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THE GROWTH POTENTIAL OF BASSWOOD IN SOUTHERN MINNESOTA

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American basswood (Tilia americana L.) is the third most abundant commercial timber species in southeastern Minnesota with a current volume and cut exceeded only by red and white oak.[2/] This paper reports the results of a 1958 study of age, diameter, height, and volume relationships of basswood in three state parks (Nerstrand, Kaplan Woods, Whitewater).[3/] The selected trees were dominants and codominants of good vigor and the oldest trees were less than 90 years. Their growth is assumed to be more representative of the growth of crop trees in managed stands of the future than that of average trees in the unmanaged stands examined. The objective was to describe the growth of superior trees on upland sites. These data should help foresters, land owners, and loggers avoid premature harvest of trees that are still in their most productive stages.

Tree diameters were measured 4½ feet above ground level 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 by formula:

$$V = 0.42\ Bh$$[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 relationship is shown graphically in Figure 1. The age-height relationship is curved in Figure 2, and cubic volume is plotted over age in Figure 3.

Table 1. Age, Diameter, Height, and Volume of Selected Basswood in Southern Minnesota.

Age in Years	DBH in Inches	Total Height in Feet	Volume in Cubic Feet	# Trees in Class
20	3.8	30	1.0	12
30	5.8	39	3.0	14
40	7.7	48	6.5	12
50	9.6	57	12.0	18
60	11.5	65	20.0	28
70	13.7	71	30.0	28
80	17.0	78	52.0	38

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 Resource 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.

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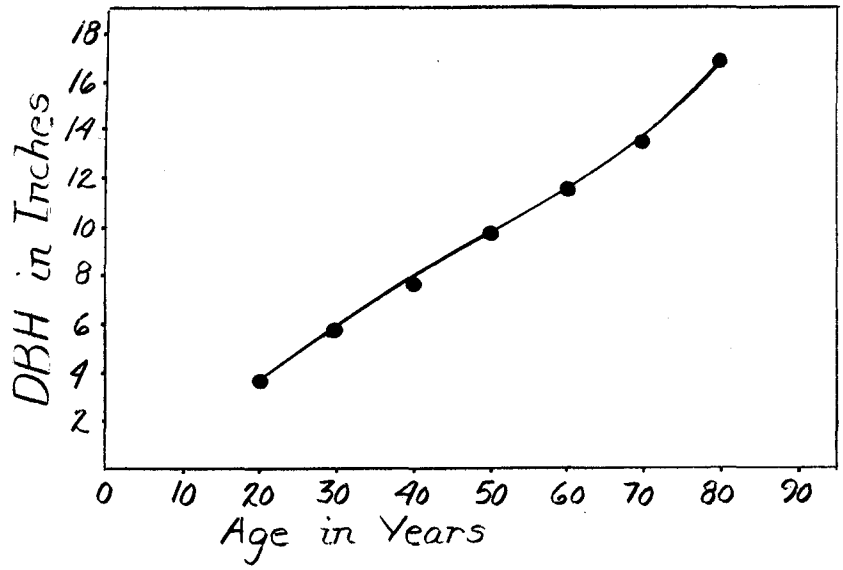

Fig. 1 Age - Diameter Relationship - Southern Minnesota Basswood.

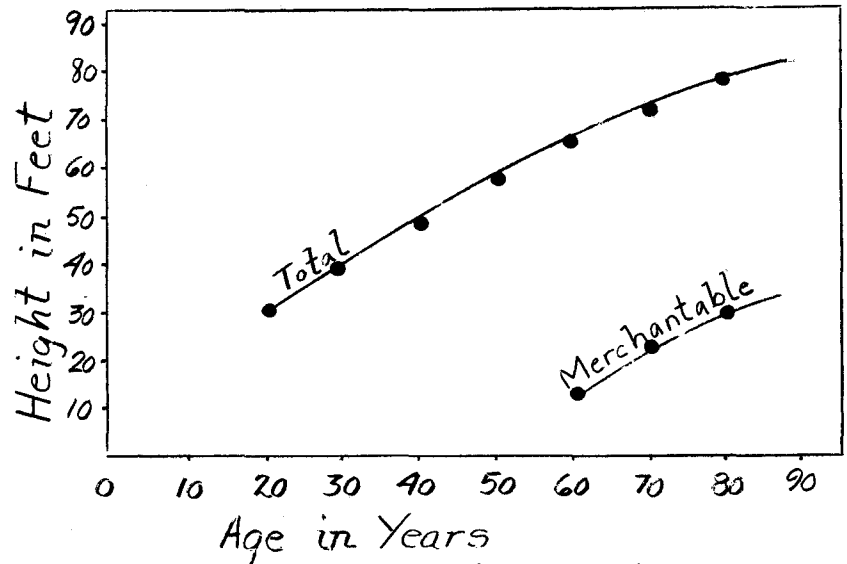

Fig. 2 Age - Height Relationship - Southern Minnesota Basswood.

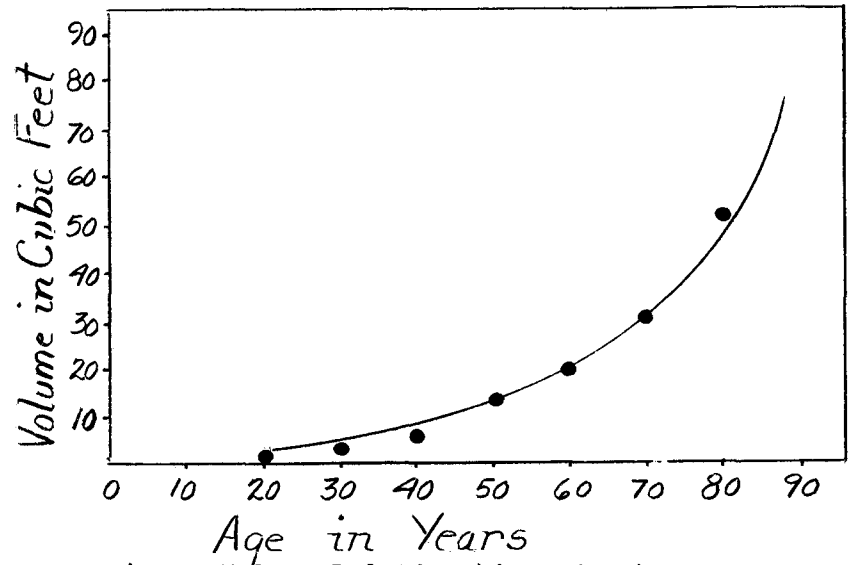

Fig. 3 Age - Volume Relationship - Southern Minnesota Basswood.

These curves can be used to predict the rate of growth of dominant and codominant basswood trees of good vigor growing on upland sites in southern Minnesota until more reliable data can be obtained through stem analyses or repeated measurements of sample trees. Periodic diameter growth appears to increase after 60 years and periodic total height growth appears to decrease after that age. Merchantable height growth is quite uniform throughout the range of ages included. Where form characteristics, such as forking, establish the upper limit of utilization, merchantable height would probably be fixed at an earlier age. Gross cubic volume growth increased with age for the trees studied. The merchantable volume in board feet, and the quality of logs can be assumed to increase even more rapidly with age, since log diameter has a strong influence on amount and quality of usable wood. Value growth may also be assumed to be more rapid than cubic volume growth. Growth expectations must be discounted, or reduced, to allow for probable mortality and increased defect. Additional data on mortality and defect as risk factors are needed to use with survivor growth data in developing cutting plans.

To the extent that a given stand is similar to those sampled, these curves should be useful in predicting rates of growth for crop trees. They suggest that the harvest of sound, vigorous, dominant and codominant Southern Minnesota basswood should be delayed until trees are over 90 years old (about 20 inches dbh and 80 feet tall). This would apply especially where salvage cuts can be made on relatively short notice to prevent the loss of investment when a tree dies before attaining this goal.

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