DEVELOPING EQUATIONS FOR ESTIMATING TREE COMPONENT BIOMASS FOR NATURALLY REGENERATED SHORTEAF PINE IN SOUTHEAST OKLAHOMA WITH APPLICATION TO BIOMASS PARTITIONING IN THINNED AND UNTHINNED STANDS

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Abstract—Traditionally, the main focus of forest production has usually been to maximize allocation of biomass to merchantable stem wood. But the assessment of biomass partitioning in stands is needed to address management concerns such as stem production and allocation, carbon sequestration, wildland fire, whole tree harvesting, etc. Thinning mainly increases the bole diameter and crown area of the residual trees. This change results in changes in biomass partitioning to tree components. To meet all purposes of forest management it is imperative to understand the effects of thinning on the allocation of biomass to different aboveground tree components. Data were obtained from a thinning study established in even-aged naturally-regenerated shortleaf pine (*Pinus echinata*) stands consisting of 12 permanent plots established during 1988 to 1989 (site 1) and 9 permanent plots established in 1990 (site 2). The two sites are located in the Ouachita Mountains of Pushmataha County in southeastern Oklahoma on industrial forest lands. The sites consisted of even-aged stands 25 to 35 years old at the time of thinning. Site 1 has a site index of 17.4 m (base age 50) and site 2 has a site index of 22.2 m (Wittwer and others 1998). Tree component (branch, foliage, and tree bole) biomass equations were developed based on destructive measurement of 48 shortleaf pine trees, ranging from 5 to 33 cm in d.b.h. on site 1, and 36 shortleaf pine trees ranging from 7 to 40 cm in d.b.h. on site 2. Thinning treatments (low thinning) included unthinned control plots and plots thinned to 70-percent, 50-percent and 30-percent full stocking on site 1, and plots thinned to 70 percent, 50 percent, and unthinned control on site 2. The biomass equations were used to estimate biomass quantities (/ha) on plots to evaluate biomass partitioning. Analysis of variance (ANOVA) and multiple comparisons were done using the REML approach in SAS PROC MIXED (SAS Institute Inc., Cary NC). Since site-by-treatment interactions were significant, the interaction model was used for ANOVA to test simple effects. Multiple comparisons were conducted by using SLICE option under the LSMEANS statement in the SAS MIXED procedure with the null hypothesis of equality of the means being rejected if P-value ≤ 0.05 experiment wise type I error rate. The proportion of biomass partitioned to branches and bark was significantly affected by thinning. Unless heavily thinned, thinning treatments did not significantly affect the proportion of biomass allocation to bole. Biomass partitioning to branches was higher as thinning intensity increased. Thinned stands partitioned smaller proportions of total biomass to bark. Although thinning seemed to reduce the total foliage biomass, it was evident that heavily thinned stands increased the proportion of foliage to total biomass.

LITERATURE CITED

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