UT Extension

Renewable Natural Resources Timely Tips

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Is Soil pH Important for New Seedlings?

The measure of the activity of hydrogen ions in the soil solution is called soil pH. Acid soils have a pH ≤6.5 while basic soils have a soil pH >7.5. The pH of neutral soils will fall between these two numbers. Most tree species will grow well over a broad range of pH values (Williston and LaFayette, 1978), although pines grow best on acidic soils and hardwoods on only slightly acidic soils.

One goal of silvicultural operations should be to increase the uptake of nutrients by crop trees (Will, R. et. al., 2006). Soil pH is important because it influences nutrient uptake as well as the resulting growth rate of new seedlings. Highest concentrations of available nutrients occur with a pH of 6.0 – 7.0 (Williston and LaFayette, 1978). This is especially true with the macronutrients (nitrogen, phosphorus and potassium). When the pH is extreme (<4.5 and > 8.5) nutrients can become unavailable or even toxic to trees.

Prior to planting trees, landowners should test their soil to determine the pH. Trees can then be matched to the soil conditions, or the soil can be altered to raise or lower the pH. Typically old-fields will have a more extreme pH than will fields recently cultivated. Trees are capable of living in a broad range of soil pH values. As a rule, the pH range for Loblolly pine (P. taeda) should be 4.5 – 7.0. The pH range for most commercial species of hardwoods be 5.5 – 6.5.

There are many other soil characteristics that affect survival and growth of tree seedlings. These include soil texture (percent of sand, silt and clay), drainage, and aspect (topographic position). It is best to consult a forester when planning a tree planting project.

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New Opportunities to Export Wood Products

When you shop in a large store such as Walmart, you are probably participating in the globalization that is changing our world. Inexpensive goods of all types are flooding into the United States from China and other countries with low-cost labor. A downside to this trend is that some manufacturers in this country are unable to compete. An upside is that we all have access to cheap clothes, tools and toys.

A further possible upside to globalization is the opportunity to sell our wood and wood products to countries overseas. Traditionally, most trees harvested in the United States have been used here to make the lumber, flooring, furniture, paper and other wood products that we use everyday. However, the wood products world is becoming globalized, and this means the export opportunities are growing for Tennessee wood products.

A recent workshop in Nashville on exporting wood products struck an overall tone of cautious optimism because the export market, while competitive, is growing. Some of the meeting's main points included the following:

- About 12 percent of the lumber produced in the U.S. is currently exported. Exports are expected to grow by 5 percent in volume this year, with the value of these shipments growing at an even faster rate.

- Traditional export markets, such as Canada, Mexico and western Europe, are steady or slightly in decline. Markets in eastern Europe (e.g. Poland, Turkey) and Asia are growing quickly, with especially strong growth in China and Vietnam.
- There are many resources available to help companies get into the business of exporting wood products. State and federal agencies can help by providing market information, organizing trade missions, explaining the exporting process and paying for some of the costs.
- Exporting wood requires special procedures and paperwork, in particular related to making sure the wood is free from pests (phytosanitation). Success in exporting requires dedication to the process, knowledge of the rules and good recordkeeping.
- First hand experience with exporting wood products indicates that foreign buyers respect the high quality wood products and professional business attitude found in the United States. However, overseas markets are very sensitive to price and can be volatile. An encouraging note was that small- to medium-sized companies can be successful in exporting.
- Further information about this event can be found at http://web.utk.edu/~mtaylo29/pages/Export percent20Workshop.htm.

Globalization is changing the wood world. In particular, the movement of furniture manufacturing from the southeastern United States to Asia means that there is now a big, and growing, market for Tennessee hardwood lumber overseas.

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Wood Products

Uneven-Aged Management in Mixed Species, Southern Hardwoods: Is it Feasible and Sustainable?

By definition, uneven-aged forests contain three or more distinct age classes. These occur either from an intermixing of the age classes throughout the entire forest or through the occurrence of age classes in groups. Many people believe that hardwoods are managed most effectively by using the uneven-aged system, which promotes the development of intermixed age classes. This approach, normally termed single-tree selection, requires the management of all sizes of trees in a stand to produce a forest that contains three or more age classes growing together. Removals are typically accomplished by harvesting individual trees or small groups of trees to keep the size of openings in the canopy small. The stand is visited often to tend the developing trees, provide stocking density control and maintain the highest quality individuals.

A popular belief is that uneven-aged stands and individual tree selection are a panacea to all the issues inherent with forest management practices. A continuous forest cover with a less-disturbed appearance is maintained. The lack of disturbance to the canopy may lead to a more visually pleasing forest. However, management based solely on aesthetics without understanding the biological requirements of the species involved can lead to unintended consequences. Uneven-aged management is difficult to sustain in the majority of southern hardwood forests because of their biological requirements and the economic considerations in applying this type of management.

Because the individual tree selection method allows the canopy to remain intact, a significant amount of shade is maintained on or near the ground, and only shade-tolerant trees can successfully regenerate. There are few upper canopy, desirable species in southern hardwood forest types that are sufficiently tolerant to form understories. Sugar maple, red maple, beech and hemlock are the primary candidates in uplands, sugarberry and elms in bottomlands. However, most of these species do not comprise important numbers and represent an insignificant economic opportunity. Midstories often are composed of small-stature, tolerant species such as dogwood, sourwood, redbud, hornbeam and blackgum. When this method is applied to stands of intolerant species (poplar, most oaks, cherry, ash, walnut, cottonwood), stand composition will shift to more shade-tolerant species. Most of the hardwood forests in the region consist of even-age stands, both historically and currently. Past cutting practices have often abused the stand structure, but they have not created uneven-age stands of high quality.

The following are fundamental to uneven-age management and the individual tree selection method:

- The promotion of shade-tolerant species
- The creation of conditions for regeneration and the securing of regeneration with each cutting
- The progression of trees from one size class to another
- That cutting occurs in all size classes (density control), even precommercial smaller sizes (2 to 8 inches) to ensure continued development
- Requires more frequent entries and cutting of trees in the stand

The creation and maintenance of an uneven-age stand can be quite a dilemma. Generally, there is a loss

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Cookeville	(931) 526-9502
Burns	(615) 797-3117
Lexington	(731) 968-6676

of growth potential in creating uneven-age stands from even-age stands. For example, if a 50-year rotation is desired and a 10-year cutting cycle is implemented, one-fifth of the stand is removed during each cutting cycle. If the stand is 50 years old, then some trees would be 100 years old before they were harvested. If the stand is younger, the first cutting would harvest immature trees and the last ones would be overmature. In either case, an unjustified financial loss may be incurred. The re-entry into the stands at relatively short intervals to selectively remove trees leads to injuries of sapling and pole-sized trees. These injuries can result in a loss of tree quality over time.

Unfortunately, disturbances that occur in southern forests, whether caused by humans or natural (tornados, hurricanes, wind, ice, insect and disease, fire) are fairly common and frequent. These disturbances produce openings or gaps in the forest canopy that are large and complete enough to promote regeneration of shade-tolerant and intermediate shade-intolerant species, thus limiting the development of true, uneven-aged stands.

Also, the average length of forest land ownership for private owners is 10 to 15 years, too short a time period to implement and maintain uneven-age structure. The long-term, steady ownership of public lands may be more appropriate for uneven-age management.

A common misunderstanding of uneven-age management practices results from a misconception that tree size is an indication of age. Implementation of individual tree selection assumes that tree diameter and age correspond. However, in mixed species hardwood stands, each species usually grows at different rates. Can you tell if a 4-inch dogwood is 20 or 50 years old or whether a 14-inch white oak is 30, 50 or 100 years old? Even-aged stands of mixed species often have a wide range of tree diameters, not due to differences in age, but rather due to the different growth rates of various species.

A prerequisite of the selection method is to use procedures where trees in all diameter classes can be considered crop trees and eligible to harvest. Some discrimination among the immature trees must occur. The poorest trees are harvested during the cutting cycle and the best are retained. The best and largest trees are only cut when trees with better growth potential can replace them, regardless of whether the replacements are small sawlogs, pulpwood or saplings. Carelessly cutting only the best trees is a sure way to deplete the future productive potential in the stand. Unfortunately, this is common when high-grading or diameter-limit harvesting is practiced in the name of uneven-age management or individual tree selection.

In individual tree selection, some of the residual trees suffer logging damage, even with careful harvesting. Logging and frequent entries damage both small trees and larger residuals, de-valuing them. Since cutting cycles are more frequent, lower volumes are harvested during each entry to maintain conditions suitable for the development of high quality trees. An elaborate network of roads and skid trails is maintained, with recurrent entries increasing the frequency of site disturbance.

The intent of uneven-age management and the use of individual tree selection is to create in a single stand, a self-sustaining forest in which trees of several to many ages and sizes are present and intermingled. Shade intolerance prevents uneven-aged management for most of our commercial southern hardwoods species. This method is cost-prohibitive for most operations because of the precommercial cutting of small diameter trees to ensure uneven-age structure and the progression of smaller diameter trees to larger sizes. Additionally, the low volumes harvested during the frequent cutting cycles are generally not economically feasible.

Uneven-Age Management in Southern Hardwoods

1. Favors tolerant species
2. Less valuable sawtimber produced due to less valuable species composition
3. Cost of operations is greater and a larger land area is impacted by harvesting
4. Frequent entries invite damage to residual trees and reproduction
5. For management to be effective, trees in all size/age classes must be cut during each cutting cycle
6. Markets for small diameter products must be available to use the system economically
7. Serious danger of degenerating to high-grading and diameter-limit cutting unless proper care is taken to promote all size/age classes

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