Several fungal diseases attack the foliage of nursery and landscape trees. These diseases have several common features: (1) They are caused by various specific fungi; (2) they usually cause most damage in wet weather; (3) in many cases, only the young developing foliage is susceptible; and (4) the primary effect of these diseases is unsightly foliage—generally, these foliage disorders do not permanently damage trees unless the conditions are very severe and they are present several consecutive years.

Despite the fact that foliage diseases seldom permanently damage mature shade trees, they can reduce the aesthetic value of affected trees. Severe infections can stunt or even kill nursery plantings.

This publication describes and illustrates common leaf problems and discusses appropriate control measures.

**Life cycle**

Most of the fungi causing foliage diseases survive winter in a dormant condition as spores, as vegetative structures on or in twigs and bark, or, more commonly, on fallen leaves. Spores are discharged during favorable periods of weather. When they come in contact with susceptible host tissue during proper moisture and temperature conditions, the spores germinate, grow into the leaves, and eventually cause dead spots or blotches. If the fungus survives as vegetative mycelium (fungal structure) in twigs, it often attacks bud tissue and may cause twig cankers as well as foliage damage. In many instances, infected foliage turns off-color, often yellow. If the fungus produces sufficient toxins, the leaves will drop off, causing varying degrees of defoliation.

Some fungi attack only young foliage. Then, symptoms usually are observed early in the season. Others attack only mature or older leaves, resulting in symptoms appearing in July or later. A few fungi are capable of attacking throughout the season when weather patterns favor them.

**Specific foliage diseases**

Listed below are a number of the more common foliage diseases that affect Wisconsin trees. Many have no common name other than the generic name of the causal organism.

These diseases cannot always be separated by symptoms alone. Thus, a description of some of the disease groups follows and may help identify the problems when used with the accompanying photographs. In some situations, such as general landscape problems, tentative identification may be all that is needed. However, if it is a nursery disease, or more specific diagnosis is needed, then collect diseased leaves showing a range of symptoms and stages of disease development and submit them to a plant disease diagnostic laboratory. Your county Extension office can help you with this.

**Ash (Fraxinus)**

- Anthracnose (Gloeosporium aridum)
- Cylindrosporum leaf spot (C. fraxini [Mycosphaerella sp.])
- Phyllosticta leaf spot (P. viridis [Mycosphaerella sp.])
- Powdery mildew (Phyllactinia guttata)
- Rust (Puccinia peridermiospora)

**Birch (Betula)**

- Anthracnose (Gloeosporium betularum and other species)
- Cylindrosporum leaf spot (C. betulae)
- Septoria leaf spot (S. betulae)
- Leaf blister (Taphrina spp.)
- Rust (Melampsoridium betulinum)

**Crabapple (Malus sp.) and Hawthorn (Crataegus)**

- Coniothyrium leaf spot (C. pyrinum)
- Frog eye leaf spot (Physalospora obtusa)
- Leaf blight (Entomosporium maculatum = Fabraea maculata)
- Leaf blotch (Phyllosticta solitaria)
- Marssonina leaf spot (M. coronaria)
- Monilinia blight (Monilinia spp.) (hawthorn only)
- Powdery mildew (Podosphaera sp.)
- Rust (Gymnosporangium spp.)
  —see Extension publication Apple, Flowering Crab, Hawthorn, Juniper Disorder: Cedar-Rust Complex (A2598)
- Scab (Venturia inaequalis)
  —see Extension publication Crabapple Disorder: Scab (A2173)
Hickory (Carya) and Walnut (Juglans)
- Anthracnose (Gnomonia spp. [Marssonina on walnut])
- Downy spot (white mold) (Microstoma juglandis)
- Powdery mildew (several genera)

Horsechestnut, buckeye (Aesculus)
- Anthracnose (Colletotrichum [Glomrella cingulata])
- Leaf blotch (Phyllosticta sp. [Guignardia aesculi])
- Powdery mildew (Uncinula flexuosa)

Maple (Acer)
- Anthracnose (Gloeosporium apocryptum and other species)
- Bull’s eye spot (Cristulariella moricola)
- Gray-mold spot (Cristulariella depraedans)
- Leaf blister (Taphrina spp.)
- Monochaetia leaf spot (M. desmazierii) (red maples only)
- Phyllosticta leaf spot (Phyllosticta minima)
- Powdery mildew (several genera)
- Septoria spot (S. aceris)
- Tar spot (Rhytisma spp.) photo 1
- Venturia leaf spot (V. acerina [Cladosporium humile])

Oak (Quercus)
- Actinopelte leaf spot (A. dryina)
- Anthracnose (Gloeosporium quercinum [Gnomonia veneta])
- Leaf blister (Taphrina caerulescens)
- Phyllosticta leaf spot (Phyllosticta spp.)
- Powdery mildew (Microsphaera alni and other genera)
- Rust (Cronartium spp.) (Pinus spp. are alternate hosts)
- Septoria leaf spot (Septoria spp.)

Disease descriptions

Anthracnose
Anthracnose is probably the most common disease affecting foliage of woody ornamentals in Wisconsin. Anthracnose means “ulcer-like sore,” which describes the symptoms that can occur as twig cankers on some hosts, such as the sycamore. Consequently, the disease is more serious on plants whose twigs also are susceptible. Anthracnose is caused by several species of fungi whose spores (“seeds”) are produced in a specific fruiting structure called an acervulus. Most belong to the genus Gloeosporium (Gnomonia).

1. Tar spot on maple. Black-colored spots; may be confused with mite-caused spots that are red.
2. Sycamore anthracnose. A diagnostic feature of anthracnose on several tree hosts is the necrosis (death) of veinal tissue. Dead areas are not confined by veins.
Symptoms include spots and dead areas in leaves. These spots vary in size and shape but typically are irregular. Affected tissue is not usually bound by leaf veins, nor confined to leaf margins. In fact, dead tissue often follows the veins, which helps in diagnosing anthracnose (photos 2-5). Color is also variable, but affected tissue first appears water-soaked, brown, purple, or black before turning tan. Under severe conditions, most of the leaf tissue is affected. Leaves frequently curl and may fall off. The lower half of the canopy often is most severely affected and, when those leaves fall off, the tree appears to have only a periphery or crown of healthy leaves remaining. Some trees, such as sycamore, usually refoliate. Oak trees typically do not lose their leaves but retain the unsightly foliage throughout the season.

Many shade trees are susceptible to anthracnose, but ash, maple, oak (especially white), sycamore, and walnut are especially so. The fungus that causes the disease on one host does not infect other species. Cool, moist weather in early spring when the buds are breaking and leaves are developing favors anthracnose. On white oaks, an epidemic can develop at temperatures about 60°F with several days of showers. The same wet weather at 80°F will cause little foliage damage. Sycamore twigs are susceptible at even lower temperatures. Neither of these hosts are susceptible after the foliage matures. By contrast, walnut is susceptible to this disease primarily in late summer and early fall.

For chemical treatment of anthracnose to be effective, timing is essential. Spray at bud break, again when leaves are half developed, and a final time when leaves are fully developed.

**Cylindrosporium, Phyllosticta, and Septoria leaf spots**

Symptoms caused by these three distinct fungi often overlap. They typically produce small round spots; and when mature, small black fruiting structures (pycnidia) can be observed sometimes embedded in the spots or over the surface of the spots (photo 6). Occasionally, these fungal diseases also cause considerable yellowing of the foliage and may result in defoliation.

Shade trees vary in their susceptibility to these fungi. Maple is susceptible to Phyllosticta as the foliage is expanding. One or two applications of the proper fungicide at that time is sufficient to prevent symptom expression. On the other hand, Cylindrosporum and Septoria leaf spots typically develop later in the season. When conditions are favorable, they may repeat several cycles of reinfection, thus necessitating several applications of fungicide when circumstances warrant it.
**Downy spot (white mold)**

Symptoms include large, angular lesions appearing in midspring (photo 7). These lesions later turn brown, then dry. A white powdery coating appears on the underside of the leaf.

**Entomosporium leaf blight**

This leaf blight (also known as Fabrea leaf spot) damages hawthorn and occasionally other rosaceae species. Spots are usually reddish-brown, somewhat irregular in shape, and generally less than ½-inch wide. They may coalesce, or grow together, and they can also cause defoliation. Spores are borne in inconspicuous structures, called acervuli, in diseased spots.

**Leaf blister**

A number of species of the genus Taphrina are responsible for this disease. Leaf blister is named because it typically causes discrete, roundish bulges in leaf tissue, often with some cupping and twisting of the leaves (photo 8). Defoliation rarely follows infection. Affected tissue sometimes has a fuzzy growth over the surface. Red oaks are especially susceptible, although other hosts are sometimes also affected. Like most other fungal leaf spots, each fungal species is host specific.

7. Downy spot (white mold) of hickory and walnut. Symptoms may resemble anthracnose, but a white, moldy growth on the lower surface of the dead spots is diagnostic of this disease.

8. Leaf blister on red oak. Distinct “blisters” appear on leaves, which remain green and attached to the tree.

9. Powdery mildew on white oak. The tiny black spots scattered within the white mold are overwintering fruiting structures of the fungus.

10. Rust pustules on oak. Red or black spore masses are found on the underside of the leaf, which remains green.
Leaf blotch
This is the most prominent disease of horsechestnut, and most related members of Aesculus (buckeye) are susceptible. Leaf blotch commonly produces symptoms similar to anthracnose, beginning in midsummer. In nurseries, symptoms may show earlier. Aesculus species also are susceptible to a physiogenic “leaf scorch” condition that is associated more with marginal burn of the foliage. However, the two can occur on the same plant.

On flowering crab, leaf blotch typically shows more yellowing and blotchiness of foliage than on horsechestnut. As the disease progresses, affected leaves fall off.

Monilinia blight
Irregular blotches suddenly appear on foliage in May or June, especially on hawthorns. Entire twigs are sometimes affected. The damaged tissue frequently has a fuzzy fungal growth over the surface. At first, the tissue appears water-soaked and gray, but soon turns tan in color.

Cool, moist conditions favor the disease, which does not spread after initial infections. Thus, you can protect trees by using appropriate fungicides where needed. Applications should be made at the same time as for cedar-hawthorn rust control.

Powdery mildew
This disease is found on many trees, especially in late summer. Symptoms include a white or gray surface of fungal spores and vegetative growth over leaves and twigs (photo 9). Powdery mildew rarely requires control on trees, but several chemicals are registered and effectively control this disease if applied at the proper time. For more information, check Extension publication Powdery Mildew of Ornamentals (A2404).

Rust
Rust diseases usually are diagnosed by the masses of red or orange spores that develop over the leaves’ surfaces (photo 10). On some shade trees, such as birch and cottonwood, leaves may become severely infected and drop off. On others, such as oak, the infection is scarcely perceptible. With still others, such as ash, there may be twisting, swelling, and malformation of affected tissue.

 Virtually all rust diseases require a second, or alternate, host on which to complete the life cycle. Alternate hosts include the juniper for hawthorn and flowering crab rust; certain pines for oak rust; Spartina (a Poaceous grass) for ash rust; and Larix laricina (eastern larch, or tamarack) for birch rust. In some cases, you can control rust by removing the less desirable host from the area, while in most cases, the problem is not serious enough to warrant treatment.

However, fungicide treatment may be required in nurseries and other settings. Infection may be seasonal, thus requiring treatments for a limited period only.

Control
Frequently, infected shade trees will survive foliage diseases without any control measures being taken. This is especially true of hardy trees that are otherwise healthy. Infections late in the season rarely cause permanent damage. However, nursery trees frequently have severe infections because they are growing closely together, they may be under sprinkler irrigation, and inoculum can build up where it is not possible to clean up leaves or practice effective crop rotation.

Where possible, the life cycle of the disease-causing fungus should be broken through sanitation, rotation, and/or elimination of alternate or carrier hosts in the area. Where that is not possible and protection is needed, select a registered fungicide that is effective against the particular fungus. The wrong pesticide may not only be ineffective, it also may cause plant injury. Apply the correct chemical when the crop needs protection.

The following table of hosts and diseases along with applicable fungicides is intended as only a guide to products to look for when certain foliage diseases need chemical treatment. Since pesticide labels change frequently, carefully read and follow all label directions before use. This list includes most fungicides registered for shade tree use, but does not include all shade tree diseases. Also, some diseases can be difficult to identify, so it is important to determine the causal organism before beginning treatment. If you need help identifying a disease, submit leaves showing a range of symptoms to your county Extension office.

References to products in this publication are for your convenience and are not an endorsement or criticism of one product over other similar products. You are responsible for using chemicals according to the manufacturer’s current label directions. Follow directions exactly to protect the environment and people from chemical exposure.
Guide to fungicides labeled for treating various foliage diseases*

<table>
<thead>
<tr>
<th>Host</th>
<th>Bayleton</th>
<th>Daconil 2787</th>
<th>Duosan, Zyban</th>
<th>Fore, Dithane M-45</th>
<th>Bordeaux</th>
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<td><strong>Ash</strong></td>
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<td>anthracnose</td>
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<td>Cylindrosporium</td>
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<td>several leaf spots</td>
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*This table is based on information provided on fungicide labels. Always check the label for current registration information before use.

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