



# CENTRAL HARDWOOD NOTES

## Silvicultural Treatments In Immature Stands

Silvicultural treatments for immature central hardwood stands include precommercial and commercial thinnings, lateral branch pruning, fertilization, cull tree deadening, and vine removal. The specifics of these treatments are discussed elsewhere in these Notes. This Note discusses some basic concepts in the selection and application of silvicultural treatments for central hardwoods.

### What Should Be Done?

To decide when and what silvicultural treatments might be useful in immature central hardwood stands you should answer the following questions in sequence:

1. What is the current condition?
2. What are the specific management objectives for the stand?
3. Given the current condition, are the management objectives realistic?
4. If the objectives are realistic, what specific silvicultural treatments are needed and practical?

### Stocking Guides

An important tool to evaluate what to do and how to do it is the stocking guide. By stocking we generally mean the proportion of an area actually occupied by trees in relation to the optimum area that would be occupied by trees under ideal growing conditions. It is also referred to as "relative stand density." The basic premise is that, as individual trees grow larger in diameter and crown size, there will be fewer trees per unit area. A stocking chart shows the relationship between basal area, number of trees, average tree d.b.h., and stocking level (see Note 5.02 *Stocking Chart for Upland Central Hardwoods*).

Although number of trees and basal area are the variables usually measured and used to enter the charts, the "A" and "B" stocking level lines are the most important for management decisions. The "A-line" is also called the "average maximum density line" and is based upon the minimum area of land needed by trees of a given diameter. It is generally derived from undisturbed or "normal" stands. The "B-line" for oak-hickory is based upon the relationship between crown width and d.b.h. for open-grown trees and represents the maximum area occupied by trees of a given diameter.

When stocking is between the A and the B lines, wood production per acre is nearly constant. If the management objectives call for a dense, slowly growing stand to maximize tree quality, the stocking should be held near the A line. But if fewer, faster growing trees are desired for a shorter rotation or maximum species control, the stocking should be held near the B line. Or if you want to stimulate

understory growth for wildlife browse, it may be necessary to reduce the stocking below the B line. Once you select a specific stocking level target and have determined the existing stocking level, the number of trees and/or basal area to remove in the thinning can be obtained from the chart.

Stocking charts for other central hardwood types may be similar in principle but may differ slightly in detail from the oak-hickory chart. For example, the chart for black walnut was developed from the maximum tree area with stocking expressed as “crown competition factor” (CCF) since minimum tree area information was not available (see Note 5.07 Estimating Black Walnut *Growth* and Yield). A stocking of 100 CCF is the same as the B line, but an A line is not precisely known.

Because different species may have different minimum areas, variation in species composition in mixed stands may require direct summation of minimum tree areas by species and size classes, as has been proposed for Allegheny hardwoods. So it may well be necessary to determine minimum tree area equations for central hardwood species other than the oaks and hickories, or to test equations from other regions to use with central hardwoods.

#### Area-wide Versus Crop Tree Treatments

Silvicultural treatments are generally applied either to an entire stand (area) or to individual trees. For example, vine control would normally be applied to an area, while lateral branch pruning should normally be applied to selected crop trees. Thinnings can be either area-wide or by crop trees. In both cases, the objective is the same, to provide additional growing space for the best trees.

An *area-wide* thinning usually includes the following steps:

1. Determine the number of trees and/or basal area to remove by comparing the existing stand to target (“leave”) stands. Consider both species composition and diameter structure.
2. Develop a priority list of trees to remove. Start with cull trees, then less valuable species, low quality individuals, and finally “excess” trees within diameter classes.
3. Mark so as to thin the entire stand as evenly as possible within the constraints defined in steps 1 and 2.

For a *crop tree* thinning focus on the trees expected to benefit directly from the thinning.

1. Determine the number of crop trees desired. For timber products, aim for 50 to 100 final crop trees per acre plus some “insurance” trees. The younger the stand, the more insurance trees you should retain.
2. Calculate spacing between crop trees =  $\sqrt{\frac{43,560 \text{ sq.ft. per acre}}{\text{number of leave trees per acre}}}$

3. Mark the stand by first identifying crop trees plus insurance trees at the appropriate spacing; then mark for removal one or more trees competing with each crop tree, depending upon the thinning intensity.

#### Modify General Prescriptions

Past treatments and wide site differences have created highly variable central hardwood stands. Consequently, you will often need to modify general silvicultural prescriptions to accommodate both stand conditions and owner objectives. Carefully consider the biological bases from which silvicultural treatments are derived when making such modifications and when explaining treatment rationale to owners, managers, and forest workers.

Richard C. Schlesinger  
North Central Forest Experiment Station  
USDA Forest Service  
Carbondale, Illinois