

Environmental Causes of Tree Damage

FOREST HEALTH FACTSHEET

Wisconsin Department of Natural Resources, Division of Forestry, Forest Health Program, Revised February 2020

Abiotic (non-living, chemical and environmental) damage to trees occurs in many forms. Some issues temporarily impact tree health (e.g., frost) while others may cause widespread mortality (e.g., storm damage). Trees may be able to recover from a single stressor but unable to recover when multiple stressors occur simultaneously or over multiple years. The following are some common abiotic issues encountered in Wisconsin forests.

STORM DAMAGE

Storms that produce tornados or straight-line winds can uproot trees and snap main stems. Large events may require months or years of tree harvesting and forest management. Minor wind damage may only require pruning and proper disposal of wood.

Lightning strikes also damage trees during storms. Sometimes



Figure 1. Pine trees damaged by straight line winds.

only a portion of a tree is impacted, and the tree survives. But often trees struck by lightning are killed, or later succumb to insects and diseases.

Hail damage can significantly impact tree health. The physical damage may be enough to kill severely impacted trees, and the injury is also a pathway for insects and diseases to colonize. Conifers may be more severely impacted by hail than deciduous species.

In general, if more than 50% of a conifer is damaged by hail it is good practice to cut it down. Deciduous trees may need dead branches pruned. If oaks must be pruned from April through July when the risk of oak wilt is highest, use tree wound paint or a latex based paint to cover the wound immediately. Likewise, paint wounds on elms during the growing season to prevent Dutch elm disease. For other tree species or times of year, do not paint wounds.

WINTER DAMAGE

Many types of winter damage impact trees. Ice and wet, heavy snow may break branches or cause entire trees to fail. Freeze and frost damage can kill exposed above ground plant parts and may also



Figure 2. Trees with brown leaves caused by frost.

kill tree roots, especially when there is no snow on the ground.

Sunscald can occur when trees are heated by direct sun on warm winter days followed by freezing temperatures at night. Frost cracks form when water in tree tissues expands and contracts with fluctuating temperatures. Damage from sunscald and frost cracks is most common on the south and west sides of trees. Trees are commonly able to recover from the damage.

Winter salt use poses a dual threat to trees. Salt spray from vehicles may cause bud death and twig dieback. Salt also dissolves into the soil and causes root damage.

Winter desiccation of conifers occurs on warm, windy days in late winter and early spring. Conifers maintain needles throughout the winter and can start photosynthesis rapidly when



Figure 3. *Brown needles caused by winter desiccation.* temperatures warm slightly. However, roots in frozen soil are not able to replace the water that is being used, causing the needles to desiccate. Trees recover from minor damage but may die if water loss is excessive

DROUGHT

Tree species vary in their ability to tolerate drought. Severe drought is a major stress that may directly cause mortality but also makes trees more susceptible to insects and diseases. The impacts of drought may build over several years. Drought stressed trees often need several years to recover. Harvesting drought killed trees reduces wildfire risk and prevents the buildup of insects and diseases.



Figure 4. *Pine trees killed by drought.*

FLOODING

Tree roots are not able to get oxygen when flooded. Some tree species tolerate seasonally flooded roots, but long-term flooding will cause root and tree mortality.

Mortality may also result from flash flooding, standing water after heavy rain events or rising ground water levels. Saturated soils may also lead to trees tipping over. Flooding is a stress that makes trees more susceptible to insects and diseases. Forest management is difficult in flooded areas due to limited access.



Figure 5. *Pine seedlings flooded by heavy rains.*

FIRE

Factors such as drought and storm damage can exacerbate fire risk and severity, and wildfires may make trees more susceptible to insects and diseases. Post-fire salvage harvesting may be necessary, but some forest ecosystems are tolerant or even need fire for tree seed to germinate.

SOIL

Soil conditions can lead to many tree health issues. Compaction, grade changes and direct damage to roots during construction all may lead to tree mortality. Improper pH and nutrient deficiencies may cause trees to appear off color (chlorotic). Choosing the correct tree species for the soil type (e.g., loam vs sand) is critical to the health and longevity of a tree. Soils in urban areas may be significantly different



Figure 6. *Chlorotic spruce trees suffering from a soil nutrient deficiency.* from rural and natural areas.

PESTICIDE

Improper use of pesticides is a common source of damage to trees. Cupped, off color, twisted or curled foliage and damage to multiple tree species are common signs of pesticide injury. Drift from nearby pesticide application or transfer through soil may occur. Pesticide damage is often mistaken for damage caused by other abiotic factors or insects and diseases. Pesticide labels are federal law so always read and follow label directions to prevent plant damage.



Figure 7. *Twisted branch tips caused by pesticide damage.*

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