

FORESTRY FACTS



UW
Extension

COLLEGE OF
AGRICULTURAL
& LIFE SCIENCES
UNIVERSITY OF WISCONSIN-MADISON

Department of Forest Ecology and Management • School of Natural Resources

No. 86

July, 1997 (rev. Dec./1997)

How To Manage White Pine

Jeff Martin and Craig Lorimer

For many people, the strong appeal of white pine is the beauty that large trees convey. Old-growth groves of pine can still be found and they definitely hold a lure for visitors walking beneath the tall giants. Many landowners have aesthetic considerations in mind when they plant and care for white pine.

There has been a common perception in recent years that white pine is a difficult species to manage. This is largely due to pest problems that can kill or deform the tree. As a result, white pine has often been maligned and not recommended, particularly in areas where the pests are most common.

Fortunately, for white pine lovers, a new philosophy of management is developing. Started in Wisconsin by Menominee Tribal Enterprise foresters, the approach is gaining acceptance with many other land managers. It is this new approach that we describe on the following pages.

Characteristics

Pure stands of natural white pine are seldom found. White pine is commonly found in mixtures with a variety of other species.

On the sandy soils, red pine, jack pine, aspen, red maple, white oak and red oak are common associates of white pine. If the soils are loamy, white pine is often found with hemlock, birch, sugar maple, basswood, balsam fir and white spruce.

White pine is usually considered to be intermediate in shade tolerance and will, therefore, persist for years below the main canopy. Usually it will respond to release when the overstory is removed, even after 30 or more years of suppression. Quickness of response is tied to the vigor of the young pine seedlings.

White pine will grow on a wide range of soils, but it is best suited for sites that have finer sands and loams. White pine is most easily managed where the soils have a high proportion of sand where it can outgrow the hardwood competition. White pine will tolerate wetter soils than will red or jack pine, and will grow quite well on poorly drained soils.

White pines are typically long-lived. If left undisturbed, they will easily attain 200 years of age. The maximum age may be around 450 years.

The growth rate for white pine depends a lot on whether trees are free-to-grow or are suppressed under an overstory canopy. Average height growth for young suppressed white pine is often less than 6 inches per year. However, with free-to-grow trees on the better sites, height growth may exceed 4 feet per year.

Diameter growth patterns in response to shading are similar. Sawtimber development can be substantially delayed for suppressed white pines.

Hazards and Pests

Major pests of white pine in Wisconsin are white pine blister rust, the white pine tip weevil, and the pine bark beetle.

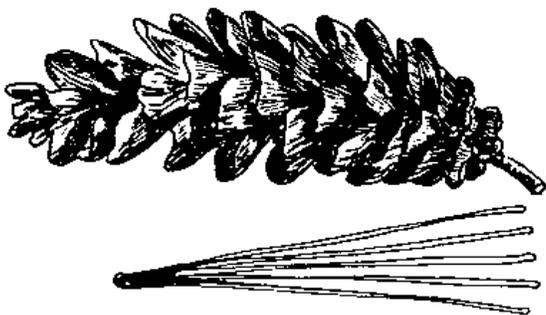
Blister rust problems can be severe in certain parts of Wisconsin. To minimize these problems, do not plant white pine where the incidence of blister rust is high, unless you can eradicate gooseberry and currant bushes (the rust's alternate host plants) from the area. Such measures may be needed as well with naturally seeded white pine stands.

The tip weevil, which kills the terminal or leading shoot and leads to crooked and multiple tree stems, probably causes the most concern. Open-grown pine usually show a greater frequency of damage. Therefore, most traditional recommendations called for retaining a dense partial overstory. This provided substantial shade until the young pines were 25 feet or more in height.

However, some experts now advocate growing saplings under partial shade for only three years. With that approach, subsequent growth is much faster. Provided the regeneration is dense, the owner can weed out any weevil-damaged trees later and still have an acceptable stand.

For example, studies on Menominee tribal lands show that height and diameter growth is much better when canopy cover of mature trees is less than 20 percent. Open-grown saplings under these conditions also had better color, denser foliage and better crown position. To achieve these results, the stands must be wellstocked (700 or more trees per acre) until crown closure occurs among the young pines.

White pine (*Pinus strobus*)



from Forest Trees of Wisconsin, Wisconsin Dept. Of Natural Resources, 1990

Establishing A New Stand

The best seedbed for regenerating white pine is exposed mineral soil. This is achieved by scarifying the forest floor, either through logging or site preparation activities.

On the better sites, competition from fast growing hardwoods often makes white pine establishment difficult if not impossible. This is most severe in stands where hardwoods become established before the white pine. However, even when white pine and hardwoods start growing at about the same time, the hardwoods will probably overtop the slower growing white pine on these good sites.

If white pine is not established before you harvest, hardwoods will usually prevail in the new stand unless you control them. You can control hardwoods with chemicals, but retaining dense overhead shade, as some recommend, does little to inhibit tolerant species such as maple.

Establishing white pine regeneration before the overstory is removed in the final harvest cut is usually a must. To accomplish this a shelterwood harvest is usually prescribed for white pine (see the section "Harvesting Mature Stands")

Ideally, your young white pine stand should have about 700 trees per acre, and you should maintain this number until crown closure occurs. Not all stems need be white pine. High densities will help correct tip weevil damage in the stand.

If weevil damage occurs, focus on your better crop trees and release them by cutting the deformed trees. In most cases, weevil deformities are confined to the inner core of a tree stem. When damaged trees reach sawtimber size, the increased stem diameter may obscure deformities caused by early weevil problems.

You should also be quite selective about the site you plan to devote to white pine. If it is an excellent hardwood site, then let the hardwoods grow there and pick another spot for your white pine stand.

Tending **Young Stands**

Thinning is not needed in the youngest stands, those averaging 1 to 5 inches dbh. However, a treatment to release pine seedlings or young saplings from hardwood competition is often needed. A **crop tree release** of your 150 best trees per acre is usually preferred.

Average stand diameter, overstory trees (inches)	Desired number of trees per acre	Desired basal area (square feet per acre)
4	600	50
5	480	65
6	395	80
7	330	90
8	280	100
9	250	108
10	220	115
11	190	125
12	165	130
13	145	135
14	130	140
15	120	145
16	110	150
17	100	155
18	95	160

*"B-level" stocking as recommended in *Stocking Guide for Eastern White Pine*, Philbrook, et al., 1973.

A release operation may need repeating if the site is rich and the hardwood competition severe.

A **thinning** program should begin as soon as possible. This is usually around age 20, when the stand averages 5 inches or more in DBH. Delays will only reduce diameter growth. Use the accompanying table to guide your thinning program.

If your stand is a plantation with trees in distinct rows, a mechanical (systematic) approach is often recommended for the first thinning. This usually means removing every other row.

However, **selectively marking** 30 to 50 percent of the trees in all rows may be a more appropriate type of thinning. This is especially true if your stand exhibits considerable variability in size, as white

pine often will. Selective marking is also better if your stand has a fair amount of weevil damage. Selective marking allows you to keep the best stems and remove the smaller and/or poorer formed stems. Selective marking is typically best for all subsequent thinnings.

If a mechanical thinning will not lower stocking to the appropriate level, you may want to selectively mark and cut some additional trees in the "leave" rows. In some cases, your stand might be understocked following an "every-other-row" thinning. If this would be the case, you may want to remove every third row and selectively thin in the remaining rows to achieve the stocking desired.

If your first thinning is late, delayed much beyond age 20, you may want to mark less heavily than every other row. Heavy thinnings in older stands increase the potential loss from snow loads and/or windthrow.

With all thinnings, you will want to follow the white pine stocking table. When marking, reduce average stocking to not less than what is shown (often referred to as "B level" stocking by foresters). If any one thinning removes too many trees, you may lose the ability to maintain the desired number of crop trees.

Pruning

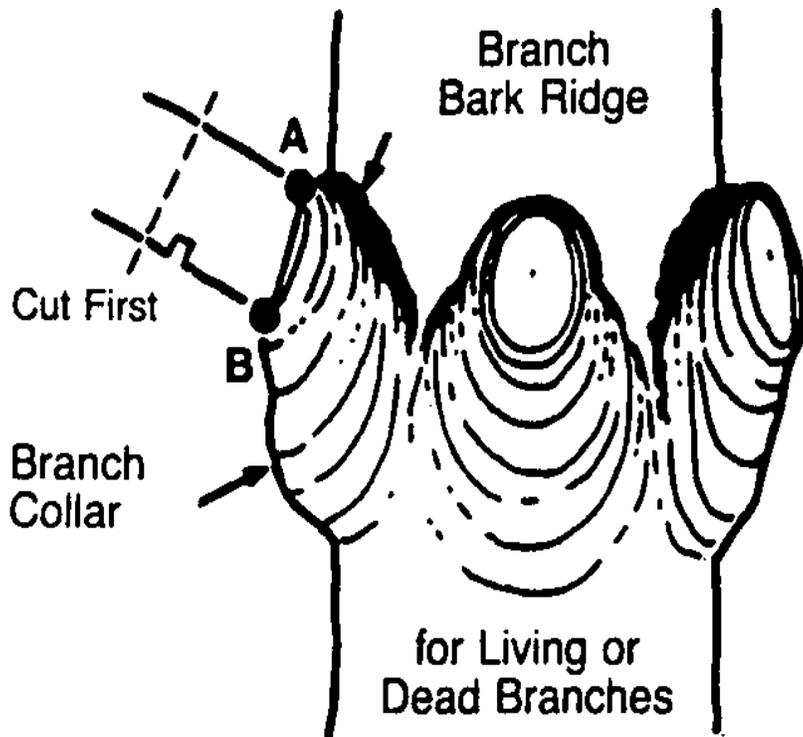
If your goal is to produce quality sawtimber from your white pine stand, you will need to prune some of your best crop trees. Dead branches of white pine persist and do not drop off naturally. Therefore, to add clear wood to the tree as it grows, the lower branches must be removed artificially.

Trees selected for pruning should be your biggest and best trees (high vigor and straight stems). As the stand moves into the sapling stage, pruning should start on about 150 crop trees per acre.

Pruning should proceed to at least 17 feet above the ground in one or more stages. Trees should not be pruned over one-half their total height at any one time, but may be pruned the full 17 feet by the time the trees are 34 feet tall.

The earlier the pruning the better. However, if you plan to grow white pine to large size, a delayed start to your pruning can still yield impressive dividends. A later start might occur if you acquire an older white pine stand with larger diameter trees.

When your white pine stand is mature, a **shelterwood** harvest, which leaves a temporary partial overstory, is usually recommended. The shelterwood approach is effective because it compensates for the slow seedling growth of white pine in the critical first five years.



The best time to prune living branches is late in the dormant season or very early in spring before leaves form. Prune dead branches any time.

How to Prune

1. Locate the branch bark ridge (BBR).
2. Locate "A" – outside BBR.
3. Locate "B" – where branch meets collar.
4. Stub cut the branch.
5. Make final cut at line AB (with power saws, make final cut on upstroke).

Do Not

- make flush cuts behind BBR
- leave living or dead stubs
- injure/remove branch collar

Harvesting Mature Stands

The rotation length for managed white pine varies depending upon the productivity of your site and your management goals. It may be as short as 90 years or as long as 150 years. Short rotations are typically recommended for very dry (poor) soils or where high return on investment is the primary goal. Longer rotations are more appropriate for moist/nutrient-rich soils and where high rates of return are less critical. Of course, rates of return can be significantly improved if you follow a program of frequent thinnings that produce salable products.

Also, specific seedbed requirements are less critical. When the litter on your forest's floor is sheltered, it can be an acceptable seedbed because it usually remains moist long enough for seedlings to germinate and take root in mineral soil.

A shelterwood harvest entails a series of 2 or 3 cuts spread over the last 10 to 30 years of the rotation. The first cut should reduce the overstory to 20 to 50 percent crown closure. The best trees should be left and they should be well distributed throughout your stand. This would be nearly identical to previous thinnings, except your goal now is to obtain regeneration and establish a new stand. Avoid making large openings in the canopy; keep openings smaller than one-half the tree height.

If the logging activity adequately scarifies the soil, you should have an acceptable seedbed for natural regeneration. If not, a separate site preparation operation may be needed to expose enough mineral soil.

If regeneration does not seem adequate after a few years, you may want to underplant some white pine seedlings to boost the numbers.

The remaining overstory can be removed 3 to 5 years later if white pine regeneration appears to be adequate. However, if the regeneration is inadequate (or completely lacking) you have a couple of choices:

(1) If the canopy has not closed, you can do some site preparation work to break up the litter and expose some mineral soil. You should also control the hardwoods, if present, and then wait another 3 to 5 years.

(2) If the canopy did close during the 10-year period, perform a second cut to again reduce crown closure to 50 percent or less. If regeneration is adequate in another 3 to 5 years, perform the final removal cut (the third cut).

Uses

White pine lumber has long been in high demand. White pine lumber of good quality is still prized by woodworkers and furniture makers.

Although today's average prices are below those of oak, cherry and walnut, high quality logs from large white pine will generate excellent prices. In fact, in some cases white pine veneer logs may be equivalent in price to red oak veneer.

White pine is also used for pulpwood; however, current prices are about one-half, or less, those for red and jack pines. Mixed plantings of two or more species may improve the market situation for material removed in your early thinnings.

From a wildlife standpoint, mixed plantings (perhaps with a hardwood species) tend to be more attractive than pure stands of white pine. Wildlife species diversity tends to be high when stands are regenerating after a harvest.

Poletimber stands see fewer species and fewer numbers of wildlife because the herb and shrub layers tend to decline. Species diversity will usually rise again in older stands due to greater stand variation and increases in wildlife that use tree boles.

For more information about forest management techniques and terminology, UW-Extension and UW-Madison Department of Forest Ecology and Management have a variety of publications available. For more information on obtaining other publications, contact:
UW-Extension <http://www1.uwex.edu/ces/pubs>
608-262-3346

Also, contact a professional forester in your area for management advice and information.

For more Forestry Facts:
<http://forest.wisc.edu/extension/forfact.htm>

This publication is available for download at
<http://forest.wisc.edu/extension/publications/86.pdf>