

## Regenerating Hardwood Forests

By: Jerre Creighton, Virginia Department of Forestry



*Virginia's hardwood forests provide numerous recreational opportunities, including hiking, hunting, fishing, and wildlife viewing.*

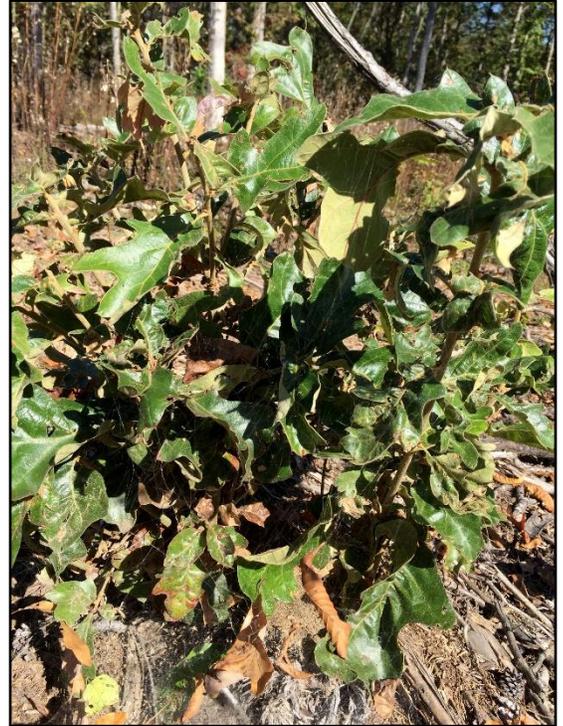
*Photo by: Jennifer Gagnon, Virginia Tech.*

Virginia is a hardwood state –approximately 80 percent of our forestland (12.6 million acres) is in hardwood or mixed hardwood-pine forests. They provide critical wildlife habitat, protect water and air quality, offer recreational and aesthetic benefits, and generate a valuable timber resource for landowners and for the industry that harvests lumber and manufactures wood products. While the volume of hardwoods growing in Virginia continues to increase, there are concerns about the future condition of the resource. Among these are high-grading (cutting the best and leaving the rest) and selective harvesting, driven by markets that demand only large-diameter trees. In addition, nearly a century of fire exclusion, damage from intense deer browsing, increasing interference from invasive species, other forest health issues, and forest fragmentation have all contributed to concerns about species composition and quality.

Successfully regenerating hardwoods is a central issue in their sustainability, and the composition and diversity of that regeneration – which will comprise the future hardwood forest – is crucial. The exact species composition of hardwood stands varies widely and depends on topography, soil, geology, local climatic conditions, land-use history, previous management activities, natural disturbances, wildlife impacts, and insect and disease pressures.

A critical concept in hardwood stands is that, following the removal of the main canopy by a complete harvest or by a natural disturbance, the future stand will be formed from new growth originating on the forest floor. This regeneration will come from: (a) small stems already established in the understory prior to the overstory being removed; (b) seeds stored on the forest floor, blown in from an adjacent stand or from the crowns of downed or cut trees; (c) sprouts from cut stumps or from the exposed roots of cut or uprooted trees; or (d) a combination of the three. Although planting hardwoods can be accomplished, it is generally not recommended because of the high cost and low probability of success. The hardwoods that re-sprout naturally following a disturbance almost always develop more rapidly and overtop and kill any planted seedlings.

Current information describing the forest's condition – soils, topography, climate, species present in both overstory and regeneration classes, and invasive species - are necessary to identify areas of concern, and determine what options might be available to address them. This is time-consuming and can be costly. But without this knowledge, the forester is simply driving blind. Armed with information, one must decide on the objective for the stand, guided by the goals of the landowner. The key to this planning phase is time. Hardwood forests develop over decades or centuries, so management regimes can often require a similar commitment to fully implement.



***In Virginia, woodland owners mainly rely on natural regeneration of hardwoods, either thorough seedlings (above) or stump sprouts (right), or more commonly, both.***

***Photos by: Jennifer Gagnon, Virginia Tech.***

The individual plants that will eventually survive and dominate

the new stand will depend primarily on how well a given species can compete with other species for light, water, and, to some degree, soil nutrients. Sunlight is probably the most important factor. Tree species that are considered intolerant to shade usually will not survive and grow in the understory of a mature stand or under the canopy of over-topping seedlings or small trees. Trees that are considered to be shade-tolerant can become established and grow in the shade of a dense overstory. Those that are intermediate in shade tolerance require at least partial sunlight to become established and to grow. Most of the oak species, hickories, and associated species fall into the shade-intermediate or shade-intolerant categories. Shade-tolerant species include most maples, beech, ash, basswood, dogwood, and holly. Yellow-poplar is a major shade-intolerant species.

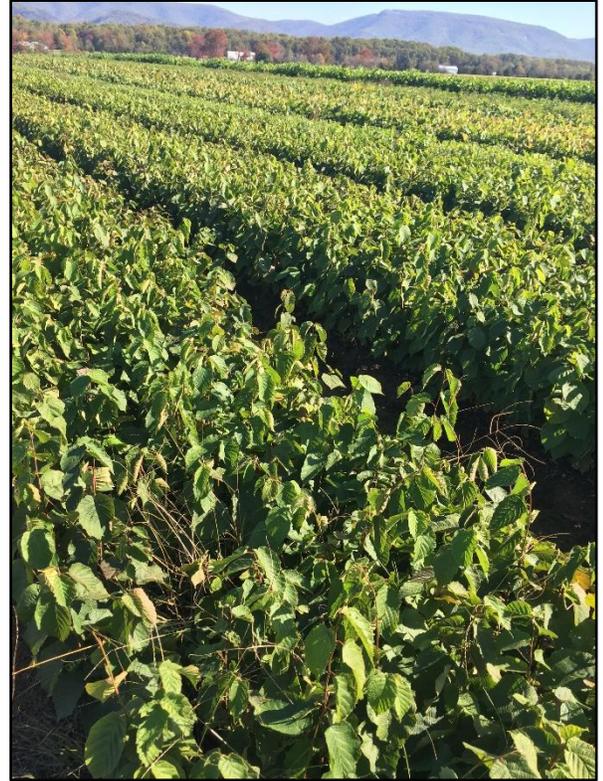
The mixed oak or oak-hickory forest types are dominant in Virginia. Where oak is a desired species in the future, it is important to understand that without advance planning and action it is possible that the oak component in the next stand will be diminished. Oak seedlings or, preferably, larger saplings present in the understory prior to the main canopy removal, combined with sprouts from the stumps removed in harvesting, are the key to maintaining oaks in the future. It can take 10 years or more to establish the desirable understory regeneration prior to a final harvest, when the entire overstory is removed. A partial removal of the main canopy and/or the removal of a significant sub-canopy will

often provide the needed light conditions on the forest floor to allow the oak regeneration to become established and to develop. This process to establish advanced regeneration of a desired species would be termed the initial harvest of the shelterwood regeneration method.

In stands that are dominated by shade-tolerant species, such as maple, beech, and basswood, where these species are desirable in the future, single mature trees can be harvested periodically, with the tolerant species being constantly re-established and growing in the understory. Under these conditions, an uneven-aged stand structure, composed of mostly shade-tolerant species, would be maintained.

The Virginia Department of Forestry can provide advice and, in many cases, financial assistance to help landowners trying to choose and implement a regeneration strategy for their hardwood forest. You can find your local VDOF forester's contact information at [www.dof.virginia.gov](http://www.dof.virginia.gov).

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***The Augusta Forestry Center in Crimora grows hardwood seedlings, as well as some pine species, that are available to landowners interested in developing Christmas tree plantations, stabilizing stream banks, and creating wildlife habitat. Photo by: Jennifer Gagnon, Virginia Tech.***