

Hickory Dieback and Mortality

Biology, Symptoms And Management

FOREST HEALTH FACT SHEET

Wisconsin Department of Natural Resources, Division of Forestry, Forest Health Program, May 2017

Locations

Rapid dieback and mortality of hickory trees (*Carya spp.*) have been reported in Wisconsin, Minnesota, Iowa, Missouri and several eastern states in recent decades.

Impact

Hickory dieback and mortality have been observed on both bitternut and shag-bark hickory, but mortality of bitternut is much more common. Thinning crowns progress quickly to whole-tree mortality. Mortality of all mature hickory in a stand typically occurs over several years. Seedlings and saplings up to a few inches in diameter are not impacted.



Adult hickory bark beetles are 3 to 5 millimeters long.. **Photo:** Natasha Wright, Cook's Pest Control, Bugwood.org



Hickory bark beetle gallery.

Biology

Rapid hickory mortality is caused by hickory bark beetles in combination with the fungus *Ceratocysis smalleyi*. The hickory bark beetle, native to Wisconsin, is regarded as the most destructive insect against hickory in the eastern United States. Although the insect usually attacks over-mature, weak or recently killed trees, healthy trees of all ages also can be infested during outbreaks. The insect overwinters as a larva in the tree. The larvae attack and kill hickory trees by mining the phloem tissue under the bark. Larval feeding galleries are centipede-shaped and 5-6 cm wide.

Adults begin to emerge around the middle of June, leaving round holes in the tree, about 3 mm in diameter. The highest beetle populations are observed in July and early August. The wounds caused by hickory bark beetles allow *C. smalleyi* to enter the trees. As more and more beetles attack a tree, hundreds or thousands of cankers develop below the bark. Cankers disrupt water transport and sap flow, leading to rapid crown decline. This interaction of the hickory bark beetles and *C. smalleyi* fungi, in combination with host stress such as drought, results in canopy dieback and, ultimately, tree death. Other insects and fungi also may contribute to hickory dieback but are not the cause of rapid mortality.



Hickory canker caused by the fungus *C. smalleyi*.

The hickory timber beetle (*Xyleborus celsus*), hickory agrilus (*Agrilus otiosus*) and red-shouldered bostrichid (*Xylobiopsis basilaris*) have been recovered from dead and dying trees. Freshly cut hickory logs also may be attacked by the painted hickory borer (*Megacyllene caryae*). The fungal pathogen *Fusarium solani* causes stem cankers that lead to canopy dieback in hickory. Additionally, galls on the main stem or branches caused by *Phomopsis* spp. fungi are a common cause of dieback. Armillaria root rot may also contribute to mortality.



Phomopsis galls on the main stem of a bitternut hickory. **Photo:** Linda Haugen, USDA Forest Service, Bugwood.org

Identification

Symptoms progress rapidly, first exhibiting thinning crowns with wilting leaves, then branch mortality, and complete tree mortality. Epicormic branches often sprout from the main stem only to wilt and die later. Bleeding cankers can often be found on these trees.

Prevention

Recommended forest management activities, such as thinning overstocked stands and avoiding additional stress to stands during drought, will help prevent buildup of beetle populations.



Inspecting dying hickory for hickory bark beetle and *C. smalleyi*.

Management

Options for managing hickory mortality are limited. After hickory bark beetles and *C. smalleyi* start killing trees, there are no practical options for stopping spread throughout the stand. Landowners with stands composed of about 20% or more hickory should consider a salvage harvest as soon as dieback or mortality is noticed. Landowners should work with a forester or forest health specialist to confirm the cause and decide on an appropriate



Hickory mortality in Wisconsin.

management plan.

Hickory also makes excellent firewood and may be kept on-site and utilized. Do not move infected hickory firewood for at least one year after tree mortality to avoid spreading the insects and fungi to uninfected areas.

Insecticide applications in July on trunks and large branches of high value yard trees can be effective to protect from infestation by hickory bark beetles, but are not practical in forests.

Hickory regeneration is not impacted in affected stands and should continue in stands with appropriate site conditions.



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Photos by Wisconsin DNR unless noted.

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

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