Hickory dieback and mortality in Wisconsin

Wisconsin Department of Natural Resources, Forest Health Protection

Hickory mortality seen in Dane County

Recently dieback and mortality on hickory have been reported throughout the natural range of bitternut and shagbark hickory in Wisconsin. This problem has been observed on both bitternut and shagbark hickory, although mortality appears to be more prevalent on bitternut hickory. Mortality of hickory has also been reported in neighboring states such as Minnesota, Iowa, and Missouri as well as eastern states such as Maryland, New York, Pennsylvania and West Virginia. The symptoms progress rapidly from thinning crowns to branch mortality to complete tree mortality. Epicormic branches often sprout from the main stem only to wilt and die later, and sunken cankers or bleeding cankers can often be found on these trees.

Hickory bark beetle adult exit holes

Historically, hickory mortality was attributed to attacks by the hickory bark beetle (*Scolytus quadrispinosus*) following periods of drought. More recent research, however, indicates that hickory mortality is due to a complex of biotic and abiotic factors, including the hickory bark beetle and other insects, and the fungus *Ceratocysis smalleyi*. The hickory bark beetle, native to Wisconsin, is regarded as the most destructive insect of hickory in the eastern United States. Larvae of the hickory bark beetle attack and kill hickory trees by mining the phloem. Although the insect usually attacks overmature, weak, or recently killed trees, apparently healthy trees of all ages are also infested during outbreaks. Feeding galleries are centipede-shaped and etched on the interface of sapwood (width 5-6 cm). Adults begin to emerge around the middle of June, and highest beetle populations and seasonal activity are observed during July and early August. The insect overwinters as a larva. Adult exit holes are round and about 3mm in diameter. It is suspected that the hickory bark beetle transmits the fungus, *C. smalleyi*.

Two additional beetles have been associated with the hickory mortality at some sites. The hickory agrilus (*Agrilus otiosus*) and the red-shouldered bostrichid (*Xylobiopsis basilaris*) have been recovered from dying/dead trees. Fresh cut hickory logs may also be attacked by the painted hickory borer (*Megacyllene caryae*). In some sites, extensive infection by Armillaria root rot was observed on some of the recently killed trees. The relative importance of Armillaria root rot in hickory mortality is unknown.

In 2006, the USDA Forest Service initiated a survey to detect the presence of *Ceratocystis* spp. on declining hickory trees in Wisconsin and some neighboring states. Isolates of *Ceratocystis* spp. were obtained from wood samples collected from 6 of the 8 sites chosen for the study in Wisconsin. In 2007, stands in Wisconsin, Iowa, and Minnesota were surveyed for the frequencies of declining and dead hickory, and the level of hickory regeneration. In the surveyed stands, percentages of hickory mortality ranged from less than 10% to more than 80%. Abundant hickory regeneration was observed in 12 out of 14 stands. The majority of stands experiencing hickory dieback and mortality were overstocked. Wood samples were also collected from the survey stands and several fungi including *C. smalleyi*, *Fusarium solani*, and *Phomopsis* spp. The study is expected to continue in 2008.

Currently, recommended management practice of this problem is limited to removal of trees harboring overwintering hickory bark beetle during winter and spring. Infested wood should be burned, chipped, debarked or submerged in water to prevent adults from emerging. Insecticide applications on trunks and large branches of high value trees in July can be effective to protect from infestation by this insect, although it is not practical in a forest situation.

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