Timber Stand Improvement

A Guide to Improving Your Woods

The purpose of timber stand improvement, or TSI, is to free desirable trees from competition, thin the trees to desirable numbers, and remove the poorer quality trees. This improves the overall condition of the stand and concentrates growth on selected trees. TSI also improves wildlife food and habitat and the appearance and health of a woodlot.

TSI increases hard mast production (acorns, hickory nuts, etc.) by giving healthy trees plenty of room to have large crowns. TSI increases ground layer vegetation, therefore increasing browse options and cover for wildlife. Flowering plants also bring in insects, which are critical turkey and songbird food, and then go to seed, providing an additional food source.

Crowded Trees Need Space

When a stand of trees is very young, 4,000 or 5,000 seedlings may grow on a single acre. This same stand will have fewer than 100 trees remaining when it is mature. Competition for sunlight and nutrients will thin the trees, but this natural process may take the stand 150 to 200 years to reach mature, marketable size. Periodic thinning can improve tree quality and hasten growth.

A stand of trees that averages 4 to 10 inches in diameter (measured at 4.5 feet from the ground) is a prime candidate for thinning. This does not mean that stands averaging more than 12 inches in diameter cannot be thinned, but these trees do not respond as quickly as do the smaller trees. If you want marketable trees for various forest products, you could thin a stand of larger trees to remove undesirable species like elm and honey locust.

Evaluate Your Woods

The two main factors that limit tree growth in Missouri are sunlight and soil moisture. While you don't have much control over soil moisture, you can control sunlight availability through tree spacing.

The easiest way to get started is to walk through the woods and observe the form, condition, and size of your trees. A stand's trees can be placed in three categories.

1. **Trees intended for harvest.** If your primary objective is to grow wood products, trees should be desirable species and have tall, straight trunks free from insect or disease damage, fire scars, or decay. They should have full, healthy crowns with no large, dead branches. Crowns should be at the general level of the tallest trees in the forest or extend above. Once a tree's crown has been reduced through competition, thinning cannot always restore it to a dominant position.
2. **Trees to be removed in future thinnings.** These are needed to maintain a healthy and sustainable number of trees on a given acre. If all but the best trees are removed in one thinning, the land is not producing all the wood it is capable of producing. Most importantly, the quality of the remaining trees will decline due to less height growth, persistent lower limbs, and wind damage.
3. **Surplus trees to be removed in the first thinning.** These trees directly compete with the desirable trees for sunlight. The second tier should be the undesirable trees, such as maples growing in the understory of oaks. Any tree considered undesirable in the stand because of species or form should be deadened or removed as soon as possible.

When selecting trees to leave, carefully consider your goal for the forest. If trees with a high commercial value is your goal, some of the more valuable species in Missouri are black walnut, white oak, black oak, red oak. Some species usually considered less desirable for wood products are honey locust, blackjack oak, Osage orange, elm, and mulberry.

Tree Spacing and Competition

Spacing between crowns is the easiest and most obvious way to determine the competition for growing space. Try to leave 10 feet of open space on at least two sides of the crown of trees you wish to keep. This will give them enough additional sunlight to maintain good growth rates. More open space between crowns — 15 to 20 feet — will encourage larger crowns with more nut production and understory (ground-level vegetation) growth for wildlife.

If the stand is relatively uniform in diameter, use the "diameter x 2" rule. Multiply the average diameter in inches by 2. This is the number of feet to leave between the stems of the remaining trees. For example, if the stand averages 5 inches in diameter, the spacing between the trees should average 10 feet.

Since trees do not grow on an even spacing, it is impossible to adhere strictly to either of these rules. Two good trees may be left with their crowns touching. If they have open space on two other sides, they will have enough growing room. In some crowded stands, it may be necessary to remove the undesired trees plus some good trees to maintain proper spacing. Aim for the averages. This will ensure proper spacing to fully use the site.

Consider leaving some flowering understory trees to grow in your woods. Dogwood, redbud, blackhaw, serviceberry, and hawthorn do not compete with the main stand for light. In addition, the fruits of these trees are a valuable food source for wildlife.

Multiple Stems

Most hardwood trees sprout readily from the stump following cutting or fire. These multi-stemmed trees can develop into quality single-stemmed trees if they are treated early enough.

On small sprouts originating from a large stump, select a low-growing sprout and cut off all the others. A low sprout is less likely to decay from the wound left when the parent stump rots.

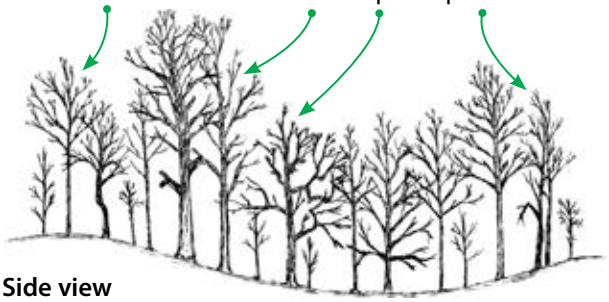
Multiple sprouts joined at the base with a V-shaped crotch are more of a problem. It is difficult to remove one stem without endangering the remaining stem. In this situation, it is better to remove the entire clump and encourage the development of a nearby single-stemmed tree.

Sprouts with a low U-shaped crotch (wide enough to place your foot between the stems) are easy to correct. For any diameter sprout, pick the best one and cut the others off at a low height.

Before Thinning

Allow healthy trees with clean, straight stems to remain.

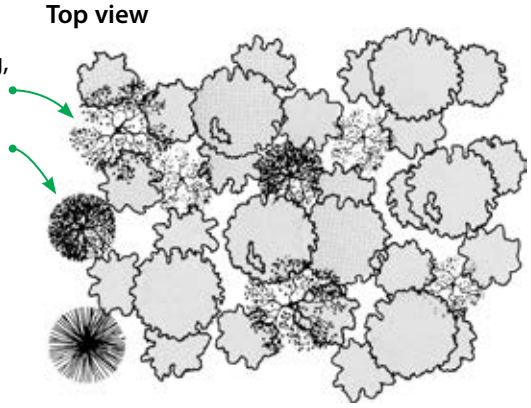
Remove trees with major defects, those that are stunted or crowded, or are poor species for the site.



Side view

Top view

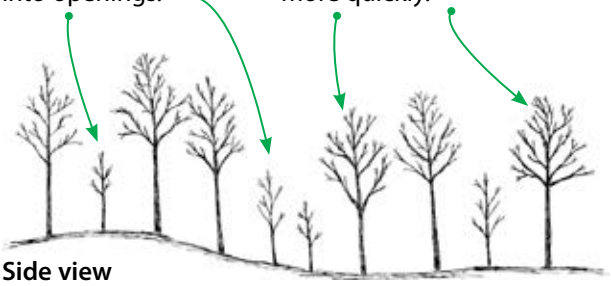
Before thinning, poorly formed and defective trees take up valuable space.



After Thinning

Young, vigorous trees will grow into openings.

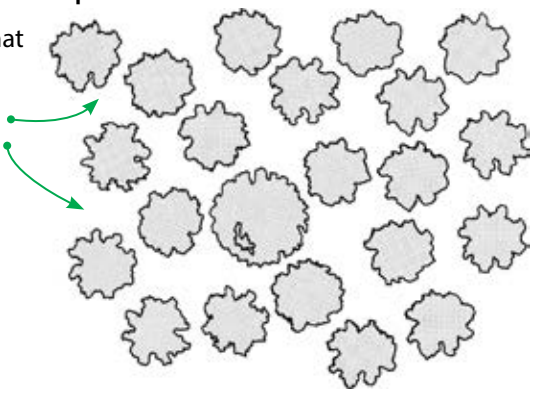
A properly thinned stand will allow the best trees to develop more quickly.



Side view

Top view

Thin trees so that 10 feet are left on at least two sides of each crown.



Future Results

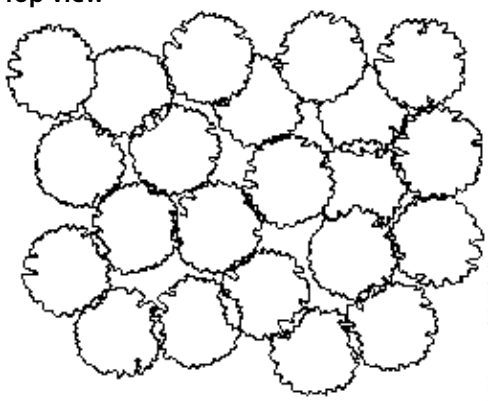
Trees with greater value are produced in the shortest time in a managed stand. Harvest and regrowth are part of the management cycle.

Some older, hollow trees may be left for the benefit of wildlife.

Side view

Top view

The best trees use available growing space. The good forest management, future thinnings may be carried out as fuel wood cuttings and or timber sales when needed.



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Prevent Unwanted Regrowth

To keep stumps from sprouting, treat them with a woody-plant herbicide immediately after each tree is cut. If several days pass before the chemical is applied, the stump's conductive tissues will seal over, and the herbicide won't be absorbed. As with any chemical, herbicides should be used only according to label directions.

TSI Time Frames

There is no reason to thin an entire property at one time. Most experts agree that for best growth, a stand should be thinned every 10 years or so. By dividing your property into 10 or more units and thinning one unit each year, the job is manageable. When the TSI in the last unit is finished, it will be time to start on the first unit again.

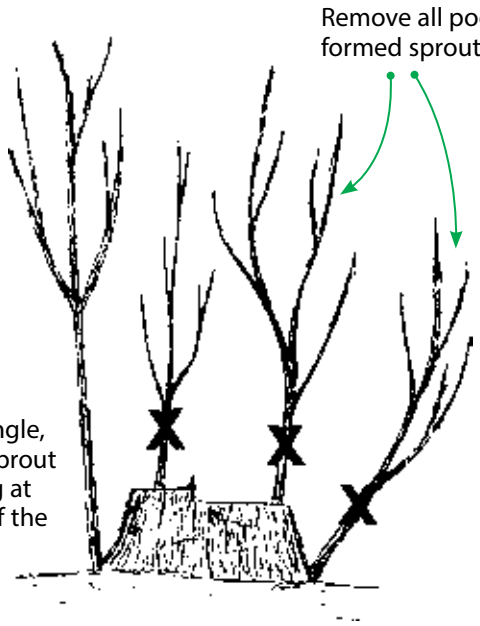
Dead Trees Provide Habitat

Trees with hollows in the trunk or upper limbs provide homes for many different types of wildlife. Leaving several hollow trees per acre encourages squirrels and raccoons. Also, leave several dead standing trees on each acre. These provide habitat for bats and cavity-nesting birds like woodpeckers and bluebirds.

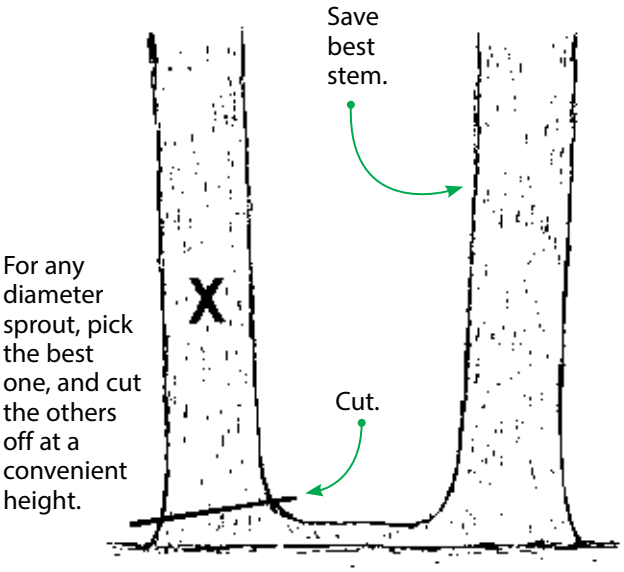
Questions?

Find your MDC forester's contact information at **mdc.mo.gov/contact-engage**.

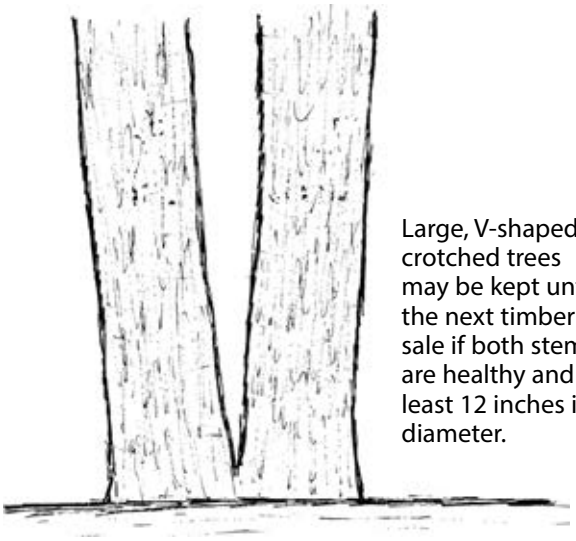
Select the best stump sprout



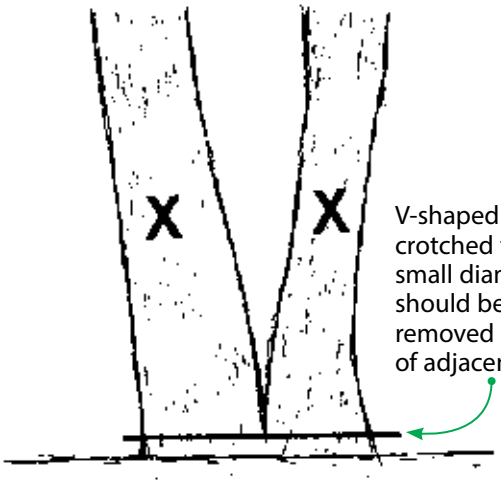
Select the better stem of a U-shaped crotch



Keep large, V-shaped crotched trees



Remove smaller, V-shaped crotched trees



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