

Tree Pruning Guide



This guide is a combination of work by: the California Department of Forestry and Fire Protection, the National Arbor Day Association, and the University of California, Agriculture & Natural Resources

Finding proper care for your tree is important. Your best assurance of obtaining professional work is by using the services of an arborist certified by the International Society of Arboriculture. Our City Forest can also provide a list of tree care companies and certified

arborists; contact us at (408) 99-TREES. For more information on how to prune young trees, sign up for a Tree Amigo class or attend a pruning workshop. This guide, and all services are provided free of cost by Our City Forest, a non-profit 501(c)3 organization.

The type of pruning your tree gets is critical to its health, longevity, safety, and appearance. Proper pruning is important because trees add beauty and enhance property value, up to 27%. Improperly pruned or neglected trees can result in: suffering tree health, lessened property value, increased potential hazards and liability, and increased long-term maintenance costs.

This guide is intended to describe how young trees should be pruned. We are not encouraging tree owners to prune large mature trees themselves. Pruning is both difficult and dangerous, it's best left to experienced arborists.

Reasons to Prune/Train Young Trees

Source: Training Young Trees for Structure & Form

Improved structural strength. By removing defects such as weak branch attachments and codominant stems, trained trees are structurally stronger than untrained trees. Structurally stronger trees have a lower potential for failure.

Reduced maintenance costs. Trained trees require less maintenance when they are mature. Typically, trained trees have fewer branches than untrained trees, which means less pruning. In addition, well-spaced branches provide easier access for arborists, and pruning can be accomplished in a shorter period of time. Finally, trained trees may not have structural defects that require correction by cabling, bracing, canopy thinning, and codominant stem removal, which avoids substantial costs.

Increased tree longevity. Simply by remaining intact longer, trained trees serve as functional components of the urban forest for more time than untrained trees. Trained trees have a lower potential for structural failure than untrained trees. Failed trees and hazardous trees need to be removed. Trees that have sustained substantial partial failure (limb or stem failure) often need to be removed because they are hazardous or unsightly.



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Five Key Steps for Pruning Young Trees

Source: Training Young Trees for Structure & Form

- 1 Remove broken, dead, dying, diseased, or damaged branches.** Inspect the canopy and remove or cut back these branches.
- 2 Select and establish a central leader.** There should only be one leader. Select the strongest and most vertical stem as the leader and remove or cut back competing stems.
- 3 Select and establish the lowest permanent branch.** Look for a well-attached branch at the desired height (determined by location and use), and remove closely-spaced, competing branches. The diameter of the lowest permanent branch should be no more than one-half that of the central leader or trunk at the point of attachment. Smaller temporary branches should be left close to the lowest permanent branch. Larger temporary branches should be pruned back to three to four buds.
- 4 Select and establish scaffold branches.** Look for well-attached branches above the lowest permanent branch that are no more than one-half the diameter of the central leader. Scaffold branches should be well spaced both vertically and radially. Vertical spacing should be 18 inches or more for large trees and 12 inches for smaller trees. Radial spacing should be allowed for balanced branch distribution around the central leader. Leave small branches close to scaffolds as temporary branches and cut back or remove larger branches.
- 5 Select temporary branches below the lowest permanent branch.** Some or all the branches below the lowest permanent branch can be retained as temporaries. If possible, leave the smallest branches and cut back or remove the largest branches.

How Much to Prune?

Source: *Training Young Trees for Structure & Form*

Generally, no more than 25% of the canopy of a young tree should be removed in any one year (This varies for different tree species). In some cases, removing only 5 to 10% will be sufficient to develop structure and form. With particularly fast-growing trees or trees with significant defects, over 25% may need to be removed. You can reduce the height of a large tree by up to 30%. It is important that approximately 1/2 of the trees foliage originate in the lower 2/3 of the tree.

Tree Location and Training

A tree's location is an important consideration for Step 3, "Select and establish the lowest permanent branch." The height of the lowest permanent branch is determined by both the location and use of the tree. Trees planted along streets or in parking lots need to allow clearance for vehicles. For street trees, many cities require an 8-foot (2.4 M.) clearance above the sidewalk and 14-feet (4.3 M.) over the street. Trees in parking lots need a 12 to 14-foot (3.7 to 4.3 M.) clearance. Trees in parks and yards have variable clearance requirements. If access is not needed, or if the tree is used for wind protection or as a visual screen, then the lower branches should be retained.

Conifers

The Five Steps can be applied to conifers, but with some modifications. Steps 1 and 2 are important. Damaged branches and competing leaders need to be removed. Step 3 may be important depending on the tree's location. If clearance is needed for vehicles, equipment, or people, then Step 3 should be applied. Step 4 is not as important for conifers as it is for hardwood species. In many cases this step can be skipped entirely. Look for and remove branches with weak attachments, however. Step 5 is needed if a lowest permanent branch is established.

Field Practice

It is very important to practice the Five Steps before applying them. Review each step with a helper before making cuts. Tie string or ribbon around the leader, the lowest permanent branch, and scaffolds. Discuss reasons for your selections, and step back to look at potential impacts on tree form and size. After you are confident of your selections, then make your cuts. Again step back from time to time to assess impacts on tree form. Remember that species and conditions vary considerably, and you will always need to use good judgment. Understand the reasons for the Five Steps, and then make reasonable adjustments in the field.

When to Prune?

Source: *Tree City USA Bulletin #1*

When to prune depends to a large extent on *why* you prune. Light pruning and the removal of dead wood can be done anytime. Otherwise, here are some guidelines, but recognizing that individual species may differ.



Winter Pruning during dormancy is the most common practice. It results in a vigorous burst of new growth in the spring and should be used if that is the desired effect. It is usually best to wait until the coldest part of winter has passed. Some species, such as maple, walnut, and birches, may "bleed" when sap begins to flow. This is not harmful, and will cease when the tree leafs out.

Spring At the latest, prune well before the buds swell and new leaves begin to develop.



Summer To direct the growth by slowing the branches you don't want; or to slow or "dwarf" the development of a tree or branch, pruning should be done soon after seasonal

growth is complete. The reason for the slowing effect is that you reduce the total leaf surface, thereby reducing the amount of food manufactured and sent to the roots for their development and next year's growth of crown.



Fall Because decay fungi spread their spores profusely in the fall and healing of wounds seems to be slower on fall cuts, this is a good time to leave your pruning tools in storage.



Flowering Trees If your purpose for pruning is to enhance flowering: 1. For trees or shrubs that bloom in summer or fall on current year's growth (e.g., crape myrtle), prune in winter. 2. For trees that bloom in spring from buds on one-year-old wood (e.g., dogwood and flowering fruit trees), prune when their flowers fade.

Caution: In some areas of the country, diseases or insect occurrence may be affected by the time of pruning. Check with an arborist or nursery operator to see if there are any local problems.

The Right Way - Where to Make The Cut

Source: *Tree Pruning - Doing it Right*

Remove unwanted branches at their attachment point to the trunk or another branch. Shorten branches to a lower lateral branch at least 1/2 the diameter of the branch to be removed. **DO NOT LEAVE STUBS.** Stubs die-back and allow decay to enter the trunk or branch. This shortens the tree's lifespan and causes potential hazards. In addition, stubs look unnatural.

Making the cut:

Make the cut just outside the branch bark ridge (D) and the trunk collar (E) (Figure 1). These 'targets' mark the boundary between the branch and the trunk. The branch bark ridge (BBR) is a raised strip of bark found on most branch crotches. When viewed from the top, it appears as a crescent shaped ridge extending downward. From the side, it appears as a narrow triangular ridge extending downward from the crotch to the center of the trunk. It marks the upper boundary between the branch and the trunk.

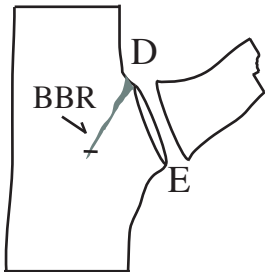


Figure 1
Basic cut

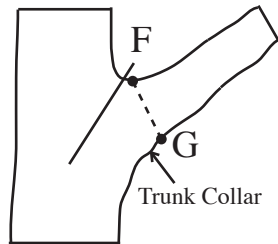


Figure 2
Unobvious BBR

If the BBR is not clearly visible, you can approximate its location by bisecting the crotch angle (Figure 2). Cut to lower side of this point (F) to protect the trunk or parent branch. The trunk collar generally appears as an enlarged area at the base of the branch. It's actually part of the trunk (G) (Figure 2). The point at where the enlargement perceptibly narrows is the lower boundary between the branch and trunk. Make your cut to the outside off this point (G) to avoid injuring the trunk. This type of cut is smaller and closes over rapidly.

A cut made inside the BBR or trunk collar is called a 'flush cut' (Figure 3). The resulting wound is larger than necessary and rather injurious to the trunk. If the trunk collar is not obvious, the angle of the final cut should approximate the angle that the BBR forms with the axis off the limb. Angle HY should equal angle HX (Figure 4). Many tree cavities are a result of 'flush cuts'.



Figure 3

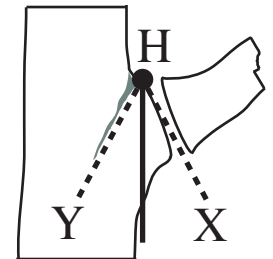


Figure 4
Unobvious trunk collar

For Larger Branches:

Make the first cut (A) on the underside of the branch about one foot from the crotch. Cut at least 1/3 of the branch diameter (Figure 5). Make the second cut (B) on the top side, 1 to 3 inches from the first. The limb should split away cleanly without tearing the bark or leaving a jagged edge. The remainder can be removed with final cut (C) without damaging the tree.

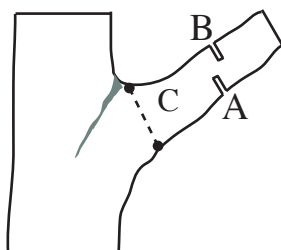


Figure 5
For larger branches

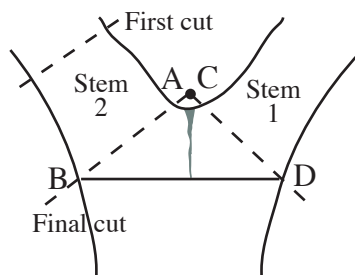


Figure 6
Codominant stems

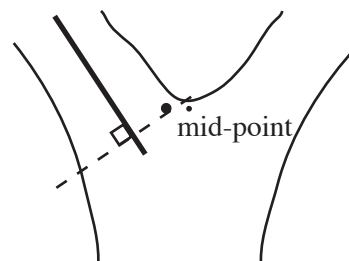


Figure 6a
Unobvious BBR

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Source: *Tree Pruning - Doing it Right*

To Change Leader Branches:

To shorten a branch back to a lower lateral branch enough to become the leader, make the final cut outside the BBR to a point directly opposite the bottom of the BBR. You can also approximate the cut by bisecting the angle formed by the BBR and an imaginary line which intersects the BBR and runs perpendicular to the axis of the trunk (Figure 7).

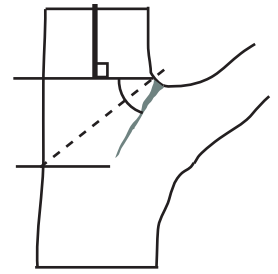


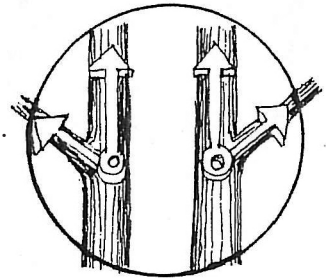
Figure 7

Pruning for Strength

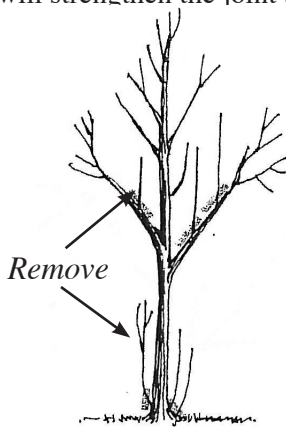
Source: *Tree City USA Bulletin #1*

Branch Angles and Size

Narrow angles signal a point of future weakness, whether in the trunk or crown. The reason is that as the two branches grow, neither has sufficient space to add the wood needed for strength. Instead, they grow against each other. The effect is similar to hammering in a wedge. To prevent this and the expensive problems that are sure to follow, simply remove one of the two branches. For strength, the ideal branching angle approximates 10 or 2 o'clock. Lateral branches should be no more than 1/2 to 3/4 the diameter of the trunk. As the trunk grows it will strengthen the joint by adding wood around the branch - like a dowel in a chair leg.



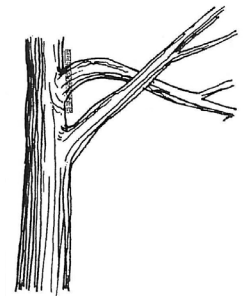
Ideal angles



Suckers

Rubbing Branches

Branches that rub result in wounds, decay and notches. Remove one of the offending branches.



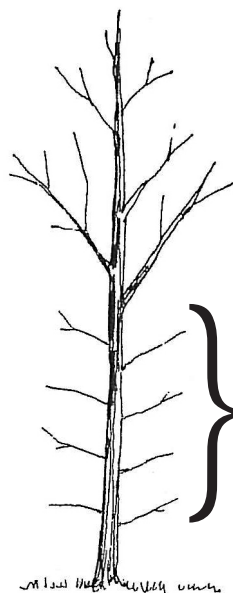
Rubbing Branches

Watersprouts and Suckers

These "parasite" sprouts can occur at the base or inside the crown. They are rapidly growing, weakly attached, and upright. Usually they use more energy that they return to the tree. It is best to remove them as soon as possible when it is obvious they are vigorous sprouts.

Lower Temporary Branches

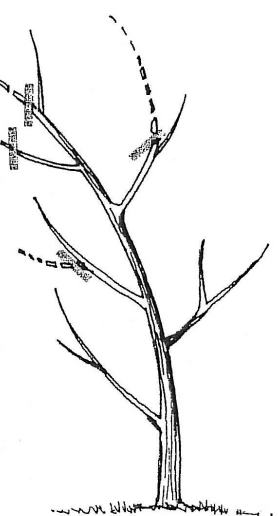
Branches below the lowest permanent branch can protect young bark from injury from the sun and add taper and strength to the trunk. Particularly in lawn plantings where lower limbs do not block passage or temp vandals, the limbs may be left for 3-4 years after planting. Then remove over the next 2-3 years, beginning with the larger temporaries. Don't let the temporary branches become large and vigorous. Shorten the larger temporary branches, or remove vigorous temporaries if less vigorous ones can be selected.



Temporary Branches

Center of Gravity

Young trees deformed by wind may be corrected by pruning. Move the tree's center of gravity to a point more central over the trunk by cutting back the leader and laterals on the downward side (or direction of lean) to more upright branches.

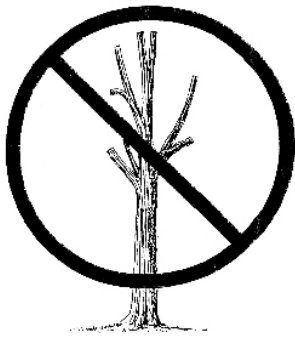


Correcting center of gravity.

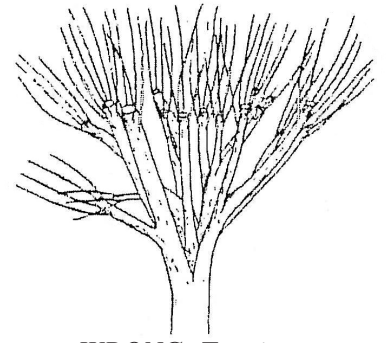
Caution: When pruning diseased trees, dip your shears in household bleach before storing or moving to the next tree. Be sure to rinse and wipe dry before storage.

The Wrong Way - Topping

Source: *Training Young Trees for Structure & Form*



Topping, heading-back or stubbing is an unnatural and destructive pruning technique used to reduce tree height. It is commonly practiced on trees under power lines and on many publicly and privately owned trees. People often assume that because they see it done so frequently that it is an appropriate way to prune trees. Unfortunately, few people are aware of how a tree grows, closes its wounds, and prevents the spread of disease and decay throughout itself, otherwise it would become a rare sight.

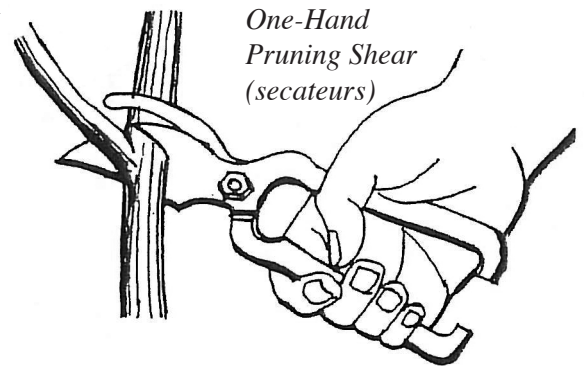


WRONG: Topping

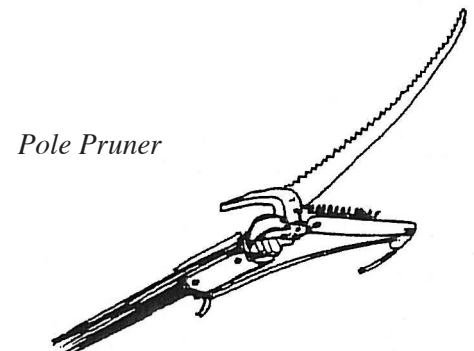
Keys to Good Pruning

Source: *Tree City USA Bulletin #1*

1. Prune early in the life of the tree so pruning wounds are small and so growth goes where you want it.
2. Begin your visual inspection at the top of the tree and work downward.
3. Don't worry about protecting pruning cuts. Do not paint larger wounds with tree paint, the evidence is that it does not prevent or reduce decay, and actually limits healing of the wound.
4. Keep your tools sharp. One-handed pruning shears with curved blades (secateurs) work best on young trees.
5. Make safety a number one priority. For high branches use a pole pruner. Some, have both a saw and shears on the same tool. A major job on a big tree should be done by a professional arborist.
6. When you prune back to the trunk or a larger limb, branches too small to have formed a collar (swollen area at base) should be cut close. (Notice in the drawing of the pruning shears that the cutting blade is cutting upward for less effort and a close cut.) Otherwise, follow the rules of good pruning of larger limbs by cutting just outside the branch ridge and collar and at a slight down-and-outward angle (so as to not injure the collar). Do not leave a protruding stub.
7. When simply shortening a small branch, make the cut at a lateral bud or another lateral branch (referred to as "head" or "headback pruning"). (See Figure 9) Favor a bud that will produce a branch that will grow in a desired direction (usually outward). The cut should be sharp and clean, and make at a slight angle about 1/4 inch beyond the bud.



One-Hand
Pruning Shear
(secateurs)



Pole Pruner

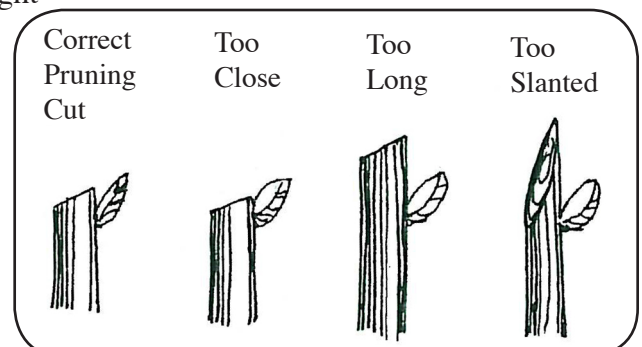


Figure 9

Glossary of Pruning Terms

Source: *Training Young Trees for Structure & Form*

Canopy. See Crown.

Central leader. Dominant, upright stem that forms the main trunk.

Codominant stems. Stems or trunks of approximately equal size, growing at about the same rate, and attached to one another. Typically, the attachment is structurally weak.

Crown. Foliated portion of the tree, from the lowest branch to the tree top; synonymous with canopy.

Decurrent. Round-headed tree form; scaffold branches codominate with central leader at maturity.

Double leader. Two codominant stems growing more or less in the center of the tree and jointly assuming the role of the leader.

Excurrent. Conical tree form; strong central leader is present to the top of tree when mature. Leader development is dominant over scaffold branch development.

Included bark. Pattern of development at branch junctions where bark is turned inward rather than pushed out. Synonymous with embedded bark.

Lateral. Secondary branch arising from scaffold limbs.

Leader. See central leader.

Lowest permanent branch. Lowest scaffold branch on tree. Its height is determined by tree use and location.

Pollard. Pruning technique by which young trees or branches are initially headed and then reheaded on an annual basis without disturbing the callus knob.

Photosynthate. Carbohydrate produced by leaves (and other chlorophyll containing tissues) during photosynthesis.

Round-over. To reduce tree size by heading back all stems on the periphery of the canopy by an equal amount. (This is not a recommended pruning practice.)

Scaffold branch. A branch that is part of the main structure of the crown. Scaffolds arise from the central leader or main trunk.

Sucker. A vigorous, upright, epicormic shoot that arises from the latent buds below the graft union or soil level.

Temporary branch. A branch that remains on the tree for a limited period of time. It is not part of the main structure of the crown. Temporaries can occur on the central leader, trunk, or scaffold branches.

Watersprout. A vigorous, upright shoot that arises from the latent or adventitious buds above the growth or graft union on older wood.

Content Sources

This guide is a combination of work by: the California Department of Forestry and Fire Protection, the National Arbor Day Association, and the University of California, Agriculture & Natural Resources.

Hagen, Bruce W. (1991). *Tree Pruning - Doing it Right*, California Department of Forestry

Tree City USA Bulletin #1 (2000). *National Arbor Day Foundation*

Training Young Trees for Structure and Form, Supplemental Information (2000). *University of California, Agriculture & Natural Resources*

For More Information

1. Take a Tree Amigo class or pruning workshop offered for free through Our City Forest: <http://www.ourcityforest.org/>
2. International Society of Arboriculture: <http://www.isa-arbor.com/>, or <http://www.treesaregood.com/>
3. City of San Jose tree permits page: http://www.sanjoseca.gov/transportation/tl_treepermits.htm
4. Registered San Jose Tree Trimming companies: http://www.ourcityforest.org/pdf/tree_trimming_companies.pdf