



REPRODUCTION LOSSES FROM SLASH DISPOSAL
AT THE CHALLENGE EXPERIMENTAL FOREST

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ABSTRACT: Ponderosa pine, the preferred species, accounted for only 15 percent of the residual coniferous reproduction in seed-tree cuttings. Logging slash was machine-piled to encourage pine regeneration. Slash piling reduced the percentage of plots stocked with conifers from 38 to 12 percent. It destroyed 90 percent of the youngest seedlings but only 27 percent of the saplings from 2.0 to 3.5 inches d.b.h.

The forest manager must recognize potential losses of advance reproduction in any slash disposal program. This paper reports the amounts of reproduction destroyed by slash piling and variations in losses owing to size of reproduction.

Machine piling of logging slash was used to reduce fire hazard and as a site preparation treatment in seed-tree regeneration studies at the Challenge Experimental Forest in Yuba County, California. The Soper-Wheeler Company of Strawberry Valley, California, cooperated in these studies.

The stands in this study were established about 1875, and averaged 50,000 board feet per acre (Scribner rule) when harvested. Ponderosa pine predominated in the overstory, and Douglas-fir and white fir were the chief understory species.

Procedures

Cuttings took place in 1958 and 1959. After logging, each acre had from two to nine seed trees. In both years slash disposal on about 10 acres was deferred until the year a good seed crop was evident. This delay was to provide freshly scarified soil on which the seed could fall.

The possibility of a good seed crop became evident early in 1960, and slash was scheduled to be piled in August. In June, 142 plot centers were established and referenced to nearby trees or large stumps. Seven 10-plot transects were laid out in the 1958 cutting area. In the 1959 cuttings, 72 plots were installed along radii of four 1/2-acre growth plots.

Reproduction tallies were made in July 1960. All coniferous reproduction less than 1.5 inches d.b.h. (diameter at breast height) was tallied on mil-acre plots. Saplings from 1.5 to 3.5 inches d.b.h. were tallied on concentric 4-mil-acre plots.

Slash was piled with a 180-drawbar horsepower tractor fitted with a brush rake built by the Company. After slash disposal, plots were relocated, and reproduction tallies were made in late August.

Results

Before slash disposal, 38 percent of all plots were stocked with one or more conifers less than 3.5 inches d.b.h. Each acre averaged 858 seedlings or saplings (table 1). The 19 percent increase in seedling stocking, between logging and slash disposal, was predominantly in ponderosa pine. The composition of stocking before slash disposal--based on number of trees--was:

	<u>Portion of total</u> (percent)
Species:	
Ponderosa pine	15
Sugar pine	18
Douglas-fir	34
White fir	28
Incense-cedar	5

The slash disposal treatment destroyed an average of 51 percent of the seedlings and saplings and reduced the number of stocked plots from 54 to 17. The number and percent of plots stocked with seedlings and saplings were:

	Plots stocked with seedlings or saplings ^{1/}	
	(number)	(percent)
Time of tally:		
After logging	45	32
Before slash disposal (new establishment)	54	38
After slash disposal	17	12
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^{1/} Basis:	142 plots.	

Table 1.--Trees per acre before and after slash disposal by size class

Size class ^{1/}	:Before slash disposal:After slash disposal:		Destroyed
	: (trees per acre) : (trees per acre) :		
	----- Number -----		Percent
Seedlings	^{2/} 421 (82)	^{2/} 152 (8)	^{2/} 64 (89)
Saplings			
1.0 foot high to 0.5 inch d.b.h.	331	204	38
0.6 inch - 1.4 inch	84	68	19
1.5 inch - 3.4 inches	22	16	27
Total	858	440	51

^{1/} Size class intervals are irregular.

^{2/} Figures in parentheses represent stocking established after logging.

We found an inverse relationship between size of reproduction and loss. The larger the reproduction, the less susceptible it was to destruction. Sixty-four percent of the seedling class was destroyed, compared to losses of 19 and 27 percent for the larger saplings.

The tractor operator could see the larger size classes more easily and avoid them. He left islands of regeneration wherever possible, yet completely eliminated reproduction where slash had accumulated. The irregularity of slash dispersal and the subsequent piling pattern resulted in considerable variation through the areas. The data reflected this variability.

Discussion

In seed-tree cuttings, the potential loss of reproduction from slash disposal operations must be evaluated against requirements of species composition, relative growth rates, levels of fuel hazard, and other factors. Although slash disposal reduced stocking to 12 percent, the treatment was successful in securing ponderosa pine regeneration.^{1/}

In May 1962, the most poorly stocked area had 990 1-year-old ponderosa pine seedlings per acre on areas where slash was piled. Forty percent of the mil-acre plots was stocked with ponderosa pine. Seedlings of other species (7 percent) and older reproduction (12 percent) brought the total mil-acre stocking to 59 percent. Other areas had even better stocking.

Tackle and Roy^{2/} found that site preparation resulting from slash disposal provided an appreciable survival and growth advantage for seedlings. Our treatment should also improve the rate of seedling growth.

The heavy accumulations of slash fuels were readily concentrated for safe burning in the late fall. The clearing left large expanses which were essentially fireproof.

Operational costs of these treatments were not prohibitive, and refinements could undoubtedly reduce them appreciably.

The combined value of the new species mix, greater stocking, and the potentials for improved growth rate must more than offset the cost of site preparation plus the value of reproduction destroyed. But such an evaluation has yet to be made.

Further research is needed to (a) evaluate the the biologic and economic aspects of various species mixes, (b) obtain reproduction growth rates under various levels of vegetation and competition, and (c) determine the dollar value of fire protection from slash piling.

^{1/} Corbett, Edward S. Ponderosa pine reproduction in relation to seed supply at Challenge Experimental Forest. U.S. Forest Serv. Pacific SW. Forest & Range Expt. Sta., Res. Note 195, 3 pp., illus. 1962.

^{2/} Tackle, D., and Roy, D. F. Site preparation as related to ground cover density in natural regeneration of ponderosa pine. U.S. Forest Serv. Calif. Forest & Range Expt. Sta. Tech. Paper 4, 13 pp., illus. 1953.