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Taking Care of the Forest Crop: Cultural Practices

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FOREST MANAGEMENT CORRESPONDENCE COURSE

UNIT 3

Purposes

- Learn how to determine the condition of your woodlot.
- Identify ways to maintain or improve benefits from your woodlot.
- Understand the importance of proper timing of cultural practices.

Advantages of Caring for Your Woodlot

A woodlot contains from one to several tree species. Their spacing, quality, age, and suitability to the land largely determine the benefits to be obtained. The future of your woodlot depends on its current condition and how you plan for its care. A well cared for woodlot is protected from fire, insects, disease, and even grazing animals.

Advantages of planned treatments include: protecting the aesthetic quality, meeting home requirements for wood products, obtaining extra income from timber sales, conserving wildlife habitat, enhancing soil and water conservation, and increasing the total value. All these add up to a better chance of maintaining the area in forest and continuing to enjoy the benefits from a correctly managed woodlot. Conservation is the wise use of natural resources. Taking proper care of your woodlot is the best kind of forest conservation for you and for future generations.

This folder is concerned primarily with timber production, but, when properly planned and applied, these cultural practices usually are compatible with most other forest uses. Although your woodlot will continue to grow without any treatment, you can improve its condition by thinning the dense areas and removing the low value and defective trees. All treatments should be done according to a well developed plan. Obtain the assistance of a forester in preparing your plan.

Species Composition

The species of trees in your woodlot determine its composition. Each tree species has its own needs for soil, water, light, and growing space. The ability of a species to compete with other plants for these requirements determines how well and where it will grow. Trees differ in length of life, growth rate, method and cycle of seeding or resprouting, and tendency to be affected by insects and diseases.

Trees are divided into two broad groups: softwoods and hardwoods. These terms can be confusing because they do not refer to the density or hardness of the wood. Softwoods are coniferous or cone-bearing trees, such as pine, spruce, or fir. Hardwoods are deciduous, broadleaved trees, such as maple, oak, birch, and aspen.

The combination of species, either singly or in mixture, is used to identify forest type (see table 1).

Stand Structure

When all the trees are about the same age and size, the stand is said to be *even-aged*. If three or more age classes are present, the stand is called *uneven-aged*. Cultural practices are designed to develop and maintain even-aged or uneven-aged structure, depending on the species composition. Aspen, pines, oaks, and birch (intolerant species) grow best in even-aged stands. Maple-basswood (tolerant species) forests grow naturally in uneven-aged stands. Any attempt to grow intolerant species in uneven-aged stands is doomed to failure.

Stand Size Classes

As stands develop (age), they pass through several stages of maturity. Differences in the size of tree diameters are used to identify this aging process: *seedlings* (0-1 inch in diameter), *saplings* (1-5 inches), *poles* (5-9 inches), and *sawtimber* (softwoods more than 9 inches; hardwoods more than 11 inches). Treatments for each of these stages are designed to improve stand conditions and the growth and vigor of individual trees. All such practices that are not part of harvesting mature timber sometimes are called *timber stand improvement* or *TSI.*

Table 1. Major Minnesota forest types

Jack pine: Forests in which jack pine predominates. (Common associates: eastern white pine, red pine, aspen, birch, and maple.)

Red pine: Forests in which red pine predominates. (Common associates: eastern white pine, jack pine, aspen, birch, and maple.)

White pine: Forests in which eastern white pine predominates. (Common associates: red pine, jack pine, aspen, birch, and maple.)

Balsam fir: Forests in which balsam fir predominates. (Common associates: white spruce, aspen, maple, birch, northern white-cedar, and tamarack.)

White spruce: Forests in which white spruce predominates. (Common associates: balsam fir, aspen, maple, birch, northern white-cedar, and tamarack.)

Black spruce: Forests in which swamp conifers (black spruce, tamarack, and northern white-cedar) predominate, with black spruce the most common.

Northern white-cedar: Forests in which swamp conifers predominate, with northern white-cedar the most common.

Tamarack: Forests in which swamp conifers predominate, with tamarack the most common.

Oak: Forests in which northern red oak, white oak, or bur oak, singly or in combination, predominate. (Common associates: elm, maple, and aspen.)

Elm-ash-cottonwood: Forests in which lowland elm, ash, cottonwood, and red maple, singly or in combination, predominate. (Common associates: basswood and balsam poplar.)

Maple-basswood: Forests in which sugar maple, basswood, yellow birch, upland American elm, and red maple, singly or in combination, predominate. (Common associates: white pine and elm.)

Aspen: Forests in which quaking aspen or bigtooth aspen, singly or in combination, predominate. (Common associates: balsam poplar, balsam fir, and paper birch.)

Paper birch: Forests in which paper birch predominates. (Common associates: maple, aspen, and balsam fir.)

Balsam poplar: Forests in which balsam poplar predominates. (Common associates: aspen, elm, and ash.)

Cultural Practices

Trees are a forest crop. Like any crop, they require a certain amount of care to maximize the benefits. Taking care of the forest crop requires a number of cultural practices that are divided into two broad categories: intermediate cuttings and harvest cuttings. Harvest cuttings are used to remove the final mature crop and to start a new crop. Cutting is needed to provide space for the new seedlings. After the seedlings are established, competition develops for light, moisture, nutrients, and growing space. Each species has its own needs for these requirements. Intermediate cuttings are used to aid the newly established reproduction and to maintain vigorously growing trees until the next final harvest.

Some of the cultural practices that may be useful to you are described separately below. They are most frequently used as described in even-aged stands. In uneven-aged stands, one or all of the practices may be used at the same time, depending on the circumstances.

INTERMEDIATE CUTTINGS

Weeding or Cleaning

The main objective is to improve composition and spacing during the seedling and sapling stages. Remove undesirable trees by weeding at the earliest possible age. Trees can be removed easily while they are still less than four inches in diameter. Select the desirable species and by weeding give them room to grow into high quality crop trees. The best way to produce high quality hardwood logs is to weed the stand between 5 and 20 years of age. If you cannot do a complete job, select about 200 of the very best trees per acre (spaced about 15 feet apart) and weed around them. Remove all competing trees for a distance (in feet) equal to twice the diameter (in inches) of the selected tree (four-inch trees need about eight feet of space in all directions).

Release or Liberation

Previously untreated stands may contain large, inferior, or valueless trees that overtop smaller understory, potentially better trees. This condition usually occurs in stands that have not been weeded. Removing these overtopping trees will *release* or *liberate* the understory, giving it room to develop into the next crop. Due to the increased demand for fuelwood, most hardwoods should be marketable. If there is no market, however, they should be eliminated as cheaply as possible without damaging the other trees. A forester can tell you which disposal method is best. Figure 1 illustrates how cutting inferior trees can improve a forest.

Thinning

The objective of thinning is to increase the diameter growth rate in pole- and sawtimber-sized stands. Thinning results in larger sized trees in shorter lengths of time. It keeps the best trees growing at the fastest rate, thus providing the high quality products that are in short supply.

When too many trees try to grow in a limited space, diameter growth is slow. Overcrowding causes the lower branches to die, reducing the length of the crown that has live branches. Start thinning whenever live branches occupy less than half of the total tree height (for example, a 30-foot tree with a live crown of 15 feet). Do not delay thinning beyond the time when the live crown has been reduced to a third of total tree height (for example, a 30-foot tree with a live crown of 10 feet). Trees with less than a third live crown usually do not respond to thinning. When weeding and releasing are done at the proper time, pole-sized stands should be ready for thinning at 15-30 years. If a stand has never been treated, a combination thinning-improvement cutting is recommended. Precommercial thinnings remove small material for which there is no market. They are considered an investment necessary for producing high quality veneer and sawlogs. Commercial thinnings remove marketable material and can provide additional income.

Thinning must be repeated often enough to maintain optimum diameter growth. Increase the spacing between trees so each crown has room on at least two sides to grow for the next 5 to 10 years. The recommended spacing (in feet) between tree trunks depends on conditions in each stand. Generally it falls between 1.3 and 2.0 times the trunk diameter (in inches; for example, a 10-inch diameter tree times 1.3 equals a spacing of 13 feet between trunks). A forester can advise you on the proper spacing for your stand conditions. Figure 2 provides general spacing guidelines for mixed upland hardwood stands.

PRUNING

High quality veneer and sawlogs must be free from knots and defects. Knots occur when branches persist. Branch

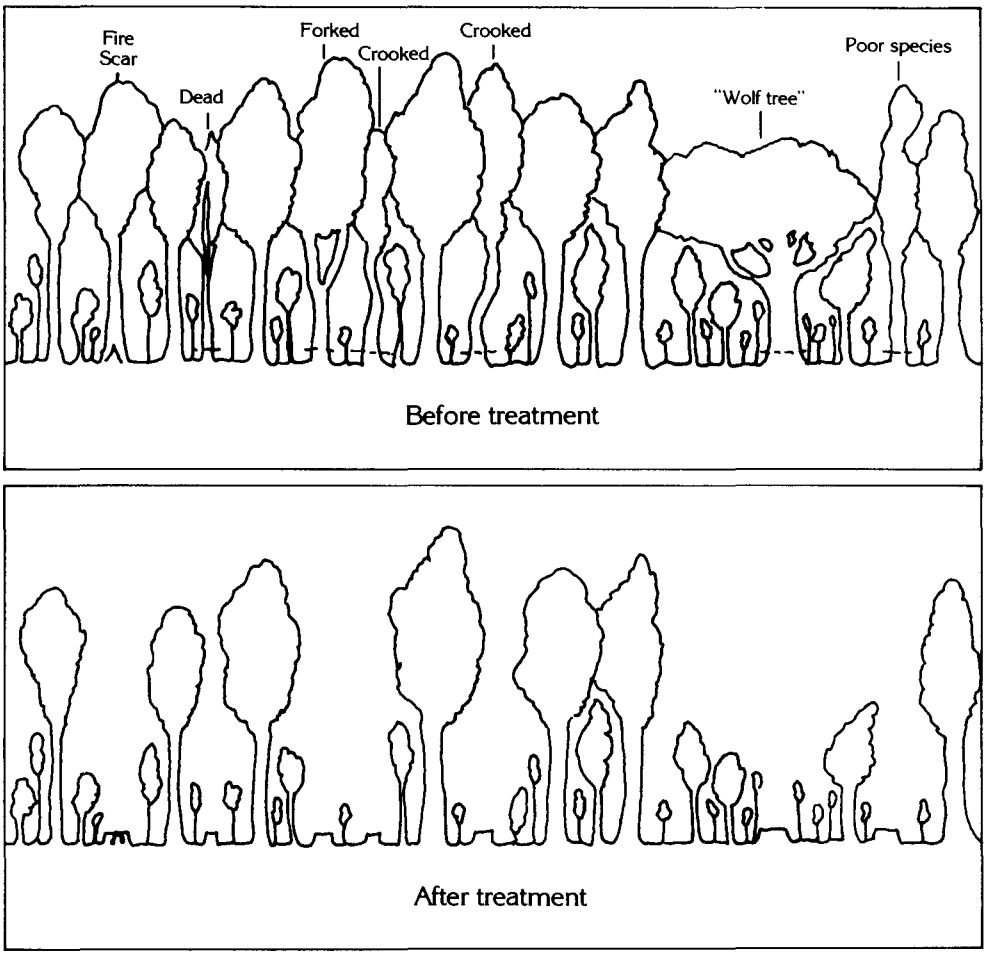


Figure 1. Trees to cut for improving your forest (Source: Farmers Bulletin 2187, Forestry Service, U.S. Department of Agriculture, May 1962).

removal at an early age limits knots to a small central core. Once the branch has been removed the branch wound heals over and clear, high quality wood is produced outside the central core.

For the greatest return on your investment, prune only fast growing, high value species. Only final crop trees that will be marketed as veneer or sawlogs need to be pruned. Usually there are fewer than 100 final crop trees per acre.

Pruning usually is started when trees are large saplings or small poles (about five inches in diameter). Branches less than one inch in diameter are the easiest to prune; they leave small wounds that heal rapidly. Never use an ax to prune. It is a dangerous tool that leaves rough jagged wounds that heal slowly. Use a saw or pruning shears and leave no stubs. Dead branches can be pruned at any time if living tissue is not damaged. It is best to prune during the dormant season (fall or winter). Avoid spring and summer when diameter growth is occurring. The first pruning should remove branches to a height of about eight feet. Do not remove more than a third of the live crown and be certain you leave at least a third of the total tree height in live crown. When the trees have grown an additional 5-10 feet, extend the pruning, in one or two steps, to a height of at least 17 feet. The same precautions about leaving the proper live crown length apply.

HARVEST CUTTINGS

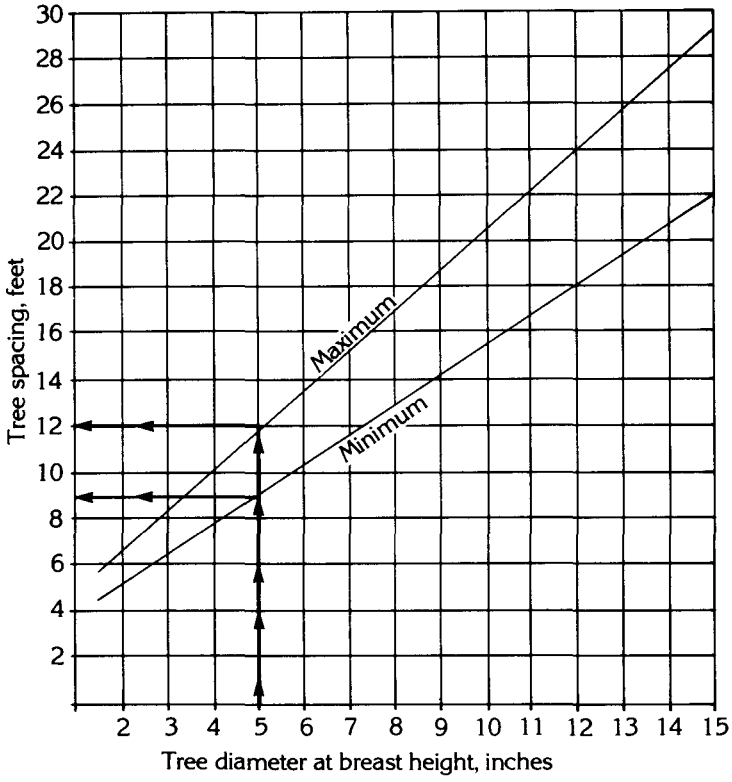
Harvest cuttings are made according to a plan that is designed to fit your conditions. They are used to remove mature crop trees and to provide proper conditions for the regeneration of the next crop. Methods most useful in Minnesota are clearcutting and shelterwood cutting in even-aged stands and selection cutting in uneven-aged stands.

Clearcutting

Clearcutting usually is used to change species or when a new stand is established by planting. A typical sequence might include clearcutting, preparing the site, planting, and followup release. Clearcutting in patches or in strips probably is the most reliable way to use this method. It can be used for a variety of conditions by keeping the patch size small (½-1 acre). On areas of several hundred acres and with the proper precautions to protect the environment, up to 40 acres of some forest types can be clearcut safely. Great care must be taken to avoid severe exposure on south and west slopes and on highly erosive or hilly land. The most reliable and cheapest way to reproduce an aspen stand is by clearcutting.

Shelterwood Cutting

Shelterwood cutting is used to remove the mature overstory in a series of two or three cuts. The first cut is designed to



HOW TO USE THIS GRAPH

- Find tree diameter at breast height (d.b.h.) on the bottom scale.
- Go upward to the *minimum* line.
- Turn left and go to the side scale. (This is the minimum spacing distance in feet.)
- Repeat these steps using the *maximum* line. (This is the maximum spacing distance in feet.)
- Any spacing between these lines is acceptable. (Example: a five-inch d.b.h. tree should have at least nine feet and not more than twelve feet of space.)

Figure 2. General guide for estimating square pattern spacing distance between trees in mixed upland hardwood stands.

prepare the seedbed and stimulate residual trees into producing seed. The second cut is made to coincide with a good seed year and provide the light necessary for seedlings to become established under the shelter of the remaining stand. The final cut is made when the reproduction is established. All remaining overstory trees are removed to release the new crop. If planting rather than natural seeding is used, the first cut can be eliminated.

Selection Cutting

Selection cutting of individual trees or groups is used to remove mature trees that have reached their most profitable size. Timber stand improvement is used to favor the potentially more valuable immature trees as replacements. No guidelines can be given to the inexperienced woodlot owner. Obtain the assistance of an experienced forester in marking trees to be cut. Maple-basswood stands are best suited for selection cutting.

Glossary

Annual Ring — The growth layer of one year, as viewed on a stem cross-section (made up of a light-colored area of springwood and a dark-colored area of summerwood).

Canopy — The uppermost layer of branches and foliage formed collectively by the crowns of adjacent trees.

Clearcutting — A harvest cutting method in which all trees in an area are cut; basic method used to maintain even-aged stands of intolerant species such as aspen and jack pine.

Composition — The kinds of tree species present.

Conifer — Cone-bearing trees with needle-shaped leaves, usually evergreen; also referred to as softwood.

Crop Tree — A tree having good form and quality that is favored in treatments throughout the rotation and carried to final maturity.

Crown — The upper portion of the tree, including branches, twigs, leaves, flowers, and fruit. Crowns of adjacent trees form a forest canopy.

Deciduous — Trees that lose their leaves during the fall; commonly called broadleaf or hardwood.

d.b.h. — Diameter at breast height, measured 4½ feet above the ground. Tree diameter is measured at this point.

Duff — Dead leaves and other organic debris, in various stages of decay, found on top of the mineral soil.

Forest — A community of living plants, with trees as the dominant species. A collection of stands as an integrated unit, frequently operated on a sustained yield basis.

Ground Cover — The grasses, mosses, herbs, shrubs, and seedlings that form the lowest layer in the forest.

Hardwood — A group of trees with broad leaves that are shed in the fall; also refers to wood, regardless of texture, produced by such trees.

Harvest Cuttings — Methods used to remove the final mature crop, either in a single cutting or in a series of cuttings, to prepare the way for a new crop.

Intermediate Cuttings — Methods used in immature stands to aid and maintain vigorously growing trees until time for final harvest.

Intolerance — The inability to grow in the shade of, and in competition with, other plants; aspen and most pines are intolerant species.

Litter — The newly fallen or slightly decayed uppermost layer of organic debris on the forest floor; duff often is included with litter.

Pole size — An immature tree from 4.6 to 8.5 inches d.b.h.

Pruning — The removal of live or dead branches from standing trees.

Release (or Liberation) — Cutting larger, inferior, or valueless trees that overtop smaller understory, potentially better trees.

Sapling — A young tree from 1.6 to 4.5 inches d.b.h.; a size class between seedling and pole size.

Sawtimber — A mature tree at least 8.6 inches d.b.h. for softwoods and 10.6 inches d.b.h. for hardwoods.

Seedling — A young tree from 6 inches in height to 1.5 inches d.b.h.

Selection Cutting — A harvest cutting method in which individual or small groups of mature trees are cut; basic method used to maintain uneven-aged stands of tolerant species such as sugar maple-basswood.

Shelterwood Cutting — A harvest cutting method in which the mature overstory is removed in a series of two or three cuts, with the final cut delayed until the new crop is established. A basic method used to regenerate even-aged stands of moderately tolerant and tolerant species.

Softwood — A group of trees having needles or scales as leaves; usually called evergreens or conifers.

Stand — A recognizable group of trees nearly uniform in age, composition, or condition and large enough to be maintained as a unit.

Swamp Conifers — In Minnesota, swamp conifers are black spruce, northern white-cedar, and tamarack.

Thinning — An intermediate cutting in immature stands designed to increase the diameter growth rate and the average form quality of the remaining trees.

Timber Stand Improvement (TSI) — A broad generalized term used to describe collectively all stand improvement cultural practices that are not part of a harvest cutting.

Tolerance — The ability to grow in the shade of, and in competition with, other plants; sugar maple and balsam fir are tolerant species.

Trunk — The main tree stem, rising from the ground and supporting the branches; also called the bole.

Understory — A layer of small trees or shrubs growing beneath the forest canopy.

Weeding or Cleaning — An intermediate cutting used to improve composition and spacing during the seedling and sapling stage; cutting or controlling undesirable woody species so as to favor the better young trees.

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Forest Management Correspondence Course Questionnaire

(Please fill out and return)

Unit 3 — Taking Care of the Forest Crop: Cultural Practices

Name _____

Address _____ County _____

Walk through and inspect your forest or a piece of forestland of your choice before answering these questions.

1. Is your forest mostly hardwood ____ or softwood ____?

   a. List the species present and estimate the percentage each occupies.

   b. Can you recognize the various stands? Yes ____ No ____ *

2. Select the largest or major stand to answer questions 2, 3, 4, and 5.

   a. In the table below, list the species present by size classes.

	Seedlings	Saplings	Poles	Small sawtimber	Large sawtimber
Softwood	0-1 inch	1-5 inches	5-9 inches	9-15 inches	More than 15 inches
Hardwood	0-1 inch	1-5 inches	5-11 inches	11-18 inches	More than 18 inches
List each species present in its proper size class column.					

*If you are dealing with your own land you may wish to contact a forestry adviser. Be sure to transfer information from this question to the appropriate question on your forest management plan (unit 1).

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b. What is the forest type (see table 1)?

3. Does this stand need intermediate cutting? Yes ____ No ____

If your answer is yes, what treatment is needed and why?

If your answer is no, why not?

4. Does this stand need pruning? Yes ____ No ____

What percentage of the tree heights is covered with living branches?*

5. Does this stand need harvest cutting? Yes ____ No ____

If your answer is yes, what method do you think would be best?*

6. Please list any questions you have.

*If you are dealing with your own land you may wish to contact a forestry adviser. Be sure to transfer information from this question to the appropriate question on your forest management plan (unit 1).