



Managing Winter Injury to Trees and Shrubs

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Table of Contents

- [▶ Introduction](#)
- [▶ Desiccation](#)
- [▶ Freezing](#)
- [▶ Breakage](#)
- [▶ Planning Ahead to Avoid Damage](#)
- [▶ Treating Winter Injury](#)
- [▶ Rodent Damage](#)
- [▶ Road Salt Damage to Garden and Landscape Plants](#)

Introduction

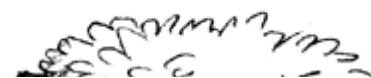
It is often necessary to provide extra attention to plants in the fall to help them over-winter and start spring in peak condition. Understanding certain principles and cultural practices will significantly reduce winter damage that can be divided into three categories: desiccation, freezing, and breakage.

Return to [Table of Contents](#)

Desiccation

Desiccation, or drying out, is a significant cause of damage, particularly on evergreens. Desiccation occurs when water leaves the plant faster than it is taken up. Several environmental factors can influence desiccation. 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 during periods of sunny, mild weather. The heat of the sun can cause stomates on the lower sides of the leaves to open, increasing transpiration. Injury due to desiccation is commonly seen as discolored, burned evergreen needles or leaves. It is worst on the side facing the wind. This can be particularly serious if plants are near a white house where the sun's rays reflect off the side, causing extra damage.

Management: Proper watering can be a critical factor in winterizing. If autumn rains have been insufficient, give plants



a deep soaking that will supply water to the entire root system before the ground freezes. This practice is especially important for evergreens. Watering when there are warm days during January, February, and March is also important.

Also, mulching is an important control for erosion and loss of water. A 2-inch layer of mulch will reduce water loss and help maintain uniform soil moisture around roots.

Antidesiccant compounds are sold in many garden centers and supply catalogs, although research has shown that these compounds degrade rapidly and are of little value to homeowners.

Although it is unattractive, small evergreens can be protected by using windbreaks made out of burlap, canvas, or similar materials. Windbreaks will help reduce the force of the wind and shade the plants. They can be created by attaching materials to a frame around a plant. A complete wrapping of straw or burlap is sometimes used. Black plastic should be avoided as a material for wrapping plants. During the day heat builds up inside, increasing the extreme fluctuation between day and night temperatures and speeding up growth of buds in the spring, making them more susceptible to a late frost. If plants require annual protection measures to this extent, move them to a more protected location or replace them with hardier specimens.

Frost heaving occurs when alternate freezing and thawing of the soil pushes small, shallow-rooted plants out of the ground. This prevents the plants from having firm contact with the soil and exposes the roots to wind desiccation.

Management: Mulch acts as a buffer to the soil. It reduces the amount of alternate freezing and thawing of the soil which causes frost heaving.

If a plant has been heaved from the ground, replant it 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 up the plant, retaining as much of the root system as possible within a soil ball, and replant it.

Return to [Table of Contents](#)

Freezing

Freezing injury can 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. Ice crystals rupture cell walls; this damage will show up as dead branch tips and branches.

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

A sharp temperature change between day and night may freeze the water within the trunk of a tree, causing it to explode or split open in a symptom called frost cracking. If not severe, these cracks seem to close when warm weather arrives, although the wood fibers within may not grow back together. This is sometimes called southwest injury because it is commonly found on the southwest side of shade trees where warm afternoon sun creates further extremes in the day and night temperatures. A similar phenomenon with many shrubs is called bark



split. Particularly susceptible are many cultivars of evergreen azaleas. In most cases plants close over the cracks adequately, with no treatment necessary.

Management: Avoid wounding trees when they are young.

Wrapping trunks with burlap strips or commercial tree wrap, painting white, or even shading with a board may prevent bark splitting. All of these methods reflect sunlight and reduce the buildup of heat during the day, thus reducing the temperature fluctuations that cause splitting. Any wraps should be removed, after one season, to prevent insect or moisture damage.

The sun can also prematurely stimulate the opening of flowers or leaf buds in the spring. Freezing night temperatures might kill these buds. 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 usually survive. Even with good management, injury to young growth or insufficiently hardened tissues may still occur as a result of unusual weather patterns. Little can be done to prevent injury in these instances.

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. Containerized or B&B plants should be placed in protected areas, sunk into the ground, grouped together, or heavily mulched to avoid low temperature injury to roots.

Rapid temperature changes can cause tree bark to split. This is known as frost cracking or southwest injury.

Return to [Table of Contents](#)

Breakage

Breakage of branches is usually related to snow and ice. Two causes of damage by snow and ice are weight and careless snow removal. High winds compound the damage done to ice-covered plants. Damage may take the form of misshapen plants, or may actually result in broken branches and split trunks.

Management: 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 that stimulates new, tender growth and reduces the supply of nutrients available to the plant through the winter.

Snow collecting on shrubs should be removed with a broom. Always sweep upward with the broom to lift snow off. When the branches are frozen and brittle, avoid disturbing them. Wait until a warmer day or until ice naturally melts away.

Return to [Table of Contents](#)

Planning Ahead to Avoid 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 native or are known to be winter hardy in your area. Avoid planting exotic species north of their plant hardiness zones unless unique microclimates in the landscape are such so as to guarantee winter survival.

Select an Appropriate Site

When planting broadleaf evergreens that are known to be easily injured, such as some varieties of rhododendron, azalea, camellia, daphne, and holly, 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 late spring frost injury to new flower growth.

Avoid Low Spots and Roof Overhangs

Avoid low spots that create frost pockets and sites that are likely to experience rapid fluctuations in temperature. Since heavy snow and ice can cause a lot of damage to branches and trunks, it is important that plants be placed away from house eaves and other areas where snow or ice is likely to collect and fall or slide onto the plants.

Promote Healthy Plants

Plants that are diseased or deficient in nutrients are more susceptible to winter injury than strong, healthy plants.



Bad branch angle. A narrow branching angle can be weak. Bark becomes included and the branch is weakly attached.



Good branch angle. A wider branch angle is conducive to a stronger branch attachment.

Return to [Table of Contents](#)

Treating Winter Injury

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.

After a particularly severe winter, many plants may show substantial injury. Damage symptoms include discolored, burned evergreen needles or leaves, dead branch tips and branches, heaved root systems, and broken branches. At winter's end, remove only those branches that are broken or so brown that they are obviously dead. Do not remove branches when scraping the outer bark reveals a green layer underneath. 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 to the branch collar of the nearest live branch.

If 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 too severely injured. Damaged leaves may drop or be removed. Prune to remove badly damaged or broken branches, to shape the plant, and to stimulate new growth.

An application of fertilizer to the soil around winter-damaged plants, accompanied by adequate watering, will usually

induce new growth to compensate for winter 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, as the plants are weak and often unable to survive the stress of drought. Be sure to water adequately.

Return to [Table of Contents](#)

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, placing poison bait in their runways controls mice. 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.

Tree wraps 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. Some commercial fruit tree growers use a repellent wash recommended by the USDA, containing equal parts of fish oil, concentrated lime sulfur, and water. Also, rabbit repellents under various trade names are available. All these materials may be applied with a paintbrush to the trunk of the tree from the ground up into the scaffold limbs.

Return to [Table of Contents](#)

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 that not only directly injure the plants but also 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, 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.

Return to [Table of Contents](#)

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