Photo courtesy: Tom Barnes

Hardwood trees produce a wide range of log types and primary forest products from low value biomass chips to high valued veneer. Understanding the characteristics of different log and product types helps in assessing the timber value of a woodlands.

Hardwood Timber Products and Tree Value

by Jeff Stringer

A tree's timber value is based upon the types, quantity, and quality of timber products that the tree contains, the cost of harvesting, and the cost of hauling it to market. All of these elements are highly variable. Harvesting costs are predominately based on woodland terrain (topography) and accessibility to a public highway. Transportation cost is directly related to hauling distance to markets. The other variables are associated with the characteristics of the trees (such as timber size). Woodland owners who want to effectively manage timber and/or are interested in timber value should have a basic understanding of common timber products and the tree characteristics that are needed for each product. This article provides information on the common hardwood timber products, their value, and the tree characteristics required to produce them.

A large tree may contain many different products while small trees may produce only one. Figure 1 shows a typical hardwood tree, in this case a white oak, containing several products. To maximize timber value, a logger would cut the tree into the different products (a process called bucking), separate the products on the log deck, and haul them to different markets. Timber products range significantly in value from a low value product such as pulpwood, to veneer – the highest valued timber product. The number of products in a tree is determined by the characteristics of the tree and the availability of local markets (see Market Availability section below).

Market Availability

Local markets vary regionally and can change based on supply/demand and hauling costs. Low value products normally can only be hauled short distances, generally 50 miles or less. High value products can be hauled much further. In many areas there is limited or no demand for biomass or pulpwood because the mills or yards that buy these products are too far away. If prices paid for these products increase, or hauling costs decrease, the market can expand. Conversely, veneer and stave logs are highly valued and markets for these products are extensive, so much so that they can be hauled great distances. Generally there are sufficient lumber mills that process construction, cant, pallet, tie, and lumber logs, and markets are also widely available.

Product Types and Specifications

Biomass/Energy Wood

Biomass (wood used for energy) is relatively low value compared to other wood products, so only the portions of trees that cannot be used for other products are used for energy wood. Typically the tops and small branches of larger trees, or possibly entire trees if they are poor quality, are used for energy wood. Often tops and branches are considered logging residues and are left in the woods. While this material can be used for biomass, leaving a portion in the woods is also ecologically important and a part of sustainable woodland management (see Markets and Sustainable Woodland Management section). All species can be used for biomass. Generally loggers chip this material at the log deck and discharge the chips into a semi truck. This process requires skidding the entire tree to the log deck and considerably more equipment, and it presents logistical challenges including the need for larger log decks and improved access.

Chipper at a logging site in western Kentucky.

Pulpwood

Pulpwood from hardwood trees is used to make chips for the production of white paper products. Generally loggers haul pulpwood to wood yards or mills that ultimately will debark and chip it. Normally all hardwood species with the exception of black walnut are used. Small end diameter requirement for pulpwood is 3 to 4 inches, and large end

Figure 1.

Biomass/Energy Wood

Generally branches and tops of any species with diameters less than those required for other products. Pulpwood – chipped to make paper. Generally small trees or tops/branches of larger trees.

Construction, Cants, and Pallet Logs

Generally sound wood from all species having knots, blemishes and staining that are unacceptable for the production of lumber.

Tie Logs

Used to make railway ties. Relatively free of decay, splits, slanting grain, or large and numerous holes and knots. A wide range of species can be used.

Lumber, Stave and Veneer Logs

Lumber Logs – Cut into lumber at sawmills. Must be sound, straight and relatively free of defects. There is a preference for larger sizes and preferred species such as oaks, black walnut, yellow-poplar.

Stave Logs – White oak logs used for barrels. Good quality logs with two sides free of defects (ex. indications of branches) are required.

Veneer Logs – Highest valued product logs must be free of defects. Generally preferred species such as oaks, black walnut, black cherry, and maple are consistently used, as are logs with larger diameters.

Photos courtesy: Jeff Stringer

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Typical load of hardwood pulpwood from western Kentucky.

diameters are 20 to 24 inches (based on the capacity of the mills chipper). Typically the minimum length is 8 to 9 feet. Pulpwood sticks (as they are commonly referred to) must contain little sweep or crook, less than 50 percent rot, and be free of charring. The latter occurs from wildfires or prescribed burns. Because of these size specifications, pulpwood can be cut from small trees 6 to 10 inches in diameter or from upper sections/branches of larger trees.

Small damaged trees can yield construction logs.

Construction, Cants, and Pallet Logs

Logs used for construction material, cants (large square products), and material for pallets must have structural integrity. The wood does not have to be aesthetically pleasing, but sound wood is required. A large number of knots, staining, and other blemishes (irregular patterns in the bark) are allowed. Logs used for these products can be cut from low value or degraded sawlog-sized trees 10 inches in diameter or greater.

Tie Logs

Tie logs are sawn into railway ties. Logs must be large enough (10 inches in diameter at the small end) to allow for cutting into 6 to 9 inch square or rectangular railway ties. Tie logs are at least 8 feet long. They must be free of decay, splits, slanting grain, or large and numerous holes and knots. A wide range of species can be used, and markets often have preferences for different species groups.

Tie logs are one of the common log types in Kentucky.

Lumber Logs

Sawlogs used for lumber production can vary significantly in quality and are generally 10 to 12 inches in diameter at the small end. Lumber can be sold in random lengths, and sawlogs typically are cut 10, 12, 14, and 16 feet, plus a 3- to 4-inch trim allowance. They must contain a limited amount of rot and be relatively sound and straight. Their value is also based upon the amount of lumber they produce that is free of knots and other defects. Therefore, the price paid for lumber logs is sensitive to the amount of knots and defects on the bark of the trees that are indicators of defects in the lumber. Value is also sensitive to species. Historically oak species, particularly white, northern red, and cherry-bark, black walnut, and black cherry are in high demand. The demand for other species varies with consumer preferences.

Lumber is cut from straight, defect free hardwood trees. The larger, straighter, and cleaner the higher the value.

Stave Logs

Only white oak species are used for barrel production. Staves are the vertical wood pieces in whisky, bourbon, and wine barrels. The wood must be relatively free of defects. Typically stave logs come from the bottom (butt) log of larger trees, with a 16- to 18-inch minimum diameter. Logs

Stave logs, exclusively from white oak, are used to manufacture barrels.

Photo courtesy: Billy Thomas

must be greater than 8 feet in length, with very little rot and at least two sides of the log free of defects.

Veneer Logs

Veneer logs are generally the highest valued common timber product. Preferred species include white and red oaks, black walnut, black cherry, and maple. Demand for other species such as hickory or even yellow-poplar occasionally arise. Logs must be straight and free of blemishes on three or four sides. Such select qualities normally only exist on the butt log. Unfortunately, there are many woodlands that historically have been abused and may not contain any veneer trees. Rarely is the veneer wood volume greater than 10 to 15 percent of the total stand volume.

Veneer logs must be straight, free of defects, solid and the right species. They command the highest price.

Markets and Sustainable Woodland Management

Having a variety of timber markets available helps enhance timber value. This variety of markets is important for those who are actively selling timber as well as those interested in long-term, sustainable management. Broad markets allow full utilization of trees, good quality and poor, as well as proper regeneration practices such as group openings. But most important it allows easier timber stand improvement practices such as thinning, release, and cull tree removal, thereby increasing the growing space for preferred trees. Value can be measured monetarily or can be intrinsic, such as wildlife, aesthetics, recreation, and other non-timber uses. Without markets for low value and small diameter trees, effectively managing large, high quality timber is financially difficult. Regardless, a broad array of timber markets helps woodland owners achieve long-term management objectives, using harvesting as a management tool.

However, when landowners are not managing sustainably for the long-term, markets can be the sole dictator of which trees are harvested, and this practice can lead to problems. For example, having markets for only high value sawtimber will lead to high grading, taking the best trees and leaving the rest. This practice ultimately results in a degrading of the woodlands. When markets are present for small diameter material, small trees can be cut that could potentially grow into large trees with both significant timber and non-timber values, for example habitat and food for wildlife. Intensive biomass harvesting that includes the buds, small branches, and leaves can result in the removal of significant nutrients from the site unless biomass harvesting guidelines that specify leaving a percentage of tops scattered throughout the woods are used.

Responsible woodland management can alleviate these problems. Woodland owners should seek assistance from a professional forester. State foresters (for example Kentucky Division of Forestry) will assist in developing a Stewardship Plan and can give instruction on proper harvesting. Consulting foresters can do the same, as can some industry foresters, particularly those industries that are committed to sustainable management.

Finally, forest certification is a voluntary means of verifying the use of good forest management practices on private lands. Forest certification is available to landowners through the American Tree Farm System, the Sustainable Forestry Initiative, or the Forest Stewardship Council. These voluntary certification systems provide standards for sustainable forest management that most landowners with hardwood forests can easily meet.

In summary, forest management is more effective and long-term wood investments are more profitable when a variety of timber markets exist. So seek professional help to ensure the proper merchandising of your timber and assistance with sustainable management. Ultimately the use of sound forestry principles will ensure the proper application of forest product markets.

About the Author:
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