

FIELD PERFORMANCE OF CONTAINERIZED SEEDLINGS IN THE  
SOUTHERN REGION, USDA FOREST SERVICE 1/

Olen Aycock 2/

Abstract.--Containerized southern pine seedlings have been planted on a large scale on various soil and site conditions throughout the National Forests in the South. Results have shown that all the southern pines can be used successfully in the containerized program. Further work is needed on diseases associated with greenhouse production.

INTRODUCTION

This paper is a report of results of planting containerized pine seedlings on the National Forests in the Southern Region. The period covered is 1969 through the spring planting of 1974. During this time there have been 1,602,000 containerized southern pine seedlings planted on 3,665 acres on areas from east Texas to the Coast of North Carolina. There have been some plantings of hardwood tubelings. But the number and results have not been adequate enough for reliable evaluation.

Containerized seedlings have been planted during all seasons of the year, and on numerous different soil and site conditions. Different methods of site preparation have been used. Both machine and hand planting methods have been tried. Many of the tubelings were planted under very adverse conditions. Some were planted on extremely hot and dry sites. Survival was expected to be difficult under these conditions. The objective was to find out if the containerized seedlings could be produced and planted successfully under adverse conditions. There have also been problems in production of containerized seedlings. Many disease problems incurred in production have caused mortality after planting. Results have been favorable enough to show that with improved seedlings most sites in the South can be successfully planted.

All the containerized seedlings planted in the Southern Region have been produced at the Stu-

1/Paper presented at North American Containerized Forest Tree Seedling Symposium, Denver, Colorado, August 26-29, 1974.

2/Forester, Southern Region, USDA Forest Service, Atlanta, Georgia 30309.

art Project near Alexandria, Louisiana. The first plantings were in Kraft tubes. The last three years most of the planting has been in Japanese paperpots. Some other containers have been used such as the BR-8 Block. Since most of the plantings have been in Kraft tubes and Japanese paperpots, these two types of containers will be discussed in the field results in the Southern Region.

KRAFT TUBES

Longleaf pine

Longleaf pine grown in Kraft tubes have been planted on sites in Alabama, Florida, Louisiana, South Carolina, Mississippi, and Texas.

The Alabama plantings were on the Tuskegee and Conecuh National Forests. The seedlings were 8 weeks old when planted. Site preparation was by mechanical chopping and by hand injector. The tubelings were planted in August 1971. Survival is below the acceptable standard. Growth is not known since the trees are in the grass stage. They are about the same size as bare-root stock of the same age. Conditions were hot and dry, and the seedlings were probably too young when they were outplanted. The Kraft tube is also a factor in survival since normal lateral root growth is difficult in the tube.

Kraft tube longleaf seedlings were planted on the Appalachian National Forest in Florida in July 1971. The seedlings were 8 weeks old, and were planted by mechanical planters on hot dry sandy sites. Survival was below acceptable levels. Growth is comparable with bare-root stock of the same age.

Good results were obtained from Kraft longleaf plantings on the Ocala National Forest in July 1971. Growth has been good on some sites and poor on others because tubes have not decomposed on dry sandy sites. In June of 1971, longleaf in Kraft tubes were planted on the Osceola National Forest in Florida. The soil was sandy and wet. The seedlings were machine planted on beds. Survival was 75% and stocking is satisfactory. Growth is good with height growth of three feet or more.

Kraft tube longleaf seedlings were planted on the Francis Marion National Forest in South Carolina in July 1971. Survival was very poor. The roots were unable to penetrate the tube and the tube did not deteriorate. Seedlings were hand planted on moist sandy sites.

The Kisatchie National Forest in Louisiana planted Kraft tube longleaf in August 1969 and again in 1970. Some results were very poor and some were very good. Weather conditions had a direct effect on percent of survival. In extreme hot dry conditions survival was about 30%. Spring planting survival was about 70%. Growth has been equal to or better than bare root seedlings.

#### Slash Pine

Slash Pine grown in Kraft tubes has been planted on the Kisatchie National Forest in Louisiana and the Appalachian, Ocala, and Osceola National Forests in Florida.

The outplantings on the Kisatchie were under various weather and soil conditions from August 1969 through March 1970. Survival was fair with best results from plantings during December to March. Growth has been equal to or better than bare root seedlings. Failures can be traced to adverse weather conditions and diseases.

Kraft tube Slash pine were planted on the Ocala National Forest in July 1971 on sandy moist sites. Survival was fair and growth has been good. Some trees are now more than six feet tall. The trees were machine planted on sites that were chopped and bedded. Weather conditions were favorable with frequent showers in the afternoon.

Similar results were obtained on the Appalachian National Forest from summer plantings of Slash in 1971, except the growth has not been as good as expected. The trees are only about 2 feet tall and this is not good growth for Slash in Florida after 2 1/2 years. The Osceola National Forest planted Slash in Kraft tubes in June 1971. The site had been chopped and bedded. Results were good and growth has been satisfactory with

some trees now over 5 feet tall. An August 1971 planting on similar sites was not successful. Both plantings were with machine planters

#### PAPER POTS

##### Longleaf Pine

Results of plantings of longleaf pine grown in Japanese paperpot containers have been obtained from the Ocala and Appalachian National Forests in Florida, DeSoto National Forest in Mississippi, Francis Marion National Forest in South Carolina, Kisatchie National Forest in Louisiana, and National Forest in Texas.

On the Ocala National Forest plantings were made on dry, hot, sandy sites in the summer of 1972 and 1973. Results were not satisfactory. These plantings were done by youth conservation girls with planting dibbles. Some of the plants were infected with diseases when received. During the same period plantings were made on the Appalachian National Forest. Results were better because of more rainfall and more soil moisture. The 1972 and 1973 longleaf are in the grass stage and growth can not be evaluated. Some losses were the results of diseases in the seedlings.

Paperpot grown longleaf were planted on the DeSoto National Forest in Mississippi in the Summers of 1972 and 1973. Results have been good. On one planting the survival rate was 98%. This compared with an average survival rate of 51% for bare root longleaf planted in February 1973. The tubelings are also growing better than the bare root stock. The tubelings were machine planted on sites that were sheared and raked.

Longleaf Paperpot seedlings were planted on the Francis Marion National Forest in 1972 and 1973. Plantings were made from January through July. Survival was satisfactory. Growth has not been good. Paperpots planted on the Francis Marion have not deteriorated after two years in the ground. This is the only area of the Southern Region where the paper has not broken down.

Results of paperpot longleaf plantings on the Kisatchie National Forest are basically the same as with Kraft tubes. Plantings in early spring during wet site conditions have shown best survival and growth.

Longleaf plantings in Texas have been on dry sites in hot weather in July and August. There has been a minimum survival and growth cannot be measured because the seedlings are in the grass stage.

Slash

Slash pine grown in paperpots has been planted on National Forests in Mississippi, and Alabama. A 1972 summer planting on the Conecuh Forest in Alabama was very successful. The stand is adequately stocked and has grown more than 2 feet. The trees were machine planted on a moist site.

The DeSoto National Forest in Mississippi has planted slash pine tubelings in 1972 and 1973. There have been both spring and summer plantings. Survival has been 80% to 98%. The trees were machine planted on sheared and raked sites. Growth of bare root stock and tubelings are comparable. Both 1973 plantings are about 3 1/2 feet tall.

Loblolly

Loblolly pine grown in paperpots has been widely planted on National Forests throughout the South from Texas to North Carolina. Survival and growth has been generally acceptable. There have been few failures with loblolly. This could be expected since loblolly is the easiest southern pine to plant with bare-root stock.

There have been some exceptional results with loblolly paperpots. The Strong River District on the Bienville National Forest in Mississippi is one of the best examples. Loblolly planted in July 1972 is over eight feet tall after two growing seasons. One big advantage of using paperpots for loblolly is the availability of summer planting stock. The normal planting season for bare root stock ends in April. Tubelings have been planted all through the summer with good results.

Shortleaf

Shortleaf pine grown in paperpots has been planted on National Forests in Arkansas and

Georgia. The plantings have been done in spring and early summer with hand tools. Survival has been acceptable and growth is comparable with bare root stock.

White Pine

White pine grown in paperpots has been planted on the Sumter National Forest in South Carolina and the Chattahoochee National Forest in Georgia. The plantings were done by hand on sites that had some hardwood overstory. Results are excellent with 90%+ survival and good growth.

A table is attached showing the species and locations of Containerized Seedling plantings in the Southern Region. These plantings have been on a sizeable scale on a variety of sites. No detailed research statistics were maintained. But the distribution and results have been adequate to give some indications and directions to the containerized program in the South.

CONCLUSIONS

Here are some conclusions we can make from our analysis of results:

- (1) All Southern pines can be grown in containers and outplanted with satisfactory results.
- (2) The planting season can be extended into June and July by using containerized seedlings.
- (3) Losses in containerized seedlings can generally be attributed to diseases or from extremely adverse weather.
- (4) Work with containers in the Southern Region should be directed to improving survival and growth of longleaf, since it is the most difficult to plant with bare root stock.

CONTAINERIZED PINE SEEDLINGS PLANTED IN SOUTHERN REGION  
1969 - 1974

Forest	Slash	Longleaf	Loblolly	Shortleaf	White pine	Total	
	----- <i>Number, in thousands</i> -----					----- <i>Acres</i> -----	
Alabama	7	42	26			75	167
Chatt-Oconee (Ga)			43	16	7	66	217
Kisatchie (La)	100	213				313	696
Florida	207	241				448	996
South Carolina		143	71		10	224	598
Mississippi	30	61	153			244	476
Texas		15	31			46	102
Ouachita (Ark)			25	72		97	216
North Carolina			74			74	164
Ozark (Ark)				15		15	33
<b>Total</b>	<b>344</b>	<b>715</b>	<b>423</b>	<b>103</b>	<b>17</b>	<b>1,602</b>	<b>3,665</b>