PB 1921-H

OAK REGENERATION PRACTICES: INTERMEDIATE PRACTICES TO MAINTAIN OPEN FORESTS

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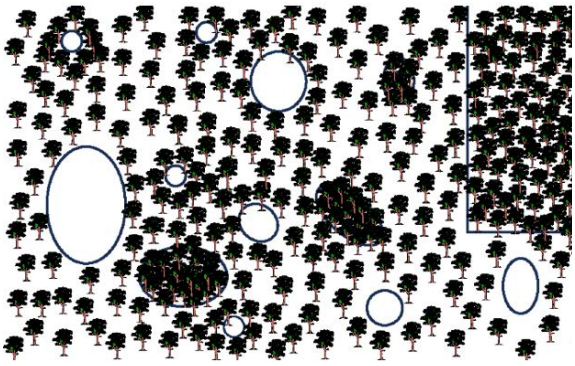
Intermediate practices are management activities used to encourage the growth of existing trees in a forest. Examples include thinnings to reduce stand density and crop tree release. These practices also increase the light penetration into the forest, improving the growing condition for small oak seedlings and providing the growing space for these shade-intermediate oaks to ultimately ascend into the overstory. Often, a "bottleneck" occurs when there are too many trees, whether oaks or other species, which limit growing space and light penetration. These treatments are intermediate disturbances that maintain open forests that are necessary to ensure that oak seedlings continue to grow and develop. Intermediate practices improve the growth of residual trees by reducing stand density while promoting oak seedling development, but are not considered regeneration methods.

THINNINGS

Traditional thinning is the removal of trees in immature stands to redistribute the growth among fewer, potentially more valuable, remaining trees by altering the light and space environment. The undesirable, poorer performing trees are thinned. The goal is to create uniform tree spacing for the remaining trees such that their growth rates are similar. In this manner, thinning is more systematic. This thinning practice occurs more frequently in plantations or single species, monotypic stands where spacing is more consistent, resulting in similar growth rates of like trees.



An example of variable density thinning with different thinning spacings and various skips, gaps, and patches of tree retentions (unthinned) and removals. Photo Credit: *Wayne K. Clatterbuck*

Variable density thinning is conducted frequently in natural, mixed species stands where spacing and growth rates of different species are heterogenous. The focus should be on which trees to retain (based on objectives) rather than trees to cut. Preferred trees remain through a more diverse system of dispersed retention, gap-level retention, and aggregated retention (patches) with the emphasis on establishing varied tree densities across the stand, within a range of individual removals, small group removals, to patches, groups, or islands that are not cut or thinned, respectively. Variable density thinning incorporates a series of skips, gaps, and patches of diverse sizes across the stand creating irregularity and diversity through individuals, clumps and small area harvested openings or uncut or unthinned retentions.

Both thinning strategies provide more dispersed sunlight and greater growing space that encourage growth and development of shade-intermediate oaks by removing adjacent trees. Traditional thinning results in uniform spacing where variable density thinning provides irregular spacing and structural stand complexity by retaining or cutting individual trees or groups of trees. The diverse light conditions caused by the irregular spacing of trees provide greater opportunities for oak to develop and flourish compared to closed canopy conditions.

CROP TREE RELEASE (CTR)

Another intermediate treatment to assure that oaks recruit into the overstory and that a bottleneck does not occur is crop tree release. The crop trees are relieved of horizontal competition from adjacent trees. The released trees become more free-to-grow to capture the additional growing space vacated by the removal of adjacent trees. Thus, the crop trees are more vigorous, healthier, and grow faster enhancing their crown position and stature in the stand. Removal of competing trees from crop trees maintains more open canopies that are favorable for shade-intermediate oaks.

Crop tree release is conducted primarily on trees in the co-dominant crown class and developing saplings and poles where growing space is limited as the stand approaches a closed canopy. Trees in a dominant crown position do not require a release and those that are in the intermediate crown position have already been left behind and do not recover even with a release. Removal of competing trees adjacent to crop trees in young stands is usually a precommercial operation and can be costly. However, some income may be derived with removal of co-dominant trees in older stands. Typically, 30 to 50 trees per acre are selected as crop trees and released for future growth and development. More released trees will increase costs for the operation.

Miller et al. (2007) provides a comprehensive synopsis of crop tree release (web address below) based on research and expresses much more information on application, benefits, economics, and risks than can be conveyed in this fact sheet. A few key aspects of crop tree release are outlined below:

Thinning provides growing space for remaining trees and partial sunlight to aid in the continued growth of oak advance reproduction. Photo Credit: *Wayne K. Clatterbuck*

- Release crop trees on 3 or 4 sides through a crown-touching release. Adjacent trees that are not affecting the crown of the crop trees should not be removed. Intermediate and suppressed trees below the crown level of the crop tree should not be treated or removed (extra cost). Trees exterior to the competitor tree removal will also grow into the released growing space. Additional crop tree removals may be necessary in the future as crop trees and other trees fill the available growing space.
- Trees being removed can be treated mechanically by cutting or girdling with a chain saw (keep safety in mind) or chemically with herbicides (glyphosate, triclopyr, imazapyr) through hack and squirt treatments where the trees die in place.
- Precommercial crop tree release is expensive, taking considerable time and effort. Costs incurred should be offset with potential benefits of the practice, primarily by selecting crop trees to improve the proportion of highly-valued species in the stand, greater diameter growth, better form, shorter rotations, or other management considerations. Selecting too many crop trees will increase implementation costs. Crop trees can be selected for timber, wildlife (habitat and mast), aesthetics, diversity, or other management purposes. For example, a rarely occurring species in the area should probably be retained rather than removed.

Crop tree release of a white oak tree.
Photo Credit: *Wayne K. Clatterbuck*

The purpose of crop tree management is to reduce adjacent competition allowing more space, sunlight, moisture, and nutrients for crop tree growth. Selected crop trees should respond to the release and remain competitive for many years. This intermediate practice enhances the development of slower-growing oaks by reducing competition, providing favorable environmental conditions (primarily more open canopies and dispersed sunlight), and allowing emergence of oaks into the overstory.

FURTHER READING

Miller, G.W., Stringer, J.W., Mercker, D.M. 2007. Technical guide to crop tree release in hardwood forests. Extension Publication PB1774. Knoxville, TN: University of Tennessee Extension, Institute of Agriculture. 24 p. (https://utia.tennessee.edu/publications/wp-content/uploads/sites/269/2023/10/PB1774.pdf).

Emmingham, W.H., Elwood, N.E. 1983. Thinning: An important timber management tool. Oregon State University Extension Service Publication PNW 184. Corvallis, OR. 8 p. (https://extension.oregonstate.edu/sites/default/files/documents/pnw184.pdf).

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PB 1921-H 03/24 24-0091