

Modeling the production of short-rotation *Eucalyptus* species for biomass in the southeastern United States

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Recent opportunities in using tree biomass as a replacement for fossil fuels has generated interest in growing *Eucalyptus* in the United States. *Eucalyptus* species have been considered in the southern United States for more than 50 years, but inadequate genotypes, aggressive competing vegetation and extreme cold have prevented the established of these plantations outside of southern Florida. The Forest Productivity Cooperative and its members installed a network of biomass screening trials across the SE US in 2010 and 2011 with 330 entries of 150 *Eucalyptus* species to identify viable *Eucalyptus* species and examine the effects of climate of productivity. Sites encompassed an area between North Carolina, Florida and Louisiana capturing a variety of climatic, edaphic and silvicultural intensities. This study was developed to 1) identify suitable *Eucalyptus* idiotypes for each climatic sub-region, 2) establish polymorphic site index guide curves, 3) examine the effect of climate on mortality, and 4) assess the current production of short-rotation *Eucalyptus* plantations in the SE US. Sites were grouped based on the minimum variance of climate variables such as temperature, precipitation, and vapor pressure deficit. Species were grouped by idiotype across all sites. Fitting site index curves and mortality function were established for each idiotype across all sub-regions of the US south to assess *Eucalyptus* production. After four winters, the results show that more than seven species of *Eucalyptus* have potential to be a viable source of hardwood fiber in the southern United States.

Keywords: cold tolerance, *Eucalyptus*, site index, growth and yield, climate effects

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Kevin Hall is a Research Associate with the Forest Productivity Cooperative (FPC) (www.forestproductivitycoop.net) at North Carolina State University (NCSU). Kevin completed his Master's and Undergraduate degrees in Forestry at NCSU. Kevin's graduate project was funded by the Integrated Biomass Supply System USDA grant and supported by the FPC's United States Eucalyptus Working Group. The project focused on developing an initial growth and yield model for *E. benthamii* across the southern United States. During his graduate program, Kevin received the Zobel Endowment for International Studies to compare production of *E. benthamii* in southern Brazil and southern United States and also received the FIPSE grant to study abroad at the Federal University of Paraná in Brazil focusing on silviculture. Current work includes managing region wide silvicultural trials for both loblolly pine and *E. benthamii* as well as producing scientific publications.