

Seed Efficiency in Southern Pine Nurseries

South, D.B. and H. S. Larsen. 1986. Seed efficiency in southern pine nurseries. Ala. Agr. Exp. Sta. Highlights Agr. Res. 33(2):5.

The forest industry in the South invests millions of dollars each year to improve the genetic potential of loblolly pine seed. However, few organizations have invested additional money in their nurseries for conserving this valuable seed. Some use essentially the same equipment and practices they use to grow seedlings from inexpensive, unimproved seed. These practices can often result in poor seed efficiency which lowers the potential economic gains from the tree improvement program. Research by the Alabama Agricultural Experiment Station has attempted to define the range of seed efficiencies present at forest nurseries.

In 1984, one pound of genetically improved loblolly pine seed (from clone 8-74) was purchased for \$83.58. There were 13,137 seeds per pound, but 10% floated when soaked in water. Removal of the empty seeds that floated resulted in 11,823 seeds with a germination rate of 99%, for a cost of 0.74 per pure live seed. These seeds were stratified and sown at seven forest nurseries, two in Alabama, two in Florida, two in Louisiana, and one in Mississippi.

At each nursery, one small plot was established by precision sowing 768 seeds by hand. Six of the nursery plots were sown during a 6-day period in April, while the seventh plot was sown about a month later. Plots were mulched with pine bark after sowing. Normal nursery practices were conducted during the growing season and all seedlings from each plot were lifted between December 26 and 29.

Seed efficiency of the plots, see table, varied from a high of 92 % to a low of 41%. The low seed efficiency from nursery G was related to the late sowing date. For the remaining nurseries (B-F), seed efficiency ranged from 60% to 72 %. The average seed efficiency for all seven plots was 66%. The plot from nursery A had low mortality as well as a low percentage of cull seedlings. This plot demonstrates that a seed efficiency of 90% or greater is possible. A few nursery managers have reported operationally obtaining this level of efficiency with certain seed lots.

The present value of a pound of genetically improved seed is based on the worth of the extra wood produced at the end of the rotation, discounted to the present. Though \$300 is the present value often mentioned for a pound of seed from a rogued, first-generation loblolly pine seed orchard, some companies have determined the present value of seed from certain clones to be worth in excess of \$1,000 a pound. Therefore, the present value of a single viable seed from a rogued seed orchard could range from 34 to 104. When a viable seed has a present value of 34 each, poor seed efficiency can lower present values by as much as \$43 for each 1,000 plantable seedlings produced, see table. Therefore, if a nursery with a seed efficiency of 41% produced 13 million genetically improved seedlings out of a total production of 26 million, it could amount to an annual loss in present value of over \$500,000 a year.

For many established nurseries in the South, the cost of producing improved seed can easily account for 30% to 50% or more of the total cost of seedling production. Therefore, reducing seed cost by increasing seed efficiency can be an effective way to lower the cost of seedling production. The seed cost per thousand plantable seedlings at Nursery A was 22% to 34% less

than for nurseries B-F. At \$83.58 per pound for seed, this means a savings of \$54,860 to \$103,740 for a nursery growing 26 million seedlings. It is apparent that when valuable seed are used, improving nursery practices to keep seed efficiency high can be economically beneficial.

SEED EFFICIENCY FROM SMALL PLOTS AT SEVEN NURSERIES IN 1984

Nursery	Date sown	Pure live seed sown/sq. ft.	Total density/sq. ft.	Plantable seedlings/sq. ft.	Cull percent	Total mortality	Seed efficiency	Loss in present value of future volume gains/1,000 plantable seedlings	Seed cost/1,000 plantable seedlings ²
		No.	No.	No.	Pct.	Pct.	Pct.		
A	4/25	30.2	29.2	27.8	5	3	92	\$ 2.61	\$ 7.60
B	4/23	30.2	27.9	21.7	22	8	72	11.67	9.71
C	4/23	30.2	27.9	21.0	25	8	69	13.48	10.05
D	4/19	30.2	24.9	20.6	17	18	68	14.12	10.25
E	4/19	30.2	23.6	19.0	20	22	62	18.39	11.11
F	4/20	30.2	21.8	18.2	16	28	60	20.00	11.59
G	5/17	30.2	17.6	12.6	28	42	41	43.17	16.68

¹Assuming a present value of 3¢ per pure live seed.

²Assuming a cost of 0.7¢ per pure live seed.