GENETIC DIVERSITY OF LOBLOLLY PINE GROWN IN MANAGED PLANTATIONS: EVIDENCE OF DIFFERENTIAL RESPONSE TO CLIMATIC EVENTS

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Adaptability of a forest tree species to a wide range of environmental conditions is partially dependent on the levels of genetic diversity found within the species. One approach to assess genetic diversity of a plant species is to examine long-term performance of provenances grown in common-garden experiments. This method allows direct comparison of performance of different families under actual field conditions. When conducted over a long period of time, the trees will likely be exposed to a variety of climatic conditions, both in terms of soil moisture levels and ambient temperature levels.

In this investigation, climatic conditions were found to be associated with differential growth patterns in provenances of loblolly pine (Pinus taeda L.) grown in common-garden trials, as measured by annual radial growth. Radial growth was assessed from annual rings extracted from forty-year-old trees growing in the Southwide Pine Seed Source Study. A sensitive analysis of variance revealed very small, but statistically significant, provenance interactions with climate over a thirty-year period.

Furthermore, differentiation between provenances appeared to be largest during periods 0f extreme climatic conditions. For instance, provenances originating from regions of relatively frequent drought events during the growing season were found to be more sensitive t0 drought, exhibiting reduced radial growth during a droughty period, compared to provenances from mesic regions, which largely maintained radial growth during a period 0f prolonged moisture deficit.