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EFFECT OF A TRANSPIRATION RETARDANT ON SURVIVAL OF PLANTED PONDEROSA PINE

by

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Losses of newly planted coniferous seedlings from drought during the critical period when new roots are developing is a continuing problem in many parts of the West. One possible solution frequently suggested to forest managers is to coat the seedling tops with a transpiration inhibitor, usually a waxy substance applied in emulsion form. This research note gives the results of a study^{1/} of one of these transpiration inhibitors--S/V Ceremul C--when used on ponderosa pine in the semiarid climate of central Oregon.

OTHER TESTS OF TRANSPIRATION RETARDANTS

Foliage coatings have been tried on several species of coniferous seedlings in various parts of the United States for many years. Gains in survival to 30 percent have been reported for treatment with Dowax, one of the early wax-emulsion preparations. Other investigators

^{1/} Study carried out in cooperation with the Deschutes National Forest. It was started at the suggestion and with the helpful advice of Gail Thomas, Western Pine Association district forester, who had conducted similar tests in 1947. The Socony Vacuum Co. provided the chemical.

using Dowax and other coatings in both laboratory and field tests found no consistent gain. In some cases such treatment actually decreased survival. Thomas and Stadel^{2/} reported small increases in survival from trials of S/V Ceremul C on ponderosa pine. After five trials of transpiration retardants on ponderosa pine, sugar pine, and Jeffrey pine in California, Fowells and Schubert^{3/} concluded that none were effective in increasing survival. When our experiments were started in 1948, however, the idea still looked promising enough to warrant a comprehensive trial of the newly developed Ceremul C in central and eastern Oregon, where success in planting ponderosa pine had been relatively poor.

WHAT WAS TESTED, HOW, AND WHERE

The chemical, S/V Ceremul C, is essentially an emulsion of wax and water with triethanolamine as the emulsifying agent. In the first year's trial, a concentration of 1 part Ceremul C to 6 parts of water by volume was used; in the second year, three concentrations-- 1:4, 1:6, and 1:8--were tested. The 2-0 ponderosa pine planting stock was treated by dipping the tops of seedlings in the emulsion, a handful at a time. The trees were then spread out for a few minutes to let the chemical dry, taking care to keep the roots moist. Treating was done at the nursery in 1948 and in the field just before planting in 1949.

In the first year's experiment, 300 treated trees and 300 untreated or "control" trees were planted in alternating 50-tree rows at each of five planting sites. These sites, all within 40 miles of Bend in central Oregon, were chosen to represent a cross section of conditions in the ponderosa pine type in the Deschutes National Forest. These conditions range from comparatively dry sites near the sagebrush desert to higher elevation sites with adequate moisture. Three plantations were in pumice sand soils, and two were in a residual sandy loam.

^{2/} Thomas, Gail M., and Stadel, Earl L. Increasing survival of planted conifers with S/V Ceremul C. Jour. Forestry 46: 764-766. 1948.

^{3/} Fowells, H. A., and Schubert, G. H. Planting trials with transpiration retardants in California. U. S. Forest Serv. Tree Planters' Notes 20: 19-22. 1955.

The second year, 400 trees were planted in each of four plots, all on pumice soils. The design for each plot was a Latin square, with a 25-tree row as the sampling unit.

SURVIVAL

Treatment with Ceremul C did not consistently aid survival in either year's test; in fact, it appears to have reduced survival in some plantations. First-year mortality of waxed seedlings in the 1948 plantations averaged 28 percent, compared to 10 percent for untreated seedlings (table 1). This difference was highly significant for

Table 1.--First-year drought mortality of planted ponderosa pine treated and not treated with the transpiration retardant S/V Ceremul C^{1/}
(Percent of seedlings planted)

Planting area	1948 planting		1949 planting			
	Treated		Treated			
	Un-	(1:6	Un-	1:8	1:6	1:4
	treated:	solution)	treated:	solution	solution	solution
Finley Butte	--	--	30	24	20	28
Lava Butte	11	31	14	19	11	13
Great Northern						
Burn	--	--	15	12	9	8
Ryan Ranch	2	22	--	--	--	--
Kiwa Springs	24	32	29	59	57	49
Jack Creek	6	23	--	--	--	--
Minto Pass	8	34	--	--	--	--
Average	10	28	22	28	24	24

^{1/} "Mortality," as used here, includes only those deaths in which the seedlings dried up, as from drought. This excludes losses caused by rodents and deer, or from miscellaneous causes unrelated to possible effects of wax treatment.

every plantation except one. Randomization was assumed for purposes of statistical analysis. Since the unfavorable effect of Ceremul C was contrary to that experienced in three other trials during the same year on private lands in central and eastern Oregon, we decided to make further tests in 1949, with even closer statistical control, including three concentrations of Ceremul C.

The 1949 study again showed higher average mortality for waxed trees (table 1), but differences were not consistent nor statistically significant. Nor was a consistent trend of mortality with concentration of Ceremul C indicated.

Treatment appeared to have little or no residual effect. Second-year mortality averaged 8 percent, and while a few more untreated trees died than did treated ones, the difference was not significant.

We conclude from this study that Ceremul C did not increase survival of planted ponderosa pine seedlings in central Oregon. This conclusion is strengthened by negative or inconsistent results from other reported trials of transpiration inhibitors.