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Anthracnose of Shade Trees

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ANTHRACNOSE is a major fungal disease of several species of shade trees grown in Michigan. Sycamore *(Platanus occidentalis)* and white oak *(Quercus alba)* are most severely affected. However, English oak *(Quercus robur)* and ash (*Fraxinus* sp.) can also be badly defoliated, and sugar maple *(Acer saccharum)* often shows extensive leaf spotting.

Symptoms—The disease strikes in the spring and is usually first noted when young foliage and growing tips turn beige to dark brown and die. At this time, the causal fungus may invade twigs via the leaf stalk and cause twig death or initiate the formation of cankers (Figure 1). This is the "leaf and twig blight" stage of anthracnose which causes many secondary shoots to develop, giving the tree a "bird's nest" or "brushy" appearance (Figure 2). See color picture (Figure 3, page 2) showing injury to first crop and some second crop leaves. If the fungus does not attack until leaves are partially developed, only the "leaf blight" stage of anthracnose occurs.

Leaf blight is characterized by beige to brown irregular areas on the leaves, usually expanding along the leaf veins (Figure 4A). Blighted leaves are usually somewhat curled and distorted due to the uneven growth of tissues (Figure 4B). When extensive leaf tissue is involved or the leaf petiole is attacked, severe defoliation occurs, causing the tree to be defoliated except for small tufts of leaves at the top of the trees (Figure 5).

Spring frost injury will mimic the leaf and twig blight stage but differs from the leaf blight stage of anthracnose in that lightly frosted leaves will develop normally except that holes develop interveinally where cells have been killed (Figure 6).

Another disorder which is often mistaken for anthracnose is "scorch" (Figure 7) caused by heat and/or water stress. Scorch usually appears during summer months but occasionally occurs in late spring due to an early heat wave or when root or trunk damage restrict water movement. The symptoms of scorch are a marginal yellowing and browning or a regular interveinal browning (compare Figure 4 with Figure 7).

Causal agent and disease cycle—Anthracnose of the trees mentioned above is caused by several species of

Fig. 1—Old and new cankers (arrows) caused by the invasion of twigs by the sycamore anthracnose fungus. Also, note the black specks on some twigs where the fungus has formed fruiting structures.

Fig. 2—Bird's nest branching in sycamore. This condition is caused when a growing tip is blighted as in Figure 3, and the host produces several lateral shoots in response to this loss.

fungi in the genus *Colletotrichum*, most of which have an overwintering stage in the fungal genus *Gnomonia*.

The anthracnose fungus spends the winter in diseased twigs and cankers on infected trees (Figure 1). In spring, spores are produced in the twigs and cankers, which are carried by rain and wind to developing leaves and shoots below. This is why defoliation often occurs as shown in Figure 5, and the uppermost parts of the tree escape infection. As the fungus invades and kills these new tissues, more spores are produced which allow further spread of the disease. Some shoots are invaded but not entirely killed; these tissues are where cankers develop, and the fungus lives until the next season. Overwintering leaves on the ground play an insignificant role in the spread of anthracnose; hence, raking and destroying leaves will not control this disease.

Temperature and moisture conditions during the early spring, however, play a very important role in governing the severity of anthracnose. Moisture is necessary to allow the fungus to produce and spread spores. Mean daily temperatures (the average of the maximum and minimum temperatures) between 50 and 57 degrees Fahrenheit during budbreak and early leaf development are critical to allow the fungus spores to germinate, invade tissues, and produce disease. When average temperatures are above or below this range, the fungus is not favored, and disease incidence is greatly reduced. Hence, even though trees are often severely blighted in the spring, as soon as temperatures increase, a new and healthy crop of leaves is formed. Anthracnose does not often kill trees. Trees that are defoliated annually can be severely injured; however, others survive and flourish.

Control—Fungicide sprays on young and recently transplanted trees in the spring can be recommended to help control anthracnose. The first application should be made when buds start to open. A second and third application should be made at about 10-day intervals. Copper (Cupric) hydroxide (Kocide 101), dodine (Cyprex), or zineb applied at label rates can be used as control sprays. A *dormant spray* of lime-sulfur (1¾ gal/100 gal) or (⅔ cup/3 gal) or bordeaux mixture (4-4-100) will also help reduce disease incidence.

For older established trees, the cost-benefit ratio of a spray program is marginal, especially under city conditions. Street trees and others must be sprayed at least twice during the early spring while leaves are developing if anthracnose is to be effectively controlled. This is time-consuming and expensive.

On the other hand, trees which are well maintained and fertilized at regular intervals (see MSU bulletin E-796) may lose the first crop of leaves in spring, but regrowth is so vigorous that by early summer there is little difference between sprayed only and fertilized only trees, with a substantial saving in dollars. Therefore, we recommend that established plantings of anthracnose-susceptible trees be placed on regular maintenance and fertilizer programs and that spray programs as mentioned above for young trees be restricted to only those established trees that are located in aesthetically critical settings.

Fig. 3—Leaf and twig blight stage (sycamore). Note first crop of leaves (small, dry) was killed by anthracnose. Some second crop leaves (larger) have also been killed; some, however, are only partially diseased or have escaped injury.

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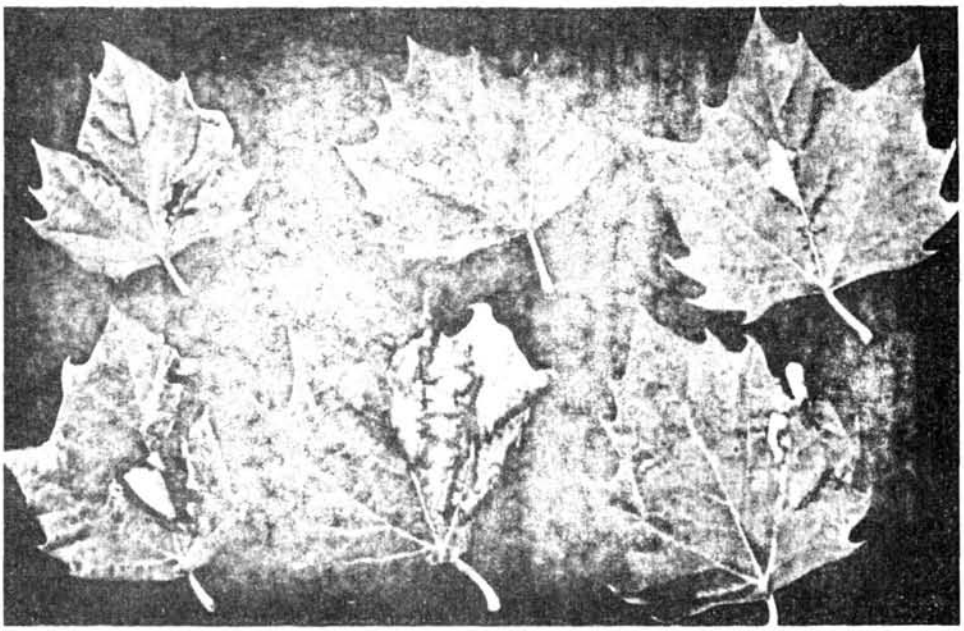
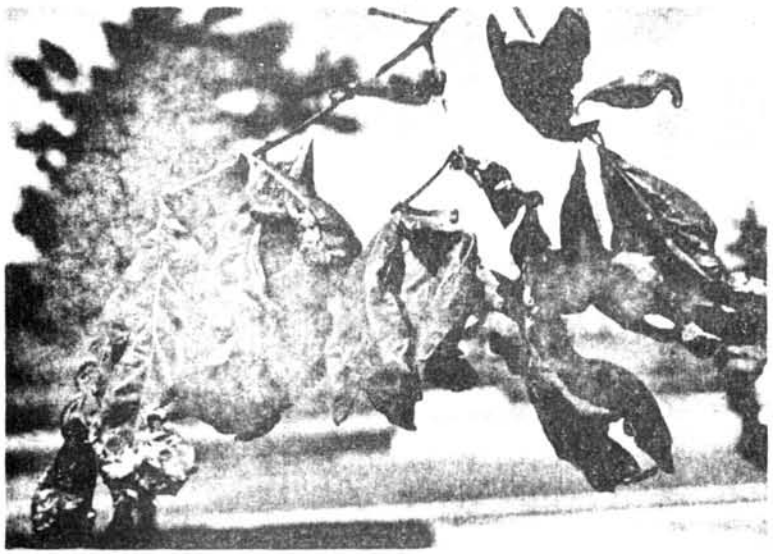


Fig. 4—Leaf blight of sycamore, above, and oak, below, caused by anthracnose under reduced disease conditions. Most of the injury occurs along veins, although in oak, large interveinal areas may be affected.



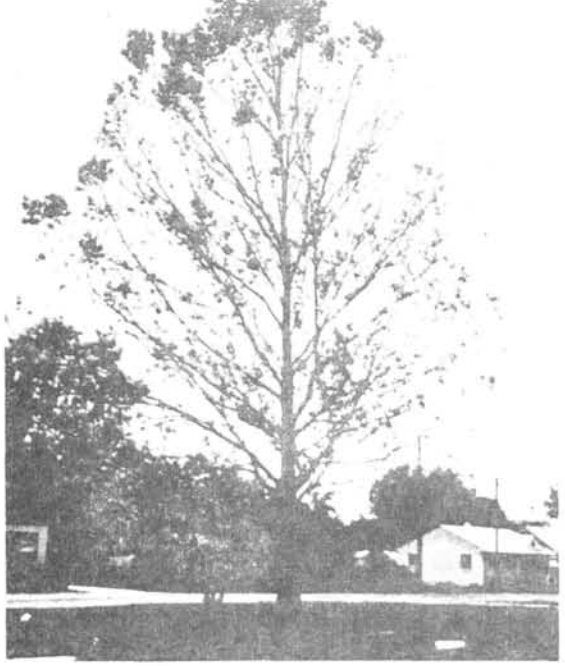


Fig. 5—Anthracnose caused defoliation of sycamore. Tufts of leaves left at ends of branches have escaped infection.

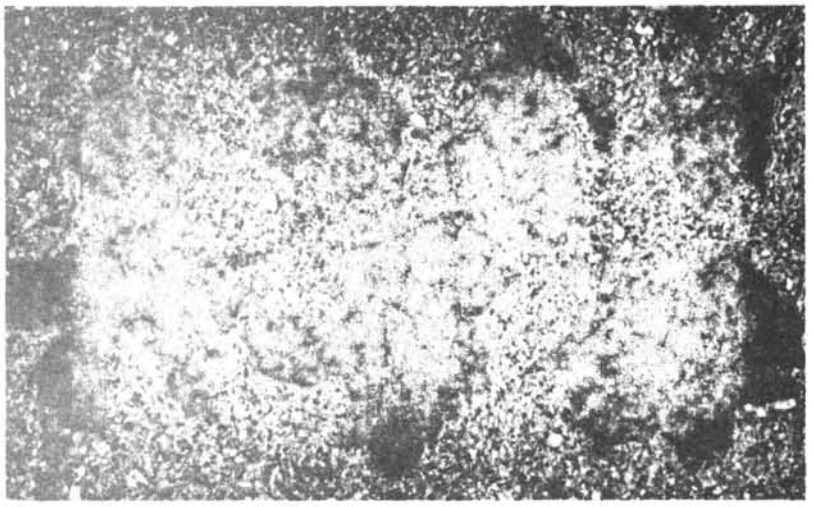


Fig. 6—Frost injury to maple. Leaf development is normal except that holes develop where cells were killed by frost when leaf was just beginning to grow.

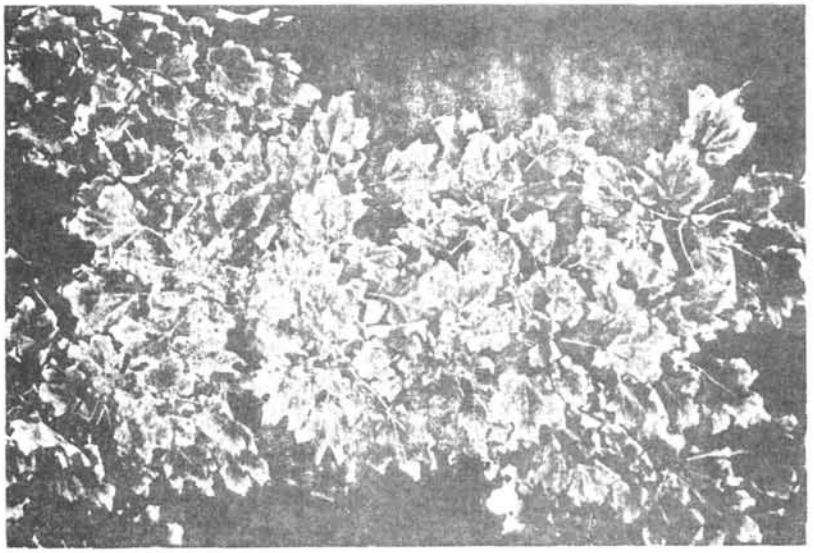


Fig. 7—Symptoms of scorch on maple. Note all the yellowing and browning is restricted to leaf margins or interveinal areas.