

The Cold Facts About Winter



Any stress during the growing season can predispose a perennial plant to winter damage. Winter damage, however, does not always show up as direct injury. Freezing temperatures, that are not sufficient to kill, can cause a plant to be predisposed to other problems such as bacterial blight, phytophthora root rot, and several other pest problems.

Start to think early on about minimizing stock losses due to winter injury. The best way to prevent winter injury is to ensure maximum acclimation by optimizing growing conditions during the growing season and minimizing stressful conditions. Supplying adequate moisture and balanced nutrition are essential.

Choose winter-hardy plants that are well adapted to your growing region. Many trees, particularly fruit trees, are sold as grafted plants, as opposed to trees grown from seed. In cold sensitive areas make sure that the rootstock used for the graft is from a hardy source, such as Columbia crab-apple, Manchurian apricot, or native plum.

Moisture

Moisture can have a considerable effect on hardiness. If moisture is withheld during the summer, hardiness is increased as a result of stopping growth. In the interior of BC, you should water less frequently beginning in early August and stop watering by the third week of August. Prolonged droughts in summer, however, should be avoided. Make sure your shrubs and trees receive supplemental watering during periods of summer drought. If rains are sparse in September and October, thoroughly soak the root zone after the leaves have fallen and just before freeze-up. This is called “watering-in” and will help to avoid root damage.

Nutrition

When you buy fertilizer, note the three numbers on the front of the bag. These numbers represent the percent of Nitrogen (N), Phosphorus (P), and Potassium (K) found in the bag. Fertilizer with a large content of Nitrogen applied too late in the growing season will generally reduce hardiness, while potassium and phosphorus tend to increase hardiness. In the interior of BC, all nitrogen application should be withheld from mid-July on. On the coast of BC, do not apply nitrogen after August 15. Nitrogen stimulates growth, thereby reducing the cold hardiness in a woody plant when applied late in the growing season.

Nursery FACTSHEET



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Nitrogen can, however, improve hardiness when applied after bud set. Potassium and phosphorus can assist in growth cessation and bud development and thus can be applied much later in the growing season than can nitrogen. When making fertilizer applications, always ensure adequate availability of moisture for uptake of the nutrients. To fertilize a large tree, drill holes around the circumference of the tree at the same distance out as the spread of the branches.

A well grown plant in good health, not weakened by insects, disease or excessive fertilization, will survive cold stress better than a plant in poor condition. Sometimes, however, despite our best efforts, winter injury still happens. Listed below are eight specific types of winter injury and what can be done to prevent them.

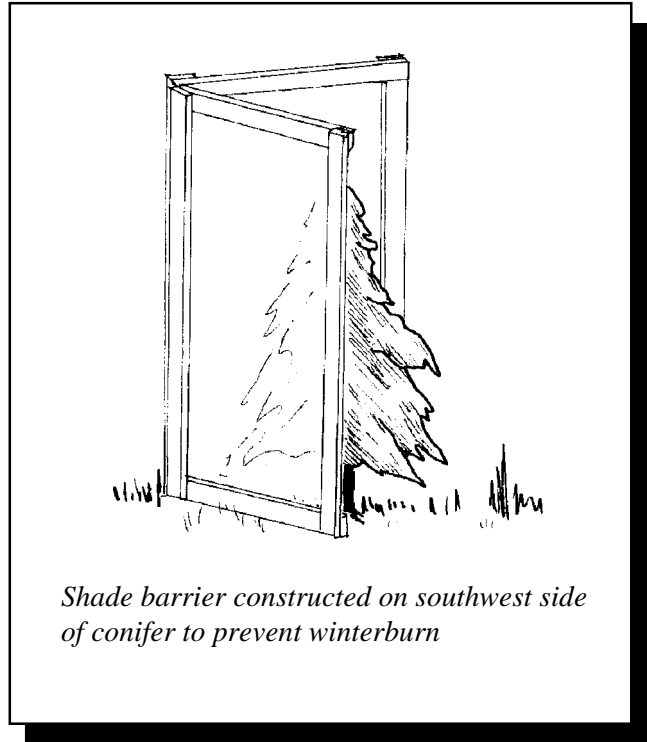
Eight Types of Winter Injury

1) Sunscald or Southwest (SW) Injury:

This type of injury is common on southwest exposures of thin barked trees. Sunny days with below freezing temperatures result in the greatest damage. The southwest side heats up, absorbing the heat of the sun. When the sun sets, or goes behind a cloud, there is a sudden freezing in the heated up tissue. This rapid freezing and thawing is often aggravated by snow cover, resulting in a reflection off the snow surface, and more extensive heating on the southwest side.

Sunscald results in death of the exposed bark. The area subsequently dries out and dies, causing a large open wound on the southwest side of the tree. Years of repeated southwest injury will weaken the trunk of the tree significantly making it susceptible to breakage.

To protect a tree from sunscald, shade the southwest side of the main trunk and large branches. This can be done by using plastic trunk guards on young trees, by wrapping with burlap or water-resistant paper, by allowing low branches to develop on the southwest side, by erecting a shading barrier and even by painting with latex paint to reflect the sun's rays.

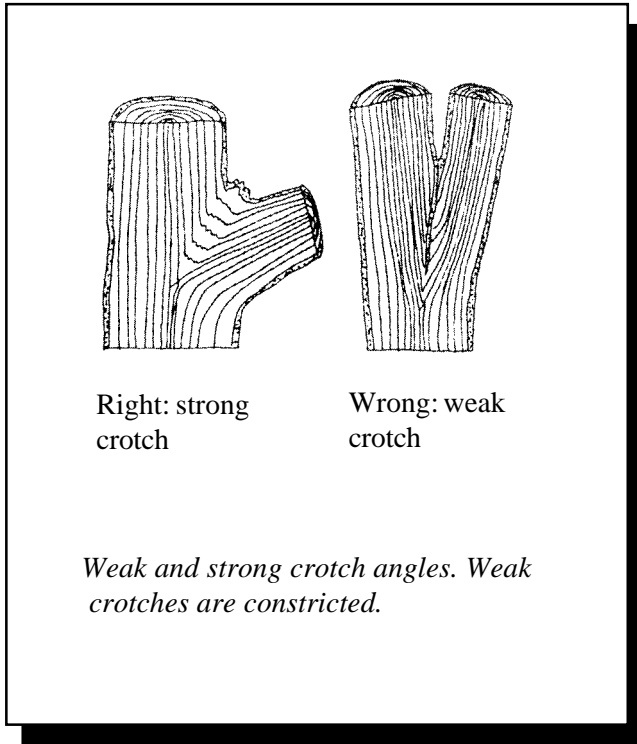


Shade barrier constructed on southwest side of conifer to prevent winterburn

2) Crotch Injury:

The areas within narrow crotch angles are constricted. Thus, the flow of nutrients into these areas is prevented. The wood in these regions is, therefore, poorly fed, last to harden off, and low in hardiness potential. Crotch injury results in a weakening of the union with the main stem. The injured areas become points for frost cracks, and eventual death of branches.

To avoid crotch injury, prune out branches with narrow crotch angles. If a particular tree is prone to narrow crotches, spreaders can be used to increase the branching angles.



Trunk, collar and root injury are often more common on young trees growing in exposed areas and on light gravel soils.

Compared with shoots, roots have relatively high moisture content. Therefore, roots are less hardy than shoots and may need extra over-wintering protection. You can add extra protection to the roots by providing a thick cover of mulch.

Organic mulches are of value in the event of a severe winter with little or no snow cover. Rodents, however, can be a problem over the winter when organic mulches are used. Mice like to overwinter under straw piled around trees, and if the trunk is not protected with screen or plastic trunk guards, the mice will thrive on a winter diet of tree bark. Mice kill trees by girdling them. Trunk guards are very effective protection against mice and must be used if organic mulches are left around the trees over winter.

3) Bark Splitting:

Bark splitting is common on thin-barked trees. It results from very cold temperatures on sunny days and is often associated with southwest injury. A longitudinal crack occurs on the bark of the tree. It may also split the sapwood causing an area of the trunk to dry out and form an awl-shaped scar in the wood. Bark splitting develops under the same conditions as sunscald and can be prevented in the same ways.

4) Trunk, Collar and Root Injury:

The collar is that portion of the plant where the trunk enters the soil. This region is often the last to harden off in the fall and thus, is susceptible to early freezes.

Collar and root injury are greater in areas where there is no cover crop, allowing for greater frost penetration into the soil. In situations where there are severe winds, injury can extend into the trunk. Injury symptoms do not appear until the following summer.

Be wary of winter injury in container plants that have been overwintered without adequate protection of the roots. Trees and shrubs with winter injury to the roots may leaf out, but will wilt and dry up later in the summer. Common winter injury problems found in poorly overwintered container stock are bark splitting, root kill, collar injury and winterburn.

5) Winterburn

Winterburn occurs on evergreens or conifers where snow has reflected sunlight onto the foliage. The area above the snow line turns brown, because it dried out. The cause and type of injury are similar to that found in southwest injury. Often injured trees will flush new growth in the spring, and show little evidence of injury in subsequent years.

To avoid winterburn, wrap conifers with burlap or water-resistant paper or erect a shading barrier on the southwest side of the tree. Do not use treated burlap. "Watering-in" as discussed on page one, will help as well.

6) *Dieback*

Dieback occurs in late winter or early spring, at bud-break. If the injury occurs before bud-break, the tips shrivel and fail to leaf out. The late winter injury is due to late growth which did not have time to harden off properly in the fall.

Both late winter and early spring dieback result in an evenly distributed browning over the crown of the tree. To avoid dieback, do not apply excessive nitrogen or water too late in the growing season. “Watering-in” is particularly helpful in avoiding dieback in trees that are prone to this type of injury such as Birch.

7) *Blackheart*

Blackheart occurs when very cold temperatures occur early in the winter, before the plant has had an opportunity to harden off.

The tissue most commonly damaged is late growth. The injury results in death of the center of the branch or trunk. The bark and cambium generally remain alive. The dead crown will eventually split and internal decay will occur in the trunk. To protect against blackheart, avoid late season applications of nitrogen and water.

8) *Bud Injury*

Freezing temperatures on calm nights in early spring will generally result in bud injury. You will often be able to determine where the snow line was or where thermal inversions occurred. The flower buds are usually the most severely affected as they are the least tolerant of fluctuating temperatures. In bud injury, the cambium may be injured and twig death will result. There is little that can be done to avoid bud injury when conditions are right for it to occur. Selecting cold hardy plant material for your area is the only insurance against this type of injury.

