

Protecting Plants from Winter Injury

By Bruce Wenning

Wednesday, January 3, 1007

Trees and shrubs, whether native or naturalized to our region (zone 6; -10 to 0F), can succumb to cold temperature injury if the natural dormancy or hardening-off process is incomplete. Mild fall and winter temperatures, where day and night temperatures do not go below 35 F for extended periods of time, contribute to incomplete plant dormancy.

When woody plants in this condition are subjected to a sudden large drop in temperature, injury or even death of plants or plant parts can occur. This phenomenon is usually called winter kill. You can limit the damage or even prevent this from happening if you take protective action now.

This is how plants protect themselves from freezing. Generally, from late August to mid- December light levels and air temperatures gradually decrease, inducing hormonal changes in plant cells to enable them to adapt to the oncoming freezing winter temperatures. Plant growth slows down considerably and the cells of different plant parts reduce their water content by osmotic pressure; water inside the cell travels to the outside of the cell and between all cells. The cellular contents left inside cells become more concentrated allowing the reduction of ice crystal formation (supercooling).

This supercooling process protects plants from being killed at freezing temperatures. Water outside of cells freeze, but contents inside the cell, including traces of remaining water, do not freeze. This remarkable environmental adaptation ensures that plant cells won't burst from ice crystal formation.

Sometimes certain plant species, both woody and herbaceous, contain specific plant pathogenic bacteria in their cells that act as ice nuclei for ice crystal formation. For example, the bacterial plant pathogen, *Pseudomonas syringae*, is a gram-negative, rod-shaped bacterium that kills infected plant tissues. The black-brown colored twig tips of Japanese red maple that you see in spring may be a direct result of this bacterial-induced cold injury.

Winter winds also cause winter injury to plants. The action of drying, cold wind on evergreen foliage draws water out of the leaf stomates faster than the plant can replace water from the roots. Newly transplanted trees and shrubs, young seedlings, broad-leaved evergreens (such as rhododendrons, boxwoods, mountain laurels, and hollies) are especially vulnerable. Even the needle-leaved evergreens such as pines, hemlocks, spruce and firs can be affected. The cold wind dries out leaf tissues and partially or completely kills them. Rhododendron and boxwood leaves in spring may show leaf margin browning or completely brown leaves.

Here's how to protect your trees and shrubs from cold and drying.

1. Water the roots of all woody plants until the first hard freeze, one inch per week.
2. After the soil freezes, mulch the roots of small trees, shrubs, and newly planted and transplanted trees and shrubs with salt marsh hay or leaves. Apply at least three to four inches of mulch around the roots. This will moderate the freezing and thawing action (frost heaving) in the root zone and help to conserve soil moisture.
3. Wrap evergreens with burlap. This will help reduce the wind speed on the foliage. Better yet, put four wooden stakes around each small tree and shrub that you want to protect and tie burlap to the stakes forming a "room". Fill this room or enclosure to the top with leaves. The protected plant should be a minimum of six inches from the burlap.
4. If you don't want to wrap your plants you can apply anti-desiccant or anti-transpirant products to the evergreen foliage, particularly for plants in exposed sites and new plantings. According to Brian Hanson, Plant Health Care Manager, Cedar Lawn Tree Service, these compounds are primarily used on the foliage of evergreens, especially the broadleaf evergreens, to reduce transpiration water loss that naturally occurs through the stomata in plant tissues. A possible side benefit for some plants is better foliage color retention. Hanson suggests several applications in late fall and winter depending on weather conditions. Unfortunately, these products provide only limited protection from cold temperature injury.

Bruce Wenning is on the Board of Directors of the Ecological Landscaping Association. www.ecolandscaping.org.