

EXTENSION NOTES



MAINTAINING HEALTHY URBAN TREES

Single trees in yards and along streets beautify and add value to a home and a community. Simply removing mature urban trees when they are sick or damaged, such as after an ice

storm, leaves great gaps that may take decades, if ever, to fill. This Extension Note tells you how to keep your urban trees healthy and how to help sick or damaged trees live longer.

THE IMPORTANCE OF URBAN TREES

The trees that you own and care for are important to you — and to your community. In fact, 90 per cent of the urban forests in Ontario are comprised of trees on private property. Urban trees increase property values, improve privacy and provide many environmental benefits. They reduce heating and cooling costs, reduce pollution, take up carbon dioxide,

produce oxygen, provide habitat for wildlife, hold water and reduce soil erosion. But the mature trees that grace our towns and cities today are not easily replaced. Modern urban conditions make it very difficult for a tree started today to reach the same stature as an existing mature tree. This makes care of our existing mature trees very important.



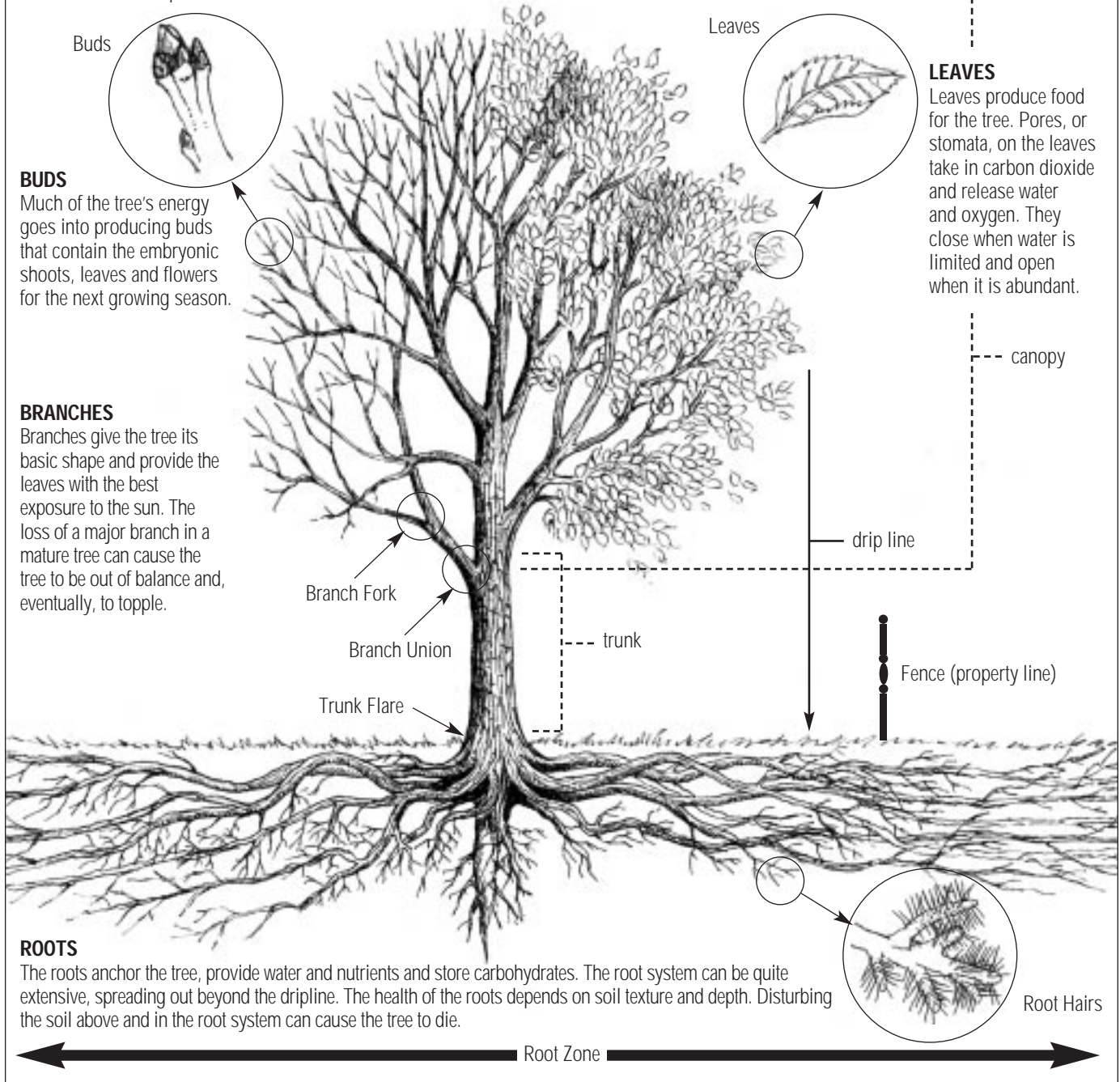
URBAN STRESSES

Trees living in urban environments face particular urban stresses. Compacted and poor soil, city streets, driveways and underground utility services can constrain their roots. A shortage of water and nutrients, common in urban areas, can kill them. Road salt, pollution and pesticides used to treat

lawns can contaminate their air and water. Other trees and buildings can block their sunlight and vandalism, vehicle accidents, lawn mowers, weed trimmers, snow plows and poor pruning can damage their trunks and branches.

PARTS OF A TREE

To understand the various stresses experienced by a tree, and what you may or may not be able to do to relieve those stresses, you need to understand how the different components of a tree work.



They must also cope with the “normal” stresses faced by trees including drought, sun scald, insects, bacterial and fungal diseases, and the consequences of severe climatic conditions

such as ice and wind storms. One stress builds upon the other with urban conditions intensifying any single stress.

KEEPING URBAN TREES STRESS-FREE

A healthy tree is able to avoid some stresses and recover from others. In fact, observations from Eastern Ontario show that trees that were well pruned and well maintained suffered little branch breakage and damage from the major ice storm of 1998. To help new urban trees stay healthy, plant them in the right location for their needs and in good, loose soil. Then water, fertilize and prune them regularly. Care is especially important in city centres where conditions for trees are most harsh.

A GOOD START

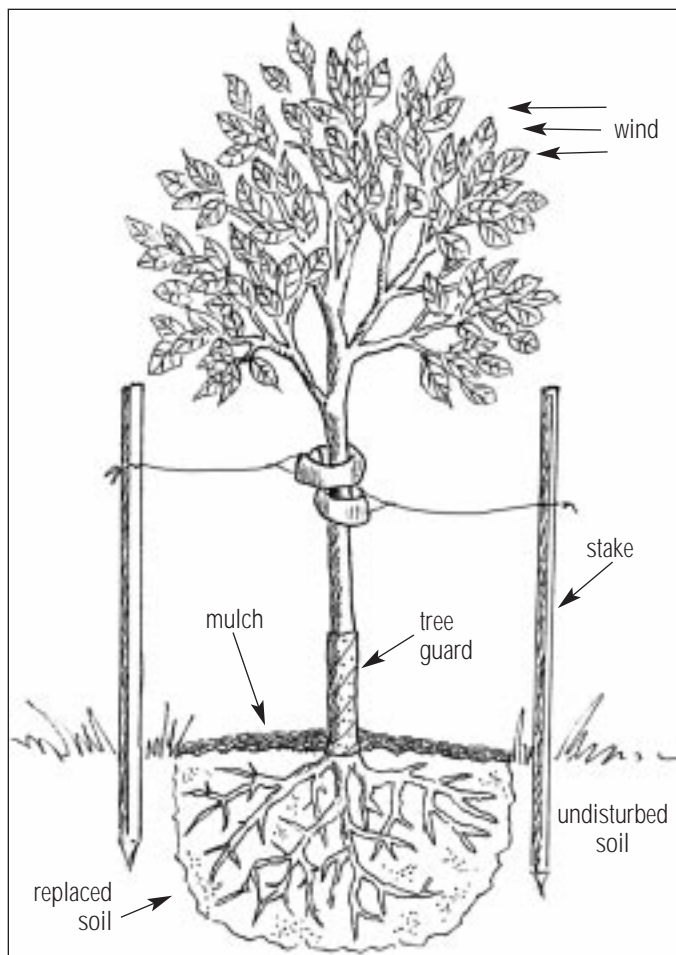
Plant new trees properly to make them less vulnerable to stress. Determine the right level of shade and sun for the species, ensure they have room to grow and plant them away from hydro lines and buildings. Place mulch, rather than grass or flowers, around the base of the tree.

SOIL AND MULCHING

A tree’s roots are underground, so they’re out of sight and often out of mind. However, a tree has as much wood below ground as above.

Our neglect of a tree’s roots can often kill a tree. When we dig a flower bed around a tree or widen a driveway or road, we damage the roots. About 90 per cent of the tree’s roots are in the top 30 centimetres of soil. Roots don’t respect property lines so when you, a neighbor or a municipal worker cut a tree’s roots, part of the tree’s crown will die.

Compacted soil is a common problem for urban trees, especially in clay and silt soils. Any area that has frequent



A properly planted caliper-sized tree in a windy location is staked, mulched and guarded.



A good community tree plant includes healthy whip stock, plastic weed barriers, mulch and enthusiastic helpers.

traffic will have compacted soil. Parking vehicles, operating construction machinery, storing heavy items such as oil tanks and simply walking can all compact soil. Compacting removes the air from the soil and destroys the soil structure. As well, piling too much soil or fill around a newly planted tree also compacts the soil. (Don't pile more than 15 centimetres of soil a year and don't put the soil against the tree trunk as this promotes rot and attracts disease.) Compacting is most evident when the soil around upper roots is beaten down and the roots are exposed.

To help keep the soil from becoming compacted from human traffic, remove the sod from around the base of the tree. This will also keep you from accidentally getting too close to the tree with a lawn mower or whipper snipper. And it will keep grasses and other plants from using the water and nutrients that are essential to the tree.

Replace the sod with mulch which conserves water, eliminates weeds and mimics conditions in the forest. Your mulch should be no deeper than 10 centimetres. Use natural or organic mulches such as chipped bark, compost or wood chips that have been composted for one year. Fresh mulch, especially wood chips, consumes nitrogen as it decomposes and can rob the tree of this essential element. Check all mulches to be sure they are free of disease. For more information, refer to the Extension Note *Mulches Help Trees Beat Weed Competition*.

Where serious compacting has occurred, use a pitchfork to carefully loosen the soil in the root zone, the area of ground around the tree. Avoid cutting or harming the roots. Use vertical mulching to add sand to the soil: Drill five-centimetre-wide holes 60 centimetres deep into the soil throughout the root zone. Feed sand into the holes.

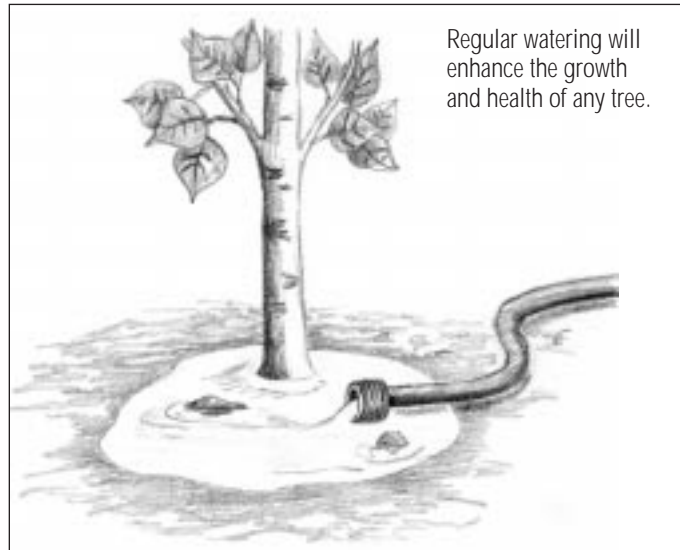
In some Ontario cities, a combination of conditions causes mature trees to draw so much water out of the soil that the soil shrinks and house foundations shift. These conditions include heavy clays, excessive pavement and downspouts that are connected directly to storm sewers. When it rains, most water flows away, rather than being taken up by the soil. The mature tree takes up the remaining water in the soil, causing the soil to shrink. If you suspect these conditions apply to you, consult the forestry department of your municipality.

WATERING

Drought is a major stress on urban trees. In fact, no rain for only four or five days can seriously stress a tree. Generally there are no signs of drought, although leaves may wilt. You may only know the tree has suffered from a lack of water when it becomes infected by disease or insects, one year after the water shortage.

In times of drought, grass protects itself by going dormant but trees keep growing. So water your trees before you think of

watering your lawn. For mature trees, leave a hose trickling at the base of the tree overnight to saturate the root zone. Young trees require only an hour or two. Regular watering will enhance the healing of wounds and support the growth of new twigs, roots, shoots and callus tissue.



FERTILIZING

To keep things tidy, we often clean up the twigs, leaves and branches that fall on our lawns. But this removes the nutrients which would normally recycle into the soil. A severe lack of certain nutrients in the soil can stress trees. Watch for signs of nutrient deficiency — smaller needles, yellow leaves and tip dieback, when the tips of branches die. Specific symptoms can indicate specific deficiencies. When you suspect a tree has a nutrient deficiency, consult an arborist who can examine the tree and test the soil.

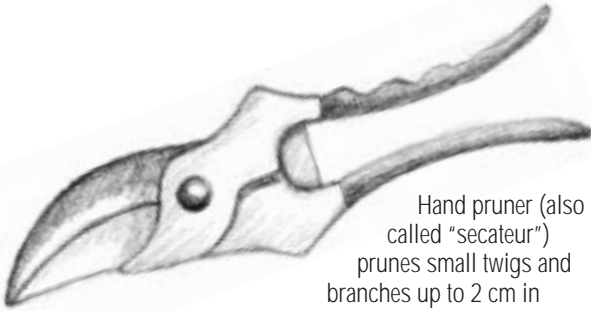
Generally, fertilize trees with a slow-release tree fertilizer that has an NPK (nitrogen, phosphorous, potassium) balance of 10-10-10. Apply the fertilizer at the rate stated on the package. Arborists use the vertical mulching technique (described above in Soil and Mulching) to get the fertilizer closer to the roots. You may find commercial tree spikes easier to use. Avoid fertilizing a tree between August 15 to October 15 of the year as this will interfere with the tree's ability to go into dormancy.

Don't fertilize a tree in the year immediately following severe damage, such as branch breakage from ice or wind. Taking up fertilizers can be a stress in itself. However, apply fertilizer if a tree shows signs of wilt or loses its leaves prematurely.

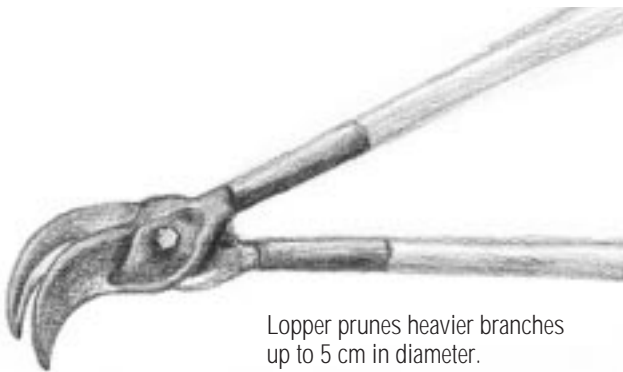
PRUNING

Regular pruning promotes good health in a tree. It allows the remaining branches to stay healthy and bear weight. It promotes better air circulation among the branches, reducing opportunities for fungi to grow. It also reduces the chances of a tree falling in the wind. It can also improve the beauty of the tree.

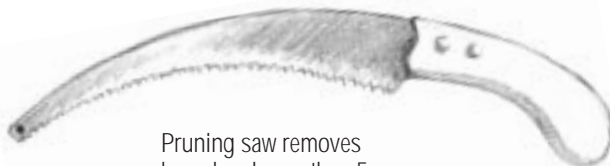
PRUNING TOOLS



Hand pruner (also called "secateur") prunes small twigs and branches up to 2 cm in diameter.



Lopper prunes heavier branches up to 5 cm in diameter.



Pruning saw removes branches larger than 5 cm.



Pole pruners remove branches higher up in the tree.

Every year, inspect your trees and take out branches that are dead, weak, diseased or crossing each other. Pruning birch and maple in the spring will cause excessive sap to run. This does not harm the tree or attract disease or insects. Don't prune elm in the summer. Cutting the elm bark at this time causes the tree to release substances that attract the beetles that spread Dutch Elm Disease. If a branch has been broken, prune the branch as soon as possible after the damage has occurred.

General Rules for Pruning

- prune all weak, diseased, dead and crossing branches
- use proper pruning techniques and maintain the branch collar
- keep the main leader, otherwise the tree will lose its form and shape
- don't remove more than one-third of the tree's original crown
- don't use a chain saw unless you are trained and experienced
- wear protective gear — hard hat, gloves, safety glasses
- know your limits and the limits of your tools
- when in doubt, call a professional

Pruning Tools

Make sure tools are clean, sharp, free of rust and in proper working condition.

Pruning Techniques

When you prune properly, a tree's branch collar grows to form a large callus that seals the wound. Cutting away the collar stops the wound from healing. Cutting too far out from the collar produces a stub that attracts fungi and insects and looks ugly. Cut large branches using the three-cut method (see Figure 1)

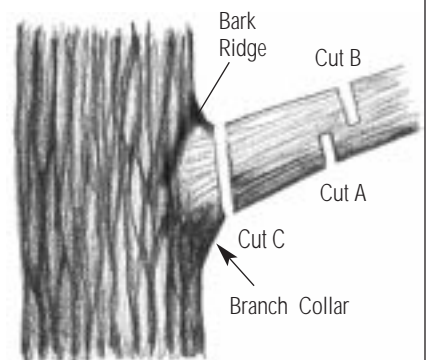
FIGURE 1: THREE-CUT METHOD OF PRUNING

CUT A

Make your first cut two feet from the trunk. Cut half way through the branch, moving from the bottom up.

CUT B

The second cut is one-third to half the diameter of the limb away from the first cut. Cut half way through the branch. At this point, the limb should fall from its own weight.



CUT C

The final cut is next to the trunk. Cut outside the branch collar with the lower edge being further away from the trunk of the tree.

so the weight of the branch will not cause it to break and tear the bark below the limb.

If ice has damaged the top of the tree, cut the stem at a 45 degree angle below the break and just above the first live branch. This will prevent water from entering or pooling in the affected area.

Don't cover the wounds with prepared compounds as they don't help and often cause decay.

REPAIRING TORN BARK

Broken limbs often tear and strip bark. These large, open wounds attract disease and insects. Use a chisel or sharp knife to smooth the ragged edges. Remove all the loose bark to the point where it is firmly attached to the tree. The rounded edges prevent dieback of the inner bark. Keep the wound as narrow and small as possible.

ASSESSING SICK AND DAMAGED TREES

Examine your trees every year. Determine whether a tree poses any danger to people or property. Is it located on or hanging over an area used by people such as a yard, public walkway, street or road allowance? Is it damaged? Are there any broken and hanging branches? Examine all sides and parts of a tree, including the main stem, branches, branch unions, the trunk flare and look for any signs of root damage. Use binoculars to see the top and upper branches.

REMOVING A TREE

Hazardous trees may not show obvious signs of breakage and therefore danger. Some signs of a potentially hazardous tree are large cracks or holes in the tree trunk, cankers, mushrooms or conks growing from the main stem of the tree, splitting or pulling apart of branch forks, missing bark, twisting and splitting of the trunk, and root damage. Signs of root damage include severed roots, twig dieback, dead wood in the crown and off-color or smaller than normal leaves. Also watch for soil mounding, where some uprooting has caused a mound to form. This indicates the tree has begun to lean and may soon fall. Severe climatic events such as ice or wind storms can cause cracking or tearing in the internal fibre of the tree. This may not show until the leaves come out or the tree produces seeds. Then, the weight may cause the branch to break or the tree to topple. If you are uncomfortable making the assessment, get professional advice.

Falling branches or stems can severely injure people, public utilities and property. As well, they are a potential legal liability. Take immediate action when trees pose a hazard to people or property. Don't go near any tree close to power lines. Arrange for experienced professionals to remove hazardous branches or trees.



Bark tearing caused by not using the three cut method.

HAZARD TREES AND WILDLIFE

If the tree is dying or dead and it is not a hazard to people or property, consider leaving it as a cavity tree. This is a partly hollow tree that wildlife use as a refuge. In Ontario, more than 50 species of birds and mammals depend on cavity trees for nesting, rearing young, roosting, feeding, storing food, escaping predators, and hibernating. These species include woodpeckers, eastern bluebirds, deer mice and squirrels. To remove any danger from a tree that is dead or dying but that you want to save as a cavity tree, cut off the top of the tree, leaving a trunk about three to five metres high. Before you start work, check the cavities in a tree for signs or sounds of nest building, birds and mammals. Wait until any wildlife have reared their young before doing any work on a tree. To find out about bird and animal birthing behaviors, call your local animal rehabilitation centre or humane society. For more specific information on cavity trees, refer to the Extension Note *Cavity Trees are Refuges for Wildlife*.



This is a good example of an ice-damaged tree that should be taken down.



Special attention should be given to trees that are close to people — they may be a hazard.

TREATING DAMAGE AND REDUCING STRESSES

Trees that are weakened by a lack of water, nutrients and care are more vulnerable to insects, diseases and breakage. Insects and many diseases show up within the same growing year. Other stresses, such as the damage caused by ice, wind, drought and the cutting of roots can take a few years to become evident. As long as the tree is not a hazard, the best course of action is to wait and see. During this time, keep a close eye on the damaged tree. Many different stresses can combine to cause serious damage. Give a stressed tree extra care over a few years to help it recover and fight off disease and insect infestations.

Here are some things to watch for and some ways to help your tree recover.

ICE DAMAGE

Ice affects each tree species differently because each has a different shape and structure. The weight of the ice can cause birch, which have long, thin branches, to bend over to the point of breaking. The large branches on the tops of elms can crack and fall off. Mature maples can lose their thick, spreading limbs. Identifying the kind of damage a tree has is the first step in determining how to care for it. For more specific information on assessing ice damage and caring for

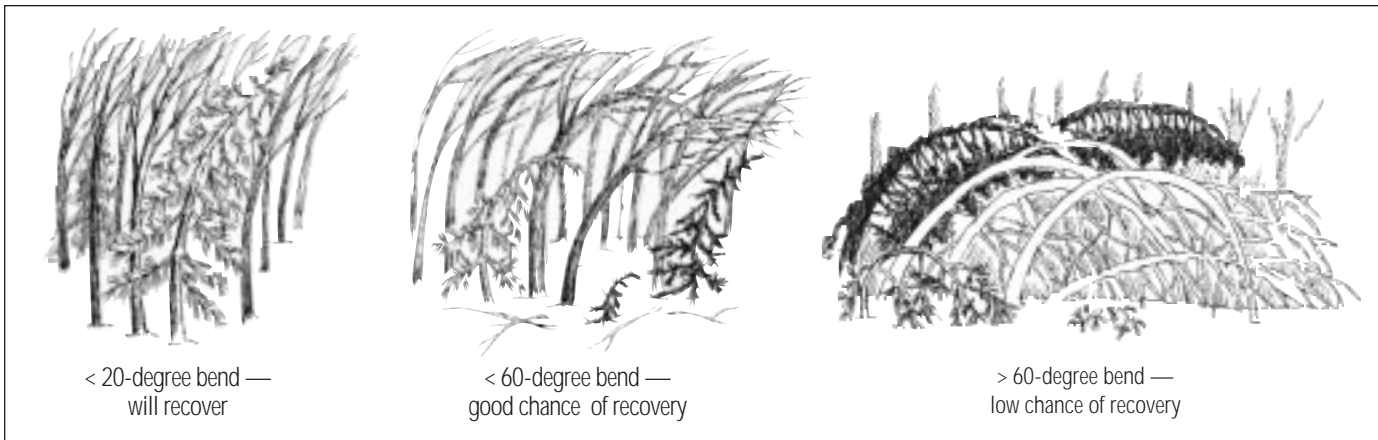
ice damaged trees, refer to the Extension Notes *Caring for Ice-Damaged Woodlots and Plantations* and *Caring for Ice Damaged Trees*.

The three most common kinds of damage are bending, breaking and poling.

BENDING

Birch, poplar, cedar, young pines and shrubs are most likely to suffer bending. The severity of the damage to a tree's external and internal structures depends on the species, the angle of the bend, the length of time a tree is bent, a tree's age and the health of a tree prior to the ice storm.

Give a bent tree plenty of time to repair itself. Don't try to straighten it. Young trees will usually straighten after the ice melts. Branches that are frozen to the ground will free themselves when the ice or snow softens. Don't release a young conifer's leader from the ice. Pulling it out could tear off the leader. Don't strike a branch with a blunt object to crack off the ice because this can break brittle branches. It's best to wait and monitor a bent tree's health before taking any action.

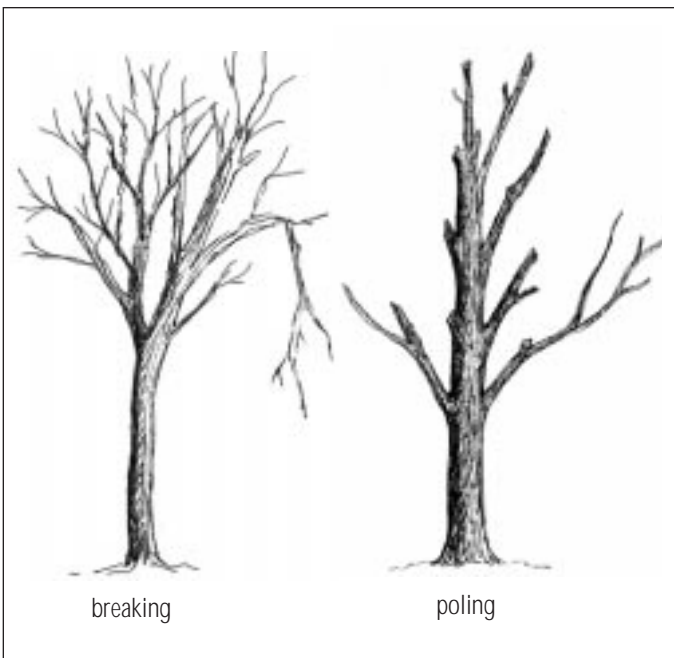


BREAKING

Deciduous trees, such as maples and elms, often lose branches and tree tops to breaking. This kind of damage is called “crown damage.” A tree’s ability to repair itself depends greatly on how much of its crown is lost.

Unless a tree is damaged severely, prune the broken branches and monitor the tree’s health carefully. Wounds can attract diseases. They can also make a tree more vulnerable to bark beetles, borers and other insects. If more than one-third of the crown has been lost, prune the remaining branches and consider removing the tree. If the tree is particularly important to you, you may want to have an expert cable or brace it.

If a tree is recovering, you will see many new, long, thin twigs. This vigorous twig growth is a healthy response to branch loss.



POLING

Poling occurs when so many branches break that only the main stem remains. Poplars and basswood are particularly vulnerable to poling. However, these trees can often recover on their own because this kind of injury stimulates the growth of new shoots along the trunk. It’s often best to leave poplars and basswood alone and monitor their recovery over time. As they recover, these trees, as well as willow and silver maple, will produce shoots, or epicormic sprouts, which will form new trees and new branches. However, these sprouts are weak and produce poor unions with the trunk. They will need careful pruning in the future.

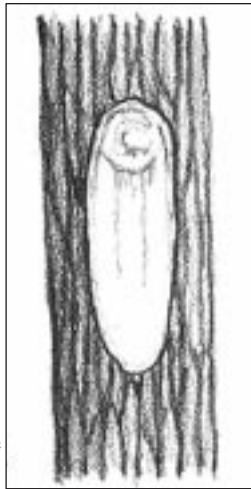
BROKEN OR BENT LEADERS

Ice often bends or breaks off the tops of young conifers. Cut the broken or bent tops just above the first set of live branches, or whorl. This will encourage a branch in the top whorl to become the new leader. Find the best branch and gently bend it upwards. Attach it to a pole that is tied to the tree’s trunk. Check the tree every few months to ensure the ties are not cutting into the new leader. Remove the pole in two to three years.



DAMAGED TRUNK

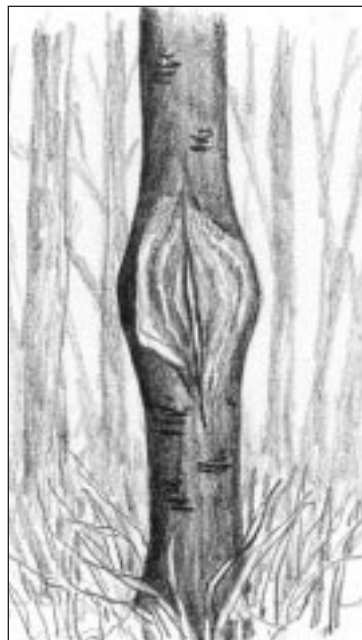
If the trunk is in good condition but some areas of the bark are damaged, leave the tree alone. Treat small wounds early so they don't have a chance to grow and lead to more widespread decay (see Repairing Torn Bark). Wound dressings are not recommended and can lead to decay. If mushrooms or conks are present, there may be extensive decay. Consider removing the tree. Severe wind or ice can cause the layers under the outside bark to crack. This damage won't be visible but will ultimately lead to the tree's death. Keep an eye on trees which have experienced severe storms.



Remove loose bark and shape the wound into an ellipse.

SUN SCALD

Sun scald is an injury that can occur when there is a rapid change in temperature. Beech, balsam fir and other trees with smooth bark are most affected by sun scald. Sun scald can occur on sunny days as cold as minus 40 degrees Celsius. The sun heats the outside bark, raising its temperature to about 10 degrees more than the surrounding air. If cloud blocks the sun, the temperature of the outside bark can drop so suddenly that it and the middle bark, or cambium, can be injured or killed. Sun scald opens a crack in the tree. Care for the wound and protect the tree from other stresses.



Sunscald occurs when rapid changes in temperature create a crack in the tree.

Don't wrap the tree with burlap because this can promote decay. You can accidentally create the ideal conditions for sun scald when you clear an area for a building. The sudden removal of trees that surround a tree with smooth bark exposes the vulnerable tree to the sun. Instead, remove the surrounding trees over a few years.

DISEASES

Trees under stress from compacted soil, broken branches or roots that have been cut are more vulnerable to leaf spots, blotches, blights and other diseases caused by fungi and bacteria. Although common, these diseases are generally not



Conks and mushrooms are an indication of a diseased tree.

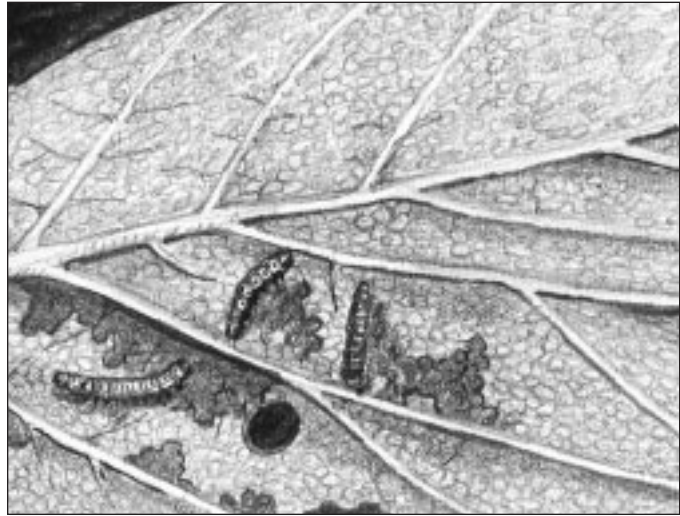
serious and are part of the natural cycle of life in the forest. Symptoms vary from small circular spots of discoloration to large irregularly shaped blotches that may involve the entire leaf surface. To identify a particular disease, refer to the *Field Guide to Tree Diseases of Ontario*.

If the tree is infected, there are both natural and chemical ways to control the disease. To control the disease without the use of fungicides, keep the area around the tree clean, burn the infected leaves and fertilize the tree if leaf loss is extensive. If you use fungicides, follow the product's safety directions carefully. Hire a licensed applicator for large trees or extensive work.

The best defence against diseases is to maintain your trees in a healthy state.



Eastern tent caterpillar is a common pest in urban fruit trees, such as cherry and apple.



Elm leaf beetle is a common pest in urban trees.

INSECTS

Many insects don't threaten the life of the tree and are part of our natural environment. However, if a tree is under stress from other factors, infestations of insects can be damaging. They can further weaken trees and make them even more susceptible to disease, severe weather and pollution.

If you see signs of insects, try to identify the particular insect and determine whether it is life threatening. Refer to *Common Pests of Trees in Ontario*. If the insect is a threat, or if you notice severe leaf or needle loss over one to two days, get help from a nursery, an arborist or your local OMNR office.

For insect infestations, there are both natural and chemical ways to control them. To avoid using insecticides, pick the insects off or cut off the infected twigs or branch. Burn or destroy these. Keep the area around the tree clean. If you use a pesticide, follow the product's safety directions carefully. Hire a licensed applicator for large trees or extensive infestations.

The best defence against insects is to maintain your trees in a healthy state.

CALLING IN THE EXPERTS

Get professional advice and assistance when a damaged tree is close to utilities, such as electrical or telephone wires, when repairing the tree requires climbing, when a mature tree needs to be removed, when cabling or bracing are required or when you don't have the training, experience or ability to do the work. Consider getting professional help for heavy pruning jobs.



Professional arborist pruning a damaged tree.

GETTING PROFESSIONAL HELP

There are a number of experts available including landscape architects, arborists, foresters, forestry technicians, biologists, ecologists, loggers and land-clearing contractors. Each has their own unique skills and experience.

Find tree-care professionals by getting referrals from friends, neighbors, co-workers and associates or by looking in the yellow pages of the telephone book. Always be careful of door-to-door salespersons.

BEFORE YOU HIRE

- ask for references and don't be afraid to verify them
- check that they provide warranties on their work, clean up the work site and keep on schedule
- get two or three written quotations and work plans
- check for liability insurance and verify
- ask for affiliation with professional or technical associations



Each expert brings in their own unique skills and experience.

CABLING, BRACING AND GUYING

If a damaged tree is of high value, get professional help to cable and brace it. Cabling is used to help one branch support another. The “cables,” or airplane wire, are usually placed at about two-thirds of the height of the tree and are held in place with stainless steel bolts and screws. “Braces,” or bolts, are used to keep stems from splitting. Poor cabling and bracing can turn a damaged tree into a hazard. Cabling and bracing are only effective for seven to 10 years. As a tree grows, these artificial supports lose their effectiveness. Inspect a cabled or braced tree regularly.

Guying keeps trees from being uprooted by the wind. It can also help them re-establish their roots after they have been uprooted. Remove the guys within two years so they don't restrict the growth of the tree.



A good example of cabling.

FOR MORE INFORMATION

For more information on caring for urban trees, contact:

- International Society of Arboriculture — (888) 463-2316
- LandOwner Resource Centre — (613) 692-2390
- Landscape Ontario — (905) 875-1805
- Ontario Professional Foresters Association — (905) 764-2921
- Ontario Forestry Association — (416) 493-4565
- Ontario Association of Landscape Architects — (416) 231-4181
- Your local Ontario Ministry of Natural Resources office or Stewardship Council
- Your local municipal/county/regional arborist or forestry department

Further Reading:

- *Citizen Arborist*, International Society of Arboriculture, Ontario Inc., Owen Sound, Ontario, 1995
- *Common Pests of Trees in Ontario*, Ontario Ministry of Natural Resources, Toronto, Ontario, 1995
- *Field Guide to Tree Diseases of Ontario*, Publication Services, Natural Resources Canada, Sault Ste. Marie, Ontario, 1997
- *How to Prune Trees*, Peter J. Bedker, J. G. O'Brien and M. E. Mielke, United States Department of Agriculture, 1995
- *Landscaping with Native Trees*, Guy Sternberg and Jim Wilson, Chapters Publishing Ltd., Shelburne, Vermont, 1995
- *Modern Arboriculture*, Alex Shigo, Shigo and Trees Associates, Durham, New Hampshire, 1991
- *Pruning Mature Trees*, International Society of Arboriculture, 1997
- *Shading our Cities*, Gary Moll and Sara Ebenreck, Island Press, Washington, D.C., 1989
- *Tree Planting Advice*, Ottawa Hydro, Ottawa, Ontario, 1994
- *Tree Pruning Guidelines*, International Society of Arboriculture, 1995
- *Trees in Canada*, Farrat, J.L.— Canadian Forest Service, Fitzhenry and Whiteside Ottawa, 1995
- *When a Storm Strikes*, James R. Fazio, Tree City USA Bulletin No. 2
- *Why Topping Hurts Trees*, International Society of Arboriculture, 1997



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