COMPARISON OF GROWTH MODELS FOR WHITE AND RED OAK 10 YEARS AFTER RELEASE AND FERTILIZATION

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Crop tree enhancement (CTE) treatments promote stand growth and quality while also providing an opportunity to maintain or improve wildlife habitat and aesthetics in hardwood forests. However, the response to crop tree release and fertilization treatments needs to be quantified for specific sites in order to assess the economic consequences of such treatments. Several methods of modeling forest growth have been proposed and utilized, but direct comparisons of these methods and models are not available for upland hardwoods. Including live crown ratio improves the performance in individual-tree growth models for western conifers compared to other modeling approaches. In addition, crown variables other than live crown ratio have not been considered for inclusion in forest growth models. Data from a CTE study in upland hardwoods at Ames Plantation, Grand Junction, Tennessee, are used to compare a relative size (stand table) projection system and an individual-tree diameter growth method. The predominant species in this study are white oak, red oak, and black cherry, with white oak being designated as the preferred crop tree species. The goal of CTE at this site was to promote volume growth and to improve the value of lumber produced. Treatments included an untreated control, fertilization only, release only, and release with fertilization, and were replicated 5 times. Measurements of dbh, total height, and crown dimensions were obtained for up to 36 crop trees in each treatment plot in 1992-93 and 2002-03. All trees included in a 10-factor prism sweep around each crop tree were designated as competitors. Total height, dbh, crown dimensions, azimuth, and distance from the crop tree were recorded for each competitor tree. Distance-dependent expressions of competition for consideration are the Hegyi index and a modified area potentially available based on basal area and crown dimensions. Distance-independent expressions of competition include: basal area of larger trees; crown diameter of larger trees; crown area of larger trees; live crown ratio of larger trees; crown volume of larger trees; and relative crown diameter, crown area, live crown ratio, and crown volume. The importance of crown variables in both modeling approaches will be evaluated.

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