

FERTILIZER TABLETS FAIL TO STIMULATE HEIGHT GROWTH

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Hardwood experimental plantations have been successfully established in the East Texas pine-hardwood area by the use of intensive cultural practices. Complete initial clearing of the site and cross-disking several times per year for the first 2 to 3 years of plantation establishment have been a standard practice. Excellent results were obtained from 1/4- to 3/8-inch diameter seedlings of a local seed source that were planted in 1970 on two East Texas Neches River bottom sites that were properly prepared and maintained. After 1 year, the average total height of five hardwood species was 2.5 feet. The same species with the same cultural practice grew 30 percent less on two East Texas flatwoods sites.

A soil analysis for each site (table 1) indicated that the soil nutrient levels were considerably lower at the flatwoods sites. The Neches River bottom plantations had twice as much nitrogen (N), 11 times more phosphorus (P), and 3 1/3 times more potassium (K) than the flatwoods sites. These low nutrient levels indicated that tree growth might be benefited by an application of fertilizer. A broadcast application of fertilizer to these plantations in an experimental manner would have been difficult so 18-8-3 slow release tablets were used.

On prepared East Texas sites, a single fertilizer tablet per tree did not increase height growth of five hardwood species and slash pine

Table 1.—Soil test results from 0 to 6 inches for the four test sites

	Acidity	N	P	K
	(pH)	(lbs/acre)	(lbs/acre)	(lbs/acre)
Neches River bottom:				
Cherokee County	5.0	17	5	160
Trinity County	6.0	13	25	240
Mean	5.5	15	15	200
Flatwoods:				
Montgomery County	6.5	5	2	58
Jasper County	5.5	9	.8	62
Mean	6.0	7	1.4	60

Methods

A split plot was used in the field design. Whole plots were studied according to the presence or absence of a fertilizer tablet. Subplots within the whole plots were planted with species in 12-tree rectangular blocks. Spacing was 8 by 10 feet at all four locations. There were 2,016 trees involved in the entire experiment or 336 trees per species. Half of the trees of each of the six species at each location were fertilized. Four replications were used at the flatwoods plantations and three at the river bottom plantations. The tablets were applied in the spring prior to the initiation of the second year's growth. One tablet was placed in a slit made by a dibble bar at a distance no greater than 4 inches from the trunk of the trees being

fertilized. The 9 gram tablets had an 18-8-3 analysis with 1 percent magnesium (Mg) added and an additional 3 percent insoluble potash. At a spacing of 8 by 10 feet, use of one tablet per tree amounts to per acre applications of 1.94 lbs of N, .86 lbs of P, .32 lbs of K and .11 lbs of Mg. Admittedly, these are not very heavy applications. Theoretically, however, these levels can be effective in increasing growth because the localized root zone placement of the tablet prevents competing vegetation from obtaining the nutrients.

Height measurements were made at the end of the first, second, and third growing seasons. The plot means for height for the 3 years and 3-year survival were subjected to a fixed effects analysis of variance. An

Table 2.—Mean values for 3-year height at the four test sites

	Sycamore	Sweetgum	Green Ash	Water Oak	Cherrybark Oak	Slash Pine	Treatment Means
<i>Neches River bottom</i>							
Cherokee County							
Fertilized	11.7	7.8	5.4	5.7	4.2	9.2	7.3
Check	11.8	9.3	4.9	5.5	4.2	10.3	7.7
Trinity County							
Fertilized	16.7	6.3	6.6	4.3	2.3	9.7	7.6
Check	16.1	7.2	7.0	3.9	2.4	9.2	7.6
Means for river bottom							
Fertilized	14.2	7.0	6.0	5.0	3.2	9.4	7.5
Check	14.0	8.2	6.0	4.7	3.3	9.8	7.7
<i>Flatwoods</i>							
Montgomery County							
Fertilized	9.5	4.0	4.8	3.6	2.8	6.0	5.1
Check	10.1	4.2	4.2	3.8	2.3	6.0	5.1
Jasper County							
Fertilized	7.6	5.0	4.6	4.1	3.0	4.5	4.8
Check	7.3	5.0	5.0	3.4	1.8	4.0	4.4
Means for flatwoods							
Fertilized	8.6	4.5	4.7	3.9	2.9	5.2	5.0
Check	8.7	4.6	4.6	3.6	2.1	5.0	4.8
Species means							
Fertilized	11.4	5.4	5.8	4.4	3.0	7.3	6.2
Check	11.4	5.3	6.4	4.2	2.7	7.4	6.2

analysis of the 1-year height data before the start of the fertilization experiment indicated no statistically significant

differences between the plots that were later fertilized and the plots that were to remain unfertilized checks.

Results

The overall mean height across fertilized and check plots for the four locations for slash pine and the five hardwood species

Table 3.—Mean values for 3-year percent survival at the four test sites

	Sycamore	Sweetgum	Green Ash	Water Oak	Cherrybark Oak	Slash Pine	Treatment Means
<i>Neches River bottom</i>							
Cherokee County							
Fertilized	86	64	86	86	67	86	79
Check	86	86	100	86	56	81	83
Trinity County							
Fertilized	94	86	94	58	58	94	81
Check	97	94	92	78	72	86	87
<i>Flatwoods</i>							
Montgomery County							
Fertilized	96	75	97	73	56	77	79
Check	100	65	90	85	65	77	80
Jasper County							
Fertilized	100	88	96	83	58	50	79
Check	98	98	100	75	48	42	77
Species means							
Fertilized	94	78	93	75	60	77	80
Check	95	86	96	81	60	72	82

(sycamore, sweetgum, green ash, water oak, and cherrybark oak) was 6.2 feet (table 2). The overall mean for the fertilized plots was the same as for the check plots. The means for the fertilizer plots were .2 feet larger than the check plots at the two flatwoods plantations. The reverse was true for the river bottom plantations. An analysis of variance at all four locations for 2- and 3-year height indicated no difference between

the check plots and the fertilized plots. Height differences among species were significant at the .01 level at all four locations (average standard error for 3-year height is .4 feet). The interaction of species height with fertilizer was insignificant except at 3 years at the Cherokee County plantation. Examination of the means for height at the Cherokee plantation indicated that

sycamore, sweetgum, and slash pine did slightly better on the check plots, whereas green ash and water oak did better when fertilized. The other plantations also have a trend for different responses to the fertilizer tablets. Examination of the means for each species at each location does indicate a minor trend for

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the fertilizer to have benefited green ash, water oak, and cherrybark oak. Sweetgum growth may have been retarded by the fertilizer tablets. These differences are not statistically significant and may only be sampling error.

Survival at 3 years was not affected by the application of the fertilizer tablets. There were significant species differences in survival at all four locations (table 3) just as for 2- and 3-year height. The average standard error was 8 percent.

Summary and Conclusions

Application of one 9-gram 18-8-3 tablet per tree to five hardwood species and slash pine after their first year in the field could not be shown to have any effect on height at 2 or 3 years or 3-year survival. A similar study with sycamore and yellow-poplar (1) in Nacogdoches County, Tex.,

also showed that fertilization with one tablet per tree in the spring after plantation establishment did not benefit height growth. It appears that greater amounts of fertilizer are needed than can be supplied by one 18-8-3 tablet if growth is to be stimulated in plantations where weed control is practiced. Application rates of more than one tablet per tree need to be investigated, taking into account the costs involved. It may be more economical to surface broadcast fertilizer when the plantations are disked for the first time than to use slow release tablets. Future research should also try to determine if the tablets depress the growth of certain species.

Literature Cited

1. Frye, Charles Ray.
1970. Effect of Cultivation and Fertilization on Survival and Height Growth of Sycamore and Yellow-poplar Seedlings. Master's thesis, Stephen F. Austin St. Univ. 48 p.

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