A Guide to Southern Pine Products and General Specifications

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by:

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Introduction

Non-industrial private forest landowners (NIPFL) have encountered reduced product marketability and increased price uncertainty since late-1997 in the Southeastern United States (Dickens and others 2001) for Southern Yellow Pine (SYP) timber. The five principle southern pine species growing in Georgia are longleaf (*Pinus palustris,* Mill.), shortleaf (*Pinus echinata,* Mill.), loblolly (*Pinus taeda* L.), slash (*Pinus elliottii,* Engelm.) and Virginia (*Pinus virginiana,* Mill.). Recent stumpage prices for pine pulpwood in Georgia are down over 50% from an historic high in 1997 (TMS 2004, Figure 1), which has forest landowners concerned about the future value of growing pulpwood on short rotations. However, many Georgia landowners realize the benefits of growing loblolly, longleaf, and slash pine on longer rotations to produce higher-valued products such as Chip-N-Saw, sawtimber, ply logs, and poles (Dangerfield and Moorhead 1997).

Purpose

The objective of this Extension note is to give some general guidelines to NIPFL, County Extension Agents, private and state foresters and others that assist forest landowners. It will review general specifications for southern pine forest products and recent pine stumpage prices.

Forest Wood Products

Forest product specifications can change based on supply/demand, local market conditions, logging conditions, proximity to mills, mill specifications, and other factors. ***Table 1*** lists current Southern pine product classes, some general specifications, and Georgia stumpage price ranges for 2nd quarter 2004 through the 3rd quarter 2005 (TMS 2004, TMS 2005).

Wood Product Quality

Solid sawn pine wood products are classified in different ways, based mainly on use. “Dimension lumber” consists predominately of 2X4s, 2X6s, etc., and is produced for use as supporting members in building structures. Consequently, dimension lumber quality is based on predicted strength and stiffness, with higher quality (grades) expected to support heavier loads for the size. Wood products sawn for mainly decorative uses is generally categorized as “boards” and graded predominately for appearance. Higher grade boards contain fewer discolorations and discontinuities like knots or holes. “Poles” for supporting vertical loads are graded on size (height and diameter) and shape (straightness in particular) with strength considered too.

Chip-N-Saw mills and conventional sawmills prefer large diameter, straight logs with few branches that will yield the most high quality lumber, because price is based on lumber size and grade. ***Table 2*** lists some criteria (easily recognized while in southern pine stands) that must be satisfied to meet certain dimension lumber grades.

Table 1. Southern pine product classes, general specifications, products, and stumpage price ranges for Georgia in 2004 and 2005 (TMS 2004, 05).

Product class	**dbh[a] (in.)**	**length (ft.)**	**min top diam (in.)**	**form**	**products**	**$/cord[b]**
Pulpwood	5 - 9	24 - 40	2 - 3 inches	variable	pulp, paper	12 - 19
chip-n-saw	9 - 12	24 - 40	4 - 6 inches	straight	chips, 2x4s	54 - 74
Sawtimber	12 - 20	24 - 40	8 - 10 inches	straight	dimension lumber	93 – 118
ply logs	14 - 24	> 8	12 inches	straight	plywood	98 – 118
Poles	10 - 24	>30	6 inches	very straight	poles	130 - 174

[a] dbh = diameter at breast height or 4 ½ feet above groundline

[b] Southern pine conversion factors:
Pulpwood 1 cord = 5,350 lbs, 2.675 tons, 90ft^3 solid wood+bark, 75 ft^3 solid wood
Sawtimber 1 MBF (Scribner) = 15,000 lbs, 7.5 tons, 2.8 cords, 252 ft^3 solid wood+bark, and 210 ft^3 solid wood (TMS 2004).

Table 2. Dimension Lumber Grades (SPIB 2002) - maximum centerline knot size in inches allowed by lumber grade and width.

[a]Lumber grade	**4" wide lumber (ex: 2x4)**	**6" wide lumber (ex: 2x6)**	**8" wide lumber (ex: 2x8)**	**10" wide lumber (ex: 2x10)**	**12" wide lumber (ex: 2x12)**
No. 1	1 1/2	2-1/4	2-3/4	3-1/4	3-3/4
No. 2	2	2-7/8	3-1/2	4-1/4	4-3/4
No. 3	2-1/2	3/3/4	4-1/2	5-1/2	6-1/2
No. 4	See below				

[a]Lumber quality descriptions:
No. 1 is recommended for construction where high strength and stiffness and good appearance are desired.
No. 2 is recommended for general construction where moderately high strength and stiffness are desired.
No. 3 is suitable for general construction where appearance is not a factor and lower strength and stiffness are not a factor.
No. 4 is lumber that will not make a grade No. 3 or better and is recommended for general utility construction where appearance, strength and stiffness are not a consideration.

Growth Rate and Characteristics of Pine Timber are Important

As pine trees grow they lay down sheaths or layers of wood all along the trunk. Characteristics of the wood in these layers, like strength, weight and color, vary during a growing season and from top to bottom. The first layers of wood produced in early Spring, called “earlywood”, are generally light colored, light weight and comparatively low in strength. Later in the year, darker, heavier and stronger wood is laid down, and it is called “latewood” (Figure 2). Latewood begins forming earliest toward the bottom of a tree, and then higher up as the season progresses. Thus a tree may be producing latewood as early as June at the base of a tall pine, and earlywood as late as September at the top.

When a tree is cut and the end of a log is examined, the wood sheaths appear as concentric rings, each consisting of light-colored low-density earlywood to the inside and dark-colored high-density latewood to the outside. These rings are known as “growth rings”, and they are usually wider toward the center of the tree, but contain more latewood toward the outside (Figure 2). As a tree is cut into logs, more growth rings can be seen at the lower end of each one than at the upper end. This difference is due to a tree growing taller each year but being “younger” with wider growth rings at upper levels than at lower ones. Parts of growth rings also appear on the ends of lumber sawn from pine logs.

Earlywood and latewood appear on the wide faces and on edges of sawn lumber too, but as long exposed views of parts of the wood sheaths laid down during growth. The light and dark areas are surfaces and edges of earlywood and latewood in the sheaths.

Branches produced in the crown cause knots in lumber, which reduce strength and consequently grade. Knots are usually considered a defect relative to appearance too. Growth rings are generally wider in the crown and they usually contain a lower proportion of latewood. These characteristics result in wood that is lighter in weight and not as strong as that produced along the branch-free trunk.

Although growth ring width alone is not necessarily related to wood strength, where there are few rings per inch of diameter, the proportion of latewood is often low and strength is down. Moreover, wide rings also reduce lumber uniformity, as wide areas of low and high density wood cause large differences in strength from place to place in the piece. Exceptionally light weight lumber is not allowed in No. 2 Non Dense or higher grades. Lumber that contains less than 15 % latewood on average in the annual rings is defined as exceptionally light lumber.

Because of differences in growth characteristics and consequent strength, some dimension lumber can be classified and marketed as “dense”, with higher allowable strength values and commanding higher prices. On one end of each piece, <u>Dense Lumber must have</u> (Figure 2),

►no fewer than 6 annual growth rings per inch containing 1/3 or more latewood

►or may average no fewer than 4 annual growth rings per inch containing 1/2 or more latewood.

Using the above general criteria of no fewer than 4 annual growth rings per inch and 50% latewood, high-quality loblolly, slash, and longleaf timber should have an

average diameter growth of no greater than 1/2" per year. To meet knot criteria for No. 1 and No. 2 dimension 2x4 lumber, branch base diameters should be less than 11/2 or 2 1/2 inches, respectively. Species selection (e.g. slash generally has smaller branch base diameters than loblolly but generally grows slower than loblolly, Figure 3), stand stocking, and timely thinnings can also greatly influence quality of final crop trees.

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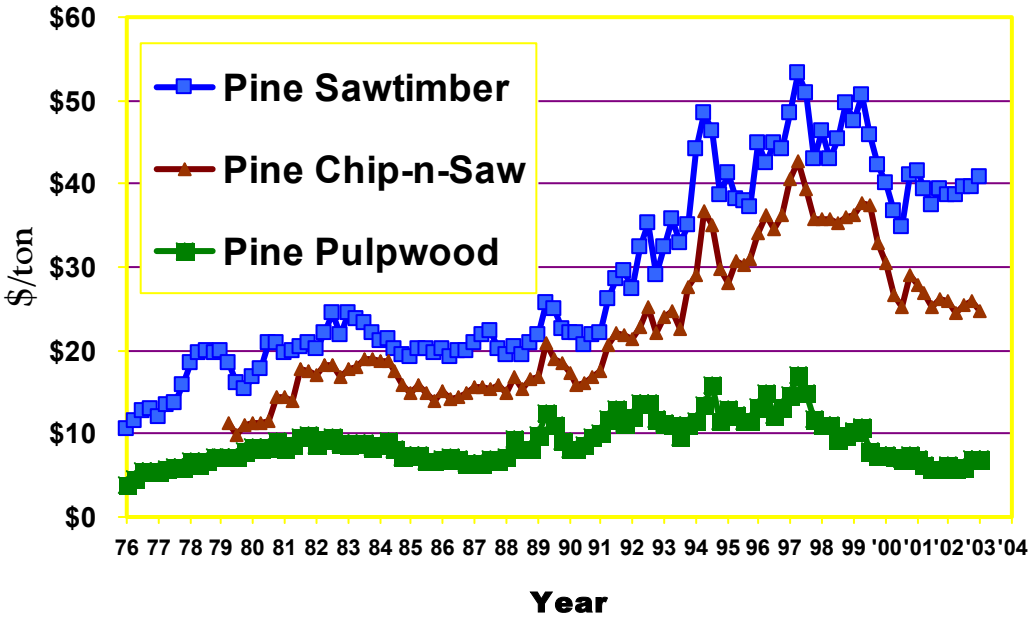

Figure 1. Georgia pine stumpage prices from 1976 through 4th quarter 2003 (TM-S 2004).

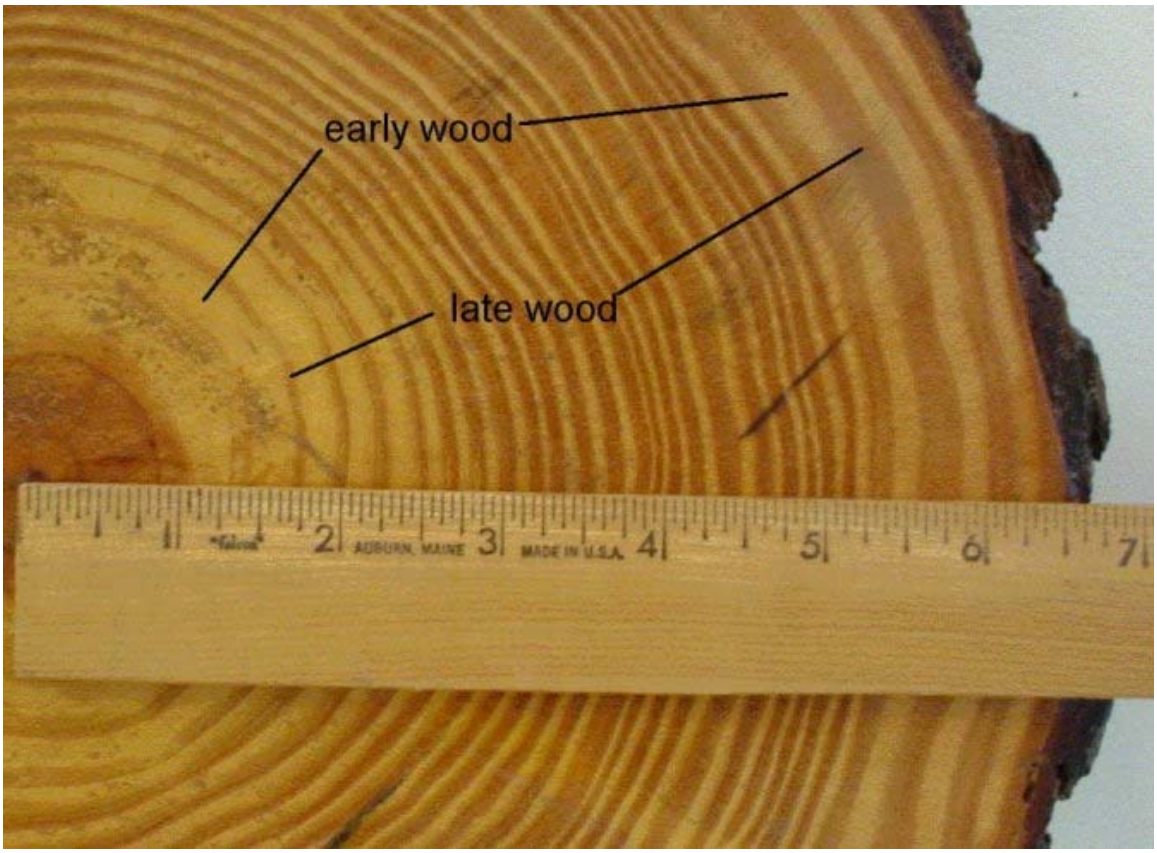

Figure 2. Cross-section of a loblolly pine stem showing juvenile core (0 through 2 ½ inches on the ruler), mature wood phase (2 ½ inches to 6 ½ inches on the ruler), early-, and late-wood.

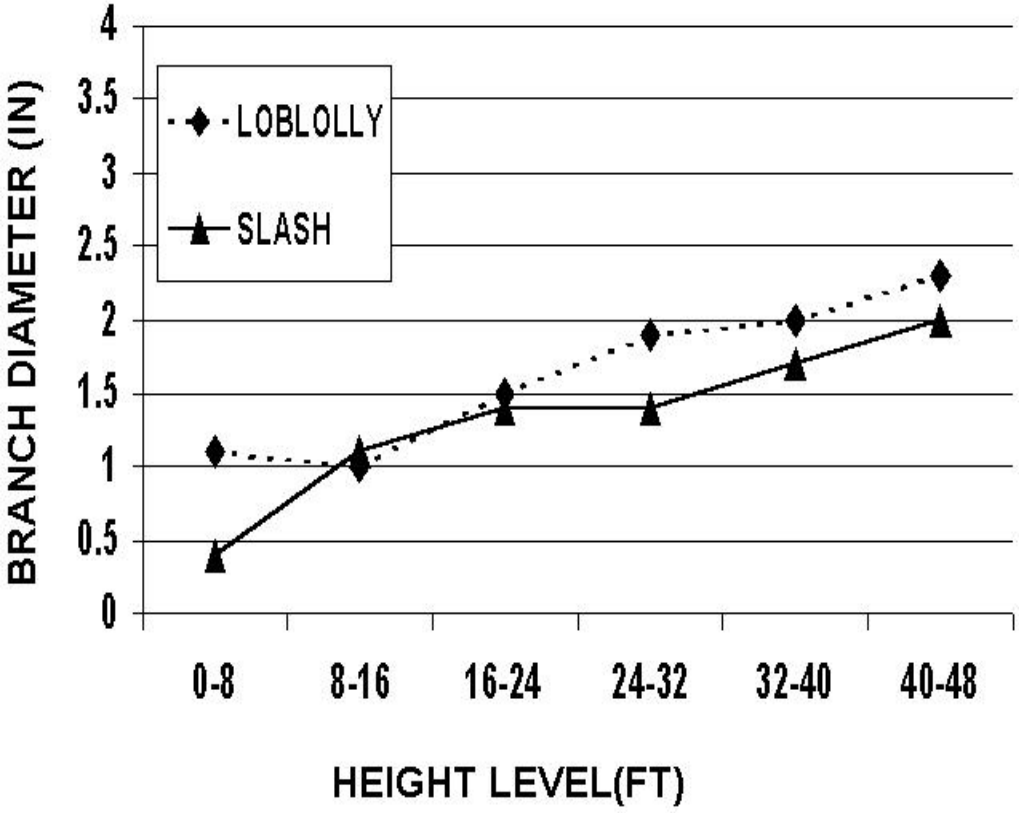

Figure 3. Average maximum branch diameter by 8 foot intervals up the stem of 21-year-old slash and loblolly pine growing in the same stand (Clark and Daniels 2004).