Silvics & Silviculture--The Agriculture of Trees

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Note: This is the third in a series of forestry-related articles to promote proper forestry practices, forestry education, and forestry extension. The series will also speak to some of the misconceptions about forestry. We are grateful to Mr. Belt and Mr. Campbell for sharing their expertise. ... *WVU-ES Editors*.

Forestry is a science. One of the most important of the many disciplines in forestry is silviculture. Silviculture is the agriculture of trees--how to grow them, how to maximize growth and return, and how to manipulate tree species compositions to meet landowner objectives.

To understand silviculture, one must first understand silvics. Silvics involves understanding how trees grow, reproduce, and respond to environmental changes. Here is a quick lesson on silvics.

Some tree species thrive in shade--sugar maple, beech, hemlock, dogwood, red maple, and basswood are good examples. These species can live, grow, and reproduce in shade and semishade conditions. Many tree species prefer or require full sunlight--yellow-popular, walnut, some oaks, black cherry, yellow pine, and hickory are good examples. These species require full sunlight to reproduce, after which they grow best in full sunlight or as part of the overstory canopy of the forest. They also tend to be the fastest-growing species and, to a great extent, the most

valuable species. Still other species such as white pine, white ash, and some oaks, elm, and birch are intermediate in their sunlight requirements. You may have noticed these patterns in the woods. Normally, large overstory trees are oaks and poplar while seedling and sapling composition is generally maple, beech, and other oaks.

Silvics also is concerned with seeding requirements, elevation, and location. Different species will show up in different areas, on different soils, and at different elevations. If this sounds like ecology, then it can be stated accurately that silvics is the ecology of the forest.

Silviculture involves managing and handling the forest in view of its silvics.

Silviculture imitates a natural change--such as a windthrow, beetle infestation, or fire. However, silvicultural methods harvest forest products for human use rather than wait on nature to burn them, eat them, or blow them down. Silviculture can be practiced at any time in the life of a timber stand. Deep southern pine management is an excellent example of silvicultural treatments throughout the life of a stand. However, in Appalachian hardwoods, 90 to 100% of silviculture is decided and carried out at the time of timber harvest. Therefore, I will limit discussion to silvicultural harvest methods. It is important to realize that a harvest in Appalachian hardwoods is also a regeneration-harvesting causes sunlight to hit the forest floor, which causes seed to germinate and existing seedlings to grow.

Perhaps it is worthwhile to mention what silviculture is not. "High-grading" a timber stand is not silviculture. High-grading is "taking the best and leaving the rest." Sometimes after high-grading, the remaining timber is of decent quality and the soil is productive, resulting in a future stand that is not noticeably degraded, except after a long-term look at growth. Sometimes the remaining timber is poor, and the poor-quality, poor-growth stand that results is apparent to everyone. The coalfields of Tennessee are perhaps the best example of how high-grading can turn a potentially productive region into a one having very little potential for producing sawtimber or any valuable wood products. High-grading is not a plot by loggers against

landowners; simply, it is a purely economic practice. Loggers want to cut only what they can sell easily. With the exception of a few areas, markets for low-quality materials (i.e., pulpwood) have been few and far between in the Appalachian region.

The markets are rapidly changing throughout our region. Therefore, the opportunity to practice silviculture has arrived.

Silviculture looks not only at the timber crop currently available, but also at the effects of present day harvesting on the **next** timber crop. We foresters are in a unique business in that we commonly make management decisions that will affect crop quality and growth 40 to 80 years into the future.

The following are a few silvicultural harvesting methods.

Selection systems are partial removals of trees based on the silvicultural objectives of the landowner. This method is used when species of shade tolerance or intermediate tolerance are considered desirable. Each tree is assessed, determined to be cut or to be left, measured, tallied, and marked. Although economics always plays some part in determinations, it is not the only factor. Rate of growth, potential for further growth, health, quality, spacing, and species are some of the factors that also must enter each determination.

It is important that a landowner get a graduate forester to do this assessment; a so-called "thinning" or "select cut" can be offered by anyone with a saw in hand. A thinning based only on economic factors can easily become a high-grade. Furthermore, a small tree is not always a younger tree. Although many small trees in the woods are that size because of their youth, just as many are small because of poor genetics, stunted growth, or being a poor or inappropriate species for the site. It takes many years of experience to tell the difference.

I always attempt to do a bit of spacing and some weeding or cleaning while I am conducting a selection system harvest. Part of this method is manipulating the

amount of sunlight on the ground to successfully regenerate desired species. Selection system harvesting has the advantage of allowing a timber stand to retain its forested appearance in the years immediately following harvest. It has particular advantages in higher elevations and farther north where shade-tolerant species are considered very desirable. It has disadvantages of providing for slower long-term growth, for allowing undesirable species to predominate, for allowing undesirable epicormic branching on future crop trees, for holding back valuable sun-loving species, and for being an easily and frequently abused method. Furthermore, it is very difficult to use successfully on steep ground due to high potential for heavy logging damage on residual trees.

Selection system harvests can be designed to suit each individual tract, each site, each timber type, and each individual landowner. Each type of selection system has a separate set of objectives for the manipulation of sunlight, reproduction, present crop, and future crop.

Seed tree cuts allow the harvest of all trees except 2 to 10 trees per acre. These remaining trees are chosen for their good form, genetics, species, and ability to produce seed crops. The job for these remaining trees is to rain down genetically good-quality seed on the freshly disturbed areas. Although this method leaves fewer trees per acre, these tend to have a pleasing appearance because their spacing is very consistent. This method is rarely used in hardwood management, but often used in pine management. I have used it in hardwoods in rare cases where the desirable species are wing-seeded (i.e., ash and maple). However, this is not a good method for oaks or other heavy-seeded species.

Clearcutting is also a silvicultural method. This much-embattled method is truly a viable silvicultural practice. It is most often prescribed where sun-loving species are desired for the future timber stand. It is also prescribed in poor-quality or problem stands which have been abused by fires or repeated high-grading. In pine management, a clearcut normally is followed immediately by planting seedlings.

However, where quality hardwoods grow, natural regeneration supplies more than enough seedlings from existing seed, existing seedlings (also called advance regeneration), root sprouts, and stump sprouts. Thankfully, natural regeneration of hardwoods is one of nature's strongest and most inevitable forces in our region. Where desirable hardwoods can be grown, natural regeneration is the proper plan; attempting to plant or artificially regenerate in such an area is neither necessary, wanted, nor advisable.

The desired effect of a clearcut is to start all regeneration at ground level so that the resulting timber crop is made up of desirable sun-loving species, which are the fastest growing, straightest, healthiest, and most superior trees possible. A 20- to 60-year-old clearcut is a textbook case of survival of the fittest. Because full sunlight is provided for future crop trees, rate of growth is at its greatest. Clearcut areas show 1.5 to 2.0 times the growth rates per acre than in selectively cut areas.

Clearcutting is **not** "cutting everything we want." A clearcut should truly be a **clear cut**. Clearcutting is cutting everything. The objective is to provide full sunlight--not partial sunlight, with a heavy dose of shade from runt, cull, and unwanted trees. Additionally, a truly clearcut area looks uniform--immediately after the cut and after regeneration has begun. This uniformity is much more pleasing to the eye, in my opinion, than the "hairy" look of a pseudo-clearcut or a heavily high-graded stand.

Clearcuts also require professional management. Streamside buffer zones should not be clearcut to protect the temperature characteristics of that stream. Likewise, our company will similarly buffer areas bordering towns or roads.

Obviously, clearcutting makes a lot of news. The method will arouse a tremendous amount of emotion and opinion. I have attempted to provide a few facts about clearcutting. In another article, I will attempt to address the controversy surrounding the subject. The practice is a viable silvicultural method when applied and managed correctly. It is one of many silvicultural methods available to foresters and

landowners.

Remember, the choice of silvicultural method must be based upon the silvics and characteristics of the existing species in a stand and upon the species deemed desirable to grow in that future stand. These are only some of the many silvicultural methods--by no means have I covered them all. I have simply chosen a few that seem to apply most often in Appalachian hardwoods. Each method has its place in different areas, in different terrains, on different soils, in different timber types, and with different landowners.

If you wish to locate a consulting forester, contact the USDA or extension office nearest you.