PAPER MULCH HELPS PONDEROSA PINE SEEDLINGS GET STARTED ON DRY SITES IN OREGON

RICHARD K. HERMANN, *Forest Ecologist,*
Forest Research Laboratory,
Oregon State University,
Corvallis, Ore.

The rapid desiccation of soils with onset of the dry season on many forest sites in southern Oregon jeopardizes first-year survival of planted seedlings unless enough soil moisture is insured.

Other vegetation competing for moisture may be eliminated by spraying with appropriate chemicals. Paper mulch, however, is preferable to chemicals on dry sites with sparse vegetation where frostheaving is often an additional problem. Here, mulch fulfills the dual purpose of preserving moisture and keeping seedlings in the ground. This report summarizes 5-year results of a mulching experiment with 2-0 ponderosa pine on such a site.

The experiment was conducted in the northern end of the 1958 Bogus Burn along the OregonCalifornia border, where annual precipitation is 15-20 inches. Five groups of 200 seedlings each were planted on 40 plots. One group consisted of ponderosa pines raised from seed collected east of the crest of the Cascades; the other four groups were ponderosa pines raised from seed collected west of the crest of the Cascades at four different sites. Asphalt-interlined paper (Kraft 30-30-30) was placed around half of the seedlings in each group immediately after planting. The other half in each group was left without mulch. Assignment of groups to plots, and assignment of mulch treatments within groups, were made randomly. Plants in each plot were spaced 8 x 8 feet and protected individually with wire cages against animal damage.

Results

Mulch helped seedlings to survive the first year in the field (table 1) by preserving moisture and by reducing frost-heaving. Statistical analysis indicated that mulch was the only significant variable and that seed source and initial size of seedlings mattered little to survival of trees in this experiment. Gophers substantially further decre4sed survival on all plots in following years. Even so, the beneficial effect of mulch on first-year survival was still apparent after 5 years (table 1) . Twice as many living trees were left on plots with initial

TABLE 1.—*Percentage survival of ponderosa pine seedlings with and without mulch after 1, 2, and 5 growing seasons in the field.*

Seed sources [1]	Survival with mulch			Survival without mulch		
	First year	Second year	Fifth year	First year	Second year	Fifth year
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
East side ____	88	77	69	47	33	27
West side 1 __	84	76	70	48	43	36
West side 2 __	89	80	77	48	39	38
West side 3 __	79	70	63	37	29	27
West side 4 __	80	76	74	41	35	33

[1] Seed sources were one site east of the Cascades and four different sites west of the Cascades. Annual precipitation ranges from 15 to 20 inches at all sites except West side 1, where it is about 30 inches.

TABLE 2.—*Initial height and subsequent 5-year height increment of seedlings with and without mulch.*

Seed source [1]	Initial height	5-year increment	
		With mulch	Without mulch
	In.	*In.*	*In.*
East side _____	9.0	13.1	13.3
West side 1 ____	14.5	25.8	19.5
West side 2 ____	17.5	20.5	18.8
West side 3 ____	12.5	16.1	18.8
West side 4 ____	7.5	16.1	14.4

[1] Seed sources were one site east of the Cascades and four different sites west of the Cascades. Annual precipitation ranges from 15 to 20 inches at all sites except West side 1, where it is about 30 inches.

mulch as on plots without mulch.

Growth of all trees was slow, which appears to reflect the severity of the site. Size of seedlings at time of planting influenced growth in height: that is, large seedlings grew more than small seedlings. Effect of mulch on growth, however, varied with source of seed (table 2). Seeds from a relatively moist site, as those in the group West Side 1, grew taller with than without mulch. By contrast, mulch appeared to be of little or no benefit to growth of trees in groups that were raised from seed collected on dry sites.

Application of paper much is expensive and can double the cost of planting. For that reason, paper mulch should be used only on problem areas where less expensive methods might be unsatisfactory.