

MISSOURI DEPARTMENT OF CONSERVATION FIELD GUIDE

MISSOURI'S OAKS AND HICKORIES

By Edgar Denison and Bruce Palmer

Photography by Jim Rathert



Serving nature and you



Your first encounter with an oak or hickory tree may have been the big one you climbed in your backyard. But you probably have had many more meetings with them since that time.

The oaks and hickories are very important members of Missouri's forests. About three-fourths of the trees you will find in our forests will be either an oak or a hickory.

These hardwoods are known for their strong, functional wood, which is manufactured into furniture, lumber, flooring and other products. Yet the beauty, recreation, wildlife habitat and water quality these forests provide are more valuable to many.

Oaks and hickories are the most numerous of the tree species in the state. But each is distinct and each has its place in Missouri's forests.

Missouri Hickories

By Bruce Palmer

Photography by Jim Rathert

Hickory wood is used in the production of charcoal, furniture and wall paneling. Hickory nuts are also an important source of food for wildlife.

While the wood of white oak may be best suited for barrel staves, the wood of hickory trees seems destined to form the handles for many of our tools.

Its more savory use, however, is cooking and smoking meats. The smell of barbecue on a warm summer evening is an unmistakable delight, and more often than not hickory wood provides the heat, smoke and flavor.

Hickory is an important part of Missouri's oak-hickory forest. Eight species of hickory are found in Missouri. We know that numerous species of hickory were also in the ancient forests of Europe, northern Africa, Asia and North America before the Ice Age.

Many hickory species have disappeared and today there remain 17 species worldwide. There are two each in mainland China and Mexico. The other 15 are found in the central hardwood forest of the eastern and southern United States and Canada.

Hickory is one of the most common woods in everyday

use. It is heavy, hard, strong and impact resistant. It is the preferred wood for striking-tool handles such as axes, picks, hammers and hatchets.

Early settlers used hickory in the hubs, rims and spokes of wagon wheels. Besides its use in handles, better grades of hickory are used today in furniture and wall paneling.

Hickory nuts are important food for many species of wildlife. Squirrels, turkeys and ducks all feed on the nuts, which are often preferred over acorns.

Hickories are divided into two major groups: the pecan hickories and the true hickories. True hickories have mostly five to seven leaflets with a large egg-shaped bud at the end of each twig. Pecan hickories have more than seven sickle-shaped leaflets and an elongated, flattened terminal bud.

In Missouri, pecan, bitternut and water hickory are members of the pecan hickory group. Shagbark, shellbark, mockernut, pignut and black hickory are members of the true hickories.



Shagbark hickory (*opposite*) is one of eight hickory species found in Missouri. It is named for the light gray bark that separates into thin plates that curl away from the tree. It is the most common hickory found in the northern half of Missouri. Hickory nuts (*above*) are an important food for many species of wildlife.

PECAN HICKORIES

Pecan (*Carya illinoensis*) is a favorite nut tree of Missourians. Typically a southern species, pecan once grew only in the southeastern part of the state. It is thought that Native Americans cultivated this tree father north and helped spread it. Pecans with large, thin-shelled nuts are now grown in commercial orchards.

Pecan thrives in the deep, moist soils of river bottoms and at the base of protected slopes. Its leaves are 12 to 20 inches long with 9 to 17 leaflets. The nut is oblong, 1 to 2 inches long and covered with a thin husk. The twigs are reddish-brown with large orange-brown dots. Pecan bark is reddish-brown and deeply furrowed, becoming scaly or platelike on old trees.

Bitternut Hickory (*Carya cordiformis*) is common throughout Missouri. It grows best where the soil has the most moisture, such as along streams. Its common name refers to the bitter taste of the nut. The nut is about 1 inch in diameter and covered with a thin husk.

The leaves of the bitternut hickory are 6 to 10 inches long with 7 to 9 leaflets. The bark is light gray and smooth on young trees, becoming shallowly furrowed with thin interlacing ridges when older. The buds are large and are bright yellow in color. The smooth gray bark and bright yellow buds make this an easy hickory to identify.

Water Hickory (*Carya aquatica*) is an uncommon hickory found only in the swamps of the Bootheel area of southeast Missouri. Water hickory often grows on soil that is underwater during part of the year. Sometimes called bitter pecan, the bitter nuts are consumed by ducks and other wildlife. The nut has a flat oblong shape with a thin husk.

The leaves are 8 to 18 inches long with 7 to 13 large leaflets. The leaves are similar to the closely related pecan. The bark is shaggy on old trees with long, platelike red-tinged scales.



TRUE HICKORIES

Shagbark Hickory (*Carya ovata*) is the most common hickory north of the Missouri River. Although it grows best on bottomland soils, it also can be found throughout the state on dry upland sites.

The leaves are 8 to 14 inches long with 5 leaflets. The nut is 1 to 2½ inches in diameter in a husk ¼- to ½-inch thick. The nutmeat is sweet with good flavor. Shag bark hickory is named for the characteristic light gray bark that separates into thin plates that curl away from the tree at both ends.





Key ID Features:
Sickle-shaped leaflets;
smooth oblong nut.

Note: All nuts are
pictured lifesize.



Key ID Features:
Bright yellow buds;
smooth light gray bark.



Key ID Features:
Found only in the
swamps of southeast
Missouri; flattened nut.



Key ID Features:
Shaggy bark;
leaf with five leaflets.



Shellbark Hickory (*Carya laciniosa*) Shellbark hickory, sometimes called big shagbark hickory, is the largest of the true hickories. Shellbark hickory is also found in the fertile bottomland soils along rivers and streams. It occurs throughout most of Missouri with the exception of the Ozarks.

The leaves are 12 to 24 inches long with 7 leaflets. The nut is 1½ to 2½ inches in diameter with a husk up to ½-inch thick. The twigs are stout, orange-brown and usually hairy. The bark of this species is similar to shagbark hickory. Shellbark hickory can be distinguished from shagbark hickory by the large leaves, greater number of leaflets, large nuts and orange twigs.



Mockernut Hickory (*Carya tomentosa*) makes its best growth on fertile, well-drained soils, although mockernut can also be found on dry ridgetops along with white oak, post oak, shagbark and pignut hickory. It is most common south of the Missouri River.

The leaves are 8 to 15 inches long with 7 to 9 leaflets. The nut is 1½ to 2 inches long and elliptical with a thick husk. The stout twigs have a large egg-shaped terminal bud. The outer bud scales are shed early in the fall to reveal the velvety yellow to tan inner scales. The bark is gray and irregularly furrowed. The large, light-colored terminal bud is a distinguishing characteristic of this species.



Pignut Hickory (*Carya glabra*) is a medium-sized tree. It mostly grows in the eastern Ozarks on dry upland soils. However, it can be found scattered throughout southern Missouri and in a few counties just north of the Missouri River.

The leaves are 8 to 12 inches long with mostly 5 leaflets. The nut is pear-shaped, about 1 to 2 inches long, with a thin husk. The bark is smooth and gray when the tree is young. As the tree matures, the bark separates into loose, scalelike plates.



Black Hickory (*Carya texana*) is a small tree. It grows where fertility is low and is usually considered an indicator of poor soil. Black hickory is widespread south of the Missouri River.

The leaves are 8 to 14 inches long, usually with 7 leaflets. The nut is pear-shaped, 1¼ to 1¾ inches long, with a thin husk. The twig tapers abruptly to the terminal bud. The terminal bud has fuzzy, rust-colored scales with tiny yellow dots. The bark is dark gray with deep furrows. Black hickory can be distinguished from pignut by greater number of leaflets, the tapering twig and the yellow dots on the bud.





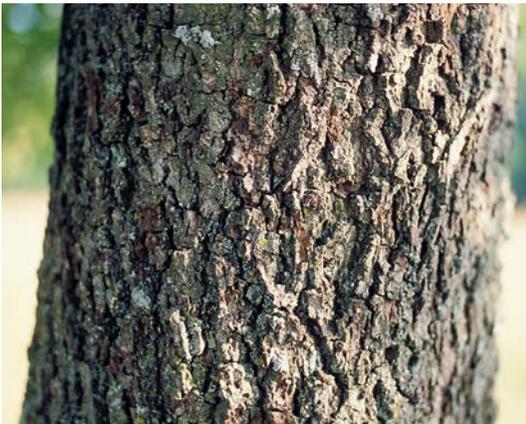
Key ID Features:
Shaggy bark; very large leaves with seven leaflets, orange twigs.



Key ID Features:
Hairy leaf axis; leaves very aromatic when crushed; egg-shaped terminal bud.



Key ID Features:
Usually five leaflets; pear-shaped nut; usually found on dry upland sites.



Key ID Features:
Yellow dots on buds; seven leaflets; usually found on dry uplands.





What Oak Is This? Part I – The White Oaks

By Edgar Denison

Photography by Jim Rathert

As many characteristics as possible, from leaves to location, must be taken into consideration when identifying oak trees.

Missouri is more than 30 percent forested, and oaks are among our most important and abundant trees. Oaks provide food for wild animals in the form of acorns, especially for deer, wild turkeys and squirrels. Oaks belong to the so-called hardwood trees, in contrast to the cone-bearing needle trees, and are an important source for lumber.

The lumber we cut from oak trees is important to Missouri's economy. It is used for making barrels, furniture, cabinets and flooring.

Oaks also shape the landscape of much of Missouri, provide shade to homes and streets and serve as historical markers.

The oaks form a large group (genus) of worldwide distribution. Most are trees but some are

shrubs. One estimate calls for 450 species in the world; another, more modest, calls for 275. In North America, north of Mexico, there are about 54 species of oaks, 21 of which grow wild in Missouri.

This abundance of American oak species compares with just three to five in all of Europe. When the glaciers covered much of the northern hemisphere

during the last two million years, our oak species found favorable conditions further south; their European relatives, however, were trapped by mountain ranges lying east to west, blocking their growth to the south.

Problems of Identification

To begin with, oaks hybridize readily. While one speaks commonly of “hybrid sterility,” our oaks have viable hybrids—hybrids with seeds that produce trees.

The amazing variability in the leaf shapes of certain species is confusing. This forces us to accept certain basic leaf shapes for identification, though we know full well that differing shapes are common.

The leaves of young trees often vary totally from the mature shape. They can be huge, an assist by nature to form an enlarged chlorophyll factory, but not conducive to identification.

No wonder Julian Steyermark, author of *Flora of Missouri*, said that in identifying oaks, it must be kept in mind that as many characteristics as possible—leaves, twigs, winter buds, range, bark, site—must be taken into consideration.

Oak Characteristics

Oaks have separate male and female flowers on the same tree. Male flowers are pollen-bearing stamens on catkins; females are rounded-to-pointed, knoblike and usually on short spikes in leaf axils. Pollination is by wind, requiring huge amounts of pollen.

The fruit, the acorn, takes one or two years to reach maturity. The combined fruits of oaks, hickories, walnuts and beeches form the “mast” of life, sustaining deer, raccoon, squirrels, chipmunks, opossum, mice and

fox. Turkey and quail also eat acorns, as do waterfowl.

Acorns are attacked by a host of insects; because of that, only an occasional one will produce a new tree. Most oaks take more than 30 years before they produce acorns.

The following is an attempt to provide useful information for identifying native oaks. The native oaks are presented in two groups, the white oaks and the red oaks.

White Oaks—General Characteristics:

- produce the most valuable oak lumber, because the cells contain bubblelike structures—tyloses—making the heavy wood leakproof.
- acorns mature during one year.
- the cups of acorns contain no hair inside.
- leaves are lobed or serrated (saw-toothed without bristles.)
- produce “sweet mast,” having less tannin than the red oaks.

LEAF LORE

There’s no better display of the infinite variety of nature than among oak leaves. We chose a few trees, all post oaks and all growing close to each other, and discovered this amazing array of shapes.

1. Normally rounded, this post oak has some pointed lobes.

2. A leaf obviously disfigured.

3. The indentations of the lobes have been eliminated and the lower lobes are quite irregular.

4. The sides are different shapes.

5. A well-developed “typical” leaf.

6 and 7. The top central lobe is reduced in size and lacks indentations.

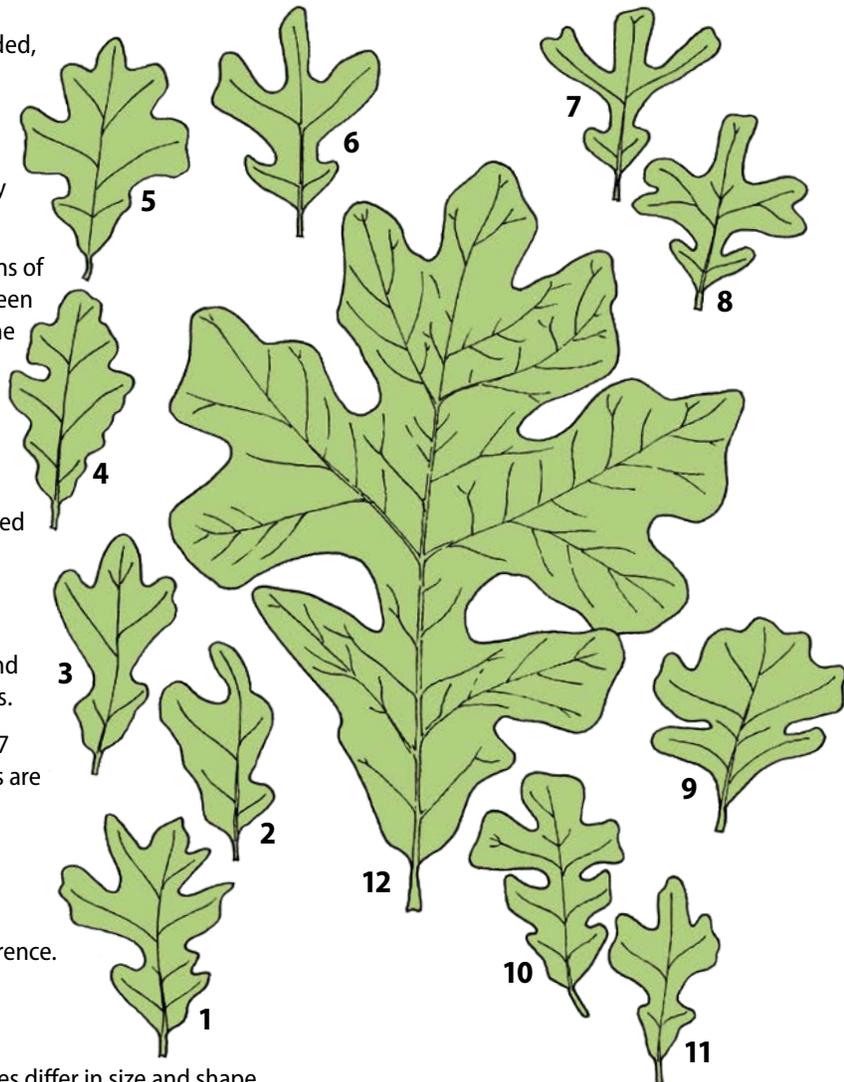
8. Same as 6 and 7 but the side lobes are deeply indented.

9. The top lobe is enlarged and flattened, an unusual occurrence.

10. An additional set of two lobes.

11. The broad lobes differ in size and shape.

12. An almost perfect and unusual leaf with deeply indented top and side lobes. The lower lobes and “knobs” below them are quite different from each other.



White Oak (*Quercus alba*)

White oak is the most important hardwood lumber tree in the United States and Missouri. It sets the standard of lumber for all other oaks. Grows in either dry or moist situations, but not in wet ones. Height to 100 feet tall throughout Missouri, with heavy, often nearly horizontal branches; wide-spreading.



Leaves: With 5 to 7 rounded lobes in two distinct forms: one has shallow, wide, rounded lobes; the other has long, narrower, fingerlike lobes with indentations nearly to midrib of leaf.

Bark: Light gray; rough with long loose scales; becoming blocky on very old trees.

Acorns: About ¾-inch long with a cup covered by warty scales.

Wood: Of great importance for whiskey barrels and barrels staves.

The name *alba* is Latin for “white.”



Post Oak (*Quercus stellata*)

Grows in dry and rocky upland woods, to 60 feet tall. Characteristics similar to white oak. Although it is found in nearly every county of the state, it is most common in the Ozarks.



Leaves: Usually with five lobes, two of which, above the middle of the leaf, are broad, forming a cross with the axis of the leaf. These and the top lobe are normally slightly indented.

Bark: Light brown; divided by deep fissures and scaly ridges.

Acorns: Small to ¾-inch long, the cup covers ⅓ to ½ of the nut.

The name post oak indicates that the wood used to be made into fence posts.

The Latin *stellata* means “star,” referring to the starlike tufts of hair on the surfaces of the leaf.



Bur Oak (*Quercus macrocarpa*)

Grows both on upland and lowland sites, but does best on rich, moist soils; to 120 feet tall, throughout Missouri.



Leaves: The largest of any native oak, to 1 foot long and very wide. Two different basic shapes exist: one widest above the middle, the upper portion shallowly lobed, the lower lobes longer. The other has a deeply lobed central section with indentations coming close to the central vein and a narrower upper part, but still wider than the lower lobes. Both forms are found on the same tree.

Bark: Similar to white oak but darker and more vertically ridged.

Acorns: The largest of all North American oaks, about 1½ inches in diameter, surrounded by a deep cup that is scaly and has a hairy fringe at the rim. Squirrels are especially fond of them.

Macrocarpa is Greek for “big-fruited.”



Swamp White Oak (*Quercus bicolor*)

A medium-sized oak of moist bottomlands, growing sparsely in the northern two-thirds of Missouri, but also found in the Ozarks.



Leaves: Shiny, green above, downy-white below, with many shallow, evenly spaced lobes all along the egg-shaped leaf, which is widest near the middle of the leaf.

Bark: Bark on the upper limbs and twigs peels off in papery scales; dark brown and deeply fissured on the main stem of old trees.

Acorns: Usually carried in pairs, characteristically on a long stem 2½ inches long, the cup scaly and with fine, woolly hair.

Bicolor, Latin, “two-colored,” referring to the leaves.





Key ID Features:
Scaly, light-colored bark on upper limbs; warty scales on acorn.



Key ID Features:
Leathery, cross-shaped leaves; light brown bark with scaly ridges.



Key ID Features:
Bark in vertical ridges; large distinctive acorn; corky, thick twigs.



Key ID Features:
Peeling bark on twigs; long stem on acorn.



Chinkapin Oak (*Quercus muehlenbergii*)

(also known as chestnut oak; Steyermark: *Q. prinoides*). Grows both on dry, rocky uplands and moist bottomlands throughout Missouri, to 100 feet tall.

Leaves: Coarsely serrated (like saw teeth) along entire margin, either narrow or wide oblong, wider above the middle, ending in a pointed tooth (but no bristles).

Bark: Ashy gray; rough and flaky.

Acorns: Small, to ¾-inch long, dark chestnut colored, the cup usually with a short fringe, covering ⅓ to ½ of the nut.

Chinkapin is the name of a shrubby chestnut, which has leaves similar to this oak.

Muehlenbergii (often misspelled) for the botanist Gotthilf Henry Ernest Muehlenberg, 1753-1815.



Swamp Chestnut Oak (*Quercus michauxii*)

(also known as cow-oak or basket oak). Restricted to southeast Missouri where it is found in moist soils in low, wet woods and along streams; to 100 feet tall.

Leaves: Similar to chinkapin oak but the small serrations (lobes are rounded, not toothed). Only the tip of the leaf is pointed. Leaf is egg-shaped with the broadest part above the middle.

Bark: Light gray or tan, irregularly furrowed or scaly.

Acorns: Large, to 1½ inches long, the cup with pointed scales and matted silky hair. The acorn is quite low in tannin, and thus called “sweet.” It is known as chestnut oak because the leaf resembles that of a true chestnut (*Castanea*).

Michauxii for the French naturalist Andre Michaux, sent by his government to the U.S. to collect plants, 1746-1802.



Overcup Oak (*Quercus lyrata*)

Leaves: Lobed with irregular broad lobes of varying depths. Leaf is dark green and shiny above; light green and hairy beneath.

Bark: Brownish-gray and rough; with large irregular plates or ridges.

Acorns: Up to 1 inch in diameter; almost entirely enclosed in a deep, unfringed cup.

Restricted to southeast bottomlands and a few localities in east-central Missouri.



Dwarf Chestnut Oak (*Quercus prinoides*)

(also known as dwarf chinkapin or scrub oak). Grows as a multi-stemmed shrub only a few feet tall or as a small tree. Usually found in prairies and open areas of north Missouri.

Leaves: Similar to those of chinkapin oak but smaller and usually with more blunt lobes. Leaf is green above, lighter-colored and hairy beneath.

Bark: Brownish-gray becoming rough or scaly on older wood.

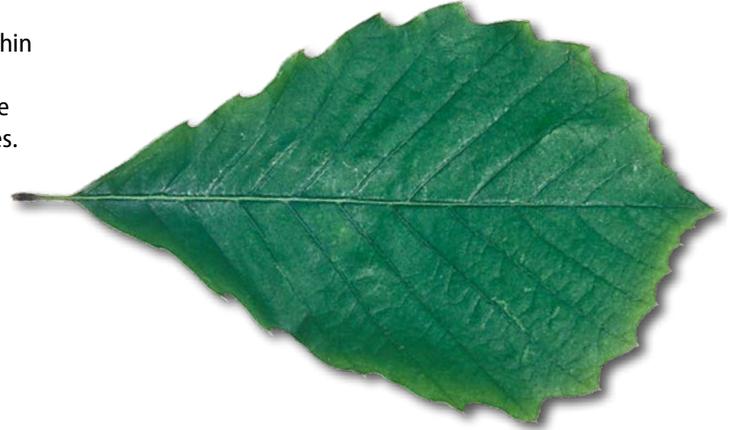
Acorns: About ½-inch diameter with small, warty scales on cup.

This is the shortest of Missouri’s oaks, and it can produce abundant acorns although only 3 to 10 feet tall.





Key ID Features:
 Ashy gray bark with thin flakes; usually found growing on limestone based soils and glades.



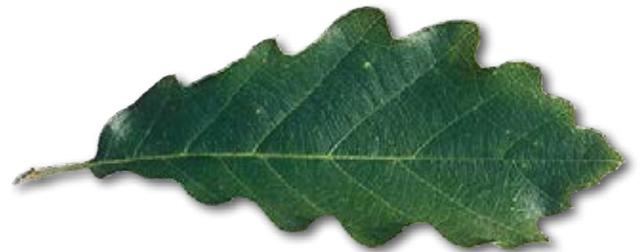
Key ID Features:
 Only found in southeast Missouri in low wet areas; large acorn with pointed scales.



Key ID Features:
 Acorn nearly enclosed by cup; usually found in swamps of southeast Missouri.



Key ID Features:
 Low shrub 3-10 feet tall; only found in western half of state; leaves have fewer and more blunt lobes than chinkapin oak.



What Oak Is This? Part II – The Red Oaks

*Red oaks get their names from the fall coloration they display.
The wood of red oaks is also often tinged with a reddish color.*



Sorting out Missouri's bounty of oak species should be easier with this handy guide to the red oaks.

**The Red Oaks
(also known as black oaks) –
General Characteristics:**

- Acorns mature in the fall of their second season.
- Leaf lobes are bristle-tipped; if unlobed, the leaf terminates in a bristle.
- The inside of the acorn cup has fine, silky hairs.
- The wood is not water-tight, but is used for lumber, flooring, ties and furniture.
- The name "red oak" probably refers to the red fall coloration that some red oaks may display in some years.
- Bark of most of the red oaks is dark gray, brown or black.

Red Oaks with entire (unlobed) leaves – General Characteristics:

- Entire leaves have smooth margins, lacking lobes and serrations.
- The three oak species of this group have acorns that mature in the second year after fertilization.
- Their woods are not leakproof.

DIFFERENCES BETWEEN RED OAKS AND WHITE OAKS

Leaves

Red oaks have bristle-tipped lobes or teeth on their leaves, while white oaks lack this feature.

Bark

The bark of red oaks is often dark gray, brown or occasionally black, and it is rough, hard and ridged. The bark of white oaks is a lighter color and scaly or flaky.

Acorns

White oak acorns are sweet and they mature on the tree in one growing season, while the acorns of red oaks are bitter and mature in two seasons.

Pores

The pores of the wood of the white oaks are plugged with material called tyloses. Because of tyloses, white oak wood is used in barrels that hold liquids, and white oak is used in the aging of spirits like bourbon whiskey. Red oak barrels can only be used to store dry materials. The wood has more important uses, such as railroad crossties and flooring.



Northern Red Oak (*Quercus rubra*)

Grows on upland slopes, or in southern Missouri, on moist bottomlands that face north or east and thus stay cooler. The tree can reach 100 feet and is found throughout Missouri except in the southernmost three counties of the Bootheel.



Leaves: To 8 inches long with pointed lobes (which are not divided again at their tips), segmented to the midrib. Middle and upper lobes point diagonally upward and have bristle-pointed teeth. Leaves are yellowish-green above.

Bark: Dark brown to black; smooth on young trees, eventually wide, flat ridges separated by shallow fissures; on very old trees more narrowly ridged.

Acorns: 1-inch long, oblong in shape. The cup saucerlike, flat, covers about 1/3 of the nut, and has a fine-hairy fringe.

Rubra, Latin, "red."



Shumard Oak (*Quercus shumardii*)

A large tree, frequently to 100 feet tall, but taller specimens are known. Prefers moist bottomlands, but does occur also on uplands throughout the southern two-thirds of Missouri; absent from all northern counties.



Leaves: To 8 inches long, deeply lobed, the tops of the lobes again shallowly divided, each tip with a bristle. Characteristically, the central lobes are more or less at right angles to the leaf axil (rather than pointing diagonally upward). Upper leaf surface dark green.

Bark: Very similar to northern red oak.

Acorns: Two kinds exist: 1) egg-shaped, to 1 inch long, cup saucerlike, enclosing 1/4 of nut (var. *shumardii*); and 2) with a deeper, bowl-shaped cup, enclosing at least 1/3 of nut (var. *schneckii*).



Black Oak (*Quercus velutina*)

(also known as yellow-bark oak). A medium-sized oak to 70 feet tall with a wide distribution. Tolerates rocky, acid soils but grows also on bottomlands. The inner bark is yellow, rich in tannin. Grows throughout Missouri.

Leaves: To 12 inches long, the upper half much wider than the lower. The bottom margin of the lowest lobe nearly straight; 7 to 9 inches wide, rather shallow lobes, their ends indented into smaller lobes, each bristle-tipped. Leaves dark green above, pale green below.



Bark: Black, rough and deeply furrowed. The inner bark is bright orange or yellow and can be used to distinguish black oak from scarlet, northern red and Shumard oaks.

Acorns: Sharply pointed, to 3/4-inch long, well rounded, the scaly cup with a ragged fringe covers half of the nut. Black oak is considered a reliable producer of acorns.

Velutina, Latin, "velvety," probably referring to tufts of hair on the underside of the leaves.



Blackjack Oak (*Quercus marilandica*)

(also known as scrub oak). With few exceptions a gnarled, short tree in Missouri found on rocky hillsides in poor and acid soils. The lower branches hang downward. Grows through most of Missouri but rare or absent from northwestern counties.



Leaves: Large, leathery, dark green and shiny above, wedge-shaped to triangular, spreading toward the top. The top mildly lobed, each lobe carrying one bristle, which may disappear with age.

Bark: Black; very rough, broken into square or rectangular blocks when old.

Acorns: Normally only 1/2-inch diameter with deep cup covering half the nut.

Marilandica is Latin for the state of Maryland.





Key ID Features:
Flat cup on acorn; bark with wide flat ridges.



Key ID Features:
Ends of lobes divided into several bristle-tipped teeth; cup covers 1/4 to 1/3 of acorn.



Key ID Features:
Bright orange inner bark; fringe around edge of acorn cup.



Key ID Features:
Black, blocky bark; dead limbs persist on lower trunk.



Pin Oak (*Quercus palustris*)

Under natural conditions, a medium-size tree—50 to 70 feet tall—moist valleys, along streams, ponds and swamps, but also sometimes on dry locations. The lower branches spread downward, covering a large area. Pin oak grows faster than other oak species and has become a much planted ornamental.



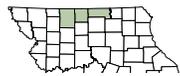
Grows throughout most of Missouri, but absent from the Ozark Plateau and southwestern counties. Many specimens provide good fall coloration.

Leaves: Mediums size, 4 to 6 inches long with 5 to 7 lobes, which are deeply divided. The ends of the lobes have two to three small divisions, each bristle-tipped. Leaves are dark green and shiny.

Bark: Grayish-brown, smooth for many years.

Acorns: Rounded, ½-inch diameter, often striped with many dark lines, with a thin, saucer-shaped cup.

Palustris, Latin, “marshy.”



Northern Pin Oak (*Quercus ellipsoidalis*)

Similar to pin oak but the acorns are more elongate. Known only in northern Missouri.

Scarlet Oak (*Quercus coccinea*)

Scarlet oak is one of the most common oaks of the flat ridgetops of the Eastern Ozarks. It is a medium sized-tree and is valuable for lumber throughout its range.

Leaves: 7 to 9 lobes with wide, nearly circular depressions between the lobes. Smooth and dark green above, paler underneath. The leaves turn a deep scarlet in the fall.



Bark: Smooth and gray, becoming rough, nearly black, broken up into irregular ridges on old trees.

Acorns: Up to 1 inch in diameter, often with concentric rings around the tip. Acorn is ⅓ to ½ enclosed in a thin, bowl-shaped cup.

Restricted to southeastern Missouri.



Southern Red Oak (*Quercus falcata*)

Missouri is on the northern edge of southern red oak range. It is found on dry upland sites in southeast Missouri and in counties along the Arkansas border.

Leaves: Up to nine inches long and found in two forms: 1) shallowly 3-lobed; 2) 5 to 7 deep lobes, often sickle-shaped. The base of the leaf is rounded. Surfaces are dark green and shiny above; pale and hairy below.



Bark: Similar to black oak except the inner bark is only slightly yellow.

Acorns: Small, about ½-inch long; enclosed ⅓ or less in a thin, shallow cup.

Restricted to counties along Arkansas border and southeast Missouri.



Cherrybark Oak (*Quercus falcata* var. *pagodifolia*)

Cherrybark oak is limited to the bottomland forest of the Bootheel. It is among the largest of the southern oaks and its wood is rated superior to any other oaks in the region.

Leaves: 5 to 11 irregular lobes, with the top of the lobes at nearly right angles to the midrib. Surface is dark green and shiny above, pale and hairy underneath.



Bark: Nearly black; broken into shallow fissures. The tree was named cherrybark oak because of the resemblance of the bark of older trees to black cherry.

Acorns: Similar to southern red oak.





Key ID Features:

Smooth grayish bark; lower limbs persist for many years.



Key ID Features:

Known only from northern Missouri; acorn is more oblong than pin oak.



Key ID Features:

Smooth gray bark; concentric rings often found around acorn tip; found only in southeastern Ozarks.



Key ID Features:

Rounded leaf base; many leaves with only three lobes; found only in southern-most counties.



Key ID Features:

Bark resembles black cherry; top of lobes at right angles to midrib; known only from a few southeast Missouri counties.



RED OAKS

Nuttall Oak (*Quercus texana*)

Nuttall oak is found on poorly drained clay bottomland sites. In Missouri it is known only from a few southeastern counties. Its leaves and bark are similar to pin oak, a tree it is easily confused with. Nuttall oak may be distinguished from pin oak by its acorn. Nuttall oak acorns are elongated, up to 1¼ inches long, ¼ to ½ enclosed in a deep, thick cup. Restricted to four southern counties.



RED OAKS WITH ENTIRE (UNLOBED) LEAVES

Shingle Oak (*Quercus imbricaria*)

A large tree, grows to 100 feet, tolerates dry and moist habitats throughout Missouri, except for a few south-central and western counties. Said to be the longest-lived oak under cultivation when used for ornamental purposes.



Leaves: Broadest above the middle, to 2 inches wide, oblong-elliptical, with a shiny upper surface, to 6 inches long; the only oak with large, entire leaves in Missouri.

Bark: Smooth gray when young; becoming nearly black with broad ridges and shallow fissures.

Acorns: Small, about ¾-inch long, but the nut nearly round, the cup with brown, hairy scales, enclosing ⅓ to ½ the nut.

Shingle oak implies the former use for roof shingles. *Imbricaria* is Latin for “overlapping,” like roof shingles. May refer to the acorn scales.



Willow Oak (*Quercus phellos*)

A medium-size oak, to 75 feet tall, growing on poorly drained soils and swampy woods. Restricted to southeast Missouri. May do well when planted as ornamental throughout Missouri.

Leaves: Narrow, lance-shaped, willowlike; much narrower than the similar shingle-oak leaves, light green above with a pointed tip.

Bark: Smooth and gray on young trees; later becoming darker and breaking into thick rough ridges separated by irregular fissures.

Acorns: Small, only ½-inch long, pale brownish-yellow, with striped nuts. The bitter nuts are important food for ducks.

Phellos, Greek, means “cork.”



Water Oak (*Quercus nigra*)

A medium-sized tree found in moist bottomland sites with exception of permanent swamps. In Missouri, its range is restricted to the southeast Missouri counties of Ripley, Butler, Dunklin and Pemiscot.

Leaves: 2 to 4 inches long, broader at the tip than the base. Edges of the leaves are smooth or slightly wavy.

Bark: Nearly black, with wide scaly ridges.

Acorns: About ½-inch long, nearly black; with a thin, saucer-shaped cup.

Restricted to four counties in and near the Missouri Bootheel.





Key ID Features:
 Elongated acorns with dark stripes;
 range limited to four
 southeastern counties.



Key ID Features:
 Elliptical leaves with
 smooth edges; smooth,
 gray bark.



Key ID Features:
 Small, narrow
 "willowlike" leaves;
 smooth, gray bark;
 native to Bootheel,
 north to St. Louis.



Key ID Features:
 Small, club-shaped
 leaves; known only
 from four counties in
 southeast Missouri.



Fall Oaks and Hickories

By Bruce Palmer

Illustrated By Mark Raitchel

Many people suppose that Jack Frost is responsible for the color change, but he is not. Some leaves begin to turn color before we have any frosts. The changes in colors are the result of chemical processes that take place in the tree as it prepares for winter.

All through spring and summer, the leaves have served as factories, manufacturing the food necessary for the tree's growth. The food-making process takes place inside leaf cells in tiny structures called chloroplasts. The chloroplasts contain chlorophyll, which gives the leaf its green color. The chlorophyll absorbs energy from sunlight and uses it to transform carbon dioxide and water into carbohydrates, such as sugars and starches.

Along with the green pigment, chloroplasts also contain pigments called carotenoids. Carotenoids are yellow and orange in color and are common in many plants

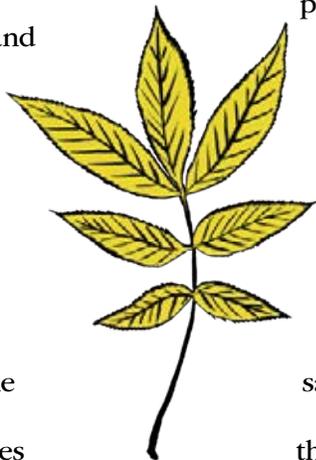
such as carrots, corn, daffodils and bananas.

Most of the year these yellowish colors are masked by the greater amount of green chlorophyll. But in fall, because of the shorter days and cooler temperatures, the leaves stop their food-making process. The chlorophyll breaks down, the green color disappears, and the yellow and the orange colors become visible.

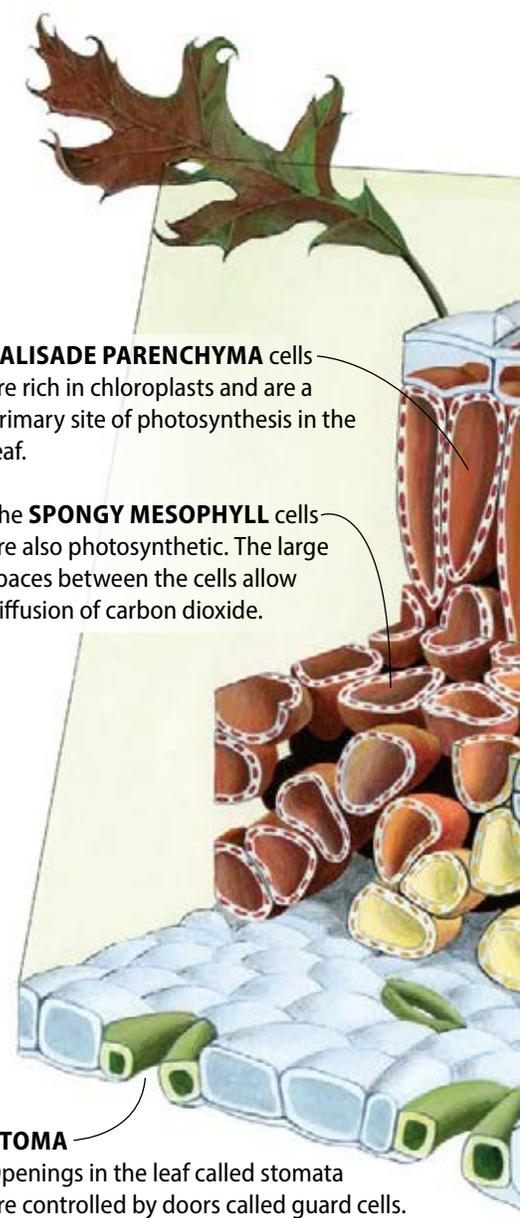
Carotenoids tint the leaves of hardwood species such as hickory, ash, maple, birch, cottonwood and sassafras.

The reds, purples, and their blended combinations come from another group of pigments in the cells, called anthocyanins.

These pigments are not present in the leaf through the growing season. They develop in late summer in the sap of the cells. The formation of anthocyanins depends on the amount of sugar in the leaf and weather conditions.



MISSOURI HICKORIES
yellow



PALISADE PARENCHYMA cells are rich in chloroplasts and are a primary site of photosynthesis in the leaf.

The **SPONGY MESOPHYLL** cells are also photosynthetic. The large spaces between the cells allow diffusion of carbon dioxide.

STOMA
Openings in the leaf called stomata are controlled by doors called guard cells. Stomata permit the exchange of moisture and carbon dioxide between the leaf and atmosphere.

Warm, sunny days followed by cool nights favor the formations of brilliant red colors. Sugar is made in the leaves during the daytime, but cool nights prevent movement of the sugar from the leaves. Anthocyanins are formed from the trapped sugars. The brighter the light during this period, the greater the production of anthocyanins.

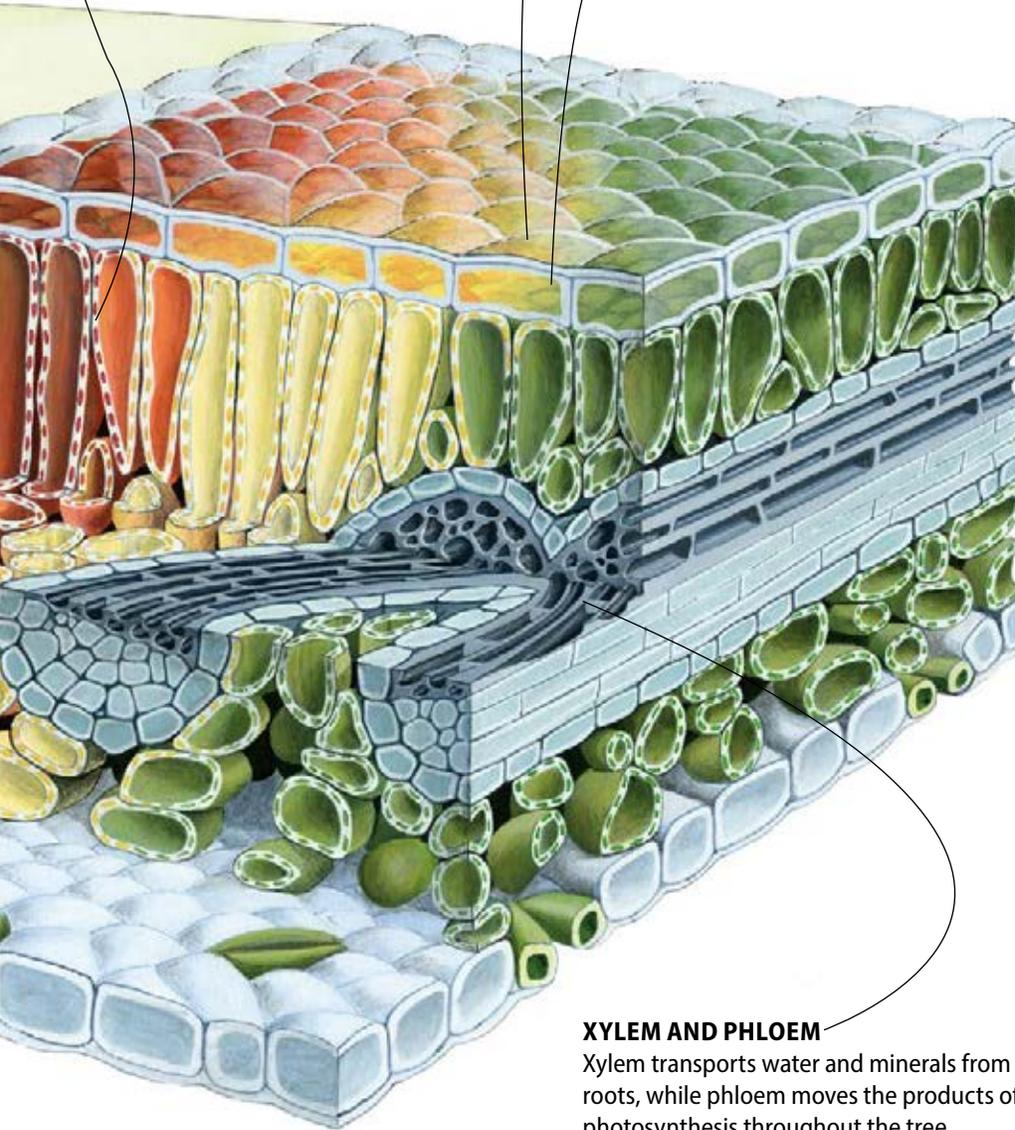
Anthocyanins give the color to common fruits such as cranberries, red apples,

PLASTIDS

The colors in leaves are contained in tiny structures within the cells called plastids. Plastids with green chlorophyll are called chloroplasts. Those with yellow and orange colors are called chromoplasts.

Leaf surfaces are coated with a **WAXY CUTICLE** to prevent water loss.

The **EPIDERMIS** is a layer of specialized, flattened cells, which appear on all plant surfaces.



XYLEM AND PHLOEM

Xylem transports water and minerals from roots, while phloem moves the products of photosynthesis throughout the tree.

blueberries, cherries and plums. In our autumn forests, they show up vividly in the maples, oaks, sweetgum, dogwood and blackgum. These same pigments often combine with the carotenoids to give deeper oranges, fiery reds and bronzes typical of many hardwood species.

Missouri has a great variety of trees, shrubs and vines. Their leaves turn at different times, and as a result, Missourians enjoy a fall color season that may last four

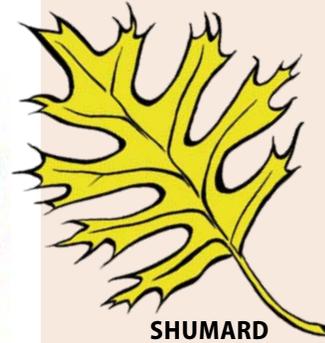
to six weeks. Sassafras, sumac and Virginia creeper are some of the earliest to change. They begin to show their fall colors in mid-September. By late September, the blackgum, bittersweet and dogwood are changing. The peak of fall color is usually mid-October. This is when the maples, ashes, oaks and hickories are at the height of their fall display. Usually by late October, the colors have faded and the leaves are beginning to drop from the trees.

OAK FALL COLORS

BLACK OAK
yellow



SHUMARD OAK
yellow



BUR OAK
yellow



SHINGLE OAK
yellow-brown/
red-brown



SCARLET OAK
scarlet



PIN OAK
red/bronze



WHITE OAK
purple





Serving nature and you

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