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A TEST PLANTING OF 2-0 AND 3-0 DOUGLAS-FIR TREES ON A STEEP SOUTH SLOPE

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Regeneration of clear-cut areas is a high-priority problem facing forest managers in the Douglas-fir region. One of the most critical phases of this problem is the establishment of new stands on south-slope sites, where conditions are unfavorable for regeneration.

Repeated failures of natural seeding on such sites has been paralleled by almost equally unsuccessful plantings of 2-0 Douglas-fir trees. Consequently, this study was undertaken to explore the use of 3-0 planting stock for improving plantation survival.

The Study

A recently clear-cut, south-facing, 60-acre tract was selected for planting. Slope approximated 50 percent and elevation 2,000 feet. The study area is on the H. J. Andrews Experimental Forest, which

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[1/] Maintained in cooperation with the School of Forestry, Oregon State College, Corvallis. This study was initiated at the request of, and in cooperation with, the staff of the Willamette National Forest.

is located on the Blue River District of the Willamette National Forest in western Oregon.

The test was made on 10 systematically arranged blocks, each approximately 60 feet square. In December 1955, 15 to 18 trees of 2-0 and 3-0 stock were planted in alternate rows in each block, totalling 172 trees of the 2-0 stock and 173 of the 3-0. Equal numbers of trees could not be planted on each block because there weren't enough suitable planting sites.

Planting was done by five men, who were assigned two randomly selected blocks each. Planting stock was grown at the Wind River Nursery, Carson, Wash., from seed obtained from the Willamette National Forest at an elevation of 3,000 to 4,000 feet. It is not known whether all seedlings originated from a common seed lot.

The plantation was examined at the end of the first and second growing seasons.

Results

Survival.--At the end of the first growing season, 60 percent of the 3-0 stock and 37 percent of the 2-0 stock had survived. After two growing seasons, the margin of difference was slightly reduced but still impressively in favor of the 3-0 stock, as follows:

Planting stock	Percentage of survival	
	First season	Second season
2-0	37	33
3-0	60	51

An analysis of variance showed these results to be significant at the 5 percent level.

Survival percentages shown above were based on total number of trees, including some that failed to live through the first bud-bursting stage. This early mortality--8 percent of the 3-0 and 19 percent of the 2-0 trees, was probably caused by poor condition of planting stock rather than by planting site factors. Therefore, a

separate analysis was made, excluding these trees to make the test more sensitive to factors affecting survival on a south slope. In the second comparison, survival of 3-0 trees also was significantly better than that of the 2-0 trees:

Planting stock	Percentage of survival	
	First season	Second season
2-0	46	40
3-0	64	56

Mortality. --Of those trees that lived through the first bud-bursting stage, 23 percent of the 2-0 and 8 percent of the 3-0 trees were lost by the end of the first growing season because of surface movement--soil, rock particles, litter, and rotten wood either covered or uprooted them. Superior height of the 3-0 stock was assumed to be the factor responsible for its less serious loss from this cause. Height advantage probably would have been less important on gentle topography, where sloughing of surface material is greatly reduced.

Losses from unclassified causes at the end of the first growing season were 31 percent of the 2-0 and 28 percent of the 3-0 stock. Statistically there was no real difference between these mortality percentages.

Mortality during the second season was only 6 percent for the 2-0 and 8 percent for the 3-0 trees.

Effect of shade. --Most of the trees that survived the first growing season were in light-to-medium shade from herbaceous or brushy vegetation. Most mortality, however, also occurred under these same shade conditions. There was some indication that survival was better in heavy shade than with no shade, especially with the 3-0 trees.

Growth. --The 2-0 trees that survived grew as much in height as 3-0 trees. Growth was generally poor, however, averaging only 0.9 inch the first year and 1.2 inches the second. Total average height at the end of the second year was 7.0 inches for the 3-0 trees and 5.9 inches for the 2-0 trees.

Summary

Failures of natural seeding and unsuccessful plantings of 2-0 stock on south slopes in the Douglas-fir region led to a field test of 3-0 stock to see if survival could be increased. The test was carried out on the H. J. Andrews Experimental Forest in Oregon.

After two growing seasons, survival was 51 percent for the 3-0 and 33 percent for the 2-0 trees. After eliminating observations of trees that died before first-season bud bursting, survival was 56 percent for the 3-0 stock compared to 40 percent for the 2-0.

The 3-0 trees resisted mortality due to movement of surface material better than the smaller 2-0 trees. This factor accounts for most of the difference in survival between the two plantings. Survival was not greatly influenced by shade from herbaceous or brushy vegetation, although there was some indication that heavy shade was better than no shade. Height growth was the same for each lot of trees, averaging about 1 inch per year.

Although use of 3-0 planting stock would not result in a cure-all solution of regeneration problems, its superior survival on this planting site provides some direction for immediate changes in planting procedure and opens new avenues for research.