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OAK SITE INDEX AND BIOMASS YIELD IN UPLAND OAK AND COVE HARDWOOD TIMBER TYPES IN WEST VIRGINIA

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Abstract. More biomass was present in 46-year-old cove hardwood than upland oak types on the West Virginia University Forest near Morgantown. Oak site index was a poor predictor of biomass yields.

Site index is commonly used as an index to the productivity of sites. However, that productivity has usually been measured in board feet or cubic feet and limited to merchantable minimum diameters. Because of the current interest in utilization of the whole aboveground woody biomass, we investigated the utility of site index as a predictor of biomass yield.

PROCEDURE

The study was established on the 8000-acre West Virginia University Forest near Morgantown. The 46-year-old forest is even aged with a few scattered residuals, and is fully stocked. Approximately 62 percent of the forest area is in the upland oak type, dominated by white, chestnut, scarlet, northern red, or black oaks. The remainder of the forest is of the cove hardwood type, dominated by yellow-poplar, black cherry, and northern red oak.

One hundred point samples (BAF = 10) were randomly located on the forest, 67 falling in the upland oak type and 33 in the cove hardwood type. Total height and age of at least three dominant or codominant oak trees were determined at each location, and site index was calculated using Wiant's (1975) prediction equations for Schnur's (1937) site index curves at each location.

The dbh and species of each in-tree were recorded; and the weights of the total tree (excluding stump, roots, and leaves) and of the bark, stem (more than 4 inches diameter

Table 1.—Statistics for regression of biomass components (in pounds per acre) on site index

Tree component, weight	Intercept	Slope	Correlation
Total tree, green	31, 319	3,032	0.493**
Total tree, dry	28,192	1,582	0.456**
Total bark, dry	8,894	153	0.329**
Stem to 4-inch top, green	-9,483	2,756	0.514**
Stem to 4-inch top, dry	-4,567	1,551	0.504**
Bark to 4-inch top, dry	3,393	147	0.394**
Branches, green	36,170	245	0.493**
Branches, dry	23,928	94	0.105 NS
Branch bark, dry	5,459	-1	-0.007 NS

** = Significant at the .01 level of probability
NS = Not significant at the .05 level of probability
Degrees of freedom = 98

outside bark), and branches were estimated using formulae developed by Wiant and others (1977). The linear regressions of per-acre biomass estimates on site index for the two timber types were compared by analysis of covariance.

RESULTS

The estimated total dry weight biomass averaged 78 tons per acre for the cove hardwood type and 66 tons per acre for the upland oak type, and the difference was statistically significant. However, the average site index was also higher for the cove hardwood type (81) than for the upland oak type (66).

The analysis of covariance showed that regressions of biomass on site index were not significantly different for the two forest types. Therefore, the data were pooled and common regressions were computed for the components of biomass (Table 1). The correlation coefficients were highly significant in most cases, but they were too low (.30 to .50) for the regressions to have much predictive value.

CONCLUSIONS

The cove hardwood type had more biomass per acre than the upland oak type relating to the higher average site index of the cove hardwood type. But at a given site index, there was no significant difference in biomass yield between the types. Oak site index by itself was a poor predictor of the aboveground biomass; it accounted for only 25 percent of the variation in total tree biomass.

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