

Environmental Causes Of Tree Damage

Non-living, Environmental And Chemical Factors

FOREST HEALTH FACT SHEET

Wisconsin Department of Natural Resources, Division of Forestry, Forest Health Program, Revised July 2023

Abiotic (non-living, environmental and chemical) damage to trees occurs in many forms. Some issues, such as frost, temporarily impact tree health; others, such as storm damage, may cause widespread mortality.

Trees may be able to recover from a single stressor but may not be able 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 tornadoes 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 can damage trees during storms. Sometimes only a portion of a tree is impacted, and the tree survives.



Pine trees damaged by straight-line winds.

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

Sunscale can occur when trees are heated by direct sun on warm winter days, followed by freezing temperatures at night.



Trees with brown leaves caused by frost.

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 desiccation of conifers occurs on warm, windy days in late winter and early spring.



Brown needles caused by winter desiccation.



Pine trees killed by drought.

Conifers maintain needles throughout the winter and can start photosynthesis rapidly when temperatures warm slightly. However, roots in frozen soil are not able to replace the water being used causing the needles to desiccate. Trees recover from minor damage but may die if water loss is excessive.

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.

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.

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.



Pine seedlings flooded by heavy rains.

The impact 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.

Flooding

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

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.

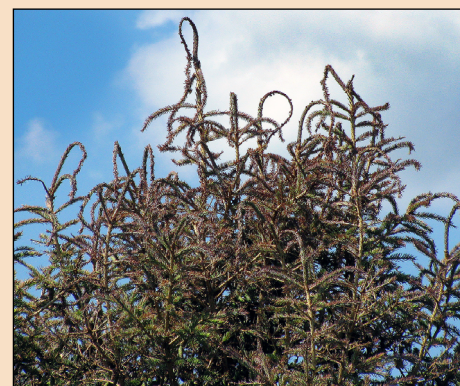
Soil

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 chlorotic (off color).



Chlorotic (off-color) spruce trees suffering from a nutrient deficiency.

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 from soils in rural and natural areas.



Twisted branch tips caused by pesticide damage.

Pesticide

Improper use of pesticide 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, insects or diseases. Pesticide informational labels are required by federal law; always read and follow label directions to prevent plant damage.



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Wisconsin Department of Natural Resources
PO Box 7921, Madison, WI 53707-7921

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