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Regenerating White Pine Stands In Maine

A Landowner's Guide

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Eastern White Pine (*pinus strobus*) is a vital tree species to the economy and ecology of Maine (the “Pine Tree” state), acknowledged by the fact that white pine has long been designated as Maine’s official state tree, and the white pine cone and tassel as the official state flower. White pine is prominently represented on the Maine state flag. Economically and socially, Eastern White Pine is one of the state’s most important tree species. Maine holds the distinction of being the number one producer of white pine lumber in the nation. In 2009, Maine sawmills processed 192 million board feet of quality white pine lumber, approximately a third of all output & 822,000 tons of pulpwood; landowners received \$31 million dollars in stumpage; substantially contributing to Maine’s GDP; while providing well paying jobs for foresters, truckers, loggers, mill workers, and others throughout Maine.

Once established, white pine grows statewide in most growing conditions, from nearly pure sand to forested wetlands. It grows best in open sun or partial shade, putting on a foot or more of height growth each year under good conditions. Although sunlight is a requirement for tree growth, the role of shade and density in growing white pine is extremely important. Growing white pine trees in partial sunlight as well as with the property density can result in smaller branches, minimizing weevil damage to stems, reducing impact of spores, and ultimately resulting in higher quality trees for future generations. For a tree that seems so well suited to Maine soils and growing conditions, establishing a new stand of naturally seeded white pine is not as easy as it seems. Woodland owners are sometimes fooled by the nearly pure stands of white pine found throughout Maine. The appearance of these stands suggests that white pine naturally and easily reproduces itself, replacing an established pine stand with another stand of young white pine. In reality, many of these “pure” stands are the result of discontinued agricultural land, and are only a relatively early stage of forest development. This process is sometimes referred to as “old field succession”. Without conscious management, many of these stands will eventually give way to the growth of mixed species. Regenerating new white pine under an existing stand of pine can sometimes be both challenging and frustrating to the woodland manager.



Here are some tips for regenerating white pine that might help the landowner/woodlot manager:

- 1) White pine seed germination is best in exposed mineral soil. This is one reason why old fields and pastures often revert to mostly white pine. Due to animal grazing or cultivation soils have usually been disturbed, providing an ideal seedbed for pine seeds. To provide a good seedbed under an existing pine stand some type of soil scarification (disturbance) is often desirable. This can often be done by conducting harvesting operations in an existing pine stand on bare ground. A common method of bringing trees from the stump to a yard or landing--known as “skidding”--consists of harvesting equipment dragging cut stems along the ground. This action can accomplish the necessary soil disturbance.
- 2) Although white pine stands usually produce some seeds every year, good seed years generally occur only every 3 – 7 years. A good forest manager should watch the appearance and abundance of pine cones in a stand. Since pine cones take two years to develop, planning a regeneration harvest around the summer months of the second year of cone development, just before the mature cones drop their seeds, is ideal. The resulting soil scarification may provide a good seedbed for the falling pine seeds. If harvesting at that time is not feasible, a separate scarification operation within the next 1-2 years may also be effective.

- 3) Successful pine regeneration, once established, requires partial to full sunlight. Quite often pine seeds will germinate and grow for the first year or two under fairly dense shade, but will then either die or, at best, will grow very slowly. Once suppressed under shade pine regeneration will often remain stagnant even if later released. For this reason a follow-up harvest should be planned to release established regeneration. This operation should occur after seedlings are well-established, i.e. 6-12' tall. More of the existing overstory trees are removed than in previous improvement thinnings, and will provide the necessary higher levels of sunlight needed to promote good growth once regeneration is established. Crown closure after this type of thinning should be 50% or less. As time goes on, more and more of the maturing overstory may be removed, until the new stand is allowed to compete against itself in nearly full sunlight. This series of regeneration cuts is known as a "shelterwood" system. Note: Although sunlight is a requirement for tree growth, the role of shade and density in growing white pine is extremely important. Growing white pine trees in partial sunlight as well as with the property density can result in smaller branches, minimizing weevil damage to stems, reducing impact of spores, and ultimately resulting in higher quality trees for future generations.
- 4) Because shelterwood cuts require a relatively heavy harvest in a short period of time (usually less than 10 years), pine managers should wait until the existing stand is mature, or almost mature, before harvesting with the intent to regenerate white pine. Pine regeneration started under a dense, semi-mature stand, with several thinnings yet to be done, will be largely unsuccessful. Prematurely established regeneration may either be destroyed by equipment during subsequent thinnings or stagnate due to too much shade, produced by the higher stocking levels needed for a well managed, fully stocked semi-mature overstory stand. Generally, younger pine stands are worth growing for themselves, with no need to establish new seedlings yet.
- 5) The greater amount of sunlight needed for survival and good growth of pine regeneration will often also encourage regeneration of other, sometimes less desirable species, such as spruce and balsam fir or hardwoods. Depending on shade, soil conditions and the objectives of the landowner, this might be controlled, eliminated or just left alone. Many Maine forests are in some stage of old-field succession, or rebounding from this history of agricultural use. As a result, future successful management of these forests, including many existing pine stands, will require adjusting species mixes to reflect what naturally would be expected to grow there. In some cases this will be a mix of pine and other species, including hardwoods. A realistic forest manager will recognize situations where trying to continue to grow pure stands of white pine is unreasonable and uneconomical in terms of the cost to control other species and establish pine regeneration. Indeed, some truly high quality pine, though not necessarily a high quantity of it, can be managed in a mixed species forest.



In summary, regenerating white pine, while often challenging, can usually be accomplished with good timing of harvest and cone years; adequate soil disturbance; effective management of sunlight ; and realistic expectations of future species mix.



Eastern white pine grows on a variety of sites with many other trees species. It often grows naturally in old fields along with other pioneer species, such as aspen and white birch.

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