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Decline in Trees and Shrubs

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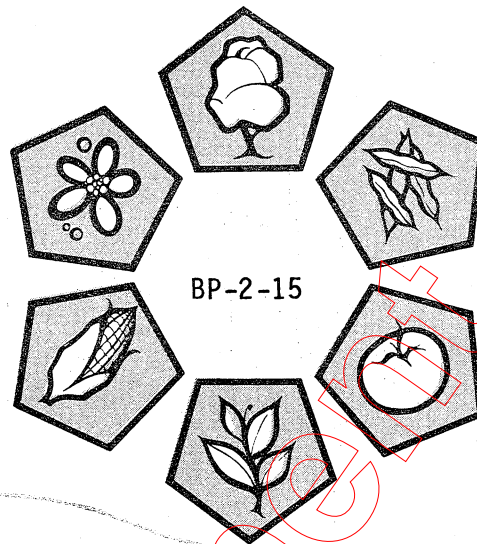
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Purdue University
Department of Botany and Plant Pathology
Lilly Hall of Life Sciences

Plant Disease Control



*Decline of Maples
& other Trees*
Replaced
Jan. 1975

Decline in Trees and Shrubs

R. J. Green and P. C. Pecknold

Shade trees and shrubs often gradually lose vigor and may show off-color, small leaves, poor growth, early leaf drop and dieback of twigs and branches. This condition is usually progressive over several years and is often referred to as tree "decline," because it is a gradual loss of growth and vigor. As we shall see, a more appropriate name for this problem is "root decline," since the symptoms observed in the above-ground parts of the plant usually begin in the root system.

STRESS FACTORS

Trees and shrubs are long-lived and over a period of years may be subject to insect attack, disease, adverse weather conditions, and other environmental effects. These are often called "stress factors" and alone or collectively reduce growth and may cause dieback of the tree or shrub. The root system is especially vulnerable to changes in the soil environment. Soil compaction, changes in drainage, soil fill over the root system, mechanical damage to roots from construction, and excess salt accumulation are examples of environmental stress factors affecting root systems.

Man's activities often cause these changes (people pressure problems). However, drought stress during the growing season and winter temperature extremes during long-term weather cycles may injure root systems and result in loss of vigor or decline of the entire tree or shrub.

Shade and ornamental trees and shrubs are especially vulnerable to people pressure problems and other adverse environmental conditions because they are often planted in locations unfavorable for optimum growth (off-site). Poor drainage, soil acidity, soil type, compaction, or salt toxicity may affect root growth and development at these sites. Also, sidewalks, roadways, building foundations, etc., may restrict root growth and further stress the root system.

Tree decline rarely results from a single stress factor. Rather, the tree or shrub is first injured or damaged by disease, insect attack, or adverse environmental conditions. The damaged or weakened plant is then subject to attack by so called "secondary" agents. Trees weakened by drought, for example, are much more susceptible to attack by borer-type insects than are normal, vigorous plants.

PREVENTING TREE DECLINE

Once the symptoms of tree decline begin, it is difficult to stop or reverse the progress of the problem. PREVENTION is the key to control, and there are three important steps to follow. These include:

1. Match the tree or shrub to the site. A common mistake is selection of trees or shrubs that will grow to a large size for confining sites, such as between the sidewalk and street or next to a building. Also, many tree species have very specific site requirements and grow poorly in certain locations. Common examples include planting Pin Oak in soils with a high pH (pH 7.0+) or White Pine in poorly drained soils. In both cases, trees eventually show typical symptoms of decline because the root systems are damaged. (Refer to publications HO-100, HO-123, and HO-127 for information on tree selection and planting.)

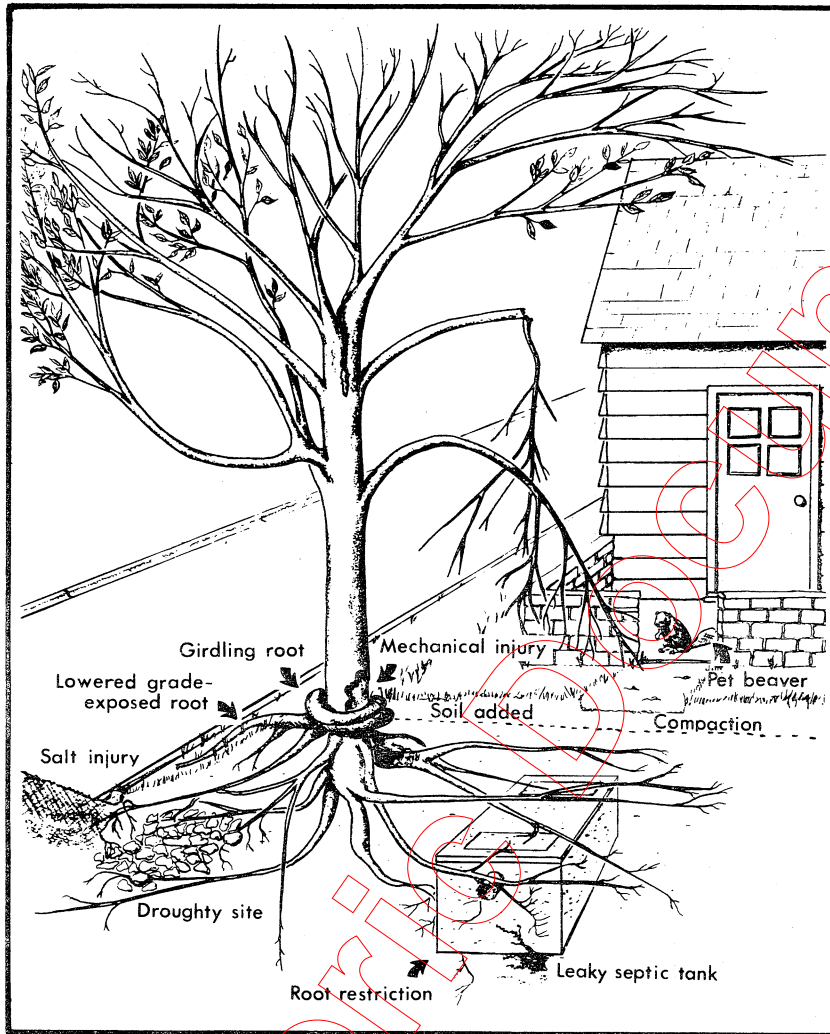
2. Maintain tree health. The two most important steps in maintaining good vigor in shade and ornamental trees and shrubs are to water and fertilize on a regular schedule. With normal rainfall and a favorable site, adapted trees and shrubs require little additional watering. However, during periods of prolonged drought or on dry sites regular watering is important during the growing season. The most beneficial method of watering is to apply an amount equal to 2 inches of rainfall every 2 or 3 weeks. The amount of water applied can be estimated by placing a straight-sided container, such as a coffee can, near the sprinkler and measuring the depth of water in the container after watering. A lance-type root feeder attached to the hose can also be used. In both cases, it is important to wet the entire root zone thoroughly. For trees in low vigor and for evergreens, watering in the late fall is also beneficial to insure that the roots have good moisture over winter.

Trees and shrubs should be fertilized every year or two. Two points are important: the type of fertilizer and the method of fertilizer application. Commercial fertilizers contain various percentages of three major elements--nitrogen, phosphorus, and potassium (NPK). For trees and shrubs, the most important is N, since P and K are usually available in adequate amounts in the soil. Therefore, fertilizers high in nitrogen, such as ammonium sulfate (21-0-0 NPK) or ammonium nitrate (33.5-0-0) are preferable. However, any good lawn or agricultural fertilizer with a high nitrogen content (10-6-4, 20-8-8, etc.) is acceptable. Apply 6 pounds of actual nitrogen for each 1,000 square feet of feeder root area in the early spring (March or April). Actual nitrogen applied is computed by multiplying the amount of fertilizer by the nitrogen percentage from the N-P-K ratio. For example, 18 pounds of ammonium nitrate (33.5-0-0) gives only 6 pounds of actual nitrogen.

Fertilizer can be applied to the soil surface and then watered into the soil. It should be spread evenly with a fertilizer spreader in the zone of the "drip line" of the plant canopy. This is the area several feet on either side of where the branches of the tree extend and is the region of the soil where the major feeder roots are. After you have spread the fertilizer, water the area thoroughly to wash the soluble nitrogen into the soil. This is very important because fertilizer left on the soil surface may damage grass or ground covers.

Custom application of fertilizer is available by arborists or nurserymen. This is usually done by pressure application of liquid fertilizer directly into the root zone.

3. Avoid changes in the growing site. Any change in the growing site of the tree or shrub may cause tree decline. A delicate balance exists between the plant root system and its soil environment. Any change in drainage, damage to roots from trenching



Site Factors and Tree Decline

or construction, change in grade by soil filling over the root zone or other site changes almost always results in root damage and decline. As indicated, this process is usually irreversible, so prevention is the key to control.

TREATING TREES IN DECLINE

Trees in decline, especially in the early stages, can often be maintained by proper management. First, follow the recommendations outlined above for

routine watering and fertilization. Next, a competent arborist or nurseryman should check the tree for problems such as girdling roots, unfavorable soil pH, and damage by borer-type insects, and treat trees if necessary. Pruning may be necessary and desirable to remove dead wood, to reduce the crown size and to promote new growth. With proper care and management, such trees and shrubs can usually be maintained and the rate of decline reduced or further problems prevented.

Historic Document