Ecological and Economic Implications of Tree Species Diversity for Forest Management in the Southeast

by

Chris Hopkins¹

Abstract

Forestry has, in general, emulated many of the intensive aspects of modern agriculture. Summarizing this approach broadly, agriculture and forestry have developed the science of choosing an appropriate species (or variety) and maximizing production by adapting the available growing environment to the particular species' needs. Recent experimental research in ecology has provided an alternative approach by which natural systems demonstrate increased productivity. David Tilman has published a series of papers (Tilman 1994, Tilman 1996, Tilman 1997) in which he has found that in native prairie species, species diversity (total number of species present) is a significant factor in increasing total production (dry biomass) and in reducing variability of production in reaction to drought stress.

This study examines several hypothesis, both ecological and economic, regarding Tilman's model of niches and my extension to stacked niches. These implications are further explored in terms of production economics and risk analysis.

H01: There is no significant difference relative productivity (variously periodic total and commercial growth or standing biomass) in relation to tree species diversity.

H02: There are no combinations of a few species that have higher relative productivities than pine monocultures.

H03: There are no combinations of species that are financially competitive with pine monocultures considering risk and return characteristics.

The data sources used to test these hypothesis are the Forest Inventory and Analysis data set collected by the United States Forest Service and possibly a private data source using a similar data collection strategy.

Analysis will include controls for stand history and landscape position and geographical region. Previous preliminary results indicate that all three null hypothesis can be proved incorrect and that judiciously selected species combinations might be able to boost productivity and financial return above that of pine monocultures.

¹Graduate Research Assistant, Department of Forestry, North Carolina State University, Raleigh, NC 27695.