These pecan trees grow on a nut-producing plantation in Georgia. The pecan is the largest of the U.S. native hickories, but its trunk usually doesn't yield long boards.

Hickory and Pecan

America's muscle woods

by Jon W. Arno

I've always been a bit surprised that hickory and pecan aren't often used in furnituremaking, even though lots of these beautiful woods are harvested in this country. In fact, the only hardwoods harvested in greater quantities are oaks, poplars and maples, all common furniture woods. About the only time you hear any reference to hickory is in relation to ax handles or sporting goods.

Timber dealers sort the eight most valuable hickory species into two groups, true hickory and pecan hickory, each of which refers to four distinct species. True hickory is one of the heaviest and strongest of our domestic woods. It is remarkably springlike and very resilient when exposed to repeated bending and shock. Even in an age of synthetic materials, hickory maintains its international reputation as the first choice for tool handles, and it is also used for sports equipment, pallets and crates. Despite its iron-like hardness, you can steam-bend hickory easily and you can machine its creamy white sapwood and light-tan heartwood to a crisp edge. And this close-grained wood finishes well and doesn't require fillers. Pecan hickory has the same attributes as true hickory, although it isn't quite as hard and dense, and therefore it isn't quite as strong. But pecan is easier to work and its reddish-brown heartwood often has a more mellow figure.

In this article I'll tell you a little more about these attractive woods and their working characteristics, and I'll help you identify them (see the sidebar on the facing page). I think you'll find that hickory, and particularly pecan, *Carya illinoensis* (from trees like those in the photo above), are worth a closer look before you plan your next furniture project.

History of a tough family—True hickories and pecan hickories are from the same genus, *Carya,* which is commonly called hickory. This genus belongs to the Juglandaceae family, which also includes the walnut genus, *Juglans.* Although this ancient angiosperm family was once distributed around the world, all species of hickory and walnut were annihilated in ancient Europe by glaciers. Walnut was reintroduced into Northern Europe a couple of millenia ago through the trade of nuts, but hickory was never re-established. Thus, hickory never had a chance to become part of the European cabinetmaking tradition.

Considering 17th-century America's abundance of walnut, oak, maple, chestnut and cherry, you can understand why colonial craftsmen chose these familiar furniture woods and ignored the hickories. The North American Woodland Indians taught the settlers to eat the sweet hickory nuts, and the displaced Europeans also learned to use hickory for ax handles, wagon spokes and archery bows.

Pecan, *C. illinoensis,* on the other hand, became popular in the French settlements in the lower Mississippi Valley for the distinct and still-popular French Provincial style furniture. With its cabriole legs, scalloped skirts and framing, beaded edges, and considerable hand-carved decoration, it's a wonder this style found a new medium in pecan. Although the pecan hickories are the softest of the hickories, none of them are as easy to carve as walnut and chestnut, which the French used in Europe.

Hickories are bargains—True hickory and pecan hickory are widely available from sawmills and sawyers at prices ranging from

$1 to $2 per board foot. Hickories grow throughout eastern North America, from southern Canada to central Mexico. But genuine pecan, *(C. illinoensis),* with a botanical name meaning "the hickory of Illinois," is primarily a Southern species native to the lower Mississippi Valley. Since the development of the papershell variety of nuts, however, pecan has been cultivated throughout the Gulf Coast states, from Texas to Northern Florida and Virginia. In fact, Georgia, which was once totally void of this species, now leads the nation in pecan nut production. Unfortunately for the woodworker, orchard-grown genuine-pecan trees produce short lengths of lumber.

According to the U.S. Forest Service, there are more than 40 billion bd. ft. of standing hickory saw timber in the United States. But hickories are exotics almost everywhere else in the world. Of the 15 species of hickory worldwide, 3 (which are of little commercial value) grow in China and the rest grow in the United States. The eight domestic species of hickory, shown in the chart on the next page, are commercially valuable, and great quantities of true hickory are cut for tool handles, target bows, skis and firewood. The hickory genus, however, suffers from identity problems here in its native range, because both true hickory and pecan hickory are often bundled together and marketed as "mixed hardwoods." Here you'll find both hickories mixed with other woods like oak, ash and sometimes elm, all of which are used in pallets and crates. Since sawyers may not know what hickory species they're cutting, customers can't count on uniformity from shipment to shipment or from board to board. If you're after genuine pecan, you will probably have the best luck in the South, where most of the pecan nut plantations are located. However, this isn't a guarantee, because true hickories crossbreed with pecans and air-borne cross-pollination creates a hodgepodge of hybrid species. This causes botanists to say the hickories are highly unstable.

Working with hickory—Both true and pecan hickories are ring-porous or semi-ring-porous woods, with large earlywood pores and smaller latewood pores. However, like walnut, hickory's mellow figure is caused by the somewhat gradual transition between earlywood and latewood. This also means that the wood can be planed and turned smoothly, because the cutter edge won't chatter

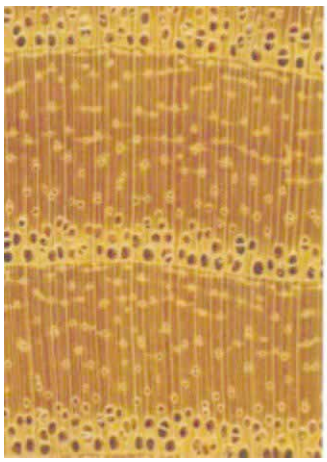
Identifying hickories

If you plan to buy any of the true hickory or pecan hickory species, you must be able to distinguish them from mixed hardwoods, like ash and elm; you might be able to do this with your naked eye. But to distinguish the true hickories from the pecan hickories, you'll probably have to look at clean-cut end-grain samples with a 10-power hand lens and compare them with the photomacrographs below.

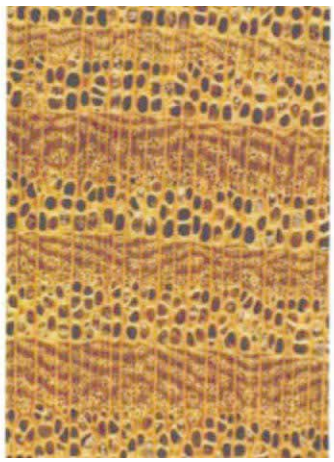
White ash, *Fraxinus americana* (shown in the left photomacrograph), can be mistaken for hickory, especially if your samples are light-colored sapwood. White ash reveals an abrupt transition from large earlywood pores to dense, more lustrous latewood pores. The smaller pores in the latewood are surrounded by parenchyma, forming light-colored patches against the darker background tissue. Hickories, on the other hand, have continuous thin bands of parenchyma, forming fine white lines, that are parallel to the annual rings.

Slippery elm, *Ulmus rubra* (shown in the center, left photomacrograph), may be more difficult to distinguish from hickory than ash. With a hand lens, you can see elm also has light-colored wavy bands, which are formed by the latewood pores. In hickory, the bands and pores are separate. Also, elm's earlywood is a narrow strip that is usually just a few pores wide, and the transition from earlywood to latewood is very abrupt.

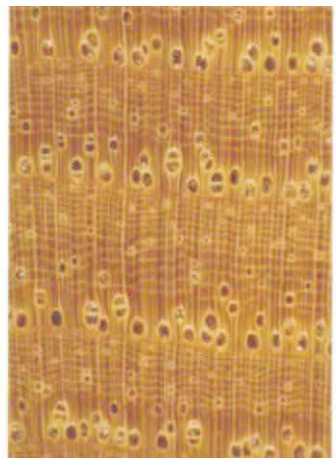
Separating true hickories from pecan hickories is difficult; as members of the same genus, they're very similar. However, shagbark hickory, *Carya ovata* (shown in the center, right photomacrograph), is ring-porous and reveals a more abrupt transition from earlywood to latewood than pecan. Pecan, *C. illinoensis* (shown in the far right photomacrograph), is typically semi-ring-porous and the transition is more gradual. Also, shagbark does not have bands of parenchyma in the earlywood; pecan does. *—J.A*



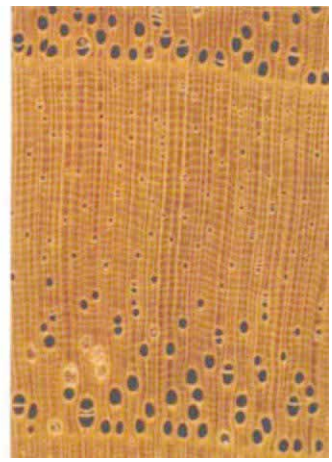
This 10-power photomacrograph of white ash endgrain shows abrupt transition from earlywood to latewood and light parenchyma around latewood pores. These traits distinguish it from the hickories.



Slippery elm can be distinguished from the hickories by its latewood pores inside light-colored, wide wavy bands of parenchyma. The earlywood is seen as a narrow strip only a few pores wide.

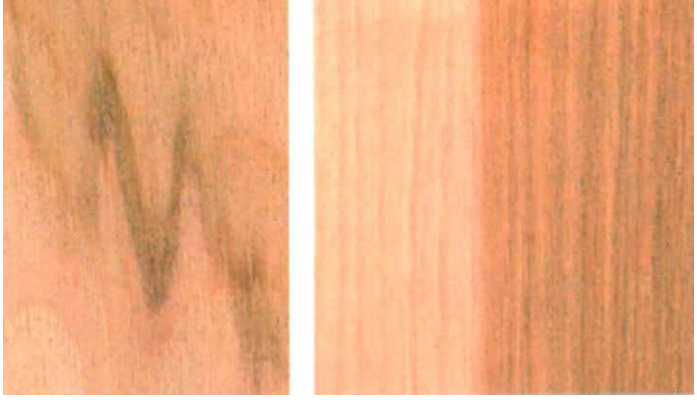


Shagbark hickory is ring-porous and distinguishable from pecan by an abrupt transition from earlywood to latewood and by thin bands of parenchyma that cross its rays only in the latewood.



Pecan, unlike shagbark hickory, is typically semi-ring-porous and there is a gradual transition from earlywood to latewood. Its thin parenchyma bands are evident in both the earlywood and latewood.

Photos this page: R. Bruce Hoadley



Left: Pecan hickory is commonly darker than true hickory. Its rust-colored heartwood mellows in time to a reddish brown with creamy white sapwood. ***Right:*** *This sample of true hickory, which is the end scrap of 1-in.-thick by 6-in.-wide tongue-and-groove flooring, is lighter in color than pecan.*

Hickories

Commercial Name/Species	Specific Gravity	Shrinkage (%) R	T	V
True hickories				
Shagbark hickory, *C. ovata*	0.72	7.0	10.5	16.7
Shellbark hickory, *C. laciniosa*	0.69	7.6	12.6	19.2
Pignut hickory, *C. glabra*	0.75	7.2	11.5	17.9
Mockernut hickory, *C. tomentosa*	0.72	7.7	11.0	17.8
Pecan hickories				
Pecan hickory, *C. illinoensis*	0.66	4.9	8.9	13.6
Bitternut hickory, *C cordiformis*	0.66	NA	NA	NA
Water hickory, *C. aquatica*	0.62	NA	NA	NA
Nutmeg hickory, *C. myristiciformis*	0.60	NA	NA	NA

Specific Gravity = Oven dry weight/volume at 12% moisture content
R = Radial shrinkage, green to oven dry
T = Tangential shrinkage, green to oven dry
V = Volumetric shrinkage, green to oven dry
NA = Information not available

Shagbark hickory has curly, shaggy bark and its small round nuts are edible and sweet, but difficult to crack. The hard, elastic, reddish-tan heartwood is lighter in color than pecan (*C. illinoensis)* and it's surrounded by a wide band of creamy yellow sapwood, especially on immature, second-growth trees.

Shellbark hickory prefers moist soil, and its range is much smaller than shagbark. Shellbark has less shaggy bark and its edible nuts are slightly larger than those from the shagbark, but otherwise the two woods are identical.

Pignut hickory is plentiful in the Appalachian foothills from Massachusetts to Georgia. The nuts are bitter, but they're used to fatten livestock. Pignut wood is the hardest of the hickories.

Mockernut hickory tolerates dry, sandy soil and it's found farther south than other true hickories. Its small, edible nut is in a thick husk, and its wood may vary due to different growing conditions.

Pecan hickory is primarily cultivated for its nuts, especially the papershell variety. Pecan is the largest of all the hickories, growing to 140 ft. tall and more than 6 ft. in diameter. Its dark reddish-tan heartwood is often streaked with dark brown or black, and it is semi-ring-porous with a more mellow figure.

Bitternut hickory is plentiful and widespread. It is sometimes marketed as pecan, but it's lighter in color. It grows farther north where the wood may have a flamboyant figure due to slower growth and a more abrupt transition between earlywood and latewood.

Water hickory is native to the coastal plains of the South Atlantic and Gulf Coast states, and prefers swampy soil. This smaller tree's nuts are tiny and bitter, but its wood is very similar to pecan.

Nutmeg hickory nuts are shaped like true nutmegs, hence this tree's name. Its wood has the favorable characteristics of pecan (it's dark and has a subtle figure), but it is easier to work. It may be the connoisseur's choice, if it can be found. It grows in pockets from Texas to the Carolinas, but it isn't plentiful and is seldom separated from other species in sawmills.

or lift and tear out porous earlywood tissue. Due to the extreme hardness of hickory, you get crisp, unfrayed edges when you shape, bore and saw it. And hickories contain proportionally more cellulose and less gum and lignin (the natural adhesive that bonds wood cells together and makes wood rigid and brittle); so sharp bits and blades won't friction-burn as readily as they do on some woods, such as cherry and maple. Despite being so hard, hickory's low lignin content makes it one of the world's most limber woods. The four true hickories are especially resilient and have a springlike elasticity.

Compared to walnut, hickory has a fine texture and considerably more surface luster, making it easier to polish and more appropriate for rubbed wax or oil finishes. Provided your hickory is seasoned adequately, it doesn't wool up when sanded, and you probably won't need fillers to achieve a glassy smooth finish if you coat it with heavy bodied varnish. These characteristics are common to all of the hickories, but there are notable differences between true hickories and pecan hickories.

True hickories—The four species of true hickories are harder, heavier and more elastic than pecan hickories. As with many dense woods, true hickories shrink considerably when drying, and so the wood is somewhat unstable. True hickories are generally lighter in color than pecan hickories, as shown in the samples above. But you can't always tell the two types of hickories apart by color, because growing conditions may produce true hickory with attractive, dark heartwood that can be streaked with rust-red or chocolate-brown highlights (see the sidebar). Old, slow-growing true hickories often yield beautifully figured boards, which tool-handle makers grade defective and hence price cheaper than pecan. But these old trees are rare and you have to look for this kind of wood.

Second-growth true hickory, which grows rapidly on fields that have been logged, has wide annual rings, light color and straight grain, and this wood is the handle maker's choice. Since this second-growth wood has proportionally more dense latewood, it is stronger. The demand for hickory tool handles is so high that only 25% of true hickory timber ends up as ordinary lumber. And much of the wood that doesn't meet the handle maker's requirements is sold as firewood or converted into chips for smoking meats. In fact, few cabinetmakers have had enough experience with true hickory to tell us about its working characteristics.

Pecan hickories—The pecan hickories are slightly softer and easier to work than any of the true hickories, but genuine pecans are still hard enough to be on par with white oak. Many of the characteristics that make pecan hickory less desirable for tool handles are what make it ideal for cabinetmaking. Genuine pecan is 20% to 30% more stable than the true hickories. Its average volumetric shrinkage (13.6%, green to oven dry) is less than white oak and sugar maple. As a result, properly made joints in pecan furniture remain snug and, provided the wood is seasoned carefully, warping and checking aren't serious problems. And with the exception of bitternut, pecan hickories are darker than true hickories and seldom need staining. Their natural, rust-tan color, shown in the left sample above, mellows in time to a rich and attractive reddish brown when finished with penetrating oil or clear varnish. Even though pecan isn't as elastic and resilient as the true hickories, it is still a first-class muscle wood compared to most of the other common, domestic hardwoods. □

Jon Arno is a wood technologist and consultant in Schaumburg, Ill. Wood samples provided courtesy of A&M Wood Specialty, Inc., 358 Eagle St. N., Box 3204, Cambridge, Ont., Canada N3H 4S6; and Constantine, 2050 Eastchester Road, Bronx, N.Y. 10461.