FOREST RESEARCH NOTES

Issued by the

PACIFIC NORTHWEST FOREST EXPERIMENT STATION

No. 38 Portland, Oregon. October 25, 1947

EDITOR'S
FILE COPY

EFFECT OF PRUNING ON GROWTH OF PONDEROSA PINE

By

Edwin L. Mowat

A study of the influence of pruning various proportions of the crowns of young ponderosa pine trees upon growth, vigor, and mortality was started on the Pringle Falls Experimental Forest in 1941. After 5 years of tree growth, the study throws some light on how severely young pines should be pruned.

Four degrees of crown removal were tested in a 55-year-old stand; namely, pruning only dead limbs, pruning one fourth, one-half, and three-fourths of the length of live crown. The trees from which only dead branches were pruned were considered as a check for comparison with the others.

Pruning treatments were assigned at random to 384 dominant or co-dominant crop trees located in four plots or blocks. On the average, 36 trees per acre were pruned. Varying in diameter, breast high, from 6 to 18 inches, with an average of 10.4 inches, the trees ranged from 25 to 76 feet high; their average height was 47.3 feet. The site a low IV (average site index of 72)--is fairly typical, though slightly poorer than that prevailing throughout the ponderosa pine region of central and eastern Oregon.

Diameters and heights of the trees were remeasured in 1946. The influence of pruning upon diameter and height growth for this initial 5-year period is shown in table 1.

Table 1.--Five year Diameter and Height Growth of Ponderosa Pine Trees Pruned to Four Degrees

Extent of pruning		Average increment, 1941 46			
Proportion of live crown removed	Average height of stem pruned	Diameter		Height	
	Feet	Inches	% of check	Feet	% of check
Dead limbs only	13.3	1.19	100	5.6	100
1/4 of live crown	22.6	1.13	95	5.3	95
1/2 " " "	30.6	.91	76	5.4	96
3/4 " " "	38.5	.44	37	5.2	93

Absolute rates of growth varied on the four plots, partly because of differences in stand density, and there was some variation in precise degree of effect. Yet the general relation between treatments and diameter growth held true throughout. The differences in diameter growth shown in table 1 are highly significant, except for the difference between the check trees and those pruned to one-fourth of live crown length. Rate of diameter growth is dependent in part upon tree diameter itself. But taking account of this "regression" makes little change in the picture because the average diameters of trees given the various degrees of pruning were very nearly the same.

Pruning various proportions of the crown seems to have had but little consistent influence upon height growth for this period. There is something of a trend from highest rate for the unpruned to lowest for three-fourths crown removal, but the range of values is so small and there are so many exceptions among plots that the difference is of no real significance. In contrast, an earlier study in young Douglas-fir showed significant reduction in height growth as well as in diameter growth following radical live crown pruning. (See Forest Research Notes No. 33.)

Other than by the reduction in growth rate, the apparent vigor of the pine trees seemed to be little affected even by the extreme pruning. No harmful effects or injuries such as sunscald appeared. Only one tree died--rather surprising in that many trees with 75 percent crown removal were left with only a tuft of branches in the tip. Trees on two of the plots were pruned in July, the others in September, chiefly to test possible differences in insect attack. Since neither series of plots suffered losses, there was no appreciable difference in this respect.

It may be concluded that for ponderosa pine of this size and age, pruning of more than one fourth of the live crown reduces diameter growth significantly but has little effect upon height growth within the first 5 years. Removing only the lower one-fourth of the live crown has a negligible effect on growth. In the 55-year old stand, on average site,

that was treated, pruning one-fourth of the crown cleared the stem for an average height of 22.6 feet. The usual upper limit of pole saw pruning is 18 feet - high enough to clear the first 16 foot log with allowance for stump and trim. Thus, it appears that stands perhaps as young as 40 years could be cleared for the first log without excessive cutting into the green crown.

Ponderosa pine trees can survive (at least for a time) much more severe live crown pruning, but it is likely that the advantage of longer clear boles thus obtained would be overbalanced by the disadvantage of substantial reduction in diameter growth. Before final conclusions may be drawn as to the best limits of pruning under given conditions, more must be learned about the growth rates over longer periods than the first 5 years of test.