EASTERN NURSERY SITUATION

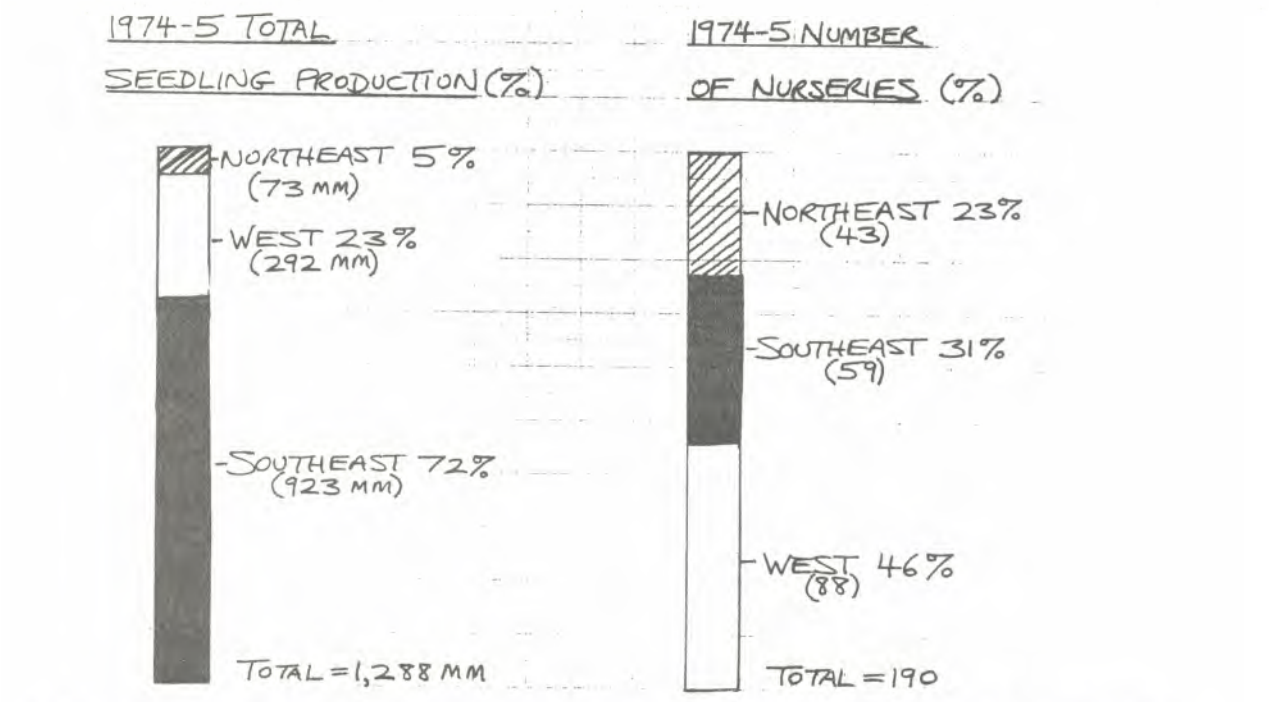
Clark W. Lantz
Nursery/Tree Improvement Specialist
USDA, Forest Service, Southeastern Area
State and Private Forestry
Doraville, Georgia

SEEDLING PRODUCTION, NUMBER AND TYPE OF NURSERIES IN THE U.S.

As a comparison with the "Western Nursery Situation" by Steve McDonald, I would like to present some additional data on seedling production and the number of nurseries across the country. These data are also taken from the 1976 Directory of Forest Tree Nurseries.

The total seedling production in the United States in 1974-75 was accounted for as follows: Northeast area 5%; West 23% and Southeast 72% (Figure 1). (This 72% amounted to more than 900 million seedlings produced by the Southeastern Area during that period).

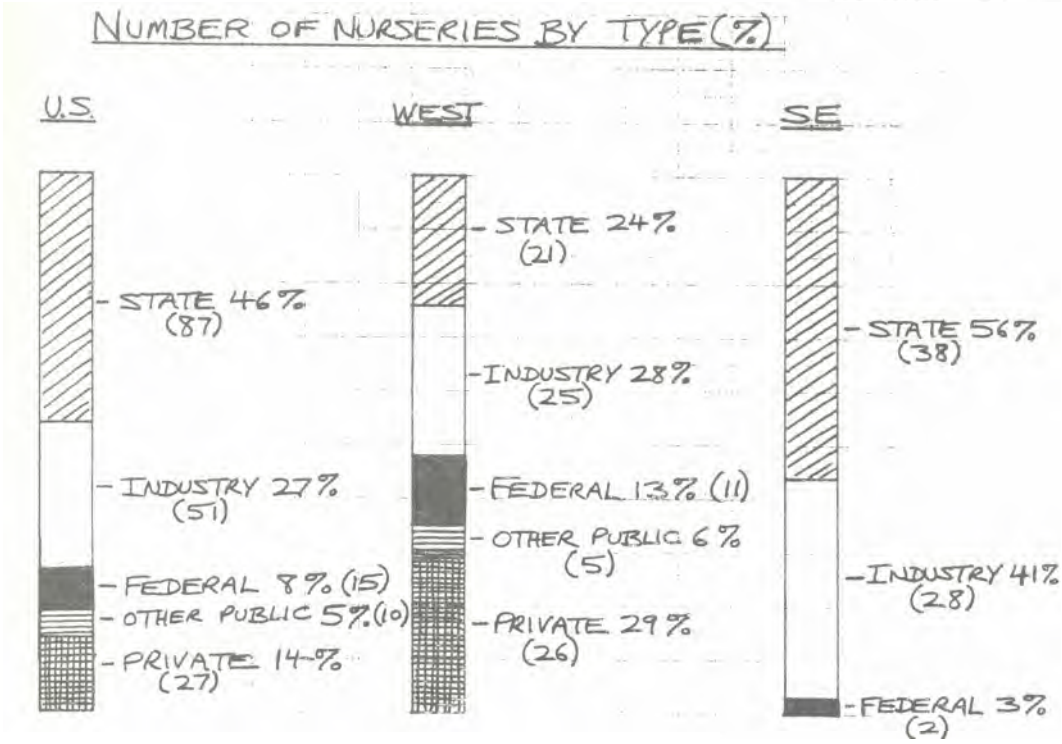
FIGURE 1.



Also from Figure 1 it is apparent that almost one half of the nurseries are located in the West (88 or 46% of the total), about a third in the Southeast (59 or 31%) and almost one quarter in the Northeast (43 or 23%).

When the type of nursery is considered, several important regional differences appear (Figure 2). State and industrial nurseries account for 97% of the southeastern nurseries, but only slightly more than half (52%) of the western nurseries. There are 11 federal nurseries in the West but only 2 in the Southeast. Actually we have only 1 bareroot federal nursery in SA - the Ashe Nursery on the DeSoto National Forest in Mississippi. The other federal nursery is the Stuart container operation on the Kisatchie National Forest in Louisiana. Private (26) and other public nurseries (SCS, BLM, BIA) are found only in the West.

FIGURE 2.



A major difference between regions exists with containerized production. Whereas 28 (32%) of the western nurseries are containerized and 13 (15%) produce both bareroot and container stock; we have only 5 container projects in the Southeast. Several of these are special purpose projects including such species as Frazer fir (Abies frazeri) in North Carolina, Eucalyptus grandis and E. robusta in south Florida, and Honduras Caribbean pine, Pinus caribaea var. hondurensis in Puerto Rico.

To summarize this section on regional differences, it is apparent that reforestation in the Southeast is big business. During the 1974-75 planting season more than 1 million, 200 thousand acres were planted in the Southeast. This total acreage amounts to 1,875 square miles which is almost as large as the State of Delaware!

In order to produce the 930 million seedlings for this planting job, large nurseries are essential. For example, the States of Georgia, Florida and Alabama, had over 1,500 acres of nursery space available for production in 1974-75 and produced more than 364 million seedlings which amounted to 28% of the U.S. production for that year.

In addition to large nurseries, other factors which favor large production figures in the Southeast are: Few species (over 90% of the seedlings are southern pines), a long-growing season, and fast-growing species which seldom require transplanting in the nursery. Almost all of our seedlings are shipped as 1-0 stock. Eastern white pine (Pinus strobus) is an exception – it is usually grown as 2-0 stock.

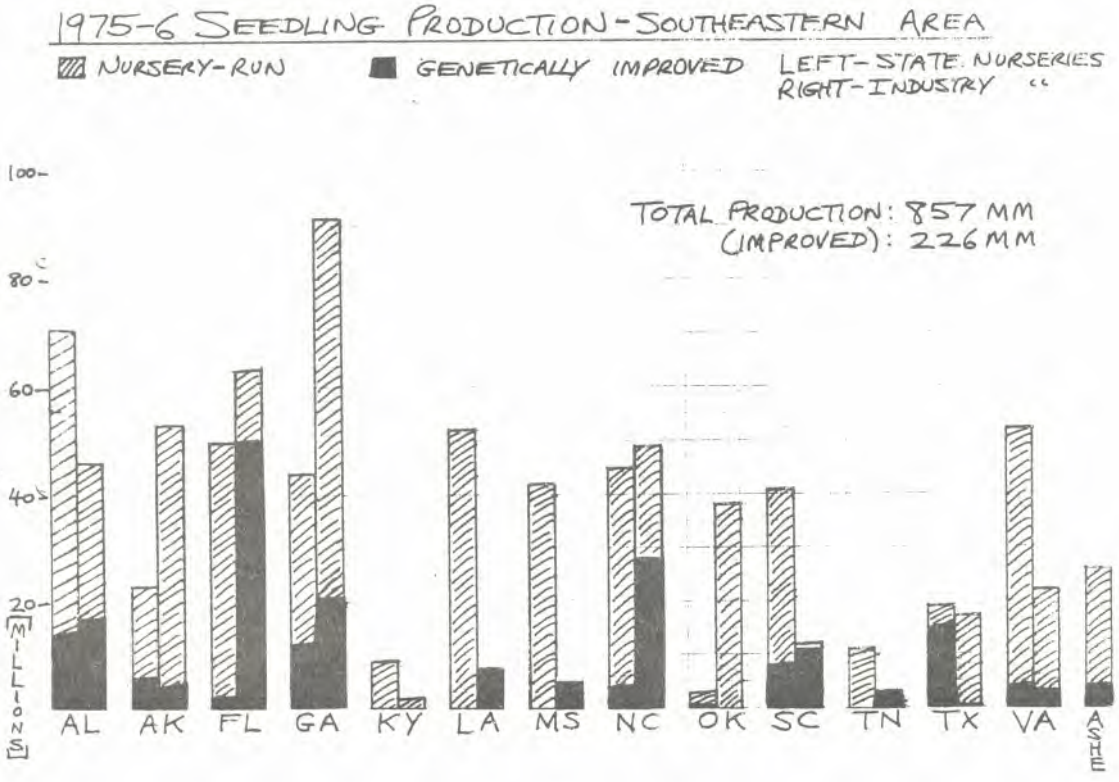
TREE IMPROVEMENT IN THE SOUTHEAST

Tree improvement in the Southeast is an integral part of the reforestation program. The only way that the goal of the "South's Third Forest" (doubled wood production by the year 2000) can be met is by an increase in the quality of seedlings as well as the quantity of seedlings. Genetically improved seedlings are currently producing 12-20% more volume growth than nursery-run seedlings.

All of the Southeastern State Forestry organizations have active tree improvement programs. In addition, several of the States and most of the larger forest industries are active in one or more of the 3 tree improvement cooperative programs (North Carolina State, University of Florida, Western Gulf). Region 8 of the U. S. Forest Service has an active tree improvement program, as does TVA.

Genetically improved seedlings from federal, state and industrial sources in the Southeast amounted to 226 million in the 1975-76 season (Figure 3). This was about 26% of the total production of 857 million for the Southeastern Area. Several companies are producing all of their planting stock from improved seed and all of the loblolly and slash pine seedlings from the State nurseries in Georgia will be from improved sources this year.

FIGURE 3.



WEED CONTROL IN NURSERY SEEDBEDS

With the implementation of the National Pesticide Control Act of 1972, all herbicides must be approved by E.P.A. and labelled for use by the manufacturer. Registration by E.P.A. usually requires 3 years of research data followed by 1 year of analysis. In addition, manufacturers are often reluctant to label these chemicals for forestry use due to the high liability involved with a limited market and very high value crop.

The Cooperative Forest Tree Nursery Weed Control Project at Auburn University has been active in the screening, field testing and registration of nursery herbicides for the past several years. The Southeastern Area of State and Private Forestry has provided financial support which has been supplemented by industrial funds this year. The project has been instrumental in providing the data for 4 pre-emergent herbicides to E.P.A. (Devrinol, Modown, Tok, Butralin). These chemicals have been tested for pine seedbed use, and several also show promise for use with hardwoods. The Auburn project has also provided the data for the State registration of a Devrinol (Napropamide) and Modown (Bifenox) mixture for pre-emergent weed control in Alabama, Arkansas and Oklahoma.

Studies in process for 1977 are located in 23 Southeastern Area nurseries. The potential savings of over $250,000 annually in weed control costs throughout the Southeastern Area from the use of these more effective herbicides (South, et al 1976) provides a measure of the value of the project.

The Great Plains segment of the Western herbicide project will include studies at the Norman Nursery in Oklahoma starting in FY '78.

ECTOMYCORRHIZAE

The Institute for Mycorrhizal Research and Development (Don Marx, USFS, Athens, Ga.) and the Forest Insect and Disease Management Group (Ed Cordell, Asheville, N.C.) are testing inoculation systems for "wonder-fungus," Pisolithus tinctorius, in 16 forest tree nurseries in the Southern United States: USFS: Placerville, Albuquerque, Ashe. States: Virginia, Tennessee, North Carolina, Kentucky, Florida, Louisiana, Texas. Industry: Weyerhaeuser, Oklahoma, Arkansas; Buckeye, Florida; Great Southern, Georgia; Westvaco, South Carolina; Kimberly-Clark, Alabama. Since Jerry Riffles will talk about the inoculation of mycorrhizae later in the program, I will not go into any details here.

ENDOMYCORRHIZAE - HARDWOOD SEEDLINGS

Endomycorrhizae differ from the ectomycorrhizae associated with pines in that the spores are not carried by the wind, but are moved by water, soil, or root contact. Endomycorrhizae are associated with most of the commercial hardwood species such as sycamore, sweetgum, ash, poplar, black cherry maples and locusts (Marx, 1972). These fungi are also common on the roots of many row crops and grasses such as beans, cotton, sugar cane and sorghum.

Endomycorrhizae also differ from ectomycorrhizae in that they must have root exudates from their hosts in order to grow. All hardwood tree species examined by the Mycorrhizal Institute in Athens, to date, have benefitted from endomycorrhizae. Some species, notably sweetgum, cannot carry on normal growth and development without endomycorrhizae (Kormanik, et al, 1976). With effective inoculation, sweetgum can be grown to 24-30 inches in height with 3/8 to 5/8" root collar diameters in one growing season (at a density of 6-7 seedlings per square foot). By comparison, seedlings without mycorrhizae seldom reach 4 inches in height.

HOW CAN ENDOMYCORRHIZAE BE USED IN THE NURSERY?

Special techniques will be necessary in order to effectively use endomycorrhizae. Since endomycorrhizal spores are not air-borne, recolonization by the fungus after fumigation of seedbeds is very slow. It may take several years for the fungus to reinvade the soil. Another problem is that living plant roots are needed for growth and development of the fungus.

More research is urgently needed to answer the dilemma of the nursery manager If hardwood seedbeds are fumigated for control of diseases and weeds, the endomycorrhizae will be wiped out. If fumigation is not done, diseases may ruin the crop and weeds may take over. Unfortunately there are no registered herbicides available which will control the weeds and not kill the hardwood seedlings at the same time.

One system which holds promise for hardwood nurseries has been proposed by Kormanik, et al, 1976. This procedure involves fumigation of the seedbeds, planting of sorghum, and inoculation with a specific endomycorrhizal fungus. When the fungus has become established the sorghum can be plowed under and the nursery beds may be formed and seeded. In this way the advantages of fumigation and endomycorrhizae associations may be combined. Hopefully these techniques will be tested on a pilot study basis in the next few years.

OTHER NEW DEVELOPMENTS IN SOUTHEASTERN NURSERIES (OYJORD SEEDER)

Trials of the Oyjord Seeder at Ashe Nursery (Schowalter and Martin, 1977) indicated that there are many good things about the unit. Among these are ease of calibration and ability to effectively sow small seed lots. In addition, when the seed are drilled they are covered with a thin layer of soil which appears to improve germination. It was also noted that there are several mechanical modifications which would improve the operation of the unit.

RYKERSCOPE

The portable oscilloscope developed by Russ Ryker (Intermountain Forest and Range Experiment Station) appears to have a great potential for determining dormancy and growth patterns in seedlings as these relate to lifting time, duration of storage and plantation survival. This unit and the new model from M.E.D.C. are being evaluated with both bareroot and container stock in the Southeastern Area.

NURSERY MANAGEMENT HANDBOOK

Dr. Jack May (just retired from the University of Georgia) has agreed to start work on a Southeastern Area Nursery Management Handbook next year. Jack will start with an extensive literature review which will be assembled into an annotated bibliography.

EASTERN TREE SEED LABORATORY

Seed testing services at the Eastern Tree Seed Laboratory continue to increase every year. During the 1975-76 season, more than 4,000 seed viability tests and 10,500 other types of tests were completed.

A "Small-Lot Seed Processing Workshop" will be conducted at the E.T.S.L. on October 18-20, 1977. Papers will be presented on both conifer and hardwood seed processing and equipment for this purpose will be demonstrated.

The 20th Report of the ETSL contains a wealth of information on seed processing and is available from:

Eastern Tree Seed Laboratory
P. 0. Box 819
Macon, GA 31202

RESEARCH NEEDED

As in the West, more research on nursery management is urgently needed in the Southeast. We need more knowledge of seedling physiology and nutrition, soil management, mechanized grading and hardwood seedling management. Unfortunately we see almost no new research in these areas.

Literature Cited

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