

EFFECTS OF SELECTIVE AND ROW THINNINGS ON DIAMETER GROWTH IN RED PINE

Eric L. Jensen
Forester, Bureau of Land Management
Salem, Oregon

and

Dieter R. Pelz
Assistant Professor of Forest Biometrics
University of Illinois
Urbana, Illinois

ABSTRACT

Results from a thinning study at Sinnissippi Forest in Ogle County, Illinois show that row thinning and selective thinning increase the average diameter of the residual stand. No statistically significant differences in diameter growth between row thinning and selective thinning was found in this study.

Forest stands are thinned to obtain optimum growth rates of residual trees and to improve stand quality. A variety of different thinning methods are available. Selective thinning and row thinning are the most frequently used methods.

Selective thinning or crown thinning removes trees that compete with desirable trees or crop trees for growing space. Crop trees are being favored in each of several thinnings until they constitute the final stand that will be harvested. Row thinning removes entire rows of trees mechanically. In most cases selective thinning is considered more desirable from a silvicultural standpoint, but row thinning is considered more desirable from a financial standpoint because of lower marking and harvesting costs.

An economic analysis of alternative thinning regimes has to consider both biological and financial components. This paper reports on a study of diameter growth as affected by row and selective thinnings. The final analysis would have to consider thinning and harvesting costs as well.

Reports on thinning studies in Illinois were mostly directed to other regions and species. Boggess (1959) reported on the growth of shortleaf pine thinned by crown and row method in southern Illinois.

He found that the growth of plots thinned by either method was significantly higher than that of unthinned plots, and that total basal area growth was slightly better on crown thinned plots than on row thinned plots. Burkhardt and Gilmore (1967) and Gilmore and Boggess (1969) updated this report after additional thinnings. In these studies a significant change of stand characteristics were found as compared to unthinned plots. Lorenz (1948) described thinning studies in white pine plantations conducted at Sinnissippi Forest.

METHODS

The study was conducted at Sinnissippi Forest, Ogle County, Illinois. In 1941 two plots of red pine (*Pinus resinosa* Ait) were established with a 6' x 6' spacing. During 1962 thinning operations were conducted on part of the area, the remainder was used as control. Thinning treatments that were applied were selective (or crown) thinning and modified row thinning. In 1970 the selectively thinned stand was thinned again.

The selective or crown thinnings removed approximately 35% of the basal area. The modified row thinning removed entire rows or every other tree in a row. Every third row was either removed completely or thinned mechanically which resulted in a comparable thinning intensity as for selective thinning.

Measurements were taken in 1960 of every third row before any treatment was applied. In 1975 the same trees that were measured previously were remeasured for computing diameter growth of the stands. As only part of the stand was measured no reference will be made to total basal area growth or volume growth, but only to diameter growth.

RESULTS AND DISCUSSION

At the 1960 measurement and average diameter did not differ significantly for the two thinning methods and the control, as shown in Table 1. The 1975 measurements showed that row thinning and selective thinning increased the average stand diameter significantly but no statistically significant difference between selective thinning and row thinning was found.

Selective Thinning. For the selective thinning the average diameter was 20.75 cm with a standard deviation of 2.445 cm which compares with an average of 16.10 cm and a standard deviation of 2.4811 for the control. The t-test resulted in a t value of 11.2156 which is significant at the 5% level, therefore it can be inferred that selective thinning increased the average stand diameter significantly.

Table 1. Tree data before and after thinnings.

	1960			1975		
	Selective	Row	Control	Selective	Row	Control
Number of observation	393	51	53	146	15	47
Average diameter	13.31	13.61	12.70	20.75	20.45	16.10
Standard deviation	2.3985	3.0277	2.8245	2.4450	1.6457	2.4811

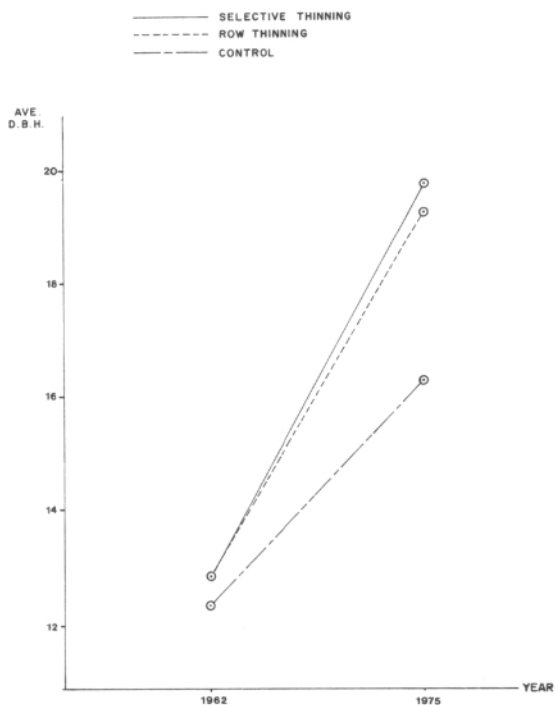


Figure 1. The Diameter Development for Selective and Row Thinnings.

Row Thinning. The row thinning resulted in an average diameter of 20.45 cm with a standard deviation of 2.4811. The comparison with the control data resulted in a t value of 7.7936 which is significant at the 5% level. Row thinning also resulted in an increase of the average stand diameter as compared to the control.

One additional hypothesis was tested to compare the two thinning methods. The comparison of row thinning and selective thinning resulted in a t value of 0.6374 which is not significant at the 5% level, i.e., it can be inferred that selective thinning and row thinning do not affect diameter growth differently. A graphical representation of the development of the average stand diameter is shown in Figure 1.

SUMMARY

Thinning studies conducted in Red Pine stands at Sinnissippi Forest showed that selective thinning and row thinning resulted in an increase in average diameter at a stand age of 34 years, thirteen years after thinning as compared with unthinned stands. No significant difference could be found between the effects of row thinning and selective thinning.

LITERATURE CITED

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