

IMPROVING OUR UNDERSTANDING OF GROWTH DIFFERENCES OF PINUS TAEDA IN THE UNITED STATES AND BRAZIL: A COMMON GARDEN EXPERIMENT

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Evidence suggests that loblolly pine (*Pinus taeda* L.) grows much better in South America than it does in its native range in the southeastern United States. Reports of typical annual growth in Uruguay, Argentina and Southern Brazil range from 300 to 500 ft³ ac⁻¹ yr⁻¹ while in the US comparable rates are less than 200 ft³ ac⁻¹ yr⁻¹ (Cubbage et al. 2007). Interestingly, carrying capacity of exotic loblolly pine plantations (~275 to 400 ft² ac⁻¹) also exceeds that of native plantations (~200 ft² ac⁻¹). Our understanding of how intensive silvicultural practices including site selection, resource management, stocking and elite genetic material including clones influence potential productivity for loblolly pine has increased tremendously in the past 50 years. However, questions still remain as to why the growth and carrying capacity differences occur. We established three sites (Virginia: outside native range but in the southeast US, North Carolina: native range, and Brazil: southern hemisphere), where the same clones, mass control pollinated and open pollinated families were planted at three stocking levels (250, 500, 750 stems ac⁻¹) and two levels of resource availability (operational, and intensive for maximum growth). This study will allow us to examine growth differences in the US and Brazil without the confounding effects of different genetics. Trees grew up to two times faster in the southern hemisphere across all treatments. Varietal response to silviculture varied across site, and clone by silviculture interactions were observed. Across site, individual tree stem volume growth was linearly related to crown width, crown foliage mass and fine root length. Photosynthetic measurements indicate relatively minor differences across variety and site which do not explain the observed growth differences to date. The trees at all sites are currently about the same size (although the Brazil trees are two years younger) which will allow comparison of ecophysiological processes when all sites are at the same developmental stage. Consequently intensive measurement campaigns are planned for all sites in the coming year.

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