



Tree Decline

Shade trees 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 aboveground parts of the plant usually begin in the root system.

Stress Factors

Trees 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. 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 trenching, and excess salt accumulation are examples of stress factors affecting root systems. Because these changes often are caused by human activities, they are often referred to as “people-pressure diseases.” Shade and ornamental trees are especially vulnerable to people-pressure diseases because they are often planted in “heavy traffic” areas as well as locations unfavorable for optimum growth (off-site). Sidewalks, roadways and building foundations are but a few of many obstacles that may restrict root growth and further stress the root system.

Tree decline rarely results from a single stress factor. Rather, it is a *combination of stress factors* working together over several years that eventually results in tree death. Damaged or weakened plants are also more prone to injury from repeated drought stress and winter temperature extremes. Finally, trees suffering from decline are much more susceptible to attack by borer-type insects and fungal stem canker diseases. These “secondary” insect and canker disease problems can often be the final blow that results in tree death.

Fig. 1 - Street trees are especially prone to decline.



Preventing Tree Decline

Once the symptoms of tree decline are noticed, it is often too late to stop or reverse the problem. Therefore, *prevention* is the best and most important factor in avoiding tree decline. Give careful consideration to each of the following:

1. Match the tree or shrub to the site. A common mistake is planting trees that will grow to a large size in 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. Refer to publications HO-100 (*Planting Ornamental Trees and Shrubs*) and HO-123 (*Trees for the Landscape*) for information on tree selection and planting.

“Grade changes – adding or removing soil or changes of any kind that disturb a tree’s root system, are likely to result in tree decline.”

Fig. 2 - Restricted sites are a major cause of tree decline.



2. Avoid changes in the growing site. Any change in the growing site of the tree may cause decline. A delicate balance exists between the plant root system and its soil environment. Changes in drainage, damage to roots from trenching or construction, change in the soil level by adding or removing soil or other site changes almost always result in root injury and decline. Such injury is usually irreversible, so think before any changes are made in the vicinity of the tree.

3. Maintain tree health. Water and fertilize trees as needed. With normal rainfall and a favorable site, trees 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. An additional deep watering in late fall is also beneficial to insure that roots have good moisture going into winter.

If trees and shrubs are growing in a

lawn where a complete fertilizer program is followed to promote healthy turf, the woody plants probably will not need additional fertilizer. Refer to publication HO-140 (*Fertilizing Woody Plants*) for information on types of fertilizers and how and when to fertilize.

Treating Trees in Decline

Water, mulch, and lightly fertilize declining trees. Take special care to keep trees well watered, especially during May to July. Mulching with wood, leaves, or other organic material will encourage the growth of fine feeder roots. Apply very light amounts of fertilizers, no more than 1 lb. of nitrogen /1000 square feet of feeder root area. High amounts of nitrogen may stimulate the stressed tree to exhaust its energy reserves.

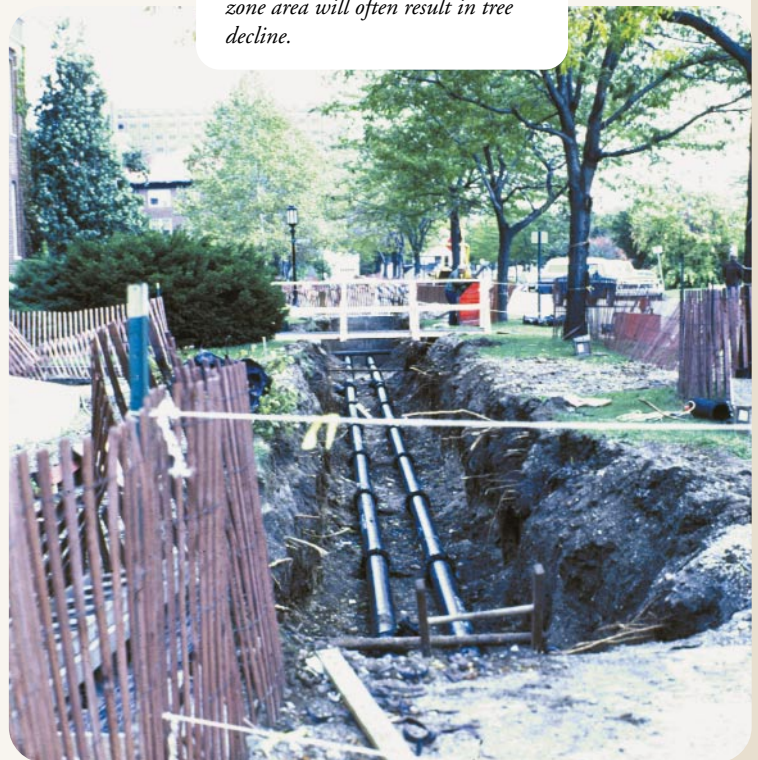
Some selective pruning may be necessary and desirable to remove dead and dying branches to improve the tree's appearance. In addition, borer-type insects are attracted to dead and dying branches. If significant root removal has occurred from trenching, thinning of the crown by 20-

30% may be the most direct way of helping a tree in decline (this is best handled by a trained arborist). Thinning lessens the demand placed on the remaining roots for water uptake, which is critical on hot, dry summer days.

Core cultivation or vertical mulching, in which holes are drilled in the soil in concentric rings around the tree, may be required in cases of severe soil compaction (this is best handled by a trained arborist).

Where possible, determine specific cause or causes of the condition and take appropriate control steps. It is advisable to have a competent arborist or nurseryman check the tree for problems such as girdling roots, unfavorable soil pH, and damage by borer-type insects. There are no miracle cures for trees suffering from decline, just patience and proper attention and care.

Fig. 3 - Construction within the root zone area will often result in tree decline.



The first and most important step before managing a tree disease is to accurately diagnose the problem. With an inaccurate diagnosis, more harm than good could be done, not to mention the wasting of both time and money.

This publication is just one of several available online from Purdue Extension that addresses diseases found on landscape trees in Indiana. If your tree does not have symptoms similar to those described in this publication, please check the others.

Also, for more detailed photographs of disease symptoms, consider purchasing *Common Tree Diseases of Indiana (BP-63)*. It presents information about the six most common tree diseases seen in Indiana. It is available from the Purdue Extension Media Distribution Center. The publication is \$5 and can be ordered by calling 1-888-EXT-INFO.

If you are still in doubt as to the cause of the problem, consult a professional such as the Extension Educators at your local Purdue University Cooperative Extension Service office or Purdue University's Plant Pest and Diagnostic Laboratory (P&PDL).

To submit a plant sample to the P&PDL for diagnosis, obtain a sample submission form from your local Purdue Extension office, from the P&PDL office (1-888-EXT-INFO), or from the P&PDL Web page www.pddl.purdue.edu/. Detailed instructions for submitting most types of samples are included on the back of the forms.

Submit a sample that is representative of the problem and shows the varying degrees of symptoms. Send several branches (even large ones) showing the symptoms and a detailed description of the problem and other useful information about the site, the age of the tree or shrub, and the date of planting. Photographs are very helpful.

Send the sample and submission form by first-class or overnight mail early in the week to:

Plant & Pest Diagnostic Laboratory
Purdue University
1155 LSPS
West Lafayette, IN 47907-1155

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