

Varietal Forestry

A Giant Step-up for Increasing Timber Value on Your Land

—Jeff Wright and Phil Dougherty

Forestry in the southeastern United States is facing many challenges: a shrinking land base due to urbanization; increased global competition; high land cost; and more expensive stand establishment and management. Clearly, just as the American corn producer has increased his yields from 40 bushels per acre to more than 200 bushels per acre to stay profitable, forest landowners in the southeast must take on the same challenge. Varietal forestry, now on the horizon, represents the next opportunity for keeping forestry an attractive investment for private landowners.

Past improvements, such as switching from natural stands to plantation forestry in the 1940s and 50s; the development and application of herbicides for herbaceous and hardwood weed control in the 1970s and 80s; and the wide-scale application of fertilization to eliminate nitrogen and phosphorous deficiencies all represent technologies that are significant step-changes in forest production. Genetic improvement in trees through varietal forestry is another

step-change that will lead to increased forest productivity.

What is Varietal Forestry?

To the untrained eye, all pine trees in a stand may look the same, but they are not. Actually, within any pine stand, every tree is unique because each one has a distinct genetic composition. Some trees in a stand will grow tall, straight, and be disease-free; these are the ones that will become “crop” trees suitable for marketing for lumber production.

Other trees may be short, crooked, or infected with diseases such as fusiform rust or pitch canker. These trees either will die before they become merchantable, or will be harvested as low-value pulpwood. In the past, it has not been uncommon for only about 35 percent of the planted trees to be harvested as highly valued crop trees.

Over the last five decades, tree improvement programs at North Carolina State University, the University of Florida, and Texas A&M University

A Giant Step for Forestry

Why call the implementation of varietal forestry a “giant step forward”? A list of improvements expected from varietal forestry easily answers this question:

- Increases in productivity that would normally take two or more generations of tree improvement breeding and selection to accomplish.
- Improvements in stem and wood quality that should permit shortening rotation lengths (investment period) with resulting increasing stand value and product options.
- Reduction in risk due to increased resistance to major diseases such as fusiform rust and a shortening of rotation lengths.
- Increased efficiency in forestry operations from stand uniformity.



have identified the best sets of parent trees from which to produce quality seedlings. These programs are now completing three cycles of breeding, testing, and selection of the best parents. These best parents are used today to produce improved seedlings for planting on forest industry and private lands.

Varietal forestry will take southeastern forestry another giant step forward in production and quality over the improvements made through conventional tree improvement programs. In varietal forestry, the best individual from the best set of parents is selected. After selection, millions of identical copies of this best individual are produced through a varietal production process.

How Does Varietal Forestry Work?

Special tissue samples from the seeds that produced the “best” individuals are stored in a freezer (cryostored). After the best varieties have been identified in field trials, such as those of the ArborGen Testing Service, some of the frozen tissue of selected varieties are pulled out of the freezer to make millions of embryos (seeds). These embryos are germinated and grown into container or bareroot seedlings that look identical to those being planted today. These seedlings, however, are far from being the same as today’s seedling lots. Each lot of varietal seedlings has the same set of superior genes, thus, every seedling has the potential to produce a high quality, rust-free, sawtimber tree if cultured correctly. In the near future, stands like the nine-year old varietal stand shown below on the right will replace the rust-riddled low value stand shown on the left.

Can Varietal Forestry Really Help in Keeping Forest Investments Attractive?

In many areas of the southeast, the price of forestland has increased from around \$500 per acre to as much as \$3,000 per acre. Making a reasonable return from forestry when land prices have increased requires increased production and stand value. The levels of produc-

Land Cost (\$/Acre)	Regen. Cost -Yr-0 (\$/Acre)	Fert. Cost Yrs 9, 15 (\$/Acre)	Gtons/Ac For 7% return (AT)	Site Index For 7% return (AT)	Mai for 7% return(AT)
\$500	\$350	\$100/trt	78	55	3.9
\$1000	\$350	\$100/trt	114	67	5.7
\$1500	\$350	\$100/trt	147	75	7.4
\$2000	\$350	\$100/trt	181	81	9.0
\$2500	\$350	\$100/trt	214	88	10.7
\$3000	\$350	\$100/trt	250	95	12.5
Annual Tax= 5.00/ac	Capital gains = 22%	Rotation length- 20 Yr	Blended Price = \$35/Gton	400 tpa	

Table 1: MeadWestvaco internal data. Varietal plantations in bold.

tion needed to achieve a 7 percent after-tax return on land ranging in value from \$500 per acre to \$3,000 per acre are, as shown in Table 1, below.

Early yield trials indicate that with varietal forestry, it will be possible to attain the production levels needed to practice forestry on land that costs between \$1,500 and \$3,000 per acre. This may actually make forestry investments more attractive because an investor can expect to earn a higher return from his forest investment and also gain from any unique appreciation in the land on which his forests are planted.

When Will Varietal Forestry Happen?

The ArborGen Testing Service has now tested more than 1,900 varieties produced from the best-of-the-best parents. Testing for varieties with improved wood properties, as well as increased

growth, stem quality, and disease resistance is expected to continue into the future. ArborGen will begin offering “selected varieties” for sale in the fall of 2007. Foresters may not have met yet the accomplishments of corn growers, who went from producing 40 bushels per acre to producing more than 200 bushels per acre, but varietal forestry is moving yield, quality, and value quickly in that direction.

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- It is important for the southeastern United States to adopt this technology quickly because it can, within a decade, begin to affect our overall competitiveness in a global wood products market and improve personal returns from forest investments.
- Forest landowners and investors will want to keep up with the improvements being made through varietal forestry because the development rate of this technology will continue to be rapid for a least another decade.
- Further information on current developments in varietal forestry can be found at www.arborgen.com

