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MICHIGAN STATE UNIVERSITY | Extension

Forest Types of Michigan

Oak-Hickory

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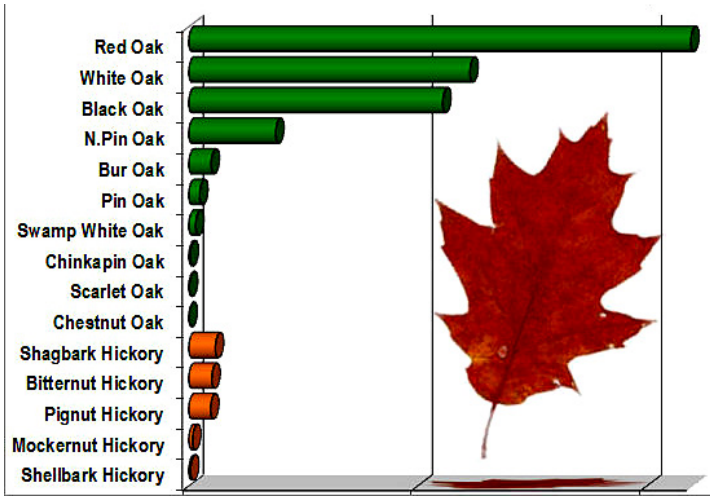
Michigan has a variety of forest types dominated by oaks, including oak savannahs and oak barrens. Oaks are also common components of many non-oak forest types. Some hickory species have similar environmental niches to oaks and are common associates of oaks in the southern Lower Peninsula, so the generalized forest type "oak-hickory" is frequently used. Hickories are usually a minor but important component of these forests.

Statewide, oak-hickory forest types occupy about 12 percent of the forest area. Most of the oak area grows in the northern Lower Peninsula. Over 70 percent of the state's oak volume occurs within the oak-hickory forest types. Most of the rest occurs in northern hardwood and aspen forest types. Within oak-hickory types, over 60 percent of the volume is in oak or hickory species.

Volumes of Oak and Hickory Species in Michigan
(million cubic feet)



Oaks are favorite trees for many people. The visual and aesthetic qualities of large oaks can become factors in forest management and, more commonly, in urban and residential arboriculture.

The Trees

According to inventory data from the USDA Forest Service, Michigan forestlands have 10 species of oak and five species of hickory. Michigan oak species are divided into two subgroups — red oaks and white oaks. Red oaks have pointed leaf lobes; white oaks have rounded/blunt leaf lobes. Red oak acorns germinate in the spring. White oak acorns germinate soon after falling. By far the most common oaks are red, white, black and northern pin oak. Species differentiation among some oak species can be difficult, and some species are known to hybridize readily. Hickory species are similar in this way. Unlike oaks with their simple leaf arrangement, hickories have compound leaves with five to seven leaflets per leaf. They produce 1-1.5 inch nuts that germinate in the spring following burial by squirrels and other rodents. The most common non-oak/hickory species in this forest type are red maple, bigtooth aspen, black cherry, white pine, basswood, white ash, sugar maple, green ash, American elm and red pine. An additional 47 species occur in oak-hickory forest types.[1] Oak-hickory forest types are among the most diverse in Michigan. Some oak species have the potential to

[1] Area and volumes of species and forest types are derived from the USDA Forest Service Forest Inventory and Analysis Data, available at *www.fia.fs.fed.us/tools-data*.

live 200 years or more. Other species have life spans of less than 100 years.

Distribution

Oaks occur in every county of Michigan, although there are large gaps in the Upper Peninsula and the Thumb where oaks are uncommon. Oaks are widespread across the United States with the exception of the Great Plains. Most of the oak resource and monetary value are located in the central and southern regions of the eastern United States. Across the country, there may be as many as 70 species of oak and about 13 species of hickory, including five in the pecan group.

Ecology

Oaks and hickories occupy a wide range of site conditions, but the best growth occurs on moist, well-drained, loamy soils. Oaks commonly occur in near monocultures on sand plains but seldom achieve high quality there. Some species are more exclusive to better soils.

There is more than one oak ecology in Michigan, and human disturbance has greatly affected the distribution of oak, usually in favor of oaks. Because of logging and fire history, especially the major conflagrations in the early 1900s, oaks are more widespread now than they were before Euro-American settlement. Their vigorous stump-sprouting characteristic allowed oaks to remain in the landscape when most seed sources were eliminated by repeated and/or particularly intense wildfires. Oaks often occupy lands that formerly grew white and red pine.

There is a range of biological characteristics among oaks and hickories. Oaks in general are somewhat tolerant of partial shade as seedlings and saplings. With older trees, best growth rates are often seen with full light conditions. Oaks will regenerate through acorns or stump sprouts. Both strategies are related to the health and vigor of the trees. Hickories also typically sprout well from stumps. They are generally intolerant of shade, however, except for bitternut, mockernut and pignut hickory. Forest owners are encouraged to learn more about the species that grow in their woodlands.[2]

Management and Silviculture

Northern red oak (*Quercus rubra*) on good quality sites will produce the finest quality trees and generate the highest monetary values. Red oak and white oak (*Quercus alba*) are the favored species for timber. All oaks on nearly all sites and forest conditions will provide a variety of wildlife habitat components.

Oak forest types are generally managed using either a clearcutting or shelterwood silvicultural system, where a partial canopy is retained. The decision depends on many variables, and management should be based on site characteristics and owner preferences and guided by the advice of a professional forester. A considerable amount of research has gone into oak silviculture. Successful systems vary from region to region.

Northern pin oak (*Quercus ellipsoidales*) and black oak (*Quercus velutina*) dominate oak stands on dry outwash plains. They are short-lived and best managed through clearcutting and stump

[2] USDA Forest Service. Silvics of Forest Trees of the United States. Agricultural Handbook No. 271. Available at *http://www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm*.

sprout regeneration. Regeneration cuts should occur before the trees become overmature and lose vigor. These oak types cover vast acreages in the northern Lower Peninsula and elsewhere in Michigan. Converting to pine types may be a good alternative on many of these sites.

On the other end of the spectrum, a northern red oak and/or white oak stand on good quality soils can be managed well through shelterwood systems or a crop-tree style of selection silviculture. Controlling stand density on these sites can yield high quality, rapid growth and a range of non-timber benefits. Thinning should be done from below to remove small and poor quality trees. The ability of a stand to respond to management will depend on a wide range of environmental factors that must be assessed before engaging in a management plan.

Oak barrens and oak savannahs often grow into pine or hardwood forests if not maintained. Prescribed fire, where permissible, can be an effective management tool to maintain these special forest types.

Red Oak with Oak Wilt

Tree Health Issues

Oaks are host to hundreds of insects, most of which cause little harm to the trees. Some of the more important insects include two-lined chestnut borer, gypsy moth, wood borers, orange-striped oakworm and timber beetles.

Oak wilt[3] is by far the most serious health threat to oak forests. This exotic pathogen enters an oak through a wound via a beetle, and then spreads throughout the stand by way of root grafts. Treatment is possible and effective, but it is expensive. Oaks in the white oak group are less vulnerable than the oaks in the red oak group.

Drought, old age and sandy soils are a deadly combination that weakens and sometimes outright kills oaks across much of Michigan. The stressed trees attract two-lined chestnut borer infestations, which kill many oaks.

A bark beetle, *Scolytus quadrispinosus*, has attacked hickories in some parts of Michigan. The beetles may be associated with two pathogens that kill hickories. These pathogens are related to the oak wilt fungus.

Many oaks are susceptible to heart rot fungi. Trees are often able to isolate fungal spread across the grain but are not good at halting vertical spread. Heart rot is more common in red oaks than in white oaks.

[3] Cook, B. 2011. Oak Wilt In Michigan's Forest Resource. Bulletin E-3169. Michigan State University Extension.

Wildlife Habitat

Acorns, hickory nuts and cavities are valuable habitat characteristics for many wildlife species. In northern Michigan, oaks are one of the few tree species that produce hard mast (nuts). Game species such as white-tailed deer and turkey readily feed on acorns. The rough bark of older oaks and hickories, along with branching structures, provide food and shelter for a wide variety of wildlife. In some parts of Michigan, oaks may provide critical habitat.

Landowner Tips

- Develop a management plan.
- Regenerate via shelterwood or clearcutting.
- Crop tree management can be used to favor mast production and/or quality sawtimber.
- Factor in that oak species have variable life spans.
- Site quality is a key element in management decisions.
- Some oak sites may be better suited to other forest types.
- To keep trees healthy, avoid wounding oaks during the growing season.
- Moving firewood from stands infected with oak wilt can spread the disease to healthy oaks.

See the Michigan Society of American Foresters' publication, Forest Management Guidelines for Michigan, on their website: *http://michigansaf.org*.

See also Michigan DNR (2000), Oaks: A Management Guide for Michigan's State Forests. *www.dnr.state.mi.us/publications/pdfs/ForestsLandWater/MainPage/OakMgtGuide.pdf*