U. S. DEPARTMENT OF AGRICULTURE FOREST SERVICE
PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
R. W. COWLIN, DIRECTOR

Research Note

Number 87 Portland, Oregon July 1953

BETTER MARKING MEANS CHEAPER PRUNING

By

Kenneth R. Eversole

Careful selection of trees to be pruned can make the difference between profit and loss on the pruning investment, especially in stands where no thinning is contemplated. Expert marking is required to make sure that the pruned trees will grow rapidly. The most important variable influencing the cost of clear wood produced by pruning is growth rate. For example, at 3 percent interest, the cost of producing clear wood at harvest is $20 per M b. m. for trees growing 2 inches per decade, while the cost is only $12 M b. m. when the growth rate is 3 inches per decade.1/

Thinning will keep the pruned trees growing at a rapid rate. What's more, it will bring a maximum number of pruned trees to harvest age and size. This is a distinct advantage because the cost of pruning trees that drop out of the stand must be charged against the pruned trees that are harvested.

If thinning is not possible, we must prune trees destined to retain a dominant position in the stand. But picking the right tree is far from easy.

Here is an example of how the dominance of trees pruned in the past may change. A 40-year-old, well-stocked stand of Douglas-fir, growing on low site III land at Wind River, was pruned 11 years ago. The stand was 29 years old when it was pruned in 1941. Trees had been selected by experienced men using essentially the same guides that are used today. They picked mostly dominants, but included some vigorous codominants to improve spacing. The exact number of

---

1/ Shaw, E. W., and G. R. Staebler. Financial Aspects of Pruning. Pacific Northwest Forest and Range Exp. Sta. Portland, Ore. 1950.

codominants is unknown. Altogether, 118 trees per acre, averaging 7.5 inches d.b.h., were pruned to a height of 17-18 feet. After 11 growing seasons these trees averaged 10.4 inches. The pruned dominants had grown an average of 3.5 inches in diameter; all other pruned trees, 2.1 inches. In the 1952 examination, all of the pruned crop trees on a 10-acre study tract were classified according to their current crown class:

Crown class	Pruned trees per acre	
	Number	Percent
Dominant	73.3	62
Codominant	35.5	30
Intermediate	7.1	6
Suppressed	0.6	1
Dead	1.5	1
Total	118.0	100

Note that an alarming number of the pruned trees have dropped into lower crown classes.

A similar investigation of a 44-year-old Douglas-fir plantation at Mt. Hebo showed this same trend. A 1-acre plot was established in 1938 in a part of the plantation that had been pruned in 1935. The plot records show that all of the pruned trees were dominant when the plot was established. Here is how they were classed in later examinations:

Crown class	1944, 8 years after pruning	1948, 13 years after pruning 1/
	Percent	Percent
Dominant	82	65
Codominant	18	28
Intermediate	--	5
Dead	--	2
Total	100	100

1/ This examination included some of the area around the plot.

The data from the natural stand and the plantation show a surprising similarity. In the short time since pruning, a large number of the pruned dominants and codominants have dropped into lower crown classes. Less than two-thirds of the pruned crop trees are still dominant. The pruning itself is not believed to have accelerated this rapid change since only a small portion of the live crown was

removed. A separate study at Wind River has indicated that removal of as much as one-fourth of the length of the live crown does not retard diameter or height growth.2/

Loss of pruned trees through mortality has not been excessive in either the plantation or the natural stand. Two-thirds of the mortality losses in the natural stand at Wind River resulted from causes that could not have been foretold--bear damage, snow breakage, and root rot (Poria weirii).

Of more immediate concern is the change in crown class. We can assume that some of the pruned trees no longer dominant will die before they reach merchantable size, and that the ones surviving through the rotation will grow slowly and produce little usable clear wood. If this is true, imperfect marking has already increased the initial pruning cost per tree greatly. The increase results when the total initial cost of pruning is divided among the pruned trees that will be harvested.

Experience in these stands indicates that risk of loss may be reduced in an unthinned stand by pruning fewer trees per acre. This makes it possible to avoid doubtful trees. Since d.b.h. is closely correlated with growth rate in even-aged stands, diameter can be used as a guide in selecting trees to prune. In stands that have filtered in slowly, the diameter guide would be less reliable. A test of this guide was made by studying a few growth plots. One was in a 40-year-old Douglas-fir stand. The 58 largest trees per acre were picked from the stand as it was 13 years ago. The records of these 58 trees show that 100 percent are still dominant. Another plot studied was in a 49-year-old stand. The 50 largest trees (23 years ago) are nearly all dominant now. Three have dropped to the codominant class and only one is dead. These two tests show that this marking guide may be what foresters have been looking for. The results are certainly encouraging.

Picking the largest trees means picking the trees most costly to prune. Undoubtedly, this is better than taking the risk of pruning slow growing trees. Another advantage of pruning the larger trees is brought out by Shaw and Staebler3/:

> "Diameter of the tree at the time of pruning affects costs in a way not usually appreciated--that is, other things being equal, the bigger trees will produce cheaper clear wood. This is apparent when one stops to

---

2/ Isaac, Leo A. Results of pruning to different heights in young Douglas-fir. Pacific Northwest Forest and Range Exp. Sta. Research Note 33, Portland, Ore. 1945.

3/ See footnote 1, page 1.

think that a shell of clear wood of given radial thickness around a big tree contains more board feet than a shell of the same thickness around a small tree. There are compensating factors, mainly in the greater cost of pruning the larger trees, but in most cases they will not be sufficient to offset the more favorable ratio of diameter growth to board-foot growth."

To sum up, when pruning unthinned stands, the margin of returns over cost can be greatly increased by selecting only the 50 or 60 largest well-formed dominants on each acre. Pruning "run-of-the-mill" dominants and codominants means risking a decline of dominance unless a crop tree thinning can be made.