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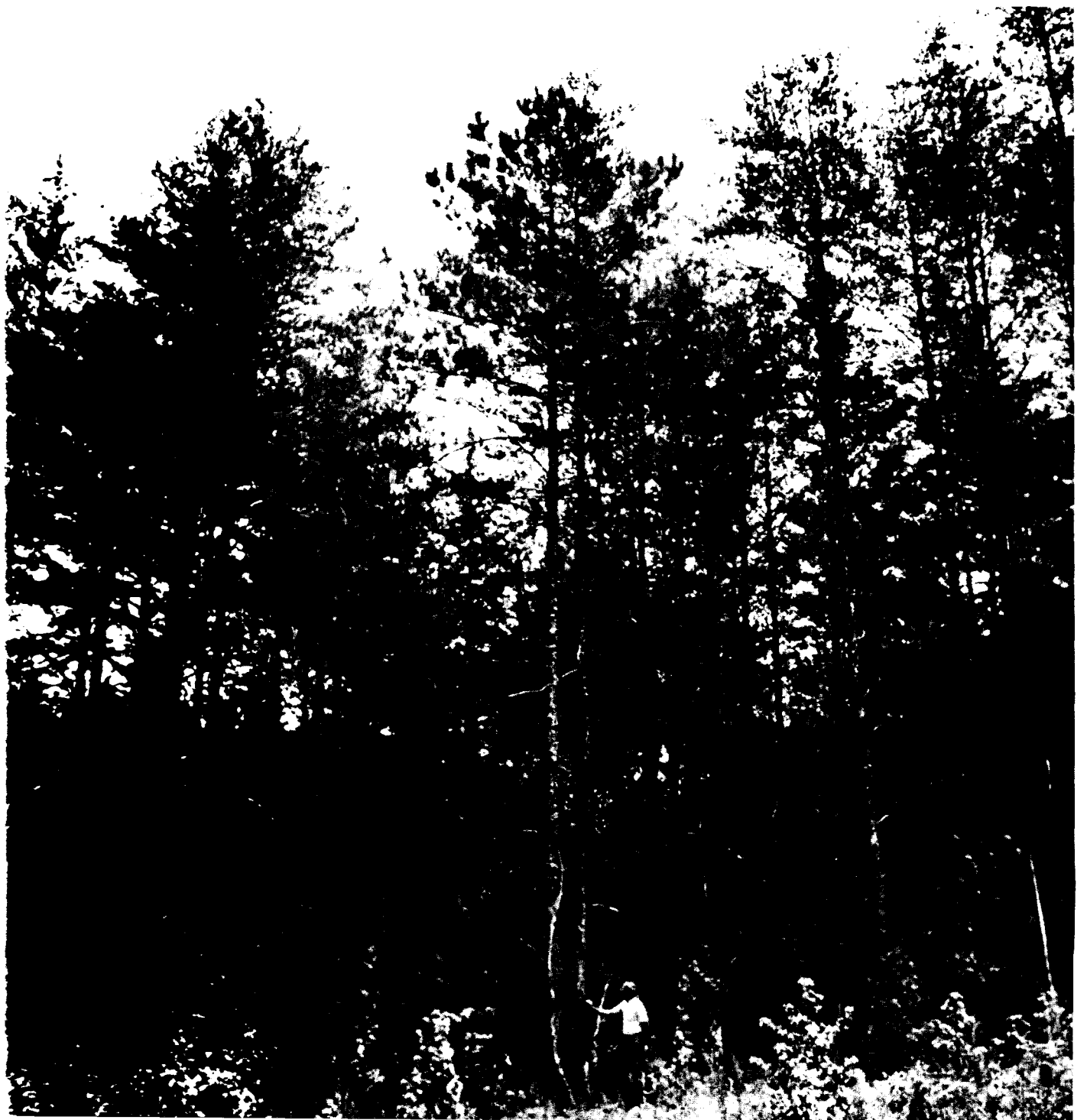
Aboveground Biomass of Virginia Pine in North Georgia

Research Paper
SE-232



June 1982
Southeastern Forest Experiment Station
Asheville, North Carolina

Aboveground Biomass of Virginia Pine in North Georgia

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ABSTRACT.--Virginia pine trees 6 to 14 inches d.b.h. were randomly selected from an uneven-aged stand in northwest Georgia to determine the weight and volume of aboveground biomass. Average green weight of the total tree ranged from 420 pounds for 6-inch trees to 2,493 pounds for 14-inch trees. The average tree green-weight distribution was 84 percent in the stem, 13 percent in branches, and 3 percent in foliage. The average tree contained 88 percent wood, 9 percent bark, and 3 percent foliage. Wood was distributed as 88 percent in the stem and 12 percent in branches. Bark distribution was 71 percent in the stem and 29 percent in branches. 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 predicted weight and cubic-foot volume of the total tree and its components by d.b.h. and total height classes.

Keywords: Pinus virginiana, tree component proportions, equations, specific gravity, logging residues, fuel sources.

There is a growing public awareness that unused wood is an untapped potential energy source. Residues generated at wood-processing plants are increasingly being utilized for fuel but logging residues and other forest materials unsuited for conventional products are not. To facilitate greater utilization of the timber resource, methods for assessing the total resource are needed. The most useful measurement for assessing the total tree with its variable shapes and sizes of crown is that of weight. When weight per unit volume is determined, the irregular mass can also be expressed in measurement units, such as cubic feet.

In this paper the green volumes and green and dry weights of aboveground biomass of commercial-size Virginia pines (Pinus virginiana Mill.) are presented. Equations and yield tables show weight and volume of wood and bark in the total tree and by merchantable subdivisions.

PROCEDURES

Field

A stratified random sample of 25 trees was selected from a fully stocked, uneven-aged stand in Dawson County, located in the upper Piedmont of Georgia. Site index averaged about 70. Five trees in each even-inch d.b.h. class from 6 to 14 inches were randomly selected. Means and ranges in tree dimensions are shown in table 1.

Sample trees were felled and limbed and the main stem of each tree was bucked into 3- to 5-foot segments and weighed to the nearest one-quarter

Table 1.--Means and ranges in dimensions of sample Virginia pines, by d.b.h. class

D.b.h. class (inches)	Sample trees	D.b.h.		Total height		Age	
		Average	Range	Average	Range	Average	Range
	Number	*-Inches-*		*-Feet-*		*-Years-*	
6	5	6.1	5.5- 6.5	57	52-62	25	24-25
8	5	8.0	7.1- 8.7	60	50-70	26	24-31
10	5	10.0	9.7-10.3	68	60.73	42	32-54
12	5	11.9	11.4-12.8	74	69-76	42	38-46
14	5	13.8	13.2-14.3	72	67-77	50	41-60
All classes	25	10.0	5.5-14.3	66	50-77	37	24-60

pound on a portable balance. Separate weights were recorded for the saw-log portion of the main stem to a 7-inch d.o.b. top and for the pulpwood portion of the stem to a 4-inch d.o.b. top. Sample branches were selected from the lower, middle, and upper portion of the crown. These were weighed and stripped of their foliage, and the foliage was weighed to establish the foliage:branch weight ratio. All other branches were weighed with foliage intact, and the foliage:branch weight ratio was applied to these weights to estimate total-tree foliage weight.

Moisture content and specific gravity of wood and bark were determined from disks removed at the butt, d.b.h., quarter points to a 4-inch d.o.b. top, and at a 2-inch d.o.b. top. Disks were also cut from the branches randomly selected from the lower, middle, and upper crown. Each disk sample was sealed in a polyethylene bag for subsequent laboratory analysis. A composite foliage sample was taken from each tree for determination of moisture content.

Laboratory

Specific gravity was computed on a green-volume and ovendry-weight basis. Moisture content was computed on an ovendry-weight basis after samples were dried to a constant weight at 103°C. Percentage of bark was determined from sample disks on a green-weight basis. Values for moisture content (MC), specific gravity (SG), and percentage of bark in stem, branches, and total tree were calculated by weighing disk values in proportion to the volume of the component they represented. Weighted moisture content values were used to convert component green weights to ovendry weights.

Green weights per cubic foot of wood and bark were calculated from weighted values for specific gravity and moisture content with the equation:

$$1 + \frac{MC}{100} (SG) (62.4) \qquad (1)$$

Cubic-foot volume of green wood and bark were computed by dividing component weight by its green weight per cubic foot. Total green cubic-foot volume is the combined volumes of wood and bark.

Analysis

Linear regression equations for predicting green and dry weights of

wood, bark, and foliage in the total tree and its components were developed with d.b.h. and total height as independent variables. Equations were also developed to predict green cubic-foot volumes of wood and bark separately and combined. Total-tree and tree-component weights and volumes were estimated with the equation:

$$Y = b_0 + b_1 D^2Th + e \quad (2)$$

where:

Y = predicted weight or volume of component

D = d.b.h. in inches

Th = total height in feet

e = experimental error

b_i = regression coefficients

Grouping the data into D^2Th classes and plotting the variance of Y over D^2Th indicated that the variances of predicted weights and volumes increased with increasing D^2Th. Therefore, logarithmic transformation was used to make the variance more nearly homogenous and meet this basic assumption of regression analysis. The final form of regression equations used to predict weight and volume of the total tree and each component sampled was:

$$\log_{10} Y = b_0 + b_1 \log_{10} (D^2Th) \quad (3)$$

SAMPLE TREE CHARACTERISTICS

Total-tree Biomass

Observed green weight of the trees sampled ranged from an average of 420 pounds for 6-inch trees to 2,493 for 14-inch trees. Assuming a 10-inch d.b.h. Virginia pine tree as average, which it was in our sample, the total green weight is distributed as 88 percent wood, 9 percent bark, and 3 percent foliage. This distribution shows a proportionally higher percentage of wood and lower percentage of bark and foliage than other similar-size southern pines reported earlier.[1] [2] In these reports the major southern pines and sand pines have component distribution of 85 percent wood, 11 percent bark, and 4 percent foliage.

On a green-weight basis, the proportion of wood increased and bark decreased only slightly with increasing tree size, while foliage remained relatively constant. The proportion of tree component weights computed on a dry basis changed slightly from those computed on a green basis because of differences in component moisture content, but component distribution remained relatively constant over the range of diameter classes (table 2).

When the trees are viewed as being composed of stem, branches, and foliage, the proportion of green or dry weight in the stem decreases, branch proportional weight increases, and foliage remains relatively constant with increasing tree size (table 3).

The stem contained an average of 84 percent of the tree green weight, branches contained 13 percent, and foliage 3 percent. This biomass distribution of tree components is similar to that reported for the major southern pine species but significantly different from that reported for sand pine where the distribution was 76 percent stem, 20 percent branches, and 4 percent foliage.[3]

The green and dry weights of all wood in the tree and its distribution in the tree are presented in table 4. On the average, 88 percent of the green or dry weights of wood was in the stem and 12 percent was in the branches. The proportion of wood in the stem decreased while branchwood increased with increasing tree size.

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[1] Clark, Alexander, III; Taras, Michael A. Comparison of aboveground biomasses of the four major southern pines. For. Prod. J. 26(10): 25-29; 1976.

[2] Taras, Michael A. Aboveground biomass of Choctawhatchee sand pine in northwest Florida. Res. Pap. SE-210. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1980. 23 p.

[3] See footnote 2.

Table 2.--Average green and dry weights of the total tree and proportions of the tree in wood, bark, and foliage for Virginia pines 6 to 14 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	Foliage		Wood	Bark	Foliage
	Feet	*Number*	*Pounds*	*-Percent-*			*Pounds*	*-Percent-*		
6	57	5	420	86	11	3	210	90	8	2
8	60	5	746	86	10	4	355	90	7	3
10	68	5	1,413	88	9	3	697	90	8	2
12	74	5	2,067	88	9	3	1,032	90	8	2
14	72	5	2,493	88	9	3	1,251	91	7	2

Table 3.--Average green and dry weights of the total tree and proportions of the tree in the stem, branches, and foliage for Virginia pines 6 to 14 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)		
				Stem	Branches	Foliage		Stem	Branches	Foliage
	Feet	*Number*	*Pounds*	*-Percent-*			*Pounds*	*-Percent-*		
6	57	5	420	88	9	3	210	90	8	2
8	60	5	746	84	12	4	355	86	11	3
10	68	5	1,413	84	13	3	697	85	13	2
12	74	5	2,067	84	13	3	1,032	86	12	2
14	72	5	2,493	79	18	3	1,251	82	16	2

When the trees are examined for timber product yield, 6- and 8-inch d.b.h. trees had 79 to 85 percent, respectively, of the green weight of wood in pulpwood material. The remaining wood was distributed in the upper stem and branches, commonly referred to as crown. Trees 10-inches d.b.h. and larger have saw-log material to the 7-inch d.o.b. top, and pulpwood from the 7-inch d.o.b. top to the 4-inch d.o.b. top. Assuming the 12-inch d.b.h. tree as the average saw-log size tree, green weight of wood was distributed as follows: 78 percent in saw log, 9 percent in pulpwood, 2 percent in the upper stem, and 11 percent in branches. On a dry basis, 80 percent of the wood weight in a 12-inch d.b.h. tree was in saw-log material, reflecting higher moisture content of wood in the upper portion of the tree.

Compared with other southern pine species, Virginia pine has about 6 percent more wood distributed in the mer-

Table 4.--Average green and dry weights of wood in the total tree and distribution of wood in the main stem and branches for Virginia pines 6 to 14 inches d.b.h.

D.b.h. class (inches)	Average total height	Sample trees	Total-tree wood weight	Proportion of wood in--			
				Main stem			Branches
				Saw log[1]	Pulpwood[2]	Total stem	
	Feet	*Number*	*Pounds*	*Percent*			
			GREEN				
6	57	5	361	--	79	92	8
8	60	5	643	--	85	89	11
10	68	5	1,239	71	14	88	12
12	74	5	1,816	78	9	89	11
14	72	5	2,214	77	6	84	16
			DRY				
6	57	5	188	--	82	93	7
8	60	5	319	--	86	90	10
10	68	5	630	77	10	88	12
12	74	5	932	80	8	89	11
14	72	5	1,142	79	5	85	15

[1]Weight to 7-inch d.o.b. top.

[2]Weight to 4-inch d.o.b. top.

chantable stem to the 4-inch top. Virginia pine branches are smaller than those of the major southern pines and fewer than those of comparable-size sand pine trees, thus contributing less to the total tree weight.

The weight and distribution of bark in the tree are presented in table 5. The percent of green weight of bark in the total stem decreased from 82 percent in 6-inch d.b.h. trees to 54 percent in 14-inch d.b.h. trees, while branchbark increased from 18 percent to 46 percent over the same range of tree sizes. For the average saw-log size tree (12 inches d.b.h.) green weight of bark was distributed as follows: 54 percent in saw log, 8 percent in pulpwood, 4 percent in the upper stem, and 34 percent in branches. On a dry-weight basis, 61 percent of the bark weight in a 12-inch d.b.h. tree was in saw-log material, reflecting, as with wood, higher moisture content in the upper portion of the tree. In comparing bark proportions with other southern pines, we find that the crown of Virginia pine has 4 percent less bark than the major southern pines and 8 percent less than sand pine.

Table 5.--Average green and dry weights of bark in the total tree and distribution of bark in the main stem and branches for Virginia pines 6 to 14 inches d.b.h.

D.b.h. class (inches)	Average total height	Sample trees	Total-tree wood weight	Proportion of wood in--			
				Main stem			Branches
				Saw log[1]	Pulpwood[2]	Total stem	
	Feet	*Number*	*Pounds*	*-Percent-*			
			GREEN				
6	57	5	47	--	65	82	18
8	60	5	72	--	68	75	25
10	68	5	132	53	13	71	29
12	74	5	197	54	8	66	34
14	72	5	217	46	5	54	46
			DRY				
6	57	5	18	--	71	83	17
8	60	5	25	--	71	77	23
10	68	5	53	67	4	74	26
12	74	5	80	61	6	69	31
14	72	5	87	56	3	60	40

[1]Weight to 7-inch d.o.b. top.

[2]Weight to 4-inch d.o.b. top.

Stem Biomass

When the main stem was analyzed separately, the proportion of stem weight in wood increased and the proportion of bark weight decreased with increasing tree size (table 6). On the average, 92 percent of the green weight of the main stem was wood and 8 percent was bark. Compared to the major southern pine species, Virginia pine has approximately 4 percent more wood, or 4 percent less bark, in the main stem than its closely related species.

Branch Biomass

When branches were analyzed separately, the proportion of branchwood and branchbark generally increased while foliage decreased with increasing tree size (table 7). On the average, 66 percent of branch green weight was branchwood, 16 percent branchbark, and 18 percent in foliage. On a dry basis, branch composition was 73 percent branchwood, 13 percent branchbark, and 14 percent foliage, indicating the greater percentage of moisture in bark

Table 6.--Average green and dry weights of the stem and proportion of the stem in wood and bark for Virginia pines 6 to 14 inches d.b.h.

D.b.h. class (inches)	Average total height	Sample trees	Main stem weight (green)	Stem proportion in green--		Main stem weight (dry)	Stem proportion in dry--	
				Wood	Bark		Wood	Bark
	Feet	*Number*	*Pounds*	*--Percent---*		*Pounds*	*--Percent--*	
6	57	5	370	90	10	189	92	8
8	60	5	627	91	9	306	94	6
10	68	5	1,181	92	8	594	93	7
12	74	5	1,739	93	7	887	94	6
14	72	5	1,975	94	6	1,023	95	5

Table 7.--Average green and dry weight of branches and proportions in wood, bark, and foliage for Virginia pines 6 to 14 inches d.b.h.

D.b.h. class (in)	Average total height	Sample trees	Green				Dry			
			Branch weight	Branch-wood	Branch-bark	Foliage	Branch weight	Branch-wood	Branch-bark	Foliage
	Feet	*Number*	*Pounds*	*------Percent---------*			*Pounds*	*------Percent---------*		
6	57	5	50	59	17	24	21	64	15	21
8	60	5	120	58	15	27	49	64	12	24
10	68	5	232	66	16	18	103	73	13	14
12	74	5	328	63	21	16	144	69	14	17
14	72	5	519	69	19	12	228	75	15	10

and foliage. Compared to the major southern pine species, Virginia pine branches have a higher percentage of wood, and a lower percentage of bark and foliage.

Physical Properties

Wood and bark specific gravity, moisture content, and green weight per cubic foot in the total tree and its components are presented in table 8. Wood specific gravity for the total tree averaged 0.479. Wood specific gravity for the saw-log portion to the 7-inch d.o.b. top averaged 0.505, while the pulpwood portion between the 7-inch d.o.b. top and the 4-inch d.o.b. top averaged 0.461. The main stem as a whole averaged 0.486, while branches alone averaged 0.462. Bark specific gravity was consistently lower than

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

Tree component	Average and standard deviation		
	Specific gravity	Moisture content	Green weight per cubic foot
		Percent	*Pounds*
		WOOD	
Total tree	0.479 ± 0.026	95 ± 9	58.5 ± 2.9
Saw log	0.505 ± 0.032	86 ± 9	58.6 ± 3.5
Pulpwood	0.461 ± 0.025	109 ± 18	59.9 ± 3.2
Main stem	0.486 ± 0.027	92 ± 8	58.3 ± 3.1
Branches	0.462 ± 0.028	113 ± 13	61.4 ± 1.9
		BARK	
Total tree	0.337 ± 0.026	160 ± 22	54.4 ± 2.3
Saw log	0.391 ± 0.029	112 ± 21	51.3 ± 2.8
Pulpwood	0.300 ± 0.042	204 ± 45	56.1 ± 4.1
Main stem	0.359 ± 0.033	143 ± 27	54.0 ± 2.9
Branches	0.310 ± 0.023	194 ± 21	56.7 ± 3.5
		WOOD AND BARK	
Total tree	0.468 ± 0.025	100 ± 8.9	57.9 ± 2.6
Saw log	0.497 ± 0.030	88 ± 8.8	58.0 ± 3.1
Pulpwood	0.452 ± 0.024	114 ± 17.5	59.6 ± 3.1
Main stem	0.479 ± 0.026	95 ± 9.7	60.3 ± 2.0
Branches	0.429 ± 0.024	131 ± 11.6	60.3 ± 2.0

wood specific gravity, averaging 0.337 for the total tree, 0.359 for the main stem, and 0.310 for branches. These wood and bark specific gravities are consistent with those reported for other southern pine species.

Wood moisture content averaged 95 percent for the total tree, 92 percent for the main stem, and 113 percent for branches (table 8). Wood moisture content was considerably higher for pulpwood (109 percent) than for saw logs (86 percent).

Bark moisture content averaged 160 percent for the total tree, 143 percent for the main stem, and 194 percent for branches. Pulpwood bark averaged 204 percent compared to saw-log bark of 112

percent. The bark moisture contents reported here are similar to those reported by Taras[4] for sand pine, but considerably higher than those reported for major southern pine species. Like sand pine, Virginia pine bark is thin and has a high proportion of inner bark as opposed to the more porous outer bark.

Green wood weight per cubic foot ranged from 58.3 pounds in the main stem to 61.4 pounds in branches and averaged 58.5 pounds in the total tree. Bark green weight per cubic foot was considerably lower than that of the wood, averaging 54.4 pounds per cubic foot. Green weight of wood and bark per cubic foot of wood and bark averaged 57.9 pounds for the total tree.

PREDICTION EQUATIONS

Equations were developed to predict weights and volumes of the total tree and its components based on the 25 sample trees. Equations for predicting green and dry weights of the total tree and its component parts are given in table 9. Equations for predicting cubic-foot volume of wood and bark of the total tree and its components 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 and branch component weights and volumes as indicated by the coefficients of determination.

In tables 9 and 10, ratio equations (Y_r) are given which allow estimation of weight or volume to any given merchantable top diameter. This technique was used to avoid possible crossover, which frequently occurs when a series of linear equations are used, each having slightly different regression slopes.

YIELD TABLES

For convenience to the users, equations based on D^2Th from tables 9 and 10 were used to develop tables of biomass weight and volume; they are presented in the Appendix (tables 11-29).

Trees with the same d.b.h. and total height can vary considerably in weight and volume because of differences in crown size, moisture content, specific gravity, and taper. The yield tables presented in the Appendix should not be used indiscriminately over the range of Virginia pine without testing. Rather, they should be applied only to trees in natural stands which are similar in age, taper rate, and wood properties.

[4] See footnote 2.

Table 9.--Regression equations for estimating green and dry weights of the total tree and its components for Virginia pine trees using d.b.h. and total height as independent variables

Weight(Y)	Regression equation[1]	Coefficient of determination (R^2)	Standard error[2] ($S_{y \cdot x}$)
Total tree (including foliage):			
Green	$Y = 0.27621(D^2Th)^{0.96083}$	0.98	0.045
Dry	$Y = 0.12016(D^2Th)^{0.97551}$	.99	.036
Total tree--wood and bark:			
Green	$Y = 0.25185(D^2Th)^{0.96785}$	.98	.043
Dry	$Y = 0.11178(D^2Th)^{0.98121}$	.99	.036
Total tree--wood			
Green	$Y = 0.20171(D^2Th)^{0.98133}$	.98	.041
Dry	$Y = 0.09772(D^2Th)^{0.98747}$	.99	.034
Total stem wood and bark:			
Green	$Y = 0.31201(D^2Th)^{0.92641}$	.98	.038
Dry	$Y = 0.13782(D^2Th)^{0.94215}$	.99	.031
Total stem wood:			
Green	$Y = 0.23714(D^2Th)^{0.94829}$	.98	.037
Dry	$Y = 0.11674(D^2Th)^{0.95364}$	.99	.030
Total crown (branches, foliage, and stem above 4-inch d.o.b. top):			
Green	$Y = 0.20959(D^2Th)^{0.80897}$	.83	.114
Dry	$Y = 0.07182(D^2Th)^{0.83341}$	.82	.283
Wood and bark in crown (branches and stem above 4-inch d.o.b. top):			
Green	$Y = 0.16438(D^2Th)^{0.81764}$	.80	.127
Dry	$Y = 0.05693(D^2Th)^{0.84379}$	.79	.137
Wood and bark in branches:			
Green	$Y = 0.00328(D^2Th)^{1.23062}$	.87	.148
Dry	$Y = 0.00106(D^2Th)^{1.26701}$	.87	.157
Wood in branches:			
Green	$Y = 0.00252(D^2Th)^{1.23263}$	.86	.153
Dry	$Y = 0.00084(D^2Th)^{1.27120}$	.86	.161

(Continued)

Table 9.--Regression equations for estimating green and dry weights of the total tree and its components for Virginia pine trees using d.b.h. and total height as independent variables (continued)

Weight(Y)	Regression equation[1]	Coefficient of determination (R^2)	Standard error[2] ($S_{y \cdot x}$)
	Ratio Equations[3]		
Wood and bark in stem to any d.o.b. top (D_t):			
Green	$Y_r = \left[1 - 0.30509(D_t^{2.99451}/Dbh^{2.72502})\right](0.31201(D^2Th)^{0.92641})$		
Dry	$Y_r = \left[1 - 0.38064(D_t^{2.65609}/Dbh^{2.68823})\right](0.13782(D^2Th)^{0.94215})$		
Wood in stem to any d.o.b. top (D_t):			
Green	$Y_r = \left[1 - 0.28010(D_t^{3.07288}/Dbh^{2.76646})\right](0.23714(D^2Th)^{0.94829})$		
Dry	$Y_r = \left[1 - 0.35682(D_t^{2.73629}/Dbh^{2.72629})\right](0.11674(D^2Th)^{0.95364})$		

[1] $Y = b_0 (D^2Th)^{b_1}$

where:

Y = component weight in pounds

D = d.b.h. in inches

Th = total height in feet

[2] Standard error in $\log_{10}$ form.

[3] Y_r = Weight to any given top diameter (D_t) using ratio technique. Statistics (R^2) and ($S_{y \cdot x}$) cannot be calculated.

Table 10.--Regression equations for estimating cubic-foot volume of the total tree and its components for Virginia pine trees using d.b.h. and total height as independent variables

Cubic-foot volume	Regression equation[1]	Coefficient of determination (R^2)	Standard error[2] ($S_{y.x}$)
Total tree (excluding foliage):			
Wood and bark	$Y = 0.00466(D^2Th)^{0.95911}$	0.99	0.034
Wood	$Y = 0.00383(D^2Th)^{0.96891}$	.99	.031
Total stem:			
Wood and bark	$Y = 0.00589(D^2Th)^{0.91582}$	.99	.028
Wood	$Y = 0.00457(D^2Th)^{0.93466}$	.99	.026
Crown (branches and stem above 4-inch d.o.b. top):			
Wood and bark	$Y = 0.00264(D^2Th)^{0.82143}$	.80	.130
Wood	$Y = 0.00306(D^2Th)^{0.77650}$	.77	.132
Branches:			
Wood and bark	$Y = 0.00005(D^2Th)^{1.24578}$	.87	.149
Wood	$Y = 0.00004(D^2Th)^{1.24262}$	.86	.154
	Ratio Equations[3]		
Stem volume to any d.o.b. top (D_t):			
Wood and bark	$Y_r = \left[1 - 0.35390(D_t^{2.96997}/Dbh^{2.80958})\right](0.00589(D^2Th)^{0.91582})$		
Wood	$Y_r = \left[1 - 0.32752(D_t^{3.08175}/Dbh^{2.87588})\right](0.00457(D^2Th)^{0.93466})$		

[1] $Y = b_0 (D^2Th)^{b_1}$

where:

Y = component volume in cubic feet

D = d.b.h. in inches

Th = total height in feet

[2] Standard error in $\log_{10}$ form.

[3] Y_r = Volume to any given top diameter (D_t) using ratio technique. Statistics (R^2) and ($S_{y.x}$) cannot be calculated.

APPENDIX

Table 11.--Predicted weight of wood, bark, and foliage in total tree in Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Pounds				
	GREEN[3]				
5	211	261	311		
6	299	371	442	512	
7	402	498	594	689	
8	520	644	768	890	1012
9	652	808	963	1116	1269
10	798	989	1179	1367	1554
11		1188	1416	1642	1866
12		1404	1673	1940	2206
13			1951	2263	2573
14			2250	2609	2967
15				2979	3387
	DRY[4]				
5	101	126	151		
6	145	180	215	250	
7	196	243	291	338	
8	254	316	377	438	499
9	319	397	474	551	628
10	392	488	583	677	771
11		587	702	816	929
12		696	832	966	1101
13			972	1130	1287
14			1123	1306	1487
15				1494	1701

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.27621(D^2Th)^{0.96083}$

[4] $Y = 0.12016(D^2Th)^{0.97551}$

Table 12.--Predicted weight of wood and bark in total tree for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Pounds				
			GREEN[3]		
5	202	250	299		
6	287	356	425	493	
7	387	480	573	665	
8	501	622	742	861	980
9	629	781	932	1082	1231
10	772	958	1142	1326	1509
11		1152	1374	1595	1815
12		1363	1626	1888	2148
13			1898	2204	2508
14			2191	2544	2895
15				2907	3308
			DRY[4]		
5	98	122	146		
6	140	175	209	243	
7	190	237	283	329	
8	247	307	368	428	487
9	311	387	463	539	614
10	383	476	570	663	755
11		574	687	799	911
12		681	815	948	1080
13			953	1109	1264
14			1102	1282	1462
15				1468	1674

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.25185(D^2Th)^{0.96785}$

[4] $Y = 0.11178(D^2Th)^{0.98121}$

Table 13.--Predicted weight of wood excluding bark in total tree for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Pounds				
	GREEN[3]				
5	177	221	264		
6	254	316	378	439	
7	343	427	511	594	
8	446	555	664	772	881
9	562	700	837	973	1110
10	691	860	1029	1197	1364
11		1037	1240	1443	1645
12		1230	1471	1712	1951
13			1722	2003	2283
14			1991	2317	2641
15				2652	3024
	DRY[4]				
5	90	112	134		
6	128	160	192	223	
7	174	217	260	303	
8	227	283	338	394	450
9	286	357	427	497	567
10	352	439	526	612	699
11		530	635	739	843
12		629	754	878	1001
13			883	1028	1173
14			1022	1190	1358
15				1364	1556

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.20171(D^2Th)^{0.98133}$

[4] $Y = 0.09772(D^2Th)^{0.98747}$

Table 14.--Predicted weight of wood and bark in total stem for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Pounds				
	GREEN[3]				
5	188	231	273		
6	263	324	383	442	
7	350	430	510	588	
8	448	551	653	753	852
9	558	686	812	937	1060
10	678	834	987	1138	1288
11		995	1178	1358	1537
12		1169	1384	1596	1806
13			1605	1851	2095
14			1841	2124	2403
15				2413	2731
	DRY[4]				
5	92	114	135		
6	130	161	191	221	
7	174	215	255	295	
8	224	276	328	380	431
9	280	345	410	474	538
10	341	421	500	578	656
11		504	598	692	785
12		594	705	815	924
13			820	948	1075
14			942	1090	1236
15				1241	1407

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.31201(D^2Th)^{0.92641}$

[4] $Y = 0.13782(D^2Th)^{0.94215}$

Table 15.--Predicted weight of wood excluding bark in total stem for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Pounds				
	GREEN[3]				
5	166	205	244		
6	234	290	344	399	
7	314	388	461	534	
8	405	500	594	688	781
9	506	625	743	860	976
10	618	763	907	1050	1192
11		915	1087	1258	1428
12		1079	1282	1484	1684
13			1492	1727	1961
14			1718	1988	2256
15			1958	2266	2572
	DRY[4]				
5	85	105	125		
6	120	148	177	205	
7	161	199	237	275	
8	208	257	306	354	402
9	260	322	383	443	504
10	318	393	468	542	616
11		472	561	650	738
12		557	663	768	872
13			772	894	1016
14			889	1030	1170
15				1175	1334

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.23714(D^2Th)^{0.94829}$

[4] $Y = 0.11674(D^2Th)^{0.95364}$

Table 16.--Predicted weight of wood and bark in stem to 4-inch d.o.b. top for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Pounds				
			GREEN[3]		
5	142	175	207		
6	224	276	327	377	
7	316	389	460	531	
8	418	514	609	702	795
9	531	652	772	891	1008
10	653	803	951	1097	1241
11		967	1144	1320	1494
12		1143	1353	1560	1766
13			1576	1818	2057
14			1814	2093	2368
15				2384	2698
			DRY[4]		
5	74	91	108		
6	114	141	168	194	
7	160	198	235	271	
8	211	261	310	358	406
9	268	331	393	454	515
10	331	408	484	560	635
11		492	584	675	766
12		582	691	800	907
13			807	933	1058
14			931	1076	1220
15				1228	1393

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.31201(D^2Th)^{0.92641}$
$R = 1 - 0.30509(D_t^{2.99451}/D^{2.72502})$
$Y_r = R(Y)$

[4] $Y = 0.13782(D^2Th)^{0.94215}$
$R = 1 - 0.38064(D_t^{2.65609}/D^{2.68823})$
$Y_r = R(Y)$

where:

Y = total stem weight

Dt = 4-inch d.o.b. top

D = d.b.h. in inches

Th = total height in feet

R = ratio of weight to 4-inch top to total stem weight

Y_r = estimated stem weight to 4-inch d.o.b. top.

Table 17.--Predicted weight of wood excluding bark in stem to 4-inch d.o.b. top for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Pounds				
	GREEN[3]				
5	128	158	187		
6	202	249	296	343	
7	285	353	419	485	
8	379	468	557	645	732
9	483	597	709	821	932
10	597	737	877	1015	1151
11		891	1059	1225	1391
12		1057	1256	1454	1650
13			1468	1699	1928
14			1695	1961	2226
15				2241	2543
	DRY[4]				
5	68	84	100		
6	106	131	155	180	
7	148	184	218	253	
8	196	243	289	335	380
9	250	309	368	426	484
10	308	382	454	526	597
11		461	548	635	721
12		547	651	754	856
13			761	881	1001
14			878	1018	1156
15				1163	1321

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.23714(D^2Th)^{0.94829}$

$R = 1 - 0.28010(Dt^{3.07288}/D^{2.76646})$

$Y_r = R(Y)$

[4] $Y = 0.11674(D^2Th)^{0.95364}$

$R = 1 - 0.35682(Dt^{2.73629}/D^{2.72629})$

$Y_r = R(Y)$

where:

Y = total stem weight

D_t = 4-inch d.o.b. top

D = d.b.h. in inches

Th = total height in feet

R = ratio of weight to 4-inch top to total stem weight

Y_r = estimated stem weight to 4-inch d.o.b. top.

Table 18.--Predicted weight of wood and bark in stem to 7-inch d.o.b. top for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Pounds				
	GREEN[3]				
8	288	354	419	483	547
9	413	508	601	693	784
10	546	671	794	916	1037
11		845	1000	1154	1306
12		1030	1219	1407	1592
13			1452	1674	1895
14			1697	1958	2216
15				2257	2554
	DRY[4]				
8	168	207	246	285	323
9	229	282	335	388	440
10	294	363	431	499	566
11		450	535	618	701
12		544	646	747	847
13			764	884	1002
14			890	1029	1167
15				1184	1343

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.31201(D^2Th)^{0.92641}$

$R = 1 - 0.30509(Dt^{2.99451}/D^{2.72502})$

$Y_r = R(Y)$

[4] $Y = 0.13782(D^2Th)^{0.94215}$

$R = 1 - 0.38064(Dt^{2.65609}/D^{2.68823})$

$Y_r = R(Y)$

where:

Y = total stem weight

Dt = 7-inch d.o.b. top

D = d.b.h. in inches

Th = total height in feet

R = ratio of weight to 7-inch top to total stem weight

Y_r = estimated stem weight to 7-inch d.o.b. top.

Table 19.--Predicted weight of wood excluding bark in stem to 7-inch d.o.b. top for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Pounds				
	GREEN[3]				
8	262	324	385	446	506
9	378	466	555	642	728
10	501	619	735	851	966
11		781	929	1075	1220
12		955	1135	1314	1492
13			1356	1569	1781
14			1589	1839	2088
15				2126	2413
	DRY[4]				
8	155	192	228	265	301
9	212	263	313	362	411
10	274	339	404	467	531
11		422	502	581	660
12		510	607	703	799
13			720	834	947
14			840	973	1105
15				1121	1273

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.23714(D^2Th)^{0.94829}$

$R = 1 - 0.28010(Dt^{3.07288}/D^{2.76646})$

$Y_r = R(Y)$

[4] $Y = 0.11674(D^2Th)^{0.95364}$

$R = 1 - 0.35682(Dt^{2.73629}/D^{2.72629})$

$Y_r = R(Y)$

where:

Y = total stem weight

Dt = 7-inch d.o.b. top

D = d.b.h. in inches

Th = total height in feet

R = Ratio of weight to 7-inch top to total stem weight

Y_r = estimated stem weight to 7-inch d.o.b. top.

Table 20.--Predicted weight of fuelwood (stem above 4-inch d.o.b. top, branchwood, branchbark, and foliage) for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Pounds				
	GREEN[3]				
5	56	67	78		
6	75	90	104	118	
7	97	116	134	152	
8	120	144	166	188	210
9	145	174	201	228	254
10	172	206	239	270	301
11		240	278	315	351
12		277	321	363	405
13			365	413	460
14			411	466	519
15				521	580
	DRY[4]				
5	23	27	32		
6	31	37	43	49	
7	40	48	56	63	
8	50	60	70	79	89
9	61	73	85	96	108
10	72	87	101	115	129
11		102	119	135	151
12		118	137	156	174
13			157	178	199
14			177	202	225
15				226	253

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.20959(D^2Th)^{0.80897}$

[4] $Y = 0.07182(D^2Th)^{0.83341}$

Table 21.--Predicted weight of fuelwood (stem above 4-inch d.o.b. top, branchwood, and branchbark) for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Pounds				
			GREEN[3]		
5	47	56	65		
6	63	75	88	99	
7	81	97	113	128	
8	101	121	140	159	177
9	122	146	170	193	215
10	145	174	202	229	255
11		203	236	268	298
12		234	272	308	344
13			310	352	392
14			350	397	443
15				444	496
			DRY[4]		
5	19	23	27		
6	26	32	37	42	
7	34	41	48	55	
8	43	52	60	69	77
9	52	63	73	84	94
10	62	75	88	100	112
11		88	103	117	131
12		102	119	136	152
13			137	156	174
14			155	176	197
15				198	222

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.16438(D^2Th)^{0.81764}$

[4] $Y = 0.05693(D^2Th)^{0.84379}$

Table 22.--Predicted weight of wood and bark in branches for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Pounds				
			GREEN[3]		
5	16	21	27		
6	25	33	42	50	
7	37	49	61	74	
8	51	68	84	102	120
9	69	90	113	136	161
10	89	117	146	177	208
11		148	185	224	264
12		183	229	277	327
13			279	337	398
14			335	405	477
15				480	566
			DRY[4]		
5	7	9	11		
6	11	14	18	22	
7	16	21	26	32	
8	22	29	37	45	53
9	30	39	50	60	72
10	39	52	65	79	93
11		66	83	100	119
12		82	103	125	148
13			126	153	182
14			152	185	219
15				220	261

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.00328(D^2Th)^{1.23062}$

[4] $Y = 0.00106(D^2Th)^{1.26701}$

Table 23.--Predicted weight of wood excluding bark in branches for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Pounds				
	GREEN[3]				
5	13	17	21		
6	20	26	32	39	
7	29	38	47	57	
8	40	53	66	80	94
9	54	70	88	107	126
10	69	91	114	138	163
11		116	145	175	206
12		143	179	217	256
13			218	264	311
14			262	317	374
15				376	443
	DRY[4]				
5	5	7	9		
6	9	12	15	18	
7	13	17	22	26	
8	18	24	30	37	44
9	24	32	41	50	59
10	32	42	53	65	77
11		54	68	83	98
12		67	85	103	122
13			104	126	150
14			125	153	181
15				182	216

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.00252(D^2Th)^{1.23263}$

[4] $Y = 0.00084(D^2Th)^{1.27120}$

Table 24.--Predicted volume of wood and bark in total tree for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Cubic feet				
	WOOD AND BARK[3]				
5	3.5	4.4	5.2		
6	5.0	6.2	7.4	8.5	
7	6.7	8.3	9.9	11.5	
8	8.7	10.7	12.8	14.8	16.8
9	10.8	13.4	16.0	18.6	21.1
10	13.3	16.4	19.6	22.7	25.8
11		19.7	23.5	27.3	31.0
12		23.3	27.8	32.2	36.6
13			32.4	37.6	42.7
14			37.4	43.3	49.2
15				49.4	56.2
	WOOD[4]				
5	3.1	3.8	4.6		
6	4.4	5.5	6.5	7.6	
7	5.9	7.4	8.8	10.2	
8	7.7	9.5	11.4	13.2	15.0
9	9.7	12.0	14.3	16.6	18.9
10	11.8	14.7	17.5	20.4	23.2
11		17.7	21.1	24.5	27.9
12		20.9	25.0	29.0	33.0
13			29.2	33.8	38.5
14			33.7	39.1	44.5
15				44.7	50.8

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.00466(D^2Th)^{0.95911}$

[4] $Y = 0.00383(D^2Th)^{0.96891}$

Table 25.--Predicted volume of wood and bark in total stem for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Cubic feet				
	WOOD AND BARK[3]				
5	3.3	4.0	4.8		
6	4.6	5.6	6.7	7.7	
7	6.1	7.5	8.8	10.2	
8	7.8	9.6	11.3	13.0	14.7
9	9.7	11.9	14.0	16.1	18.2
10	11.7	14.4	17.0	19.6	22.1
11		17.1	20.2	23.3	26.3
12		20.1	23.7	27.3	30.9
13			27.5	31.6	35.8
14			31.5	36.2	41.0
15				41.1	46.5
	WOOD[4]				
5	2.9	3.6	4.3		
6	4.1	5.0	6.0	6.9	
7	5.5	6.7	8.0	9.2	
8	7.0	8.6	10.2	11.8	13.4
9	8.7	10.8	12.8	14.7	16.7
10	10.6	13.1	15.5	17.9	20.3
11		15.7	18.6	21.4	24.3
12		18.4	21.8	25.2	28.6
13			25.4	29.3	33.2
14			29.1	33.6	38.1
15				38.3	43.4

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.00589(D^2Th)^{0.91582}$

[4] $Y = 0.00457(D^2Th)^{0.93466}$

Table 26.--Predicted volume of wood and bark in stem to 4-inch d.o.b top for Virginia pine trees[1]

D.b.h (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Pounds				
	WOOD AND BARK[3]				
5	2.5	3.1	3.6		
6	3.9	4.8	5.7	6.6	
7	5.5	6.8	8.0	9.2	
8	7.3	9.0	10.6	12.2	13.8
9	9.2	11.3	13.4	15.4	17.4
10	11.3	13.9	16.4	18.9	21.4
11		16.7	19.7	22.7	25.7
12		19.7	23.2	26.8	30.3
13			27.0	31.1	35.2
14			31.1	35.8	40.4
15				40.7	46.0
	WOOD[4]				
5	2.2	2.8	3.3		
6	3.5	4.4	5.2	6.0	
7	5.0	6.1	7.3	8.4	
8	6.6	8.1	9.6	11.1	12.6
9	8.4	10.3	12.2	14.1	16.0
10	10.3	12.7	15.0	17.4	19.7
11		15.3	18.1	20.9	23.7
12		18.1	21.4	24.8	28.0
13			25.0	28.9	32.7
14			28.8	33.2	37.7
15				37.9	42.9

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.00589(D^2Th)^{0.91582}$

$R = 1 - 0.35390(Dt^{2.96997}/D^{2.80958})$

$Y_r = R(Y)$

[4] $Y = 0.00457(D^2Th)^{0.93466}$

$R = 1 - 0.32752(Dt^{3.08175}/D^{2.87588})$

$Y_r = R(Y)$

where:

Y = total stem volume

Dt = 4-inch d.o.b. top

D = d.b.h. in inches

Th = total height in feet

R = ratio of volume to 4-inch top to total stem volume

Y_r = estimated stem volume to 4-inch d.o.b. top

Table 27.--Predicted volume of wood and bark in stem to 7-inch d.o.b. top for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Cubic feet				
	WOOD AND BARK[3]				
8	5.2	6.4	7.5	8.7	9.8
9	7.4	9.0	10.7	12.3	13.9
10	9.6	11.8	14.0	16.1	18.2
11		14.8	17.5	20.1	22.8
12		17.9	21.2	24.4	27.6
13			25.1	29.0	32.7
14			29.3	33.7	38.1
15				38.8	43.8
	WOOD[4]				
8	4.7	5.8	6.8	7.9	8.9
9	6.7	8.2	9.7	11.2	12.7
10	8.8	10.8	12.8	14.8	16.8
11		13.6	16.1	18.6	21.0
12		16.5	19.6	22.6	25.6
13			23.3	26.9	30.5
14			27.2	31.4	35.6
15				36.2	41.0

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.00589(D^2Th)^{0.91582}$

$R = 1 - 0.35390(Dt^{2.96997}/D^{2.80958})$

$Y_r = R(Y)$

[4] $Y = 0.00457(D^2Th)^{0.93466}$

$R = 1 - 0.32752(Dt^{3.08175}/D^{2.87588})$

$Y_r = R(Y)$

where:

Y = total stem volume

Dt = 7-inch d.o.b. top

D = d.b.h. in inches

Th = total height in feet

R = ratio of volume to 7-inch top to total stem volume

Y_r = estimated stem volume to 7-inch d.o.b. top

Table 28.--Predicted volume of fuelwood (stem above 4-inch d.o.b. top, branchwood, and branchbark) for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Cubic feet				
	WOOD AND BARK[3]				
5	0.8	0.9	1.1		
6	1.0	1.2	1.4	1.6	
7	1.3	1.6	1.9	2.1	
8	1.7	2.0	2.3	2.6	2.9
9	2.0	2.4	2.8	3.2	3.6
10	2.4	2.9	3.4	3.8	4.2
11		3.4	3.9	4.4	5.0
12		3.9	4.5	5.1	5.7
13			5.2	5.9	6.5
14			5.8	6.6	7.4
15				7.4	8.3
	WOOD[4]				
5	0.7	0.8	0.9		
6	0.9	1.0	1.2	1.3	
7	1.1	1.3	1.5	1.7	
8	1.4	1.6	1.9	2.1	2.3
9	1.6	1.9	2.2	2.5	2.8
10	1.9	2.3	2.6	3.0	3.3
11		2.6	3.0	3.4	3.8
12		3.0	3.5	3.9	4.4
13			3.9	4.5	4.9
14			4.4	5.0	5.5
15				5.6	6.2

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.00264(D^2Th)^{0.82143}$

[4] $Y = 0.00306(D^2Th)^{0.77650}$

Table 29.--Predicted volume of wood and bark in branches for Virginia pine trees[1]

D.b.h. (inches)	Total-tree height[2] (feet)				
	40	50	60	70	80
	Cubic Feet				
	WOOD AND BARK[3]				
5	0.3	0.4	0.5	0.5	0.6
6	0.4	0.6	0.7	0.9	1.0
7	0.6	0.8	1.0	1.3	1.5
8	0.9	1.2	1.5	1.8	2.1
9	1.2	1.6	2.0	2.4	2.8
10	1.5	2.0	2.5	3.1	3.6
11	1.9	2.6	3.2	3.9	4.6
12	2.4	3.2	4.0	4.9	5.7
13	3.0	3.9	4.9	5.9	7.0
14	3.6	4.7	5.9	7.1	8.4
15	4.2	5.6	7.0	8.5	10.0
	WOOD[4]				
5	0.2	0.3	0.4	0.4	0.5
6	0.3	0.4	0.6	0.7	0.8
7	0.5	0.7	0.8	1.0	1.2
8	0.7	0.9	1.1	1.4	1.6
9	0.9	1.2	1.5	1.8	2.2
10	1.2	1.6	2.0	2.4	2.8
11	1.5	2.0	2.5	3.0	3.6
12	1.9	2.5	3.1	3.8	4.5
13	2.3	3.0	3.8	4.6	5.4
14	2.8	3.6	4.6	5.5	6.5
15	3.3	4.3	5.4	6.6	7.8

[1] Blocked-in area indicates range of data.

[2] Includes 1-foot stump allowance.

[3] $Y = 0.00005(D^2Th)^{1.24578}$

[4] $Y = 0.00004(D^2Th)^{1.24262}$

*U. S. GOVERNMENT PRINTING OFFICE 1982—539-000/4004

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Aboveground biomass of Virginia pine in north Georgia. Res. Pap. SE-232. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1982. 32 p.

For greater utilization of logging residues and other forest materials unsuited for conventional products, the total tree--with its variable shapes and sizes of crown--is best assessed by weight. Green volumes and green and dry weights of aboveground biomass of commercial-size Virginia pines are presented along with equations and yield tables that show weight and volume of wood and bark in the total tree and by merchantable subdivisions.

KEYWORDS: Pinus virginiana, component proportions, specific gravity, logging residues, fuel sources.

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