



RESEARCH NOTE 97-2

A Growth Regulator Study at a Loblolly Pine Nursery

By

David B. South and Al Bradley

INTRODUCTION

Growth regulators have been tested in forest tree nurseries for over 50 years. In early studies, it was believed that root growth could be improved by applying IBA (Plank 1939; Maki and Marshall 1945). More recently, growth regulators have been tested to slow height growth (Blake and South 1991).

Currently, a new product (Cytoplex®) contains a mixture of kinetin, indole-3-acetic acid, gibberellic acid (G_3) and a small amount of micronutrients. In addition, a new biostimulant (SP-11c) is said to increase plant growth by affecting the plant's growth regulators. Nu-Film-17® is an adjuvant that is made up of a terpenic polymer (poly-l-p-menthene) similar to Vapor-guard®. Sol-U-Gro® is a soluble fertilizer that contains 12% nitrogen, 48% P_2O_5 , and 8% K_2O . Sol-U-Gro also contains a small amount of boron, copper, iron, manganese molybdenum and zinc.

The objective of this study was to test the effect of a mix of compounds on morphology of young loblolly pine seedlings in a bare-root nursery. The null hypothesis is stated as follows: seedling morphology of loblolly pine is not affected by a dual application of either Cytoplex or SP-11c (in combination with a sticker-spreader and nutrients).

METHODOLOGY

The study was conducted at the Kimberly-Clark Nursery at Verbena, Alabama. Seed were sown on April 20, 1996 and the first treatment was applied on May 14, (3.5 weeks after sowing). The growth regulating compounds (Table 1) were applied to a single bed with a CO_2 powered

sprayer (calibrated for 32 gallons/acre). The length of each plot was 10 feet and the width was 4 feet (one bed wide). There were four replications and the study design was a randomized complete block. A second application was made to the same plots on July 3, 1996.

The plots were sampled on July 18 (prior the first top-pruning on July 19). A second sample was collected on November 11, 1996. The samples were measured for root-collar diameter and height and were then oven dried to a constant weight. Data were analyzed using an analysis of variance (ANOVA) procedure.

RESULTS and DISCUSSION

July Morphology

At the first sample, seedlings were approximately 11 weeks old (9 weeks since the first treatment). There was no significant effect of any treatment on height, root weight, shoot weight or seedling density. However, treatments did affect diameter growth (Table 2). The Cytoplex plus Nu-Film-17 treatment was smaller than the control by less than 0.1 mm (Table 3). No visible difference among treatments was noticeable. However, seedlings in replications 2 and 3 were about 1 cm shorter than seedlings in replications 1 and 4.

November Morphology

At the final harvest, seedlings were about 28 weeks old (18 weeks since the final treatment). Seedlings had been top-pruned and seedling uniformity was very high. Due to the top-pruning treatments, seedling heights were not measured. There were no differences among treatments for either diameter or dry weights (Table 4). It is not know if the growth regulators ever passed through the epicuticular wax layer.

MANAGEMENT IMPLICATIONS

Based on these results, the use of this particular growth regulator compound had no effect on seedling morphology and does not justify its application to improve seedling performance.

Table 1. Treatment rates per acre (rate per application).

Tr	Cytoplex	SP-11c	NU-FILM-17	SOL-U-GRO	Number of applications
1	0	0	0	0	0
2	8 oz.	0	1 pint	0	2
3	0	0	1 pint	5 lbs.	2
4	8 oz.	0	1 pint	5 lbs.	2
5	0	1.3 pints	1 pint	0	2

Table 2. ANOVA results for the effects of replication (REP) and treatment (TREAT) on seedling diameter, height, and biomass (NS = not significant: Numbers = probability of a greater F value).

Sample date	Source	Diameter	Height	Root Weight	Shoot Weight	Seedling number
July 18	REP	0.32	0.008	0.009	0.41	0.67
	TREAT	0.02	0.68	0.08	0.90	0.66
November 11	REP	0.33	--	0.72	0.26	--
	TREAT	0.90	--	0.99	0.72	--

Table 3. Effect of treatments on diameter and height and biomass (dry weights) and seedling production of loblolly pine in July of 1996.

Treatments	Diameter (mm)	Height (cm)	Root weight (g/25 trees)	Shoot weight (g/25 trees)	Number of seedlings per square foot
Control	2.11 a	14.6	1.81	14.9	23.6
Cytoplex+NuFilm-17	2.09 a	14.4	1.74	14.8	25.1
NuFilm-17+Solugro	1.98 b	14.2	1.88	14.3	24.6
Cytoplex+NuFilm-17+Solugro	1.97 b	14.0	1.86	14.1	25.1
SP-11c +Nufilm-17	2.03 ab	14.5	1.56	14.1	24.5

Within a column, means followed by the same letter are not different at the 0.05 level of probability (Duncan's Multiple Range Test).

Table 4. Effect of treatments on diameter and height and biomass (dry weights) and seedling production of loblolly pine in November of 1996.

Treatments	Diameter(mm)	Root weight (g/25 trees)	Shoot weight (g/25 trees)
Control	5.0	14.47	80.21
Cytoplex+NuFilm-17	5.1	14.31	82.14
NuFilm-17+Solugro	5.1	14.18	83.44
Cytoplex+NuFilm-17+ Solugro	5.1	14.26	80.34
SP-11c +Nufilm-17	5.0	14.22	81.86

LITERATURE CITED

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