Tree failure is a major cause of residential property damage, as well as the leading cause of power outages nationwide.

An ice storm can overload all the branches on a tree, a hurricane or high wind can blow down a tree if its roots are restricted, or a cracked tree can fail under its own weight. "Homeowners worried about trees falling and damaging property should call a professional arborist in for an inspection," advises Peter Gerstenberger, senior advisor for safety, standards and compliance with the Tree Care Industry Association.

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Decay Can Cause Hazardous Defects in Trees

Gerstenberger notes that trees are designed to withstand storms, but all trees can fail – and defective trees fail sooner than healthy trees. A sound tree becomes potentially dangerous when the tree's woody structure is weakened by one or more defects. During storms, pre-existing defects predispose trees to failure.

"To a professional arborist," notes Gerstenberger, "defects are detectable signs that a tree has an increased potential to fail. Broadly defined, there are seven categories of defect: decayed wood, cracks, root problems, weak branch unions, cankers, poor tree architecture, and dead trees, tops or branches.

Decay

Healthy, well-maintained trees growing on suitable sites will be able to minimize the extent of decay and other defects. Trees that are stressed have reduced energy reserves, and therefore, have less ability to deal with wounds and the ensuing decay. Most urban trees survive on construction-altered soils that may be compacted, poorly drained, high in clay, sand, or gravel, very alkaline or littered with construction debris. Additionally, many urban trees are subjected to chemicals such as deicing salts, herbicides and fertilizers commonly used in landscape maintenance. Poor tree maintenance is another contributor to stress. These cumulative stresses all take a toll on tree vitality and structural integrity, increasing the risk of failure.

All defective trees cannot be detected, corrected or eliminated. Although a professional arborist can readily recognize most defects, there are root problems and some internal defects that are hidden. These trees may require in-depth assessments and specialized diagnostic tools. Homeowners should also keep in mind that defects change with time. A tree that looked fine three years ago may have severe problems today. By doing regular inspections arborists can successfully manage the risk of tree failure.

Advanced decay and cavities result in less structural strength and reduced stability. Indicators of advanced decay are rotten wood, fungal fruiting bodies, cavities, holes, open cracks or bulges in the wood. Decayed wood is the result of the long-term interaction between a tree and decay-causing fungi. Wood decay is an internal process with just a few external indications, such as mushrooms, conks, rotten or punky wood, cavities, hollows, holes, inrolled cracks, and bulges in the wood.

The undecayed layer surrounding the decay column is called the shell. If the shell thickness is thin relative to the size of the tree, the shell is likely to fracture causing the tree to fail. A tree can have internal decay and an opening and still be structurally sound provided that the shell is thick enough and the opening is not too wide. If a tree is repeatedly wounded by the presence of inrolled cracks, included bark, canker-rot fungi, or equipment (mowers, plows, and weed whips), decay occurs in every annual ring of wood. These trees should be carefully inspected be a professional arborist because they do not form a sound shell of wood. The tree is likely to fail at or near the location of the crack or wound because a large and ever-expanding column of decay is present there. Again, a professional arborist can evaluate shell thickness and opening width to help determine the tree's potential for failure.

Visual assessment by a trained arborist of the extent of decay can often be a reliable means of predicting potential risk. However, invasive techniques may be needed to quantify the thickness of the sound shell of wood in comparison to the size of the tree. Use of a probe or another tool may be needed to test several areas in order to find the location of the thinnest shell of sound wood. In-depth assessments, using specialized diagnostic tools, may be warranted when additional information about the location and extent of internal decay is critical to assessing the probability of tree failure.

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