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Landscape Health Update: Cold Snap Lingering Effects

The sudden, dramatic temperature drop in early November 2014 will have lingering impacts on trees along the front range of Colorado. Through early and mid-fall, warm temperatures persisted, in some cases setting record highs for that date such as (81-degrees F on October 24). Wild fluctuations preceded the deep freeze in the days leading up to the event, with daytime highs hovering around 60 and nighttime temps in the lower 30's.

In preparation for winter, plants undergo a two-stage process: dormancy and chilling. This cold hardening enables woody plants to withstand winter weather. As day length shortens, deciduous woody plants undergo a process called resorbing, which converts leaf starch, proteins, and other complex molecules into soluble molecules, such as sugars and amino acids, and moves them into storage cells. These storage cells are in the inner bark of twigs, the outer sapwood of the main stem and in root tissues. In spring, the stored nutrients are remobilized and used for the flush of new leaves and burst of growth in other tissues.

Once resorption is complete, woody plants form an abscission layer between the branch and the leaf petiole. This abscission layer closes off pathways into the leaf, protecting the plant from drying out or invading diseases, and allowing the leaf to fall. Gradually freezing temperatures ensure the plant is cold hardy for the remainder of winter.

On November 10, the high was 58F at 8 am, by 11 pm that day the temperatures had dropped to 16F. Due to the warm, lengthy fall, trees and shrubs had not completed hardening off for winter. When our freeze hit, many plants such as elms, callery pears, and oaks had not completed the hardening off process. Many conifers and deciduous trees and shrubs showed freeze damage immediately with straw-colored needles or flash-frozen leaves. Buds and shoots suffered freeze injury that in some cases resulted in death of buds or the entire plant, however, long-term impact on these buds won't be seen until spring.

Leaves left on trees from the rapid temperature change are known as a "marcescent" fall, defined as "to wither without falling off". There are two types of marcescence, one type occurs naturally on trees such as English Oak, hazelnuts and beech. The other type, which is what happened to some of the Front Range trees, occurs when temperatures plummet before the abscission layer has formed, killing the leaves but leaving them attached to the tree. Marcescence does not directly harm the tree, but if there is a snowfall while the leaves still cling to the tree, marcescence creates a high risk of limb breakage from snow being held by the leaves. Winds eventually will remove the leaves.

Conifers showed damage immediately. While yellow or brown needles with some green where the needles attach to the branch, are a hallmark of winter damage to pines, symptoms from the intense cold are needle scorching, with tips turning white, gray, silver or straw-colored leaving green fascicles near the branch. Twig dieback can also occur. The freeze burned needles will not green up, but new needles will mask the damaged ones. If you are concerned about the evergreen's health, gently press a bud, found on the tips of the twigs and branches, between your thumb and first couple fingers. If the bud feels soft, it is alive and will produce new growth the following spring. If the bud is dry and brittle, it is dead. Check in several places around the plant as not all buds may have been killed.

Monitor your trees this winter and next spring for sign of damage. Look for black, shriveled shoots or buds. Winter watering may help, but care of the trees in the spring will depend on how much freeze damage the trees have sustained. Additional fertilizer in the spring is not recommended. Conifers may grow out of the damage with new growth masking the frozen needles. Deciduous trees may need judicious pruning to remove the dead twigs and branches.