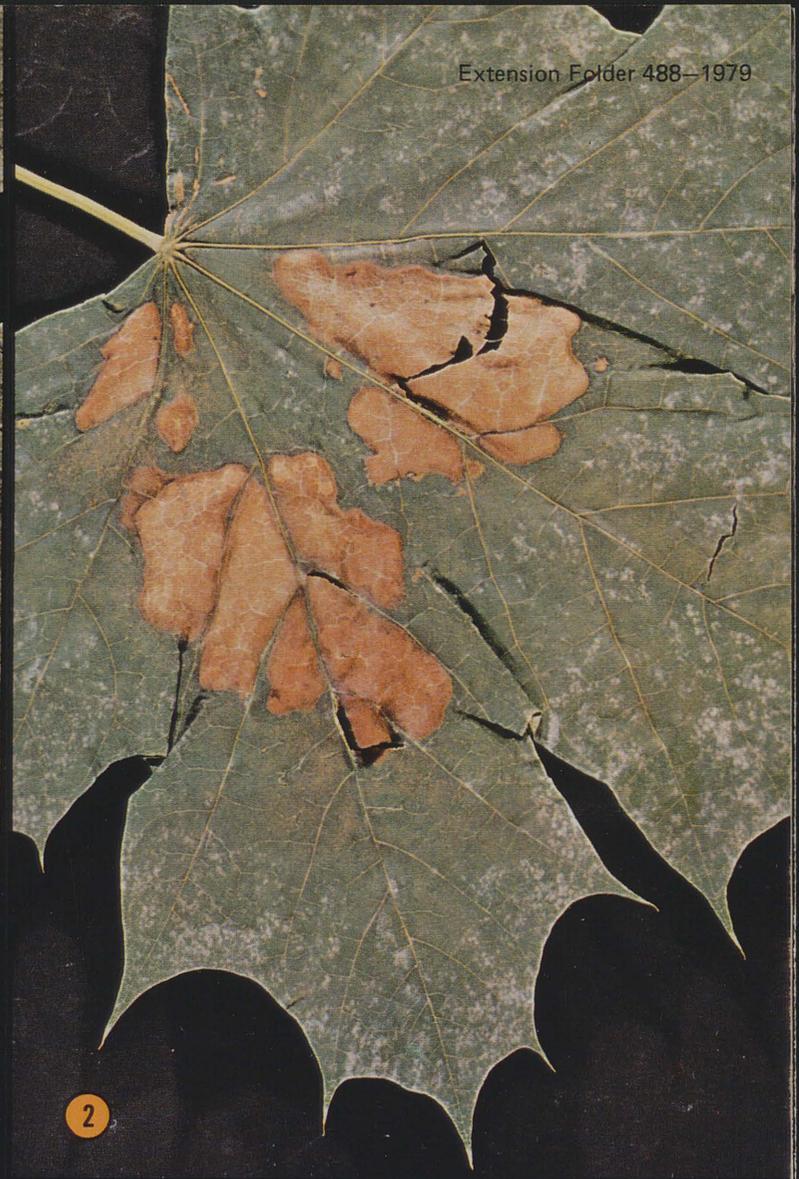
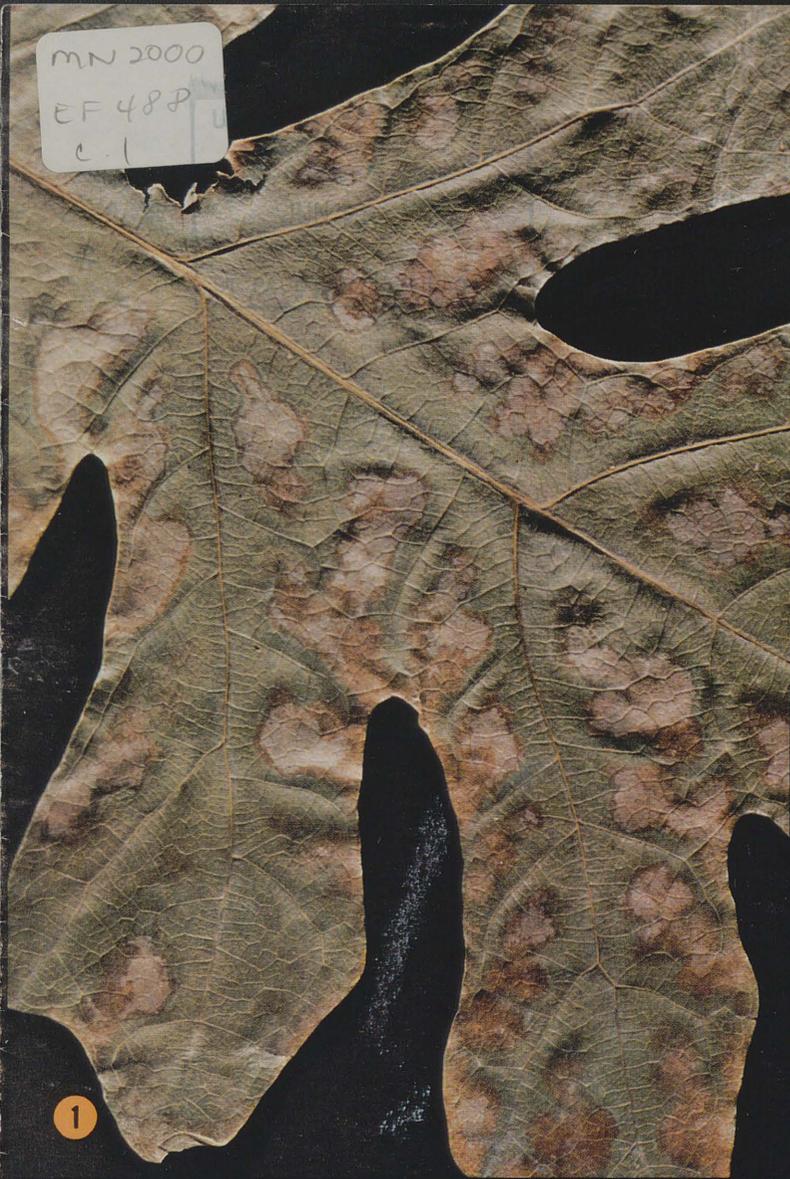


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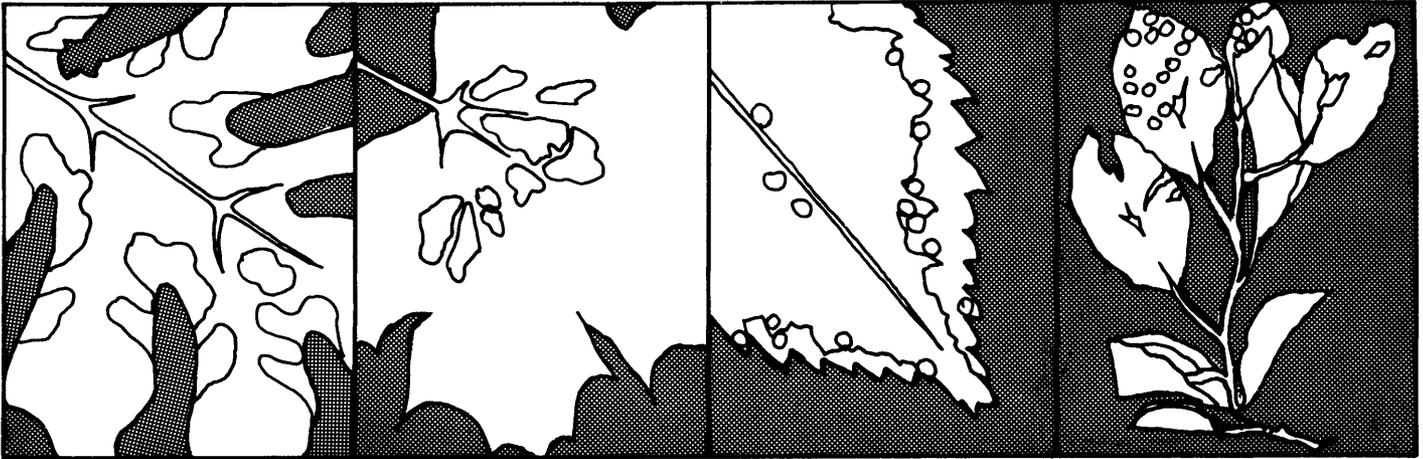
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Agricultural Extension Service
University of Minnesota

LEAF SPOT DISEASES of Deciduous Trees

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1. Oak anthracnose

2. Maple anthracnose

3. Elm black leaf spot

4. Apple Scab

Leaf spot diseases are a very common problem on many kinds of deciduous trees such as elm, oak, and maple, throughout Minnesota. Air pollutants, chemical sprays, herbicides, and adverse atmospheric and soil conditions are all possible sources of the problem. However, more often serious leaf spot diseases are caused by living organisms, such as insects, bacteria, viruses, and fungi. Of these, fungi are the most frequent cause of leaf spots, blotches, and blights.

In spite of the unsightliness of these kinds of diseases, they usually do only minor damage to established, healthy trees. Repeated attacks by leaf spotting fungi, however, may result in a poorly formed, less vigorous tree. In addition, severe leaf losses due to these diseases during late May or early June in successive years may cause the tree to die.

SYMPTOMS

In general, leaf spots appear as beige to brown, purple, or black irregular areas, usually expanding along the veins. The spots may grow together until they cover more than half the leaf (figures 1 to 4). A very common type of leaf spot is the "anthracnose." Different microorganisms cause anthracnoses on different kinds of trees. However, the symptoms are quite similar and easy to identify. Anthracnose spots usually have a light center separated from the healthy tissue by a darker margin (figures 1 and 2).

When the leaf spot infection is severe, the leafstems may also be attacked, leading to loss of leaves. If infection occurs in the spring, the fungus causing the disease may invade the twigs, via the leafstem and kill small twigs or initiate twig cankers.

Young leaves and small green twigs are the parts of a tree which are most susceptible to the leaf spotting fungi. However, mature leaves may also become infected. Leaves of hardwoods lost to leaf spot diseases early in the season are often replaced with new leaves which are smaller and fewer in number.

HOW LEAF SPOTS DEVELOP

Leaf spot diseases caused by living organisms appear when there are extended periods of cool, moist weather and when there are infected leaves and twigs that carry the fungi from

the preceding year. When cool, moist conditions prevail in spring, large numbers of fungal spores are produced on the infected twigs and leaves. These spores require high relative humidity or free water on healthy leaf surfaces to create new infections. Though there are usually infected leaves around from season to season, the rainy periods may not be long enough for the fungi to grow, multiply, and infect new leaves and twigs. Consequently, leaf spot diseases do not develop every year. When there are long periods of cool, moist weather in May leaf spots are most likely to occur.

Occasionally anthracnoses may be confused with leaf scorch, which appears as a marginal leaf browning progressing between veins, and which lacks the dark margin found in the anthracnoses. Leaf scorch occurs when excessive water is lost from the leaves. It often appears on young leaves during warm, dry weather.

CONTROLLING LEAF SPOTS

The main way to control leaf spots is by using proper cultural practices. First, all infected leaves from the previous season must be destroyed so the microorganisms will not have a chance to survive and multiply. Raking and disposing of infected leaves on the ground and pruning infected twigs will accomplish this. Trees weakened by past infections should be fertilized to increase vigor. Watering, especially during drought periods, can be helpful to such trees. Since leaf spot fungi are encouraged by a cool, humid environment, thinning and pruning the crown to promote air movement and rapid drying of the leaves will make conditions less favorable for the development of leaf spots.

Treating established trees with chemicals for leaf spots is usually not necessary. However, when leaf loss has been severe in the past several years, using protectant fungicides can be considered. The fungicides in the included list have been used to control various leaf spot diseases. And, although these have not been tested on all tree species, they are likely to reduce leaf spots and anthracnoses if applied correctly and at the right time. The fungicides must be applied when the leaves are beginning to emerge from the buds and then 2 to 3 times at 7 to 10-day intervals unless otherwise specified. You cannot wait until leaf spots appear and then expect to control them.

LEAF SPOT DISEASES, SYMPTOMS, AND CHEMICAL CONTROL

Plant and Disease(s)	Symptoms	Chemical Control	Causal Organism(s)
Ash			
Anthracnose	large irregular brown spots, usually along the leaf edge	Captan, Zineb	<i>Gloesporium aridum</i>
Leaf spots	spots of various size and appearance	same as above	several fungi (<i>Mycosphaerella</i> , <i>Phyllosticta</i> , <i>Septoria</i> etc.)
Aspen			
Leaf spots	small, discrete, circular or lens-shaped spots, or brown spots with a darker brown margin, or angular black spots	Bordeaux mixture, Copper fungicides, Captafol	<i>Marssonina populi</i> and other fungi (<i>Mycosphaerella</i> , <i>Phyllosticta</i> , <i>Venturia</i> etc.)
Basswood (linden)			
Anthracnose	elongated brown spots along the veins, but mainly near the tip of the leaves; a narrow black band separates the dead and the healthy tissues	Maneb, Zineb, Captafol, Bordeaux mixture	<i>Gnomonia tiliae</i>
Leaf spots	large brown, circular spots with dark margins, or small, white specks with wide dark margins	same as above	several fungi (<i>Cercospora</i> , <i>Phyllosticta</i> etc.)
Birch			
Leaf spots	the first fungus produces brown spots with dark brown to black margins, and the second produces smaller spots with no definite margin	Copper fungicides	<i>Gloesporium betulatum</i> <i>Cylindrosporium betulae</i>
Boxelder	same as maple diseases		
Buckeye			
Leaf blotch	discolored and water-soaked irregular spots, which later turn a light reddish-brown with a bright yellow margin; very similar to leaf scorch	Dodine, Zineb, Mancozeb	<i>Guignardia aesculi</i>
Leaf spot	small, brown, circular spots, which can merge to blight larger leaf areas	same as above	<i>Septoria hippocastani</i>
Butternut			
Anthracnose	dark, brown or blackish, angular, subcuticular spots, ranging from pin-prick size to 1/2-inch	Benomyl, Dodine, Zineb, Mancozeb, Maneb	<i>Gnomonia leptostyla</i>
Bacterial blight	small, water-soaked spots which turn reddish-brown	Copper Oxychloride Sulfate (C-O-C-S), Copper Hydroxide, Streptomycin plus a spreader-sticker; spray when flower buds open, at full bloom, and petals fall	<i>Xanthomonas juglandis</i>
Bull's eye leaf spot	dark, round spots with concentric white rings and a target-like appearance	no fungicide has been tested (fertilization with Nitrogen is recommended to increase tree vigor)	<i>Cristulariella pyramidalis</i>
Catalpa			
Leaf spots	spots of various size and appearance	Bordeaux mixture	several fungi (e.g. <i>Phyllosticta</i> , <i>Alternaria</i> , <i>Cercospora</i>)
Cherry, flowering			
Leaf spot	reddish spots which drop out leaving circular holes on the leaves	Benomyl, Captan, Dodine, Ferbam	<i>Coccomyces hiemalis</i>
Shot hole	infected tissue dries up and falls out leaving holes of about 1/8-inch diameter	Dodine	<i>Xanthomonas pruni</i>

Plant and Disease(s)	Symptoms	Chemical Control	Causal Organism(s)
Cottonwood	same as aspen diseases		
Crabapple Scab	dull, smokey areas, which change to olive-green moldy spots	Benomyl, Dodine, Captan, Polyram, Folpet, Mancozeb	<i>Venturia inequalis</i>
Dogwood Spot anthracnose	circular to angular dark purple areas, less than 1/25-inch diameter, with light paper-thin centers that often fall out, producing "shot hole"	Benomyl, Zineb, Bordeaux mixture, Mancozeb, Maneb, Chlorothalonil; spray at bud break, when bracts fall, 4 weeks later, and in late summer	<i>Elsinoe corni</i>
Leaf spots	small, angular, numerous spots, with sharp and haloed borders or lacking these characteristics	Benomyl, Zineb, Bordeaux mixture, Mancozeb	several fungi (<i>Colletotrichum</i> , <i>Phyllosticta</i> , <i>Septoria</i> etc.)
Elm Black leaf spot	small white or yellow flecks, which increase in size and turn shiny black, raised and appear only on the upper leaf surface; the leaf turns yellow	Ferbam, Zineb, Fixed Copper, Bordeaux mixture	<i>Gnomonia ulmea</i>
Anthracnose	circular brown spots with darker brown margins, or spots elongated on midribs, veins, and leaf margins	same as above	several fungi (<i>Gloesporium</i> , <i>Mycosphaerella</i> , <i>Septogloeum</i> etc.)
Leaf spots	spots of various size and appearance	same as above	several fungi (<i>Cercospora</i> , <i>Cylindrosporium</i> , etc.)
Hackberry Leaf spots	spots of various size and appearance	Copper fungicides, Ferbam, Zineb	several fungi
Hawthorn Leaf spot	small, angular, reddish-brown spots	Maneb, Mancozeb, Zineb, Benomyl	<i>Diplocarpon maculatum</i>
Scab	see crabapple scab	same as crabapple scab	<i>Venturia inequalis</i>
Honey locust Leaf spot	very small grayish specks with brown margins	no chemical control described	<i>Cercospora condensata</i> and <i>Cercospora olivacea</i>
Horsechestnut	same diseases as Buckeye		
Ironwood Leaf spots	spots of various size and appearance	Copper fungicides	several fungi (<i>Cylindrosporium</i> , <i>Gloesporium</i> , <i>Septoria</i> etc.)
Kentucky coffee tree Leaf spots	spots of various size and appearance	Copper fungicides, Ferbam, Zineb	several fungi (<i>Cercospora</i> , <i>Phyllosticta</i> , <i>Marssonina</i> etc.)
Linden (basswood)	same diseases as basswood		
Maple (red, silver, sugar, Norway) Anthracnose	irregular, light brown, purplish or black spots, very similar to leaf scorch	Fixed Copper, Bordeaux mixture, Zineb, Maneb	<i>Gloesporium apocryptum</i>
Leaf spot (purple eye)	irregular, 1/4-inch spots, with brownish centers and purple-brown margins	Bordeaux mixture, Zineb	<i>Phyllosticta minima</i>

Plant and Disease(s)	Symptoms	Chemical Control	Causal Organism(s)
Tarspot	irregular, shiny black, tar-like spots, up to 1/2-inch, developing on the upper leaf surface	Ferbam, C-O-C-S	<i>Rhytisma acerinum</i>
Mountain ash			
Leaf spot	small purple spots, becoming brownish; small, irregular to round brown spots	no chemical control described	<i>Fabraea maculata</i> and <i>Phyllosticta sorbi</i>
Scab	see crabapple scab	same as crabapple scab	<i>Venturia inequalis</i>
Mulberry			
Leaf spots	spots of various size and appearance	Copper fungicides	several fungi (<i>Cercospora</i> , <i>Cercosporaella</i> etc.)
Oak			
Anthraxnose	irregular, light brown spots which merge, appearing as leaf blotch or blight	Maneb, Zineb, Captafol, Captan, Bordeaux mixture, Dodine, Tribasic Copper Sulfate; spray before bud break, at bud break, and at full leaf stage	<i>Gnomonia quercina</i>
Leaf spots	spots of various size and appearance	Copper fungicides, Zineb; apply as above	several fungi (<i>Gloesporium</i> , <i>Marssonina</i> , <i>Phyllosticta</i> , <i>Septoria</i> , etc.)
Plane			
Anthraxnose	symptoms on very young leaves resemble frost injury, the leaves becoming curled and distorted; symptoms on fully grown leaves appear as light brown dead areas, frequently along the veins, which may enlarge to include the whole leaf; ends of twigs may also be killed; symptoms on old leaves resemble leaf scorch	Maneb, Zineb, Captafol, Benomyl, Captan, Dodine, Tribasic copper sulfate	<i>Gnomonia platani</i>
Leaf spots	spots of various size and appearance	same as above	several fungi (<i>Mycosphaerella</i> , <i>Phyllosticta</i> , <i>Septoria</i> etc.)
Poplar	same diseases as aspen		
Russian olive			
Leaf spots	small circular spots with a whitish-brown center and a definite brown border	no chemical control is justifiable	several fungi (<i>Cercospora</i> , <i>Phyllosticta</i> , <i>Septoria</i> etc.)
Sycamore	same diseases as plane		
Walnut	same diseases as butternut		
Willow			
Gray scab	round, irregular, somewhat raised, grayish-white spots with narrow, dark brown margins	Ferbam, Zineb, Copper fungicides	<i>Sphaceloma murrayae</i>
Leaf spots	spots of various size and appearance	same as above	several fungi (<i>Cercospora</i> , <i>Cylindrosporium</i> , <i>Marssonina</i> , <i>Phyllosticta</i> , <i>Rhytisma</i> etc.)



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