RELATIONSHIP OF LEAF AREA AND DRY WEIGHT TO HEIGHT AND VOLUME IN A YOUNG PLANTATION OF NORTHERN RED OAK

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Estimates of dry weight and leaf area for young plantation-grown hardwoods are frequently needed to fully assess responses to cultural treatment. The objective of this study is to determine the relationship of dry weight and leaf area to less expensively measured characteristics such as height and volume (D^2H). This study reports on such relationships for a 5-year-old northern red oak (*Quercus rubra* L.) planting containing a wide range of size classes.

The sampled plantation was originally established at a 1.2 by 1.2 meter spacing on an abandoned forest nursery site characterized by a silt-loam alluvial soil. At the time of this study, the year-old planting contained trees ranging in height from 0.2 to 4.6 meters. In late August after completion of shoot elongation and leaf maturation and before any defoliation, 101 trees representing the range of sizes in the test were harvested (by severing at the root collar) and divided into leaves, branches, and main stem. Each portion was immediately placed in a plastic bag and fresh weight was determined. A sample of each portion was oven-dried to determine moisture content, and oven-dry weight of the plant was computed from moisture content and fresh weight data. In addition, on 56 randomly selected trees, leaf area-weight relationships were determined and total tree leaf area was computed. Using these data, the relationships of leaf area and oven-dry weight to plant height and volume (D^2H) were determined by linear regression of $\log_{10}$ values.

Relations of leaf area and oven-dry weight to height and volume (D^2H) are plotted in figures 1 and 2. Height and volume (D^2H) accounted for 90 percent of the variance in leaf area and total oven-dry weight. Therefore, they are suitable for prediction of these latter characteristics in plantations at spacing approximately that in this test. As tree size increased, there were changes in the distribution of biomass with higher percentages of weight in stem and branches in larger plants (fig. 3). he correlation coefficients between height and percentage of total weight in branches, stem, and leaves were 0.39, 0.67, and 0.77, respectively.

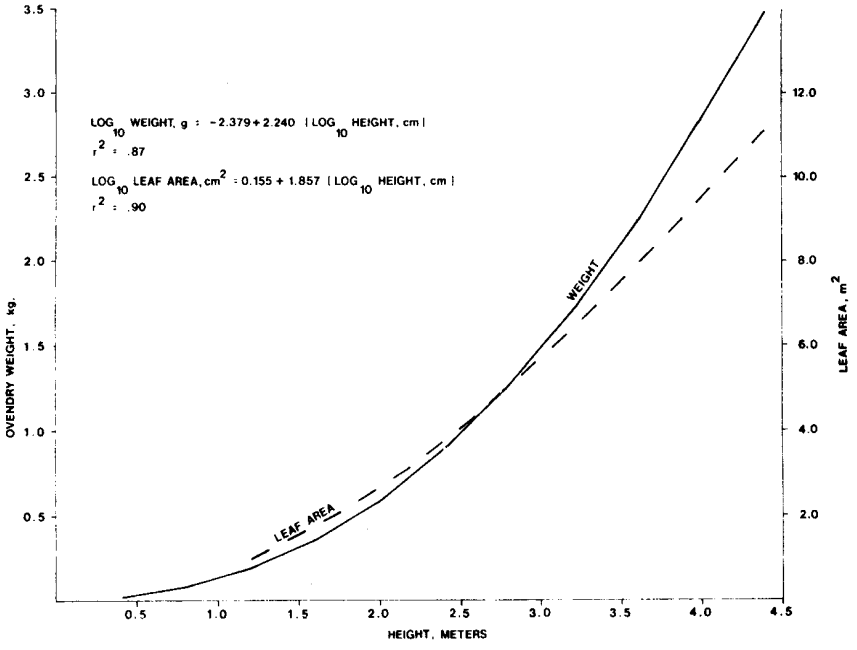

Figure 1.—*Relationship of oven-dry weight and leaf area to height in northern red oak.*

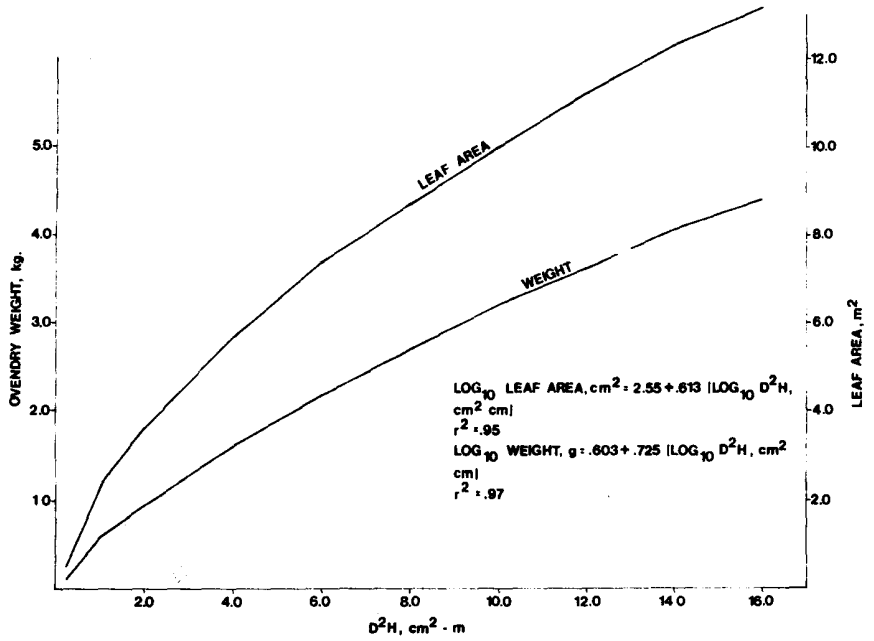

Figure 2.—*Relationship of volume (D^2H) to oven-dry weight and leaf area in northern red oak.*

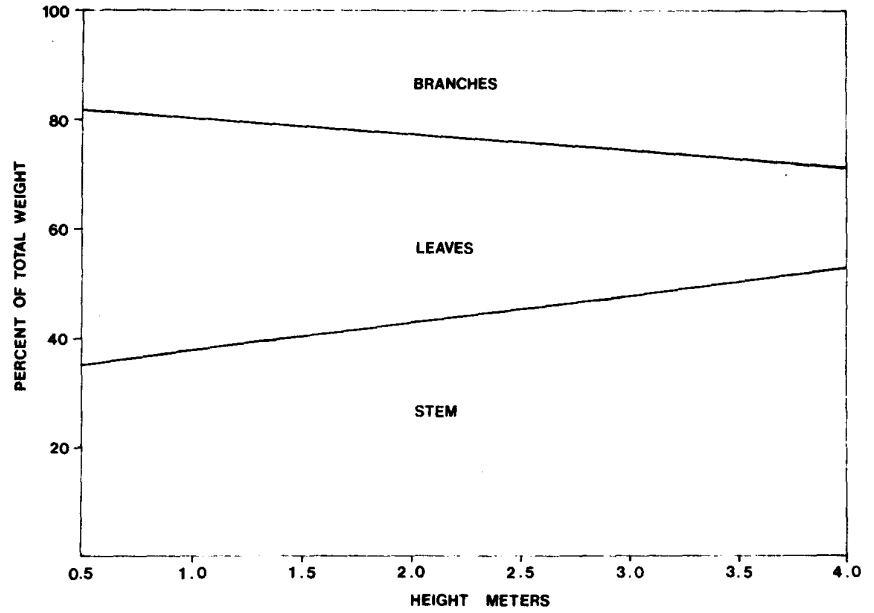

Figure 3.—*Distribution of biomass in above-ground parts of northern red oak as influenced by tree size.*