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BLACK WALNUT VOLUME TABLES FOR FURNITURE-TYPE, FLAT, 4/4-INCH DIMENSION FROM SMALL LOW-QUALITY TREES

ABSTRACT.--Volume tables are given for yield of clear-one-side, flat dimension from small low-quality trees and bolts removed in a stand improvement cut from 30- to 40-year-old black walnut cuttings.

OXFORD: 526.6:176.1 *Juglans nigra*. KEY WORDS: bolter saw, bolts, flitches, cut-stock, thinnings.

Presented here are volume tables based on the yields of 4/4-inch-thick clear-one-side (C1S) grade furniture-type dimension cut from small, low-quality black walnut (*Juglans nigra*) trees. These trees were removed in a timber stand improvement cut from 30- to 40-year-old plantations in southern Illinois and, therefore, were small and low-quality.

All trees were cut off at a 6-inch top diameter inside bark (d.i.b.). The procedures used for sawing and cut-up were described previously.[1] Sixty-three trees were bucked into 200 bolts 2 to 6-1/2 feet long, which were sawed into 1-1/8-inch-thick flitches on a portable bolter saw. Sixteen of the bolts had one or two faces clear; the rest had no faces clear. The flitches were then kiln-dried to 8 percent moisture content and skip-dressed to 15/16-inch thickness.

The square-foot area of dimension was measured by diagramming various size cuttings on each flitch. Cuttings 1 to 6 inches wide and 12 to 72 inches long were recorded for each flitch. Most of the cuttings were small: 50 percent were in the 1.5-inch-width class and 56 percent in the 24-inch-length class.

The tables show the maximum volumes recovered from low-quality material cut with a bolter saw. Losses due to further processing were estimated on a sample of flitches from 14 low grade bolts. The flitches were ripped into 2-1/4-inch-wide strips, and the strips finger-jointed and edge-glued into C1S panels. The trials showed that more wood is lost when ripping to a specific width and then crosscutting out the defects than when cutting random widths and lengths. Yield of 2-1/4-inch-wide strips was about 74 percent of the yield of random cut-up obtained by diagramming the same flitches. Crosscutting the defects from the 2-1/4-inch strips and then finger-jointing the ends reduced the yield further. The yield in panels made from the defect-free, finger-jointed strips was 42 percent of the diagrammed C1S yield. These trials illustrate how the volume tables presented here can provide a starting point in determining yields of products for a potentially higher value use for material from low-quality trees and bolts than for other roundwood products.

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[1] *D. E. Dunmire, E. F. Landt and R. E. Bodkin. Logging residue is a source of valuable black walnut dimension. For. Prod. J. 22(1): 13-17, illus. 1972.*

Table 1.--*Bolt volumes for clear-one-side (C1S), flat, nominal 4/4-inch dimension black walnut*[1]
(In square feet)

Bolt d.i.b. small end (inches)	Bolt length (inches)																Number of bolts
	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	
5	0.75	0.93	1.12	1.31	1.51	1.72	1.92	2.13	2.35	2.57	2.79	3.01	3.24	3.47	3.70	3.94	-
6	1.13	1.40	1.69	1.98	2.28	2.59	2.91	3.22	3.55	3.88	4.21	4.55	4.90	5.24	5.60	5.95	113
7	1.60	1.99	2.39	2.81	3.24	3.67	4.12	4.57	5.03	5.50	5.97	6.45	6.94	7.43	7.93	8.44	38
8	2.16	2.69	3.24	3.80	4.38	4.97	5.57	6.18	6.81	7.44	8.08	8.73	9.39	10.06	10.73	11.41	29
9	2.82	3.51	4.23	4.96	5.72	6.49	7.27	8.07	8.88	9.71	10.55	11.40	12.26	13.13	14.01	14.90	14
10	3.58	4.46	5.37	6.30	7.25	8.23	9.23	10.24	11.28	12.32	13.39	14.47	15.56	16.66	17.78	18.91	4
11	4.45	5.53	6.66	7.81	9.00	10.21	11.45	12.71	13.99	15.29	16.61	17.95	19.30	20.67	22.06	23.46	-
12	5.41	6.74	8.11	9.51	10.96	12.44	13.94	15.47	17.03	18.62	20.22	21.85	23.50	25.17	26.85	28.56	2
13	6.49	8.08	9.72	11.40	13.13	14.90	16.71	18.55	20.42	22.31	24.24	26.19	28.17	30.17	32.19	34.23	-
14	7.67	9.55	11.49	13.49	15.53	17.62	19.76	21.93	24.14	26.39	28.67	30.97	33.31	35.67	38.06	40.48	-
15	8.97	11.16	13.43	15.76	18.16	20.60	23.10	25.64	28.22	30.85	33.51	36.21	38.94	41.70	44.49	47.32	-
Number of bolts	-	14	11	5	16	6	3	42	22	3	7	1	-	44	26	-	200

[1]Regression equation for C1S square feet=$0.000538 \times \text{Diameter}^{2.26265} \times \text{Length}^{1.19954}$ (based on all bolts). Standard error of estimate=1.46 square feet. $R^2=0.86$.

NOTE: Heavy black lines indicate distribution of data.

Table 2.--*Tree volumes for clear-one-side (C1S), flat, nominal 4/4-inch dimension black walnut and dimension recovery factors (DRF)*[2]
(C1S volumes in square feet)

D.b.h. (inches)	Item	Tree height to a 6-inch d.i.b. top (feet)									Number of trees
		10	15	20	25	30	35	40	45	50	
6	C1S	3.60	5.23	6.83	8.39	9.93	11.45	12.96	14.45	15.92	8
	DRF	*2.79*	*3.05*	*3.24*	*3.40*	*3.53*	*3.65*	*3.76*	*3.85*	*3.94*	
7	C1S	5.42	7.89	10.29	12.64	14.96	17.25	19.52	21.76	23.99	21
	DRF	*2.96*	*3.23*	*3.43*	*3.60*	*3.74*	*3.87*	*3.98*	*4.08*	*4.17*	
8	C1S	7.73	11.25	14.67	18.03	21.34	24.61	27.84	31.04	34.22	15
	DRF	*3.11*	*3.39*	*3.61*	*3.78*	*3.93*	*4.07*	*4.18*	*4.29*	*4.39*	
9	C1S	10.58	15.38	20.04	24.66	29.19	33.66	38.08	42.46	46.80	8
	DRF	*3.25*	*3.54*	*3.77*	*3.95*	*4.11*	*4.25*	*4.37*	*4.48*	*4.58*	
10	C1S	14.00	20.36	26.56	32.64	38.63	44.54	50.39	56.18	61.93	6
	DRF	*3.38*	*3.69*	*3.92*	*4.11*	*4.28*	*4.42*	*4.55*	*4.66*	*4.77*	
11	C1S	18.03	26.23	34.21	42.05	49.77	57.38	64.92	72.38	79.79	4
	DRF	*3.50*	*3.82*	*4.06*	*4.26*	*4.43*	*4.58*	*4.71*	*4.83*	*4.94*	
12	C1S	22.73	33.05	43.12	52.99	62.72	72.32	81.82	91.22	100.55	-
	DRF	*3.62*	*3.95*	*4.20*	*4.40*	*4.58*	*4.73*	*4.87*	*4.99*	*5.10*	
13	C1S	28.11	40.89	53.35	65.56	77.59	89.47	101.22	112.86	124.40	-
	DRF	*3.73*	*4.07*	*4.32*	*4.53*	*4.71*	*4.87*	*5.01*	*5.14*	*5.26*	
14	C1S	34.24	49.80	64.96	79.84	94.49	108.96	123.26	137.44	151.49	1
	DRF	*3.83*	*4.18*	*4.44*	*4.66*	*4.85*	*5.01*	*5.15*	*5.29*	*5.41*	
15	C1S	41.13	59.83	78.04	95.91	113.51	130.89	148.08	165.11	181.99	-
	DRF	*3.93*	*4.29*	*4.56*	*4.78*	*4.97*	*5.14*	*5.29*	*5.42*	*5.55*	
Number of trees		23	14	12	5	6	2	1	-	-	63

[1]Regression equation for C1S flat dimension is $0.00366 \times \text{Dbh}^{2.6587} \times \text{Height}^{0.9241}$. Standard error of estimate for the regression is 5.143 square feet. $R^2=0.92$.

[2]Dimension recovery factor equals volume of C1S in square feet divided by total cubic feet in tree to a 6-inch top. Prediction equation for cubic feet equals $0.0042 \times \text{Dbh}^{2.2859} \times \text{Height}^{0.71042}$. Standard error of estimate for the regression is 0.834 cubic feet. $R^2=0.94$.

NOTE: Heavy black lines indicate distribution of data.