

CHERRYBARK OAK (*QUERCUS PAGODA*) CROWN PROFILES AFTER 10 YEARS OF GROWTH IN MIXED SPECIES STANDS OF THREE SPACINGS IN THE CUMBERLAND MOUNTAINS OF MORGAN COUNTY, TENNESSEE

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Forest canopy structure and morphology can have a dramatic impact on individual tree ontogeny. In single cohort, mixed species stands, neighboring crown morphology may exhibit a competitive or a complimentary role in the development of desirable species such as oak and their ability to occupy growing space as the stand matures. In 2009, 6.5 acres on the University of Tennessee's Cumberland Forest was identified for hardwood afforestation and subdivided into 27 one-quarter acre blocks. Nine blocks each were planted in yellow-poplar (*Liriodendron tulipifera*), sweetgum (*Liquidambar styraciflua*), or black cherry (*Prunus serotina*). Each block was also planted at one of three spacings: 6 feet by 6 feet, 8 feet by 8 feet, and 10 feet by 10 feet. Cherrybark oak (*Quercus pagoda*) was intermixed in these plantings so that an oak was planted in every other row as every other tree in that row. In this arrangement, each oak seedling was surrounded by six seedlings of a competitor species. The species-specific crown architecture of these competitors at these spacings created distinguishably unique neighborhoods within 3 years from establishment and began acting on the survival and growth responses in the oak through 10 years of stand development. In particular, the interactions of specific stand mixtures modified oak crown allometry and canopy occupancy when measured after 10 years of growth. Since the ability to model crown profiles is essential to physiological-based process models of trees and stands, cherrybark oak crown dimensions were modeled and presented as differential crown profile diagrams.

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