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NURSERY EQUIPMENT

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CAUTION NEEDED IN FALL APPLICATIONS OF NITROGEN TO NURSERY STOCK

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Late-season fertilization of nursery beds with heavy applications of nitrogen is sometimes suggested as a way to improve field survival of southern pine seedlings. A study conducted in 1956 and 1957 by the Alexandria Research Center of the Southern Forest Experiment Station showed that the practice is not an easy, sure cure. While it may be helpful in some circumstances, it must be used with extreme caution, for it can also depress survival.

Related Work

Commercial fertilizers are usually applied before the beds are sown or added as topdressings while the seedlings are growing rapidly. The two methods are often combined to ensure an adequate supply of nutrients through the season.

Early results¹ of studies at North Carolina State College indicated that fertilization of normal and yellow longleaf and loblolly seedlings with ammonium nitrate at a rate of 160 pounds of actual nitrogen per acre at least 3, and preferably 5, weeks before lifting would improve survival of the outplanted seedlings.

An exploratory study by the Alexandria Research Center, in which normal loblolly and slash pine seedlings were topdressed with 160 and 200 pounds of nitrogen per acre 5 weeks before lifting, failed to confirm these results: fertilized and unfertilized seedlings survived equally well.

Ursic² depressed survival of normal loblolly seedlings by topdressing the nursery beds with 160 pounds of nitrogen plus 200 pounds of K²O per acre 1 month before lifting.

Study Methods

The study reported here was conducted in the Northwest and Southwest Nurseries of the Louisiana Forestry Commission. Beds were seeded to longleaf, loblolly, and slash pine on March 28, 29, and 30, 1956. In May, after germination was complete, longleaf pine beds were thinned to 25 to 30 seedlings per square foot, and loblolly and slash pine beds to 35 to 40 seedlings. Otherwise, the seedlings received normal nursery fertilization and care until topdressings were applied in mid-December.

Before the December fertilization, the beds of each species in each nursery were divided into nine 9-foot segments, with buffer strips between. Treatments included the application of ammonium nitrate at the rates of 150 and 300 pounds of actual nitrogen per acre and an unfertilized check. The fertilizers were divided into three equal parts and applied during a 2-week period to prevent burning of the seedlings. Each treatment was replicated 3 times in a randomized block design.

After treatment, the seedlings remained in the beds for about 8 weeks before they were lifted and planted in February 1957. Stock from the 3 plots of each fertilizer treatment was composited and representative samples of morphological grade 1 and 2 seedlings,³ combined, were accepted for planting.

Six randomized blocks were established on each of two sites. Each block contained all possible combinations of three species, two nurseries, and three fertilizer treatments. Plots were rows of 25 trees.

¹ Unpublished data.

² Ursic, S. J. Late winter prelifting fertilization of loblolly seedbeds. U.S. Forest Serv. Tree Planters' Notes 26, pp. 11-13. 1956.

³ Wakeley, P. C. Planting the southern pines. U.S. Dept. Agr., Agr. Monog. 18, p. 103. 1954.

Results

The topdressing induced growth of seedlings in the nursery beds during the mild winter of 1956-57, and by lifting time many of the buds had burst. Stems had not elongated, however, and topdressing did not affect the size of plantable seedlings (table 1). Unfertilized trees remained dormant.

Survival of longleaf and loblolly seedlings from the Southwest Nursery was substantially depressed by fertilization, and the highest rate reduced field survival the most (table 2). Survival of slash pine seedlings grown in adjacent beds was not significantly affected.

All stock from the Northwest Nursery benefited from topdressing, but the species differed in the amount of additional nitrogen needed to improve survival. In some instances, the addition of more or less than the optimum amount produced lower survival than no fertilization. Loblolly seedlings were not affected by the addition of 150 pounds

TABLE 1.--Average size of planting stock at lifting time

Nursery	Actual N applied per acre as topdressing	Loblolly		Longleaf		Slash	
		Root collar diameter	Height ¹	Root collar diameter	Height ¹	Root collar diameter	Height ¹
	<i>Pounds</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>
Northwest-----	0	5/32	9	10/32	12	6/32	6
	150	6/32	9	10/32	11	5/32	7
	300	6/32	8	11/32	12	7/32	6
Southwest-----	0	5/32	9	10/32	13	5/32	8
	150	5/32	9	12/32	13	5/32	8
	300	5/32	9	11/32	14	5/32	8

¹ Height from root collar to base of terminal bud or tuft of needles for loblolly and slash pine. Length of needles for longleaf pine.

TABLE 2.—How late-season topdressing with ammonium nitrate affected first-year survival of pine seedlings from two Louisiana nurseries

Nursery	Actual N applied per acre	First-year survival of—		
		Longleaf	Loblolly	Slash
	<i>Pounds</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Northwest-----	0	88	74	88
	150	95	74	85
	300	86	88	94
	Average	90	79	89
Southwest-----	0	36	79	56
	150	32	69	58
	300	20	60	63
	Average	29	69	59

of nitrogen per acre, but application of 300 pounds of nitrogen survival to 88 percent--as contrasted with 74 percent for unfertilized stock.

Slash pine also responded to fertilization at the highest rate, but the increase in survival was smaller. When slash was fertilized at a rate of 150 pounds of nitrogen per acre, survival was slightly lower than that of untreated stock. With longleaf pine, seedlings topdressed at the 150-pound rate survived best.

Seedlings from the Northwest Nursery survived better than those from the Southwest Nursery in almost all instances. These seedlings of apparently superior vigor were improved by winter topdressing with nitrogen. In contrast, less vigorous seedlings from the Southwest Nursery were harmed or unaffected by fertilization.

Conclusions

This study further demonstrates the folly of prescribing fertilization without adequate knowledge of the needs of the plant at the particular time the fertilizer is to be available, and the extent to which these needs will be supplied by nutrients already in the soil.

More specifically, in tests at widely separated nurseries at different times, fall applications of nitrogen to beds of normal seedlings have improved survival, produced no response, and decreased survival. Both increases and decreases in survival associated with the treatments have been substantial.

It may be concluded that post-growing-season fertilization with nitrogen is useful when nutritional levels indicate it is needed, but that wholesale applications may be more damaging than the condition they are supposed to cure. Therefore, the practice should be employed only where there is a demonstrated need.

As knowledge of seedling nutrition increases, it may be possible to analyze soil samples from compartments or even individual beds, and thus determine where late-season fertilization is needed. Meanwhile, small empirical tests in individual nurseries should help nurserymen determine areas where the practice is useful.

Nursery Diseases of Southern Pines. A. A. Foster. Forest Pest Leaflet 32, Forest Service, U.S. Dept. Agr.

Newly published, this 7-page leaflet describes the symptoms and treatments of such southern pine nursery stock afflictions as damping-off, black root rot, nematode injury, fusiform rust, brown spot, and chlorosis. The leaflet is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. Price--5^.

Weeds of the North Central States. North Central Regional Technical Committee. Cir. 718, Univ, of Illinois, Agr. Expt. Sta., Urbana, Ill.

This book of 239 pages with 192 illustrations presents detailed drawings, descriptions, distribution maps, and keys for more than 200 weeds. Wherever possible common terms have been substituted for technical ones so that people with a minimum of botanical knowledge can identify almost every weed they are likely to find. Published by the Agricultural Experiment Station, University of Illinois, Urbana, Ill. Price--\$ 1.00.

Weeds of the Northeast: Aids to their Identification by Basal Leaf Characteristics. C. E. Phillips. Field Manual No. 1, Univ, of Delaware, Agr. Expt. Sta., Newark, Del.

This book describes and illustrates 346 weeds occurring in the Northeastern States. The feature used for the identifying characteristic is the weed's basal leaf, pictured by a simple line drawing and also described in nontechnical terms, insofar as that is possible. Published by the Agricultural Experiment Station, University of Delaware, Newark, Del. Price--\$.65.

The two weed books should be useful to nurserymen and foresters for the names of the weeds they must fight.

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.

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