

Sustainable Urban Landscapes

Managing Storm-damaged Trees

Ice, snow, and wind can damage all species and ages of trees. The dynamic force of wind may whip trees back and forth or twist them causing branches or trunks to fail. Ice loading—and to a lesser extent, snow loading—results in weight accumulation on tree limbs resulting in branch failure. In fact, accumulations of ice can increase the branch weight of trees by 30 times or more. After damaging storms, injured trees should be examined carefully and treated appropriately.



Storm-damaged tree after summer wind storm.

Different tree species vary in their resistance to storm injury. The following characteristics may *increase* a tree's susceptibility to storm damage:

- included bark (bark that turns inward at the point where branch and trunk or codominant stems meet) in branch junctures;
- old or over-mature trees with increased crown size, internal decay, and decreased flexibility of limbs and bole (trunk);
- prestorm conditions, such as unbalanced crown and dead wood;
- numerous small twigs and branches that increase total surface area;

- broad crowns (decurent branching habit) that increase ice and snow accumulation; and
- trees with horizontal branching.

Characteristics that may *decrease* a tree's susceptibility to storm damage include the following:

- trees with excurrent (conical) branching patterns;
- strong branch attachment;
- trees with coarse branching; and
- trees that are small at maturity.

The maintenance history of trees also affects performance during ice, snow, or wind storms. Trees that have been neglected or improperly pruned may sustain more injury than trees that were carefully maintained. Failure to maintain a central leader or to remove weakly attached branches when the tree was young can increase probability of damage by storms in later years.

Trees that have been “topped” often are damaged in storms. Vigorous regrowth arising just below the topping cut is weakly attached to the remaining stub. This weak attachment makes such trees very vulnerable to ice, snow, and wind. More information about the hazards and risks associated with the destructive practice of topping trees can be found in SUL 7, *Topping—Tree Care or Tree Abuse?*

Evaluating damaged trees

After a damaging storm, carefully examine each injured tree for the type and extent of damage. Pay particular attention to trees that present obvious hazards to people or property. Large, broken branches or split portions of the main trunk that still are partially attached and hanging over houses, sidewalks, driveways, garages, or other buildings should be considered first. For safety reasons, always allow the utility company to handle broken limbs or tree damage around power lines. Clean up debris on the ground before initiating tree repair.

IOWA STATE UNIVERSITY

University Extension

After hazards are eliminated and ground debris has been cleared, assess individual trees to determine whether further treatment is required. The effect of storm damage on the survival, longevity, appearance, and function of each tree must be judged. This impact assessment is not an easy task; in many cases, it simply will be a judgment call. However, the safety and protection of people and property should be the most important consideration.

Severe splitting of the main trunk or any type of injury that results in removal of more than one-third of the bark around the circumference of the main trunk usually places the tree in severe jeopardy and may make removal necessary. Larger trees that have had their tops broken also are poor risks. Broken side branches or minor trunk or top injuries do not typically put the tree at risk.

Carefully inspect the tree for hidden damage. Identify cracks in the trunk or in large limbs. To reduce safety hazards, it is important to find hidden damage before repair work begins.



Exposure of a large area of wood on the main trunk makes recovery difficult and may make removal necessary.



Severely damaged tops make trees a poor risk.

Any type of major injury may reduce the useful life of a tree. Such wounding can provide an entrance point for decay fungi or insects. Damage to trees also may reduce or destroy their intended function or severely disfigure the tree and ruin the appearance. The decision to retain or remove those trees depends on the individual situation and no specific guidelines can be offered.

Repairing damaged trees

After deciding treatment is necessary, the first decision to make is who will do the work. In situations where governmental units have jurisdiction, the choice may be obvious; cities and counties typically employ individuals assigned that responsibility. For individual home owners or rural land owners, the choice is either to do it themselves or hire a professional tree care specialist (arborist). The choice may depend on the type and extent of damage. Severe damage high in large trees may necessitate the use of professionals, but minor limb breakage on the lower parts of smaller

trees may be easily handled by the owner. Interest, skill, and access to equipment may influence the decision.

Trimming large trees should be left to trained arborists. Consult a professional arborist if

- climbing or chain saws are required,
- cabling or large branch removal is needed, or
- the injured tree or branch is leaning on another tree or structure.

Hiring help for tree care?

Consider these suggestions before hiring individuals or companies for tree care services:

- Most established arborists do not create new business by going door-to-door. Owning a truck and a chain saw does not automatically qualify someone as a tree care professional.
- Some communities require arborists to be licensed; check with city hall and also ask for a list of licensed arborists.
- Ask to see evidence showing the individual or company has insurance for personal and property damage and workers' compensation.
- Ask for and check local references or past clients.
- If time permits, obtain cost estimates from several arborists. Ask for a written estimate listing all work to be done.
- Don't pay for the job until everything agreed upon is completed.
- Be patient and be prepared to wait to get the work completed by a qualified arborist, especially after a storm.

Do it yourself tips

If the resident or land owner is doing the work, he or she should understand the pruning methods needed to best treat tree injury. In addition, the resident must own or have access to the proper tools and equipment. For pruning smaller branches (up to 4 inches in diameter), a good sharp bow saw or pruning saw is the most appropriate tool. Safe, proper use of chain saws to remove or cut up larger material requires thorough knowledge of the equipment and experience in saw operation and maintenance. Never cut above shoulder height with a chain saw, and always wear proper safety equipment (e.g. hearing and eye protection, leather gloves, hard hat, steel-toed boots, and chain-saw chaps).

Pruning tips

Much of the repair work needed for treating storm-damaged trees can be defined as pruning. Although the preferred time for pruning may not coincide with the occurrence of a storm, immediate repair is recommended. Some basic guidelines are summarized here. First, do not make the wound any larger than necessary. Storm breakage of limbs often leaves large, uneven stubs. The goal is to make the wound as small as possible to encourage prompt wound closure.

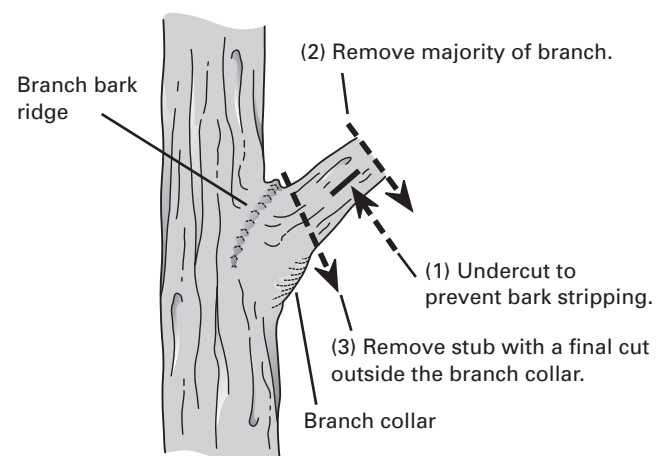
Second, use the right technique and avoid flush cutting. Locate the branch-bark ridge and then use the three-cut method on larger limbs to prevent bark tearing. (See diagram below.)

In large limbs with broken tips or ends, pruning back to the first undamaged side branch may be most appropriate. Do not "top" trees at any time. For more information on pruning trees see SUL 5, *Pruning Trees: Shade, Flowering, and Conifer*.

Trees and other woody plants have natural defense systems that will begin to close the wounds with new woody tissue. Because woody plants can seal or close wounds themselves, the use of wound dressings or pruning paints is no longer recommended.

Pruning young trees helps reduce later storm damage

The main reason to prune young trees is to develop good branch structure and tree strength. Removing weak branches and correcting poor form when branches are small minimizes size of the pruning wounds. Early pruning also promotes strength and



Proper branch removal is an important part of pruning.

balance that help make a tree less susceptible to damage from wind, ice, and snow storms. Developing good structure is critical during the first 15 to 20 years of a tree's life.

Limit pruning of newly planted trees to the removal of dead and broken branches or the correction of multiple leaders. Begin developmental pruning of deciduous trees two to three years after planting. Other key things to remember when pruning young trees include the following:

- Always leave 70 percent of the tree height with live branches, and avoid removing lower branches too quickly.
- Leave the temporary lower branches on the tree until they reach 1 inch in diameter to increase trunk growth and root development.
- Concentrate efforts on removing crossing, rubbing, broken, diseased, and weak-angled branches in the upper portion of the tree. Also, eliminate double leaders and basal sprouts.

Planting new trees

When replacing storm-damaged trees, consider a species' susceptibility to damage from ice, snow, and wind. Some cultivars may prove more storm-hardy than the parent species.

For more information, visit these Iowa State University Extension Web sites:

Distribution Center—
www.extension.iastate.edu/store

Forestry—
www.forestry.iastate.edu

Horticulture—
www.yardandgarden.extension.iastate.edu

... and justice for all
The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Many materials can be made available in alternative formats for ADA clients. To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914 in cooperation with the U.S. Department of Agriculture. Jack M. Payne, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.

File: Horticulture and Landscape Architecture 4; Forestry 4

Susceptibility of tree species to storm damage

Common Name	Scientific Name
Susceptible	
Silver maple	<i>Acer saccharinum</i>
Hackberry	<i>Celtis occidentalis</i>
'Marshall's' green ash	<i>Fraxinus pennsylvanica</i> 'Marshall's'
Honeylocust	<i>Gleditsia triacanthos</i>
Black cherry	<i>Prunus serotina</i>
Black locust	<i>Robinia pseudoacacia</i>
Japanese pagoda tree	<i>Styphnolobium japonicum</i>
American linden	<i>Tilia americana</i>
American elm	<i>Ulmus americana</i>
Siberian elm	<i>Ulmus pumila</i>
Intermediate	
Red maple	<i>Acer rubrum</i>
Sugar maple	<i>Acer saccharum</i>
White ash	<i>Fraxinus americana</i>
Tuliptree	<i>Liriodendron tulipifera</i>
White pine	<i>Pinus strobus</i>
Sycamore	<i>Platanus occidentalis</i>
Bur oak	<i>Quercus macrocarpa</i>
Red oak	<i>Quercus rubra</i>
Resistant	
Norway maple	<i>Acer platanoides</i>
Serviceberry	<i>Amelanchier</i> spp.
American hornbeam	<i>Carpinus caroliniana</i>
Catalpa	<i>Catalpa speciosa</i>
Redbud	<i>Cercis canadensis</i>
Ginkgo	<i>Ginkgo biloba</i>
Kentucky coffeetree	<i>Gymnocladus dioica</i>
Black walnut	<i>Juglans nigra</i>
American sweetgum	<i>Liquidambar styraciflua</i>
American hophornbeam	
(Ironwood)	<i>Ostrya virginiana</i>
'Aristocrat' callery pear	<i>Pyrus calleryana</i> 'Aristocrat'
White oak	<i>Quercus alba</i>
Swamp white oak	<i>Quercus bicolor</i>
Baldcypress	<i>Taxodium distichum</i>
Littleleaf linden	<i>Tilia cordata</i>
Silver linden	<i>Tilia tomentosa</i>
Eastern hemlock	<i>Tsuga canadensis</i>

Note: All species of trees can become more susceptible to damage if improperly maintained and pruned.

Originally prepared by Mark Vitosh former forestry program assistant; and Paul Wray, retired extension forester, Revised by Jeff Iles, extension horticulturist.