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AG FACTS

WINTER INJURIES TO TREES AND SHRUBS IN MICHIGAN

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Despite winter dormancy, many trees and shrubs can suffer extensive injury over the winter months. Severe weather conditions may be partially responsible, but other important factors, such as plant hardiness, vigor, tissue moisture, soil moisture, drainage, and location also determine how the plant will respond to unfavorable weather. Once injured, plants can become unsightly and susceptible to disease, and they are, of course, expensive to replace. Fortunately, many forms of winter injury can be prevented or reduced with proper maintenance during the growing season. A vigorous, healthy plant is the best insurance against winter injury.

Fig. 1. The needles on the Scots pine were killed by low temperatures. The buds survived to produce new growth so there is not permanent injury.

Types of winter injury in Michigan and preventive measures.

1. **Low Temperature Injury**. Prolonged periods of near zero or sub-zero temperatures can be injurious (fig. 1), particularly to fruit trees such as peach, apricot, cherry and nectarine. Buds, twigs and entire branches of non-vigorous trees and shrubs may be killed by low temperatures. The failure of a tree or shrub such as forsythia to bloom (fig. 2) or the initiation of growth by fruit or other trees followed by sudden wilt and collapse, could be due to cold temperature injury. Plants entering winter lacking adequate soil and tissue moisture or with low food reserves are very susceptible to low temperature injury. Pruning at the wrong time or defoliation during the growing season can also increase susceptibility to low temperature injury.

To avoid low temperature injury, plant hardy varieties. Exotic plants (plants not native to an area) may lack hardiness, hence homeowners and landscapers are cautioned to check the hardiness of new plant types before using them in the landscape. By doing so many problems may be avoided. Also maintain plants in the best possible vigor with yearly fertilization, adequate water and mulch. Once low temperature injury has occurred it cannot be reversed.

2. **Desiccation Injury.** Yellowing, browning and purple discoloration[1] of evergreens in the winter or early spring is usually the result of desiccation injury (fig. 3). Desiccation is caused when winter winds rob the needles and leaves of moisture at a time when soil is frozen and water is unavailable to replenish the moisture. Broadleaved evergreens such as rhododendron, boxwood, holly and some species of euonymus and barberry are even more susceptible to desiccation injury than the needle-bearing evergreens. Beige to brown leaf margins[2] and curled leaves are symptoms of injury. Preferably, plant broadleaved evergreens in a location protected from north and west winds, or wrap them in canvas or burlap. Some protection of foliage is also given by applications of chemical anti-transpirants (fig. 4). These compounds are usually applied as a foliar spray to prevent moisture loss when temperatures are above 32 F. The best preventive measures, however, begin in the summer. Deep water plants whenever rainfall is less than one inch per week. A mulch of leaves, wood chips or similar material around the base of the plant will prevent rapid moisture loss from the soil. A winter mulch will also prevent deep freezing of the soil and allow roots to draw on any moisture present.

Photo courtesy: H. Davidson

Fig. 2. Blossoms in the lower portion of these forsythia bushes show how deep the snow was. All the blossom buds in the upper portion were killed by extreme cold while those below were protected by snow cover.

[1] Yellowing, browning and purple discoloration may be normal in some species in fall or spring. Familiarity with the species is necessary to avoid concern over a natural phenomenon.

[2] Do not confuse this injury with sulfur dioxide (SO_2) injury which can occur in areas near high sulfur fuel burning facilities.

Photo courtesy: H. Davidson

Fig. 3. The green portions of these Taxus were insulated by snow cover. The tops were exposed and died due to desiccation by winter winds.

Fig. 4. The effectiveness of an antitranspirant compound is dramatically shown here. The middle tree was sprayed with the compound while the outside trees, which exhibit winter dessication, were not.

3. **Frost Crack**. During sunny winter days the south side of a deciduous tree trunk is warmed and the tissues expand. The rapid temperature drop following sunset allows the bark to cool and contract faster than the wood beneath causing the bark to split (fig. 5). Repeated heating and cooling in this manner can cause the trunk to split open. The wound will usually heal over with the coming of spring, but the damage has already been done via wood decay and canker-causing fungi which may have entered these wounds. Chances are the crack will reopen each winter unless the tree is shaded (fig. 6) or the sun deflected from the south side of the tree. Barriers such as fences, hedges, or shrubs will work, as will physical trunk protection in the form of a coat of whitewash, burlap, paper tree wrapping or a board tied to the trunk. If shrubs, trees or a fence have recently been removed from the south side of a tree due to landscape changes, some trunk protection is essential until the tree can adapt to its new situation.

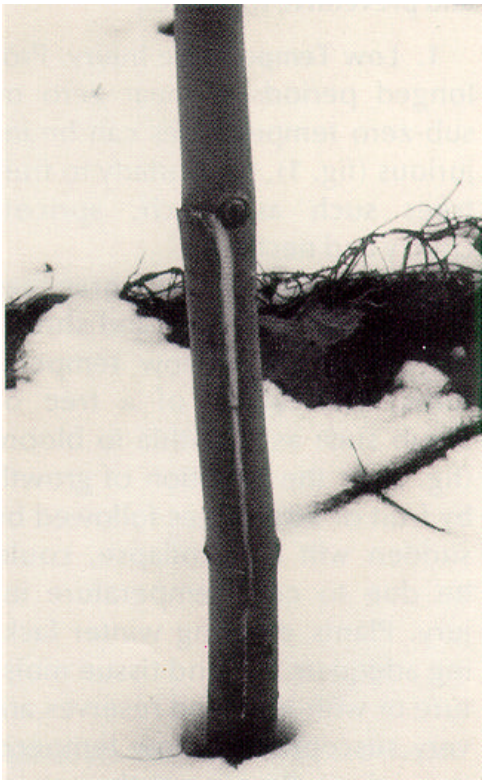

Photo courtesy: H. Davidson

Fig. 5. The crack at the base of this tree is caused by the expansion and contraction phenomenon discussed under "frost crack" in section 3.

Fig. 6. Some trees frost crack annually in the same area, developing a crack zone.

4. **Rodent Girdling.** Mice, rabbits and other rodents will use bark and cambium (the cell layer between bark and wood from which these tissues are produced) tissues as food when their usual forage is unavailable. Damage can be especially severe during prolonged snow cover. Large patches of bark may be gnawed off (fig. 7 and fig. 8) either above (rabbits and squirrels) or below (mice) (fig. 9) the snow line. The tree becomes non-functional wherever bark and cambium are removed (girdling); however, due to large food reserves, the tree may appear to function quite normally for several months and then suddenly die. Once girdling has occurred, bridge grafting is the only method of repair.

Photo courtesy: H. Davidson

Fig. 7. This young crabapple has been completely debarked by rabbits searching for winter forage. The white spots are rodent repellent – a case of too little, too late.

Fig. 8. This is rabbit-caused injury, as indicated by size of the teeth marks. Mice make very small grooves.

Rodent damage can be prevented by encircling the base of the trunk with wire mesh which has been pushed a few inches into the ground. However, the mesh must be replaced every few years to accommodate the expanding trunk circumference. An application of rodent repellent (thiram) applied in late fall also helps prevent damage. Rodent traps and poison bait may be necessary where large acreages of plants, such as nurseries or tree plantations, need to be protected.

5. **Salt Injury.** Salt used on roads and highways can cause varying degrees of injury to trees and shrubs, the most common being foliage burn of evergreens and growth deformities of deciduous plants (fig. 10). Ornamental plants vary in susceptibility to salt damage. Austrian pine, honey locust, and Norway maple are reasonably tolerant to salt, while white, red and scots pine, oak, and sugar maple are very sensitive to salt injury. This fact should be kept in mind when placing plants in the landscape. Established evergreens beside salted roadways can be protected by barriers or burlap or similar material and all plants should be washed and heavily watered in spring to remove accumulated salts from the root zone.

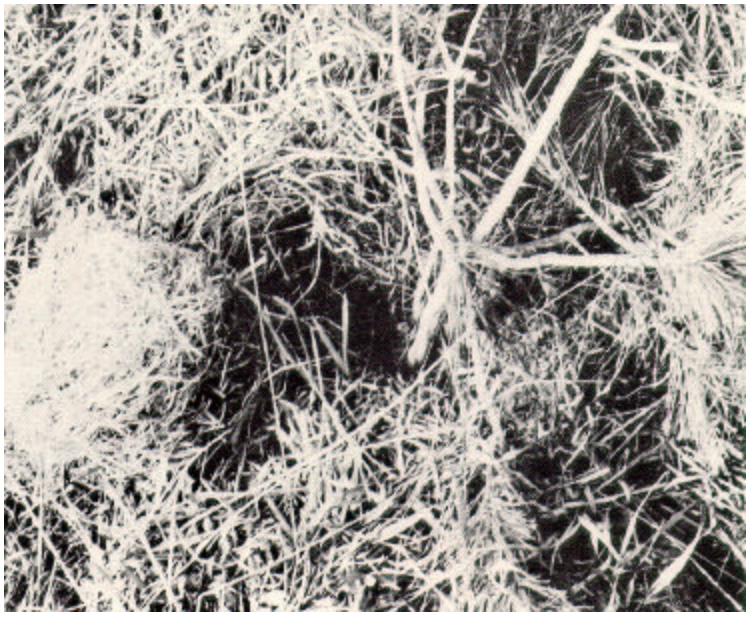

Fig. 9. The small mouse house is a tell-tale sign of what debarked this small pine tree.

6. **Snow and Ice.** Heavy loads of snow and ice can cause major structural damage to trees and shrubs (fig. 11), especially when combined with wind. If limb breakage does occur, prune back all injured branches to sound wood immediately. If ice accumulates on plants, do not remove it. Limbs and twigs are very brittle when frozen and attempting to remove the ice may cause breakage and more damage. Instead, support ice covered limbs.

Snow shoveled from roofs or driveways directly on top of shrubbery can cause breakage and promote tip dieback that may not be evident until late spring or summer.

7. **Heaving.** Alternate freezing and thawing of soil can force shallow rooted plants out of the ground. Recently planted trees and shrubs that have not reestablished a root system are subject to heaving and roots exposed to cold and dryness will be killed. Plants in heavy clay soils and very wet soils are most prone to heaving injury. To help prevent rapid soil temperature fluctuation and heaving, apply mulch before the soil freezes in late fall.

8. **Late Spring Frosts.** Once the plants have begun active growth in the spring, all are susceptible to frost injury. If new leaf buds are killed, most plants will rebud quickly except for some evergreen trees (fig. 12). Frosted flower buds, however, are usually lost for that season. Frost can cause tiny new leaves to cup, crinkle, twist, curl (fig. 13) or appear shot full of holes. As the injured leaves increase in size, they may appear tattered, or as if chewed by insects. This type of injury is unsightly, but does no lasting damage to the plants.

Fig. 10. The "birds' nests" on this oak branch are due to injury caused by salt spray from an adjacent highway.

Photo courtesy: H. Davidson

Fig. 11. The weight of a coating of ice is causing this tree to bend to the ground. Note stepladder support to keep the tree from breaking.

Fig. 12. The new growth on this spruce was killed by a spring frost. New buds will not produce new growth on the injured twigs until next season.

Fig. 13. The new growth on this spruce appears wilted. The down turned twig tips are due to injury from a spring frost.

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