

HEIGHT GROWTH IN RELATION TO CROWN
SIZE IN JUVENILE LODGEPOLE PINE

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by
E. W. Mogren^{1/}

The securing and maintaining of maximum height growth during the juvenile and early pole stages is of importance, because in stands of intolerant tree species, such as lodgepole pine (*Pinus contorta* Dougl.), the pattern of height growth during this early period often determines the total height potential of the stand. Consequently, thinning schedules in young stands should include this objective.

The purpose of this study was to simulate several levels of thinning by exposing different amounts of crown to solar insolation and to evaluate the effect of these different crown sizes on annual growth in height in juvenile lodgepole pine.

Several assumptions were necessarily made at the beginning of the study:

1. That macroclimatic conditions, edaphic factors and aspect would be reasonably uniform due to small size of the study area.
2. That root competition could be eliminated or greatly reduced by removing competing vegetation adjacent to each tree in the study.
3. That removal of branches and leaves by pruning resulted in the same impact on height growth as eventual death of leaves and branches from stand shading.

The stand selected for study was an even-aged stand of juvenile lodgepole pine ranging in age from 9 to 12 years. The area was quite uniformly stocked with a density of 1300 stems per acre. Total tree heights ranged from 4.5 to 9.0 feet and averaged 6.6 feet. Eighty trees to be included in the study were selected randomly from a five-acre portion of the stand.

Each tree selected was released to a minimum spacing of nine feet by removal of competing vegetation. Following release, total tree height was determined, and trees were pruned to 25, 50, or 75 percent of bole length. The treatment that each tree received was also determined randomly. Twenty trees were included in each treatment and an additional twenty were left untreated i.e., with full bole length in crown. The pruning was done after leader growth had ceased in August of 1959. Leader growth from base to tip of terminal bud was then measured in August for four successive years.

^{1/} Professor of Forest Science

The impact of reduced crown size on leader growth became apparent the first year after treatment. Results of the treatments, in terms of annual leader growth, appear in Figure 1. During the first year following treatment the most severely pruned trees, i.e., those with only 25 percent of bole length in crown remaining, produced leaders that were only 64 percent as long as the untreated trees. In the fourth year after treatment this dropped to only 43 percent. When all treatments were compared statistically (Fisher's F-test and "Student's" t-test) by years, all showed highly significant differences (99% level) with one exception. The 75 percent bole length in crown trees did not differ significantly (95% level) from the untreated controls.

The data show that a functional crown equal to 75 percent of bole length or greater must be present to insure maximum height growth in juvenile lodgepole pine. Furthermore, it appears from the findings that to insure maximum height growth in juvenile lodgepole pine, thinnings must be made early enough to prevent crown closure and heavy enough to expose each selected "leave" tree to almost full sunlight.

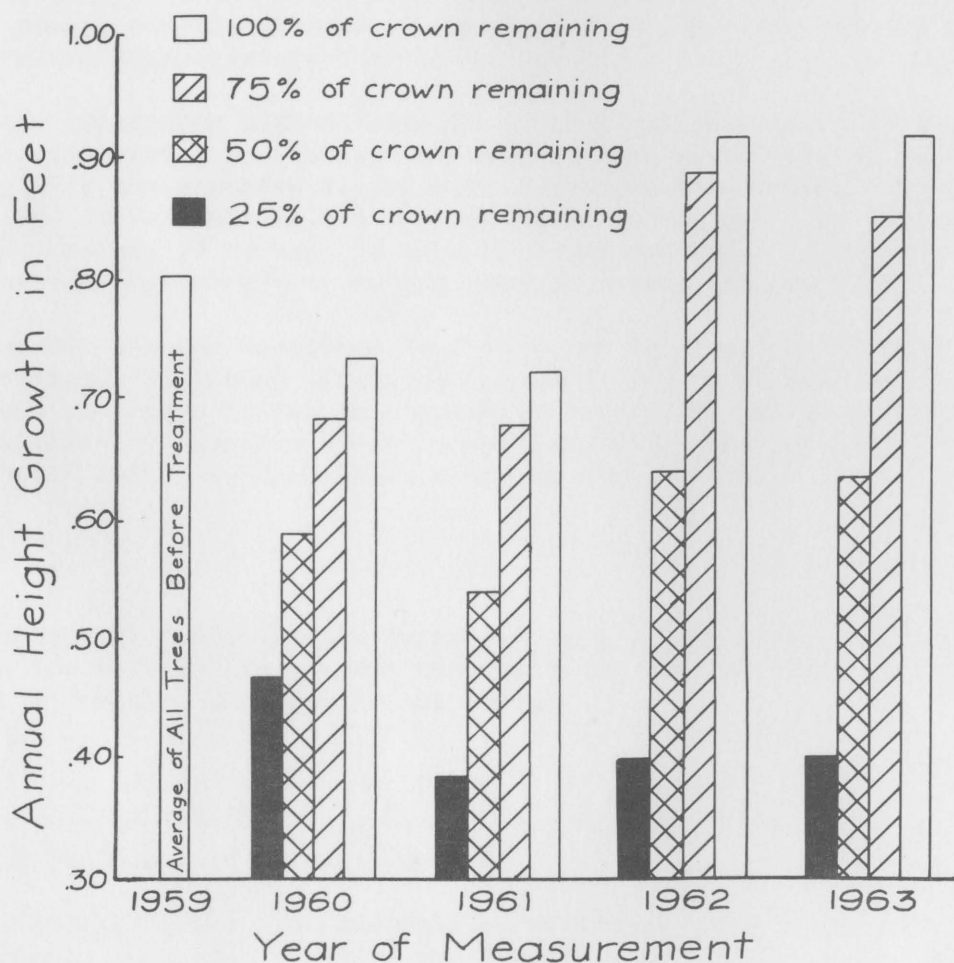


Figure 1. Annual height growth of juvenile lodgepole pine for different percents of residual crown. Larimer County, Colorado. Altitude 9100 feet.