



Fact Sheet 5001

# Thinning to Improve Pine Timber

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It has long been a practice of many landowners to "selectively cut" their pine timber stands every 5 to 10 years as they need a little income. This is often accomplished by cutting the pine timber to a diameter limit (everything larger than the limiting diameter, say 12 inches, is harvested). Unfortunately, this practice usually results in lowering the quality of the timber stand, reducing its economic potential, and eventually eliminating the pines in favor of competing hardwoods. Unlike a "diameter limit cut," a properly-conducted thinning operation results in increased stand quality and economic potential. Plus, it gives the landowner a little income at the same time.

## What Is Thinning?

Some 30 to 50 years are required to grow a stand of pine sawtimber to economic maturity. However, it is usually necessary to cut some of the trees before the stand reaches maturity. Cuttings made in immature stands to stimulate the growth of the remaining trees and thereby improve the yield of the stand are called thinnings.

In any timber stand, the trees compete with each other for light, soil moisture, and nutrients. The more crowded the trees are, the more intense the competition. In a very crowded stand, the growth rate is reduced and, eventually, the weaker trees die. However, the volume per acre of wood produced by a timber stand of a certain age on a particular site is about the same over a wide range of stand densities. This means that, if the number of trees in a stand is reduced, the same volume of wood can be produced with fewer trees while maintaining a good rate of growth. The main objectives of thinnings are: (1) to redistribute the growth potential of the stand to the well-formed, high-quality trees, (2) to maintain the

growth rate of the stand, and (3) to utilize to financial advantage all merchantable timber produced by the stand.

## Pine Trees Grow Quickly

Most pine stands are even-aged. That is, all of the trees are within a few years of being the same age. If all trees are about the same age, then the larger trees must have been growing at a faster rate. Improper thinning operations, such as cutting to a diameter limit, remove the larger, faster-growing trees for immediate income and leave the smaller, slower-growing trees for future growth.

On good sites, managed pine trees grow about 10 percent each year up to age 50, almost doubling in volume and value every 7 years (see Table 1). Trees in the 6- to 9-inch diameter range are usually sold as pulpwood, but when they reach the 10-inch diameter size or larger, they can be sold as sawlogs at 2 to 5 times the pulpwood value. And, as the diameter of each tree gets larger, the annual growth in value increases. As a tree grows from 12 inches in diameter at age 28 to 15 inches in diameter at age 35, the value increases at a rate of \$1.56 per year. But, as the diameter grows from 18 to 20 inches, between age 42 and 49, the annual increase in value is \$2.29.

## Always Leave the Best Trees for Future Growth

The purpose of any thinning operation should be to provide more growing space for the well-formed, fast-growing trees while harvesting the trees that are diseased, damaged or poorly formed, and those that will not live until the next scheduled harvest. The following types of trees should be harvested during thinning: (1) overtopped trees, (2) forked trees, (3) trees with broken tops, (4) trees with one-sided crowns, (5) trees with crooked stems, (6) trees with

Table 1. A Pine Tree Grows Rapidly in Volume and Value

Age of tree (years)	14	21	28	35	42	49
Diameter of tree (inches)	6	9	12	15	18	20
Height of tree (feet)	41	54	64	72	78	83
Pulpwood volume of tree (cords)	0.04	0.12	0.23	0.39	0.61	0.84
Sawlog volume of tree (Bd ft Doyle scale)			48	121	215	322
Pulpwood value of tree (@ \$12 per cord)	\$0.48	\$1.44	\$2.76	\$4.68	\$7.32	\$10.08
Sawlog value of tree (@ \$150 per 1000 bd ft)	---	---	\$7.20	\$18.15	\$32.25	\$48.30

trunk swellings (cankers) caused by fusiform rust disease, and (7) trees damaged by insects, fire, or weather (see Figure 1).

reach this size. In a natural stand, the trees will probably not reach this size until they are several years older.

## When to Thin

The first thinning in a pine stand should usually be made when the trees reach pulpwood size, about 6 inches in diameter. In a plantation, the trees will normally be about 14 to 15 years old when they

Within a few years, after the diseased, damaged, poorly formed, and weak trees are removed by thinning, the branches and roots of the remaining trees will grow to fill in the gaps. The same crowded condition that existed before thinning will redevelop. Before the trees get so crowded that the growth rate slows down, thin the stand again.

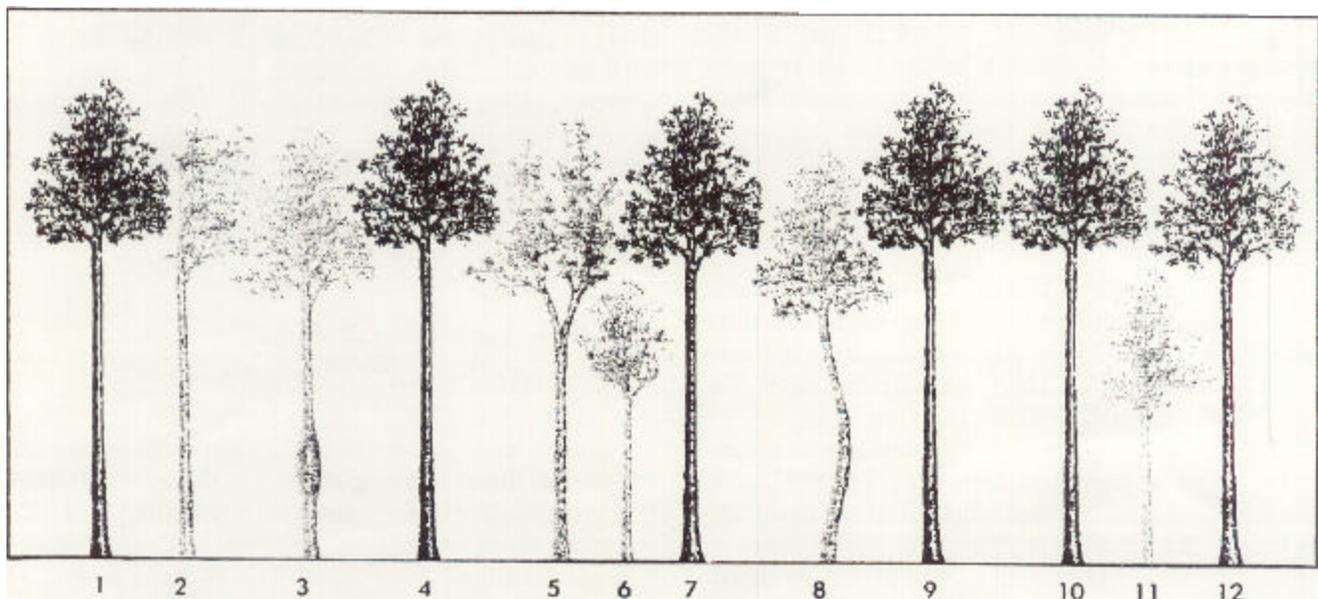


Figure 1. The trees above removed by thinning are (2) one-sided crown, (3) fusiform canker, (5) forked stem, (6) overtopped tree, (8) crooked stem, and (11) small tree too close to larger neighbors.

A good way to determine when a stand should be thinned is to look at the live crown ratio, the percentage of the length of the stem that has live branches. The live crown ratio equals the length of the live crown divided by total tree height multiplied by 100. When the live crown ratios of the dominant trees in the stand drop to near 30 percent, it is time for another thinning (see Figure 2). If the live crown ratios drop below 30 percent, the growth of the trees will be substantially reduced; and even after thinning, trees with very small crowns will not resume rapid growth until the sizes of the crowns increase.

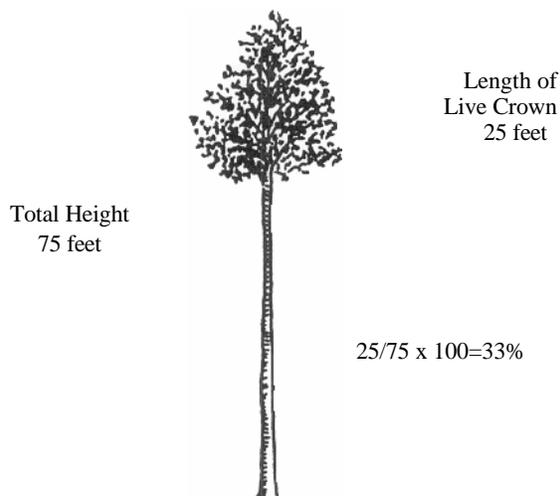


Figure 2. The live crown ratio equals the length of the live crown divided by total tree height multiplied by 100. When the live crown ratio drops to near 30 percent, it is time for thinning.

## How to Thin

In natural pine stands, thinnings should be accomplished by individual tree selection. This provides the maximum opportunity to select and favor potential crop trees. Each tree to be cut should be marked, and the logger should be penalized for cutting or damaging unmarked trees. This method will not bring the top price for the wood sold, but remember, the objective is to favor the best trees for future growth, not to produce maximum income from the thinning operation.

Individual tree selection is also the best way to thin pine plantations, but row thinning has become popular because it is quick, easy, and economical. However, since row thinning is nonselective, it does not improve the quality of the stand.

For the first thinning in a pine plantation, it is better to use a modified row thinning in which every fourth row is removed to provide access to the stand, and intermediate rows are thinned by individual tree selection. Then, in subsequent thinnings, the plantation should be thinned by individual tree selection.

For the first thinning in a pine plantation with a high level of fusiform rust disease, you can remove every sixth row and thin the intermediate rows more heavily.

## Key Points to Remember

1. Thinnings are cuttings made in immature stands to stimulate the growth of the remaining trees and improve the yield of the stand.
2. Trees compete for light, moisture, and nutrients. If they become too crowded, growth slows and they may eventually die.
3. Pines grow rapidly, and trees grown for sawlogs are worth far more than trees grown for pulpwood.
4. The purpose of a thinning operation should be to provide more growing space for the best trees while harvesting diseased, damaged, poorly formed, or dying trees.
5. The first commercial thinning in a pine stand is usually made about age 14 or 15 when the trees reach pulpwood size.
6. Subsequent thinnings should be made before the live crown ratios drop below 30 percent.
7. In natural stands, thinning is best accomplished by individual tree selection where each tree to be cut is marked.
8. A modified row thinning is acceptable as the first thinning in pine plantations. Every fourth to sixth row can be removed and intermediate rows thinned by individual tree selection.
9. Subsequent thinnings in pine plantations are best accomplished by individual tree selection.