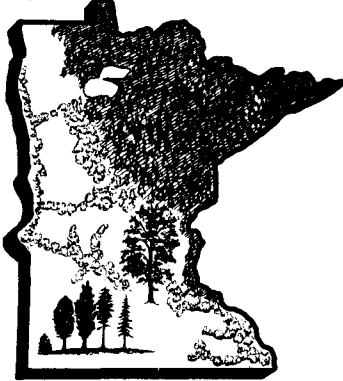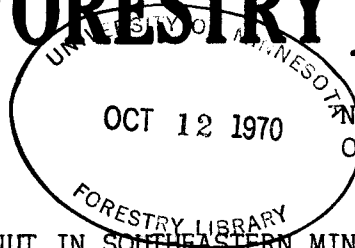# MINNESOTA FORESTRY NOTES

THE GROWTH POTENTIAL OF BLACK WALNUT IN SOUTHEASTERN MINNESOTA

P. F. Ffolliott, F. D. Irving, and D. P. Duncan[1]

Although black walnut (Juglans nigra L.) ranks below ten other hardwood species in total sawlog volume in southeastern Minnesota,[2] it commands the highest stumpage prices paid in the state (occasionally over $400 per thousand board feet).

This paper reports the results of a 1958 study of age, diameter, height, and volume relationships in 72 selected trees from eight locations in and near the Whitewater Valley in Winona and Wabasha counties.[3] The selected trees were dominants and codominants of good vigor which ranged from 13 to 94 years in age and are assumed to be representative of the crop trees which can be produced in managed stands in the future. The objective of the study was to describe the growth of superior trees on good sites to help land owners and their technical advisers manage stands containing these species.

Tree diameters were measured $4\frac{1}{2}$ feet above the ground by diameter tape to the nearest .1 inch. Total height was measured to the nearest foot with an Abney hand level and merchantable height was estimated to the nearest 5 feet using a 10 inch minimum top diameter. Age was determined by counting rings in increment cores taken at breast height and adding 4 years. Cubic volume was computed as follows:

$$V = 0.42 \ Bh \ [4]$$

Where V = peeled cubic foot volume
       B = basal area in square feet
       h = total height in feet

(The form factor 0.42 was changed to 0.48 for trees under 30 feet in height.)

The average values for diameter, height, and cubic volume for 10 year age classes are presented in Table 1. The age-diameter data, as presented graphically in Figure 1, suggest that the rate of diameter growth is relatively constant for the range of ages studied. As shown in Figure 2, total height

Table 1. Age, Diameter, Height, and Volume of Selected Black Walnut in Southeastern Minnesota

Age in Years	DBH in Inches	Total Height in Feet	Volume in Cubic Feet	# Trees in Class
20	6.7	34	3.5	7
30	9.4	47	9.5	18
40	11.3	59	17	14
50	13.0	71	27	8
60	14.7	80	40	2
70	16.6	85	54	11
80	19.0	89	74	10
90	22.4	91	100	2

[1] Former Research Assistant, Assistant Professor, and Professor, respectively, University of Minnesota, School of Forestry.

[2] Office of Iron Range Resources and Rehabilitation. 1957. The Forest Resources of Southeastern Minnesota.

[3] Ffolliott, P. F. 1959. Growth of Selected Basswood, Black Cherry, Black Walnut, and Red Elm on Specific Sites in Southeastern Minnesota. Unpublished report. Forestry Library, University of Minnesota.

[4] Gevorkiantz, S. R. and L. P. Olsen. 1955. Composite Volume Tables for Timber and Their Application in the Lake States. Tech. Bull. No. 1104. U.S.D.A.
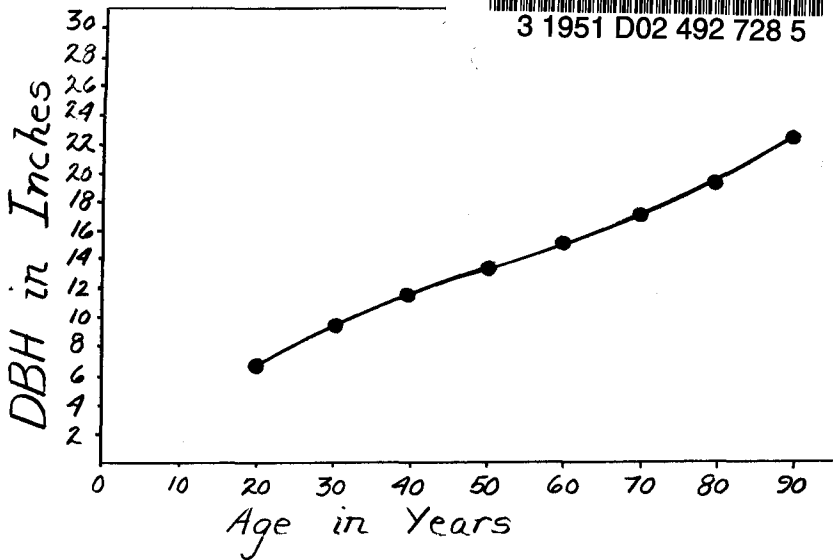
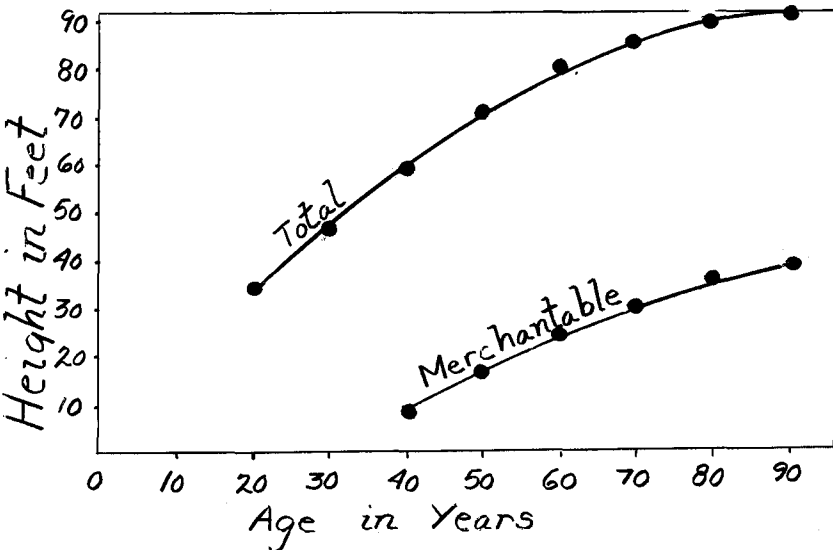Fig. 1   Age – Diameter Relationship – Southeastern Minnesota Black Walnut

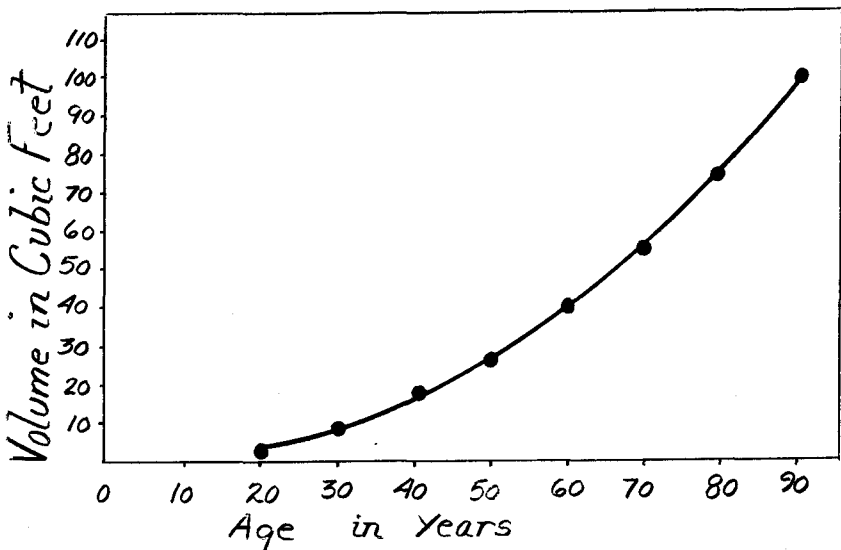Fig. 2   Age – Height Relationship – Southeastern Minnesota Black Walnut

Fig. 3   Age – Volume Relationship – Southeastern Minnesota Black Walnut

growth appears to slow down after about 60 years and merchantable height growth after about 70 years. The cubic volume data plotted in Figure 3 indicate that volume growth increases until about age 70 and then remains constant to the upper limit of these data. Value growth may be assumed to increase even more rapidly since stumpage rates for veneer logs usually increase with average log diameter. The expected growth must, however, be discounted for probable mortality and defect.

These data should be useful in predicting the growth of dominant and codominant black walnut trees of good vigor on lower slopes, coves, stream banks, and other good sites in southeastern Minnesota. They suggest that the harvest of healthy trees may be delayed until they are over 90 years old (22 inches in diameter and 90 feet tall).