

# INTEGRATING A WOOD QUALITY COMPONENT WITH THE SYLVAN STAND STRUCTURE MODEL FOR COMPARING CHERRYBARK OAK PLANTATION MANAGEMENT SCENARIOS

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Plantations will occupy an increasing proportion of the landscape in the future. This is particularly true for temperate hardwood plantations in the southern United States as reflected by the recent increases in afforestation activities in the Lower Mississippi Alluvial Valley. Hardwood plantation management has been constrained by limited information. The result has been the reliance on a paradigm derived from and dominated by pine plantation science and generally limited to monocultures. Anecdotal and empirical evidence suggests this approach may not be optimal for hardwood plantations where wood quality is a significant determinant of stand and stem value. One alternative to monospecific hardwood plantation management is a mixed-species approach. Although mixed species plantations have a long history and some convincing research exists, little operational or commercial adoption has been realized. An argument with significant economic implications will be necessary to increase the utilization of mixed species hardwood plantations.

A simulation system was developed by integrating a wood quality module within the Sylvan Stand Structure Model. The simulation system, CherrybarkSQ, was developed to investigate the impact of plantation design on the development of clear wood within cherrybark oak (*Quercus pagoda* Raf.) stems. Of particular interest was the difference, if any, between pure and mixed species designs of similar density. After simulations of approximately 50 years, the mixed species design resulted in trees with a higher proportion of clear wood than the pure design of the same initial planting density. In addition, a widely spaced pure cherrybark oak plantation produced more clear wood per tree than pure plantations at a denser spacing.

CherrybarkSQ simulations of mixed species hardwood plantations resulted in higher quality cherrybark oak stems than monocultures of the same planting density. The increase in stem quality improves stand-level value. The knowledge that a mixed-species approach to cherrybark oak plantation management may improve stand-level value and therefore increase investment opportunities and returns, should play a role in increasing research and commercial establishment of mixed species hardwood plantations.