



CMG GardenNotes #614

# Structural Training Summary for Young Shade Trees

## Dosage: How much to remove

The amount of live wood/foliage to remove per season depends on the growth rate of the tree. Look at 6 to 12 twigs around the tree to assess actual growth rates.

- For trees with critical stress and insignificant annual growth, limit pruning to *cleaning* (removal for dead and damaged branches).
- For trees putting on little growth, limit pruning to a light dosage correcting codominant trunks.
- For trees putting on approximately six to 12 inches of new growth per season, 10% would be an estimate.
- For trees putting on a foot or two of new growth, 25% would be an estimate.
- Trees putting on three to four plus feet of new growth may tolerate 25% to 50% of the live wood/foliage being removed.

Ideally, all pruning cuts are two inches in diameter and smaller.

## Growth habit

The desired branching structure depends on the natural growth habit of the tree. Trees with an **excurrent** growth habit develop with a **central leader** (single trunk) to the top. Examples of excurrent trees include Aspen, Linden and pines. Trees with a **decurent** growth habit develop a more rounded form with multiple **scaffold branches** (secondary trunk-like branches) or secondary trunks originating from the trunk. Examples of decurent trees include Maple, Ash, Elm and Honeylocust.

## Developing Trunk

The primary pruning objective is to eliminate multiple secondary and codominant trunks. If multiple trunks start to develop, remove all but one. If the leader is killed, select a side branch to become the new leader, removing competition.

**On excurrent (central leader) trees, maintain a single trunk to the top of the tree.** If a side branch begins growing upright in a trunk-like fashion, prune it back, redirecting growth to an outward direction. Do not prune or “head back” the central leader (trunk).

**On decurrent trees, maintain a single dominant trunk to at least 2/3s of the tree’s mature height.** For example, if the mature tree height is 30 feet, a single trunk should dominate to at least 20 feet. If the mature tree reaches 60 foot, a single trunk dominates to at least 40 feet. Scaffold branches become the secondary framework of the tree. Through training, secondary trunks are avoided. Do not “head-back” (prune) the central leader.

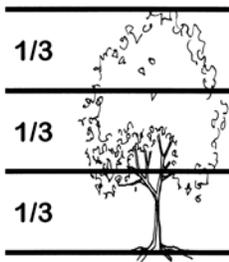
The overall objective with decurrent trees is to develop a structural system of *scaffold branches* rather than secondary trunks. **Scaffold branches** are the major structural, trunk-like branches that originate off of the trunk. By definition, a scaffold branch must be less than one-half the size of the adjacent trunk. Less than one-third is preferred. This allows for a branch collar to develop creating a structurally strong branch union. In contrast, “secondary trunks” lack the size relationship for branch collar development creating structurally weak branch unions. In an open landscape setting, most decurrent trees naturally develop multiple secondary trunks arising at the same location predisposing the tree to storm damage.



Codominant trunks – A branch union with two trunks of similar size is structurally weak and prone to storm damage. “Included bark” (hidden bark) between the trunks prevents the wood from growing together. In structural pruning, there is zero tolerance for codominant

## Managing Side Branches

**Selecting lowest branch** – The objective is to identify what will become the lowest permanent branch early in the tree’s life, allowing the gardener to manage and remove lower branches over time. Branches below the lowest permanent branch are called *temporary branches*.



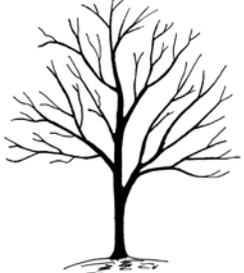
To develop a strong trunk taper, at least one-half of the foliage must be in the lower two-thirds of the tree. *Temporary branches* below the lowest permanent branches will be removed over time, as the tree grows in height.

**On excurrent trees**, select the lowest permanent branch. Branches below this point become temporary branches.

**On decurrent trees**, select the lowest (first) scaffold branch. Other scaffold branches will be selected based on the location of this branch. Branches below the lowest (first) scaffold branch become temporary branches.

**Developing branching structure** – For a branch collar to develop (creating a structurally strong branch union) the side branch must be less than one-half the diameter of the adjacent trunk. Less than one-third is preferred. If a side branch is growing too fast, compared to the trunk, prune back the side-branch to slow the growth.

In structural training of decurrent trees, the overall intent is to guide development of the branching structure, creating *scaffold branches* and eliminating secondary trunks. Minimum spacing on scaffold branches is based on the mature height of the tree, based on the formula of six inches per ten feet of mature height. For example, a tree with a mature height of 30 feet should have scaffold branches spaced at least 18 inches apart.

	 <b>Excurrent Trees</b> Single trunk to the top	 <b>Decurrent Trees</b> Scaffold branches arise from the trunk becoming the main structural system
<b>Objective 1</b>	Remove dead and damaged branches.	
<b>Objective 2</b>	Maintain single trunk to top of tree.	Maintain single dominant trunk to at least 2/3 <sup>rds</sup> of the tree’s mature height.
<b>Objective 3</b>	Select lowest permanent branch.	Select lowest scaffold branch.
<b>Objective 4</b>	Maintain diameter of all branches less than ½ the diameter of adjacent trunk.	Select other scaffold branches (Scaffold branch must be less than ½ the diameter of adjacent trunk.)
<b>Objective 5</b>	Manage growth on temporary branches by routinely pruning them back, and eventually removing them over time as the tree grows in height. Ideally, temporary branches are pruned back to a few buds. On temporary branches that have grown significantly before training begins, start by cutting them back by about 50%, removing more over time. <u>Temporary branches are removed before they reach a two inch diameter.</u>	

For additional information refer to CMG GardenNotes #613, *Structural Training of Young Shade Trees*, available online at [www.cmg.colostate.edu](http://www.cmg.colostate.edu).

Colorado State University, U.S. Department of Agriculture and Colorado counties cooperating.  
 Extension programs are available to all without discrimination.

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