

EFFECTS OF A FERTILIZER SOLUTION AND GIBBERELIC ACID ON LOBLOLLY PINE SEEDLINGS

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Aqueous solutions containing nutrients are applied at time of transplanting certain field crops. Many of the solutions produce an initially favorable environment in the root zone by providing additional moisture and nutrients. Similar applications in field transplanting of pine seedlings may increase survival, as well as stimulate growth.

Austin and Strand⁴ summarize trials of fertilizer applications on planted seedlings, and investigated the use of slowly soluble fertilizers in forest plantings in the Pacific Northwest. Results were extremely variable and were influenced by kind of fertilization, site conditions, species, and climatic conditions.

Westing,⁵ Bilan and Kemp,⁶ Kraus and Johansen,⁷ and Woods⁸ reported the effects of gibberellic acid on survival and growth of conifers. Westing, Kraus and Johansen, and Woods found that gibberellin, in general, failed to stimulate root or stem growth. Bilan and Kemp reported that shoot-treated seedlings responded only to the highest concentrations of gibberellin.

In this study, nitrogen and phosphorus, two nutrients considered in short supply, were applied in a water soluble form. Gibberellic acid was included as a root dip.

Procedure

The study consisted of four replications of fertilized and nonfertilized plots. Gibberellic and nongibberellic acid treatments were superimposed on the fertilizer treatment. A total of 800 loblolly pine seedlings (*Pinus taeda* L.), obtained from the Morgan Nursery, Macon, Ga., were planted on March 3, 1959.

The gibberellic acid treatment consisted of placing the roots in 1,000 p.p.m. gibberellic acid solution for 24 hours prior to planting. The seedlings were planted with a dibble on a south slope in the middle Piedmont of Georgia. The soil is a severely eroded Cecil sandy clay loam on a gently sloping site. The area had been cultivated for 10 to 20 years. Ground cover consisted of broom sedge, briars, *Crataegus* spp., and scattered shortleaf pine. All woody vegetation was cut prior to planting. On fertilized plots, 1 pint of mono ammonium phosphate (NH₄H₂PO₄) solution (396 p.p.m. N, 758 p.p.m. P) was poured into each slit at time of planting.

Survival counts were made 10 weeks after planting and at the end of the first and second growing season. Stem heights were measured after one growing season.

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4 Austin, R. C., and Strand, R. F. The use of slowly soluble fertilizers in forest planting in the Pacific Northwest. *Jour. Forestry* 58:619-627. 1960.

5 Westing, Arthur H. Effect of gibberellin on conifers: generally negative. *Jour. Forestry* 57: 120-122. 1959.

6 Bilan, M. Victor. and Kemp, Arne E. Effect of gibberellin on height growth of one year old seedlings of loblolly pine. *Jour. Forestry* 58: 35-37. 1960.

7 Kraus, J. F., and Johansen, R. W. A test of gibberellic acid on long leaf pine. *Jour. Forestry* 58: 194. 1960.

8 Woods, F. W. Gibberellic acid fails to stimulate growth of long leaf pine seedlings. U.S. Forest Serv. South. Forest Expt. Sta. Res. 1 (1): 17. 1960.

Results

Gibberellic acid treatment of the 1-0 seedlings did not favorably influence survival; in fact, results indicate (table 1) that it was detrimental to survival in succeeding years. Survival and height growth of nontreated seedlings were higher than gibberellin treated seedlings for both the fertilized and nonfertilized plots. The fertilization of seedlings at the time of planting did not favorably influence survival or growth of seedlings (table 1). The data were not analyzed statistically since the effects of gibberellic acid treatment and fertilization were not positive.

TABLE 1.--Survival and growth of loblolly pine seedlings (mean)¹ treated with gibberellic acid

Date	Survival			
	Fertilized plots treated		Nonfertilized plots untreated	
	Seedlings treated	Seedlings untreated	Seedlings treated	Seedlings untreated
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
<i>1959:</i>				
<i>May 5</i>	97.5 +	98.0 +	96.0 +	98.5 +
October 1.....	78.5 +	83.5 +	77.5 +	88.0 +
 <i>1960:</i>				
November 1.....	76.5 +	82.5 +	75.5 +	86.0 +
	Stemheights			
	<i>Feet</i>	<i>Feet</i>	<i>Feet</i>	<i>Feet</i>
April 5	1.70 +	1.88 +	1.69 +	1.79 +

¹ Seedlings planted March 3, 1959.

Discussion and Conclusion

At the time of planting and thereafter for several weeks, the weather was optimum for transplanting as is indicated by the very high survival rates. Since optimum environmental conditions may account for the absence of differences, further studies are indicated. There may be many instances where a starter solution would improve survival and increase early growth.