

SHADE BENEFITS DOUGLAS-FIR IN SOUTHWESTERN OREGON CUTOVER AREA

DON MINORE 1

Procedure

Two-year-old Douglas-firs were auger-planted in an old cutover area on a west slope at 4,700-foot elevation by a Boise Cascade Corporation crew in early April 1968.² The cutover is located on the Dead Indian Plateau east of Ashland, Oreg.-an area where Douglas-fir plantations have repeatedly failed. The seedling tops were unusually short for 2-yearold stock, averaging only 3 inches when planted. Atrazine applied before planting effectively reduced grass competition, and the stock was treated with Thiram to repel rabbits.³ A 16- by 16-foot spacing was used.

Three weeks after planting, 60 seedlings that happened to be located in the shade of a shrub or tree (ceanothus, currant, willow, grand fir, or Douglasfir) were numbered and staked (fig. 1). Two seedlings planted in the open near each shaded seedling were also numbered and staked. Thus, 60 groups of three seedlings each were established. One of the two seedlings located in the open in each group was randomly chosen to be shaded artificially. This shading was accomplished by piling rocks, bark, logs, or anything readily available around the south and west sides and close to the designated seedlings (fig. 2). All surviving seedlings were remeasured twice-in September 1968 and 1969.

Results

Seedling survival and growth are shown in table 1. All the survival differences were statistically significant in 1968. However, only the shade-no shade differences were significant in 1969-mortality was greater in dead shade than in live shade during the second growing season.

1 Plant ecologist, Forestry Sciences Laboratory, Pacific Northwest Forest and Range Experiment Station, USDA Forest Service Corvallis; Oreg.

2 Permission to conduct this study in a company plantation and the cooperation of John L. Gartman, forester for the Boise Cascade Corporation in Medford, are gratefully acknowledged.

3 See pesticide disclaimer on page ii.



Figure 1.—Douglas-fir seedling planted in the shade of a currant bush.



Figure 2.—Seedling shaded by rocks.

TABLE 1.—Survival and growth of Douglas-fir seedlings, by treatment

Treatment	Survival		Average height growth	
	1968	1969	1968	1969
	Percent	Percent	Inches	Inches
No shade	18.3	10.0	0	1.2
Live shade	56.7	46.7	.2	1.2
Dead shade	86.7	60.0	.3	1.6

Seedling growth was very poor in 1968, and the no shade-dead shade differences (table 1) are of no practical significance. Growth was much better during 1969. However, the 1969 growth differences were not statistically significant.

The Thiram rabbit repellent was only partially effective, because 12 percent of the planted seedlings were clipped. Clipping in live shade was twice that in either dead shade or the open. This difference in clipping damage between live and dead shade was balanced by an equal and opposite difference in pocket gopher damage. Pocket gophers killed 8 percent of the seedlings planted in dead shade, but harmed none in live shade.

Discussion

Dead shade has long been recognized as a beneficial influence upon seedling survival on dry sites. Stoeckeler (1945) used dead chokecherry branches to benefit exotic species planted in the Lake States. Adams et al. (1966) similarly benefited Douglasfir and white fir seedlings in California by shading them with shingles. Several dead shade intensities were used by Woodard⁴ to show that the survival period of potted Douglas-fir seedlings under drought conditions increased with shade intensity.

The benefits of live shade are complicated by competition between shade source and seedling. However, Youngberg (1966) found that soil moisture and temperature conditions were more favorable under brush cover than in the open, and Wahlenberg (1930) ob-

⁴Woodard, Ernest S. Effects of some transpiration retardants and shade on survival of Douglas-fir seedlings under drought conditions in the field. 30 p. 1966. (Unpublished M.S. thesis on file at Oregon State Univ., Corvallis.)

served that ponderosa pine survival under ceanothus brush was higher than in the open. Isaac (1938) stated that Douglas-fir seedling mortality was less in dead shade than in living shade.

Both dead and live shade were beneficial to seedling survival in this study. As Isaac observed, dead shade seemed slightly better than live shade. The superiority of dead shade was not statistically significant, however, and providing dead shade was more expensive-piling logs and rocks around the seedlings to create dead shade required 2 to 5 minutes per seedling. Furthermore, as Roy (1955) warned, planting next to logs and stumps (common sources of dead shade) can be disastrous if bark fragments fall on the seedlings. Collapsing piles of bark and rocks killed several study seedlings during 1969.

Seedling growth was not significantly reduced by planting under the brush and tree species that provided live shade. There was no evidence of species differences in regard to shade providers.

When survival, growth, animal damage, and planting expense were considered, live shade seemed to be about as good as dead shade. Shade as such, live or dead, was essential to Douglas-fir seedling survival on this hot, dry site.

Literature Cited

- Adams, Ronald S., Ritchey, John R., and Todd, W. Gary.
1966. Artificial shade improves survival of planted Douglas-fir and white fir seedlings. Calif. Div., Forest., State Forest Notes 28, 11 p.
- Isaac, Leo A.
1938. Factors affecting establishment of Douglas-fir seedlings. U.S. Dep. Agr. Circ. 486 46 p.
- Roy, D. F.
1955. Don't plant close to unbarked logs! Calif. Forest and Range Exp. Sta. Forest Res. Note, 101, p. 1.
- Stoeckeler, Joseph H.
1945. Brush shade increases plantation survival on droughty sites. Lake States Forest Exp. Sta. Tech. Note 233, 1 p.
- Wahlenberg, W. G.
1930. Effect of ceanothus brush on western yellow pine plantations in the northern Rocky Mountains. J. Agr. Res. 41: 601-612.
- Youngberg, C. T.
1966. Silvicultural benefits from brush. Soc. Amer. Forest. Proc. 1965: 55-59.