Cornell University Cooperative Extension

Forest Connect

Supporting Sustainable Management of Private Woodlands

An Extension Publication of the Department of Natural Resources, New York State College of Agriculture and Life Science, a Statutory College of the State University at Cornell University, Ithaca, New York

Red and White Oak

Peter Smallidge, NYS Extension Forester and Director, Arnot Teaching and Research Forest, Department of Natural Resources, Cornell University Cooperative Extension, Ithaca, NY 14853. Contact Peter at pjs23@cornell.edu, or (607) 592-3640. Visit his website www.ForestConnect.info, and webinar archives at www.youtube.com/ForestConnect.

Northern red oak (*Quercus rubra*) and white oak (*Q. alba*) occur throughout all of New York, except for portions of the upper elevations in the Adirondacks. White oak tends to be more restricted to drier soils; northern red oak has a broader tolerance for soil moisture. These species are renowned and enjoyed because of the multitude of virtues that include beauty, timber, food for wildlife, firewood, and their ability to attain massive size (Figure 1). Much has been written about these species, and a good starting point is a google search for "silvics." The best book, of coffee table quality, for the identification of oaks and other New York trees is *"Trees of New York State, Native and Naturalized"* by Donald J. Leopold.

Figure 1. This white oak is more than 60 inches in diameter and likely dates to before the time when the founders debated the principles of government for the United States.

The oak genus, *Quercus*, is broken into two subgenera, the red and white oaks. This adds a bit to confusion in naming because a tree might be called a "red oak" and be one of several of the species of the subgenus *Erythrobalanus* (as compared to the white oak subgenus *Leucobalanus*). In practice, most people don't refer to the subgenus and rather intend to refer to a particular species of red and white oak. There are more than a dozen oak species that occur in New York. The subgenus distinction has value because in addition to the botanical features that identify the genus, there are features that are specific to the subgenera.

The oak genus is characterized by acorns as a fruit, leaves that typically have prominent lobes and sinuses, and a cluster of buds at the end of the twig. When the twig is cleanly cut in cross-section the

pith may have a shape that resembles a "star." The features of acorns that are used to differentiate the oaks include the length of the stalk (peduncle), the length of the acorn, the extent of the acorn covered by the acorn cap, and the texture of the acorn cap. Oaks will tend to drop some immature acorns by mid-summer, but the features of these don't usually allow for easy identification of the species.

The Red Oak Subgenus

The red oak subgenus has all the features of the genus plus the trees tend to have dark gray to blackish-gray bark, the lobes of the leaves are tipped with a bristle, and the buds are pointed. The bark of the subgenus can vary from a ridge and valley pattern to coarsely blocky. The acorns mature over two growing seasons, which allows some prediction of the acorn crop that will occur in the following growing season.

Figure 2A. The bark of a six inch diameter northern red oak has started to develop the tell-tale smooth ridges

Figure 2B. The bark of a 10 inch diameter northern red oak has developed smooth ridges that extend well up into the lower portions of the crown.

The bark of northern red oak has the general form of "ridge and furrow", but the furrows are shallow and the thin ridges are relatively long, unbroken and smooth (Figure 2A and B). Students of tree identification may learn to recognize those long smooth ridges as resembling ski tracks in fresh snow. Northern red oak leaves have sinuses that extend approximately halfway to the midrib, moderately rounded sinuses, and the bristle tipped lobes characteristic of its subgenus (Figure 3). The buds of northern red oak are brown, pointed and either free of any fine delicate hairs (pubescence), or only having hairs on the edges of scales on the upper half of the bud (Figure 4). Bud size varies with the vigor of the tree, but the buds are usually larger than those of white oak.

Figure 3. The leaves of northern red oak have bristle tips as do all members of the red oak subgenus. The typical leaf shape has moderately sized lobes and sinuses, with the sinuses extending approximately half way to the midrib. The shape, though, varies depending on the amount of shading, tree vigor, and on seedlings versus mature trees.

Figure 4. The buds of northern red oak are uniformly brown, and may be mostly smooth (as pictured) or with hairs on the edges of scales on the half of the bud. Buds are pointed relative to the white oaks.

Figure 5. Northern red oak acorns require two growing seasons to mature. Binoculars can be used to predict the abundance of acorns the following year. White oak acorns (not pictured) mature in the growing season that they form.

Figure 6. White oak leaves lack a bristle tip on the sinus and described as rounded. The sinus may be deep and extend more than halfway to the midrib. This picture illustrates deeper than normal sinuses and late summer leaves that have been enjoyed by some skeletonizing insects.

Northern red oak, as for the red oak subgenus, have acorns that require two years to develop (Figure 5). Northern red oak typically has a relatively shallow cap covering approximately one-quarter of the acorn's length and the cap's smooth is surface. The acorn is about 1" long. The stalk is short or absent.

The White Oak Subgenus

The white oak subgenus is characterized by bark that varies considerably from plates to coarsely blocked and textured, but typically is ashy gray in color. The lobes of the leaf lack the bristle tip of the red oak subgenus, and the buds are rounded.

White oak leaves have moderately deep sinuses and moderately wide lobes (Figure 6). The bark of white oak is ashy gray. While the bark often has plates, the pattern of the bark varies considerably on any one tree (Figure 7). White oak is thought by some to have the greatest variation of bark on a tree. The buds of white oak are small compared to northern red oak, smooth, brown and rounded (Figure 8). White oak acorns are slightly smaller than northern red oak at approximately 0.75 inches and the cap also covers approximately one-quarter of its length. The cap scales give a warty appearance.

Oaks, Acorns and Wildlife

The value of red or white oak acorns to wildlife can't be overstated. These fruits are used by countless mammals, birds and insects. Oaks have peak years of acorn production, known as "mast years" that may litter the forest floor. A mast year may occur for oaks on one ridge, but not on an adjacent ridge, or in one section of the state and not in another. Some individual trees may not fruit while neighboring trees have an abundant crop of acorns.

The cycle for mast years in white oak may vary from 4 to 10 years and is often associated with specific weather conditions that coincide with flowering. White oak acorns mature the year they form and will germinate that fall by growing the root (called the radical) into the soil. The cycle for mast years of northern red oak varies from 2 to 5 years. The animals that enjoy acorns may consume or damage more than 80% of acorns in mast years and all in poor seed years. The meat of white oak acorns is described as "sweet", but anyone tasting the meat of both subgenera would describe them as bitter.

Deer not only eat the acorns, but also browse the tips of seedlings. Repeated browsing of seedling tips results in stunted plants that are not able to grow in height. Excessive browsing can kill the seedlings. Seedlings that have been browsed for several years attain a growth form that resembles a bonsai tree. While there may be some aesthetic appeal to a bonsai oak, the woodland owner trying to growing single-stemmed and straight oaks for timber will be frustrated. Similarly, the stunted trees will become overtopped by neighboring trees and fail to attain a level of vigor that allows for future acorn production.

Figure 7. White oak bark is ashy gray and platey, although the bark may vary on a tree.

Figure 8. White oak buds are smooth, brown, and rounded.

For additional information on woodland management go to:
www.ForestConnect.com & www.CornellForestConnect.ning.com

Layout and design provided by Diana Bryant.
Support for ForestConnect is provided by the Cornell University College of Agriculture and Life Sciences, Cornell Cooperative Extension, and USDA National Institute of Food and Agriculture.
06/2020