



IMPROVING TIMBER STANDS

FOREST STEWARDSHIP MANAGEMENT NOTE #16

"November is, for many reasons, the month of the axe...The leaves are off the hardwoods, so that one can see just how the branches intertwine, and what growth occurred last summer. Without this clear view of treetops, one cannot be sure which tree, if any, needs felling for the good of the land."

- Aldo Leopold

INTRODUCTION

During the time between the regeneration of a new stand of trees and its harvest at maturity, the ability of most woodlands to meet the landowners' objectives can be enhanced by various management practices. Tree can be viewed as crops, and like beds of garden crops, stands of crop trees can often be improved by weeding, thinning, and pruning. Collectively, such methods and are referred to as timber stand improvement (T.S.I.) practices.

This Note introduces the concept of crop tree management, to the various types of T.S.I. practices, and to the many publications that are available to assist landowners improve their timber stands. Stewardship implications of T.S.I. practices are briefly discussed.

LANDOWNER OBJECTIVES AND CROP TREE MANAGEMENT

1. **SELECT CROP TREES BY OBJECTIVES** - In contrast to more technical, commercially-oriented T.S.I. methods, the "crop tree method" is designed to be easily understood by non-foresters and to enhance the multiple values commonly sought by private, non-industrial landowners (#16, FSMN #17). With this method, the landowners' goals and objectives are first defined for each management unit (FSMN #34). Based on these considerations, one or more categories of crop trees (e.g., timber trees, wildlife trees, aesthetic trees, water quality trees) are identified for each management unit. Then, criteria, such as species of trees, size of trees, etc., are defined for each crop tree category.
2. **REMOVE NON-CROP TREES CAREFULLY** - The T.S.I. practices discussed below can then be applied to favor the types of crop trees selected to enhance the landowners' objectives. Most T.S.I. practices involve cutting trees that are undesirable. One might think at first that it would be good to remove all non-crop trees, but this is rarely the case. The more non-crop trees that are felled, the more likely crop trees are to be damaged. Furthermore, too much growing space can cause crop trees to become too branchy for good timber production and may even cause damage to them from exposure to the weather. Thus, the methods used for T.S.I. must be used in moderation or the result may not be an improvement.

FOREST TYPES WHERE T.S.I. PRACTICES ARE JUSTIFIED

T.S.I. practices tend to be economically justified only in forests dominated by the more commercially valuable species. In Michigan, such forests include those having substantial levels of valuable hardwoods, such as basswood, black walnut, black cherry, oak (and hickory), red maple, sugar maple, white ash, yellow birch, yellow poplar, and occasionally other species (#8). T.S.I. is also commonly justified in red pine and white pine stands. For most species, 45 years is the maximum age beyond which the expense of TSI is not likely to be justified.

TYPES OF T.S.I. PRACTICES

1. **SEEDLING-SAPLING STANDS** - The following practices apply to stands that are dominated by seedlings and saplings (trees less than 5" in diameter at breast height (DBH), meaning 4.5 feet above the ground). Collectively, such practices are often called "release" treatments.

CLEANING AND WEEDING - Cleaning removes only overtopping competitors of the approximately the same age. Weeding removes all competitors of approximately the same age. These practices are not needed if there are more than 200 seedlings or saplings per acre of the desired species that are evenly spaced and free enough from competition to grow well. If the desired species are in short supply, consider site preparation and replanting (FSMN's #10,12).

If the desired species are plentiful but suffering from competition, select good quality trees about 15 feet apart as crop trees to be given more growing room. If the crop trees are less than 6 feet tall, remove competitors within 3 feet. If the crop trees are more than 6 feet tall, remove competitors within 6 feet that are more than 1/2 the height of the crop trees. If the competing plants are much taller than the crop trees, begin 2 feet from the top of the selected tree and extend an imaginary line out in all directions at a 45-degree angle to form a downward pointing cone. Remove trees that are growing within the space of the cone (#8).

LIBERATION CUTTING - Liberation cutting frees desirable seedlings and saplings from undesirable, overtopping trees that are much older. Liberation is often needed after regeneration has become established, about 5-10 years after a partial harvest. Larger cull trees that are competing with crop trees should be felled, girdled, or killed with herbicides (see #8 for further specifications), except those that are needed to achieve wildlife objectives (FSMN #28).

2. POLE-SAWLOG STANDS - The following practices apply to stands that are dominated by poles (5.0-9.9" DBH) and sawlogs (10.0" DBH and up).

IMPROVEMENT CUTTING - Improvement cutting focuses on the removal of trees, shrubs, and vines (#14) that are undesirable to retain in the stand due to poor form, low vigor, economic maturity, wrong species, etc. This practice is usually combined with a thinning operation. Note: "timber stand improvement" is sometimes narrowly defined to include just this practice.

THINNING - Whereas improvement cutting focuses on the removal of undesirable trees, thinning focuses on providing growing room for the pole- and sawlog-sized crop trees. The overall purpose of thinning is to space trees so that they fully occupy the site (utilize the available light, soil, and moisture resources) without becoming stressed by overcrowding. Accordingly, as stands age and the trees become larger, fewer trees per acre can be supported without excessive competition.

USEFUL PUBLICATIONS ON IMPROVEMENT CUTTING AND THINNING - Improvement and/or thinning cuts are the T.S.I. methods most commonly practiced by landowners and many public information bulletins on these topics are available (#4-12,16-19). For hardwoods, References #5 and #16 are especially useful. For red pine, References #4 and #11 are recommended. Information on white pine is harder to come by but References #16 and #17 contain some guidelines. Special considerations apply for T.S.I. operations in sugarbushes (FSMN #20) or fuel woodlots (FSMN #19).

PRUNING - Pruning, the removal of selected branches, is commonly practiced only on species that produce high quality lumber or veneer and only in areas where there is a market for such products. However, pruning may also be effectively used to enhance the beauty of certain areas, to expose views, or to reduce fire hazard by keeping branches above the reach of ground fires. Technically speaking, pruning is a tree improvement practice rather than a stand improvement practice. See References #3,8,11,13, and 17 for pruning guidelines and specifications on various species.

STEWARDSHIP CONSIDERATIONS

Most information on T.S.I. focuses on timber production, but other values are often of equal, or greater, importance to landowners. For example, there are ways to incorporate aesthetic considerations into T.S.I. operations (#16, FSMN #33). Water quality can also be enhanced by careful selection of trees to be retained along the edges of water bodies (#16, FSMN #31).

The effects of T.S.I. on wildlife habitat can be customized by selecting certain practices or by varying the degree to which they are used (#2). For example, early release cuttings speed the growth of crop trees, reduce the length of the brushy stage, and inhibit wildlife species that depend on brushy vegetation. Whether this is desirable or not depends on the type of wildlife the landowners are interested in and the existing levels of similar habitat and wildlife populations in the area (e.g., FSMN #42).

On a local scale, more wildlife diversity generally exists where there are more species of plants and where the vegetation is layered and patchy (FSMN's #40,41). Thus, T.S.I. practices that diversify existing vegetation can attract new wildlife species. An example of this would be a thinning that allowed enough light to reach the forest floor to stimulate ground vegetation where few plants previously grew. Non-living habitat structures, such as brushpiles (FSMN #26) and den trees (FSMN #28) can also be developed in conjunction with T.S.I. operations.

REFERENCES

FSMN #'s refer to other Forest Stewardship Management Notes in this series.

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