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CUBIC-FOOT VOLUME TABLES FOR SOUTHERN APPALACHIAN WHITE PINE PLANTATIONS

Some of the earliest successful forest plantations in the United States were those of eastern white pine (*Pinus strobus*) established about 1900 on the Biltmore Estate near Asheville, North Carolina. Since that time white pine has played an increasingly important role in reforestation in the southern Appalachians. Growth is rapid, the wood is valuable, and white pine blister rust (*Cronartium ribicola*) and white pine weevil (*Pissodes strobi*) are less common than in the northern part of the range.

From 1952 through 1960, about 20 million white pine seedlings were planted in the 15 western counties of North Carolina. In 1957, studies were begun to develop volume and yield tables and site index curves for old-field plantations. Tables 1 and 2 are a partial result of these studies; they may be used to estimate cubic-foot volume of white pine trees planted in old fields in the southern Appalachian region. These tables were prepared by regression methods from detailed measurements of 241 sample trees located mainly in North Carolina.

Table 1. --Cubic-foot volumes (outside bark) for white pine plantations

TOP DIAMETER 4.0 INCHES OUTSIDE BARK

D. b. h. (Inches)	Total tree height (feet)															
	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
	-----Cubic-feet-----															
5	.73	1.05	1.38	1.71	2.03	2.38	2.80	3.01	3.34							
8	1.30	1.77	2.24	2.71	3.18	3.85	4.12	4.50	5.07	5.54	8.01					
7	1.98	2.82	3.28	3.00	4.54	5.18	5.82	8.48	7.10	7.74	8.38	9.02	9.66			
8			4.44	5.27	8.11	8.95	7.78	8.82	9.48	10.28	11.13	11.08	12.80			
9				8.83	7.89	8.95	10.00	11.08	12.12	13.18	14.24	15.30	16.35	17.41		
10					9.87	11.18	12.49	13.79	15.10	16.41	17.71	19.02	20.33	21.83	22.94	24.25
11						13.65	15.23	18.81	21.58	23.14	24.72	28.30	27.88	29.48		
12									22.00	23.88	25.78	27.85	29.53	31.41	33.29	35.17
13											30.34	32.55	34.75	36.98	39.17	41.38
14													40.40	42.08	45.52	48.08

TOP DIAMETER 3.0 INCHES OUTSIDE BARK

4	.64	.85	1.08	1.27	1.48	1.88	1.89	2.10								
5	1.11	1.44	1.78	2.09	2.41	2.73	3.08	3.38	3.70							
8	1.88	2.15	2.81	3.08	3.54	4.01	4.48	4.94	5.41	5.87	8.34					
7	2.38	2.99	3.82	4.28	4.89	5.52	8.18	8.79	7.43	8.08	8.70	0.33	9.08			
8			4.79	5.81	8.44	7.27	8.10	8.93	0.76	10.59	11.41	12.24	13.07			
9				7.15	8.20	9.25	10.30	11.35	12.40	13.45	14.49	15.54	18.59	17.84		
10					10.17	11.47	12.78	14.05	15.35	18.84	17.94	19.23	20.53	21.82	23.12	24.41
11						13.91	15.48	17.04	18.81	20.18	21.74	23.31	24.88	28.44	28.01	29.58
12								20.31	22.18	24.05	25.91	27.78	29.84	31.50	33.37	35.23
13											30.44	32.63	34.82	37.01	39.19	41.38
14													40.41	42.98	45.52	48.08

Table 2. --Cubic-foot volumes (inside bark) for white pine plantations

TOP DIAMETER 4.0 INCHES OUTSIDE BARK

D. b. h. (Inches)	Total tree height (feet)															
	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
	-----Cubic-feet-----															
5	.60	.89	1.18	1.47	1.75	2.04	2.33	2.81	2.90							
6	1.11	1.52	1.94	2.35	2.78	3.17	3.58	4.00	4.41	4.82	5.23					
7	1.70	2.27	2.83	3.39	3.95	4.51	5.07	5.83	6.19	6.75	7.31	7.87	8.43			
8			3.88	4.59	5.32	6.08	6.79	7.52	8.25	8.98	9.72	10.45	11.18			
9				5.95	6.88	7.81	8.73	9.88	10.59	11.51	12.44	13.37	14.29	15.22		
10					8.82	9.78	10.91	12.05	13.10	14.34	15.48	16.83	17.77	18.92	20.08	21.20
11						11.02	13.31	14.89	16.08	17.48	18.85	20.22	21.82	23.00	24.38	25.77
12									19.24	20.88	22.53	24.18	25.83	27.47	29.12	30.77
13											28.54	28.47	30.40	32.34	34.27	38.20
14													35.35	37.59	39.83	42.07

TOP DIAMETER 3.0 INCHES OUTSIDE BARK

4	.48	.66	.84	1.03	1.21	1.39	1.57	1.75								
5	.89	1.17	1.48	1.75	2.03	2.32	2.80	2.89	3.17							
6	1.39	1.80	2.21	2.83	3.04	3.45	3.88	4.27	4.88	5.10	5.51					
7	1.99	2.55	3.11	3.87	4.23	4.79	5.35	5.91	6.47	7.03	7.59	8.15	8.71			
8			4.13	4.87	5.80	6.33	7.08	7.79	8.52	9.28	9.99	10.72	11.45			
9				8.23	7.15	8.08	9.00	9.03	10.88	11.78	12.71	13.83	14.58	15.49		
10					8.89	10.03	11.18	12.32	13.48	14.81	15.75	18.89	18.04	10.18	20.32	21.48
11						12.19	13.58	14.98	16.34	17.73	19.11	20.49	21.88	23.28	24.84	28.03
12									19.50	21.14	22.79	24.44	26.08	27.73	29.37	31.02
13											28.79	28.72	30.85	32.59	34.52	38.45
14													35.59	37.83	40.07	42.31

Weighted regression equations were developed, using the following form:

$$\frac{\text{Cubic-foot volume}}{D^2H} = b_0 + b_1 \left(\frac{1}{D^2H} \right)$$

where D = diameter at breast height in inches

H = total height in feet

b with subscripts = coefficients derived from the data.

Table 3 gives the regression coefficients and standard error of the mean volume for the various equations.

Table 3. --Regression coefficients and standard error of the mean volume

Top diameter limit (Inches)	Equation for volume	b ₀	b ₁	SE mean volume ^{1/}
				Cubic feet
4.0	Outside bark	0.00281388	-0.581077	± 0.887
3.0	Outside bark	0.00258898	-0.184542	± 0.533
4.0	Inside bark	0.00228831	-0.535208	± 0.594
3.0	Inside bark	0.00228820	-0.254528	± 0.500

^{1/} Standard error of the mean volume = (root mean square residual from weighted regression) (D²H).