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OVENDRY WEIGHTS FOR LOBLOLLY PINE TREES IN OLD - FIELD PLANTATIONS IN THE INTERIOR WEST GULF COASTAL PLAIN

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and

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Loblolly pine (*Pinus taeda* L.) is often harvested for conversion into cellulose products. Estimates of tree contents in terms of dry weight of bark-free wood may be more compatible with wood-fiber industries than volumetric measurements and should provide a more efficient basis for forest management.

This paper presents prediction equations and tables for estimating bark-free oven-dry weights of entire loblolly pine boles, and of their merchantable portions to three top diameter limits, on the basis of diameter at breast height and total tree height.

PLANTATION MEASUREMENTS

Four randomly selected trees within each of 158 loblolly pine plantations located in old fields throughout the Interior West Gulf Coastal Plain were felled and sectioned into 4-foot bolts (Hasness and Lenhart, 1972). Diameter at breast height (D) and total tree height including stump (H) were measured on each tree. A disc, 1 to 2 inches in thickness, was sawn from the bottom of each bolt. After debarking and numbering, discs were placed in water-filled containers and transported to the laboratory for specific gravity determination.

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TREE SPECIFIC GRAVITY

After oven-drying the discs at 105°C, specific gravities were calculated as the ratio of oven-dry weights (g) to green volumes (cc). The specific gravity of each disc was weighted by multiplying it by its diameter squared times the length of the bolt from which it was cut. Whole tree specific gravity was computed as the weighted average of the individual disc specific gravities. Specific gravity values for each tree to merchantable top diameter limits of 2.0, 3.0 and 4.0 inches outside bark (d.o.b.) were calculated by interpolation within the terminal bolt.

TREE OVENDRY WEIGHT PREDICTION EQUATIONS

Hasness and Lenhart (1972) obtained observed green cubic-foot volume, excluding bark, of the sample trees. The observed dry weight, excluding bark, for each tree was found by using the following general equation:

$$\text{Tree dry weight (Pounds)} = \text{Tree specific gravity} \times 62.4 \times \text{tree cubic-foot volume.}$$

Observed tree dry weights were determined for each of the four merchantability classes.

These dry weight values and respective diameters and heights were used as input for regression analyses. Resulting prediction equations are:

- (1) Dry weight, for total stem = $0.05505D^2H - 3.90587$
- (2) Dry weight, to a 2.0-inch top (d.o.b.) = $0.05506D^2H - 4.89438$
- (3) Dry weight, to a 3.0-inch top (d.o.b.) = $0.05536D^2H - 9.44022$
- (4) Dry weight, to a 4.0-inch top (d.o.b.) = $0.05617D^2H - 21.52434$

Each equation accounted for 98 percent or more of the total variation in dry weight, and the standard deviations about regression were 18 pounds or less.

The values shown in Tables 1 through 4 were calculated from equations (1) through (4), respectively.

LITERATURE CITED

Hasness, J. R. and J. D. Lenhart. 1972. Cubic-Foot Volumes for Loblolly Pine Trees in Old-Field Loblolly Pine Plantations in the Interior West Gulf Coastal Plain. Texas Forestry Paper No. 12. 7 pp.

Table 1. Oven-dry bark-free weight, in pounds, of the total stem, for loblolly pine trees.

D. b. h. inches	Total height, feet												
	20	25	30	35	40	45	50	55	60	65	70	75	
5	23.6	30.5	37.4	44.3	51.1	58.0	64.9	71.8	78.7				
6		45.6	55.5	65.5	75.4	85.3	95.2	105.1	115.0	124.9	134.8		
7			77.0	90.5	104.0	117.5	131.0	144.5	157.9	171.4	184.9		
8			101.8	119.4	137.0	154.6	172.3	189.9	207.5	225.1	242.7		
9			129.9	152.2	174.5	196.8	219.0	241.3	263.6	285.9	308.2		
10				188.8	216.3	243.8	271.3	298.9	326.4	353.9	381.4	409.0	
11						295.8	329.1	362.5	395.8	429.1	462.4	495.7	
12						352.8	392.5	432.1	471.7	511.4	551.0	590.6	
13						414.7	461.3	507.8	554.3	600.8	647.3	693.9	
14							535.6	589.5	643.5	697.4	751.4	805.3	

Table 2. Oven-dry bark-free weight, in pounds, to a 2.0-inch top d.o.b., for loblolly pine trees.

D. b. h. inches	Total height, feet												
	20	25	30	35	40	45	50	55	60	65	70	75	
5	22.6	29.5	36.4	43.3	50.2	57.0	63.9	70.8	77.7				
6		44.7	54.6	64.5	74.4	84.3	94.2	104.1	114.0	123.9	133.9		
7			76.0	89.5	103.0	116.5	130.0	143.5	157.0	170.5	184.0		
8			100.8	118.4	136.1	153.7	171.3	188.9	206.5	224.2	241.8		
9			128.9	151.2	173.5	195.8	218.1	240.4	262.7	285.0	307.3		
10				187.8	215.3	242.9	270.4	297.9	325.5	353.0	380.5	408.1	
11						294.9	328.2	361.5	394.8	428.2	461.5	494.8	
12						351.9	391.5	431.2	470.8	510.5	550.1	589.8	
13						413.8	460.4	506.9	553.4	599.9	646.5	693.0	
14							534.7	588.7	642.6	696.6	750.5	804.5	

Table 3. Oven-dry bark-free weight, in pounds, to a 3.0-inch top d.o.b., for loblolly pine trees.

D. b. h. inches	Total height, feet												
	20	25	30	35	40	45	50	55	60	65	70	75	
5	18.2	25.2	32.1	39.0	45.9	52.8	59.8	66.7	73.6				
6		40.4	50.3	60.3	70.3	80.2	90.2	100.2	110.1	120.1	130.1		
7			71.9	85.5	99.1	112.6	126.2	139.8	153.3	166.9	180.4		
8			96.9	114.6	132.3	150.0	167.7	185.4	203.1	220.9	238.6		
9			125.1	147.5	169.9	192.3	214.8	237.2	259.6	282.0	304.5		
10				184.3	212.0	239.7	267.4	295.0	322.7	350.4	378.1	405.8	
11						292.0	325.5	359.0	392.5	426.0	459.5	493.0	
12						349.3	389.2	429.0	468.9	508.7	548.6	588.4	
13						411.6	458.4	505.1	551.9	598.7	645.5	692.2	
14							533.1	587.3	641.6	695.8	750.1	804.4	

Table 4. Oven-dry bark-free weight, in pounds, to a 4.0-inch top d.o.b., for loblolly pine trees.

D. b. h. inches	Total height, feet												
	20	25	30	35	40	45	50	55	60	65	70	75	
5	06.6	13.6	20.6	27.6	34.6	41.7	48.7	55.7	62.7				
6		29.0	39.1	49.2	59.4	69.5	79.6	89.7	99.8	109.9	120.0		
7			61.0	74.8	88.6	102.3	116.1	129.9	143.6	157.4	171.1		
8			86.3	104.3	122.3	140.2	158.2	176.2	194.2	212.1	230.1		
9			115.0	137.7	160.5	183.2	206.0	228.7	251.5	274.2	297.0		
10				175.1	203.2	231.2	259.3	287.4	315.5	343.6	371.7	399.8	
11						284.3	318.3	352.3	386.3	420.3	454.2	488.2	
12						342.5	382.9	423.3	463.8	504.2	544.7	585.1	
13						405.6	453.1	500.6	548.0	595.5	643.0	690.4	
14							528.9	584.0	639.0	694.1	749.1	804.2	