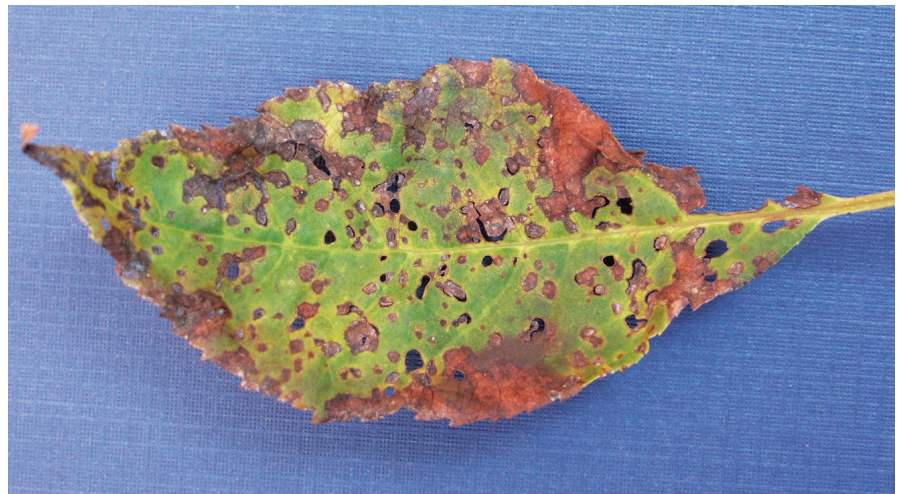
### Biology

Most leaf diseases have similar disease cycles. Sexual spores called ascospores are produced in leaves and stem tissue infected in the previous year. These spores are moved in the spring by wind and rain splash to infect new foliage. Further spread of the disease occurs during the asexual stage of the pathogen

when conidia spores are produced in fruiting bodies throughout the late spring, summer, and early fall. These spores are spread by irrigation, rain splash, and wind to surrounding leaves, further intensifying the infection centers. Some pathogens of leaves also infect stems (for example, *Septoria* spp.) and cause cankers that result in stem breakage and mortality (see chapter 26).

*Taphrina* species do not produce spores in fruiting bodies; instead, ascospores are produced from a layer of asci that breaks through the surface of the infected leaf. The ascospores will then bud and form blastospores. These spores can infect newly expanding leaves or overwinter in bud scales and bark until bud break in the spring. Warm, wet springs favor the development of *Taphrina* leaf diseases, but serious infections are rare.

Bacteria that cause leaf diseases are spread by water and cutting tools and can infect leaves, twigs and fruit. Bacteria can overwinter in infected plant tissue and on plant surfaces until environmental conditions and host material are favorable for infection in the spring.



**Figure 24.7**—Bacterial leaf spot on chokecherry. Photo by Michelle M. Cram, USDA Forest Service.

## Control

### Cultural

High seedling density and frequent irrigation favor leaf diseases. Culture techniques that encourage rapid drying of foliage can reduce the infection severity. Irrigate in the morning and consider lower seedling densities to permit more airflow and quick drying. After seedlings are lifted, incorporate all plant debris in the soil to reduce this inoculum source. In hardwood stooling beds, rogue any severely infected clones. Use resistant cultivars or clones if available.

### Chemical

Control of leaf spots that affect seedling production often requires fungicides applied to the foliage every few weeks, beginning in the spring. Early population control of pathogens that cause leaf diseases is critical to avoiding premature defoliation. Pathogens that also cause stem cankers require regular inspection and control through the late summer.

Control of bacterial leaf spot diseases requires the use of copper-based fungicides and bactericides as preventative sprays. If copper-resistant strains of bacteria are present, it may be necessary to increase the action of copper by the addition of fungicides containing ethylene-bis-dithiocarbamate.

### Selected References

- Filer, Jr., T.H.; Anderson, R.L. 1989. Leaf spots and blights. In: Cordell, C.E.; Anderson, R.A.; Hoffard, W.H.; Landis, T.D.; Smith, Jr., R.S.; Toko, H.V., tech. coords. Forest nursery pests. Agriculture Handbook 680. Washington, DC: USDA Forest Service: 95–96.
- Funk, A. 1985. Foliar fungi of western trees. Publication BC-X-265. Victoria, British Columbia, Canada: Canadian Forestry Service, Pacific Forest Research Centre. 159 p.
- Scheck, H.J.; Pscheidt, J.W. 1998. Effect of copper bactericides on copper-resistant and -sensitive strains of *Pseudomonas syringae* pv. *syringae*. Plant Disease. 82: 397–406.
- Sinclair, W.A.; Lyon, H.H. 2005. Diseases of trees and shrubs, 2nd ed. Ithaca, NY: Cornell University Press. 660 p.