

Landowner's Guide to Determining Weight and Value of Standing Pine Trees

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Introduction

In years past, landowners and foresters could measure a tree and use the Doyle Rule to estimate the number of board feet of lumber in the tree. By measuring a sample of trees, the landowner could estimate the volume of lumber that could be cut from the forest stand. By applying the market value to the volume, the value of the standing timber could be determined.

Today, the medium of exchange is the outside bark weight of the timber (dollars per ton) not the board foot volume. Most procurement foresters use a conversion factor to change board feet to pounds or tons. Then the market value for weight is used to determine the price to offer for the standing timber. The landowner has the problem of determining his/her own value for the standing timber so they can determine if the price is fair.

The objective of this fact sheet is to provide landowners and procurement foresters with a method of accurately estimating the weight of standing trees. Research conducted by the Arkansas Forest Resources Center has resulted in equations for accurately predicting the outside bark weight of loblolly pine boles (trunks or stems). These equations require only the standard tree measurements.

Also, the value of timber is affected by the quality of the trees. This fact sheet will conclude with a discussion of the southern pine tree grading rules to aid the landowner in estimating the quality of standing trees.

Option One: Measure Diameter Only

This option is predicated on the landowner having only a standard tape measure to determine the size of the tree stem and no way of estimating the tree height. The tree stem should be measured at a point 4.5 feet above the ground (breast height). The tape should measure the circumference of the tree stem in inches. This value can be used in Table 1 or it can be divided by 3.1416 (pi) to provide the diameter (DBH) of the tree stem in inches. If the landowner has a diameter tape (D-tape), it will indicate the diameter directly. Either diameter or circumference can be used with Table 1. If the measurement is between the sizes shown in the table, it can be rounded or the weight can be interpolated. Table 1 is based upon an equation that accounts for 90 percent of the variation in tree weight.



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TABLE 1. Outside bark sawlog portion weight, pulpwood portion weight and total weight of loblolly pine boles to a 3-inch top (in pounds) by diameter or circumference at breast height.

Diameter	Circumference	Sawlog Weight	Pulpwood Weight	Total Weight
(inches)	(inches)	(lbs)	(lbs)	(lbs)
6	19	0	163	163
7	22	0	294	294
8	25	0	445	445
9	28	0	617	617
10	31	630	162	792
11	35	875	200	1075
12	38	1143	243	1386
13	41	1435	288	1723
14	44	1749	339	2088
15	47	2088	392	2480
16	50	2449	449	2898
17	53	2834	510	3344
18	57	3242	574	3816
19	60	3673	642	4315
20	63	4128	714	4842
21	66	4606	790	5396
22	69	5107	869	5976
23	72	5632	952	6584
24	75	6180	1038	7218
25	79	6752	1128	7880
26	82	7346	1222	8568
27	85	7964	1320	9284
28	88	8605	1421	10026
29	91	9270	1526	10796
30	94	9958	1634	11592

Option Two: Measure Diameter and Height

This option is predicated on the landowner having a D-tape for measuring the diameter at breast height (DBH) and an instrument for measuring tree height (for example, a clinometer). Including height increases the accuracy of estimating weight, and the equations that Tables 2 and 3 are based upon account for 95 to 98 percent of the variation in tree weight. Table 2 is for pulpwood trees which are 6 to 9 inches in DBH. Table 3 is for sawlog-sized trees with DBH of 10 inches or more. The tables give the weight in pounds of loblolly pine boles to a 3-inch top.

The weight of trees in Arkansas varies by the season of the year. The values in the tables are the averages for the year. Research at the Arkansas Forest Resources Center has shown that trees are the heaviest in the spring and almost as heavy in the fall. The summer weights are about the yearly average, but in the winter the trees are 6 percent lighter than in the spring and 5 percent lighter than in the fall. Therefore, the table values could be adjusted up 2 or 3 percentage points in the spring and fall and adjusted down 2 or 3 percentage points in the winter.

TABLE 2. The weight in pounds of loblolly pine pulpwood stems to a 3-inch top by DBH and total tree height.

DBH (inches)	Total Tree Height (feet)					
	35	40	45	50	55	60
6	158	184	210	238	264	290
7	224	260	296	332	368	404
8	302	348	394	442	488	536
9	388	448	506	566	624	684

TABLE 3. The weight in pounds of loblolly pine sawlog-sized boles to a 3-inch top by DBH and total tree height.

DBH (inches)	Total Tree Height (feet)								
	40	50	60	70	80	90	100	110	120
10	702	808	904	996	1082				
11	856	984	1102	1212	1318				
12	1024	1176	1318	1450	1576				
13	1208	1388	1556	1712	1860	2002			
14	1408	1618	1812	1994	2168	2332			
15		1866	2090	2300	2500	2690	2872		
16		2132	2388	2628	2856	3072	3280		
17			2706	2978	3236	3482	3718	3946	
18			3046	3352	3642	3920	4184	4440	
19			3406	3748	4072	4382	4678	4964	
20			3786	4166	4528	4872	5202	5520	
21			4188	4608	5008	5388	5754	6104	6444
22			4610	5074	5512	5932	6334	6720	7094
23				5562	6042	6502	6942	7366	7776
24				6072	6598	7100	7586	8044	8490
25				6606	7178	7724	8248	8752	9238
26				7164	7784	8376	8944	9490	10018
27				7744	8416	9054	9668	10258	10830
28				8348	9072	9762	10422	11060	11674
29				8976	9754	10494	11206	11890	12552
30				9626	10460	11256	12018	12752	13462
31				10302	11194	12044	12864	13646	14406
32				11000	11952	12862	13732	14572	15382

Quality

The term “quality” is defined in textbooks as “aptness for use.” Does the object being considered have the properties and attributes necessary for the use for which it is intended? Therefore, quality is in the eye of the user. If the purchaser of timber has a different idea as to quality than the landowner, then the landowner should seek out other buyers or markets. For example, if the landowner has trees with straight, clear boles of good size, then the market to pursue would be companies that manufacture and market 1-inch lumber. High grade 1-inch lumber will sell for two to three times the price of 2-inch lumber of the same grade.



How can the landowner determine the quality of the trees? The most common way is to use the U.S. Forest Service southern pine tree grades. The grades are based on the lowest 16-foot log in the tree. The log starts after a 12-inch stump, but this stump can be raised up to 4 feet if necessary to avoid fire scar, logging damage, etc.

Once the 16-foot section is selected, then it must be divided into four full-length faces. Each face must include one-fourth of the circumference of the tree. The faces may be positioned on the tree in any manner,

TABLE 4. Determining tree grade by the number of clear faces.

Tree Grade	Number of Clear Faces
A	3 or 4 clear faces
B	1 or 2 clear faces
C	no clear faces

but it is desirable to position the faces so that all of the defects can be placed on the minimum number of faces. The grade for the tree is determined by the number of clear, full-length faces (Table 4).

As mentioned earlier, quality trees are straight. There is a reduction of one grade for grade A and B trees if (1) sweep in the lower 12 feet of the grading section amounts to 3 inches or more **and** (2) the amount of sweep is equal to or greater than one-fourth of the DBH.

With this fact sheet and the fairly simple measures described, a landowner can estimate the weight and grade of the trees in his/her stand and subsequently calculate how many tons of grade A tree boles, how many tons of grade B tree boles and how many tons of grade C tree boles are in the stand. If most of the trees are grades A and B and the landowner sells to the correct market, he/she should receive an above-average price for the trees. But if the majority of the trees are grade C, a below-average price offer may be received.

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