FOREST PRODUCTS LABORATORY † FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE

VENEER CUTTING AND DRYING PROPERTIES

PECAN

(Reported)

There are four commercially important pecan hickory species: Sweet pecan (Carya illinoensis), bitter pecan (C. aquatica), nutmeg hickory (C. myristicaeformis), and bitternut hickory (C. cordiformis). Sweet pecan is the largest tree in the hickory group. Mature trees are 200 to 300 years old and have a height greater than 100 feet and a diameter of from 2 to 4 feet. Bitter pecan or water hickory is a smaller tree rarely over 2-1/2 feet in diameter. Most of the commercial sweet and bitter pecan grows in the lower Mississippi Valley. Nutmeg hickory has a very limited range and is not commercially important. Bitternut hickory is found throughout the eastern states but is of limited commercial importance.[1]

Pecan is not so dense, strong, hard, and tough as true hickory, but it equals or exceeds commercial white oak, hard maple, and white ash in these properties. The sapwood, which makes up about one-half of the usable volume of average pecan logs, is white in color. The heartwood is reddish-brown in color. Pecan grows rather rapidly and is normally straight-grained.

Pecan lumber is used principally for boxes and crating, automobile truck framing, furniture, flooring, and handles. In the past 20 years it has been increasingly used for parquet flooring, wall paneling, and chairs.[2]

It is reported that there is considerable waste in manufacturing finished products because of many defects found in pecan. Ring shake, bird peck, insect damage, bark pockets, and knots are commonly found in pecan logs.[1]

Selection, Handling, and Preparation of Logs for Cutting

The veneer cutting and drying properties of sweet pecan and bitter pecan have been studied at the Forest Products Laboratory.[3] Veneer cutting and drying tests were made on 15 logs of sweet pecan from near Onward, Miss. and on six logs of bitter pecan from Holmes County, Miss. The sweet pecan logs were reported to be of relatively low quality for the species. As a group, they appeared rough and knotty. In some cases bird peck and insect damage were noted on the bark and on the ends of the logs. The six bitter pecan logs were selected in the tree for veneer-cutting studies, but were not veneer-grade logs.

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[1] Betts, H. S. Pecan, American Woods. Forest Service, U. S. Department of Agriculture. 1945.

[2] Southern Hardwood Producers, Inc.: "Southern Hardwoods, No. 4, Pecan." Southern Lumberman. Vol. 161, No. 2031. Nov. 15, 1940.

[3] Acknowledgment is made to the Illinois Central Railroad Company for their cooperation in supplying the sweet pecan logs used in this study.

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The test logs were from 13 to 20 inches in diameter at the small end. The average specific gravity of the test material was 0.60. The growth rate varied from 3 to 20 rings to the inch, the sweet pecan logs being of faster growth rate than the bitter pecan logs.

Bolts heated in water at 170° to 180° F. yielded smooth and tight rotary veneer 1/16 inch to 1/6 inch in thickness. Bolt end checking that occurred during conditioning at this temperature was not excessive, as it was at higher temperatures. Heating the bolts at 170° F. or higher also facilitated the removal of the bark with hand tools.

A temperature of 150° F. at a core diameter of 8 inches can be developed by heating 8-foot bolts of different diameters in water at 170° F. according to the following schedules:

Average log diameter (Inches)	Heating time (Hours)
12	9
18	26
24	55
30	100

Heating periods that are inconveniently long for production operations may be reduced by partially heating, cutting to a medium diameter, reheating, and cutting to final core diameter.

Veneer Cutting

The most common defects found in cutting the logs studied were the overgrown tracings of cambium mining insects. These tracings were apparent as local grain deviations and frequently they were associated with traumatic tissue and mineral deposits. Tracings were common in all bolts and caused continuous trouble since the associated mineral deposits nicked the lathe knife. Furniture manufacturers have also reported that the abrasive character of pecan required the use of special cutting tools.[4] Ring shake was the worst defect in the bitter pecan logs but was not a serious defect in the sweet pecan test logs. Other defects that were common in the pecan logs were knots, bird peck, and bark pockets.

The lathe settings[5] given in table 1 were found to be satisfactory for cutting 1/16-inch, 1/8-inch, and 1/6-inch pecan veneer.

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[4] Murphy, S. J. Louisiana Sweet Pecan, the Stubborn Aristocrat of Furniture Woods. Furniture Manufacturer. Vol. 53 (9). September 15, 1938.

[5] Fleischer, H. O. Experiments in Rotary Veneer Cutting. Proceedings. Forest Products Research Society. 1949.

Table 1.--Lathe settings used for pecan veneer

Veneer thickness	Knife angle	Nosebar opening	
		Horizontal	Vertical
Inch	Degrees-Minutes	Inch	Inch
1/16	90-10	0.055	0.016
1/8	89-40	.115	.028
1/6	89-35	.150	.030

Veneer Drying

Most of the green sweet pecan veneer had a moisture content of from 55 to 85 percent. The moisture content of the bitter pecan averaged about 25 percent higher than that of the sweet pecan. Temperatures of 250° F. and 320° F. were found satisfactory for drying the pecan veneer in a small progressive-type veneer dryer. Table 2 lists the schedules used to dry veneer of various thicknesses.

Table 2.--Drying schedules for sweet pecan sapwood veneer

Veneer thickness	Temperature in dryer	Time in dryer*	Final moisture content
Inch	°F.	Minutes	Percent
1/16	250	8	2 to 4
1/8	250	20	2 to 4
1/8	320	12	2 to 4
1/6	320	14	9 to 13

*Approximately 25 percent longer time should be used for drying bitter pecan sapwood veneer. The heartwood of both species dries about 10 percent slower than the sapwood. These figures are only approximate because the veneer from different bolts varied considerably in drying rates.

Tangential shrinkage during drying to 2 to 4 percent moisture content averaged 8.5 to 9 percent of the green width. The shrinkage when drying to 9 to 13 percent moisture was about 6.5 percent.

When drying 1/16-inch veneer to 2 to 4 percent moisture content, a slight buckle was formed between springwood and summerwood. This buckling did not occur in drying 1/8- and 1/6-inch veneer.

Veneer Yields

The 21 logs used in this study produced a very low percentage of face veneer. Since the sweet pecan logs were of poorer quality than would normally be cut into veneer, it is not possible to draw conclusions as to the acceptability of that species from the yield standpoint. One bitter pecan log yielded more face veneer than any of the other pecan logs, indicating that an occasional log of this species may be suitable for high-grade veneer production. An estimated yield of over 80 percent acceptable box shook indicates that this may be a suitable use for rotary-cut pecan (both sweet and bitter).

Other Factors

Tests on pecan blocks indicate that good glue joints can be made with this wood.[6] Limited tests on pecan plywood indicate that it tends to warp more than many of our more commonly used plywood species.

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[6] Truax, T. R. The Gluing of Wood. U. S. Department of Agriculture Bulletin No. 1500. 1929.