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Crop Tree Management for Fine Hardwoods

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Those of you who attended the Walnut Council Annual Conference in West Virginia this summer were provided tours on crop tree management by one of the originators of the technique, Arlyn Perkey. One of the many good reasons to attend the annual meeting if you can! Crop tree management (CTM) is a relatively simple and easy to use tree management system well-suited to small woodland ownerships. CTM, also called crop tree release, can be adapted to manage for several woodland ownership goals including timber production, wildlife, aesthetics, biodiversity and water quality protection.

The system is based on the principle of managing to promote the health and vigor of those trees that best achieve your management goals. This is normally done by deadening or felling trees competing with the crowns of selected crop trees so that each crop tree is free to grow on 75 to 100% of the crown circumference (3 or 4 sides). This is often referred to as a crown touching release. This method has been demonstrated to increase the growth of released crop trees in comparison to area-thinned or unthinned forest stands. There are several steps that lead to the application of this practice:

Landowner/manager goals for the property are **defined.** What the owner or manager wants to accomplish on the property will guide the selection of crop trees managed to help meet those goals.

Stand-specific objectives drive tree selection on different parts of the property. Some areas may have a higher priority of management for wildlife or aesthetics than timber production, so different crop trees are selected. The property goals and stand objectives become an important part of the long-term management plan for your property, so they deserve careful consideration. You can decide to change goals or objectives as time passes and conditions change, but that may result in additional time and management needed to meet those goals.

Figures 1 and 2. A good black walnut crop tree (center of figure 1) with straight stem and small side branches that can be easily pruned to produce a clean log. Girdling or felling (figure 2) can be used to release crop trees.

Photos by Lenny Farlee, HTIRC

Develop crop tree selection criteria. Your forester can assist with this step. Assuming you are managing for production of high quality hardwood timber, here is a list of potential criteria for selecting crop trees:

1. Select tree species with a history of strong market demand and/or better than average value. Tree species values fluctuate over time as consumer preferences and product

In This Issue

Continued from page 1

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markets change, but several species have been market leaders through time. This list includes black walnut, red and white oaks, maple, and cherry. Some other species may have good regional or local markets or grow quickly enough that what they lack in value per unit may be compensated for by growth rate in volume. A professional with knowledge of local markets can help with this evaluation.

2. Be aware of insect or disease issues that may present an unacceptable risk for some species. At this moment, ash trees across the eastern US are threatened by emerald ash borer, with little hope of a near-term solution to stop the advance of this insect pest, making ash a poor bet as a long-term crop tree in many areas.
3. Be sure the selected trees are on soils and site conditions well-adapted to good growth and health of the species. Many trees, like walnut and cherry, will grow on a wide range of sites, but only make their best growth and quality development on a much narrower range of soil and site conditions. Selecting and releasing crop trees unable to grow well due to site limitations is counter-productive.
4. Choose trees that are part of the main canopy of the woodland. Trees that have crowns that are at or slightly above the average crown height for all trees in their vicinity have a much better chance to respond well to the release provided by crop tree management. In forestry terms these trees would be called dominants, the tallest trees in the area, and co-dominants, average or better height and still in sunlight on the upper crown. Trees that are overtopped or have greatly reduced crowns barely in sunlight will have little chance of fully recovering and growing vigorously after release.
5. Select trees with clean, straight stems that have strong potential to produce high grade logs. Favor straight single stems that can produce long logs and have less risk of breakage than forked stems. Stems that are already free of branches or have small side branches that can be easily pruned to produce clean log lengths are preferred. Choose trees with no signs of damage or decay that could degrade the bottom log. Select for vertically straight trees over "leaners" that may have inferior wood quality and be more subject to wind-throw.
6. Choose trees that have enough lifespan to respond to the release. A tree that may be harvested in 5 years would not be a good crop tree candidate, since it may take several years for the released tree to fully respond to the release provided and grow vigorously.

Separate criteria can be developed for goals like wildlife or aesthetic management, depending on the landowner's objectives and woodland conditions. If you are interested in managing for these objectives, the references at the end of this article provide excellent guidance.

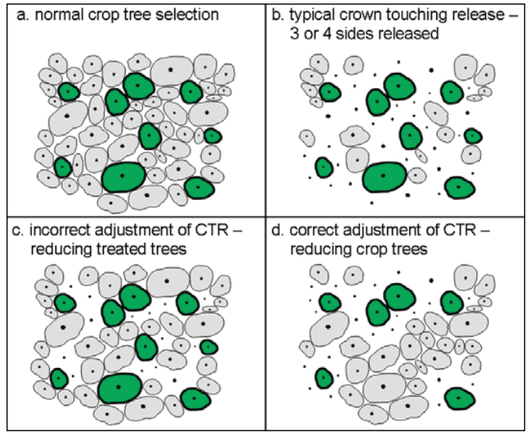

Figure 3. All crop trees should be provided at least 75% crown release (a and b). If you wish to kill fewer trees, reduce the number of crop trees (c and d). Figure from Miller, Stringer, and Mercker, 2007.

How many crop trees will be released per acre? Tree size at the time of crop tree selection will influence how many trees may be selected. If you are working in fully stocked stands that are less than 20 years old, you may be able to select 60 to 70 crop trees per acre since there are many trees and each tree currently requires less space. As the stand grows, you will have to eliminate some crop trees in favor of others, but those are positive choices, as opposed to having too few crop trees to choose from. Without crop tree management, the number of potential crop trees can drop quickly as competition in the stand eliminates trees, so starting crop tree management in young stands yields the greatest benefit. This means that you may apply crown touching release to your crop trees two or more times before they are harvested to maintain vigorous growth.

If you are selecting crop trees in older stands, you may be limited to 20 or 30 crop trees per acre, depending on your objectives. Higher crop tree numbers per acre will result in more trees to eliminate per acre to provide the crown touching release for the crop trees. In some cases, managers or landowners may want to lower the number of crop trees to maintain more trees per acre on parts of the property. This could be done to address aesthetic concerns, to provide certain types of wildlife habitat, or to protect riparian zones. In any case, if the desire is to reduce the number of trees killed, reduce the number of crop trees rather than reducing the percent crown touching release given to each crop tree.

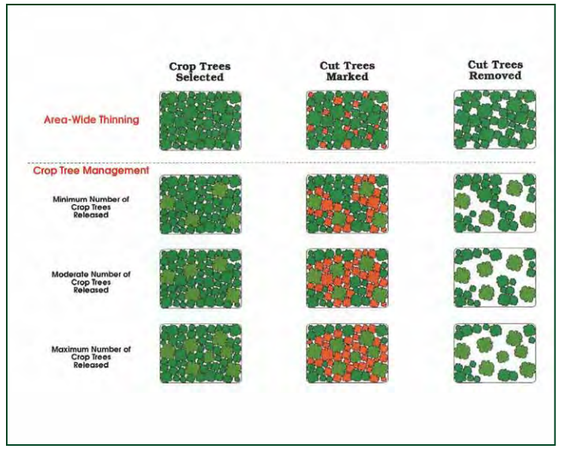

Figure 4. Differing numbers of crop trees released contrasted with area-wide thinning demonstrates the growing space provided to crop trees versus trees left in the thinning operation. Figure from Perkey, Wilkins, and Smith, 1994.

Select crop trees and trees to be cut or killed to provide the crown touching release for each crop tree using the selection criteria and desired number of crop trees per acre. To provide 100% crown touching release, look up at the crown of the crop tree and identify any trees with crowns touching or nearly touching the crown of the crop tree. Include only trees that are adjacent to the live crown area of the crop tree crown, not smaller trees and shrubs below the canopy. These are the trees to be deadened or felled to release your crop tree. A healthy hardwood tree may increase its crown diameter by one to two feet annually, so create enough free crown space for the crop tree to allow for several years of growth, at least 10 to 15 feet.

You may want to mark the crop trees with paint or flagging to help you track your selections. If you are using work crews to assist you, you may also want to mark with a different color or scheme the trees to be thinned from around the crop trees. Communicate clearly about how crop trees and trees to be thinned are marked.

There may be areas where there are not enough crop trees to meet your per acre goal. Release those trees that meet your criteria. It may not be worth the extra time and effort to release trees that are not good crop tree candidates. You may be killing several trees to release each crop tree, so you want that crop tree to more than make up for the trees being eliminated.

In some cases, you may have two crop trees very close to one another. In these instances you can retain both trees and thin all the surrounding trees competing with the crowns of the crop trees. For all crop trees you want at least 75% and preferably 100% of the crown perimeter released from competition with other tree crowns. As stated before, if this treatment seems to be eliminating more trees than desired, reduce the number of crop trees rather than reducing the percent of crop tree crown released from competition.

Trees that are not directly competing with the live crown of the crop tree do not need to be deadened. Trees and shrubs below or more than 15 feet away from the live crown of the crop tree present no immediate competitive threat and may be a good source of shade that can reduce sprouting along the trunk. Some exceptions might be a smaller tree that is rubbing or touching the trunk of a crop tree should be cut to prevent damage to the trunk, or controlling undesirable species that could expand populations with the additional space and sunlight provided.

Crop tree management is a technique that concentrates growth potential on those trees that contribute the most to the property management objectives and provides a straightforward approach for landowners to manage their forests. Below are several sources for the information in this article and additional information on the planning and application of crop tree management.

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Online Site Offers Forestry Tools

The Toolbox, available at http://www.agrability.org/toolbox, is a collection of products that help agricultural workers complete difficult tasks in easier and more effective ways. Even if you don't have disabilities, there are a number of great products to make the job easier.

New products include log-cutting and brush-clearing equipment for owners of woodlands and forests, and orchard and nursery aids for fruit and vegetable farmers. One example is the Chain Saw Caddie, a two-wheeled device which eliminates the need to bend, stoop, and carry or lift the saw for ground level cutting. In the toolbox search box, type in "forestry" to get a list of forestry items. This website is sponsored by the National AgrAbility Project.