



## HARDWOODmanagement

### High Impact Options for Hardwoods: Before, During, and After Harvest

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**T**reatments completed in association with a regeneration harvest and to a newly developing hardwood stand can result in significant financial gains compared to treatments, such as thinning, that are applied later in stand development. Regeneration and early stand treatments are effective because they can help ensure that:

- \* the stand is fully occupied (stocked) with trees.
- \* adequate numbers of well formed trees termed acceptable growing stock (AGS) are present.
- \* the AGS trees are comprised of highly valued (preferred) species.
- \* these trees have room to grow rapidly in diameter.

There is no other time during the rotation when so many improvements can be made. In simple terms, there are several silviculture practices that can be used in and around a harvest that can help ensure that stands are fully stocked with preferred species of acceptable quality. These practices are well known and work over a wide range of stand types. This article will provide you with a description of these practices and a real world example of how these practices improved the value of an upland hardwood stand. While the focus will be on timber production and value, many of these practices can also be used to improve the value of wildlife habitat and potentially forest health.

#### Pre-Harvest

Before we discuss silviculture treatments that can be completed during or directly after a harvest, it is appropriate to mention that in some stands, particularly those composed of oak species, you may need to apply a silvicultural treatment several years prior to a harvest. This is to ensure the presence of an adequate number of large competitively-sized oak seedlings or oaks that will stump sprout when the regeneration harvest occurs. Without the presence of these forms of regeneration prior to a harvest, the stand will fail to regenerate oak. One of these treatments is called an oak shelterwood. This practice removes the small understory and mid-story trees, allowing better light conditions near the ground where the small naturally occurring or planted oak seedlings are present. This improved light allows small seedlings to increase in size so that they are vigorous enough to grow rapidly after a regeneration harvest. This treatment is often done 2 to 10 years in advance of a regeneration harvest. Foresters can evaluate a stand to determine if there are adequate numbers of advance oak seedlings or stump sprouters to permit immediate harvest or whether an oak shelterwood should be accomplished, followed in several years by a regeneration harvest.

#### Regeneration Harvests and Site Preparation

A regeneration harvest is one that initiates a new age class of trees. This can be from a small group opening one-half to one acre in size up to a total clear-cut over the entire stand. A site preparation treatment is completed directly before, during, or after a regeneration harvest. Site preparation treatments for hardwoods are different than those applied in pine stands in which the treatment is normally used to prepare the site for tree planting. In hardwood stands, site preparation treatments are used to remove unwanted trees that will compete for growing space or will overtop the preferred species that are naturally regenerating. Oftentimes, this treatment will turn a commercial clear cut where unwanted species and trees are left, into a complete clear cut where these problematic trees have been removed. The treatment is conducted by individually treating unwanted trees with herbicides or cutting all (or a large percentage) of unharvested trees down and applying herbicides using a cut stump treatment to kill unwanted species. Foresters can help assess the stand and prescribe a specific treatment to ensure effective removal of unwanted trees.

The table shows the growth and development of an upland oak/maple stand that was harvested using

## 22 Year Change in Preferred Species and Acceptable Growing Stock Resulting from Silvicultural Treatments in an Upland Hardwood Stand

Species	avg. ht.		avg. dbh		Preferred	
	feet	inch	%	dbh	%	Dbh
Commercial Clear Cut	49.2	4.4	7		18	
Site Preparation	52.3	3.9	17	5.1	36	4.9
Site Prep. + Crop Tree Release	62.4	3.9	38	5.7	72	5.9

Table 1. Release of crop trees in regenerating stands.

a commercial clear cut 22 years ago. Specifically, the table provides information on the growth of the stand and the increase in the percent and size of acceptable growing stock and preferred species when appropriate silvicultural treatments were applied. Acceptable growing stock are trees of a commercial species (ex. Yellow-poplar) that have good form. Preferred species are those having high commercial value (ex. White oak, walnut, cherry).

After the commercial clear cut removed 3,000 board feet of sawtimber the unmerchantable poorly formed trees that were subjected to a site preparation treatment. The site preparation treatment was accomplished by cutting all remaining trees on the site. Trees ranged from 1 to 12 inches in diameter at breast height (dbh). The stumps of unwanted species like red maple were sprayed with herbicide while poorly formed oaks and other preferred species were left unsprayed and allowed to sprout.

Compare the data for the commercial clear cut that was not treated (row 1) to the data for the portion of the stand in which the site preparation treatment was administered (row 2). By year 22, trees in the site preparation area had grown in height and diameter to match those in the commercial clear cut, even though 20 to 40 foot tall trees were left standing in the commercial clear cut. This shows the rapid growth of the newly regenerating age class compared to the slow growth of the suppressed and poorly formed trees left standing after the commercial

clear cut. More importantly the site preparation treatment doubled the number of trees that were preferred species and acceptable growing stock. Both of these attributes will result in improved timber value over time.

Once site preparation treatments have been completed, the stand is generally left to grow until the newly regenerating trees have grown for 10 to 15 years and closed together to form a canopy. At this time, the trees in the stand can be evaluated for their form, species, and crown dominance. Crop trees are selected (typically 50 to 150 per acre) that have good form, a well-developed crown, and are a commercial species and hopefully a preferred species. Once crop trees are selected, the trees that are directly touching the crown of crop trees are removed. Typically, this is done by either chain sawing or hack and squirt with herbicides to kill the competing trees. The crown touching release is used to increase the growing space for the crop trees. This crop tree release treatment is a common, and foresters can easily define crop trees and determine what trees should be removed.

Table 1 shows the additive effect of using a crop tree release that was completed 12 years after harvest in a portion of the stand in which the site preparation treatment was administered. The crop tree release doubled the number of preferred species and acceptable growing stock compared to the site preparation treatment alone and increased the

diameter by one-half inch for the preferred species and one inch for acceptable growing stock. These improvements will result in a significant increase in the final stand value. Certainly, the combination of these treatments improved the stand dramatically compared to the portion of the commercial clear cut where no treatments were used.

### Summary

The use of a site preparation treatment and crop tree release can greatly increase the number of dominant trees in a newly regenerating stand that are of good quality and a preferred species. These treatments are normally always non-commercial and cost money to apply. However, foresters will know whether farm bill programs can be used to offset the costs of these treatments and how to minimize their costs. Once these treatments have been done, the next thinning or release will probably be a commercial harvest. During this harvest a large number of the original crop trees will be retained for final harvest. In the example above, the site preparation and crop tree release yielded four to five times the amount of acceptable growing stock and preferred species compared to conducting a commercial clear cut without silvicultural treatments. Also, the diameter growth of the trees was improved by the release. Both of these result in improved value. These practices increased future sawlog value by four times and reduced the length of the sawlog rotation by 10 to 30 years, both increasing the value of the stand substantially.

Foresters can evaluate your stand prior to a harvest to determine if the stand is ready to regenerate, if it needs a site preparation treatment, and if it will need a release 10 to 15 years after the harvest. Regardless, these treatments alone or in combination can produce results that will ultimately improve the long-term value of your stand.