



Extension FactSheet

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Crop Tree Management: A New Tool to Help You Achieve Your Woodland Goals

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Ohio woodland owners have many different reasons for owning and managing their woodlands. Some desire woodlands that provide habitat for a variety of wildlife. Others want a woodland that supports particular types of recreation such as hiking, hunting, and bird watching. Still others want to harvest timber and non-timber products from their woods for home and farm use or to provide periodic income. Most aspire to maintain or improve the health, vigor, and attractiveness of their forest. For many private woodland owners, the ability of their woodlands to provide these and many other values can be enhanced through crop tree management.

Crop trees are trees that produce or have the potential to produce the desired landowner benefits. If, for example, improved squirrel habitat is desired, a large-crowned white oak that produces abundant acorns would be a valuable crop tree. If increased economic value is an important ownership objective, a 14-inch-diameter black walnut tree with a straight and relatively defect-free trunk and a fairly small crown would be a valuable crop tree. On the other hand, if fall color was important, a group of black gum trees, which turn brilliant red in the fall, might all be potential crop trees.

In an unmanaged woodland, competition among trees for light, water, and nutrients is often severe and can result in slow growth or even the death of the more desirable trees. In a woodland under crop-tree management, these crop trees are freed from excessive competition by reducing or eliminating some of the less desirable competing trees. The released¹ crop trees are healthier and more vigorous, more insect and disease resistant, grow faster, and produce additional landowner benefits.

¹ Released trees are those that have had crown touching competitors removed.



Figure 1. Crop tree after release.

In application, crop tree management is simple. Once ownership goals and objectives have been clearly identified, criteria are developed for selecting crop trees based on those goals and objectives. Next, trees meeting those criteria are located in the woodland, and then some or all of those trees are released from competing trees (Figure 1). An important tangible advantage of crop-tree management for the private nonindustrial forest landowner is that it focuses management activities on improving the health, vigor, and growth rate of trees that directly satisfy ownership objectives.

This fact sheet is intended to introduce the crop-tree management process and to provide some guidance in its application. Landowners and others seeking a more in-depth written reference to crop-tree management are encouraged to obtain a copy of *Crop Tree Management in Eastern Hardwoods*.² Although written for professionals, its content is well within the grasp of knowledgeable forest landowners.

Identifying Goals and Objectives

The first and most important step in managing any resource is identifying ownership goals. In this case, why do you own your woodlot? Do you like to hike and bird watch? Are you a hunter? Do you hope to produce income from timber now or in the future? Is it the fall foliage and spring wild flowers that grab your attention? Ever thought about how your forest can improve the quality of water flowing through your property?

Clearly, identifying goals for your woodland is critical. They provide the basis for determining what should and should not be done in your woods to improve its ability to satisfy your needs and desires. Said another way, ownership goals define the target for management activities such as crop-tree management.

The next step is to translate the more general ownership goals into stand-specific³ objectives. For example, if enhancing the quality of wildlife habitat is an ownership goal, shortening the time to mast⁴ production and increasing the amount of mast produced using crop-tree release might be an objective for a young oak-hickory stand. Or, if future income was a goal in a mixed species stand, increasing the growth rate of the economically more valuable trees through crop-tree release might be an objective.

And just as we can have more than one goal for our woodland, we can and most likely will have more than one objective for individual stands. We could, for example, be looking at a 30-year-old mixed oak-hickory stand with overall goals of improving timber production and wildlife habitat. In such a stand, crop-tree management could be used to selectively release some trees that satisfied the timber production goal (high-value species, good quality, fast growing), some that satisfied the wildlife habitat goal (mast-producing species, variety of species, large crowns, etc.), and some that might satisfy both goals.

² Perkey, Arlyn W. and Brenda L. Wilkins. *Crop Tree Management in Eastern Hardwoods*. U.S.D.A. Forest Service Technical Publication NA-TP-19-93.

³ A stand is a group of trees with similar characteristics such as age, species, health, and quality.

⁴ Mast is the seed and fruit of trees utilized as food by wildlife.

Table 1. Examples of Crop Tree Selection Criteria for Woodland Owners With Wildlife, Timber, Aesthetics, and Water Quality as Primary Objectives.

WILDLIFE

- Crown is large, healthy, and in or above the main canopy.
- Mast-producing species (prefer hard over soft).
- Trees with dead branches and open cavities are desirable.
- Species variety is highly desirable.
- Expected longevity of 20+ years.

TIMBER

- Crown is large, healthy, and in or above the main canopy.
- High-value commercial species.
- High-quality tree with:
 - ✓ Butt log with high-grade potential.
 - ✓ No sprouts on butt log.
 - ✓ No lean, low forks, etc.
- Species well adapted to the site.
- Expected longevity of 20+ years.

AESTHETICS

- Select trees and species that are unique in appearance or character, produce attractive flowers and colorful foliage, and have attractive or unique bark.
- Visible from travel lanes, vantage points, etc.
- Expected longevity of 20+ years.

WATER QUALITY

- Crown is large, healthy, and in or above the main canopy.
 - Species that are good nutrient accumulators (young, deciduous).
 - Species tolerant to flooding.
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Developing Crop Tree Selection Criteria

Once specific goals and objectives have been established, criteria can be developed for selecting crop trees. These criteria are simply characteristics looked for when selecting crop trees. Table 1 shows examples of selection criteria for landowners with wildlife, timber, aesthetics, or water quality as their primary objective. Remember, these are only examples. You can — and should — develop criteria to suit your specific goals. And, as we noted earlier with our timber and wildlife example, several criteria aimed at achieving more than one objective can be used in a single stand.

Inventory — Identifying Crop Trees

Now it's time to inventory your property, utilizing your selection criteria, to see how many potential crop trees are present. How extensive and sophisticated this inventory needs to be depends on the size and character of the woodland and the

intensity of crop-tree management planned. A woodland owner with 10 acres who intends only to release three or four hard mast-producing trees per acre to improve wildlife habitat may need to do little more than walk over the property and select the trees based on the selection criteria and their spacing throughout the woodland.

On the other hand, a woodland owner with 50 acres who intends on releasing 20 to 30 crop trees per acre to favor timber production and wildlife habitat may need a fairly detailed inventory to determine the number of suitable crop trees, identify their location, evaluate their potential to respond to release, and indicate how many trees need to be removed to release the crop trees. Also, if the trees to be removed are merchantable and the removal is to be a commercial sale, some form of formal inventory will be desirable for marketing purposes.

The methodology to perform a formal inventory is beyond the scope of this fact sheet. However, when a complete or sample inventory is performed for crop tree management, it should include the species, diameter, height, and free-to-grow rating (described in the next paragraph) of the potential crop trees, along with a record of the trees competing with the crop trees that would be removed if the crop trees were released.

The *free-to-grow* rating is an index of competition which rates the available growing space for the crop tree by determining on how many sides of the crown there is room for growth. The rating is accomplished by visually dividing the crown of the tree into four sections and then determining how many of the sections have room to grow (Figure 2). Ratings range from 0 for trees with no room to grow to 4 for trees with room to grow in all four directions.

Application

The application of crop-tree release involves removing or deadening all of the trees that directly compete with the designated crop trees. Essentially, this involves removing or deaden-

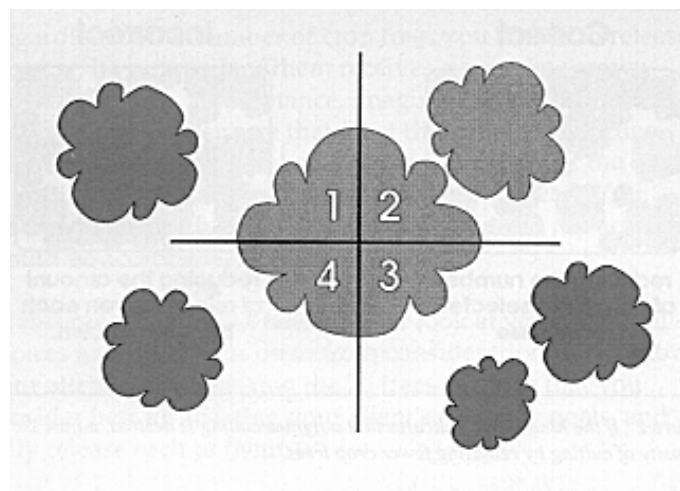


Figure 2. The center “crop tree” has a free-to-grow rating of 3. It has space to grow on three of its four sides.
(From: *Crop Tree Management in Eastern Hardwoods*. USDA-FS. Used with permission.)

ing all of the trees whose crowns touch the sides of or overtop the crowns of the crop trees. Trees whose crowns are below those of the crop trees’ crowns do not provide significant competition and are usually not removed or deadened.

The number of crop trees released and the number of competing trees is dependent on several factors including number of potential crop trees occupying the site, age and size of the forest stand, and landowner preference. Ideally, a released crop tree should have a *free-to-grow* rating of 4, meaning it has been released from competing crowns on all four sides of its crown. Occasionally, two crop trees will be so close that both cannot be released on four sides. If the decision is made to keep both trees, each can be released on three sides and their crowns allowed to touch. In general, younger stands will require more crop trees to be released since not all crop trees will survive until the stand matures.

Once the crop trees and trees to be removed have been identified, it is usually a good idea to mark them with different colored flagging and evaluate the planned release. While a crop-tree release that releases only a few crop trees per acre will have little effect on the woodland’s appearance, a moderate to heavy crop-tree release may substantially alter its appearance. Evaluating the visual impact before cutting will allow modifications if the anticipated results are not as desired.

If releasing all of your crop trees will result in an unacceptable visual effect, release fewer crop trees. It is far more desirable to completely release fewer crop trees than to partially release more. Partially released trees, with lower free-to-grow ratings, grow at a much slower rate than completely released trees. For example, using the data from Figure 3, a 10-inch-diameter tree with a free-to-grow rating of 4 would increase to more than 14 inches in 10 years while the same-sized tree with a 0 free-to-grow rating would only increase to less than 12 inches. Based on a conservative estimate, the tree with a free-to-grow rating of 4 would have approximately 80% more board

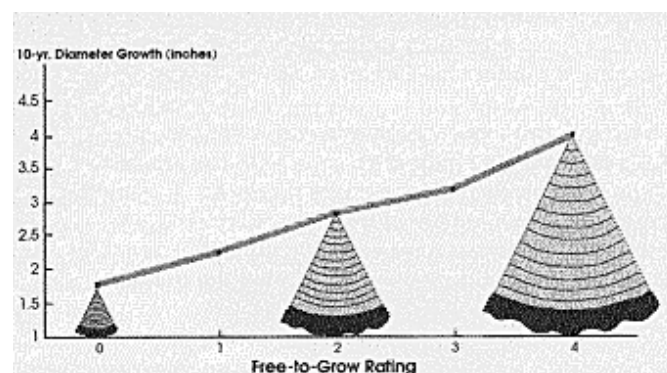


Figure 3. This graph shows how an increase in free-to-grow rating from a crown-touching release can dramatically increase crop-tree growth.
(From: *Crop Tree Management in Eastern Hardwoods*. USDA-FS.)

foot volume after 10 years than the tree with a free-to-grow rating of 0. Larger trees not only produce more timber volume but also produce substantially more wildlife food and other benefits. Consequently, crop trees that are free-to-grow are much more likely to contribute toward reaching woodland ownership goals.

Trees to be removed may be cut or deadened. In some instances, enough trees of suitable size may be cut to warrant a commercial timber sale. More commonly, the trees being removed will be too few or too small to be marketable. In such instances, the trees can be cut for landowner use (firewood,

fence posts, etc.) or deadened in place by girdling or other appropriate technique. Girdling can be accomplished by using a chain saw to cut through the bark and about one inch into the wood of the tree around its entire perimeter. Double girdling, with a second girdle about three inches above the first girdle, is even more effective. Properly girdled trees will die standing and will slowly decay, providing habitat for wildlife in the process. For more information on girdling and other techniques to free your crop trees from competition, refer to OSU Fact Sheet F-45, *Controlling Undesirable Trees, Shrubs, and Vines in Your Woodland*.

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