

LOBLOLLY PINE WATER RELATIONS IN RESPONSE TO FERTILIZATION AND THROUGHFALL EXCLUSION

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The impact of climate change on temperature and precipitation patterns in the southeast U.S. are likely to have an important impact on southern pine systems. A 2009 summary from the U.S. Global Change Research Program indicates that the southeast U.S. will experience an increase in average temperature of 2.5 to 5°C by the 2080s. Predictions for changes in precipitation for the southeast, although less certain, generally indicate a 10 to 30 percent reduction in summertime precipitation. The objective of this research project is to quantify the impact of artificial drought conditions on loblolly pine (*Pinus Taeda*) water relations and productivity in both fertilized and unfertilized plantations. The study utilizes a randomized complete block design containing two levels of fertilization and throughfall exclusion in a 2x2 factorial arrangement. Treatments include: fertilization with 224N, 28P, 56K (kg/ha) and micronutrient blend as to eliminate any nutrient deficiencies, and an exclusion of 30 percent of incoming throughfall. The specific objectives are to: 1) quantify the impact of both 30 percent rainfall exclusion and fertilization treatments on loblolly pine productivity, whole-crown stomatal conductance, and whole tree hydraulic conductivity, 2) investigate the relationship between vapor pressure deficit, soil moisture, and stomatal conductance, and 3) provide water relations parameters for the Physiological Principles in Predicting Growth (3-PG) model.

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