Monahan, Ralph T., "EC67-1214 Marketing and Utilization of Nebraska Timber" (1967). Historical Materials from University of Nebraska-Lincoln Extension. 3839.
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MARKETING and UTILIZATION of NEBRASKA TIMBER
Marketing & Utilization of Nebraska Timber

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Introduction

The average Nebraskan is unaware of the small but thriving timber industry in the state. This bulletin was prepared for people who want to learn more about the uses and possible outlets for native wood.

For names and locations of Nebraska forest industries, the reader is referred to the Directory of Nebraska Forest Products Industries published annually by the State Extension Forester's office, 105 Plant Industry Building, University of Nebraska - East Campus, Lincoln, Nebraska 68503.
The Forest Resource

Nebraska's commercial forest land amounts to slightly over one million acres, 90% of which is held in small private ownerships.

Generally, timberlands follow the major waterways of the Missouri, Platte, Niobrara and Republican Rivers and their tributaries. Isolated pockets of timber frequently occur in the canyons and draws of the Sandhills, perhaps indicative of past periods of widespread forestation.

Farther west, forests again become prominent in the Nebraska Pine Ridge, a crescent-shaped geologic fault situated in the northwestern tier counties of Sioux, Sheridan and Dawes.

The forest type of Nebraska is unique in that the natural range of some central hardwoods and western softwoods extends to within the state boundaries. Cottonwood, elm, ash, hackberry and walnut can be found growing near major waterways. Ponderosa pine is the principal western species, most of which grows in the 250,000-acre Pine Ridge near Chadron.

Limited stands of ponderosa are found in the Niobrara drainage to the east and the Wildcat range to the southwest.

History of Nebraska's Timber Industry

At the turn of the century, as the lumber industry moved west to the virgin forest of the Rocky Mountains, many mills were set up in the state which virtually destroyed Nebraska's timber. The policy in those days was to cut and get out; no thought was given to forest management. As a result, the residual stands which were left were, at best, in poor condition.

Today, for the most part, the opposite is true. Wood-using industries realize that timber is a renewable natural resource and are now harvesting their crop on a sustained yield basis. State and Federal programs now emphasize the benefits of multiple-use forest management.
Under such programs, valuable assets such as watershed management, recreation, forage and wildlife management are given weight equal to that of timber production.

In 1955, Nebraska had 285 sawmills. By 1960 this figure had dropped to 100, and now 50 sawmills are operating full- or part-time throughout the state.

The seemingly high attrition rate is not alarming, since a majority of the mills surveyed in 1955 and 1960 were not cutting on a commercial basis but rather sawed rough lumber for their own use.

This same pattern still exists, with about a dozen mills cutting lumber commercially and the remainder providing custom sawing to their neighbors.

Sawtimber

A majority of the state's annual harvest of 15 million board feet is cut from cottonwood. Strength properties of cottonwood in relation to its light weight make it especially suited for fabrication into pallets, stock rails, truck beds and rough lumber for farm construction purposes.

Red, black and bur oak, sycamore, white and rock elm, Kentucky coffee tree and ponderosa pine are other native species frequently manufactured into rough lumber.

Red elm, soft maple, ash, basswood, hackberry and black walnut, because of their greater value, are purchased and shipped in log form to larger out-of-state mills for manufacture into gunstocks, veneer and furniture squares.

Logs used for sawtimber must be at least 12 inches in diameter at the small end, have a minimum length of 8 feet, plus 2 inches on each end for trim. Trees should be sound, straight and free of defects.
Fig. 1. Typical Nebraska sawmill cutting rough lumber for local consumption.

Trees which show evidence of containing foreign objects such as barbed wire or spikes are worthless and are never purchased by sawmills.

Sawtimber is measured and purchased in units of board feet, a board foot being a piece of wood one inch thick by twelve inches square. Tables known as log rules have been developed which give the volume of a log in terms of board feet according to the diameter and length of the log.

For Nebraska, the rule which is most commonly used is known as the Doyle Log Rule (Table 1).

Payment for timber to the landowner is referred to as the stumpage price. Stumpage prices are computed as the amount the timber buyer can afford to pay for standing trees after he has deducted the costs of cutting, skidding, hauling and a fair profit margin. Consequently, bad logging conditions, together with long hauls to the mill will result in lower stumpage prices.
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An even more important reason for variations in stumpage prices among buyers can be attributed to markets. If a certain buyer is in contact with a foreign firm which cuts face veneer in his market allows him to pay more for timber than a buyer who purchases logs for lumber. This is why there is a wide range of prices offered for highly valued timber such as black walnut.

The key piece of equipment in any sawmill is the headsaw. There are three types of headsaws: circular, band
and gang. Fewer maintenance problems and lower initial cost have made the circular headrig the most popular in the state.

There are some bandsaws in Nebraska cutting high value species. Because bandsaws are thinner, less of the log is wasted in the form of sawdust.

There are no gang headrigs in the state.

After boards are cut on the headsaw, it is necessary to rip them to even widths. This is accomplished through the use of an edger, which has several small circular saws on a single arbor that can be adjusted to accommodate different widths. As boards leave the edger, they are stacked for air drying, or if lumber is to be sold in the rough green condition, boards are packaged in units of one thousand board feet (MBF).

Many of the sawmills in Nebraska cut wood on a custom basis only. In such cases, the sawyer charges the timber owner a flat rate ($35-$45 MBF) for his services. The timber owner often helps the sawyer by removing slabs from the headsaw and positioning logs on the carriages.

Some of the commercial sawmills in Nebraska direct a major portion of their production to the manufacture of pallet stock. Pallet stock is a term referring to stringers, blocks and deck boards used in fabricating wooden pallets. Pallets are wooden platforms upon which merchandise can be transported or stored.

Consumers specifications for pallets vary to such degrees that cutting standard sized pallets is out of the question. Basically, there are three types of pallets: expendable, reusable and special use. Palletization has done much to reduce the cost of material handling and storage in industry. Many pallet mills also produce large volumes of crating for use in the shipping of manufactured products.
Fig. 2. Hand nailing of pallets has advantages over automatic nailer. With automatic nailing machines, pallet stock must be cut to extremely narrow tolerances to be usable.

Pulpwood

Until 1962, the second growth ponderosa pine resource of the Nebraska Pine Ridge was virtually untapped. Small sawmills and a few isolated post-treating plants did little to utilize the 250,000-acre forest.

Through the efforts of a pulpwood dealer in the Black Hills of South Dakota, working to reduce the freight rates of pulpwood shipped to Wisconsin papermills in carload lots, a market for pulpwood became a reality.

A Nebraska firm received a subcontract to ship wood east. By working with the Black Hills dealer and obtaining direct contracts, this firm has increased

Fig. 3. Typical pulpwood logging operation. Near Chadron, Nebr.
production from 2,500 cords in 1962 to its present cut of 15,000 cords per year.

Because Wisconsin paper mills are faced with skyrocketing labor costs and an increased public demand to set aside land for recreational purposes, it appears that the amount of pulpwood cut from the Pine Ridge will double in the next few years.

Cutting 15,000-30,000 cords out of the Pine Ridge on a yearly basis will not deplete the resource. To the contrary, removing such volumes is the only way in which good forest management can be practiced in that area.

On a sustained yield basis, foresters have determined that 30,000 cords of pulpwood a year should be harvested from the Pine Ridge.

Fig. 4. Loading 100-inch pulpwood sticks at a log deck in the Nebraska Pine Ridge.

Wood suitable for pulpwood must be cut from living trees which show no evidence of fire damage or advanced deterioration from insects and disease. Trees are felled and marked into 100-inch lengths at the stump. Tree lengths are transported by rubber-tired or crawler skidders to a central landing or deck. The log deck is in a well drained and easily accessible location.

At the log deck, tree lengths are cut into 100-inch pulpwood sticks and loaded onto trucks having a capacity of 4-6 cords, a cord being a stack of wood 4'x4'x8'.
Pulpwood trucks take their payload to one of four railroad sidings scattered throughout the Pine Ridge for loading on bulkhead cars. Twenty to twenty-four cords are loaded in each rail car. Multiple car shipments of at least 10 cars are then sent to Wisconsin paper mills.

Ponderosa pine and other resinous pines are manufactured into paper by using the sulfate process. Paper produced by this method is usually stronger than that produced by other processes, since chemicals used in the sulfate method do not weaken the wood fibers.

Bleached sulfate pulp is made into fine writing paper, printing paper and other high-grade paper products.

Kraft paper produced from unbleached sulfate pulp is used for wrapping paper, paper bags and other paper products where strength is a prerequisite.

Wood Shavings

Fig. 5. An integrated saw and shaving mill in southeast Nebraska.
Increased agricultural use of wood shavings has led to the establishment of several shaving mills in Nebraska. Shavings have found uses for livestock bedding, mulches, packing material and insulation. Research has shown that wood shavings are far superior to other forms of bedding because:

Shavings are cheaper to use in the long run when compared to other forms of bedding.

Shavings last twice as long as corn cobs or straw.

Moisture is readily absorbed and shavings dry rapidly.

Shavings are odorless.

When shavings are used in place of straw or cobs, only half the volume is needed.

Once soiled, shavings can be used as a mulch and have some value as fertilizer.

Once dry, shavings do not heat or mold since they don't pack together.

Shavings are thinner than wood chips and therefore decay more rapidly when used for mulch.

Shavings eliminate the weed seed problems realized when straw is used.

Shavings are cleaner than straw--less dust and dirt.

Animals show no discomfort when bedded on wood shavings and the shavings provide soft, sure footing.

The production of wood shavings hinges on a shaving machine such as that manufactured by Jackson Lumber Harvester Co. in Mondovi, Wis. Essentially, the machine consists of a nine-foot Blanchard-ground steel bed with a welded high-strength steel box 4 1/2 feet long by 27 3/4 inches wide positioned on the surface of the bed.
The box, driven by chains, moves back and forth over the entire length of the bed. On the surface of the bed are two opposing cutter heads with 4 knives in each head. The machine can be run from the power take-off on a tractor or with a 45-50 H.P. motor; with either source turning about 2800 RPM.

Some Nebraska sawmill operators have constructed home-made shaving mills following this basic design.

In operation, the steel box is loaded with cordwood bucked into 4 to 4 1/2 foot lengths and ranging in diameter from 2" to 27". The box oscillates to and fro over the cutter heads and shavings drop out under the bed.

Shavings, as opposed to wood chips, are produced by cutting parallel to the grain, not across it. Shaving thickness is regulated by adjusting the cutting knives; however, the recommended thickness is 3/32 of an inch.

Unless local market conditions are such that the entire output of a shaving mill can be sold in the green condition and in bulk quantities, drying is necessary. Product storage, handling and merchandising require that shavings be dried and baled. Baling shavings that have moisture content greater than 20% is inadvisable, as the bales will head and mold, yielding an unsatisfactory product.

Alfalfa dehydrators and starch driers may be used for drying the product. Shavings are sold green or dry, in bulk quantities or baled.

Black Walnut

No other species of tree in the United States has received as much attention in the past few years as American black walnut, *Juglandis nigra.*
Fig. 6. The bulkiness of wood shavings requires that they be baled for transit to markets.

Fig. 7. A converted alfalfa dehydrator for drying wood shavings.
Perhaps its beauty as a shade tree, its delicious fruit or its luxurious chocolate brown wood, possessing superb physical and mechanical properties, have made it an American favorite. It is more likely, however, that it has enjoyed widespread popularity because of the increasing demand and decreasing supply of high quality walnut timber.

Such a situation leads to high, sometimes unbelievable prices being paid for standing timber by stumpage buyers. It is common for a single tree to sell for $100 and a few for $1,000. One tree in Indiana, a truly superior specimen, recently sold for $12,600.

Measurement

Black walnut timber is bought and sold in units of board feet log scale in accordance with the Doyle Log Rule. Mathematically, Doyle's rule is expressed by the formula: \( \frac{(D-4)^2 \times L}{16} \) = board feet volume of the log, with D being the diameter inside bark (d.i.b.) at the small end of the log in inches and L representing the length of the log in feet. Hence, a ten-foot log having a d.i.b. of 17 inches contains 106 board feet.

Logs are purchased either on a lump sum or on a log tally basis. The lump sum method of purchase is much easier and less time-consuming to transact, providing buyer and seller are completely familiar with current market conditions and the methods used in scaling standing trees to determine the volume of the tract. In practice, the buyer will agree to pay the timber owner a price, say $728, for all the trees that have been marked for sale.

Log tally means that the logs are measured as they leave the woods and the owner is paid a set rate per thousand board feet (MBF). The log tally method of purchase is the one most commonly used in Nebraska.
Gunstocks

Gunstocks are not made exclusively from black walnut. Elm, maple, cherry, sycamore and mesquite are some of the other species used for gunstocks.

Walnut is without question, however, the superior wood to use for gunstocks. Strength properties such as hardness, shock resistance, dimensional stability and coarse texture to give the nimrod a good grip on the gun make walnut the "Cadillac" of the gunstock industry.

The bulk of gunstock quality walnut from Nebraska goes to American Walnut Co., Kansas City, Kan.; Iowa-Missouri Walnut Co., St. Joseph, Mo.; and Midwest Walnut Co., Council Bluffs, Iowa. Specifications on logs suitable for gunstocks vary among companies.

Usually the minimum acceptable log must be 12 inches in diameter and at least six feet long. As a rule, companies buy logs on a graduated scale based on diameter. To illustrate, a log 26 inches in diameter at the small end is worth considerably more per board foot than a 12-inch diameter log.

The stumpage (timber) buyer purchasing trees for gunstocks prefers open grown walnut; that is, a single tree not growing in association with other trees. Such trees usually have short boles (stems) and branch out quite profusely at the top.

Wood at the junction of a branch and the main stem or two branches is highly figured, meaning that at the junction there is quite a bit of grain variation. This gives a truly striking appearance in the finished gunstock.

Characteristic patterns of grain variations are called crotch figure, feather crotch or moonshine crotch, depending on the degree and amount of figure.

Figured gunstocks are separated and graded as fancy stocks. Only 1/2 of 1% of all gunstocks are of the fancy grade. These, of course, demand greater prices on wholesale and retail markets.
Another type of figure in walnut is known as fiddleback. Fiddleback is caused by undulating grain; that is, the wood, while growing, spirals in one direction one year and the opposite the next. When such wood is cut, cellular elements from spirals of both directions appear on the same plane. Differences in light reflectivity of such cellular elements give the wood a striped or fiddleback figure.

Logs used for gunstocks are cut into 2 1/4 - 2 3/4 inch boards. Defects in the board, such as pith and unsound knots, are marked after the boards come off the headsaw. Gunstock patterns are outlined on the board, then cut out on a band saw. The ends of these gunstock "blanks" are coated with wax to prevent the wood from splitting. Blanks which have been marked fancy are sprinkled with salt in addition to being end coated. Both of these steps help to reduce seasoning (drying) degrade.

The gunstock blanks are air dried for several months before being placed in a dry kiln for final moisture removal. Walnut gunstocks must have a moisture content of 8% or less before being sent to gun companies such as Remington, Savage and Winchester.
Veneer

Veneer is a term applied to thin sheets of wood. To obtain such sheets, logs may be sliced, rotary cut or sawed. High quality logs should be sliced at a face veneer mill. There are no face veneer mills in Nebraska; however, several in adjoining states use a lot of Nebraska walnut.

The American Walnut Manufacturers Assn. published a set of grading rules which were strictly adhered to in the past. Unfortunately, today there are no definite grading rules for segregating walnut logs into quality classes.

This situation has come about due to the refusal of the Department of Commerce to impart total or partial restrictions on the export of high quality walnut veneer to foreign countries. Domestic veneer companies have been forced to lower their log specifications, since the exporter is picking the best logs for overseas shipment.

In 1965 and 1966, according to the Department of Commerce, 30.9 million board feet of walnut were exported at a value of $42 million. Most of the logs were sent to Japan, Germany or Italy for slicing on horizontal veneer slicers.
Until the present exploitation of American black walnut is curtailed, standardization of log grades is impossible.

Veneer thickness depends upon the ultimate use of the product. Furniture manufacturers use walnut veneer cut to between 1/32 and 1/36 of an inch thick. The standard used to be 1/28 inch; however, the scarcity of walnut veneer logs has resulted in the use of thinner stock.

Some panel manufacturers use veneer from 1/42 to 1/85 of an inch thick, and veneer has been cut as thin as 1/100 of an inch.

Straight logs free of serious defect are suitable for veneer. Such logs are delivered to a sawmill (usually a band mill) and cut into halves or quartered. The half or quarter logs are known as flitches.

Cutting flitches is an extremely important operation, done carefully to get the maximum figure and, hence, value out of the logs. A steel band is fixed about 4 inches from the ends of each flitch to reduce the possibility of the flitch splitting prior to being sliced. Flitches are then stored in a shed, some of which are equipped with spraying equipment to keep the wood moist. Prior to slicing, flitches are soaked in a hot water bath for 4 to 5 days. Soaking removes imbedded dirt and softens the wood, thus facilitating slicing. After the soaking period the flitches are debarked and checked for metal with a metal detector. Presence of foreign objects in wood will ruin a $700 veneer knife.

Fig. 10.

Checking flitches for metal with a metal detector.
Once the flitch has undergone the preceding operations it is ready for slicing. The flitch is attached to a steel frame by means of several small clamps. The veneer knife is then brought up flush with the surface of the wood. The steel frame with the attached flitch moves up and down against the stationary knife. Directly above the knife's edge is a nose bar designed to apply the correct amount of pressure to compress the wood ahead of the knife. This prevents the thin sheets of veneer from breaking or tearing during cutting.

As veneer sheets come off the slicer, they are stacked in exactly the same order as they were cut from the flitch. The side of the veneer which was compressed by the nose bar (tight side) is therefore always on top of the stack. This procedure is precisely followed, as certain finishing operations are especially suited to the tight side of the veneer.

Flitches of sliced veneer are clipped to uniform widths and sent to a storage room to cool for 24 hours. Next, the individual sheets are sent through a continuous drier and restacked into a flitch at the output end of the drier. The drying takes about 3 1/2 minutes. Each flitch is individually packaged in its own container and stored in a warehouse until being sold.

Fig. 11. Walnut veneer at output end of the drier being re-stacked into flitches.
Fig. 12. Veneer samples in the pricing room. Pricing of veneer depends on color, figure, defects and amount of veneer in flitch.

From each flitch three sample sheets of veneer are selected; one a third from the bottom, one a third from top, and one from the middle. Samples are labeled to identify the flitch, the position of the sample in the flitch and the number of square feet of veneer in the flitch. Pricing of the flitch is based on the sample. Prices vary tremendously depending upon the figure, length and width of the flitch, color, defects and the amount of square feet in each flitch.

Cooperage

The term cooperage refers to the barrel-making industry. "Slack" cooperage barrels are those used as containers for dry commodities such as apples, nails and tobacco. "Tight" cooperage barrels are used exclusively for liquid storage.
Only wood for "tight" cooperage is cut in Nebraska and most of this ends up in the form of bourbon barrels.

Bourbon barrels are manufactured from a group of trees known collectively as "white oaks." The wood of such trees is characterized by the presence of tyloses, cellular components that plug the pores in wood, thus making it impervious to liquids.

Bur oak is a member of the white oak group and is extensively cut in Nebraska for barrel staves and heading. Staves are the curved boards used for barrel sides, while heading boards are used at the top and bottom of the barrel.

Fig. 13. Cooperage bolts are measured in units of chord feet. Only bur oak trees free of defects are cut for cooperage in Nebraska.

Stave and heading bolts (short logs) are purchased on the basis of a chord foot. A chord foot is measured on the transverse section of the bolt. One chord foot equals a 12" chord measured from heartwood to heartwood on the cross section of the bolt. Length of the bolt does not change the number of chord feet. For example, stave bolts are cut into 33-44 inch lengths while heading bolts vary from 18-24 inches in length.
Length differences are accounted for by differences in price. To illustrate, the stumpage price of staves may be 50¢ per chord foot while heading bolts bring only 25¢ per chord foot.

Trees cut for staves and heading bolts must be free of defects such as knots and spiral grain. In addition, trees must be at least 16 inches in diameter before they are considered suitable for cooperage.

Heads are quartersawn on a circular heading saw. The next step is edging and grading. Heads are divided into three grades based primarily on quality. Export heads must be perfectly clear, straight grained, quartersawn pieces at least 24 inches long, 5 inches wide and 1 1/4 inches thick.

The domestic (bourbon) heads can be either of two specifications. If the piece is to be used as an exterior piece on the top or bottom of barrels, it is known as a cant. Cants must be 18 inches long, 3 1/4 inches wide and 1 1/8 inch thick. Interior pieces or straights are 22 inches long, 2 3/4 inches wide and 1 1/8 inch thick.

Fig. 14. Swing circular heading saw quartersawing bourbon heads.
The lowest grade (oils) must be 22 inches long, 2 inches wide and an inch thick.

Staves are cut on a barrel saw. Essentially, the saw is a cylindrical steel tube with teeth on one end. Quartersawing bolts on this equipment imparts a curvature to the staves. Staves vary in length from 33-44 inches depending on the size of the barrel.

Once cut, staves and heads are stacked until an adequate supply is on hand to warrant shipment to cooperage plants where the actual fabrication of barrels takes place.

At the cooperage plant staves and heads are seasoned, jointed and fitted on a basal jig. The barrel is then moved from the assembly and put in a steaming chamber. Steaming softens the wood and makes it flexible enough to pull the top of the staves together so that top hoops can be fastened to the barrel.

Next the barrel is heated to extreme temperatures (400-500°F) to set the staves in a concave plane and to relieve the stresses that arose in bending the staves.
Before final finishing and filling of the barrels, all interior barrel surfaces are charred. The charred wood removes impurities while imparting color and flavor to the bourbon during the aging process.

The severity of charring depends upon what type of whiskey is to be aged in the barrels. Barrels are lightly charred for scotch whiskey and severely charred for the darker bourbon.

Posts

Black locust, cedar, mulberry, catalpa and osage orange or hedge are used extensively throughout Nebraska for fence posts. All of these species have what is known as durable heartwood. Such heartwood is characterized by the presence of infiltrated materials, either extractives or essential oils which discourage colonization of wood by insects and/or diseases. Toxicity will vary among species; however, black locust and osage orange seem to have the greatest resistance to deterioration.

It is important when using these "natural" fence posts that the posts be dry, peeled and the thin ring of exterior sapwood removed along with the bark.

Fig. 16. Removing bark from posts to insure adequate penetration and retention of chemical preservatives.
The sapwood of any species is the living portion of wood and does not have chemical constituents capable of warding off the agents of deterioration. If the bark and sapwood are not removed, they will rot in a year or two, leaving unsatisfactory loose posts.

Most fence posts are made from coniferous species. These require chemical treatment. Chemical treating is done at about a half dozen locations throughout the Niobrara and Pine Ridge areas.

These post-treating plants are relatively small, treating 10 to 20 thousand posts per year. All of them are non-pressure and treat by the cold-soaking method. Cold-soaking simply means leaving the posts submerged in a chemical preservative treating tank for 24 to 48 hours. At the end of this period, the post has absorbed sufficient preservative to remain in service for at least 20 years.

Cold soaking of posts in Nebraska yields a product which has satisfactory in-service qualities, because of the state's relatively dry climate. Posts treated by cold soaking could not last long in a humid climate such as the Carolinas', in which case posts are pressure treated.

Posts are delivered to the treating plant in lengths of 6 1/2 feet up. They are debarked on a post peeler and stacked to dry. Posts must be below 20% moisture content before they can retain any preservative during treating.

After they are dry, the posts are placed in the treating tank and the preservative is pumped in. Creosote or pentachlorophenol can be used as the preservative. After the posts have soaked for 24 to 48 hours, they are removed from the tank and excess chemicals drained off. Posts are then sold to farmers and ranchers in the immediate area.
Miscellaneous Forest Products

Christmas Trees

Nebraska has more than 100 growers actively engaged in the production and marketing of quality Christmas trees. Interest among the group was so high that in the fall of 1966 the growers organized what is now known as the Nebraska Christmas Tree Growers and Timber Producers Association. The organization is designed to provide growers with the latest cultural and marketing techniques for this specialty crop.

Intensive care is a necessity to grow marketable trees. Problems such as weed, insect and disease control, shearing and marketing consume much of the plantation owners' time. Species selection is extremely important and varies throughout the state depending upon local site conditions.

Generally, Scotch, Austrian and ponderosa pine can be successfully grown in western Nebraska. These same species plus white and red pine are suitable for the eastern half of the state.

Trees may be marketed through wholesalers or retailers or on a choose-and-cut basis. Choose-and-cut marketing can be quite successful if the plantation is near a fairly large town. Since the consumer cuts the tree himself, he is assured of getting a fresh one, and the idea of taking the family to the woods makes it an enjoyable event.

Baskets

Cottonwood veneer is being rotary cut and manufactured into baskets and fruit containers at Omaha. The veneer logs are peeled on a lathe after they have been soaked in hot water to make the wood more pliable and to remove dirt. Baskets are fabricated with hand labor and marketed in the northern Great Plains.
Wooden Shoe Soles

Columbus, Nebr., is the site of the nation's largest manufacturer of wooden shoe soles. Cottonwood and elm are used exclusively for this unusual forest product. Safety shoes, orthopedic footwear and shower thongs are some of the company's products.