AG-FO-1411-B
Revised 1992

MINNESOTA EXTENSION SERVICE
UNIVERSITY OF MINNESOTA
AGRICULTURE

Protecting Trees and Shrubs Against Winter Damage

Bert T. Swanson and Richard Rideout
Horticulture

Minnesota's harsh climate is often responsible for severe damage to plants in the landscape. Winter sun, wind, and cold temperatures can bleach and dessicate evergreens, damage bark and injure or kill branches, flowerbuds and roots. Snow and ice can break branches and topple entire trees. Salt used for deicing street pavement, sidewalks and parking lots is harmful to landscape plantings. Winter food shortages force rodents and deer to feed on bark, twigs, flowerbuds and foliage, injuring and sometimes killing trees and shrubs. All is not bleak, however, as protection can be provided to landscape plants to minimize some of this injury.

COLD DAMAGE

Cold temperatures can damage plants in several ways. Plants that are not hardy in Minnesota will be killed or injured unless protected in a microclimate. Plants that normally grow in hardiness zone 3 (northern Minnesota) and hardiness zone 4 (southern Minnesota) may be injured as well. Injury is more prevelant and more severe when low temperatures occur early or late in the season, when there is little or no snow cover during the season or when low temperatures are of prolonged duration. Pronounced fluctuating temperatures can be extremely detrimental to plants throughout the fall, winter, or spring.

Sun Scald

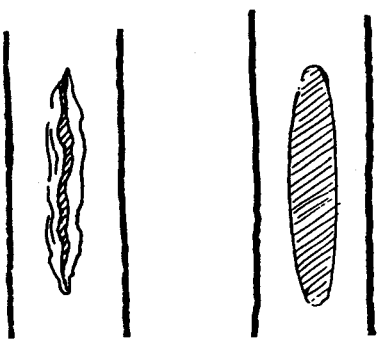
Sun scald is characterized by elongated, sunken, dried or cracked areas of dead bark, usually on the south or southwest side of a tree. On cold winter days, the sun can heat up bark to the point where activity is stimulated in the cambium. Then when the sun is blocked by a cloud, hill, or building, the bark temperature drops rapidly, killing the active tissue.

Young trees, newly planted trees, and thin barked trees (cherry, crabapple, honeylocust, linden, maple, mountain ash, plum) are most susceptible to sun scald. Trees that have been pruned to raise the lower branches, or transplanted from a shady to a sunny area are also sensitive because the lower trunk is no longer shaded. Older trees are less subject to sun scald because the thicker bark can insulate the dormant tissue from the sun's heat therefore the tissue will remain dormant and cold hardy.

Sun scald can be prevented by wrapping the trunk with a commercial tree wrap paper, plastic tree guards, or any other light colored material. The wrap will reflect the sun and keep the bark at a more constant temperature. Put the wrap on in the fall and remove it in the spring after the last frost. Newly planted trees should be wrapped for at least two winters and thin barked species up to five winters or more.

To repair sun scald damage, cut the dead bark back to live tissue with a sharp knife, following the general shape of the wound, rounding off any sharp corners to facilitate healing (**Figure 1**). Wrap the trunk in subsequent winters to prevent further damage. Do not use a wound dressing on the exposed area, however. Spraying the area with a fungicide may help prevent fungal infection of the area.

Figure 1. Repairing sun scald damage.



Winter Discoloration of Evergreens

Browning or bleaching of evergreen foliage occurs for three reasons:

1) Winter sun and wind cause excessive transpiration (foliage water loss) while the roots in frozen soil are unable to replace lost water. This results in dessication and browning of the plant tissue.

2) Bright sunny days during the winter also cause warming of the tissue above ambient temperature which in turn causes cellular activity. Then, when the sun is quickly shaded, the foliage temperature drops to injurious levels and the tree is injured or killed.

3) Also, during bright, cold winter days, chlorophyll in the foliage is destroyed (photo oxidized) and is not resynthesized if the temperature is below 28° F. This results in a bleaching of the foliage.

4) Early cold temperatures before harding of plant tissue, particularly Scotch Pine.

Damage normally occurs on the south, southwest, and windward side of the plant, but in severe cases the whole plant may be affected. Yew, arborvitae and hemlock are the most susceptible, but winter browning can affect all evergreens. New transplants or plants with new, late seasonal growth, are particularly sensitive.

There are several ways to minimize winter injury to evergreens. The **first** is proper placement of evergreens in the landscape. Yew, hemlock, and arborvitae should not be planted on south or southwest sides of buildings or in highly exposed (windy, sunny) places. A **second** way to reduce damage is to prop pine boughs or Christmas tree greens against or over evergreens to protect them from wind and sun and to catch more snow for natural protection.

Winter injury can often be prevented by constructing a barrier of burlap or similar material on the south, west and windward sides of the evergreen (**Figure 2**). If a plant has exhibited injury on all sides, surround it with a barrier but leave the top open to allow for some air and light penetration.

Keeping evergreens properly watered throughout the growing season and into the fall is another way to reduce winter burn. Never stress the plant by under- or over-watering. Decrease the watering slightly in September to encourage hardening off, then water thoroughly in October until freeze-up. Watering only in the late fall does not help reduce injury.

Anti-dessiccant and anti-transpirant sprays are often recommended to prevent winter burn. Most studies, however, have not shown them to be effective for winter protection.

If an evergreen has suffered winter injury, wait until mid-spring before pruning out injured foliage. The brown foliage is most likely dead and will not green up, but the buds, which are more cold hardy than the foliage, will often grow and fill in the area where the brown foliage was removed. If the buds have not survived, prune off the dead branches. Fertilize winter injured plants in early spring and water them well throughout the season. Provide appropriate protection the following winter.

Die Back

Deciduous trees and shrubs can incur shoot die back and bud death during the winter months. Flower buds are more susceptible to injury than vegetative buds. A good example of this is forsythia, where the plant stems and leaf buds are hardy but the flower buds are very susceptible to cold temperature injury.

Little can be done to protect trees and shrubs from winter die back. Plants that are not completely hardy should be planted in sheltered locations (microclimates). Plants in a vigorous growing condition late in the fall are most likely to suffer winter die back, so avoid late summer pruning, fertilizing, and overwatering. Apply fertilizer in the spring on sandy soil or in the fall on heavier soil after the leaves have dropped.

Root Injury

Roots do not become dormant in the winter as soon as stems, branches and buds, and roots are less hardy than the stems. The roots of most trees and shrubs that grow in Minnesota are killed at temperatures at or below 0 to +10° F. These plants survive in Minnesota because the soil temperature normally is much higher than the air temperature and because the soil cools down much slower and later than air temperature.

Many things influence soil temperature. Moist soil holds more heat than dry soil, so in a sandy soil or during a dry year, frost penetration will be deeper and

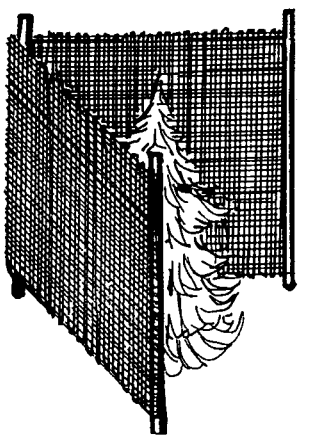


Figure 2.
Protecting evergreens
from winter burn.

soil temperatures colder. Snow cover acts as an insulator as does mulch, keeping the soil temperature higher. With newly planted trees, any cracks in the planting hole backfill will allow cold air to penetrate into the root zone which prevents fall root growth or kills newly formed roots.

To encourage fall root growth and to reduce root injury, mulch new trees and shrubs with 6 to 8 inches of wood chips or straw. If the fall has been dry, water heavily before the ground freezes to reduce frost penetration. Check new plantings for cracks in the soil around the plants and fill them with soil.

Frost Heaving

Repeated freezing and thawing of the soil in the fall or spring causes soil to expand and contract which can damage roots and result in heaving shrubs and new plantings out of the ground. A 4- to 6-inch layer of mulch will prevent heaving by maintaining a more constant soil temperature.

SNOW AND ICE DAMAGE

Heavy snow and ice storms cause damage by bending and breaking branches. Multiple leader, upright evergreens, such as arborvitae and juniper, and multiple leader or clump trees, such as birch, are most subject to damage. Relatively small trees can be wrapped together or the leaders tied with strips of carpet, strong cloth or nylon stockings two-thirds of the way above the weak crotches (**Figure 3**). These wrappings must be removed in the spring to prevent girdling, and to allow free movement of the stem. Proper pruning to eliminate multiple leaders and weak branch attachments will reduce snow and ice damage. For large trees with large wide-spreading leaders or large multi-stemmed trees, the main branches should be cabled together by a professional arborist.

SALT DAMAGE

Salt used for deicing walks and roads in the winter can cause or aggravate winter injury and die back. Salt runoff can injure roots and be absorbed by the plant, ultimately damaging the foliage. Salt spray from passing autos can also cause severe foliar injury.

To prevent salt damage, do not plant trees and shrubs in highly salted areas. Avoid areas where salty runoff collects or where salt spray is prevelent, or use salt tolerant species in these areas. Burlap barriers (**Figure 2**) may provide protection to some plants from salt spray.

ANIMAL DAMAGE

Mice, rabbits and deer can all cause severe damage to plants in the winter. These animals feed all winter on the tender twigs, bark, and foliage of landscape plants. They can girdle trees and shrubs, and eat shrubs to the ground line. Deer can cause significant injury and breakage by rubbing their antlers on trees.

Rodents

Trees can be protected from rodent damage by placing a cylinder of 1/4-inch mesh hardware cloth around the trunk. The cylinder should extend 2 to 3 inches below the ground line for mice and 18 to 24 inches above the anticipated snow line for rabbit protection (**Figure 4**). The hardware cloth can be left on year-round, but it must be larger than the trunk to allow for growth. For small trees, plastic tree guards are also effective. You can protect shrub beds from rabbits by fencing the beds with chicken wire. However, check such fenced areas frequently to ensure a rabbit has not gained entrance and is then trapped inside.

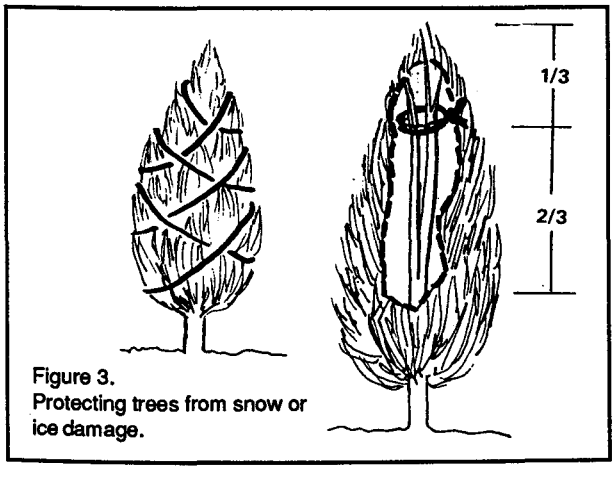


Figure 3.
Protecting trees from snow or ice damage.

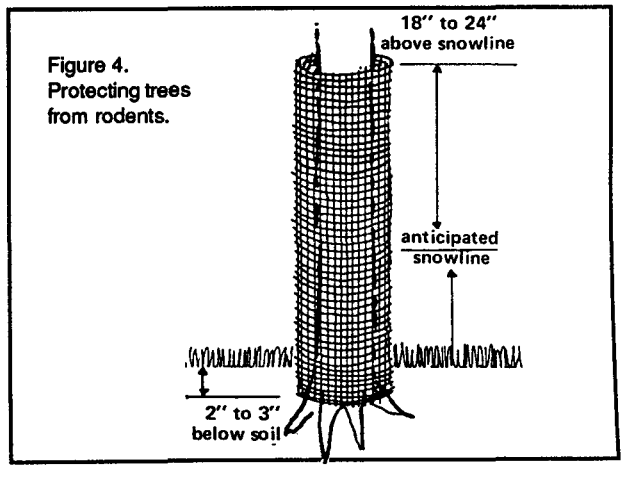


Figure 4.
Protecting trees from rodents.

If you have several trees or shrubs to protect, using screens and wraps may be too expensive and time consuming. In such a situation, repellents may be the best solution. Remember that a repellent is not a poison; it simply renders the plant undesirable through taste or smell.

The most effective repellents for rodents are those containing thiram, a common fungicide. You can either spray or paint these on trees and shrubs. Repeat applications are necessary particularly after heavy precipitation.

If these methods do not control the rodents, commercial baits containing poisoned grain are effective. However, baits may be hazardous to humans, pets, and beneficial wildlife. Injury or death can result in animals that eat the bait directly and in animals that consume bait-killed rodents. Shelter or containerize baits so they stay dry and so only targeted rodents have access. Beverage cans laid on their sides work well for this purpose. Trapping and shooting, where legal, will also control rodents.

Deer

Deer feed on and damage tops and side branches of small trees and shrubs. Repellents containing thiram provide some control if feeding pressure is not extremely heavy. Plants can be sprayed or painted with the repellent, however, the most effective procedure is to hang heavy rags near the plants to be protected that have been dipped in the concentrated repellant. Repeated plant applications or dipping of the rags is necessary. For deer enclosures to be effective, fences must be high and/or constructed properly. If deer are starving there is little that will prevent feeding. Providing a more palatable forage may help, but it may also attract more deer.

CONCLUSION

Although plant cold hardiness and winter injury are common concerns associated with Minnesota winters, appropriate plant selection, selecting the proper site, providing proper cultural practices and preventive maintenance will significantly reduce or prevent severe injury or loss to plants in the landscape.

Even though all plants respond differently to winter stress and each winter provides a different set of stressful conditions, plants do possess a remakable ability to withstand extremely severe conditions. Minnesota winters should not discourage the planting of traditional or new plant species.

Learn to take advantage of microclimates to plant interesting or different plants. Minnesota's list of usable plant species needs to be expanded, not reduced.