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## Winter Injury in Evergreen Trees

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As trees begin to leaf out in the spring, homeowners are often perplexed by the appearance of dead, reddish-brown foliage on their evergreen trees (pine, spruce, fir, juniper, redcedar, arborvitae). The extent of the symptoms can vary from needle tips to one or two branches to the whole tree. Homeowners often look for a recent cause for this problem, but the death of the foliage actually occurred during the previous fall or winter. Winter desiccation and damage from an early fall freeze are two major causes of winter injury to evergreen trees.

### Winter Desiccation

Winter desiccation is a common type of winter injury that occurs when the amount of water lost by the foliage exceeds the amount picked up by the roots. Warm, sunny days increase water loss from needles. If the soil is frozen or is low in moisture due to previous drought, roots are unable to pick up enough water to meet the demands of the needles. Needles dry out and die, but they may hold their green color until warmer temperatures arrive in spring, thus delaying the browning symptoms. Often the pattern of needle browning is directional, on one side of the tree more than the other. Wind accompanying dry periods can accelerate water loss from needles, and needle death is more extensive on the side of the tree facing the prevailing wind. Other common terms for this type of injury are winter burn, winter drying or winter scorch.

Another factor that can contribute to a directional pattern of browning is solar radiation reflected from building surfaces such as brick, concrete or light-colored metal siding. Ornamental junipers and arborvitae located around buildings are quite prone to this type of injury. This is especially common on the south and west sides of buildings. Other factors that can predispose evergreen trees to winter desiccation are: 1) white or lava rock around the base of the tree; 2) poorly developed root systems due to improper planting; 3) stress due to insects or disease; and 4) tree genetics, i.e., trees from a southern United States source.

The key to preventing winter desiccation in evergreen trees is to maintain adequate soil moisture beginning in the summer and continuing through the winter. One of the best ways to accomplish this is by mulching a 3- to 6-foot diameter area around the base of the tree with an organic material like coarse

wood chips. Trees also should be kept adequately watered during dry periods in the summer and fall. A tree that has suffered from drought conditions at any time during the year will not be able to withstand dry winter conditions as well as a tree that has consistently received adequate moisture. Many people put their water hoses away for the winter, but periodic watering of trees during the winter at times when the ground is not frozen can be very beneficial.

### **Damage from an Early Fall Freeze**

Brown foliage on evergreens also can be caused by extreme changes in temperature at the end of the growing season. Two recent weather events, the "Halloween freeze" of 1991 and the October snow storm of 1997, witnessed record temperature drops over a 24- to 48-hour period that resulted in needles turning brown several days later. In these situations, the needles were still actively functioning when the temperature suddenly dropped to well below freezing, causing their death. When warmer temperatures returned, the needles turned brown.

Generally, winter desiccation and freeze damage affects only the needles. Buds and branches are usually well enough protected. In most cases new needles emerge from buds the following spring. Homeowners should wait until after new foliage has emerged to appraise the overall condition of the tree.

### **Other Causes of Browning**

In rural areas, landowners sometimes notice the browning of entire trees in their windbreaks. This is most common in cedar or juniper windbreaks between the ages of 5 and 15 years. The damage is usually caused by rodent activity. During the winter, field mice or voles often nest in and around evergreen trees if suitable habitat (weedy growth, crop residue) is available. The animals feed on the bark tissue on stems and branches, which girdles the tree. With the bark removed, water cannot be delivered to the foliage, so the tree dies.

Harsh winter conditions can also predispose trees to attack by cedar bark beetles, especially trees already weakened by drought, insects, poorly developed root systems or other stresses. The winter of 1996-97 experienced extreme temperature fluctuations with prolonged periods of dry weather. Many trees in the spring were attacked by the bark beetles. Healthy cedar trees are usually not attacked by the insects; only when the trees become stressed are they susceptible. Properly managed windbreaks that have adequate weed control when young and are thinned if necessary as they grow older generally stay healthier and have fewer stress-related problems.

Browning caused by winter desiccation or freeze damage should not be confused with natural needle loss or needle disease. Natural needle loss occurs in the fall and is characterized by older needles in the interior of the tree turning yellow to brown. These needles are loosely attached to the branch and dislodge very easily when touched. Winter desiccation and sudden temperature drops usually affect newer growth more than the older. Several diseases can cause needles to turn brown also, but the browning is typically accompanied by spots or bands on the needles.

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