



Colorado MASTER GARDENER

Pruning Mature Shade Trees

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Objectives

As trees mature, pruning should be limited to the five pruning objectives:

- **Crown cleaning** – removal of dead and dying branches.
- **Crown thinning** – thinning of the tree's upper/outer canopy by selective removal of smaller (less than 2 inch diameter) branches.
- **Crown raising** – removal of lower branches (also know as *limbing up*)
- **Crown reduction** – selective removal of some larger upper branches to lower a tree's height.
- **Hazard pruning** – crown cleaning and crown thinning to reduce a tree's potential for storm damage.

Limitations

Do not indiscriminately remove branches with live foliage as this stresses the tree. On mature trees, avoid removing more than 20 percent of the foliage in any given year. On healthy medium aged trees, up to 25 percent of the foliage may be removed in a year. On young actively growing trees, up to 33 percent of the foliage may be removed per year.

More severe pruning reduces the amount of carbohydrates supplied to in the root system, putting the tree under stress. Heavy pruning also reduces carbohydrate reserves, making the tree less tolerant of insects, disease, and drought stress. On very old trees and trees under stress or decline, live branches should be removed only if absolutely necessary.

Correcting Structural Defects

Most storm damage in Colorado trees is due to co-dominant trunks (trunks of similar size). Structural problems of this type should have been corrected while the tree was in the early growth stage. Little can be done to correct structural defects on mature trees without predisposing the tree to internal decay and creating an unsightly shaped tree.

For additional details on structural training, refer to fact sheets 7.822, *Structural Training: Trees with a Central Leader* and 7.823, *Structural Training: Trees with Multiple Scaffold Branches*.

General Guidelines

- Whenever possible, use thinning cuts (natural target pruning cuts) since they minimize potential for decay. For details, refer to fact sheet 7.821, *Pruning Cuts*.
- Ideally, the majority of pruning cuts are made on branches less than 2 inches in diameter. These small wounds minimize the potential for internal decay. Unless there is a strong justification, avoid removing

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branches larger than 4 inches in diameter. Large wounds predispose some trees to internal decay.

- To maintain overall tree vigor, at least one-half of the foliage should be in the lower two-thirds of the tree.
- Pruning should maintain the tree's natural shape.
- Cleaning out the small twiggy foliage along the interior lower scaffold branches (secondary trunks) is a common mistake, increasing the tree's potential for breakage in strong winds. The small twiggy branches in the lower center canopy serve as counter weight to buffer branch sway in winds.
- Avoid *lion-tailing* where the inner foliage is removed, leaving leafing areas only at the branch tips. This shifts weight to the ends of branches and increases the potential for breakage in winds. It also reduces the carbohydrate reserves in the lower branching structure decreasing resilience to stress factors.
- Avoid topping a tree. Topping opens the tree to internal decay. Regrowth of suckers and adventitious shoots (water sprouts) is structurally unsound.

Pruning Objectives

Pruning of mature trees should fall into one of five objectives: crown cleaning, crown thinning, crown raising, crown reduction, or hazard pruning.

Crown Cleaning

Crown cleaning is the removal of dead, dying, broken, diseased, low vigor, and competing branches and water sprouts. Most pruning of mature trees falls into this category. Trees under stress or declining trees may need crown cleaning every 6 months to 5 years. In crown cleaning, do not remove healthy branches in the tree's interior.

Remove dead branches – It is advisable to remove any dead branch larger than a two-inch diameter to minimize hazards if the branch were to fall. Dead or broken branches higher than 30 feet are of particular concern because of the speed they could hit the ground if they were to fall. Dead branches may also become a source of insect and disease pressure in the tree.

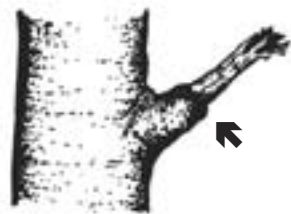


Figure 1. When removing dead branches, do not cut into the living tissues. Cut just beyond the branch collar.

Remove the dead branches with correct thinning cut techniques using the 3-step pruning technique. For details refer to fact sheet 7.821, *Pruning Cuts*. Do not cut into the branch collar because decay can readily spread into the trunk. If the bark of the branch collar has begun to grow out along the dead limb, cut just beyond the branch collar, being cautious not to nick the collar. Never *flush cut* the dead branch.

Crown Thinning

Crown thinning is the selective removal of smaller branches (less than 2 inches in diameter) in the leafy upper/outer canopy of the tree, using thinning cuts. For details on thinning cuts refer to fact sheet 7.821, *Pruning Cuts*.

Since crown thinning is in the upper/outer canopy, it requires a trained arborist with a high level of skill. Crown thinning is expensive, often running \$500 to over \$1,000 per large tree when done correctly.

Benefits of crown thinning include:

- Crown thinning is a good way to minimize damage caused by snow loading, the primary factor leading to tree failures in Colorado. Crown thinning reduces limb weight in order to compensate for structural defects.

- Crown thinning may or may not reduce wind sail and potential for breakage in strong winds. In situations where a tree has a very thick canopy, excessive thinning may increase wind flow through the tree canopy and may increase the potential for limb breakage in strong winds. Increased air circulation through the canopy may reduce foliage diseases.
- Crown thinning increases light penetration into the tree interior, which can invigorate the tree and help retain the tree's natural shape. However, increased light penetration into a lawn may invigorate the lawn, adding stress to an old or declining tree due to root competition for water and nutrients.
- Crown thinning is a technique to partially open a view, without removing or structurally impacting a tree. This is often referred to as **vista pruning**.

Crown thinning is a technical term describing a specific pruning technique. Crown thinning is done on relatively small branches (less than 2 inches in diameter) in the leafy upper/outer canopy of the trees. Crown thinning is not thinning out the lower branches, as incorrectly done by untrained gardeners. The term **thinning** has no technical meaning and does not describe what type of pruning will be done.

Avoid **lion-tailing** which is the removal of the small leafy twigs down in the tree's interior. These small interior branches are critical to the trunk's structural integrity and vigor. Lion-tailing, often done by untrained gardeners, shifts the wind load to the outer canopy predisposing the tree to wind damage.

Remove no more than 20 percent of the foliage at one time. Over thinning stresses the tree by removing energy (carbohydrate) reserves to the tree and stimulates undesirable sucker growth.

Crown Raising

Crown raising or **limbing up** is the removal of lower branches to provide clearance for people, traffic, buildings, or a view. To protect the trunk's structural integrity, always maintain at least one-half of the foliage in the lower two-thirds of the tree.

Crown raising should be part of the tree's structural training while young. Ideally crown raising should be done before branches to be removed exceed a 2-inch diameter. Removing branches larger than a 4-inch diameter may predispose the trunk to internal decay. This is a primary concern when the diameter of the branch removed is greater than one-half the diameter of the trunk.

On many trees, lower branches make-up a significant portion of the tree's entire canopy and cannot be removed without significantly impacting tree health and appearance.

On healthy, medium-aged trees, if greater than 25 percent of the foliage will be removed, pruning should be done over a period of years. On mature trees, do not remove more than 20 percent of the foliage in any single year. Avoid crown raising on older trees showing symptoms of stress and decline.

Crown Reduction

Crown reduction is reducing the overall size of the tree by using reduction cuts to remove larger branches back to smaller branches. For details on reduction cuts, see fact sheet 7.821, *Pruning Cuts*.

Crown reduction requires the extensive use of reduction cuts that predispose the branch or trunk to internal decay. For this reason, professional arborists discourage crown reduction.

On older trees showing stress or decline, crown reduction can accelerate decline and death. In most situations, crown cleaning or crown thinning techniques better address the concerns of large trees prone to wind damage.

It is very difficult to use crown reduction to permanently maintain a tree at a small size without causing tree decline. Ideally, trees were selected with adequate space for their mature size. Where size control is necessary, it is best to begin crown reduction pruning as the tree reaches acceptable size, rather than when the tree becomes overgrown.

Hazard Pruning

Hazard pruning focuses on reducing potential problems of tree failure related to structural weaknesses. It is a combination of crown cleaning and crown thinning. Do NOT top a tree as a method to reduce hazard. Regrowth on a topped tree is structurally unsound. Hire a certified arborist for large hazard pruning jobs.

Frequently Asked Questions

What about topping a tree?

Shade trees should **never** be topped. The regrowth of a topped tree is structurally unsound. Topping required by utility right-of-way pruning is starkly obvious and sets an unfortunate community standard. Instead of topping, use crown cleaning or crown thinning.



Figure 2. Never top a tree, the regrowth is unnaturally dense, elongated, and structurally unsound, making it very prone to wind and storm damage.

What about utility right-of-way pruning?

Pruning for utility line clearance does not always follow desirable pruning techniques in regards to the appearance and health of the tree. In this situation, the needs of the utility right-of-way take priority over the tree's health and appearance.

When a tree under a power line requires frequent topping, consider having the tree removed. Utility companies are generally eager to accommodate. In planting trees, selection criteria (i.e., size and placement) should be followed so that a tree's health and appearance will never be compromised by the need for utility pruning.

I'm concerned about my tree in breaking in storms, but I really don't want to lose the shade. Do I really need to have the tree pruned or removed?

This is a two-part question. First, does the tree show signs of being highly susceptible to storm damage, i.e., previous storm damage, dieback or dead branches, structural problems such as co-dominant trunks or internal decay (internal cavities or mushrooms)?

Second, if yes, what would the tree or branch hit should it come down in a storm? If it would cause significant property damage or threaten life, the tree should be pruned or removed as a preventive measure. No one can predict when a tree will break in a wind or storm.

Crown cleaning and **crown thinning** may reduce the potential storm hazards without compromising the shade. Remember that healthy, structurally sound trees are generally windfast, even when mature.

Storm damage is usually, but not always, related to structural problems that could have been corrected with proper structural training when the tree was young. Co-dominant trunks account for the majority of tree failures in Colorado. The hazard of wind damage is higher on the regrowth of trees that have been topped. Consult a certified arborist for additional details.

How should storm-damaged trees be pruned?

First, focus on crown cleaning (removing broken and damaged limbs, keeping in mind the structural integrity of the tree). Use thinning cuts (natural target pruning cuts) to the extent possible. For details refer to fact sheet 7.821, *Pruning Cuts*.

Second, focus on crown thinning, restoring the tree's structural integrity and shape to the extent possible. This may take place over a period of years. The maximum amount of tree canopy that may be removed (including storm damage)

without putting the tree under stress is 33 percent for young trees, 25 percent for medium aged trees, and 20 percent for older mature trees. Keep the tree if it can be pruned back to structurally sound wood and will be esthetically pleasing. Often when one side of the tree is gone, the best option is to remove the entire tree.

How should trees with root damage be pruned?

Focus on crown cleaning (removing dead and dying branches). Avoid removing live wood or topping as this sudden loss of stored carbohydrates and photosynthesizing leaf surface can speed decline. Use thinning cuts while avoiding reduction cuts which open the branch/trunk to internal decay. Trees in a construction site with damaged roots may require crown cleaning every 3 to 12 months.

How should declining trees be pruned?

Focus on crown cleaning, (removing dead and dying branches). Avoid removing live wood or topping, as this sudden loss of stored carbohydrates and photosynthesizing leaf surface can speed decline. Use thinning cuts while avoiding reduction cuts which open the branch/trunk to internal decay. Old declining cottonwoods and poplars may warrant crown cleaning every 1 to 5 years.

When do I need to hire a professional?

Pruning large trees is a safety issue beyond the training and experience of most home gardeners. Hiring a bonded professional is the best approach for most tree pruning jobs. Look for arborists with certification from the International Society of Arboriculture, ISA, or National Association of Arborists, NAA. Many are listed in the phone book yellow pages. For certification, they must complete an educational and testing process. Also ask about liability insurance coverage.

A list of ISA Certified Arborists working in your area can be found on the ISA Web site at <http://www.isa-arbor.com/findArborist/findarborist.asp>.

Additional Information

Fact Sheets on Pruning

- 7.820, *Tree Growth and Decay*
- 7.821, *Pruning Cuts*
- 7.822, *Structural Training: Trees with a Central Leader*
- 7.823, *Structural Training: Trees with Multiple Scaffold Branches*
- 7.824, *Structural Training of Trees – Pruning Flow Chart*
- 7.825, *Pruning Mature Shade Trees*
- 7.826, *Pruning Flowering Shrubs*
- 7.827, *Pruning Evergreens*

Books

Edward F Gilman. An Illustrated Guide to Pruning, Second Edition. Delmar. 2002

Web

<http://hort.ifas.ufl.edu/woody/pruning/>

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