

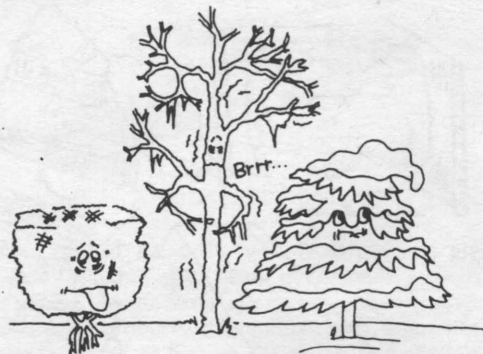
## Winter Injury to Trees and Shrubs

*Diane Relf and Bonnie Appleton\**

It is often necessary to give a little extra attention to trees and shrubs in the fall to help them over-winter and start spring in peak condition. Understanding of certain principles and cultural practices will significantly reduce winter damage to woody ornamentals.

### *Causes of Winter Damage*

The majority of winter damage can be divided into three categories: (1) desiccation, (2) freezing, and (3) breakage.



DESICCATION FREEZING BREAKAGE

#### Desiccation

Desiccation, or drying out, is a significant cause of damage, particularly on evergreens. This occurs when water is leaving the plants faster than it is being taken into the plant. There are several environmental factors that can influence desiccation. The needles and leaves of evergreens transpire some moisture even during the winter months. During severely cold weather the ground may freeze to a depth beyond the extent of the root system, thereby cutting off the supply of water. If the fall has been particularly dry, there may be insufficient ground moisture to supply the roots with adequate water. Water loss is greatest during periods of strong winds and sunny, mild weather. The heat of the sun causes stomates on the lower sides of the leaves to open, thus increasing transpiration. Small, shallow rooted plants are often injured when alternate freezing and thawing of the soil heaves the plants from firm contact with the soil and exposes the roots to drying winds. Injury due to desiccation is commonly seen as discolored or burned evergreen needles or leaves. Damage is worse on the side facing the wind, and can be particularly serious if plants are near a white house where they receive reflected light and warmth which causes extra damage.

#### Freezing

Freezing injury may take several forms. New growth stimulated in early fall by late summer fertilization or pruning may not have had time to harden off sufficiently to survive sudden drops to below freezing temperatures. This new growth may be killed by ice crystals rupturing cell walls. This damage will show up as dead branch tips and branches. A sharp temperature change between day and night may freeze the water within the trunk of a tree causing it to split open in a symptom called frost cracking. If not too severe, these cracks seem to close when warm weather arrives. However, the wood fibers within may not grow together. Frost cracking is sometimes called southwest injury because it is commonly found on the southwest side of shade trees when warm afternoon sun creates further extremes between day and night temperatures. A similar phenomena with many shrubs is called bark split. Particularly susceptible are many cultivars of evergreen azaleas. In most cases the plants close over the cracks adequately, with no treatment necessary.

The sun can also prematurely stimulate the opening of flowers or leaf buds in the spring which can be killed by freezing night temperatures. Bud injury due to the cold temperatures of winter also occurs in the dormant state on more tender trees and shrubs. Flowering shrubs may lose their flower buds although their leaf buds are usually unaffected. Root injury may occur in containers and planters, or balled and burlapped (B&B) stock which has been left exposed during the winter. Lethal root temperatures can start at 28°F on some species.

#### Breakage

Two causes of damage by snow and ice are its weight and careless removal. High winds compound the damage done when ice is on the plant. The damage may take the form of misshapen plants or may actually result in broken branches and split trunks.

Many plants have protective mechanisms that should not be confused with winter damage. Some will shed leaves (nandina, privet); some will position their leaves flat against their stems (fatsia); some will roll their leaves downward or the margins inward (rhododendron); while others will have wilted-looking leaves all winter (viburnum). In addition, the red, purple, bronze, and brown winter color of some evergreens (juniper, arborvitae, cryptomeria, boxwood) should not be confused as winter injury.

\*Extension Specialists, Horticulture, Virginia Tech



VIRGINIA POLYTECHNIC INSTITUTE  
AND STATE UNIVERSITY

Virginia Cooperative Extension programs and employment are open to all, regardless of race, color, religion, sex, age, veteran status, national origin, disability, or political affiliation. An equal opportunity/affirmative action employer. Issued in furtherance of Cooperative Extension work, Virginia Polytechnic Institute and State University, Virginia State University, and the U.S. Department of Agriculture cooperating. C. Clark Jones, Director, Virginia Cooperative Extension, Virginia Tech, Blacksburg; Lorenza W. Lyons, Administrator, 1890 Extension Program, Virginia State, Petersburg.

VT/028/0997/2.5M/980730/426500



VIRGINIA STATE UNIVERSITY

LD  
5655  
A762  
no. 426-500  
1997  
VPI  
Spec

## Avoiding Damage

Much of the disappointment and frustration of winter damaged plants can be avoided by planning ahead. Select hardy plants. Grow plant materials that are either native or are known to be winter hardy in your area.

### Select an Appropriate Site

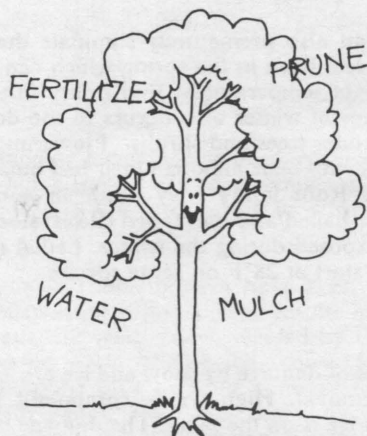
When planting broadleaf evergreens that are known to be easily injured, such as some varieties of rhododendrons, azaleas, camelias, daphne, and hollies, select a location on the north, northeast, or eastern side of a building or other barrier where they will be protected from prevailing winds and intense winter sun. These exposures will also delay spring growth, thus preventing injury from late spring frost to new growth or flowers.

Avoid poorly drained soil, low spots that create frost pockets, and sites that are likely to experience rapid fluctuations in temperature.

Since heavy snow and ice can cause much damage to branches and trunks, it is important that plants be placed away from house eaves and other snow or ice collecting areas, where the snow or ice is likely to fall or slide onto the plants.

### Follow Recommended Cultural Practices

Following recommended cultural practices has been highly effective in reducing winter injury to ornamentals. Plants that are diseased or deficient in nutrients are more susceptible to winter injury than strong, healthy plants.

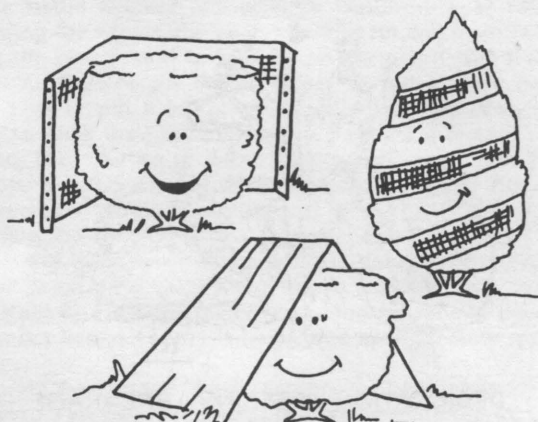


A fall fertilization, after plants are dormant but before soil temperature drops below 45°F, may be of value in preventing winter damage. But avoid late summer or early fall fertilization while plants are still active, as this stimulates late fall growth which is easily killed by the cold.

Proper pruning at an appropriate time throughout the year is effective in reducing damage by ice and snow. Particularly important is the removal of any weak, narrow-angled, V-shaped crotches. Avoid late summer pruning which stimulates new, tender growth and reduces the supply of nutrients available to the plant through the winter.

Proper watering can be a critical factor in winterizing trees and shrubs. If autumn rains have been insufficient, give your plants a deep soaking that will supply water to the entire root system before the ground freezes. This practice is especially important for broadleaf and needle-leaf evergreens, as is watering during January, February, and March when there are warm days.

Mulching reduces weeds, helps control erosion, and reduces loss of water. A two- to three-inch layer of a mulch material such as pine or fir bark, pine needles, wood chips, or sawdust reduces water loss and helps maintain uniform soil moisture around the roots. Mulching also reduces the alternate freezing and thawing of the soil which heaves some shallow-rooted plants and buffers the soil temperature, keeping the soil warmer for a longer period of time during the winter, permitting extra winter root growth. Leave a space of several inches between the trunk of the tree and the mulch to discourage mice living in the mulch from feeding on the bark. Avoid fall planting certain species that do not transplant well in fall (many oaks, magnolias, dogwood, others).



## Protecting Against Damage

Special actions may be taken to give added protection during the winter.

### Wrapping plants

Small evergreens can be protected by using wind breaks made of burlap, canvas, or similar materials. The wind breaks help reduce the force of the wind and also shade the plants. Wind breaks may be made by attaching materials to a frame around a plant (as illustrated). A complete wrapping of straw and burlap is sometimes used. Black plastic should be avoided as a material for wrapping plants. During the day heat builds up inside of it and actually increases the extreme fluctuation between day and night temperatures. The added heat may also speed up the growth of buds in the spring, making them more susceptible to a late frost.

Certainly, these various boxes, shields, and wrappings add nothing to the aesthetics of the winter landscape. If your ornamentals require annual protection measures such as these, it would be wise to move them to a more protected location or replace them with harder specimens. If wrapping is used, it should be removed each



spring. Be sure to wrap from the base of a tree upward so that water is shed off the wrapping, not allowing it to seep in behind it where moisture can lead to bark rotting.

### Snow Build-up

Snow that is collecting on shrubs should be removed immediately with a broom. Always sweep upward with the broom to lift off the snow.



### Early frost

Protection against an early hard frost may be given to particularly valuable specimens by providing them with a fine, gentle, continuous spray of water. Satisfactory protection can be obtained in many cases, even when the temperature drops as low as 20°F. When the air temperature drops below freezing, water sprayed onto the plant begins to form ice. During the process of freezing, the water gives off heat. Enough of this heat is absorbed by the plants to prevent them from freezing. As long as water is applied continuously, the plant cells remain above the freezing point. The application of water should begin when the temperature at plant level reaches 34°F. It must be constant throughout the period when the air temperature is below freezing and continued until all the ice has melted off the plant. A stationary or rotary sprinkler will give very satisfactory results. However, the weight of the ice can become excessive, causing splitting and breakage.

### Splitting bark

Bark splitting, especially dangerous on newly planted trees, may be prevented by wrapping trunks with burlap strips or commercial tree wrap, painting white, or even shading with a board. All of these methods reflect sunlight and reduce the buildup of heat during the day, thus reducing the temperature fluctuations that cause splitting.

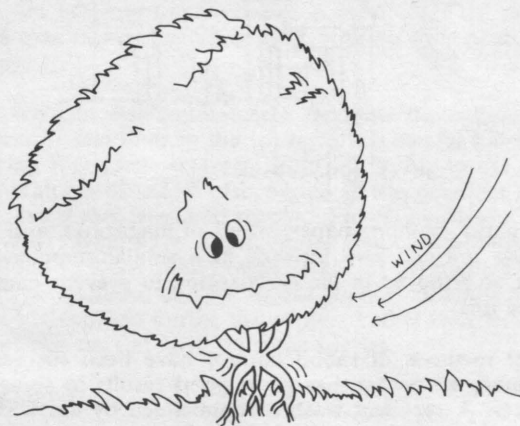
### *If Winter Injury Occurs*

After a particularly severe winter, many plants may show substantial injury. Among the damage symptoms you may see are discolored or burned evergreen needles or leaves, dead branch tips and branches, heaved root sys-

tems, and broken branches. At winter's end, remove only those branches that are broken or so brown that they are obviously dead. The extent of winter damage can best be determined after new growth starts in the spring. At that time, prune all dead twigs or branches back to within one quarter of an inch above a live bud, or just outside the branch collar where one branch attaches to another. Do not remove branches when scraping the outer bark reveals a green layer underneath. Wait until late spring before removing because even the dearest looking plant may still be alive (wait until early summer for crape myrtle). If dead branches are not pruned away, insects or secondary fungi may attack dead tissue.

If the discoloration on narrow-leaved evergreen needles is not too severe, they may regain their green color, or new foliage may be produced on the undamaged stem. Broad-leaved evergreens showing leaf damage will usually produce new leaves, if branches and vegetative leaf buds have not been severely injured. Damaged leaves may drop or be removed. Prune to remove badly damaged or broken branches, to shape plant, and to stimulate new growth.

Replant small plants with root systems partially heaved out of the ground as soon as the soil thaws. Unless the root system is small enough to be pushed easily with the fingers into the soft soil, dig the plant, retaining as much as possible of the root system within a soil ball, and replant it. An application of fertilizer to the soil around winter damaged plants, accompanied by adequate watering, will usually induce new growth to compensate for injuries.



Special care should be given to plants injured by winter's cold. The dry months of June, July, and August can be particularly damaging, for these plants are weak and less able to survive the stress of drought than healthy plants. Be sure to water adequately. Normally at least one inch of water per week is recommended, so when rain is scarce, supplemental water should be provided by irrigation.

### *Rodent Damage*

Mice may cause serious damage to trees or shrubs. They chew off the bark at ground level or below and can completely girdle a tree, causing it to die. Most of this damage takes place during winter. Keep mulch pulled away from the base of the tree, and examine it frequently for the presence of mice.

In many home and commercial plantings, mice are controlled by placing poison bait in their runways. These poisons and complete directions on how to use them may be obtained from many spray material dealers.

Mice may also be controlled by trapping. This can be successful where only a few trees are involved.

*Rabbits* can also be responsible for the loss of young trees each year. Where rabbits are a common problem, a satisfactory method of preventing damage is the use of a mechanical guard.

Cut a 36" wide roll of galvanized screen or "hardware cloth" with a 1/4" mesh lengthwise, forming two 18" strips. By cutting these strips into pieces 14" long, guards 14 or 18" are obtained.

Roll or bend the strip around the trunk of the tree so that the long side is up and down the trunk and the edges overlap. Twist a small wire loosely about the center to prevent the strip from unrolling. Push the lower edges well into the ground. This metal guard will last indefinitely and can be left in place all year.



Tar paper, building paper, sheets of magazines, and aluminum foil can also be used in a similar manner, but must be removed in the early spring to prevent damage to the tree.

Other methods of rabbit control have been successful. Ordinary whitewash has given good results in some instances. A repellent wash recommended by the USDA, containing equal parts of fish oil, concentrated lime sulfur, and water, is used by some commercial fruit tree growers. Also, rabbit repellents under various trade names are available. All these materials may be applied with a paint brush to the trunk of the tree from the ground up into the scaffold limbs.

## ***Road Salt Damage to Garden and Landscape Plants***

Road salt damage to garden and landscape plants is a problem for many gardeners. Runoff from the road contains dissolved salts which not only directly injure the plants but can change the structure of the soil, causing it to become compacted, thereby restricting the nutrients, water, and oxygen available to the plants. Although the salt is applied throughout the winter, most salt damage occurs in late winter and early spring when plants are beginning active growth. Growing portions of the plant, such as shoot tips and young leaves are affected the most. One of the symptoms of salt damage is marginal scorch, a dried burnt effect on leaf edges. If you have plants near a possible source of excessive salt, bring a soil sample to your county extension office and request a soluble salts test to determine if you have a problem. In sandy soil, soluble salt levels of > 1000 ppm indicate potential trouble; clay-loam soils can handle levels up to 2000 ppm as they have much higher water-holding capacities which dilute the salt.

The battle against salt damage continues year round. During the winter, the goal is to prevent salt from reaching the plants, and to wash it off the plants that it does reach. Do not pile snow containing salt around plants or trees or put it where runoff will flow over plant root zones. Ask the road maintenance people if there is anything they can do to direct salty runoff away from your property. Where runoff is unavoidable, flush the area around the plants in early spring by applying 2" of water over a 2-3 hour period and repeating this 3 days later. This will leach much of the salt from the soil. If salt spray from the road surface is a problem, use copious amounts of water to rinse the foliage and branches of any affected plants when salt spray is heavy and again in early spring.

During the summer, work to improve planting conditions. Incorporate large quantities of organic materials into salt damaged soil to enhance its texture and to increase its water and nutrient holding capacity. Plants that are already stressed by salt will do much better if no other stresses are added to them, so be sure that you properly fertilize, water, and otherwise care for them.

When selecting species for a new roadside planting, minimize the potential for salt damage by planting salt tolerant species such as white oak, honey locust, Norway maple, Scotch pine, red oak, junipers, roses, or asparagus. Avoid salt sensitive plants such as red pine, white pine, black walnut, red maple, and sugar maple. A low wall or a hedge of salt tolerant evergreens can deflect salt spray from sensitive plants nearby.

Remember the damage that salt can cause when removing ice from home walks and driveways. Instead of tossing a handful of rock salt on slick surfaces, stick with sand or sawdust to improve traction on slippery sidewalks.