NURSERY CULTURE OF LONGLEAF PINE

Philip Wilson)!

Abstract.--Longleaf pine (Pinus palustris) can be artificially regenerated successfully through the judicious use of current nursery management techniques and the proper handling of the seedling. Current nursery management techniques must have an integrated approach to be successful as each practice promotes the next practice.

INTRODUCTION

The Alabama Forestry Commission's Hauss Nursery has been producing longleaf pine seedlings since the 1952-53 crop year. A total of 30 million longleaf seedlings have been produced since the inception of the nursery in 1952. This amounts to 3% of the total seedlings produced over a 37 year period. The largest amount produced in any one year was 2.7 million longleaf pine seedlings. The current production trend is in the upward position. Current production is 10% of the total seedlings being produced.

SOWING

Longleaf pine are generally fall sown during the month of October to insure large caliper and high quality planting stock. Seedlings may be spring sown during the month of March but a greater than economical cull percent may also be expected.

Density should be 12-15 per square foot to provide high caliper planting stock. High density stock is unmanageable and should be thinned. Management decisions concerning sowing rates and densities should be done so as to protect against high density stands. Low density stands will produce high quality seedlings and high density stands will produce culls.

Planting is accomplished with a Whitfield hydraulic driven planter with oversized drop tubes. Seed should be well dewinged and cleaned to obtain resonable results. Seed with cone scales or foreign material in them are exceptionally hard to sow correctly. Pine bark is used for a mulch at 1/4 to 1/2 inch covering rate.

Seedlings which are fall sown are irrigated promptly to encourage germination and root development before sever cold weather sets in. Seedlings are not propagated during the winter months.

CULTURAL PRACTICES

During the growing season we essentially do very little cultural practices to longleaf pine seedlings. This decision was based on a test where we set up different production blocks, each having different cultural practices. Tested were lateral root pruning, horizontal root pruning, top clipping, and no cultural practices. The test proved to us that any cultural practice we tried decreased quality and quantity of seedlings produced.

1/ Nursery Forester, Alabama Forestry Commission, E.A. Hauss Nursery, Atmore, Alabama

Our normal routine for longleaf pine cultural practices is to top prune once around September 1 to facilitate handling and packing and to horizontal root prune on October 15 to control tap root length and to allow seedlings to heal root cuts before actual harvesting. Care should be taken in horizontal root pruning to insure undercutting blade is sharp and ground conditions are not too wet. If the blade is dull or soil is too wet "L" roots could develop. If the soil is too dry then proper root length can not be obtained.

DISEASE CONTROL

At Hauss our most persistant disease problem is Rhizoctonia blight on longleaf. We try to control this problem through an integrated approach by keeping organic matter in a 2% range, fall sowing, early fertilization, regular spray schedule, and replacement of lost mulch.

We have found that fall sown longleaf seedlings which are fertilized in early spring have crown closure early and show a lesser percentage of Rhizoctonia incidence. Consequently, we try to sow all of our longleaf seedlings in the fall of the year. On fall sown longleaf we spray for Rhizoctonia with Daconil 2787 and Benlate on a six week schedule and on a three week schedule for spring sown longleaf seedlings.

Since mulch loss is greater on spring sown longleaf we replace it as necessary to hold down soil splash which seems to be our culprit on Rhizoctonia. We also try to utilize as fresh of seed as possible as Rhizoctonia seems to be a worse problem on older seed.

For Red Spider Mite control we use Cygon as needed. Red Spider Mites are a problem for us when the weather turns dry in September and October.

For Brown Spot control we use Daconil 2787 and a Bordeaux mixture. These are sprayed starting in September on a 3 week schedule. We have not had much of a problem with Brown Spot on longleaf pine.

SOIL REQUIREMENTS

At Hauss Nursery all of our fertilizing is done during the off rotation year preceding cover crop sowing. The fertility standards table below indicates the ranges which we strive for to produce quality seedlings.

pH	OM%	P *	K *	Mg *	Ca *
5.5	1.0-2.0	26-100	150-250	90-200	400-1200

*These values are pounds per acre

We have found that a top dressing of fall sown longleaf with a complete fertilizer during April seems to give it an advantage during the later fall months. We top dress both fall and spring sown longleaf with Ammonium Nitrate at a rate of 1 pound per unit about six times during the growing season, usually with the last application being August 15. We also top dress longleaf seedlings with Muriate of Potash at a rate 1 pound per unit three times during the growing season with the last application being just prior to the October 15 horizontal root pruning.

HARVESTING

Harvesting of longleaf pine seedlings at Hauss Nursery is accomplished with a Grayco full bed harvester, with handlifting being the backup system. We can harvest 160,000 seedlings per day with a 10 man crew. It is critical with this harvester, and any other means of harvesting, to not recut the tap roots. If the roots are fresh cut they will bleed profusely and therefore reduced survival could result.

As with any type harvesting operation, seedlings should be protected from exposure to the elements. This can be accomplished *by* proper placement of seedlings in tubs, the use of seedling tarps during transportation, dampening seedlings upon arrival to processing shed and a good meshing of harvesting and processing capacities. Longleaf seedlings are much more susceptible to improper handling losses than any of the other southern pines.

PROCESSING

The grading shed at Hauss Nursery has the capacity to process 160,000 longleaf seedlings per day. Grading is performed based on root caliper (>.4) and the overall appearance of the seedling. Seedlings are graded and counted by graders and placed on a conveyor to move them to the packaging area. Seedlings are packaged using a root gel and a Benlate solution for root protection and bundled in an open ended bale. We routinely use a third strap in the middle of a longleaf bale to help maintain tightness of the bundle.

After packaging, seedlings are placed on a rack so as to prevent bale touching and placed in a seedling cooler for a minimum 24 hour cool down period. Seedlings should be stored for no more than one week. If stored for more than one week, bales should be rotated 180 degrees to allow percolation downwards of available moisture.

SHIPPING

Shipping at Hauss Nursery is accomplished by rotating oldest stock out first. Refrigerated transportation is stressed but not mandatory. We ship stock by means of a refrigerated van state wide to refrigerated distribution points.

Customers who pick up at the nursery are strongly advised to haul seedlings covered with a tarp with a minimum 12 inches of free air space between seedlings and tarp. Alabama Forestry Commission trucks which transport seedlings to customers must have a tarp or they are denied seedlings.

Customers are advised of proper field storage techniques through a brochure which is given to each customer. The brochure strongly suggests the use of space tarps, available natural shade and other tips to insure good survival. Also mentioned is the need to protect seedlings on the planter through the use of root gel, water, or wet burlap sacks in the planter boxes.

CONCLUSION

The effects of various nursery cultural, biological and chemical practices on longleaf pine have been repeatedly demonstrated. Sustained longleaf pine seedling production and successful reforestation requires the continuous integrated application of all the above related nursery management and reforestation practices,

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SEEDLING PRODUCTION SUMMARY - STATE DISTRIBUTION

CROP YEAR	SLASH PINE	LOBLOLLY PINE	LONGLEAF PINE	SHORTLEAF PINE	SPRUCE PINE	SAND PINE	SCOTCH PINE	MONTEREY PINE	VIRGINIA PINE	YELLOW POPLAR	RED CEDAR	ARIZONA CYPRESS
1952-53	5116850	2256000	30000	0	0	0	0	0	0	0	0	0
1953-54	7650700	0	0	0	0	0	0	0	0	0	0	0
1954-55	9800600	0	0	0	0	0	0	2101	0	0	0	0
1955-56	14575275	0	0	0	0	0	0	0	0	0	0	0
1956-57	18101400	6513000	6675	0	0	0	0	0	2900	0	0	0
1957-58	26753250	9615000	0	0	0	0	0	0	0	0	0	0
1958-59	50214375	10030500	1583300	515000	0	40000	0	0	1000	0	500	0
1959-60	37372400	13703550	326875	0	40050	6000	1000	0	65500	0	0	0
1960-61	17746250	1831000	0	0	1000	0	0	0	0	0	0	0
1961-62	14367500	1396700	11025	38025	66150	41000	0	0	0	0	0	0
1962-63	16033750	1983300	140500	77100	11500	52000	0	0	0	24500	214225	0
1963-64	11141750	2891500	594800	127650	0	0	0	0	0	3575	0	0
1964-65	8446436	2247500	177900	379500	38875	72250	0	0	0	81200	0	0
1965-66	9492200	1426000	256800	0	0	15500	0	0	0	8125	0	0
1966-67	10857965	2386610	389385	0	0	17500	0	0	0	0	0	0
1967-68	6599116	4590931	366011	2241	0	4025	0	0	0	21516	27891	0
1068-69	3338525	3460187	220925	17000	0	0	0	0	0	15050	0	0
1969-70	4553325	5622200	193725	0	0	0	0	0	0	0	0	0
1970-71	1470950	3943650	391000	0	0	19750	0	0	0	1800	7925	0
1971-72	3712350	2231400	0	0	0	0	0	0	0	0	0	0
1972-73	3519200	6082650	41000	0	0	0	0	0	0	0	0	0
1973-74	3523500	2713450	127500	0	0	0	0	0	0	0	0	0
1974-75	5915425	4393000	259350	0	0	0	0	0	0	0	0	0
1975-76	3958180	3892500	199150	0	0	0	0	0	0	0	0	0
1976-77	4056250	7832428	23500	0	0	0	0	0	0	0	0	0
1977-78	4713979	3860000	670000	0	0	0	0	0	0	0	0	0
1978-79	2253000	3959000	446000	0	0	0	0	0	0	0	0	0
1979-80	1563000	4525000	66650	0	0	0	0	0	0	0	0	0
1980-81	1967000	6159250	446025	0	0	0	0	0	0	0	0	0
1981-82	2470000	10809000	578000	0	0	0	0	0	0	0	0	0
1982-83	3746000	9976500	721250	0	0	0	0	0	0	0	0	0
1983-84	1832000	9842500	490000	0	0	0	0	0	0	0	0	0
1984-85	1349000	10701700	1316000	0	0	0	0	0	355250	0	0	0
1985-86	876500	7692000	1775775	0	0	0	0	0	67525	0	0	0
1986-87	7455500	22392500	702600	0	0	0	0	0	0	0	0	0
1987-88	8468000	15488500	1907400	0	0	0	0	0	0	0	0	0
1988-89	6590000	19950275	1734000	0	0	0	0	0	0	0	0	0
1989-90	6388050	16955450	1509350	0	0	0	0	0	0	0	0	0
TOTALS	347989551	243354731	17702471	1156516	157575	268025	1000	2101	492175	155766	250541	0

SEEDLING PRODUCTION SUMMARY - STATE DISTRIBUTION

CROP YEAR	BALD CYPRESS	BICOLOR	SWEET-GUM	TOTAL
1952-53	0	0	0	7402850
1953-54	0	0	0	7650700
1954-55	3800	3334800	0	13141301
1955-56	0	2028800	0	16604075
1956-57	0	552200	0	25176175
1957-58	0	0	0	36368250
1958-59	5725	0	0	62390400
1959-60	0	0	0	51515375
1960-61	0	0	0	19578250
1961-62	0	0	0	15920400
1962-63	0	0	0	18536875
1963-64	0	0	0	14759275
1964-65	0	0	0	11443661
1965-66	1975	0	0	11200600
1966-67	9125	2500	0	13663085
1967-68	9435	0	0	11621166
1068-69	0	0	0	7051687
1969-70	3012	0	0	10372262
1970-71	5225	0	0	5840300
1971-72	3190	0	0	5946940
1972-73	0	0	0	9642850
1973-74	0	0	0	6364450
1974-75	0	0	0	10567775
1975-76	0	0	0	8049830
1976-77	0	0	7750	11919928
1977-78	0	0	0	9243979
1978-79	0	0	0	6658000
1979-80	0	0	0	6154650
1980-81	0	0	0	8572275
1981-82	0	0	0	13857000
1982-83	0	0	0	14443750
1983-84	0	0	0	12164500
1984-85	0	0	0	13721950
1985-86	0	0	0	10411800
1986-87	0	0	0	30550600
1987-88	0	0	0	25863900
1988-89	0	0	0	28274275
1989-90	0	0	0	24852850
TOTALS	41487	5918300	7750	617497989

SEEDLING PRODUCTION SUMMARY - CONTRACT DISTRIBUTION

CROP YEAR	SLASH PINE	LOBLOLLY PINE	LONGLEAF PINE	SHORTLEAF PINE	SPRUCE PINE	POND PINE	VIRGINIA PINE	SWEET-GUM	SYCAMORE	PROGENY TEST	MISC.	TOTAL
1959-60	11912000	2676000	0	0	0	0	88500	0	0	0	0	14676500
1960-61	11239000	2815000	0	0	10000	0	0	0	0	0	967	14064967
1961-62	10357500	3061500	0	0	34000	0	0	125000	0	0	0	13578000
1962-63	3065500	3869500	0	53500	0	0	0	218950	0	0	0	7207450
1963-64	4146900	1449000	205000	83000	0	0	0	410000	0	0	0	6293900
1964-65	2651500	3162500	55500	0	0	49500	0	359500	23000	0	0	6301500
1965-66	3230138	3580500	429500	0	0	0	0	151500	22000	0	0	7413638
1966-67	4732660	5531000	132500	0	0	0	0	107000	84350	0	0	10587510
1967-68	2960600	7481720	0	159875	0	0	0	0	64000	0	0	10666195
1968-69	7174150	10798500	47500	0	0	0	0	0	0	0	0	18020150
1969-70	8343250	9937500	0	0	88500	0	0	0	0	44500	0	18413750
1970-71	7023000	13196000	0	1100	0	0	0	23700	30100	0	0	20273900
1971-72	7673500	10216000	0	7000	0	0	0	0	0	0	0	17896500
1972-73	7236500	8332500	853500	0	20000	0	0	0	0	0	0	16442500
1973-74	7404250	5225500	374200	0	0	0	0	0	0	16900	0	13020850
1974-75	7578500	11204000	52950	0	0	0	0	0	0	39500	0	18874950
1975-76	6203050	10798720	70750	0	0	0	0	85454	130800	0	0	17288774
1976-77	3395919	7757588	0	0	0	0	0	64815	0	0	0	11218322
1977-78	4422000	7940250	1713450	0	0	0	0	77625	137250	0	53600	14344175
1978-79	4930000	8165000	0	0	0	0	0	0	0	0	0	13095000
1979-80	4520750	9527750	800500	0	0	0	0	74550	77775	0	10500	15011825
1980-81	3593000	8060500	807225	0	0	0	0	18585	20775	0	0	12505085
1981-82	5288000	6294750	1398225	0	0	0	0	32250	70625	0	39692	13123542
1982-83	3220250	10993000	881950	0	0	0	0	90125	54250	0	1550	15241125
1983-84	657500	6082750	1569250	0	0	0	0	10375	1200	0	3100	8324175
1984-85	1824250	7837050	1538875	0	0	0	0	41950	0	0	0	11242125
1985-86	968250	5260550	703925	0	0	0	0	16875	264	13000	0	6962864
1986-87	1430000	6388500	0	0	0	0	0	0	0	0	0	7818500
1987-88	316000	3606000	0	0	0	0	0	0	0	0	0	3922000
1988-89	963000	3119500	200000	0	0	0	0	0	0	0	0	4282500
1989-90	1365500	3031000	357350	0	0	0	0	0	26314	0	0	4780164
TOTALS	149831417	207399628	12192150	304475	152500	49500	88500	1908254	742703	113900	109409	372892436