PLANT DISEASE CONTROL NOTES
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DISEASES OF SHADE TREES

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CULTURAL CONTROL OF SHADE TREE DISEASES

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Many of the more common shade tree disease are caused by parasites--fungi, bacteria and viruses. Many of them can be prevented or controlled satisfactorily by the use of various fungicides or resistant varieties. On the other hand, however, many disorders such as (1) leaf scorch, (2) winter and low temperature injuries, (3) mechanical injuries, (4) non-pathogenic diebacks and (5) nutritional deficiencies are primarily of non-parasitic origin. These problems can best be treated by cultural practices. Five major problems of the latter type will be considered in this publication.

1. Leaf Scorch occurs commonly on maple, elm, ash, beech, fir, pine and many other trees. It develops as a browning (necrosis) between veins or along margins of leaves (Figure 1). Certain leafspot diseases produce similar symptoms. A clinical analysis with supporting environmental data is beneficial in revealing the causal factors.

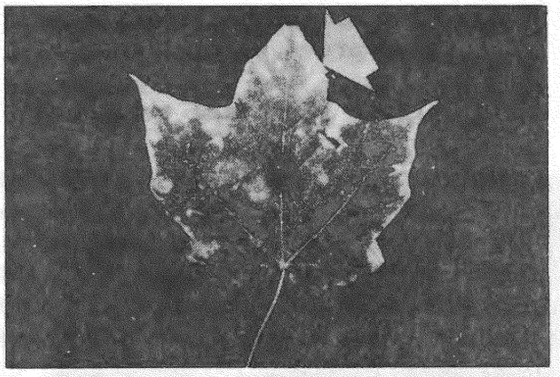

Figure 1. Leaf scorch on sugar maple.

Scorch may be caused by any one or a combination of the following factors: drought, hot and dry winds, limited root-soil areas, soil compaction, diseased root systems or shallow soil. In any case, the roots are unable to provide sufficient water to compensate for moisture normally lost from the leaves by transpiration. The condition can frequently be controlled by supplying adequate water during stress periods, and by maintaining good vigor of the tree.

2. Winter and Low Temperature Injuries. Injuries to shade trees during the winter as a result of rapid fluctuating temperatures, snow and ice are numerous, and have been given a variety of names: winter injury, winter killing, sunscald, winter sunscald, winter drying, frost damage, frost cracks, snow and ice damage and others. Low temperatures affect plants in different ways, and the symptoms, on some occasions, are sometimes difficult to distinguish from parasitic diseases. Although the causes and symptoms are numerous, with adequate information, a sound diagnosis can often be made. Many times these

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injuries can be avoided by observing proper control measures. Two common problems are winter injury and sunscald.

A. Winter Injury is generally believed to be caused by a moisture deficit. Leaves, needles and buds lose moisture normally by the process called transpiration. When high temperatures and drying winds occur suddenly at the time the ground is frozen, transpiration is accelerated and insufficient water is available to the roots to restore the transpired water to the foliage. Irreversible damage may result. This is revealed in the spring as degrees of "burning" of leaves and needles, defoliation, twig dieback or even death of the entire tree. In Virginia winter injury is more commonly observed on Magnolia, holly, hemlock, pine and boxwood. For control the following are suggested:

(1) Maintain trees in good vigor by fertilizing and watering as needed. Water if necessary in the late fall and during the winter.

(2) Mulch heavily in the late fall to retard water loss, and to insulate against deep soil freezing.

(3) The use of an antitranspirant, available at garden supply centers, may prove helpful in some instances.

(4) Prune back dead twigs and branches in the spring.

B. Sunscald, bark scorch or winter sunscald occurs following drastic and sudden fluctuations of bark temperatures. The removal of adjacent trees in summer or the sudden exposure of sun to dark on a cold winter morning are the major causes. Symptoms resulting from killed cambial and bark tissues include cracking, scaling and canker formation. For control, one should avoid heavy thinning and pruning. Young trees can be protected by wrapping the trunk with sisalkraft paper, burlap or aluminum foil. Any convenient means of shading such as a 6-inch board tied upright on the south or southwest exposure during the winter has prevented injury.

3. Mechanical Injuries are, in many cases, portals of entry for deadly tree pathogens. Wind, lightning, ice damage and especially lawnmowers are the major causal agents of mechanical injuries to shade trees. Trees weakened by heart rots or cankers which may result therefrom are more subject to breakage. In pruning broken branches, the cut should be made as close to the trunk as possible, and mechanical or pruning wounds should be shaped smoothly and treated first with orange shellac, then with an asphalt base wound paint. Lawnmower injury can be prevented by mulching for a distance around the tree trunk. Wires disrupt the continuous food transport system of the bark, and their attachment to trees should be avoided. Strangling tree roots which grow tightly around the trunk and other roots may weaken or kill trees. Such girdling roots which may occur above or below ground should be cut off with a chisel and the exposed surface painted. The occurrence of these roots can be minimized by spreading out the root system when planting.

4. Dieback is the progressive death of shoots and branches generally starting at the tips. It may be due to cankers, stem rots, building construction root damage, borers, nematodes, winter injury, deficiency or excess of moisture or nutrients or other factors. Figure 2 illustrates severe dieback and decline of white oak due to careless building construction activities. In any case, all dead and dying tree parts should be removed promptly and burned. This destroys the medium in which many pathogens survive until they can later gain entrance into a healthy host. Pruning tools should be disinfected between cuts in alcohol or household bleach solution (1 part of bleach and 9 parts of water.) Trees in advanced stages of decline should be removed.

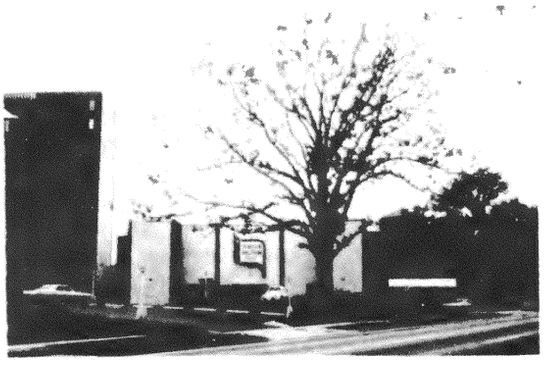

Figure 2. Dieback and decline of white oak resulting from construction injuries.

5. Nutrient Deficiencies.

Shade trees commonly benefit from applications of fertilizer. In the forest, leaves that fall remain on the ground and return elements to the soil. Under cultivation, shade trees are usually denied this recurring source of plant nutrients because leaves are raked and burned. Moreover, the removal of grass clippings further impoverishes the soil. Applications of fertilizer to the soil replenishes elements needed for good growth.

Figure 3. Iron deficiency (D) of silver maple. Normal leaf (N) at left.

Shade trees growing in unfertile soil may be stunted, and the leaves chlorotic (yellow), necrotic (dead) or small and misshapen (See Figures 3 and 4). Well-maintained and vigorous plants are usually more resistant to disease and insect damage. Wounds of well-fertilized trees heal more quickly, thereby minimizing the chance of infection. Fertilization is the only therapy that can be suggested for scores of non-parasitic or unknown problems, and in the case of Verticillium wilt, has

proven therapeutically beneficial in mild infections. It must be emphasized, however, that over-fertilization can be devastating, especially in heavy soils in which the excess minerals cannot be leached out. A soil test, then, is always a good place from which to proceed.

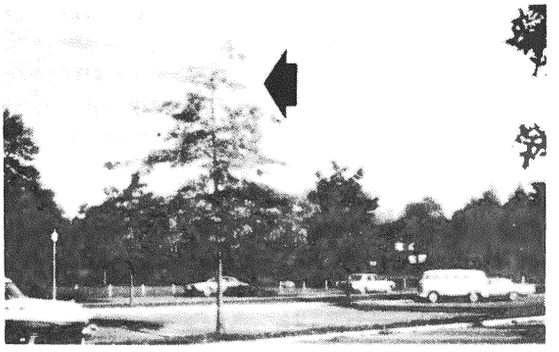

Figure 4. Severe mineral deficiency of pin oak. Note stunting, poor leaf and twig development.

High analysis commercial fertilizer such as 10-6-4 is recommended. For young trees with trunk diameters from 2-6 inches, use 1 lb. fertilizer per inch of diameter at breast height. A dosage of 2 lbs. for each inch of diameter for trees over 6 inches in diameter is usually adequate.

Mark off, in some manner, concentric circles, 2 feet apart, beginning about 1 foot from the trunk in the case of a 6 inch-diameter tree, and about 5 feet from the trunk in the case of a 48 inch-diameter tree. The outermost ring should extend beyond the dripline, that is, beyond the perimeter of the outermost branches. The correct amount of fertilizer should be divided up and placed in holes about 1 1/2 - 2 feet deep and spaced 2 feet apart in the circles. Holes can be made with a soil auger or punch-bar. After the fertilizer is inserted, the holes may be filled with sand, peat moss, loose soil or left open to collect water.

The frequency of fertilization depends on the soil type, tree species treated and, of course, on the results of a soil test. Usually a treatment every 2 years is adequate. Over-fertilization with nitrogen may intensify fireblight on fireblight-susceptible species such as mountain ash (Sorbus) and, hence, should be avoided.

Fertilizer may be applied from early spring until midsummer or in the fall after the leaves have dropped but before the ground freezes. Where early fall frosts are apt to occur or deep winter cold prevails, fertilizers should not be applied in late summer because of the danger of stimulating new growth so late in the season that the tree does not harden soon enough or sufficiently to withstand the early frosts or winter cold.

In summary it must be emphasized that, regardless of the shade tree and problem (parasitic or non-parasitic) under consideration, the shade tree is generally more resistant to adverse effects of disease and injury if one observes good cultural practices. In many cases, this is the only therapy that can be suggested. This includes careful pruning, regular fertilization and watering programs as needed. In a new planting program, it is possible to avoid or to minimize many problems by selecting species that are either native to your area or which are known to be resistant to existing stress conditions and problems discussed herein.