

EFFECT OF PHOSFON-D ON POTTED DOUGLAS-FIR

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A chemical growth retardant probably would be valuable in the forest nursery for two reasons. It would control the size of fast-growing hardwoods (1) and limit hardwood and coniferous seedlings to a handling size when a change in plans necessitates the prolonged retention of seedlings in the nursery.

Phosfon-D¹ has been used successfully for several years to shorten stems on herbaceous plants such as chrysanthemums. When it was used on woody plant species, the results were not as successful. Black locust (*Robinia pseudoacacia* L.) was significantly retarded in height by application of Phosfon-D to potted seedlings; however, the effect of the treatment soon disappeared on seedlings in the nursery bed (1). Because of the successful response of black locust, the effect of Phosfon-D on coastal Douglas-fir seedlings in pots was investigated at this laboratory.

A two-part test was begun on December 17, 1962. In the first part, sixteen 1-gallon cans with drain holes were partially filled with a bottom layer of gravel and a second layer of masonry sand to a level leaving room for 2 quarts of soil. A mixture of one part nursery soil, one part peat moss, and one part sand was divided into four lots. Each lot received one of the following number of teaspoonfuls of Phosfon per quart of soil: One-half (manufacturer's recommendation),

1Tributyl-2, 4-dichlorobenzylphosphonium chloride developed by the Virginia-Carolina Chemical Corporation.

1, 2, and 0 (control). Four cans were filled from each lot. Nineteen newly emerged seedlings, sown several weeks earlier in sand, were spaced out in each of the 16 cans. The cans were arranged in a 4 by 4 Latin square in a greenhouse operated 16 hours a day.

The cans were moved to a lathhouse for the summer of 1963.

The second part of the test was identical except for the age and number of seedlings. Each can contained two Douglas-fir seedlings sown several months earlier in 3-inch peat pots. Roots were beginning to show through the pot walls, so the seedlings were not removed from the peat pots.

On October 1, 1963, height measurements were taken of all seedlings, and averages were recorded for each can. No consistent differences or trends due to treatments could be shown among the older seedlings. The younger seedlings in the first phase were separated into top and root components and oven-dried. Results for only the first phase of the study are summarized in table 1.

TABLE 1.--The effect of Phosfon-D on potted 1-0 Douglas-fir

Phosfon application (Tsp./qt. soil)	Mean seedling height	Top-root ratio, dry weight	Dry weight	
			Whole plant	Top only ¹
	<i>Mm.</i>		<i>Mg.</i>	<i>Mg.</i>
0.....	100.9	50:50	462	231
½.....	91.6	50:50	384	190
1.....	106.3	51:49	521	267
2.....	111.6	55:45	575	315

¹ Significantly different at the 5-percent level.

Though a definite trend appears in the data collected, the only differences at the 5-percent level of significance were between the dry weights of tops. The author feels that additional replication of these tests would have also revealed statistically significant differences in seedling heights and dry weights of whole plants. Extreme variability in growth rate between 1-0 Douglas-fir seedlings and the large unaccountable differences in growing conditions that commonly appear between pots treated alike contributed greatly to the experimental error. The variability of the growth rate indicates the need for an adequate sample size, and it was very likely a key factor in the failure of the second part of the study.

Conclusions

The data indicate that Phosfon-D retarded the growth of newly germinated and potted Douglas-fir during the first year when used at the rate suggested by the manufacturer (onehalf teaspoonful per quart of soil). However, higher rates of application under the conditions under which it was tested appear to stimulate growth. The latter results are in

contrast to those obtained when Phosfon was applied to black locust. The stimulating effect of the higher rates was mainly expressed in top growth, as indicated by the dryweight top to root ratio.

On the basis of this small-scale study, it is doubtful that growth control of potted Douglas-fir by use of Phosfon-D is practical for our tree improvement program because of the following reasons. First, overdosage may result in a lack of control or the opposite of the desired effect. Second, the retarding of height growth was not evident with older seedlings; however, this phase of the study is far from conclusive due to inadequate sample size and replication. Third, as indicated by similar studies, retardation of height growth is probably only temporary, and periodic treatments of this type would not only be inconvenient and costly, but might increase the mortality of valuable specimens.

Literature Cited

- (1) Williams, Robert D. Phosfon-D retards height of black locust. Tree Planters' Notes 51, p. 5.