# LOBLOLLY PINE PROVENANCE AND FAMILY DIFFERENCES IN WATER USE IN RESPONSE TO ATMOSPHERIC CO2 ENRICHMENT

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**Abstract.** Elevated $CO_2$ concentrations have been reported to reduce stomatal conductance and water use in tree species. To determine whether there are family or provenance differences in loblolly pine *(Pinus taeda* L.) water use in response to short-term increases in atmospheric $CO_2$ concentration, whole plant water use of seedlings derived from 10 Interior families and 13 Coastal Plain families was measured at ambient and twice ambient $CO_2$ concentrations. Whole plant water use was measured a second time, four months later, to test whether the results changed with increasing size or age. When measured the first time, $CO_2$ enrichment decreased whole plant water use of the Coastal Plain seedlings by 4.7% which was significantly greater than the 2.5% decrease in water use of seedlings from the Interior region. Family within region differences in the percent decrease in water use due to $CO_2$ enrichment were not significant. Measured the second time, $CO_2$ enrichment decreased whole plant water use of Coastal Plain seedlings by 18.l% which was significantly greater than the 15.1% decrease of the Interior seedlings. During this second sampling, some of the family differences within region were significant. Size and growth rates of seedlings from different regions were significantly different but were not correlated with the percent decrease in water use due to $CO_2$ enrichment.

**Key words:** *Pinus taeda* L., half-sib families, provenance, whole plant water use