WASHINGTON STATE UNIVERSITY EXTENSION

ENVIRONMENTAL INJURY: SUNSCALD AND SUNBURN ON TREES

Home Garden Series

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Environmental Injury: Sunscald and Sunburn on Trees

The symptoms of sunscald and sunburn are similar as both injure the cambium (the living cells in a tree just under the bark that give rise to the annual growth ring). Both are due to damaging temperatures, but sunscald is low-temperature damage and sunburn is high-temperature damage.

Symptoms of Sunscald

Sunscald is characterized by an elongated area of dead bark typically found on the south or southwest side of tree trunks, branches, or both (Figure 1). The area may be sunken with dried, cracked bark that peels off to expose dead wood (Figure 2). Sunscald is also called southwest winter injury because it is commonly found on that side of the tree.

Recently planted trees, young trees, and trees with thin bark are more susceptible to sunscald. Deciduous trees are more prone to sunscald damage than evergreen trees because evergreens usually have lower branches to shade the trunk. Susceptible species include maple, linden, mountain-ash, honeylocust, birch, walnut, crabapple, flowering cherry, fruit trees, aspen, ash, tuliptree, Japanese snow-bell, and willow.

Figure 1. Dead, peeling bark is a symptom of sunscald. (Photo by Steven Katovich, USDA Forest Service, Bugwood.org.)

Figure 2. Symptoms of sunscald also include a sunken area on the trunk with dried, cracked, peeling bark or exposed dead wood. (Photo by Rita Hummel)

Cause of Sunscald

Sunscald happens during cold winter weather and is caused by sudden temperature changes of the bark. On a sunny, cold winter day, cold hardy tissues in the bark on the south to southwest side of the trunk are exposed to direct sunlight and warm up. The warmed bark deacclimates, decreasing its ability to withstand freezing temperatures. When the sun goes down or behind a cloud, the temperature of the bark drops quickly to below freezing and the bark tissues are unable to reacclimate or regain cold hardiness quickly enough to withstand freezing. Living bark tissues are damaged by the freezing temperature, which leads to sunscald injury (Figure 3). For more information on freezing damage, see the WSU Extension Home Garden Series on *Cold Temperature Injury of Landscape Woody Ornamentals.*

Research has shown significant differences in the temperature of the cambium on the north and south sides of trees. One study of fruit trees in New Hampshire during the winter revealed temperature differences of 50 to 55°F between the north and south side of peach trees and 30 to 35°F between the north and south side of apple trees (Eggert 1944).

Figure 3. Note the exposed area of cambium beneath the bark. The darkened tissue on the right is cambium that has been killed by sunscald. (Photo by Joseph OBrien, USDA Forest Service, Bugwood.org.)

In these experiments, the temperature of peach cambium on the south side of the trunk reached 86°F in early March when the air temperature was 31.5°F. In just three minutes, Harvey (1923) recorded an 18°F rise in the cambial temperature of plum with the passing of a cloud. Sunscald damage is usually greater in winters with rapid and wide temperature fluctuations (Litzow and Pellett 1983).

Sudden exposure to full sun, such as moving a tree from a shaded to a sunny location, pruning the lower branches, or removing another tree or structure that was shading the trunk, can expose bark to sunscald damage (Figure 4).

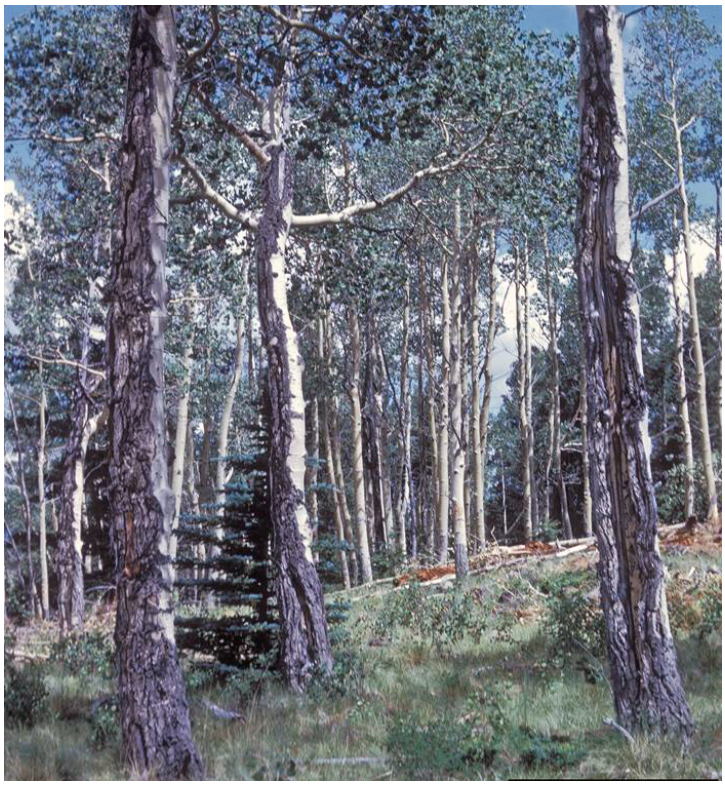

Figure 4. Sudden exposure to full sun when bark was previously shaded can result in sunscald damage. Note the sunscald on the bark of these aspen after removal of some of the trees exposed the trunks to sunlight. (Photo by Thomas E. Hinds, USDA Forest Service, Bugwood.org.)

Symptoms of Sunburn

Sunburn produces damage similar to sunscald and typically occurs on the south or southwest side of tree trunks, branches, or both (Figure 5). Sunburn on trees may not be immediately evident. It can take months before the damage is noted. The bark will first become discolored, sometimes a reddish-brown, and later dries out. With time, the damaged tissues dry out more and the bark becomes obviously cracked and starts peeling.

Cause of Sunburn

Sunburn is damage to the cambium caused by exposure of the trunk to solar radiation and high temperatures. It typically occurs when tree trunks that are acclimated to lower light intensities, either from shading or growing in regions with less sunlight, are suddenly exposed to intense radiation via direct sunlight.

Figure 5. Sunburn on the south or southwest side of a tree is the result of exposure to intense solar radiation or high temperatures. In some areas, the trunks of young trees, especially trees with dark or thin bark, are painted white to reflect light and avoid sunburn. (Photo by Gerald Holmes, California Polytechnic State University at San Luis Obispo, Bugwood.org.)

Sunburn occurs during the extreme heat of summer weather. Typically, sunburn occurs on the side of young trees that is exposed to high light intensities, usually the south to southwest sides. Young trees with thin bark, such as fruit trees, maple, ash, crabapple, flowering cherry, and mountain ash, are more susceptible to sunburn. Drought stress also increases the likelihood and severity of sunburn.

In arid regions with hot, sunny summers, sunburn to the trunks of young trees is not uncommon. The best time to plant trees in the landscape is when they are fully dormant, as in late winter and very early spring or in the fall after leaf drop. Unfortunately, many landscapes are planted during the heat of late spring or summer. Trees grown in nurseries where close spacing provided shading of their trunks and trees grown in areas with much lower light intensities are prime candidates for sunburn when planted in some regions of central and eastern Washington where light intensity is very high.

Treatment of Sunscald and Sunburn

Although sunscald is a low-temperature injury that occurs in winter and sunburn is a high-temperature injury that occurs in summer, the same living tissues in the tree trunk and branches are damaged and the treatment is similar for both injuries. Depending on the severity of the damage and the tree's overall health, a tree may seal or callus over the damaged area within several years. The callus closes over the wound, helping to limit the introduction of disease organisms and insects through the open wound.

To aid in callus development, carefully remove any dead or loose bark from the wound. This will eliminate hiding places for insects and improve the appearance of the wound. By no means should the area ever be treated with a wound dressing or paint. Research has indicated that there is no value in using these materials to bandage a tree wound, and they can make the problem worse.

What are the implications of bark sunscald or sunburn on the health of a tree? Eventually the dead bark and cambium tissue will loosen and peel away from the underlying wood. Also, wood-boring insects, canker disease fungi, or wood decay fungi often invade the damaged areas (Figure 6). These may also progress into undamaged bark and wood tissues, especially if the tree is not healthy and vigorous.

The best way to treat a tree already affected by sunburn or sunscald is to keep the tree as healthy and vigorous as possible with proper irrigation, especially during the hot and dry part of summer. Fertilizer should only be applied if soil tests indicate it is needed.

Figure 6. Trees with bark damaged by sunscald or sunburn are prone to infestation from wood-boring insects, canker disease fungi, and wood decay fungi. These pests often progress from damaged areas into undamaged tissues. (Photo by Joseph OBrien, USDA Forest Service, Bugwood.org.)

Prevention of Sunscald

Because sunscald is caused by direct sunlight heating the bark, prevention methods involve protecting the bark from the sun. Techniques to shade the bark include leaving lower branches on the young tree trunks for a few years after transplanting to shade the bark and nourish the trunk as the tree becomes established in the landscape (Harris et al. 2004). If possible, plant susceptible trees where they will be shaded by buildings, solid fences, or evergreens. Consider placing a light-colored, upright board on the southwest side of the tree near the trunk to provide shade during the critical time of year.

Figure 7. Commercial white or light colored tree trunk wraps reflect sunlight and prevent sunscald. (Photo by Ray Maleike, Ph.D., WSU Extension Horticulturist, Emeritus)

Light-colored or white tree wraps reflect light and can help prevent sunscald injury by keeping the bark temperatures lower (Litzow and Pellett 1983). The wraps should be applied in late fall and must be removed as soon as possible in spring after the possibility of hard frost has passed (Figure 7). If not removed, the wraps can become a harbor for insects and diseases and can constrict tree growth in diameter.

Painting exposed trunks and lower limbs with a good quality exterior white latex paint is used in fruit tree orchards to reflect sunlight and prevent sunscald.

Eggert (1944) painted apple and peach trunks white and recorded temperatures on the south side of both painted and unpainted trees. At no time were the temperatures of the painted trunks more than 10°F higher than the air temperature, but the temperature on the south side of unpainted trunks was 30 to 50°F higher than the air temperature. However, white paint may be objectionable in the landscape because it can be considered unsightly.

In a transplant study, researchers examined sunscald on 120 seven-year-old Emerald Queen Norway maples and 45 five-year-old ‘Greenspire’ littleleaf lindens in Milwaukee, Wisconsin. The study concluded that “the answer to minimizing sunscald injury may be as simple as the timely watering of newly planted trees” (Roppolo and Miller 2001).

Prevention of Sunburn

Preventing sunburn also involves protecting the bark from the sun using the same techniques as employed for preventing sunscald. If trunk wraps are used during the summer for sunburn prevention, they should be light colored and loose fitting, allowing air movement and preventing a buildup of moisture. Check the wraps often to make sure they are not constricting the trunk or harboring pests.

If at all possible, avoid planting trees in the heat of summer. This can lead to extreme transplant stress, especially to trees planted in parking lots or surrounded by pavement and buildings. These trees are very likely to develop sunburned bark.

It is advisable to mulch around the base of the trees with coarse organic materials, like wood chips or shredded bark, to moderate the temperature of the soil and help retain soil moisture (Chalker-Scott 2007). In the warmer areas of the state, refrain from using reflective rock mulches that may hold and radiate heat back to the tree. It is important to remember that Washington State has a Mediterranean climate with wet winters and dry summers, so be sure to water your trees as needed.

Additional Resources

Cox, R. 2010. Winter Weather Brings Sunscald to Trees.

Hummel, R. L. and M. C. Ophardt. 2016. Environmental Injury: Cold Temperature Injury of Landscape Woody Ornamentals. *Washington State University Extension Publication* FS196E.

Swanson, B.T. and R. Rideout. 2013. Protecting Trees and Shrubs Against Winter Damage.

Wagner, K. and M. Kuhns. 2011. Sunscald Injury or Southwest Winter Injury on Deciduous Trees.

References

Chalker-Scott, L. 2007. Impact of Mulches on Landscape Plants and the Environment—A Review. *Journal of Environmental Horticulture* 25(4): 239-249.

Eggert, R. 1944. Cambium Temperatures of Peach and Apple Trees in Winter. Proceedings of the American Society for Horticultural Science. 45: 33-36.

Harris, R.W., J.R. Clark, and N.P. Matheny. 2004. Arboriculture: Integrated Management of Landscape Trees, Shrubs, and Vines. 4th edition. Prentice Hall, Upper Saddle River, New Jersey.

Harvey, R.B. 1923. Cambial Temperatures of Trees in Winter and Their Relation to Sun Scald. *Ecology*. 4(3): 261-265.

Litzow, M. and H. Pellett. 1983. Materials for Potential Use in Sunscald Prevention. *Journal of Arboriculture* 9(2): 35-38.

Roppolo, D.J. Jr. and R.W. Miller. 2001. Factors Predisposing Urban Trees to Sunscald. *Journal of Arboriculture* 27(5): 246-254.

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