INEXPENSIVE PUBLICATIONS OF INTEREST TO TREE PLANTERS

Production of Polar Timber in Europe, and its Significance and Application in the United States. Ernst J. Schreiner. Agr. Handb. 150, 124 pp. U.S. Dept. Agr., Forest Service

This book gives detailed information of European knowledge and its American application on poplar. It is abundantly illustrated and includes variety selection and breeding; nursery practice; plantation site selection; field planting; disease, insect, and other threats; growth and yield; and utilization of this genus. Localities discussed range from central Sweden to southern Spain and from northern Scotland to Naples, Italy. The book offers much of value to American foresters who work with this and related kinds of trees. It is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. The price is 45cents.

Windbreaks in Conservation Farming. Arthur E. Ferber. Misc. Pub. 759, 22 pp. U.S. Dept. Agr., Soil Conservation Service

This booklet, profusely illustrated, discusses the value and the establishment of windbreaks. Prepared *in* popular style, it is intended *to* aid in persuading landowners to plant and care for windbreaks on their farms and ranches. The technical forester *in* agricultural and rangeland regions will also find much of interest in the booklet. It sets forth reasons for having windbreaks and then describes their placement and design, species composition, subsequent care, protection from pests, and management as the trees grow and threaten to compete destructively with each other. The booklet is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, DA, The price is 25$.

How to Prepare Gulfcoast Sandhills for Planting Pines. Frank W. Woods, John T. Cassady, Harry Rossoll. Occasional Paper 161, 12 pp. U.S. Dept. Agr., Forest Service Southern Forest Experiment Station.

This' booklet demonstrates to the landowner the necessity of clearing certain types of brushland before planting them to pine. It is most effective through its use of powerful cartoon drawings and photographs with a minimum of text. Although applying specifically to a limited section of the United States, the principles set forth apply to any area where brush is a deterrent to reforestation. The booklet is free from the U.S. Forest Service Southern Forest Experiment Station, 2026 St. Charles Ave., New Orleans 13, La.; or State Forester, Florida Forest Service, PA, Box 1200, Tallahassee, Fla.

A PLANTING BAR EXTENSION FOR SETTING LARGE-ROOTED SEEDLINGS

by

H. H. Whisinant and David F. Olson, Jr.[1]

When hardwood seedlings are hand planted, it is almost impossible to properly arrange the large root systems in the slit made by an ordinary 3-inch planting bar. However, there are numerous advantages in bar planting over mattock or shovel planting. Bar planting is faster, cheaper, and a system that laborers like because they are used to it.

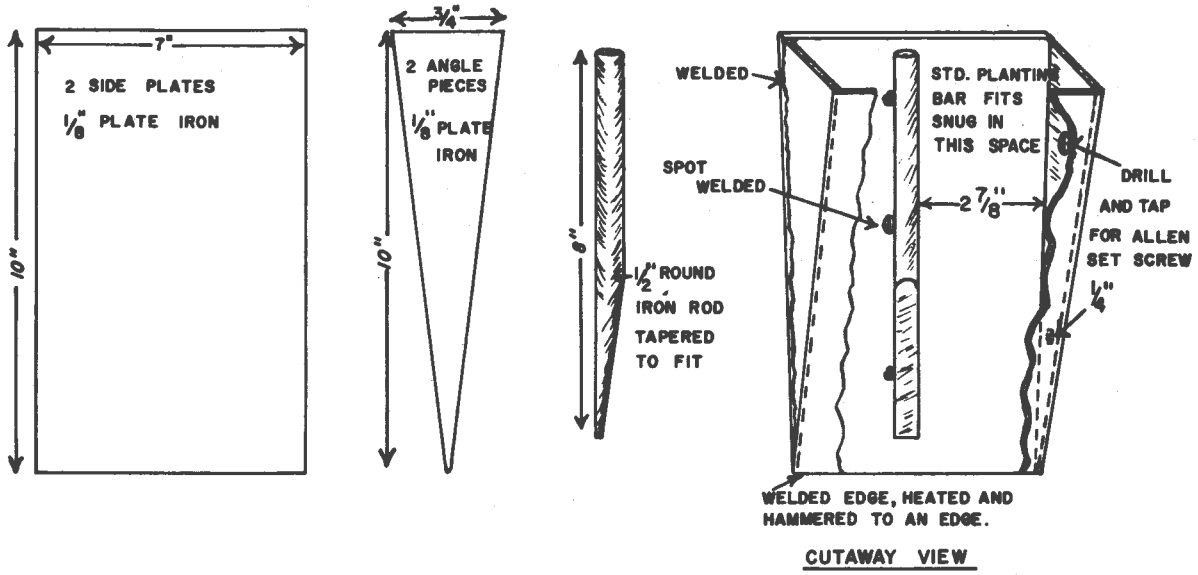
Planters learned that if two or three holes were made side by side most of the large roots could be properly set and a good planting job done. But this made much extra work, because four to six holes, including the closing ones, were needed for each tree.

For these reasons a removable extension. has been designed to increase the width of the standard 3-inch bar to 7 inches. The extension, slipped over the standard bar, is held firmly by set screws. When the bars are needed for planting average seedlings, the extensions are easily removed.

Thus, the main advantage of the extension is to make the standard planting bar a convertible tool. Use of this side-bar tool results in a higher quality planting job, with fewer holes per tree. The extra weight of the extension makes carrying the bar more tiring on a day-long planting job, but the high-quality work and the need for fewer holes more than compensate for the extra pounds.

1/ Respectively, Farm Agent, Duke Power Company, Morgantown, N. C., and Forester, Southeastern Forest Experiment Station, Statesville, N. C.

The design and details for making planting bar extensions are shown in the adjoining figure. This modified tool should be useful to tree planters throughout the country.



The bill of material for making a planting bar extension is given below. The average cost of manufacture in a machine shop in Morganton, N. C., was $4.50 per unit for materials and labor.

Bill of materials for one planting bar extension:

2 pieces-1/8-inch thick plate iron, 7 x 10 inches. 2 pieces-1/8-inch thick plate iron, 3/4 x 10 inches. 1 piece-1/2-inch iron rod, 8 inches long. 2-Allen setscrews, recessed hexagonal head. Welding rod.

THE PORTABLE POST HOLE DIGGER AS A TREE PLANTING MACHINE

Leonard Nunn
Shasta-Trinity National Forest, Redding, Calif.

Many planting sites on the Big Bar District of the Shasta-trinity National Forest in California are too steep and rocky, or too obstructed by debris to permit the use of the continuous slit type of planting machine. Soles for the trees must be dug individually, a laborious and slow task, and one in which it is difficult to obtain truly satisfactory work from many laborers,

In April 1958, a portable power post hole digger (Little Beaver) with a 2-inch auger bit was used to dig such holes. It was found that one man with the machine could keep three or four men busy planting. The machine with a 4-inch auger was again used in December, and the output of the crew contrasted with the output of the same crew using hand methods in November. A total of 30,000 trees has been planted using the machine, increasing production 30 percent per man. This includes time lost by servicing and breakdowns.

Survival counts made of trees planted in April in 2-inch diameter holes show no difference between those planted in machine-made holes and those planted in hand-made holes. Further examinations are scheduled to determine the effect of 4-inch diameter holes.

The power unit and auger bit cost $245, plus additional expense when it was found necessary to have the factory apply a hard surface to the screw, cutting blade, and tip of the auger. With a hard surface, the bit stood up well in drilling 1,500 holes each day, 10 inches deep on rocky sites. Since the power unit can also be used on timber stand improvement work of girdling, thinning, and pruning, its cost as a planting machine is proportionately reduced.

There was no particular safety hazard in using this machine on clear cut areas where the slash had been bunched and burned. However, digging the holes by hand was found to be more efficient among piles of cull logs and where slope prevented bunching of slash.

The forest supervisor believes that this tool has real value on planting sites similar to those on which it has been used successfully on this forest. It would be especially useful on areas with slopes in excess of 10-15 percent, irregularly shaped areas, and tracts too small to justify the cost of hauling in a planting machine and tractor.

CATTLE REPELLENTS FOR PLANTED PINES

Don A. Duncan and Louie B. Whitaker Southern
Forest Experiment Station, Forest Service
U.S. Department of Agriculture
Alexandria, Louisiana

Browsing cattle seriously damage newly planted pines in many parts of the South. Stock often congregate on open areas, the very ones in greatest need of planting. They nip off seedlings during the dormant season, when other green vegetation is scarce. Browsing of the needles generally is not very harmful, but often the bud or stem is eaten, and then the seedlings die or are deformed.

Recognizing that fencing is often impractical, the Alexandria Research Center of the Southern Forest Experiment Station, with the advice of the Fish and Wildlife Service, U.S. Department of the Interior, has been searching for a repellent to apply to seedlings. Four chemicals have been found effective. They are ZAC, a zinc compound; TMTD, a thiram compound;. ZIP, a commercial rabbit and deer repellent containing 30 percent ZAC; and a mixture of copper carbonate and asphalt emulsion.

Here is an account of the 3-year study that produced this information. While slash pine was used in each test, results are probably applicable to all southern pines.

INITIAL TESTS

In 1956 six chemicals that had previously shown promise as deer, rabbit, and rodent repellents in other regions were tested under varying cover conditions and grazing intensities in central Louisiana. Seedlings were sprayed individually immediately after being planted.

The repellent concentrations were lower than normally recommended, and none of them significantly reduced cattle browsing damage. Several, however, showed promise.

The most important finding was that browsing damage was closely related to grazing pressure. On one area with 37 percent forage utilization, only 9 percent of the seedlings were damaged by browsing. But on another area with 85 percent utilization, 61 percent of the pine seedlings were heavily damaged or destroyed.

1957 TESTS

Promising repellents were tested again at higher concentrations in 1957. They included 10 percent-ZAC with a Rhoplex sticker, 10 percent TMTD or thiram with Rhoplex, 5 percent TNB-A (an Aroclor formulation) plus acetone, and 8 percent copper carbonate and asphalt emulsion. In addition, two adhesives, Rhoplex AC-33 and Dow latex 512-R, were tested alone at 10-percent concentration. All chemicals were sprayed on seedlings after planting.

All repellents were equally effective in reducing browsing on an area heavily grazed by both dairy and beef herds (fig. 1). By May, only 36 percent of the untreated seedlings were undamaged whereas 72 percent of the repellent-treated seedlings escaped. Stickers alone demonstrated no repellent properties. TNB-A killed more than 12 percent of the seedlings to which it was applied and was therefore dropped from subsequent trials..

Figure 1.-On the heavily grazed area of the 1957 test, two-thirds of the unprotected seedlings were killed or damaged,

1958 TESTS

In 1958 the following repellent-sticker formulations were compared with an untreated check: 10 percent ZAC with 10 percent Rhoplex AC-33, 10 percent TMTD with 10 percent Rhoplex, 8 percent copper carbonate with 12 percent asphalt emulsion, and 10 percent ZIP with 7 percent Dow latex 512-R. Seedlings were treated in three ways: (1) Sprayed individually after being planted, (2) sprayed in the nursery 2 days before being lifted, and (3) bundled and dipped to within a few inches of the root collar in the repellent solutions just before being planted.

Results, measured in terms of seedlings undamaged from February to June, were as follows:

Chemical and method of application:	Undamaged seedlings (percent)
ZAC	
Field spray	81
Nursery spray	84
Bundle dip	86
TMTD	
Field spray	82
Nursery spray	84
Bundle dip	86
Copper carbonate	
Field spray	89
Nursery spray	62
Bundle dip	81
ZIP	
Field spray	83
Nursery spray	87
Bundle dip	82
No repellent	70

Because cattle grazing was moderate in the 1958 test, 70 percent of the untreated seedlings survived undamaged. Treated seedlings, with the exception of those sprayed with copper carbonate in the nursery, fared considerably better-84 percent were undamaged.

The copper carbonate had a phytotoxic effect on seedlings when they were baled for shipping and storage. In all tests copper carbonate caused some needle burning regardless of how it was applied. Apparently this chemical must be used with caution, and storage of treated seedlings in bales and bundles should be avoided. Properly applied, however, copper carbonate is quite satisfactory, and has the advantage of being cheaper than the other preparations. One gallon of repellent is enough to bundle-dip about 2,500 average-sized slash pine seedlings. On this basis, repellent materials, exclusive of labor, will cost $0.20 per thousand seedlings for copper carbonate, $0.40 for ZAC and ZIP, and $0.55 for TMTD.

MIXING AND APPLYING

The. copper carbonate repellent is prepared by diluting 3 pounds of 12 percent asphalt emulsion (Flintkote C-13-}JPC) in 3 quarts of water, adding 2 pounds of copper carbonate (55 percent metallic copper) and, finally, diluting with 8 more quarts of water. The solution should be agitated frequently, for the copper carbonate tends to settle quickly. A new solution should be made every 2 or 3 days.

Bundle dipping is fast and easy. Seedlings should be immersed to within several inches of the root collars, but the roots themselves should be kept free of the chemical. Treated bundles can be heeled into a wet sawdust bed until the tops dry. Seedlings should be planted the same day that the repellent is applied.

Formulations containing ZAC and TMTD are difficult to prepare, but ready-mixes are now commercially available. If these chemicals are used, seedlings can be treated in the nursery of bundle-dipped.

INUNDATION DAMAGE TO LOBLOLLY PINE SEEDLINGS

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Oxford, Miss.

One of the problems faced by foresters in north Mississippi is that of growing timber on land intermittently flooded. More than 150,000 acres within the Arkabutla, Enid, Grenada, and Sardis reservoirs may be covered with water in time of flood. Additional acreage to be intermittently flooded lies within the impoundment areas of the 650 floodwater retardation structures under construction by the Soil Conservation Service near the headwaters of small creeks. Much of this land is best suited to-growing pine. The key to its management for pine lies in the length of time that reproduction can survive inundation.

The effect of flooding on seedling survival was studied during 1958 at the Tallahatchie Research Center, in Oxford, Miss. In January, 240 1-0 loblolly pine seedlings were individually potted in No. 10 cans. Starting on February 26, groups of 10 seedlings were submerged or flooded to 1 inch above root collar in a pond for periods of 2, 5, 10, and 15 days the object being to simulate dormant-season flooding. Additional seedlings were similarly treated during the growing season, starting on May 13. Check seedlings were kept at the edge of the water for the duration of the related flooding or submergence treatment.

Noonday water temperatures during the winter ranged from 48° to 62° F. and averaged 55° F. Water temperatures in May were from 65° to 81° F, and averaged 79° F. Samples of water taken in February contained 5 p.p.m. of sediment; those in May, 72 p.p.m. of sediment.

Seedlings submerged for 15 days during the winter emerged in fine shape and with good color but had been damaged somewhat by muskrats. Seedlings submerged for 5 or more days during May were covered with slime and frog eggs and so. limber as to be easily broken in handling. When the dormant seedlings were removed from the water in March, they were allowed to stand in full sunlight. Those removed in May,-during the growing season, were placed in-the shade immediately; it seems likely that mortality would have been heavy had this second lot been allowed to stand in the hot sun for a day or two, but additional tests will be needed to prove it.

Three months after they were taken from the water, seedlings inundated in February had survivals ranging from 80 to 100 percent. Survival of seedlings inundated in May varied from 75 to 100 percent. No statistically significant differences in survival can be attributed to season, depth, or duration of flooding, or to any of their interactions.

Thus, loblolly pine seedlings in this study successfully survived 15 days of complete submergence during both dormant and growing seasons. Additional studies have been installed to pinpoint the lethal period of submergence of 1-0 stock and for newly germinated seedlings as well.

NO ADVANTAGE TO CLIPPING BALDCYPRESS PLANTING STOCK

R. N. Krinard 1/
Southern Forest Experiment Station, Forest Service U.S.
Department of Agriculture

Early in 1955, 900 1-year-old seedlings of baldcypress (Taxodium distichum) were planted near Stoneville, Miss. to compare seedling treatments that were intended to reduce transpiration and thereby increase survival during droughts. Seedlings were planted as follows:

A, With root collar at ground line but with the stem clipped 6 inches above the ground.

B. With root collar at ground line but with the top third of the stem removed.

C. With root collar 6 inches below the ground level, and the top third of the stem removed.

D. With root collar at ground line and no top clipping.

The planting site had a heavy clay soil and sloped from a ridge top to a drained slough, the range in elevation being 3 feet. To aid in cultivation, rows at right angles to the slope were placed 10 feet apart, with 6-foot spacing between trees. The area had to be cultivated 3 or 4 times. each year to keep down vines.

Rabbits nipped off about 100 of the newly planted seedlings, but these were replaced and further damage was prevented by spraying the trees with a copper carbonate-asphalt emulsion. A frost defoliated the trees the first spring, but no defoliation from frosts or floods has occurred since.

After four growing seasons, seedlings that had been clipped or planted deep are not significantly superior in either growth or survival to seedlings planted normally. Average heights range from 6.9 feet for the untreated seedlings to 6.5 feet for both treatments involving stem clipping in conjunction with normal planting. The treatment which left only 6 inches of stem also has had the poorest survival--57.6 percent. Best survival was 66.5 percent for the seedlings that bad the top third-of their stem re moved after deep planting. The normally planted seedlings showed the second-best survival, 63.4 percent.

Any treatment that lowers the growing tip is likely to be detrimental if it results in complete submergence of the tip during high water after the tree is in leaf. Though this often kills young bald-cypress, it does not always do so (probably warm water and heavy sediment load are also unfavorable factors.) For example, bald cypress seedlings in an area in north Louisiana were completely submerged for several months after they had leafed out in the spring, yet they put out new leaves in August after the water had subsided.

Stationed at the Delta Research Center, which is maintained by the southern Forest Experiment Station at Stoneville, Miss. in cooperation with the Mississippi Agricultural Experiment Station and the Southern Hardwood Forest Research Group.

ROOT PRUNING BOOSTS LONGLEAF SURVIVAL

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U.S. Department of Agriculture
Alexandria, La.

Root pruning is an effective way of reducing the high proportion of seedling failure common to longleaf pine plantations.

The Alexandria Research Center of the Southern Forest Experiment Station started a series of studies in 1955 to test survival of planted longleaf pine seedlings that had been root-pruned in the nursery beds. The results are decisive. Root pruning does improve seedling survival-most markedly on adverse sites where survival is usually lowest.

The Studies

In one stud , seedlings grown at two bed densities (18 and 27 per square foot were root-pruned in the beds in early November at a depth of 6-7 inches. They were planted on three kinds of sites. First-year survival was compared to that of unpruned stock planted on the same sites.

Another study compared survival of root-pruned (in November) and unpruned stock lifted from the beds with three degrees of care ranging from normal practice to careful hand lifting. The purpose was to determine if pruned stock required special handling.

A third study compared the effects of time and depth of pruning. Stock vas root-pruned in mid-June, mid-August, and mid-November, on each date at two different depths--3-1 inches and 6-7 inches. This study also tested double pruning--shallow (3-4 inches) in June, followed by deep (6-7 inches) in November.

Roots were pruned with a thin, sharp blade mounted behind a tractor and drawn horizontally through the bed at the predetermined depths (fig. 1). As a precaution against mortality from pruning, beds were watered immediately after pruning. All seedlings were lifted in late January or early February, so that the minimum interval

between pruning and lifting was 2 to 3 months. The maximum was 7 months, for the June treatment.

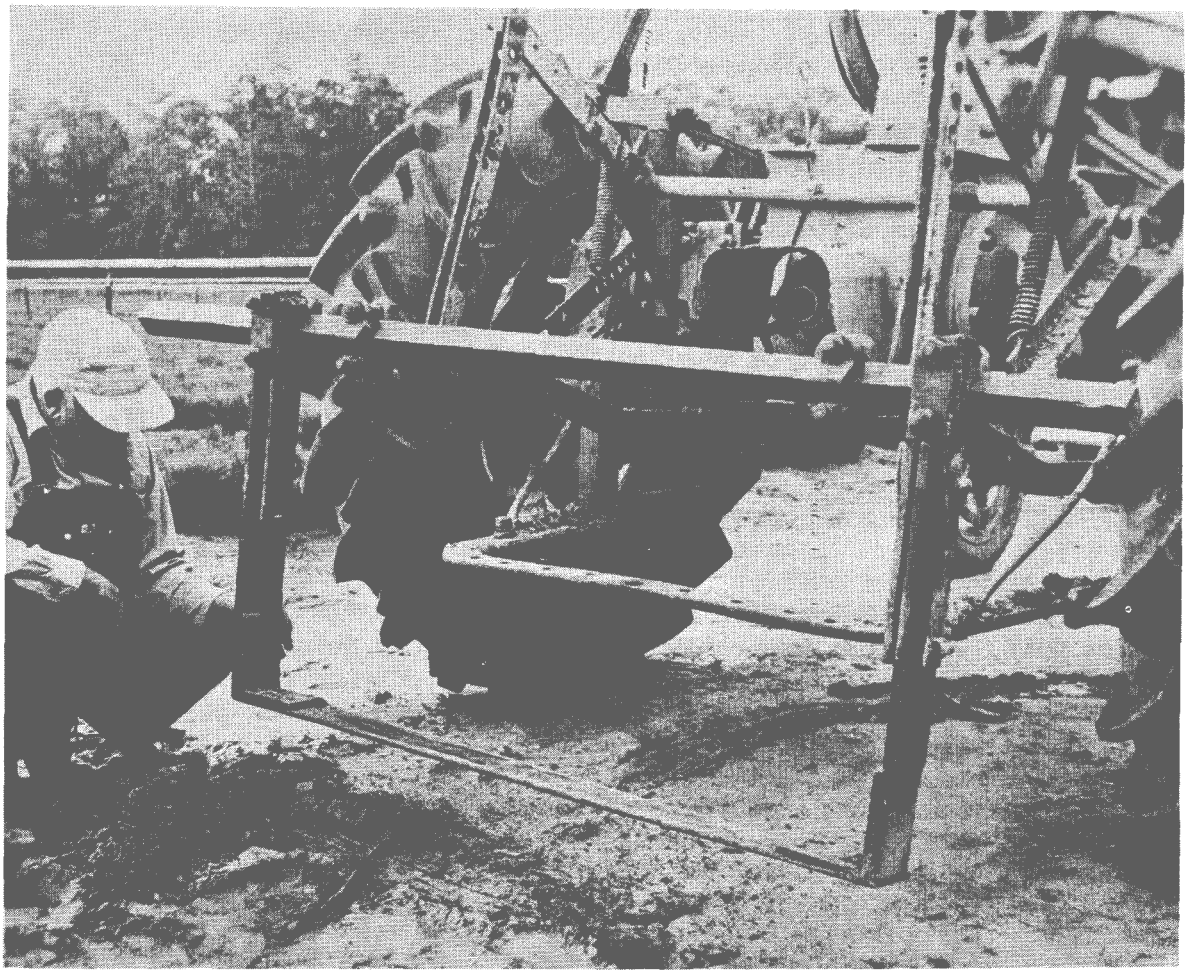

Figure 1.-Root-pruning blade mounted on tractor, ready for use.

All stock was graded, and seedlings with root collar diameters of less than 3/16 inch or needles shorter than 8 inches were culled. Unpruned seedlings with roots less than 5 inches long were also discarded. Regardless of prior pruning, seedling roots too long to plant conveniently were clipped. Seedlings were stored from 1 to 3 weeks in Forest Service bales before planting. Each treatment was replicated in field outplantings as well as in the nursery.

Effect on Survival

Root pruning in November benefited stock grown at both bed densities. The improvement was most pronounced in seedlings outplanted on a poorly drained site, where the difference in survival between pruned and unpruned stock was 17 percent (46 vs 29 percent). The survival difference between the two bed densities was not significant, but pruned and unpruned stock from low-density beds survived equally well when planted on good sites. That is, root pruning was most effective in high-density beds or when stock was planted on adverse sites.

The second study demonstrated that root-pruned longleaf seedlings require no special care in lifting to preserve their higher survival potential. Lifting methods that give good survival of normal nursery stock are adequate for root-pruned seedlings. Survival of pruned stock was 42 percent when carefully lifted, as compared to 43 percent when undercut with a lifting blade and pulled in the normal manner. Only 28 percent of the unpruned stock lived through the first year. The low survivals of all stock were probably due to the draughty site selected to obtain a rigorous test.

In the third study, all combinations of pruning depth and time boosted first-year survival of longleaf pine seedlings substantially and significantly, by comparison with unpruned stock, as follows:

Date and kind of pruning:	Survival (percent)
June	
Shallow	56
Deep	62
August	
Shallow	74
Deep	69
November	
Shallow	66
Deep	68
Double pruning (shallow in June, deep in November)	77
No pruning	27

Double pruning gave significantly higher survival than single, shallow pruning in June, but otherwise differences between the treatments were unimportant and non significant. First year survival of unpruned longleaf seedlings averaged 27 percent, while survival of root-pruned stock ranged from 56 to 77 percent. Shallow-pruned stock averaged 65 percent survival for the three planting times; deep pruned stock, 66 percent. For both depths of pruning combined, average first-year survivals of seedlings pruned in June, August, and November were 59, 71, and 67 percent, respectively.

Effect on Stock

Pruning in the nursery bed affected the root systems in different ways, depending on when the pruning was done. Seedlings pruned in June or August developed new taproots--often two or more-near the point where the original taproot was severed. These new roots extended well below lifting depth by the end of the season. November-pruned stock did not produce new taproots, but the wound area callused and, on many of the seedlings, white budlike primordia formed near the cut.

Lateral root development was not measured, but plantable seedlings from pruned and unpruned beds appeared to have about equal numbers of secondary roots above the pruning zone.

None of the pruning treatments caused mortality of seedlings in the nursery bed, Moreover, pruning had little influence on the diameter of the root collar or the length of needles of plantable seedlings, regardless of when it was done or how severely the root systems were reduced.

Discussion

These studies have demonstrated that root pruning in the nursery bed improves survival of longleaf pine seedlings. They have also shown that, within reasonable limits, time and depth of pruning are not critical to the success of the treatment. Some lapse of time between pruning and lifting is probably necessary; the minimum period was not determined, but 2 to 3 months are probably sufficient.

Root-pruned stock need not be grown at any particular bed density, nor lifted with other than the standard techniques, to retain the over-all advantage to survival.

Survival is only one of the factors in deciding when and how to root-prune. Thought must also be given to the difficulty and expense of the treatment 'in each particular nursery, as well as the ease or difficulty of planting pruned stock. When all factors are considered, late-season pruning at a depth of about 7 inches has several advantages. Little or no regrowth of roots occurs, and hence seedlings require no clipping of roots on the grading table or at the planting site. Root systems of seedlings pruned in early or middle summer are somewhat similar to those of unpruned stock,

and require clipping before planting. Shallow pruning late in the season provides the same advantage, but is not recommended because short-rooted longleaf seedlings are difficult to plant by machine.

With proper equipment, root pruning is relatively simple and easy. Tractors used for lifting are usually powerful enough to draw the blade smoothly and at a uniform speed. The tractor should be equipped with a double-acting hydraulic cylinder or other device for maintaining accurate depth settings. Positive control of both upward and downward movement of the blade is essential. The blade should be rigid, yet thin enough to pass through the soil with a minimum of disturbance. It should be mounted so that it is truly horizontal at pruning depth, and must be sharp enough to cut the roots cleanly. Blades may be mounted at right angles or obliquely to the long aids of the bed.

SITE TREATMENTS HAVE LITTLE EFFECT DURING WET SEASON IN TEXAS

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Benefits from preplanting site preparation and later cultivation were not significant in a Texas test that encountered a better than average growing season. Survival and growth were relatively good, even on untreated check areas.

In east Texas (the western edge of the southern pine belt). thousands of acres of abandoned farmlands are planted to loblolly pine each year. Droughts of more than 30 days are frequent in normal growing seasons
and poor plantation survival has been the rule rather than the exception. In exploratory small-plot tests, removal of competing weeds had materially improved seedling survival during drought periods.

To verify these small-plot findings under field conditions, the present study was started in February 1957 at the Nacogdoches Research Center of the U.S. Forest Service Southern Forest Experiment Station. The site was a field uncultivated for the previous 10 years. Unfortunately for the test, rainfall in east Texas in 1957 was ample (63 inches as compared with the normal of 47 inches) and well distributed (growing season soil-moisture levels never approached wilting point), so that evaluation of treatment benefits under the usual severe stresses was impossible. However, the findings are of interest.

Two randomized block split-plot designs were employed, with 3 randomized blocks on a burned area, and 3 randomized blocks on an unburned area. Hence, no valid statistical comparison can be made between burned and unburned areas. Principal soils were Kalwia sandy loam and Cahaba fine sandy loam. The major preplanting treatments were as follows:

1. Furrowing with a middlebuster plow.
2. No treatment.
3. Tandem disking.
4. Flatbreaking--diskplow followed by tandem disks.

Loblolly pine 1-0 seedlings were planted in February 1957. Each major preplanting treatment was then split at random into 2 postplanting treatments:

1. Cultivation twice during the growing season, on May 19 and August 7, 1957, with regular farm tractor and cultivator.
2. Noncultivation.

Maintained at Nacogdoches, Texas, in cooperation with Stephen F. Austin State College.

First-year survival and height data for loblolly pines planted on burned and unburned areas in February 1957 were recorded in January 1958; the means are summarized as follows:

	Survival		Height	
	Burned (percent)	Unburned (percent)	Burned (feet)	Unburned (feet)
Site preparation:				
Furrowing - - - 52	69		1.1	1.2
Tandem disking -56	68		1.3	1.3
Flatbreaking - -78	75		1.4	1.3
No treatment - -52	69		1.2	1.4

The apparent superiority of flatbreaking over all other treatments could not be statistically demonstrated on either burned or unburned areas in either survival or height growth. The 22-percent survival advantage of flatbreaking on the burned area however, suggests the possibility of much greater benefit in drier years.

Growing-season cultivation in this test had very little effect on average first year survival (reduced from 66 percent to 63 percent) and no effect on average first-year height growth.

Although no valid statistical inference as to effects of burning could be drawn, it was found that site preparation took twice as long on the unburned area as on the turned area.

The main conclusions to be drawn from this study are:

1. Cultivation of loblolly pine plantations was <u>not</u> notably beneficial in a <u>wet</u> year.
2. Flatbreaking prior to planting loblolly was slightly beneficial in a wet year (expecially in conjunction with burning), but was not worth the cost; flatbreaking in dry years seems promising but has yet to be tested.
3. Burning greatly reduced the cost of all methods or pre planting site preparation tested in bushy old fields.
4. Furrowing was the least helpful treatment tested; in a wet year, it did not improve survival and tended to reduce height growth.

THE EFFECTS ON FIELD SURVIVAL OF LATE NITROGEN FERTILIZATION of LOBLOLLY PINE AND SLASH PINE IN THE NURSERY SEEDBED

A. R. Gilmore, E. S. Kyle, Jr., and Jack T. May [1]

Ursio [1] reported in 1954 that late seedbed fertilization in the nursery had a detrimental effect on loblolly pine seedling survival. A similar study at Auburn on loblolly and slash pines conducted by the Agricultural experiment Station during the 1955-56 planting season failed to support the results obtained in the earlier study.

Ammonium nitrate was applied to normal 1-0 seedlings in the nursery beds on October 31, 1955. Fertilizer was applied at the rates of 0, 100, 200, and 400 pounds of nitrogen per acre. Four replications of 30 representative plantable seedlings from each treatment area were field planted at three different times during the lifting season. The first group was lifted on November 24, 1955, and the other two groups on January 5 and February 7, 1956. Third-year field survival of loblolly pine seedlings was as follows:

The low survival percentages of both loblolly and slash pine for the January

Nitrogen applied per acre (pounds):	December 1955 (percent)	January 1956 (percent)	February 1956 (percent)	Average (percent)
0	93	34	65	64
100	89	35	72	65
200	93	41	74	69
400	83	36	69	63
Average	90	37	70	--

Third-year field survival of the slash pine seedlings was somewhat lower, as follows:

Nitrogen applied per acre (pounds):	December 1955 (percent)	January 1956 (percent)	February 1956 (percent)	Average (percent)
0	50	27	35	37
100	58	31	47	45
200	51	35	48	45
400	40	35	37	37
Average	50	32	47	--

planting can be attributed to poor soil moisture. The ground was quite dry before and after the January plantings because of an extended drought that encompassed this period. Some rain fell immediately before and after the February plantings.

1 A. A. Gilmore, Dixon Springs Expt. Station, Univ. of' Illinois, E. S. Lyle, Jr., Agr. Expt. Station, Alabama Polytechnic Institute, Jack T. May, School of Forestry, University of Georgia.

With both loblolly and slash the extreme fertilizer treatments seemed to suppress survival, but it is questionable that this is a real difference. Because of the variability within treatments it is doubtful that any valid conclusions can be drawn from these findings. No effects of late nitrogen fertilization on seedling survival were demonstrated.

PAYING DEBT

In the fall of 1958, the editor of Prairie Farmer, Paul C. Johnson, wrote an editorial entitled, "If You Would Live Long--Plant a Tree l" In it he told of an old man planting a tree, who was jeered by a passing youngster: "That tree will never do you any good, gramps." "I have enjoyed trees planted by others all my life," replied the old man, "I am merely paying a debt."

INVITATION

We would appreciate receiving recommendations regarding subjects which should be covered in future issues of Tree Planters' Notes. We also need your help in providing articles on new methods or techniques in doing the many jobs relating to reforestation. Articles will be welcome in any form - letter, rough draft, or final. Photographs which will help create interest or a better understanding of the article should be enclosed if available. Please send your contributions to: Chief, Forest Service, U. S. Department of Agriculture, Washington 25, D. C.

SUBSCRIPTIONS AND MAILING LIST

Tree Planters' Notes will be sent upon request, without charge, to persons and organizations doing reforestation work, libraries, forest schools, and similar educational institutions interested in reforestation. The address is given above.