

Hardwood Lumber and Veneer Series



Yellow-Poplar

FNR-293-W

Daniel L. Cassens, Professor and Extension Wood Products Specialist
Department of Forestry and Natural Resources, Purdue University, West Lafayette, IN 47907

EXPERT
REVIEWED

Of all the eastern hardwoods, yellow-poplar (*Liriodendron tulipifera* L.), or tulip poplar and American tulip, wood is routinely the tallest, largest, clearest, and straightest tree in the forest. It can develop dense stands much like the conifers. The trees are abundant, making the wood inexpensive. It has had a wide variety of functional and sometimes decorative uses both in the past and present. It is “machine food” for the wood manufacturing industry.

Yellow-poplar grows throughout most of the eastern United States and north to central Michigan, Lake Ontario and southern Massachusetts, with the exception of north central Pennsylvania and central New York. The trees occur on moist, well-drained, loose textured soils of moderate depth. Yellow-poplar tends to develop best in full sunlight. Because of its rapid juvenile growth, it will dominate other species. The trees are often of good size, thus wide, long lumber is relatively common in the marketplace. The largest tree reported is nearly 10 feet in diameter at 4¼ feet above the ground.

Wood Color and Texture

Most yellow-poplar timber available today has a very wide band of white sapwood. Depending on processing times and conditions, this sapwood may remain white or discolor to a grey cast. Sticker stain is a common occurrence. The sapwood can eventually turn very light brown with exposure to the light. The central heartwood column is usually a light yellow to greenish color which changes to a light to dark brown color. Some old growth material can be a very dark green color when freshly cut, but on the surface and after aging, it too is a dark brown color.



Chip Morrison

Yellow-poplar and Dan Cassens

Freshly cut lumber can also have streaks of bright blue, black, purple, or even red mineral stain. With time, these bright colors fade to the more common brown color. The contrast of white sapwood and yellowish green heartwood color makes clear uniform finishing of the wood difficult or impossible.

The wood is diffuse porous, meaning the pores are of uniform size throughout the growth ring.

However, the wood does have a characteristic grain pattern due to a general flattening of the cells at the end of each year's growth. A small fleck can be seen on finished quartered surfaces.

Workability

The wood is rated as intermediate in planing, shaping, turning, and boring. Being intermediate in density, the wood can have a tendency to fuzz or tear. However, the use of sharp tools should eliminate any problems. The wood is easily painted and tends to hold paint well.

Strength

At 12 percent moisture content, yellow-poplar wood is relatively light and weighs 29.4 pounds per cubic foot. However, the weight of the wood can vary substantially. Due to the lighter weight, the mechanical properties of the wood are reduced as compared to the heavier species. However, the MOR (breaking point in bending) and MOE (bending strength) in comparison to other woods of similar density are relatively high.

Steam Bending

In a U.S. Forest Products Laboratory study, yellow-poplar is rated relatively low in bending. The wood is seldom bent in commercial manufacturing processes.

Drying

The wood is easily dried with a moderate kiln schedule. If not properly stacked and weighted, however, some warping can result.

Shrinkage

The wood is intermediate in shrinkage.

Decay Resistance

The heartwood is rated with only slight or no resistance to decay. It should not be used where a decay hazard exists. However, heartwood from the old-growth material seems to have performed well when used for beveled drop siding, window parts and frames, and other applications that are periodically wetted. The old-growth wood was also noted for some resistance to termites. Today's trees have a very high percentage of sapwood, which has no resistance to decay. Studies on conifers with natural decay resistance have shown that younger timber does not have the resistance of the old-

growth material. From experience, a similar situation seems to exist for yellow-poplar.

Commercial Use, Grading, and Value

Yellow-poplar has a long and varied history of applications and uses. Pioneers used it for the upper logs on cabins and boards for every possible application from furniture and millwork to heavy timbers in covered bridges to construction lumber. The old-growth heartwood was stained to look very much like cherry when used in furniture.

By the turn of the century, old-growth yellow-poplar was a common construction material for framing, millwork, and even beveled house siding.

Before the advent of modern day particleboard, the species was almost universally used for corestock in furniture veneering operations. Large amounts of rotary-cut poplar were also produced for use as cross banding and for berry and fruit boxes. Solid stock was used in shipping boxes and crates.

Today, the species continues as a favorite for painted furniture and hidden parts. Low-grade material often ends up in pallets and crates. It is also used in toys, novelties, and other miscellaneous items. It is sometimes used in place of basswood for Venetian blinds.

The species has also been rediscovered as a construction material. As western pine resources became scarce, the species was quickly readapted for moulding, trim, and interior doors. It is now rotary peeled for plywood and it is also used for other laminated construction type products. Smaller trees are flaked for panel products.

Yellow-poplar lumber is priced and sold for both the Appalachian and southern regions. Large price differentials between the two regions do not exist. However, market reports for the Appalachian region list 4/4 through 16/4 stock, whereas reports for the southern region list only 4/4 through 8/4 stock.

The species is low to intermediate in value. Prices are less than the showy grained and decorative woods such as oak, cherry, maple, and walnut and somewhat more than low-valued species, such as beech, gum, and cottonwood.

Shipments of yellow-poplar should contain only the one species. However, magnolia is very similar

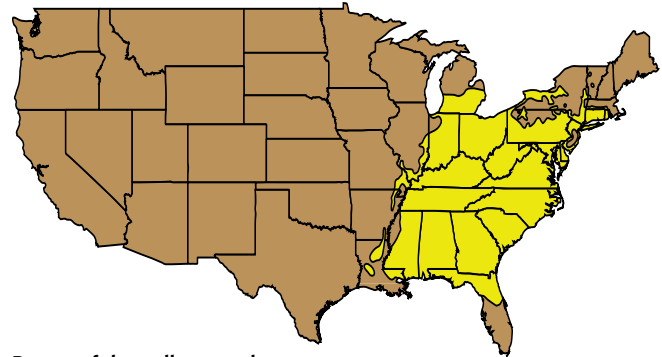
Hardwood Lumber – Yellow-Poplar

and is sometimes mixed in the shipment of southern lumber. The author has seen both boxelder and aspen mixed with yellow-poplar. In the south, magnolia may also be mixed with yellow-poplar but it too can be separated anatomically. Each of these species, however, can be separated with certainty.

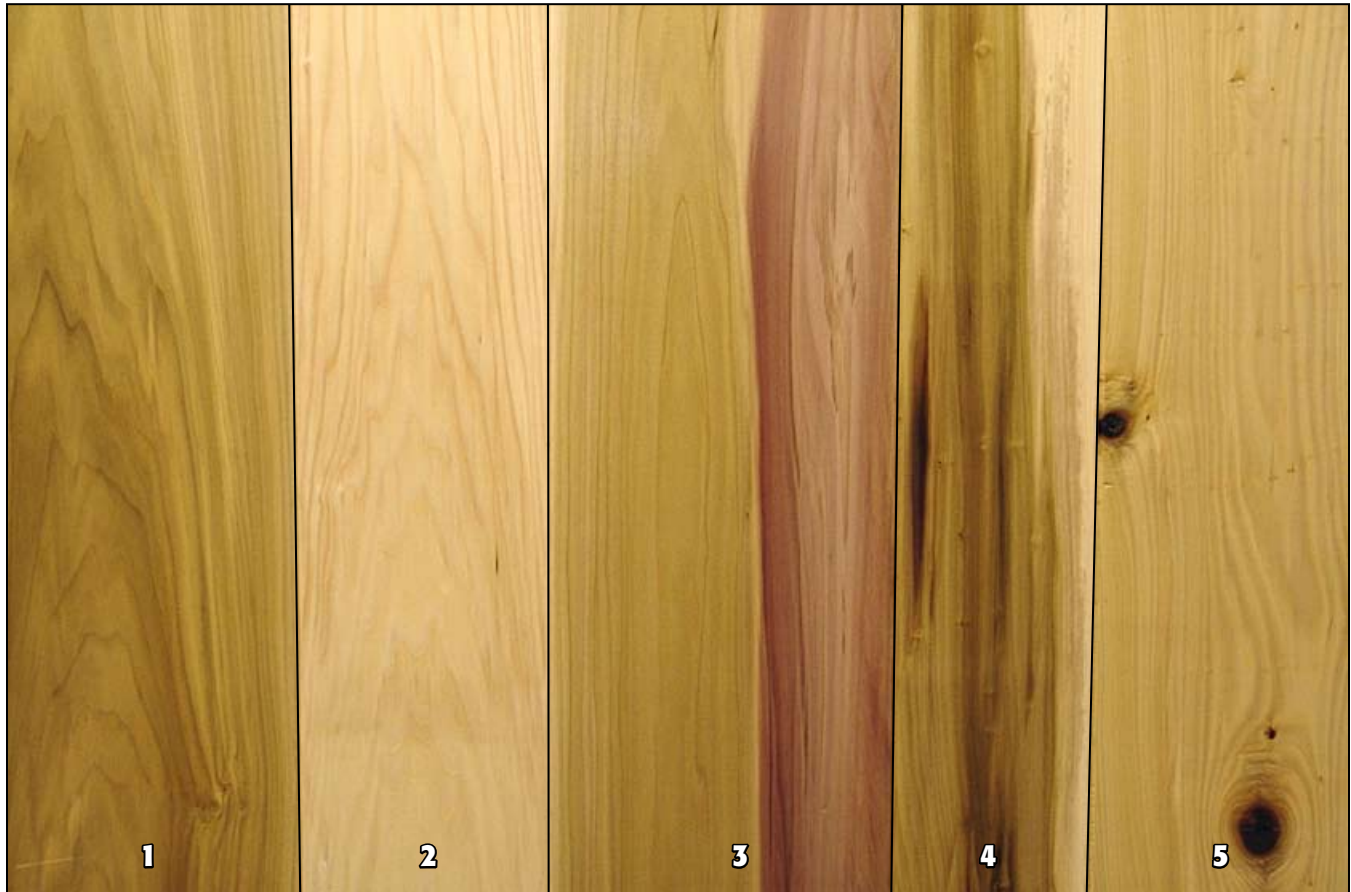
The upper grades of lumber are graded standard except some mineral stain is allowed. No. 1 Common allows slight sap stain and No. 2A allows unlimited sap stain. The stain referred to here is a light grey color in the sapwood after surfacing. Usually, it is the result of oxidation stain, but it can also be caused by mold and fungi. Mineral stain is not limited in the common grade.

Other Considerations

Yellow-poplar is probably one of the best buys in the lumber market, even though it has a wide variety of applications. There is an excellent stock of good-sized sawtimber available. Thus, the widths and lengths of individual lumber pieces are generally excellent. It is easily sawed and dried, thus severe shortages and substantial price increases are not likely. This species deserves consideration wherever a functional wood is needed.



Range of the yellow-poplar



Chip Morrison

Yellow-poplar is one of our most abundant, inexpensive, and commonly used hardwood species. The boards are normally wider than for many other species. This species has a moderately wide sapwood.

The wide, clear heartwood board on the left, Board 1, is typical of high-grade yellow-poplar. The growth rings are faintly visible, but there are no discernible pores visible to the naked eye. The color of the heartwood will vary from this relatively dark green color to a lighter almost yellow color in some boards. Small burls are present in the bottom right corner of this piece.

Board 2 is all white sapwood. Heartwood and sapwood are often mixed in the same board making it difficult to obtain a uniform natural color in a finished product. The sapwood tends to darken to a very light brown, and the greenish heartwood changes to a dark brown over an extended time period.

Sapwood also tends to turn grey due to oxidation stain. This piece shows evidence of two very light sticker marks. Stickers are strips of lumber used to separate the different coarse of boards during drying. In white woods, stain can often develop under these stickers. In this case, the contrast appears to be due to weight and crushing of the wood.

Board 3 shows a purplish color, called mineral stain on the right side. In some boards this color will be almost black. With time, the color changes to a dark brown. This stain is probably the result of wounding to the tree.

Board 4 shows mixed heartwood and sapwood and numerous grain swirls. The grain swirls are probably the result of shallow bird peck in the cambium. Some sap stain appears along the right edge.

Board 5 shows both open and tight knots and grain swirls across the width of the board.

PURDUE AGRICULTURE

NEW 9/07

It is the policy of the Purdue University Cooperative Extension Service that all persons have equal opportunity and access to its educational programs, services, activities, and facilities without regard to race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, disability or status as a veteran. Purdue University is an Affirmative Action institution. This material may be available in alternative formats.