STOCK SIZE AFFECTS EARLY GROWTH OF A LOBLOLLY PINE CLONE

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For decades, forest researchers in the South have known that early gains in survival and growth of loblolly pine (*Pinus taeda* L.) can be achieved by planting large-diameter seedlings (South 1993; Wakeley 1949). For *P. radiata*, increasing size of planting stock also increases early growth of both seedlings (Mason and others 1996) and cuttings (South and others 2005). Stock is now produced from somatic embryogenesis (Grossnickle and Pait 2008). Although some landowners have paid $0.40 each for such seedlings, data on the effect of stock size on field-growth of tissue-cultured stock are lacking. Does stock size still make a difference when planting clones?

To address this question, studies were installed in Alabama (cutover site) and Georgia (grassland site) to determine the effects of stock size on early height growth of a tissue-cultured clone (L-3576). The stock was provided by the CellFor Corporation (no longer in business). Loblolly pine transplants (mini-plugs) were grown at the Pearl River Nursery in Mississippi as bareroot stock, and they were sorted into three classes according to root-collar diameter (3 to 4.9 mm, 5 to 6.9 mm, and 8 to 9.9 mm). Trees were planted in block plots, four replications per site, with 100 or 105 trees per plot (1,075 seedlings per ha). Survival after 5 years was greater than 97 percent at both sites (table 1). Trees in grassland plots with the largest diameter class exhibited the greatest height and diameter growth. At year 5, the difference in height between the smallest and largest class ranged from 0.3- to 1.2-m, and basal area was increased by 4- to 23-percent. Data from these trials suggest that early growth performance of one loblolly pine clone can be affected by stock size, but statistical significance depends on site variability. The cutover site was more variable and therefore provided less statistical significance.

In addition to absolute gains, an estimate of the time gain (South and Miller 2007) was made using annual height measurements. By plotting height over time (fig. 1) and using linear equations, a hypothetical number of days required to reach a height of 5 m was calculated, assuming growth rate is constant throughout the year. For the cutover site, the height was reached 3 months sooner for the 6 mm stock (versus 4 mm), and on the grassland site the time was 4 months sooner. Assuming a plantation is harvested when the current annual increment (CAI) is 16 m^3/ha, then 3 months of additional growth would be equivalent to an additional 4 m^3/ha of wood.

In these two trials, the null hypothesis (size had no effect on early growth) was rejected. It may be wise for researchers who compare early growth of various clones to document initial differences in stock size at time of planting.

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Table 1--Effect of initial stock size on 5th year survival, diameter at breast height (d.b.h.), basal area per tree, and height of loblolly pine clone L-3576. Probabilities of a significant linear contrast are given. HCDN is hypothetical calendar day number when stock reached a height of 5 m in 2010 and was estimated using simple linear equations

Location	Diameter class	Survival	D.b.h.	Basal area	Height	HCDN to reach 5 meters
		%	*cm*	*cm²*	*m*	*days*
Cutover site	4 mm	97.2	7.1	41.7	5.1	339
	6 mm	99.6	8.0	51.4	5.5	253
	9 mm	98.8	8.2	54.8	5.4	254
	probability	0.3106	0.0586	0.0897	0.4774	
Grassland site	4 mm	98.8	10.6	90.6	5.3	267
	6 mm	98.8	11.3	94.9	5.9	139
	9 mm	98.8	11.7	108.0	6.5	52
	probability	0.9870	0.0068	0.0076	0.0066	

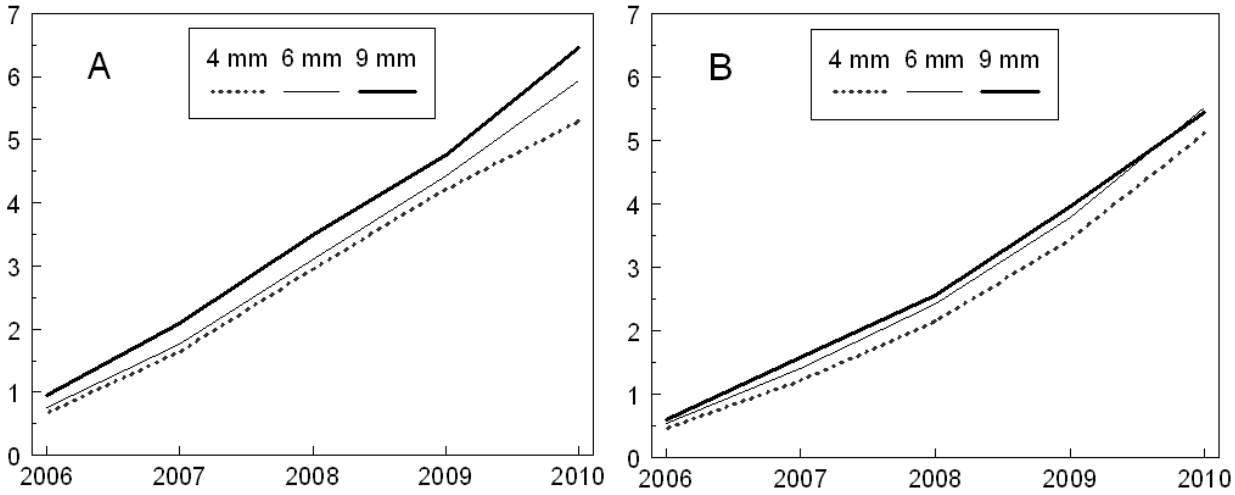

Figure 1--Effect of initial stock size on height (m) of loblolly pine clone L-3576 on a (A) grassland site and (B) cutover site.