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Multiply		By		To Obtain
Inches	x	2.540	=	centimeters
Feet	x	.3048	=	meters
Pounds	x	.4536	=	kilograms
Cubic feet	x	.02832	=	cubic meters
Pounds per cubic foot	x	16.02	=	kilograms per cubic meter

All English units of measure in this report can be converted to metric units by multiplying by the appropriate conversion factor listed above.

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U.S. Department of Agriculture - Forest Service
Asheville, North Carolina

Photo caption, front cover.--Natural stand of yellow-poplar that regenerated after heavy logging in the 1920's on Pisgah National Forest in North Carolina.

Biomass of Yellow-Poplar in Natural Stands in Western North Carolina[1 2]

by

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Abstract.--Aboveground biomass was determined for yellow-poplar (*Liriodendron tulipifera* L.) trees 6 to 28 inches d.b.h. growing in natural, uneven-aged mountain cove stands in western North Carolina. Average green weight of total tree biomass without foliage ranged from 336 pounds for 6-inch trees to 14,336 pounds for 28-inch trees. The average tree contained 91 percent of the total dry weight in the stem material, with 9 percent found in the branches. On the average, 23 percent of branch dry weight was bark and 77 percent was wood compared to stem material which contained 15 percent bark and 85 percent wood. Trends in biomass proportions are discussed; and specific gravity, moisture content, and green weight per cubic-foot data are presented for the total tree and its components. Tables developed from regression equations show weight and volume of the total tree and its components by d.b.h. and total height class.

Keywords: Biomass, component proportions, *Liriodendron tulipifera* L., prediction equations, volume, weight.

Competition for timber, escalating costs, and the energy shortage have forced wood users to consider maximizing total tree use. Pulpwood trees and upper stems and tops of sawtimber trees are now being chipped in the field for use in reconstituted paper and board products. The old method of estimating volume or weight by the merchantable saw-log stem no longer provides sufficient information for utilizing the total tree. More weight and volume information is needed to determine aboveground total tree biomass.

This paper discusses green volume and green and dry weights of aboveground biomass of commercial-size yellow-poplar growing in natural, uneven-aged mountain cove stands in western North Carolina. The wood and bark proportions of tree biomass are discussed on a weight basis. The equations

[1]This study was conducted in cooperation with and through the financial assistance of the Range, Timber, and Wildlife Program Area of Region 8 of the National Forest System. Field personnel were provided by the Pisgah District of the Pisgah National Forest. Cooperation and assistance were also received from the Canton Hardwood Lumber Company and the Timberlands Division of Champion International Corporation.

[2]Presented at the Third Annual Hardwood Symposium, Cashiers, North Carolina, May 1975.

presented predict weight and volume of the total tree and its components (wood, bark, saw logs, total stem, and branches). Wood and bark specific gravity, moisture content, and green weight per cubic foot are presented for the total tree and its component parts. In this report, total tree refers only to aboveground wood and bark and does not include stump, roots, or foliage.

PROCEDURE

FIELD

A stratified random sample of 39 trees was selected from natural, closed, uneven-aged mountain cove stands of yellow-poplar. The sample trees were from a pulpwood stand and a mature sawtimber stand, both located on the Pisgah Ranger District of the Pisgah National Forest in western North Carolina. Site index (age 50) averaged 100 to 110. One to five trees were selected from each even-inch d.b.h. class from 6 to 28 inches. Means and ranges of tree measurements are shown in table 1.

Table 1.--Means and ranges of yellow-poplar tree measurements for each d.b.h. strata sampled

D.b.h. class (inches)	Sample trees	D.b.h.		Total height		Merchantable height[1/]		Age		Form class	
		Avg.	Range	Avg.	Range	Avg.	Range	Avg.	Range	Avg.	Range
	Number	Inches		Feet				Years			
6	5	6.1	5.8- 6.5	61	53- 69	--	--	32	21-47	76	73-79
8	5	7.9	7.6- 8.1	70	65- 80	--	--	30	21-42	78	73-83
10	5	10.1	9.9-10.3	90	77-102	--	--	60	47-75	80	79-83
12	5	11.9	11.7-12.3	105	93-118	44	34- 48	67	61-75	86	83-91
14	5	14.2	13.9-14.5	102	85-110	60	52- 68	62	59-67	81	79-84
16	3	15.9	15.6-16.2	118	108-132	71	62- 86	63	60-68	82	79-85
18	3	18.0	17.7-18.3	111	107-113	65	56- 76	60	56-62	83	82-84
20	1	19.1	--	116	--	68	--	68	--	87	--
22	2	21.5	21.5-21.5	126	120-132	80	76- 83	72	68-75	82	78-85
24	3	24.3	24.0-24.7	137	130-147	93	87-102	67	65-72	83	80-85
26	1	25.6	--	128	--	82	--	73	--	84	--
28	1	28.4	--	129	--	94	--	81	--	80	--
All classes	39	13.9	5.8-28.4	99	53-147	67	34-102	56	21-81	81	73-91

[1/] Height to 8-inch d.i.b. merchantable top.

After felling and limbing, the main stem of each tree was bucked into merchantable saw logs and pulpwood. Saw logs 8 to 16 feet long were cut from the main stem to a 8-inch d.i.b. top or a degrading quality indicator such as large knots. Saw-log stem top d.i.b. averaged 9.5 inches. All material between the saw-log merchantable top and the 4-inch top was classed as pulpwood, and material between the 4- and 2-inch top was classed as topwood. The crown was cut up and separated into three categories: (1) large branches (≥ 2.0 inches d.o.b.), (2) medium branches (≥ 0.6 and ≤ 1.9 inches d.o.b.),

(3) small branches (≤ 0.5 inches d.o.b.). The tip of the stem (2 inches d.i.b. to top) was included as branch material in the analysis. All crown material and pulpwood were weighed to the nearest 0.25 pound. Saw logs were weighed individually to the nearest pound.

Disks were removed from the butt of each tree, at each bucking point, at the points where d.i.b. measured 4 and 2 inches, and from branches randomly selected from each branch category. Immediately after being cut, the disks were calipered and weighed with and without bark. A representative sample of bark and wood was removed from each disk, weighed, and sealed in a polyethylene bag for laboratory analysis. From these disks the moisture content and specific gravity of wood and bark were determined.

LABORATORY

Specific gravity was computed on a green volume and ovendry basis. To determine moisture content, samples were dried to a constant weight at 103° C and their moisture content was computed on an ovendry basis. Percentage of bark was determined on a weight basis from cross-sectioned samples. Weighted values for moisture content, specific gravity, and percentage of bark in stem, branches, and total tree were calculated by weighting disk values in proportion to the volume of the component they represented. Weighted values for moisture content were used to convert component green weight to ovendry weight.

The following equation was used to calculate green weight per cubic foot separately for wood and bark on the basis of the weighted values for specific gravity and moisture content:

$$\text{Green weight per cubic foot} = \left(1 + \frac{\text{weighted moisture content in percent}}{100}\right) \times (62.4 \times \text{weighted specific gravity}) \qquad (1)$$

The green cubic-foot volume of wood and bark was computed by dividing component weight by its green weight per cubic foot. Green cubic-foot volume (wood and bark combined) was computed by adding green volume of wood to the green volume of bark.

ANALYSIS

Simple linear equations were developed to predict green and dry weights of wood and bark in the total tree and components. Independent variables were: diameter at breast height (D), total height (Th), merchantable height, crown ratio, and form class both separately and in various combinations. Equations were also developed to predict green cubic-foot volume of wood and bark separately and combined.

For determining both weights and volumes, the independent variable giving the closest correlations was D^2Th. Grouping of the data into D^2Th classes indicated that the variance of Y increased with increasing D^2Th. A logarithmic transformation (to the base 10) was used to obtain a homogeneous

variance as assumed in regression analysis. Thus, regression models for tree and component weights and volumes with D^2Th were calculated using the equation:

$$\text{Log } Y = b_o + b_1 \text{ Log } D^2Th + e \tag{2}$$

where:
- Y = weight or volume of component,
- D = d.b.h. in inches,
- Th = total tree height in feet,
- e = experimental error, and
- b_o, b_1 = constants.

When logarithmic estimates are converted back to original units, they are biased downward because the antilogarithm of the estimated means gives the geometric rather than the arithmetic mean.[3] To account for this bias a correction factor was computed using a procedure described by Baskerville[4] and was applied to each equation. The form of the equation including the correction factor was:

$$\text{Log } Y = b_o + b_1 \text{ Log } (D^2Th) + \frac{S^2_{y \cdot x}}{2} \tag{3}$$

$$= b'_o + b_1 \text{ Log } D^2Th \tag{4}$$

where: $S^2_{y \cdot x}$ = error mean square from regression analysis and b'_o is the intercept adjusted by the correction factor.

Separate prediction equations were developed for the pulpwood and sawtimber trees. Statistical tests[5] of the slopes and intercepts of these equations indicated there was no significant difference in the slopes or intercepts at the 0.01 probability level for either the total tree and stem weights or the volume equations. Therefore, the pulpwood and sawtimber trees were combined and one series of equations developed for trees 6 to 28 inches d.b.h.

RESULTS

TOTAL TREE BIOMASS

Green and dry weight of the total tree (excluding foliage) and proportion of tree weight in wood and bark are shown in table 2. Green weight of the total tree ranged from 336 pounds for 6-inch trees to 14,336 pounds for a 28-inch tree. Assuming the trees were composed of wood, bark, and water, 51 percent of their green weight was water; 41 percent was wood; and 8 percent was bark. On a dry-weight basis, trees averaged 85 percent of their weight in wood and 15 percent in bark. Component proportions differed slightly for

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[3] Cunia, T. 1964. Weighted least squares method and construction of volume tables. For. Sci. 10:180-191.

[4] Baskerville, G. L. 1972. Use of logarithmic regression in the estimation of plant biomass. Can. J. For. Res. 2:49-53.

[5] Snedecor, G. W., and W. G. Cochran. 1967. Statistical methods. 6th ed. p. 432-436. Iowa State Univ. Press, Ames.

green-weight measurements because of differences in component moisture content.

The proportion of tree dry weight found in branches ranged from 7 to 12 percent and averaged 9 percent (table 3). Pulpwood trees had 2 to 5 percent more of their dry weight in branches than the sawtimber trees.

The green and dry weight of all wood and bark in the tree and distribution of wood and bark throughout the tree are presented in tables 4 and 5. As can be seen from these tables, wood and bark are not distributed evenly

Table 2.--Average green and dry weight of the total tree and proportion of the tree in wood and bark for yellow-poplar trees 6 to 28 inches d.b.h.

D.b.h. class (inches)	Average total height	Sample trees	Total tree green weight	Tree component proportions (green)		Total tree dry weight	Tree component proportions (dry)	
				Wood	Bark		Wood	Bark
	Feet	Number	Pounds	Percent		Pounds	Percent	
6	61	5	336	80	20	145	83	17
8	70	5	649	81	19	292	85	15
10	90	5	1,316	82	18	628	85	15
12	105	5	1,928	82	18	931	83	17
14	102	5	2,876	82	18	1,382	84	16
16	118	3	3,830	83	17	1,951	85	15
18	111	3	4,770	81	19	2,314	82	18
20	116	1	6,036	82	18	2,901	83	17
22	126	2	8,051	84	16	4,050	87	13
24	136	3	9,712	83	17	5,021	84	16
26	128	1	13,026	84	16	6,842	86	14
28	129	1	14,336	84	16	7,570	86	14
Average	--	--	3,589	83	17	1,799	85	15

Table 3.--Average green and dry weight of the total tree and proportion of the tree in main stem[1/] and branches[2/] for yellow-poplar trees 6 to 28 inches d.b.h.

D.b.h. class (inches)	Average total height	Sample trees	Total tree green height	Tree component proportions (green)		Total tree dry weight	Tree component proportions (dry)	
				Stem	Branches		Stem	Branches
	Feet	Number	Pounds	Percent		Pounds	Percent	
6	61	5	336	87	13	145	88	12
8	70	5	649	87	13	292	88	12
10	90	5	1,316	86	14	628	88	12
12	105	5	1,928	94	7	931	94	7
14	102	5	2,876	90	10	1,382	91	9
16	118	3	3,830	90	10	1,951	92	8
18	111	3	4,770	88	12	2,314	90	10
20	116	1	6,036	88	12	2,901	90	10
22	126	2	8,051	89	11	4,050	90	10
24	136	3	9,712	91	9	5,021	92	8
26	128	1	13,026	92	8	6,842	93	7
28	129	1	14,336	92	8	7,570	92	8
Average	--	--	3,589	90	10	1,799	91	9

1/ Stem material to 2-inch d.i.b. top.
2/ Includes all branch material and tip of main stem.

Table 4.--Average green and dry weight of wood in the total tree and distribution of wood in main stem and branches in yellow-poplar trees 6 to 28 inches d.b.h.

D.b.h. class (inches)	Average total height	Sample trees	Total tree wood weight	Proportion of wood in--							
				Main stem[1]				Branches			
				Saw log	Pulp-wood	Top wood	Total stem	Large	Medium	Small	All branches
	Feet	Number	Pounds	Percent							
					GREEN						
6	61	5	268	--	66	24	90	0	7	3	10
8	70	5	526	--	80	10	90	0	7	3	10
10	90	5	1,075	--	84	4	88	2	7	3	12
12	105	5	1,583	68	25	2	95	1	3	1	5
14	102	5	2,358	80	11	1	92	3	4	1	8
16	118	3	3,200	82	9	1	92	5	2	1	8
18	111	3	3,876	78	11	1	90	6	3	1	10
20	116	1	4,953	78	11	1	90	6	3	1	10
22	126	2	6,786	82	8	0[2]	90	7	2	1	10
24	137	3	8,075	86	6	0[2]	92	6	2	0[2]	8
26	128	1	10,934	79	14	0[2]	93	5	2	0[2]	7
28	129	1	12,014	84	9	0[2]	93	6	1	0[2]	7
Average	--	--	2,976	81	9	1	91	5	3	1	9
					DRY						
6	61	5	121	--	64	24	88	0	8	4	12
8	70	5	248	--	80	9	89	0	8	3	11
10	90	5	532	--	84	4	88	3	7	2	12
12	105	5	776	67	26	2	95	1	3	1	5
14	102	5	1,161	80	11	1	92	3	4	1	8
16	118	3	1,656	82	9	1	92	5	2	1	8
18	111	3	1,898	78	12	1	91	6	2	1	9
20	116	1	2,422	78	12	1	91	5	3	1	9
22	126	2	3,517	83	8	0[2]	91	6	2	1	9
24	137	3	4,225	86	6	0[2]	92	6	2	0[2]	8
26	128	1	5,880	80	14	0[2]	94	4	2	0[2]	6
28	129	1	6,512	84	9	0[2]	93	6	1	0[2]	7
Average	--	--	1,524	81	10	1	92	4	3	1	8

[1] Main stem to 2-inch d.i.b. top.
[2] Less than one-half of one percent.

Table 5.--Average green and dry weight of bark in the total tree and distribution of bark in main stem and branches in yellow-poplar trees 6 to 28 inches d.b.h.

D.b.h. class (inches)	Average total height	Sample trees	Total tree bark weight	Proportion of bark in--							
				Main stem[1]				Branches			
				Saw log	Pulp-wood	Top wood	Total stem	Large	Medium	Small	All branches
	Feet	Number	Pounds	Percent							
				GREEN							
6	61	5	68	--	53	23	76	0	12	12	24
8	70	5	122	--	68	10	78	0	11	11	22
10	90	5	241	--	71	5	76	4	12	8	24
12	105	5	345	63	22	3	88	1	8	3	12
14	102	5	518	70	10	1	81	6	9	4	19
16	118	3	630	67	9	1	81	10	6	3	19
18	111	3	894	68	11	1	80	10	6	4	20
20	116	1	1,093	66	13	1	80	10	7	3	20
22	126	2	1,265	73	8	1	82	11	4	3	18
24	137	3	1,637	77	7	0[2]	84	10	4	2	16
26	128	1	2,092	71	15	0[2]	86	8	4	2	14
28	129	1	2,322	73	11	0[2]	84	12	2	2	16
Average	--	--	612	71	10	1	82	8	6	4	18
				DRY							
6	61	5	25	--	60	24	84	0	8	8	16
8	70	5	43	--	65	10	85	0	8	7	15
10	90	5	96	--	80	5	85	3	8	4	15
12	105	5	155	64	24	2	90	3	5	2	10
14	102	5	221	74	11	1	86	5	6	3	14
16	118	3	295	77	10	1	88	6	4	2	12
18	111	3	416	74	12	1	87	7	4	2	13
20	116	1	479	70	15	1	86	8	4	2	14
22	126	2	533	76	9	1	86	9	3	2	14
24	137	3	796	80	7	0[2]	87	9	3	1	13
26	128	1	962	73	16	0[2]	89	6	3	2	11
28	129	1	1,058	72	13	0[2]	85	12	2	1	15
Average	--	--	276	75	10	1	86	7	4	3	14

[1] Main stem to 2-inch d.i.b. top.
[2] Less than one-half of one percent.

throughout the tree; the saw-log portion of the tree contains 81 percent of the dry wood, but only 75 percent of the dry bark. Branches contain 8 percent of the dry wood compared to 14 percent of the dry bark. On the average, the pulpwood section of the total tree contains equal proportions of the wood and bark (10 percent). The topwood section also contains equal proportions of the total wood and bark (1 percent).

BRANCH BIOMASS

When branches were analyzed as a separate entity, the proportion of dry weight in wood ranged from 74 to 81 percent and proportion of dry weight in bark ranged from 19 to 26 percent (table 6). On the average, 77 percent of branch dry weight was wood and 23 percent was bark.

Branches make up 7 to 12 percent of the dry weight of the total tree, depending on tree size (table 3). On the average, 12 percent of the branch dry weight was in small branches, 32 percent was in medium branches, and 56 percent was in large branches. The proportions in branch size varied greatly with tree size (fig. 1); the proportion of large branches increased rapidly with

Table 6.--Average green and dry weight of the branches and proportion of branches in wood and bark for yellow-poplar trees 6 to 28 inches d.b.h.

D.b.h. class (inches)	Average total height	Sample trees	Branch weight (green)	Branch proportion in green--		Branch weight (dry)	Branch proportion in dry--	
				Wood	Bark		Wood	Bark
	Feet	Number	Pounds	Percent		Pounds	Percent	
6	61	5	44	65	35	17	79	21
8	70	5	84	67	33	34	81	19
10	90	5	188	69	31	77	80	20
12	105	5	121	64	36	51	74	26
14	102	5	283	67	33	125	76	24
16	118	3	383	69	31	163	78	22
18	111	3	557	68	32	225	76	24
20	116	1	693	68	32	276	76	24
22	126	2	886	73	27	393	80	20
24	136	3	870	70	30	416	75	25
26	128	1	999	71	29	457	77	23
28	129	1	1,204	70	30	632	75	25
Average	--	--	351	69	31	156	77	23

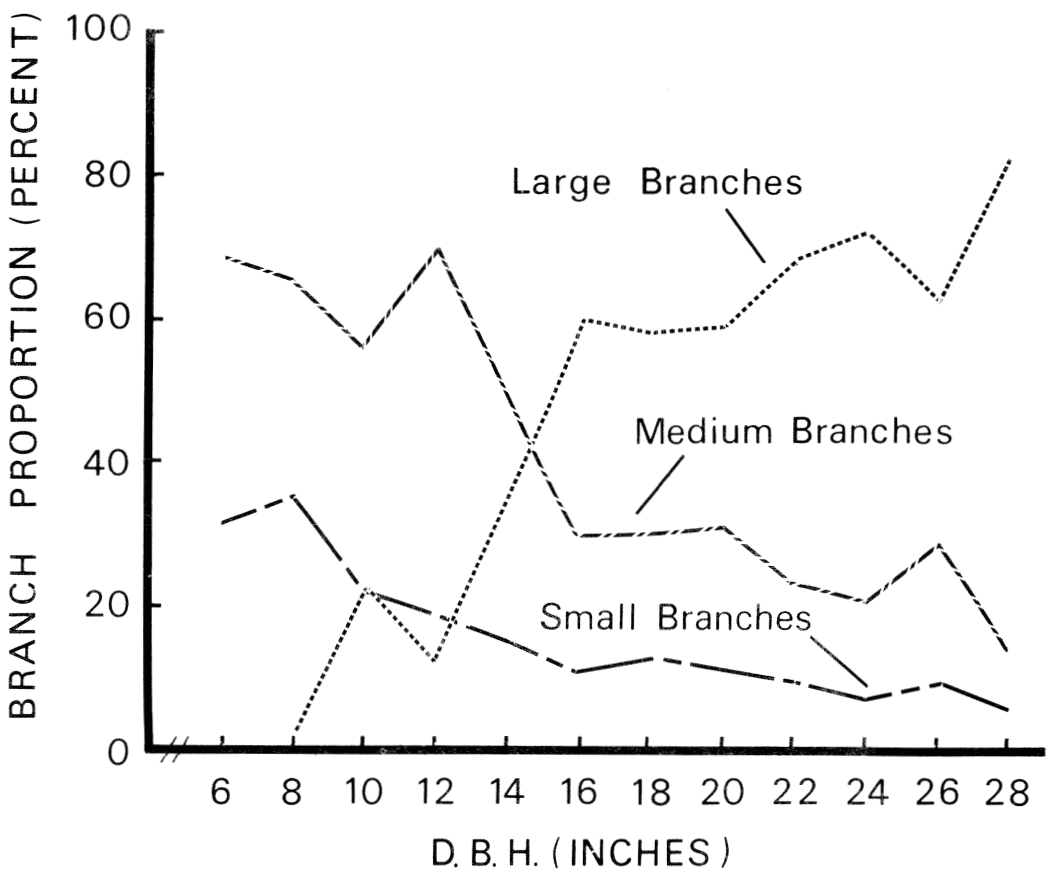

Figure 1.--Proportion of yellow-poplar crown in small, medium, and large branches by tree size.

increasing tree size while the proportion of medium and small branches decreased with increasing tree size. When branches were separated into wood and bark, large branches averaged 78 percent wood and 22 percent bark, medium branches averaged 77 percent wood and 23 percent bark, and small branches averaged 67 percent wood and 33 percent bark.

MAIN STEM BIOMASS

When the main stem was analyzed as a separately entity, the proportion of dry weight in wood averaged 85 percent and 15 percent was bark (table 7).

Table 7.--Average green and dry weight of the stem[1/] and proportion of stem in wood and bark in yellow-poplar trees 6 to 28 inches d.b.h.

D.b.h. class (inches)	Average Total height	Sample trees	Stem weight (green)	Stem proportion in green--		Stem weight (dry)	Stem proportion in dry--	
				Wood	Bark		Wood	Bark
	Feet	Number	Pounds	Percent		Pounds	Percent	
6	61	5	292	82	18	128	84	16
8	70	5	565	83	17	258	85	15
10	90	5	1,128	84	16	551	85	15
12	105	5	1,807	83	17	880	84	16
14	102	5	2,593	84	16	1,257	85	15
16	118	3	3,447	85	15	1,788	85	15
18	111	3	4,213	83	17	2,089	83	17
20	116	1	5,343	84	16	2,625	85	15
22	126	2	7,165	86	14	3,657	88	12
24	137	3	8,842	84	16	4,605	85	15
26	128	1	12,027	85	15	6,385	87	13
28	129	1	13,132	86	14	6,938	88	12
Average	--	--	3,238	84	16	1,643	85	15

[1/] Stem material to 2-inch d.i.b. top.

PHYSICAL PROPERTIES

Wood and bark specific gravity, moisture content, and green weight per cubic foot for the total tree and its components are presented in table 8. Wood specific gravity and moisture content did not vary significantly with tree size. Wood specific gravity for the total tree averaged 0.407--within the average range reported for the species.[6] Branches had the highest wood specific gravity, averaging 0.424, and saw-log wood the lowest, averaging 0.406. Average wood moisture content ranged from 103 percent in the saw-log section to 111 percent in the topwood section and averaged 104 percent for all wood in the tree. Wood green weight per cubic foot averaged 51.8 pounds in the stem, 54.4 pounds in the branches, and 51.8 pounds in the total tree.

[6] U.S. Forest Products Laboratory. 1974. Wood handbook: Wood as an engineering material. USDA Agric. Handb. 72 rev., p. 4-44.

Table 8.--Average wood and bark specific gravity, moisture content, and green weight per cubic foot for yellow-poplar trees and tree components

Tree component	Average and standard deviation		
	Specific gravity	Moisture content	Green weight per cubic foot
		Percent	Pounds
	WOOD		
Total tree	0.407 ± 0.029	104 ± 13	51.8 ± 3.5
Total stem	.407 ± .030	104 ± 14	51.8 ± 3.7
Saw log section	.406 ± .029	103 ± 13	51.5 ± 3.8
Pulpwood section	.413 ± .037	103 ± 18	52.3 ± 4.6
Topwood section	.419 ± .035	111 ± 13	55.2 ± 4.4
Branches	.424 ± .026	106 ± 15	54.4 ± 3.9
	BARK		
Total tree	0.325 ± 0.028	142 ± 36	49.1 ± 8.4
Total stem	.332 ± .034	126 ± 29	46.8 ± 8.4
Saw log section	.328 ± .035	124 ± 28	46.1 ± 8.0
Pulpwood section	.354 ± .027	123 ± 35	49.3 ± 8.2
Topwood section	.350 ± .035	151 ± 27	54.8 ± 6.5
Branches	.285 ± .048	247 ± 66	59.9 ± 3.1

Specific gravity of bark was consistently lower than the specific gravity of wood, averaging 0.325 for the total tree (table 8). Branch-bark specific gravity averaged 0.285 and was on the average lower than stembark specific gravity (0.332).

Bark moisture content averaged 142 percent for the total tree, considerably higher than the corresponding value for wood (table 8). Branchbark moisture content (247 percent) was significantly higher than stembark moisture content (126 percent). The higher branchbark moisture content was probably due to the higher proportion of inner bark which has a high moisture content and the season of the year the trees were sampled.

Bark moisture content has been reported to vary with the season of the year; Phillips and Schroeder[7] found bark moisture content highest during and just following leaf development and lowest at the time of leaf fall. Since our trees were sampled during April and May, it is possible that the bark moisture content was higher than if we had sampled in the fall of the year. For example, Phillips and Schroeder's highest seasonal green bark weight was 49.6 pounds per cubic foot, while the average weight for the year was 46.1 pounds per cubic foot. The green weight of total tree bark in our study is 49.1 pounds, close to the maximum value reported. Therefore, when considering an average value for the year, our bark should possibly be approximately 3.0 pounds per cubic foot lighter.

[7] Phillips, Douglas R., and James G. Schroeder. 1973. Some physical properties of yellow-poplar wood and bark. Part 1. - Seasonal moisture content. Wood Sci. 5:265-269.

Average bark green weight per cubic foot varied considerably within the tree, ranging from 46.1 pounds per cubic foot for saw-log bark to 59.9 pounds per cubic foot for branchbark (table 8). Green weight per cubic foot of wood and bark combined averaged 51.4 pounds for the total tree, 50.8 pounds in the main stem, and 56.2 pounds in branch material.

EQUATIONS

A series of equations was developed to predict total tree and tree component weight and volume based on the 39 sample trees. Equations for predicting weight of the total tree and its green and dry component parts are shown in table 9. Equations for predicting total tree and tree component wood and bark green cubic-foot volume are presented in table 10. Also included in tables 9 and 10 are the coefficients of determination and standard errors of estimate for each equation. The coefficients of determination indicate a high degree of linear association between the independent variable (D^2Th) and total tree or component weight and volume. Poorest association occurred in equations predicting branch weight and volume. Crown components had a higher degree of variability than other tree components, as indicated by the coefficients of determination.

The downward bias, occurring when logarithmic estimates were converted to untransformed units, ranged from less than 1 percent for total tree and stem equations to over 6 percent for branch equations. Although the bias was negligible for total tree and stem equations, a correction factor was applied to each equation for consistency.

YIELD TABLES

Equations from tables 9 and 10 were used to develop tables of biomass weight and volume. Predicted green and dry weights of wood and bark and wood excluding bark in the total tree, main stem, and branches are presented in tables 11-18 by d.b.h. and total height classes. Predicted green cubic-foot volume of wood and bark and wood excluding bark in the total tree, main stem, and branches are presented in tables 19-22. The predicted weight or volume of bark in a tree or component can be estimated by substracting the value in the table for wood excluding bark from the corresponding value in the table for wood and bark combined.

SUMMARY

This paper discusses the aboveground biomass of yellow-poplar trees 6 to 28 inches d.b.h. growing in natural, uneven-aged, mountain cove stands in western North Carolina. Regression equations were formulated to predict the weight and volume of the total tree and its components. Tables developed with these equations show the weight and volume of wood and bark, and wood excluding bark for the total tree and its components by d.b.h. and total height classes.

Trees with the same d.b.h. and total height may vary considerably in weight and volume because of differences in crown size, taper, and weight per

Table 9.--Regression equations for estimating green and dry weight of the aboveground biomass of natural yellow-poplar trees 6 to 28 inches d.b.h. and tree component parts using d.b.h. and total height as the independent variables

Weight (Y)	Regression equation[1]	Coefficient of determination (R^2)	Standard error ($S_{y.x}$)[2]
TOTAL TREE (EXCLUDING LEAVES)[3]			
Green	$\text{Log}_{10}\ Y = -0.69614 + 0.96067\ \text{Log}_{10}\ D^2Th$	0.99	0.049
Dry	$\text{Log}_{10}\ Y = -1.22162 + 1.00962\ \text{Log}_{10}\ D^2Th$	.99	.046
ALL WOOD IN TREE[3]			
Green	$\text{Log}_{10}\ Y = -0.83371 + 0.97283\ \text{Log}_{10}\ D^2Th$	.99	.050
Dry	$\text{Log}_{10}\ Y = -1.31186 + 1.01330\ \text{Log}_{10}\ D^2Th$	.99	.050
ALL BARK IN TREE [3]			
Green	$\text{Log}_{10}\ Y = -1.20965 + 0.90556\ \text{Log}_{10}\ D^2Th$	.98	.055
Dry	$\text{Log}_{10}\ Y = -1.94536 + 0.99070\ \text{Log}_{10}\ D^2Th$	.98	.063
WOOD AND BARK IN STEM FROM STUMP TO SAW-LOG MERCHANTABLE TOP FOR TREES >11.5 INCHES D.B.H.[4]			
Green	$\text{Log}_{10}\ Y = -1.40405 + 1.09136\ \text{Log}_{10}\ D^2Th$	.98	.049
Dry	$\text{Log}_{10}\ Y = -1.92791 + 1.14055\ \text{Log}_{10}\ D^2Th$	.98	.049
WOOD IN STEM FROM STUMP TO SAW-LOG MERCHANTABLE TOP FOR TREES >11.5 INCHES D.B.H.[4]			
Green	$\text{Log}_{10}\ Y = -1.54143 + 1.10526\ \text{Log}_{10}\ D^2Th$	.98	.051
Dry	$\text{Log}_{10}\ Y = -2.07644 + 1.15782\ \text{Log}_{10}\ D^2Th$	.98	.053

continued

Table 9.--Regression equations for estimating green and dry weight of the aboveground biomass of natural yellow-poplar trees 6 to 28 inches d.b.h. and tree component parts using d.b.h. and total height as the independent variables (continued)

Weight (Y)	Regression equation[1]	Coefficient of determination (R^2)	Standard error ($S_{y.x}$)[2]
BARK IN STEM FROM STUMP TO SAW-LOG MERCHANTABLE TOP FOR TREES >11.5 INCHES D.B.H.[4]			
Green	$\text{Log}_{10}\ Y = -1.88576 + 1.01997\ \text{Log}_{10}\ D^2Th$	0.95	0.069
Dry	$\text{Log}_{10}\ Y = -2.32150 + 1.04433\ \text{Log}_{10}\ D^2Th$	.95	.071
WOOD AND BARK IN STEM FROM STUMP TO 2 INCH D.I.B. TOP[3]			
Green	$\text{Log}_{10}\ Y = -0.81474 + 0.97694\ \text{Log}_{10}\ D^2Th$	.99	.040
Dry	$\text{Log}_{10}\ Y = -1.33025 + 1.02493\ \text{Log}_{10}\ D^2Th$	.99	.042
WOOD IN STEM FROM STUMP TO 2 INCH D.I.B. TOP[3]			
Green	$\text{Log}_{10}\ Y = -0.92750 + 0.98533\ \text{Log}_{10}\ D^2Th$	.99	.043
Dry	$\text{Log}_{10}\ Y = -1.41983 + 1.02925\ \text{Log}_{10}\ D^2Th$	.99	.045
BARK IN STEM FROM STUMP TO 2 INCH D.I.B. TOP[3]			
Green	$\text{Log}_{10}\ Y = -1.42008 + 0.93339\ \text{Log}_{10}\ D^2Th$	.99	.051
Dry	$\text{Log}_{10}\ Y = -2.05248 + 1.00116\ \text{Log}_{10}\ D^2Th$	.98	.070
WOOD AND BARK IN BRANCHES[3]			
Green	$\text{Log}_{10}\ Y = -1.15689 + 0.83663\ \text{Log}_{10}\ D^2Th$	.80	.211
Dry	$\text{Log}_{10}\ Y = -1.71827 + 0.88172\ \text{Log}_{10}\ D^2Th$	.83	.206

continued

Table 9.--Regression equations for estimating green and dry weight of the aboveground biomass of natural yellow-poplar trees 6 to 28 inches d.b.h. and tree component parts using d.b.h. and total height as the independent variables (continued)

Weight (Y)	Regression equation[1]	Coefficient of determination (R^2)	Standard error ($S_{y.x}$)[2]
WOOD IN BRANCHES[3]			
Green	$\text{Log}_{10}\ Y = -1.40010 + 0.85422\ \text{Log}_{10}\ D^2Th$	0.79	0.225
Dry	$\text{Log}_{10}\ Y = -1.76294 + 0.86612\ \text{Log}_{10}\ D^2Th$	.80	.219
BARK IN BRANCHES[3]			
Green	$\text{Log}_{10}\ Y = -1.49101 + 0.79882\ \text{Log}_{10}\ D^2Th$	.83	.185
Dry	$\text{Log}_{10}\ Y = -2.60277 + 0.93682\ \text{Log}_{10}\ D^2Th$	.89	.172

[1] $\text{Log}_{10}\ Y = b_0' + b_1\ \text{Log}_{10}\ D^2Th$

where: Y = weight of tree or component in pounds,
D = d.b.h. in inches,
Th = total height in feet.

[2] Standard error of estimate in Log_{10} form.

[3] Regression equations based on 39 trees 6 to 28 inches d.b.h.

[4] Regression equations based on 24 trees 12 to 28 inches d.b.h.

Table 10.--Regression equations for estimating green cubic foot volume of the aboveground biomass of natural yellow-poplar trees 6 to 28 inches d.b.h. and tree component parts using d.b.h. and total height as the independent variables

Cubic foot volumes	Regression equation 1/	Coefficient of determination (R^2)	Standard error ($S_{y.x}$) 2/
TOTAL TREE (EXCLUDING LEAVES) 3/			
Wood	$\text{Log}_{10}\ Y = -2.60833 + 0.98740\ \text{Log}_{10}\ D^2Th$	0.99	0.036
Bark	$\text{Log}_{10}\ Y = -3.34254 + 1.01348\ \text{Log}_{10}\ D^2Th$	.99	.057
Wood & bark	$\text{Log}_{10}\ Y = -2.53544 + 0.99215\ \text{Log}_{10}\ D^2Th$	.99	.034
STEM FROM STUMP TO A SAW-LOG MERCHANTABLE TOP FOR TREES > 11.5 INCHES D.B.H. 4/			
Wood	$\text{Log}_{10}\ Y = -3.36739 + 1.13164\ \text{Log}_{10}\ D^2Th$	.99	.036
Bark	$\text{Log}_{10}\ Y = -3.58003 + 1.03884\ \text{Log}_{10}\ D^2Th$	.95	.066
Wood & bark	$\text{Log}_{10}\ Y = -3.19278 + 1.11325\ \text{Log}_{10}\ D^2Th$	.99	.036
STEM FROM STUMP TO 2 INCH D.I.B. TOP 3/			
Wood	$\text{Log}_{10}\ Y = -2.70952 + 1.00212\ \text{Log}_{10}\ D^2Th$	.99	.031
Bark	$\text{Log}_{10}\ Y = -3.59784 + 1.05620\ \text{Log}_{10}\ D^2Th$	.98	.066
Wood & bark	$\text{Log}_{10}\ Y = -2.66141 + 1.01119\ \text{Log}_{10}\ D^2Th$	.99	.030
BRANCH MATERIAL (EXCLUDING LEAVES) 3/			
Wood	$\text{Log}_{10}\ Y = -3.09526 + 0.84474\ \text{Log}_{10}\ D^2Th$	.80	.213
Bark	$\text{Log}_{10}\ Y = -3.34471 + 0.81757\ \text{Log}_{10}\ D^2Th$	.84	.180
Wood & bark	$\text{Log}_{10}\ Y = -2.90517 + 0.83679\ \text{Log}_{10}\ D^2Th$	.82	.202

1/ $\text{Log}_{10}\ Y = b_0' + b_1\ \text{Log}_{10}\ D^2Th$

where: Y = cubic foot volume of tree component,
D = d.b.h. in inches,
Th = total height in feet.

2/ Standard error of estimates in Log_{10} form.
3/ Regression equations based on 39 trees 6 to 28 inches d.b.h.
4/ Regression equations based on 24 trees 12 to 28 inches d.b.h.

cubic foot. Therefore, these equations and tables should not be used indiscriminately over the range of yellow-poplar. They should only be applied to similar aged trees growing in natural closed stands which have taper rates and weight per cubic-foot values similar to the trees sampled.

APPENDIX

Table 11.--Predicted weight of total tree wood and bark for yellow-poplar trees[1]

D.b.h. (inches)	Total tree height (feet)[2] 40	50	60	70	80	90	100	110	120	130	140
	Pounds										
	GREEN[3]										
6	218	270	321	373	424						
7	293	363	432	501	570	638					
8	378	469	559	648	737	825	913				
9		588	701	812	924	1,034	1,145	1,254			
10			858	995	1,131	1,266	1,401	1,536	1,670		
11			1,030	1,195	1,358	1,521	1,683	1,844	2,005		
12			1,218	1,412	1,605	1,798	1,989	2,180	2,370	2,559	
13			1,420	1,647	1,872	2,097	2,320	2,542	2,764	2,985	
14				1,899	2,159	2,417	2,675	2,931	3,187	3,442	3,696
15				2,168	2,465	2,760	3,054	3,347	3,639	3,929	4,219
16				2,454	2,790	3,124	3,457	3,789	4,119	4,448	4,776
17				2,757	3,135	3,510	3,884	4,257	4,628	4,998	5,366
18				3,077	3,499	3,918	4,335	4,751	5,165	5,578	5,989
19					3,882	4,347	4,810	5,271	5,730	6,188	6,645
20					4,284	4,797	5,308	5,817	6,324	6,829	7,333
21					4,705	5,268	5,830	6,388	6,945	7,501	8,054
22					5,145	5,761	6,375	6,986	7,595	8,202	8,807
23						6,275	6,943	7,609	8,272	8,933	9,592
24						6,809	7,534	8,257	8,977	9,694	10,410
25						7,365	8,149	8,931	9,709	10,485	11,259
26							8,787	9,630	10,469	11,306	12,140
27							9,448	10,354	11,256	12,156	13,053
28							10,132	11,103	12,071	13,036	13,998

continued

Table 11.--Predicted weight of total tree wood and bark for yellow-poplar trees [1] (continued)

D.b.h. (inches)	Total tree height (feet) [2]										
	40	50	60	70	80	90	100	110	120	130	140
	Pounds										
	DRY [4]										
6	93	116	140	163	187						
7	127	159	191	223	255	287					
8	166	208	250	292	334	376	418				
9		263	317	370	423	477	530	584			
10			392	458	524	590	656	722	788		
11			475	555	635	715	795	875	956		
12			566	661	757	852	948	1,044	1,139	1,235	
13			665	777	889	1,002	1,114	1,227	1,339	1,452	
14				903	1,033	1,163	1,294	1,425	1,555	1,686	1,817
15				1,038	1,187	1,337	1,487	1,638	1,788	1,939	2,089
16				1,182	1,353	1,523	1,694	1,866	2,037	2,208	2,380
17				1,336	1,529	1,722	1,915	2,109	2,302	2,496	2,690
18				1,499	1,716	1,932	2,149	2,366	2,584	2,801	3,019
19					1,914	2,155	2,397	2,639	2,882	3,124	3,367
20					2,123	2,391	2,659	2,928	3,196	3,465	3,735
21					2,342	2,638	2,934	3,231	3,527	3,824	4,121
22					2,573	2,898	3,223	3,549	3,875	4,201	4,527
23						3,170	3,526	3,882	4,239	4,595	4,952
24						3,455	3,842	4,230	4,619	5,008	5,397
25						3,751	4,172	4,594	5,016	5,438	5,860
26							4,516	4,973	5,429	5,886	6,343
27							4,874	5,366	5,859	6,352	6,846
28							5,245	5,775	6,306	6,836	7,367

[1] Blocked-in area indicates range of data.
[2] Includes 1-foot stump allowance.
[3] $\text{Log}_{10}\ Y = -0.69614 + 0.96067\ \text{Log}_{10}\ (D^2Th)$.
[4] $\text{Log}_{10}\ Y = -1.22162 + 1.00963\ \text{Log}_{10}\ (D^2Th)$.

Table 12.--Predicted weight of all aboveground wood excluding bark for yellow-poplar trees [1]

D.b.h. (inches)	Total tree height (feet)[2]										
	40	50	60	70	80	90	100	110	120	130	140
	Pounds										
	GREEN [3]										
6	173	215	257	299	340						
7	234	291	347	403	459	515					
8	303	377	450	523	595	668	740				
9		474	566	657	749	840	930	1,021			
10			695	807	919	1,031	1,142	1,253	1,363		
11			836	972	1,106	1,241	1,375	1,508	1,641		
12			990	1,151	1,310	1,469	1,628	1,786	1,944	2,101	
13			1,157	1,345	1,531	1,717	1,902	2,087	2,272	2,456	
14				1,553	1,769	1,983	2,197	2,411	2,624	2,836	3,048
15				1,776	2,023	2,268	2,513	2,757	3,001	3,244	3,486
16				2,014	2,293	2,572	2,849	3,126	3,402	3,678	3,953
17				2,266	2,581	2,894	3,206	3,518	3,828	4,138	4,448
18				2,533	2,884	3,234	3,583	3,931	4,279	4,625	4,971
19					3,204	3,593	3,981	4,368	4,753	5,138	5,522
20					3,540	3,970	4,399	4,826	5,252	5,678	6,102
21					3,893	4,365	4,837	5,306	5,775	6,243	6,710
22					4,262	4,779	5,295	5,809	6,322	6,834	7,345
23						5,211	5,773	6,334	6,893	7,452	8,009
24						5,661	6,271	6,881	7,489	8,095	8,700
25						6,128	6,790	7,450	8,103	8,764	9,419
26							7,328	8,040	8,751	9,459	10,166
27							7,887	8,653	9,417	10,180	10,941
28							8,465	9,287	10,103	10,926	11,743

continued

Table 12.--Predicted weight of all aboveground wood excluding bark for yellow-poplar trees[1/] (continued)

D.b.h. (inches)	Total tree height (feet)[2/] 40	50	60	70	80	90	100	110	120	130	140
	Pounds										
	DRY [4/]										
6	77	97	117	136	156						
7	106	133	159	186	213	240					
8	139	174	209	244	280	315	351				
9		221	265	310	355	400	445	490			
10			329	384	440	495	551	607	663		
11			398	466	533	601	669	736	804		
12			475	556	636	717	798	879	959	1,041	
13			559	654	748	843	938	1,033	1,128	1,224	
14				759	870	980	1,090	1,201	1,311	1,422	1,533
15				873	1,000	1,127	1,254	1,381	1,508	1,636	1,763
16				996	1,140	1,284	1,429	1,574	1,719	1,864	2,009
17				1,126	1,289	1,452	1,616	1,780	1,944	2,108	2,272
18				1,264	1,447	1,630	1,814	1,998	2,182	2,367	2,551
19					1,615	1,819	2,024	2,229	2,435	2,641	2,847
20					1,791	2,019	2,246	2,474	2,702	2,930	3,158
21					1,978	2,228	2,479	2,731	2,983	3,235	3,487
22					2,173	2,449	2,725	3,001	3,277	3,554	3,831
23						2,679	2,981	3,284	3,586	3,889	4,193
24						2,921	3,250	3,579	3,909	4,240	4,570
25						3,173	3,530	3,888	4,247	4,605	4,965
26							3,822	4,210	4,598	4,986	5,375
27							4,126	4,544	4,963	5,383	5,802
28							4,442	4,892	5,343	5,794	6,246

1/ Blocked-in area indicates range of data.
2/ Includes 1-foot stump allowance.
3/ $\text{Log}_{10}\ Y = -0.83371 + 0.97283\ \text{Log}_{10}\ (D^2Th)$.
4/ $\text{Log}_{10}\ Y = -1.31186 + 1.01330\ \text{Log}_{10}\ (D^2Th)$.

Table 13.--Predicted weight of wood and bark in main stem to saw-log merchantable top for yellow-poplar trees[1/]

D.b.h. (inches)	Total tree height (feet)[2/]								
	60	70	80	90	100	110	120	130	140
	Pounds								
	GREEN[3/]								
12	780	923	1,068	1,214	1,362	1,511	1,662	1,814	
13	929	1,099	1,272	1,446	1,622	1,800	1,979	2,160	
14		1,292	1,495	1,700	1,907	2,116	2,327	2,539	2,753
15		1,502	1,738	1,976	2,217	2,460	2,705	2,952	3,201
16		1,729	2,001	2,275	2,552	2,832	3,114	3,398	3,685
17		1,974	2,284	2,597	2,913	3,233	3,555	3,879	4,206
18		2,236	2,587	2,942	3,300	3,662	4,027	4,395	4,765
19			2,911	3,310	3,714	4,121	4,531	4,945	5,362
20			3,256	3,703	4,154	4,609	5,068	5,531	5,997
21			3,622	4,119	4,621	5,127	5,638	6,153	6,671
22			4,009	4,559	5,114	5,675	6,240	6,810	7,384
23				5,023	5,636	6,253	6,876	7,504	8,136
24				5,512	6,184	6,862	7,546	8,234	8,928
25				6,026	6,760	7,502	8,249	9,002	9,760
26					7,365	8,172	8,986	9,806	10,632
27					7,997	8,874	9,758	10,648	11,545
28					8,658	9,607	10,564	11,528	12,499

continued

Table 13.--Predicted weight of wood and bark in main stem to saw-log merchantable top for yellow-poplar trees[1] (continued)

D.b.h. (inches)	Total tree height (feet)[2]								
	60	70	80	90	100	110	120	130	140
	Pounds								
	DRY[4]								
12	365	435	506	579	653	728	804	881	
13	438	522	608	695	784	874	965	1,057	
14		618	720	823	928	1,035	1,143	1,252	1,362
15		723	842	963	1,086	1,211	1,337	1,465	1,595
16		838	976	1,116	1,259	1,403	1,550	1,698	1,847
17		962	1,121	1,282	1,445	1,611	1,779	1,949	2,121
18		1,096	1,277	1,460	1,647	1,836	2,027	2,221	2,417
19			1,444	1,652	1,863	2,077	2,293	2,513	2,734
20			1,623	1,857	2,094	2,334	2,578	2,824	3,073
21			1,815	2,075	2,340	2,609	2,881	3,157	3,435
22			2,018	2,308	2,602	2,901	3,204	3,510	3,820
23				2,554	2,880	3,211	3,546	3,885	4,228
24				2,814	3,174	3,538	3,907	4,281	4,659
25				3,089	3,484	3,884	4,289	4,699	5,113
26					3,810	4,247	4,690	5,139	5,592
27					4,152	4,629	5,112	5,601	6,094
28					4,511	5,029	5,554	6,085	6,622

1/ Blocked-in area indicates range of data.
2/ Includes 1-foot stump allowance.
3/ $\text{Log}_{10}\ Y = -1.40405 + 1.09136\ \text{Log}_{10}\ (D^2Th)$.
4/ $\text{Log}_{10}\ Y = -1.92791 + 1.14055\ \text{Log}_{10}\ (D^2Th)$.

Table 14.--Predicting weight of wood excluding bark in main stem to saw-log merchantable top for yellow-poplar trees [1]

D.b.h. (inches)	Total tree height (feet)[2]								
	60	70	80	90	100	110	120	130	140
	Pounds								
	GREEN [3]								
12	645	765	886	1,009	1,134	1,260	1,387	1,516	
13	770	913	1,058	1,205	1,354	1,504	1,656	1,809	
14		1,075	1,246	1,419	1,595	1,772	1,950	2,131	2,313
15		1,252	1,451	1,653	1,857	2,064	2,272	2,482	2,694
16		1,444	1,674	1,907	2,142	2,380	2,620	2,863	3,107
17		1,651	1,914	2,180	2,449	2,721	2,996	3,273	3,552
18		1,874	2,172	2,474	2,779	3,088	3,399	3,714	4,031
19			2,447	2,788	3,132	3,480	3,831	4,185	4,543
20			2,741	3,122	3,508	3,898	4,291	4,688	5,088
21			3,053	3,478	3,907	4,341	4,780	5,222	5,667
22			3,384	3,854	4,331	4,812	5,297	5,787	6,281
23				4,252	4,778	5,308	5,844	6,385	6,930
24				4,672	5,249	5,832	6,421	7,015	7,613
25				5,113	5,745	6,383	7,027	7,677	8,332
26					6,265	6,961	7,664	8,372	9,087
27					6,810	7,567	8,330	9,101	9,878
28					7,380	8,200	9,028	9,863	10,705

continued

Table 14.--Predicting weight of wood excluding bark in main stem to saw-log merchantable top for yellow-poplar trees [1/] (continued)

D.b.h. (inches)	Total tree height (feet) [2/]								
	60	70	80	90	100	110	120	130	140
	Pounds								
	DRY [4/]								
12	303	362	423	484	547	611	676	742	
13	365	436	509	583	659	736	814	893	
14		517	604	692	782	873	966	1,060	1,155
15		607	709	812	917	1,025	1,133	1,243	1,355
16		705	823	943	1,065	1,190	1,316	1,444	1,573
17		811	947	1,085	1,226	1,369	1,514	1,661	1,810
18		926	1,081	1,239	1,399	1,563	1,728	1,896	2,066
19			1,225	1,404	1,586	1,771	1,959	2,149	2,342
20			1,379	1,581	1,786	1,995	2,206	2,420	2,637
21			1,544	1,770	2,000	2,233	2,470	2,710	2,952
22			1,720	1,971	2,227	2,487	2,751	3,018	3,288
23				2,185	2,469	2,757	3,049	3,345	3,645
24				2,412	2,724	3,042	3,365	3,691	4,022
25				2,651	2,994	3,344	3,698	4,057	4,421
26					3,279	3,662	4,050	4,443	4,841
27					3,579	3,996	4,420	4,849	5,283
28					3,893	4,347	4,808	5,275	5,748

1/ Blocked-in area indicates range of data.
2/ Includes 1-foot stump allowance.
3/ $\text{Log}_{10}\ Y = -1.54143 + 1.10526\ \text{Log}_{10}\ (D^2Th)$.
4/ $\text{Log}_{10}\ Y = -2.07644 + 1.15782\ \text{Log}_{10}\ (D^2Th)$.

Table 15.--Predicted weight of wood and bark in main stem to 2-inch d.i.b. top for yellow-poplar trees [1]

D.b.h. (inches)	Total tree height (feet)[2] 40	50	60	70	80	90	100	110	120	130	140
	Pounds										
	GREEN [3]										
6	187	232	277	322	367						
7	252	314	375	436	496	557					
8	327	407	486	565	644	723	801				
9		512	612	712	811	910	1,008	1,107			
10			752	874	996	1,118	1,239	1,360	1,480		
11			906	1,053	1,200	1,346	1,492	1,638	1,783		
12			1,074	1,249	1,423	1,596	1,769	1,942	2,114	2,286	
13			1,256	1,460	1,663	1,866	2,068	2,270	2,472	2,673	
14				1,687	1,922	2,157	2,391	2,624	2,857	3,089	3,321
15				1,931	2,200	2,468	2,736	3,003	3,269	3,535	3,800
16				2,190	2,496	2,800	3,103	3,406	3,709	4,010	4,311
17				2,466	2,809	3,152	3,494	3,835	4,175	4,514	4,853
18				2,757	3,141	3,524	3,907	4,288	4,668	5,048	5,427
19					3,491	3,917	4,342	4,765	5,188	5,610	6,032
20					3,859	4,330	4,799	5,268	5,735	6,202	6,667
21					4,245	4,763	5,280	5,795	6,309	6,822	7,334
22					4,649	5,216	5,782	6,346	6,909	7,471	8,032
23						5,690	6,307	6,922	7,536	8,149	8,761
24						6,183	6,853	7,522	8,190	8,856	9,521
25						6,696	7,422	8,147	8,870	9,591	10,311
26							8,014	8,796	9,576	10,355	11,132
27							8,627	9,469	10,309	11,147	11,984
28							9,262	10,166	11,068	11,968	12,867

continued

Table 15.--Predicted weight of wood and bark in main stem to 2-inch d.i.b. top for yellow-poplar trees[1/] (continued)

D.b.h. (inches)	Total tree height (feet)[2/] 40	50	60	70	80	90	100	110	120	130	140
	Pounds										
	DRY [4/]										
6	81	101	122	143	164						
7	111	139	168	196	225	254					
8	146	183	221	258	296	334	372				
9		233	281	329	377	425	474	523			
10			348	408	468	528	588	648	709		
11			424	496	569	642	715	788	862		
12			506	593	680	767	855	942	1,030	1,118	
13			597	699	801	904	1,007	1,110	1,214	1,318	
14				813	933	1,052	1,172	1,293	1,413	1,534	1,655
15				937	1,074	1,212	1,350	1,489	1,628	1,767	1,906
16				1,069	1,226	1,384	1,541	1,699	1,858	2,017	2,176
17				1,211	1,388	1,567	1,745	1,924	2,104	2,284	2,464
18				1,361	1,561	1,761	1,962	2,164	2,365	2,568	2,770
19					1,744	1,968	2,192	2,417	2,643	2,868	3,095
20					1,937	2,186	2,435	2,685	2,936	3,187	3,438
21					2,141	2,416	2,691	2,968	3,244	3,522	3,800
22					2,355	2,658	2,961	3,264	3,569	3,874	4,180
23						2,911	3,243	3,576	3,909	4,244	4,579
24						3,176	3,539	3,902	4,266	4,630	4,996
25						3,454	3,848	4,242	4,638	5,035	5,432
26							4,170	4,598	5,026	5,456	5,887
27							4,505	4,967	5,431	5,895	6,360
28							4,854	5,352	5,851	6,351	6,852

1/ Blocked-in area indicates range of data.
2/ Includes 1-foot stump allowance.
3/ $\text{Log}_{10} Y = -0.081474 + 0.97694 \text{ Log}_{10} (D^2Th)$.
4/ $\text{Log}_{10} Y = -1.33025 + 1.02493 \text{ Log}_{10} (D^2Th)$.

Table 16.--Predicted weight of wood excluding bark in main stem to 2-inch d.i.b. top for yellow-poplar trees[1]

D.b.h. (inches)	Total tree height (feet)[2]										
	40	50	60	70	80	90	100	110	120	130	140
	Pounds										
	GREEN[3]										
6	153	191	228	265	303						
7	207	258	309	360	410	461					
8	270	336	402	468	534	599	665				
9		424	507	590	673	756	839	921			
10			624	726	829	931	1,032	1,134	1,235		
11			753	877	1,000	1,123	1,246	1,368	1,491		
12			894	1,040	1,187	1,333	1,479	1,624	1,770	1,915	
13			1,047	1,218	1,390	1,561	1,731	1,902	2,072	2,242	
14				1,410	1,608	1,806	2,003	2,201	2,398	2,595	2,791
15				1,615	1,842	2,069	2,295	2,521	2,747	2,972	3,198
16				1,834	2,092	2,350	2,607	2,863	3,120	3,376	3,631
17				2,067	2,358	2,648	2,937	3,227	3,515	3,804	4,092
18				2,313	2,639	2,963	3,288	3,611	3,935	4,257	4,580
19					2,935	3,297	3,657	4,017	4,377	4,736	5,095
20					3,248	3,647	4,046	4,445	4,842	5,240	5,637
21					3,575	4,015	4,455	4,893	5,331	5,769	6,206
22					3,919	4,401	4,882	5,363	5,843	6,323	6,801
23						4,804	5,329	5,854	6,378	6,901	7,424
24						5,224	5,795	6,366	6,936	7,505	8,074
25						5,662	6,281	6,899	7,517	8,134	8,750
26							6,786	7,454	8,121	8,787	9,453
27							7,310	8,029	8,748	9,466	10,183
28							7,853	8,626	9,398	10,169	10,940

continued

Table 16.--Predicted weight of wood excluding bark in main stem to 2-inch d.i.b. top for yellow-poplar trees[1/] (continued)

D.b.h. (inches)	Total tree height (feet)[2/]										
	40	50	60	70	80	90	100	110	120	130	140
	Pounds										
	DRY[4/]										
6	68	85	103	121	138						
7	93	117	141	166	190	214					
8	122	154	186	218	250	282	315				
9		196	237	278	319	360	401	442			
10			294	345	396	447	498	549	601		
11			358	420	482	544	606	668	731		
12			428	502	576	650	725	799	874	949	
13			505	592	679	767	855	943	1,031	1,119	
14				690	791	893	995	1,098	1,201	1,304	1,407
15				795	912	1,029	1,147	1,265	1,384	1,503	1,622
16				908	1,041	1,176	1,310	1,445	1,581	1,716	1,852
17				1,028	1,180	1,332	1,484	1,637	1,791	1,945	2,099
18				1,157	1,327	1,498	1,670	1,842	2,014	2,187	2,361
19					1,483	1,674	1,866	2,059	2,252	2,445	2,639
20					1,649	1,861	2,074	2,288	2,502	2,717	2,932
21					1,823	2,058	2,293	2,530	2,767	3,004	3,242
22					2,006	2,264	2,524	2,784	3,045	3,306	3,568
23						2,481	2,766	3,051	3,336	3,623	3,910
24						2,709	3,019	3,330	3,642	3,955	4,268
25						2,946	3,283	3,622	3,961	4,301	4,642
26							3,559	3,926	4,294	4,663	5,033
27							3,847	4,244	4,641	5,040	5,439
28							4,146	4,573	5,002	5,431	5,862

1/ Blocked-in area indicates range of data.
2/ Includes 1-foot stump allowance.
3/ $\text{Log}_{10}\ Y = -0.92750 + 0.98533\ \text{Log}_{10}\ (D^2Th)$.
4/ $\text{Log}_{10}\ Y = -1.41983 + 1.02925\ \text{Log}_{10}\ (D^2Th)$.

Table 17.--Predicted weight of wood and bark in branches for yellow-poplar trees [1]

D.b.h. (inches)	Total tree height (feet) [2]										
	40	50	60	70	80	90	100	110	120	130	140
	Pounds										
	GREEN [3]										
6	31	37	43	49	55						
7	40	48	56	63	71	78					
8	49	60	69	79	88	98	107				
9		73	85	96	108	119	130	141			
10			101	115	128	142	155	168	180		
11			118	135	151	166	182	197	211		
12			137	156	174	192	210	227	245	261	
13			157	178	199	220	240	260	280	299	
14				202	225	249	272	294	317	338	360
15				226	253	279	305	330	355	380	404
16				252	282	311	340	368	396	423	450
17				279	312	344	376	407	438	468	498
18				307	343	379	414	448	482	515	548
19					376	415	453	491	528	564	600
20					409	452	494	535	575	615	654
21					444	490	536	580	624	667	710
22					480	530	579	627	674	721	767
23						571	624	675	726	777	826
24						613	670	725	780	834	887
25						656	717	776	835	893	950
26							766	829	892	953	1,014
27							815	883	950	1,016	1,081
28							867	939	1,009	1,079	1,148

Table 17.--Predicted weight of wood and bark in branches for yellow-poplar trees [1] (continued)

D.b.h. (inches)	Total tree height (feet)[2]										
	40	50	60	70	80	90	100	110	120	130	140
	Pounds										
	DRY [4]										
6	12	14	17	19	21						
7	15	19	22	25	28	31					
8	19	24	28	32	36	40	43				
9		29	34	39	44	49	53	58			
10			41	47	53	59	64	70	76		
11			49	56	63	69	76	83	89		
12			57	65	73	81	89	97	104	112	
13			65	75	84	93	102	111	120	129	
14				85	96	106	116	127	137	147	157
15				96	108	120	132	143	155	166	177
16				108	121	134	147	160	173	186	198
17				120	135	150	164	178	193	207	221
18				132	149	165	181	197	213	229	244
19					164	182	200	217	234	252	269
20					179	199	219	238	257	275	294
21					196	217	238	259	280	300	320
22					212	236	258	281	304	326	348
23						255	280	304	328	352	376
24						275	301	328	354	380	405
25						295	324	352	380	408	436
26							347	377	408	437	467
27							371	403	436	467	499
28							395	430	464	498	532

1/ Blocked-in area indicates range of data.
2/ Includes 1-foot stump allowance.
3/ $\text{Log}_{10}\ Y = -1.15689 + 0.83663\ \text{Log}_{10}\ (D^2Th)$.
4/ $\text{Log}_{10}\ Y = -1.71827 + 0.88172\ \text{Log}_{10}\ (D^2Th)$.

Table 18.--Predicted weight of wood excluding bark in branches for yellow-poplar trees [1]

D.b.h. (inches)	Total tree height (feet)[2]										
	40	50	60	70	80	90	100	110	120	130	140
	Pounds										
	GREEN [3]										
6	20	24	28	32	36						
7	26	31	37	42	47	52					
8	32	39	46	52	59	65	71				
9		48	56	64	72	79	87	94			
10			67	77	86	95	104	113	121		
11			79	90	101	112	122	133	143		
12			92	105	117	130	142	154	166	178	
13			105	120	134	149	163	177	190	204	
14				136	153	169	185	200	216	231	246
15				153	172	190	208	225	243	260	277
16				171	192	212	232	252	271	290	309
17				190	213	235	257	279	301	322	343
18				209	234	259	284	308	332	355	378
19					257	284	311	338	364	389	415
20					281	310	340	368	397	425	453
21					305	337	369	401	431	462	492
22					330	365	400	434	467	500	533
23						394	431	468	504	540	575
24						424	464	503	542	580	618
25						455	497	540	581	622	663
26							532	577	621	665	709
27							567	615	663	710	756
28							604	655	705	755	805

continued

Table 18.--Predicted weight of wood excluding bark in branches for yellow-poplar trees[1/] (continued)

D.b.h. (inches)	Total tree height (feet)[2/] 40	50	60	70	80	90	100	110	120	130	140
	Pounds										
	DRY [4/]										
6	9	11	13	15	17						
7	12	15	17	20	22	25					
8	15	19	22	25	28	31	34				
9		23	27	31	35	38	42	46			
10			32	37	41	46	50	55	59		
11			38	44	49	54	59	64	69		
12			44	51	57	63	69	75	81	87	
13			51	58	65	72	79	86	93	99	
14				66	74	82	90	98	105	113	121
15				75	84	93	102	110	119	127	136
16				83	94	104	114	123	133	142	152
17				93	104	115	126	137	148	158	169
18				102	115	127	139	151	163	175	186
19					126	140	153	166	179	192	205
20					138	153	167	181	196	210	224
21					150	166	182	197	213	228	243
22					162	180	197	214	231	247	264
23						194	213	231	249	267	285
24						209	229	249	268	288	307
25						225	246	267	288	309	329
26							263	286	308	330	352
27							281	305	329	353	376
28							299	325	351	376	401

1/ Blocked-in area indicates range of data.
2/ Includes 1-foot stump allowance.
3/ $\text{Log}_{10}\ Y = -1.40010 + 0.85422\ \text{Log}_{10}\ (D^2Th)$.
4/ $\text{Log}_{10}\ Y = -1.76294 + 0.86612\ \text{Log}_{10}\ (D^2Th)$.

Table 19.--Predicted green volume of total tree wood and bark for yellow-poplar trees [1]

D.b.h. (inches)	Total tree height (feet) [2]										
	40	50	60	70	80	90	100	110	120	130	140
	Cubic feet										
	WOOD [3]										
6	3.2	4.0	4.8	5.6	6.4						
7	4.4	5.5	6.6	7.6	8.7	9.8					
8	5.7	7.1	8.5	9.9	11.3	12.7	14.1				
9		9.0	10.8	12.5	14.3	16.1	17.8	19.6			
10			13.3	15.4	17.6	19.8	21.9	24.1	26.3		
11			16.0	18.6	21.2	23.9	26.5	29.1	31.7		
12			19.0	22.1	25.2	28.3	31.5	34.6	37.7	40.8	
13			22.2	25.9	29.6	33.2	36.8	40.5	44.1	47.7	
14				30.0	34.2	38.4	42.6	46.9	51.1	55.3	59.4
15				34.4	39.2	44.0	48.9	53.7	58.5	63.3	68.1
16				39.0	44.5	50.0	55.5	61.0	66.5	71.9	77.4
17				44.0	50.2	56.4	62.6	68.7	74.9	81.1	87.2
18				49.3	56.2	63.1	70.0	77.0	83.9	90.8	97.6
19					62.5	70.2	77.9	85.6	93.3	101.0	108.7
20					69.2	77.7	86.2	94.8	103.3	111.8	120.2
21					76.2	85.6	95.0	104.3	113.7	123.1	132.4
22					83.5	93.8	104.1	114.4	124.6	134.9	145.1
23						102.4	113.7	124.9	136.1	147.3	158.5
24						111.4	123.6	135.8	148.0	160.2	172.3
25						120.8	134.0	147.2	160.4	173.6	186.8
26							144.8	159.1	173.4	187.6	201.9
27							156.0	171.4	186.8	202.1	217.5
28							167.6	184.2	200.7	217.2	233.7

continued

Table 19.--Predicted green volume of total tree wood and bark for yellow-poplar trees [1] (continued)

D.b.h. (inches)	Total tree weight (feet)[2] 40	50	60	70	80	90	100	110	120	130	140
	Cubic feet										
	WOOD AND BARK [4]										
6	4.0	4.9	5.9	6.9	7.9						
7	5.4	6.7	8.0	9.4	10.7	12.0					
8	7.0	8.8	10.5	12.2	14.0	15.7	17.4				
9		11.1	13.3	15.4	17.6	19.8	22.0	24.2			
10			16.3	19.0	21.7	24.4	27.1	29.8	32.5		
11			19.7	23.0	26.3	29.5	32.8	36.0	39.3		
12			23.5	27.3	31.2	35.1	38.9	42.8	46.6	50.5	
13			27.5	32.0	36.6	41.1	45.6	50.2	54.7	59.2	
14				37.1	42.4	47.6	52.9	58.1	63.3	68.6	73.8
15				42.5	48.6	54.6	60.6	66.6	72.6	78.6	84.6
16				48.4	55.2	62.1	68.9	75.7	82.6	89.4	96.2
17				54.5	62.3	70.0	77.7	85.4	93.1	100.8	108.5
18				61.1	69.8	78.4	87.0	95.7	104.3	112.9	121.5
19					77.6	87.3	96.9	106.5	116.1	125.7	135.3
20					86.0	96.6	107.3	117.9	128.5	139.2	149.8
21					94.7	106.4	118.2	129.9	141.6	153.3	165.0
22					103.9	116.7	129.6	142.5	155.3	168.1	181.0
23						127.5	141.6	155.6	169.6	183.6	197.7
24						138.7	154.0	169.3	184.6	199.8	215.1
25						150.5	167.0	183.6	200.1	216.7	233.2
26							180.5	198.5	216.3	234.2	252.1
27							194.6	213.9	233.2	252.4	271.7
28							209.1	229.9	250.6	271.3	292.0

1/ Blocked-in area indicates range of data.
2/ Includes 1-foot stump allowance.
3/ $\text{Log}_{10}\ Y = -2.60833 + 0.98740\ \text{Log}_{10}\ (D^2Th)$.
4/ $\text{Log}_{10}\ Y = -2.53544 + 0.99215\ \text{Log}_{10}\ (D^2Th)$.

Table 20.--Predicted green volume of wood and bark in main stem to saw-log merchantable top for yellow-poplar trees[1]

D.b.h. (inches)	Total tree height (feet)[2]								
	60	70	80	90	100	110	120	130	140
	Cubic feet								
	WOOD[3]								
12	12.2	14.6	16.9	19.3	21.8	24.3	26.8	29.3	
13	14.7	17.4	20.3	23.2	26.1	29.1	32.1	35.2	
14		20.6	24.0	27.4	30.9	34.4	38.0	41.6	45.2
15		24.1	28.1	32.1	36.1	40.2	44.4	48.6	52.9
16		27.9	32.5	37.1	41.8	46.6	51.4	56.2	61.2
17		32.0	37.2	42.6	47.9	53.4	58.9	64.5	70.2
18		36.4	42.4	48.4	54.6	60.8	67.1	73.4	79.9
19			47.9	54.7	61.7	68.7	75.8	83.0	90.2
20			53.8	61.5	69.3	77.1	85.1	93.2	101.4
21			60.1	68.7	77.3	86.2	95.1	104.1	113.2
22			66.8	76.3	85.9	95.7	105.6	115.6	125.8
23				84.3	95.0	105.9	116.8	127.9	139.1
24				92.9	104.6	116.6	128.6	140.8	153.1
25				101.9	114.8	127.8	141.1	154.4	168.0
26					125.4	139.7	154.2	168.8	183.5
27					136.6	152.2	167.9	183.8	199.9
28					148.3	165.2	182.3	199.6	217.1

continued

Table 20.--Predicted green volume of wood and bark in main stem to saw-log merchantable top for yellow-poplar trees [1] (continued)

D.b.h. (inches)	Total tree height (feet)[2]								
	60	70	80	90	100	110	120	130	140
	Cubic feet								
	WOOD AND BARK[4]								
12	15.5	18.4	21.3	24.3	27.3	30.4	33.5	36.6	
13	18.5	22.0	25.5	29.0	32.7	36.3	40.0	43.7	
14		25.9	30.0	34.2	38.5	42.8	47.2	51.6	56.0
15		30.2	35.0	39.9	44.9	49.9	55.0	60.1	65.3
16		34.9	40.4	46.1	51.8	57.6	63.5	69.4	75.4
17		39.9	46.3	52.8	59.3	66.0	72.7	79.5	86.3
18		45.3	52.6	59.9	67.4	74.9	82.6	90.2	98.0
19			59.3	67.6	76.0	84.5	93.1	101.8	110.5
20			66.5	75.8	85.2	94.7	104.4	114.1	123.9
21			74.1	84.5	95.0	105.6	116.4	127.2	138.1
22			82.2	93.7	105.3	117.1	129.1	141.1	153.2
23				103.4	116.3	129.3	142.5	155.8	169.2
24				113.7	127.9	142.2	156.6	171.2	186.0
25				124.5	140.0	155.7	171.5	187.5	203.7
26					152.8	169.9	187.2	204.6	222.2
27					166.2	184.8	203.6	222.6	241.7
28					180.2	200.4	220.8	241.4	262.1

[1] Blocked-in area indicates range of data.
[2] Includes 1-foot stump allowance.
[3] $\text{Log}_{10}\ Y = -3.36739 + 1.13164\ \text{Log}_{10}\ (D^2Th)$.
[4] $\text{Log}_{10}\ Y = -3.19278 + 1.11325\ \text{Log}_{10}\ (D^2Th)$.

Table 21.--Predicted green volume of wood and bark in main stem to 2-inch d.i.b. top for yellow-poplar trees[1]

D.b.h. (inches)	Total tree height (feet)[2]										
	40	50	60	70	80	90	100	110	120	130	140
	Cubic feet										
	WOOD[3]										
6	2.9	3.6	4.3	5.0	5.7						
7	3.9	4.9	5.8	6.8	7.8	8.8					
8	5.1	6.4	7.6	8.9	10.2	11.5	12.7				
9		8.0	9.7	11.3	12.9	14.5	16.1	17.7			
10			11.9	13.9	15.9	17.9	19.9	21.9	23.9		
11			14.4	16.9	19.3	21.7	24.1	26.5	28.9		
12			17.2	20.1	22.9	25.8	28.7	31.6	34.4	37.3	
13			20.2	23.6	26.9	30.3	33.7	37.1	40.4	43.8	
14				27.3	31.2	35.2	39.1	43.0	46.9	50.8	54.7
15				31.4	35.9	40.4	44.9	49.4	53.9	58.4	62.9
16				35.7	40.8	45.9	51.1	56.2	61.3	66.4	71.5
17				40.3	46.1	51.9	57.7	63.4	69.2	75.0	80.8
18				45.2	51.7	58.2	64.7	71.1	77.6	84.1	90.6
19					57.6	64.8	72.1	79.3	86.5	93.7	100.9
20					63.9	71.9	79.9	87.9	95.9	103.9	111.9
21					70.4	79.2	88.1	96.9	105.7	114.5	123.4
22					77.3	87.0	96.7	106.3	116.0	125.7	135.4
23						95.1	105.7	116.3	126.9	137.4	148.0
24						103.5	115.1	126.6	138.1	149.7	161.2
25						112.4	124.9	137.4	149.9	162.4	175.0
26							135.1	148.6	162.2	175.7	189.3
27							145.7	160.3	174.9	189.5	204.1
28							156.7	172.4	188.2	203.9	219.6

continued

Table 21.--Predicted green volume of wood and bark in main stem to 2-inch d.i.b. top for yellow-poplar trees [1] (continued)

D.b.h. (inches)	Total tree height (feet) [2]										
	40	50	60	70	80	90	100	110	120	130	140
	Cubic feet										
	WOOD AND BARK [4]										
6	3.4	4.3	5.1	6.0	6.9						
7	4.7	5.8	7.0	8.2	9.4	10.6					
8	6.1	7.6	9.2	10.7	12.3	13.8	15.4				
9		9.7	11.7	13.6	15.6	17.6	19.5	21.5			
10			14.4	16.9	19.3	21.7	24.2	26.6	29.1		
11			17.5	20.4	23.4	26.4	29.3	32.3	35.2		
12			20.9	24.4	27.9	31.4	35.0	38.5	42.0	45.6	
13			24.5	28.7	32.8	36.9	41.1	45.3	49.4	53.6	
14				33.3	38.1	42.9	47.7	52.6	57.4	62.2	67.1
15				38.3	43.8	49.3	54.9	60.4	66.0	71.6	77.1
16				43.6	49.9	56.2	62.5	68.9	75.2	81.5	87.9
17				49.3	56.4	63.6	70.7	77.9	85.0	92.2	99.3
18				55.3	63.3	71.3	79.4	87.4	95.4	103.5	111.5
19					70.6	79.6	88.5	97.5	106.5	115.4	124.4
20					78.4	88.3	98.2	108.1	118.1	128.0	138.0
21					86.5	97.4	108.4	119.4	130.3	141.3	152.3
22					95.0	107.0	119.1	131.1	143.2	155.3	167.3
23						117.1	130.3	143.5	156.7	169.9	183.1
24						127.6	142.0	156.4	170.7	185.1	199.5
25						138.6	154.2	169.8	185.4	201.1	216.7
26							166.9	183.8	200.7	217.7	234.6
27							180.2	198.4	216.7	234.9	253.2
28							193.9	213.6	233.2	252.9	272.5

[1] Blocked-in area indicates range of data.
[2] Includes 1-foot stump allowance.
[3] $\text{Log}_{10}\ Y = -2.70952 + 1.00212\ \text{Log}_{10}\ (D^2Th)$.
[4] $\text{Log}_{10}\ Y = -2.66141 + 1.01119\ \text{Log}_{10}\ (D^2Th)$.

Table 22.--Predicted green volume of wood and bark in branches for yellow-poplar trees[1]

D.b.h. (inches)	Total tree height (feet)[2]										
	40	50	60	70	80	90	100	110	120	130	140
	Cubic feet										
	WOOD[3]										
6	0.4	0.5	0.5	0.6	0.7						
7	.5	.6	.7	.8	.9	1.0					
8	.6	.7	.9	1.0	1.1	1.2	1.3				
9		.9	1.0	1.2	1.3	1.5	1.6	1.7			
10			1.2	1.4	1.6	1.8	1.9	2.1	2.2		
11			1.5	1.7	1.9	2.1	2.3	2.4	2.6		
12			1.7	1.9	2.2	2.4	2.6	2.8	3.1	3.3	
13			1.9	2.2	2.5	2.7	3.0	3.2	3.5	3.7	
14				2.5	2.8	3.1	3.4	3.7	4.0	4.2	4.5
15				2.8	3.2	3.5	3.8	4.1	4.4	4.8	5.1
16				3.1	3.5	3.9	4.3	4.6	5.0	5.3	5.6
17				3.5	3.9	4.3	4.7	5.1	5.5	5.9	6.3
18				3.8	4.3	4.7	5.2	5.6	6.1	6.5	6.9
19					4.7	5.2	5.7	6.2	6.6	7.1	7.6
20					5.1	5.7	6.2	6.7	7.2	7.7	8.2
21					5.6	6.2	6.7	7.3	7.9	8.4	8.9
22					6.0	6.7	7.3	7.9	8.5	9.1	9.7
23						7.2	7.8	8.5	9.2	9.8	10.4
24						7.7	8.4	9.1	9.8	10.5	11.2
25						8.3	9.0	9.8	10.5	11.3	12.0
26							9.7	10.5	11.3	12.1	12.8
27							10.3	11.2	12.0	12.8	13.7
28							10.9	11.9	12.8	13.7	14.5

continued

Table 22.--Predicted green volume of wood and bark in branches for yellow-poplar trees[1] (continued)

D.b.h. (inches)	Total tree height (feet) [2]										
	40	50	60	70	80	90	100	110	120	130	140
	Cubic feet										
	WOOD AND BARK [4]										
6	0.5	0.7	0.8	0.9	1.0						
7	.7	.9	1.0	1.1	1.3	1.4					
8	.9	1.1	1.2	1.4	1.6	1.7	1.9				
9		1.3	1.5	1.7	1.9	2.1	2.3	2.5			
10		1.5	1.8	2.1	2.3	2.5	2.8	3.0	3.2		
11			2.1	2.4	2.7	3.0	3.2	3.5	3.8		
12			2.4	2.8	3.1	3.4	3.8	4.1	4.4	4.7	
13			2.8	3.2	3.6	3.9	4.3	4.6	5.0	5.3	
14				3.6	4.0	4.4	4.9	5.3	5.7	6.1	6.4
15				4.0	4.5	5.0	5.5	5.9	6.4	6.8	7.2
16				4.5	5.0	5.6	6.1	6.6	7.1	7.6	8.1
17				5.0	5.6	6.2	6.7	7.3	7.8	8.4	8.9
18				5.5	6.1	6.8	7.4	8.0	8.6	9.2	9.8
19					6.7	7.4	8.1	8.8	9.4	10.1	10.7
20					7.3	8.1	8.8	9.6	10.3	11.0	11.7
21					7.9	8.8	9.6	10.4	11.2	11.9	12.7
22					8.6	9.5	10.4	11.2	12.1	12.9	13.7
23						10.2	11.2	12.1	13.0	13.9	14.8
24						11.0	12.0	13.0	13.9	14.9	15.9
25						11.7	12.8	13.9	14.9	16.0	17.0
26							13.7	14.8	15.9	17.1	18.1
27							14.6	15.8	17.0	18.2	19.3
28							15.5	16.8	18.1	19.3	20.5

[1] Blocked-in area indicates ranges of data.
[2] Includes 1-foot stump allowance.
[3] $\text{Log}_{10}\ Y = -3.09526 + 0.84474\ \text{Log}_{10}\ (D^2Th)$.
[4] $\text{Log}_{10}\ Y = -2.90517 + 0.83679\ \text{Log}_{10}\ (D^2Th)$.

Clark, Alexander, III, and James G. Schroeder
1977. Biomass of yellow-poplar in natural stands in western North Carolina. USDA For. Serv. Res. Pap. SE-165, 41 p. Southeast. For. Exp. Stn., Asheville, N. C.

Aboveground biomass was determined for yellow-poplar (Liriodendron tulipifera L.) trees 6 to 28 inches d.b.h. growing in natural, uneven-aged mountain cove stands in western North Carolina. Specific gravity, moisture content, and green weight per cubic foot are presented for the total tree and its components. Tables developed from regression equations show weight and volume of the total tree and its components by d.b.h. and total height class.

Keywords: Biomass, component proportions, Liriodendron tulipifera L., prediction equations, volume, weight.

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