

Forest Stand Improvement with Crop Tree Management

Crop Tree Management (CTM) is a forest stand improvement practice based on a “crown-touching” release technique. Crown-touching release technique focuses on releasing individual trees that have been pre-selected to produce benefits consistent with landowner goals and site objectives. Crop Tree Management involves careful identification of landowner goals, establishment of stand-specific objectives, and development of crop tree selection criteria. Ultimately, the entire perimeter of each crop tree’s crown is “released” from competing tree crowns, (Figure 1) thereby redistributing the growth potential of the site to the best trees so that they get bigger, grow faster and move into larger diameter forest products sooner. Neighboring trees are cut if their crowns touch or extend over the crown of the crop tree. Crop trees are typically high value timber species or high value mast producing wildlife species. CTM typically follows a 6 step process.



STEP 1: Identify landowner’s goals and objectives

Common landowner goals and objectives include improving the woodland for wildlife habitat and managing the stand for timber production – firewood, saw logs, and veneer, etc. Fortunately, both of these goals are compatible with one another. Selecting high value timber species for release not only stimulates the growth rate of the crop tree, thereby allowing the selected crop trees to reach economic maturity sooner, but released trees will expand their crowns thus enabling them to produce more mast, (e.g., acorns, nuts, walnuts, berries, etc.) for wildlife consumption and for future regeneration of desirable tree species.

STEP 2: Select suitable species

Most Illinois forests could benefit from CTR, but the greatest benefit will be realized on the more productive sites. Productive sites exist where measurable growth will occur the quickest and where returns on an investment will be realized soonest. Sites with deep, fertile and moist soils, sites with north and east slope aspects, and sites that are lower on the slope are the best choices.

If timber production and/or improved wildlife habitat are goals for the landowner, then certain trees should be favored to meet these goals. Desirable oak species such as white oak, bur oak, swamp white oak, northern red oak, black oak, and cherrybark oak are valuable timber species as well as important mast producing species capable of sustaining diverse wildlife populations. Hickory species are generally considered a marginal economic timber species but a valuable mast producing species. Hickory species that are typically found in Illinois include shellbark hickory, bitternut hickory, mockernut hickory, pignut hickory, pecan, and shagbark hickory. Black walnut is also a premier timber tree as well as an excellent fall and winter source of food for wildlife. Hackberry, basswood, silver maple, cottonwood, sycamore, Kentucky coffeetree, Ohio buckeye, sassafras, while not valuable timber or hard mast species, are none-the-less necessary associates of a healthy and diverse forest ecosystem and should be maintained, if possible, in the stand.

STEP 3: Determine crop trees

Once specific goals and objectives have been established, criteria can be developed for selecting crop trees. Mark crop trees as they are selected in order to facilitate release cutting and gain a better understanding of the stand level of treatment. Criteria are characteristics looked for when selecting crop trees. The following lists illustrate selection criteria for stands where wildlife, aesthetics, or timber (Figure 2) are the primary objective. Remember, the criteria lists below are only guidelines. Land users can—and should—develop criteria to suit specific goals. It is interesting to note that many high value timber crop trees are also premier mast producing species. For all tree species, crop trees should generally meet the following selection criteria:

Wildlife or General

- Large healthy crown in or above the main canopy
- Mast-producing¹ species: (favor hard mast producers)
- Select to accomplish species diversity if applicable
- Expected longevity² >20yrs
 - Cavity trees: expected longevity > 10yrs.

Timber

- Large healthy crown in or above the main canopy
- High-value commercial species
- High-quality form:
 - No forks or large branches low on main stem (<16')
 - No or very little lean
 - No insect or disease damage
- Species well adapted to the site
- Expected longevity² > 20 years

Water Quality

- Large healthy crown in or above the main canopy
- Healthy crown and root system
- Tolerant of flooding³
- Species well adapted to the site
- High growth/nutrient accumulation potential
- Expected longevity² > 20 years

Aesthetics

- Attractive and/or unique flowers, foliage color or bark
- Unusual species and/or tree form (Non-Invasive species only)
- Expected longevity² > 20 years
- Visible from residence, travel lanes, vantage points, etc.

¹Mast is the fruit of trees, which may be hard (acorns, walnut, hickory nuts) or soft (black cherry, maple, hackberry, mulberry).

²Expected longevity is estimated by looking at the size and condition of the tree, especially any evidence of injury or decay.

³See Conservation Tree/Shrub Suitability Groups, Section II, FOTG and/or Chapter 3, IL Direct Seeding Handbook.

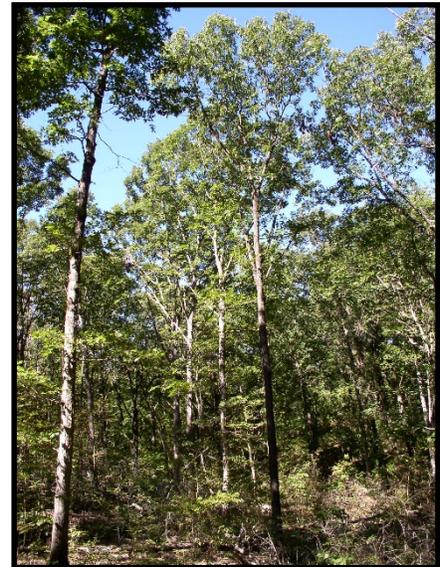


Figure 2. Example of vigorous, well-formed crop trees designated for commercial timber production.

STEP 4: Decide how many crop trees to release

The intensity of the crop tree management operation will determine the appropriate number of trees to be released. For example, if the landowner decides that every crop tree should be released in a particular stand – the practice may result in a heavier cut. Other alternatives might concentrate on selecting the best 20 trees per acre – resulting in a lighter cut. Landowner objectives and stand quality may result in as few as 5 to 20 crop trees released per acre, but never more than 100 trees per acre. Generally, most situations call for 25-75 crop trees per acre to be identified. Keep in mind that only the trees in direct competition with the crop tree should get cut; all non-competing trees should remain in the stand. In addition, if the residual mid-story trees are removed to

create a more open understory the practice may positively affect the regeneration of those desirable tree species requiring more sunlight for germination and growth. Canopy openings increase the amount of sunlight reaching the forest floor, thereby stimulating the growth of a variety of forbs, herbs, legumes, and other herbaceous plants utilized by wildlife. On the other hand, leaving mid-story trees standing will reduce the open appearance of the stand and retain valuable wildlife benefits.

STEP 5: Choose which trees will be cut

The crop tree management process requires determining which trees need to be removed in order to fully release the crop trees chosen. The process is accomplished by observing each crop tree’s crown and envisioning it divided into four separate quadrants or sides (Figure 3).

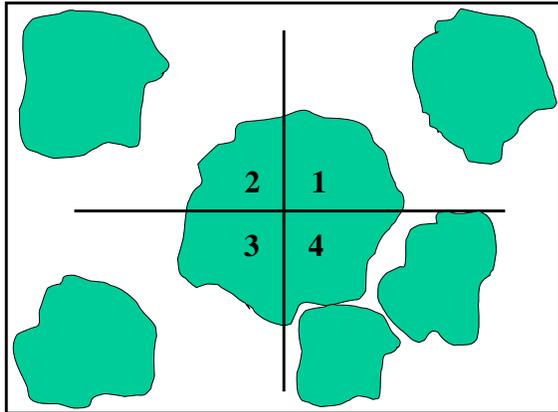


Figure 3. Crop tree broken into 4 quadrants.

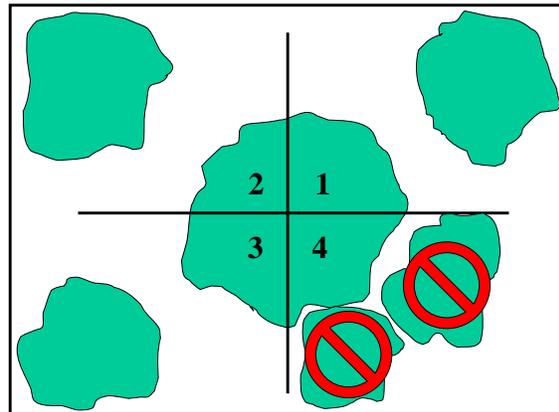


Figure 4. Quadrant “4” needs to be released.

A determination is then made to see how many of the four sides are free from competition by neighboring crowns. Each crop tree is classified from 0 to 4. A “0” classification means the crop tree crown has no room to grow. In contrast, a rating of “4” means there is no crown competition and the crop tree is free to grow on all of its four sides. A classification determination of “3” is shown in Figure 4. A crop tree that has only one or two feet between its crown and a neighboring crown is not free to grow in that quadrant. If there is doubt about whether an adjacent tree is touching and competing – eliminate it.

Healthy crowns of immature hardwood trees generally expand at the rate of one foot per year. Therefore, the growing space between adjoining crowns decreases by about two feet annually. Consequently, 15 feet of space between crowns provides adequate release for about seven or eight years for larger trees. A minimum of 10 to 15 feet of crown growing space should be followed for all crop tree releases. A CTM release essentially involves the removal of all trees with crowns on all four sides that interfere with, or touch, the crop tree (Figures 5 & 6).

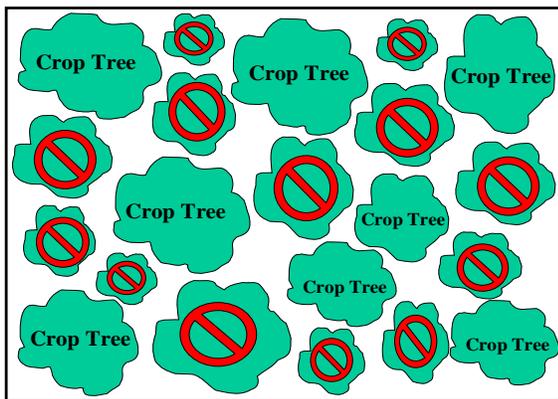


Figure 5. Crop trees identified for release.

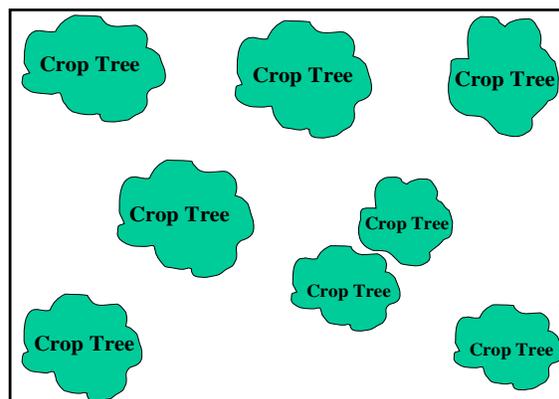
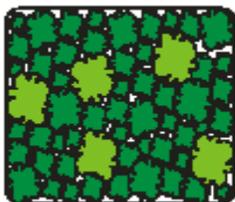


Figure 6. Competing trees removed.

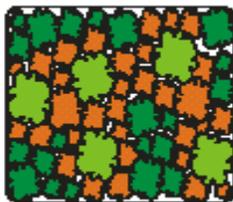
In the event that two crop trees occur close together with adjoining crowns, it is acceptable to consider the two as one crown, and then release fully around the dual crown. Choose crop trees about 25 feet apart and avoid selecting V-connected trees.

STEP 6: Eliminate trees for crop tree release

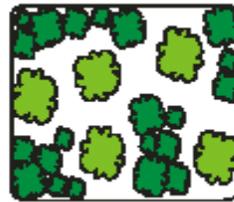
After all the trees have been identified and marked for removal, the next step is to eliminate the competing trees. Competing trees are eliminated by cutting, chemical treatment and/or girdling. Girdling (with or without chemical treatment) a tree in place results in a standing, dead snag, valuable for wildlife that no longer interferes with the growth of the crop trees. Properly girdled trees will die standing and will slowly decay. The girdling method of release often provides cavities for wildlife and sufficient decay material for insects. Refer to Illinois Forestry Technical Note 2 – Controlling Undesirable Trees and Shrubs (TN2-IL666CUTS) for methods and techniques to remove undesirable trees.



Select Crop Trees



Mark Competing Trees



Remove Competing Trees

References:

Perky, Arlyn W. and Brenda L. Wilkins. 1993. *Crop Tree Management in Eastern Hardwoods*. Forest Resources Management, Northeastern Area, State and Private Forestry; USDA Forest Service. NA-TP-19-93. 58 pp.

Merker, David. 2004. *Crop Tree Release in Precommercial Hardwood Stands*. University of Tennessee Extension. SP559-1M-10/04. 8pp.

Apsley, David and Randall Heiligmann. 2002. *Crop Tree Management: A New Tool to Help You Achieve Your Woodland Goals*. Ohio State University Fact Sheet. F-50-02. 5pp.

Bardon, Robert E. and William E. Gardner. 2001. *Crop Tree Management in North Carolina*. North Carolina Cooperative Extension Service. Woodland Owner Notes. E01-3892B. 1/01-2.5M-JMG-310031. 10pp.

Adapted from Missouri NRCS Crop Tree Management Conservation Practice Information Sheet (IS-MO666ctm) December 2005

For additional information on Forest Stand Improvement, contact your local USDA Service Center or Illinois Department of Natural Resources office.

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