

YIELD AND FINANCIAL PERFORMANCE ESTIMATES OF FOUR ELITE LOBLOLLY PINE SEED SOURCES PLANTED IN THE WESTERN GULF REGION

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Eastern seed sources of loblolly pine (*Pinus taeda* L.) have been planted in the Western Gulf region for nearly three decades because they often have higher growth rates than local seed sources. However, productivity gains for eastern families are sometimes offset by poorer survival rates relative to local families. Clonal propagation of loblolly pine seedlings has further increased productivity gain potential of loblolly pine, but survival and yields of eastern varieties grown in the Western Gulf must be determined. In addition, varietal seedlings cost nearly five times that of conventional open-pollinated seedlings. It is essential to determine the effects of this greater establishment cost on plantation financial performance in order to develop economically feasible management strategies for varietal plantations.

Two eastern open-pollinated families (7-56 and 8-103), two eastern varieties (Clone 93 and Clone 9), and one mixture of Western Gulf open-pollinated families (LA OP) were planted at the LSU AgCenter Hill Farm Research Station in northwest Louisiana with the goal to determine survival and growth trends, estimate forest product yields, and estimate financial performance. Trees were planted at a 6 foot by 16 foot spacing in January 2005. Survival, total tree height, and dbh were measured annually since planting in 2005. Age seven (2012) measurements of codominant height, basal area, trees/acre were used as inputs for the FASTLOB growth and yield model to estimate product yields of a 25-year rotation. Modeled stand densities reaching between 35 percent and 55 percent of maximum stand density index dictated simulated stand thinning.

All seed sources exhibited survival rates greater than 80 percent. However, 7-56 showed significantly poorer survival than 8-103, Clone 9, and Clone 93 (fig. 1-A). By age 4 significant height differences emerged among the five seed sources. Clone 93 had the tallest height growth, while 8-103 and LA OP were the shortest of the seed sources (fig. 1B). Clones 9 and 93 had the highest predicted pulpwood and Chip-n-saw yields. The open-pollinated 7-56 had the highest predicted sawtimber yields, although 7-56, 9, and 93 had the highest total yields across all product classes (fig. 1-C). Although all sources achieved a greater than 8 percent return on investment, the open-pollinated sources achieved higher internal rates of returns above the two clonal varieties, which were at least two percent lower (fig 1D).

Although both clone 9 and 93 and 7-56 showed greater productivity than the Western Gulf mixture on this site, the productivity gains were not sufficient to overcome the greater initial cost of the seedlings and planting (Table 1), which led to lower internal rates of return. High survival rates of the clones led to high proportions of pulpwood and chip-and-saw using the simulated stand density index thinning approach. The clonal management scenario had higher cost and led to a greater proportion of lower value forest product yields relative to the open pollinated seedlings. These results indicate the need for different management strategies to capture the higher productivity of the clonal varieties such as increasing the planting spacing to reduce initial cost and increase the proportion of sawtimber yields, thus allowing an earlier final harvest.

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Table 1--Cost assumptions for internal rate of return calculations

Year	Activity	Seed Source(s)	Cost (\$/acre)
0	Subsoil	All	89.06
0	Hand planting, bareroot	7-56, 8-103, LA OP	22.95
0	Hand planting, container	9, 93	44.10
0	Seedling cost	LA OP	18.00
0	Seedling cost	7-56, 8-103	27.00
0	Seedling cost	9, 93	157.50
1	Two band applications herbicide	All	69.93

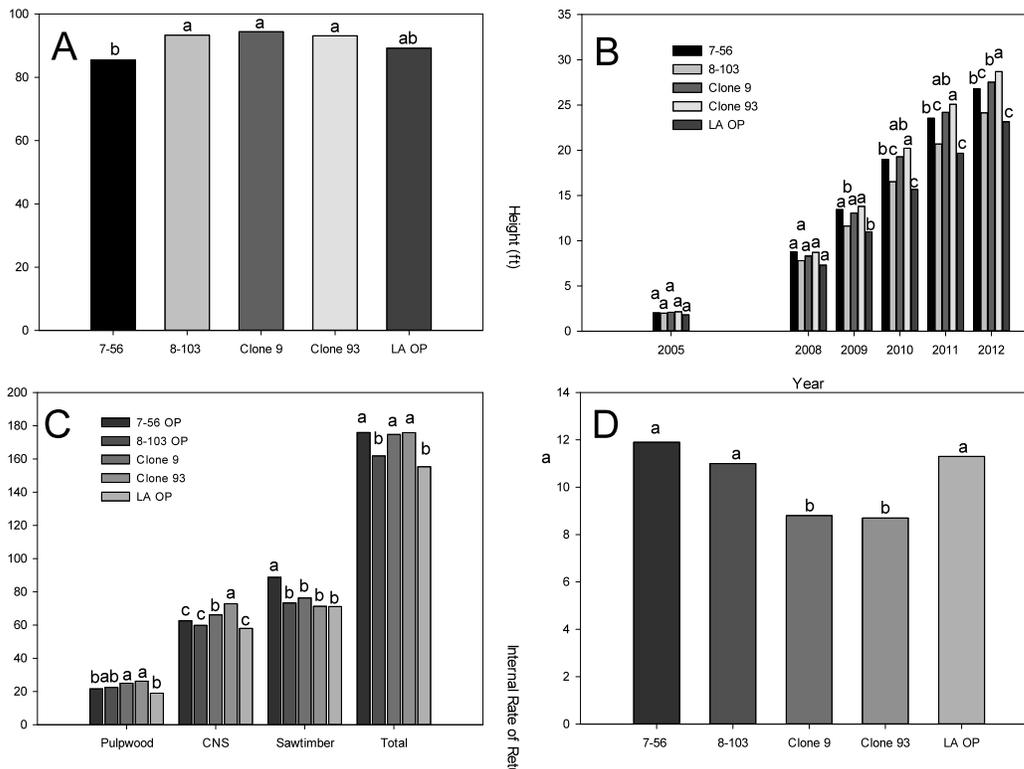


Figure 1. Survival averaged over seven years (A), height (B), predicted yields by product class for a 25-year rotation (C), and predicted internal rates of return (D) for four loblolly pine seed sources at the LSU AgCenter Hill Farm Research Station in northwestern Louisiana. Seed sources 7-56, 8-103, and LA OP are half-sib families; seed sources 9 and 93 are clonal varieties. For each variable, bars headed by different letters differ at $P < 0.05$.