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SP573 How to Recognize and Prevent Tree Hazards

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How to Recognize and Prevent Tree Hazards

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A tree failure near a parked vehicle.

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A building or "target" underneath a hazard tree.

Trees benefit us in many ways. They can also cause major damage when limbs or the whole tree falls on power lines, cars, houses or people. Usually, weakened trees give some warning signs of danger. By learning to recognize the signs and to follow-up with prompt, proper action, you can often manage this risk, saving yourself grief as well as money.

What is a Hazard Tree?

A **tree failure** occurs when a tree or large part of a tree breaks and falls. **Hazard Tree Management** deals in probabilities of failure rather than certainties. Age, species (especially rooting and branching characteristics), site, and condition all influence the relative hazard of the tree. A high probability of failure does not make a tree a hazard; there

Peter J. Bedker

A hazard tree with deadwood and crown dieback near a public ball field.

Peter J. Bedker

Eutypella canker on Norway maple, the result of a mower wound.

also must be a "target" that could be damaged or injured if the tree fails.

Trees become a potential **hazard** when there is a **target**. A target is a structure, vehicle or a person that would be struck by a falling tree or its parts. The target directly influences the degree of hazard. Consider the differences among a tree falling on a fence, a house or a person. A tree leaning over the bedroom is most hazardous. Trees near high-use areas are more of a risk than those near infrequently visited areas, as the probability of a person being hit is greater. Priorities for removal or corrective treatments depend on the hazard rating of the tree.

Tree age is important in hazard tree management. Every tree species has an inherent life span. Some trees inherently live longer than others. Risk of failure increases with age. Table 1 provides a general guide for hazards based on tree age and species. Longevity should be considered when evaluating existing tree hazards or selecting species to plant. Generally, longer-lived species are preferred, unless plans are made to maintain or periodically replace less persistent species.

The environment in which a tree lives will also determine its hazard potential. Trees growing on rock ledges or near a body of water often have shallow root systems. Trees recently exposed by the removal of neighboring trees are more susceptible to damaging winds.

Observe the Trunk

Decay, a major cause of tree failure, is caused by fungi that weaken wood as they grow and reproduce. As healthy trees bend and sway, wood fibers slide past each other. Decaying tissues, however, are not flexible and often break. Each species of fungi has a characteristic, often conspicuous, reproductive structure. Some are conks, which are woody and perennial, while others are mushrooms that are soft and deteriorate after a short (e.g. several days to a few weeks) period. The presence of many reproductive structures often indicates advanced stages of decay.

Decay is often present without obvious signs. Cracks, seams, butt swell, dead branch stubs and large, older wounds suggest internal decay. Decay fungi typically need an opening in the tree's bark to enter the tree. Openings in the bark above and below ground are caused in a variety of ways. Fire, lightning, branches rubbing each other in response to wind and the activities of insects, humans, birds and other animals can wound a tree. Wounds and cankers are two types of tree defects associated with hazards. Cankers are usually tree diseases that are perennial and aggressive. These defects enlarge with time and increase the likelihood of tree failure.

Wounds and cankers can be weak points on a trunk and their position relative to the prevailing winds influences the risk they represent. A tree is more likely to break at a wound or canker if it is facing or opposite to the direction of the prevailing wind. Most trees fail during winds greater than 40 mph. Some fall on a perfectly still day. Vertical cracks or seams along the trunk suggest internal defects.

A hollow tree is not necessarily a hazard tree. Cavities develop from bark wounds. Many old trees have large conspicuous cavities or "hollows" in the main trunk, large root or branch. Vigorous trees have been observed to grow more sound wood around the hollow, compensating for that lost to decay. Compartmentalization of the decay also prevents the size of the "rotten compartment" from expanding. In later years, this new wood is continuous with the spreading roots and the tree can be strong enough to exist safely for many more years.

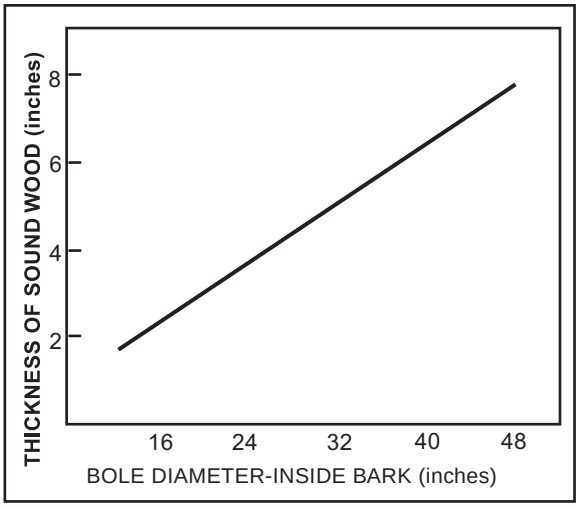
Inspect the Crown

Crown vigor and form are two indicators of the general health of trees. Crown characteristics of a potential hazard tree include dieback, V-shaped forks and lopsidedness. Branches in the upper crown often die from the top down in response to stress. Repeated insect defoliation, extended periods of drought, soil compaction or root disease cause stress. Opportunistic pests, such as insects and fungi, often invade and further stress the tree.

Trees can recover from dieback, if the source of the stress is eliminated in time. However, trees with advanced crown decline will die and should be removed.

V-shaped forks are weak compared to broader angled forks and branches. Ice storms, heavy wet snow or high winds often trigger failure. Elm, oak, maple, yellow-poplar and willow are especially prone to break at weak forks. Corrective pruning when trees are young can prevent many of these problems.

Trees that grow on the edge of a woodlot or trees crowded together often form lopsided crowns or lean into



Thickness of sound wood in outer shell required to maintain 66 percent of original strength in trees with center rot. If the amount of sound wood exceeds that established by the line on the graph, the tree can be considered safe from failure (Johnson, 1981).

Table 1. Hazard ratings based on tree longevity (Robbins 1986).

Common name	*Scientific name*	*Age*	*Rating*[a]
Red maple	*Acer rubrum*	<70	1
Silver maple	*Acer saccharinum*	70-150 >150	2 3
Hickory	*Carya* spp.	<80 80-170 >170	1 2 3
Beech	*Fagus grandifolia*	<80 80-170 >170	1 2 3
Ash	*Fraxinus* spp.	<60 60-150 >150	1 2 3
Eastern redcedar	*Juniperus virginiana*	<70 70-120 >120	1 2 3
Yellow-poplar	*Liriodendron tulipifera*	<80 80-200 >200	1 2 3
Virginia pine	*Pinus virginiana*	50-80 >80	2 3
Shortleaf pine	*Pinus echinata*	<80	1
Eastern white pine	*Pinus strobus*	70-175 >175	2 3
Sycamore	*Platanus occidentalis*	<80 80-200 >200	1 2 3
Cottonwood	*Populus deltoides*	<40	1
White oak	*Quercus alba*	<80	1
Northern red oak	*Quercus rubra*	>120	2
Pin oak	*Quercus palustris*	<60	1
Black oak	*Quercus velutina*	60-150 >150	2 3
Eastern hemlock	*Tsuga canadensis*	<110 110-200 >200	1 2 3

[a]1=low hazard, 2=moderate hazard, 3=high hazard; ratings based on reported biological, silvicultural, insect and disease rotations.

the opening in response to sunlight. Leaning, lopsided trees may represent a hazard if they are above a target. Generally, trees that lean more than 15 degrees from vertical should be removed. Trees that have grown leaning are not as hazardous as trees that were originally straight, but subsequently developed a lean due to wind or root damage. The general growth form of the tree and any uplifted soil on the side of the tree opposite the lean provide clues to when the lean developed. Large trees that have tipped in intense winds seldom recover.

Roots

Root integrity and health cannot be over emphasized. In addition to absorbing water and essential elements, roots anchor the tree to the world. If the roots are damaged in any way, tree vitality and health are affected and the likelihood of failure increases. Construction is especially damaging to tree roots. Earthmoving and trenching can cut large portions of the root system. The probability of failure increases as the amount of the root damage increases. If 50 percent of a tree's root system is damaged, it should probably be removed. Wounds created during construction can cause problems several years after the construction is complete.

Tree roots damaged by decay or cutting may cause the tree to become more susceptible to wind throw. Soil depth and drainage also affect wind firmness. Trees rooted in shallow, wet soils are generally more prone to uprooting.

Above-ground clues to poor root conditions include thin crowns, with dwarfed, off-color or yellowing leaves, stunted growth, soil compaction, erosion, construction activity, soil fill around the tree, discolored or resin-soaked wood at the root collar and fruiting bodies of root-rot fungi growing at or near the base of the trees. Not all mushrooms growing under trees are associated with root diseases. Familiarity with the fruiting bodies of common root-disease fungi is useful during tree hazard inspection. These fungi indicate rotting in the lower trunk or roots of infected trees.

What Can You Do?

Check your trees, especially large, old ones. Periodic, thorough inspections are essential to prevent accidents. At least one inspection per year should be made, but two per year are recommended, one in the summer while the leaves are on the tree and one in the winter. Every tree likely to have a problem should be inspected from bottom to top, looking for signs of root or butt rot and continuing up the trunk toward the crown, noting anything that might indicate a potential hazard.

Binoculars are helpful. Walk completely around the tree. Documentation is recommended, especially where you are responsible for a large number of guests. Documentation is also helpful to track tree health.

A word about your **liability**. If you have a hazard tree, you may be responsible for any damage it causes if it falls. If a tree in your yard fails and damages your neighbor's property, and you have no prior knowledge of its condition as a hazard tree, your neighbor's general policy may cover the damages. This determination however, may be disputed. Documenting the condition of your trees can be important in case of litigation involving the failure of a tree.

Treatments

Since all trees are potential hazards, the only way to completely eliminate a tree hazard is to remove the tree. Where this is not acceptable, regular inspection and appropriate action is the best way to "have your trees and reduce your risks."

Dead trees within the range of a target should be removed. A common question is "How long does it take a standing tree to fall after it dies?" The small twigs and branches typically fall first, followed by larger branches and ultimately the trunk. This process can take several years. Trees that die and have limited hazard potential can be left as "snags" for wildlife.

When removing a hazard tree, prevent creating another hazard tree by limiting damage to the site and residual trees. Opening the area potentially exposes the remaining trees to additional sunlight, wind and ice loading.

Pruning, cabling and bracing are remedies for reducing hazards and keeping a tree in the landscape. These generally require special tools, equipment and expertise, but certain trees are worth the investment. Prune dead, broken or hazardous branches correctly. Weak branches or V-shaped forks can be supported with wire cabling or braced with metal rods. Appropriate treatments vary in cost and required expertise.

Prevention

Prevention is the best action. Start a tree health program as soon as possible. Proper selection and placement of trees prevents many hazard problems. Hazards are often created when a tree is bought and planted, regardless of the original intention. Care of trees during construction projects is also very important in avoiding tree hazards.

Caution: Hazard trees are unpredictable. They do not always fall when and where you think. Don't try to solve one problem just to create another. When in doubt contact your county Extension agent or favorite tree professional.

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A hazardous cracked branch from decayed wood.

Mike Albers

Tree with crown dieback.

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Opening on the tree trunk provides an entrance for decay organisms.

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A spiral crack in a birch tree.

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Canker and associated wood decay is a weak point along the tree trunk.

Peter J. Bedker

Tree with a V-shaped fork is a potential hazard.

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Uplifted soil adjacent to a leaning tree is an indication of a hazard tree.

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Damage to tree roots from constuction of a sidewalk.

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