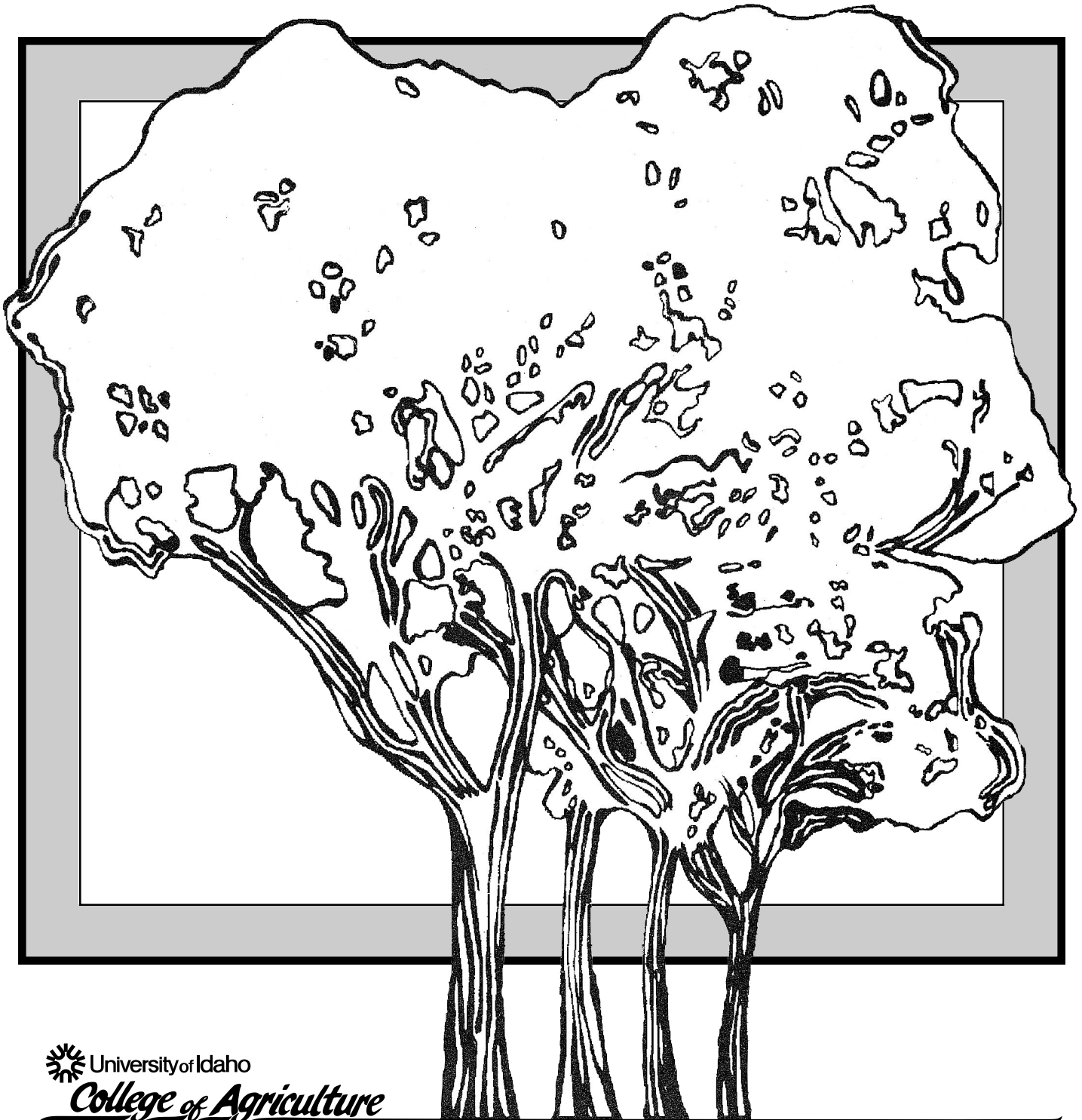
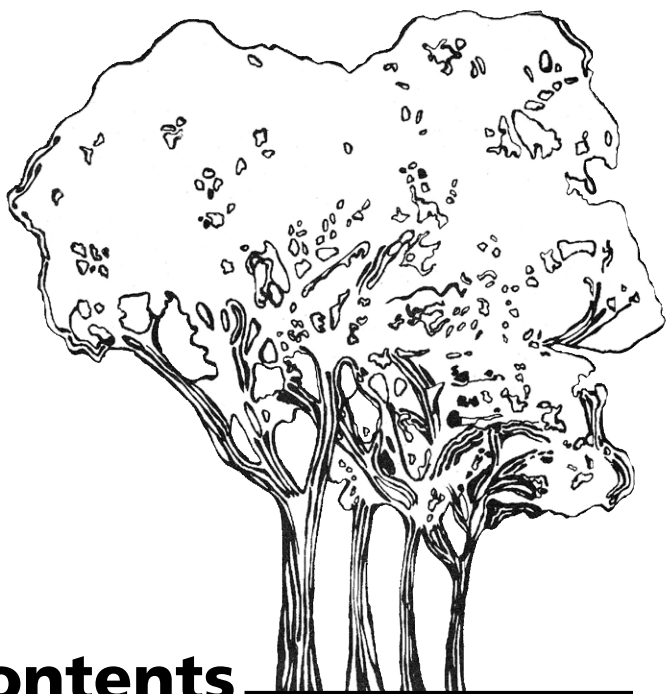


How to Prune Deciduous Landscape Trees

W.M. Colt, R.R. Tripepi, R.L. Mahoney





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How to Prune Deciduous Landscape Trees

Trees enhance the environment around our homes, in our parks, and along our highways. Unfortunately, trees are often taken for granted and they suffer from inadequate care.

A regular maintenance program during the tree's lifetime can minimize problems and enhance its benefits. Proper pruning is one phase of a complete maintenance program.

Why Prune?

Pruning helps maintain a tree's natural form and corrects undesirable branch growth. Pruning also reduces public safety hazards associated with structurally deficient limbs and helps control disease or insect problems.

Nature's way of pruning is by crowding and shading, which creates dying branches and twigs. If you prune regularly (based on the national arbor standard of every 5 to 7 years) and remove undesirable growth, you can avoid an extensive and expensive pruning job later. The pruning wound is also smaller and closes faster. Pruning each tree annually may be unnecessary because the key is to remove undesirable growth as required.

Pruning to control tree size in its allocated space is a poor solution; remove the tree and select one that grows to a more appropriate size.

Who Should Prune Your Trees?

This decision depends, of course, on your physical ability, your pruning knowledge, your time availability, and the tree's size and location. If you decide to hire a tree service professional, and this may be wise for large trees, follow these points:

- ◆ Ask if the contractor is a certified arborist through the International Society of Arboriculture.
- ◆ Verify that the pruning contractor is licensed as required by the local municipality. Be sure the contractor is bonded, insured, and carries worker's compensation. Crews should carry a copy of liability insurance. Under some circumstances, you can be held financially responsible if an uninsured worker is injured on your property.
- ◆ Check the contractor's references of previous work in the community.
- ◆ Don't be forced into a quick decision by a high pressure sales representative. Get a second or third cost estimate.
- ◆ Use a written contract. Ask for a written agreement, and require that the work be done on a job basis rather than an hourly basis.
- ◆ Be sure the contractor has safe climbing equipment. The crew should use climbing spikes only when removing trees from the landscape.

◆ Contact your local utility office if the tree is near or under a power line. In such cases, use a trained professional who is qualified to prune trees near electrical lines.

If you decide to prune the tree yourself, read this publication. Study the illustrations carefully. Work safely. Contact your County Extension Educator with any questions.

When to Prune

Planting Time

A tree may first require pruning when planted. Leave most branches on the tree to provide maximum leaf surface and buds for manufacturing the food and plant hormones that promote rooting.

At planting time, remove broken or damaged limbs and branches attached to the trunk at a 45° angle or less to avoid development of weak crotches. Eliminate branches that cross over each other or grow toward the center of the tree. For bare root trees, remove broken or damaged roots before planting.

Maintenance Pruning

For established trees, prune routinely every 5 to 7 years. Make inspections and take corrective action if needed.

Proper timing for pruning is important. When to prune depends on the reason for pruning. For example, you can do light pruning, such as removing diseased or injured plant parts and dead wood, year-round.

Prune most deciduous trees during the dormant season (late fall to early spring). Avoid pruning when decay fungi are sporulating, usually during warm,

moist weather in early fall. Avoid pruning when the plant tissue is frozen in winter. Frozen wood becomes brittle and may break or crack, causing an undesirable wound.

Pruning during the dormant season minimizes cleanup and reduces the chance of spreading disease organisms. If you complete pruning before the leaves develop in early spring, new plant tissue (callus) will start to cover the wounds during this period of most rapid tree growth.

Some trees, such as **birch, elm, maple, walnut, and sycamore**, exude clear sap from pruning wounds. This sap flow does not harm the tree but is often unsightly. **Prune these trees in late fall or early winter to minimize the sap flow.**

Avoid moderate to severe pruning for all trees (removing many branches, especially those greater than 3 inches in diameter) in late summer or early fall to avoid stimulating new growth. If this growth fails to harden off before a heavy frost, new stems or branches can be killed.

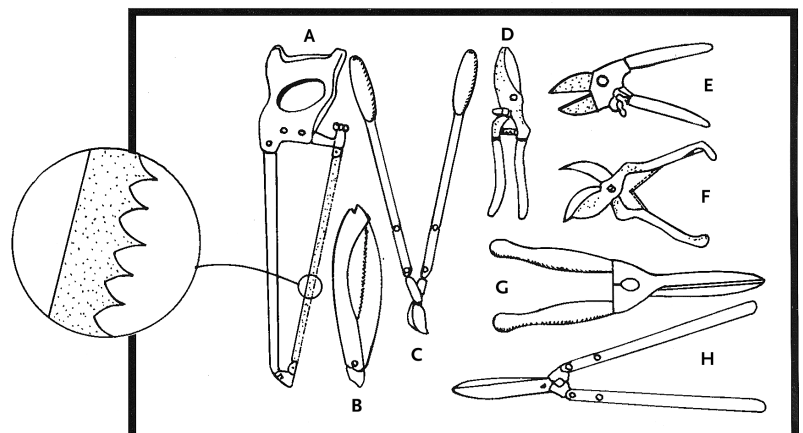
Prune flowering trees whose blossoms form on the previous year's wood, such as **dogwood and crabapple**, after they flower. Otherwise, you will lose a year's flower production by pruning in fall or spring. Keep in mind that pruning immediately after flowering removes fruits for summer or fall.

For trees that bloom in summer, such as **golden rain tree and little leaf linden**, flowers form on new wood. You can prune these trees from late fall to early spring without reducing the number of flowers.

Which Tools to Use

Use the proper tools to make a clean cut. Hand-

Figure 1. Effective pruning tools include pruning saws (A and B), lopping shears (C), and hand shears (D, E, and F). Do not use hedge shears (G and H), as they fail to make a clean cut on tree branches. Similarly, chain saws are not suitable for final cuts on large branches.



saws that cut on the pull stroke are easy to use and provide excellent control. Use pole saws if branches are less than 20 feet above the ground. For small branch removal, use lopping shears and hand shears (Figure 1).

In general, use pruning saws to cut limbs greater than 1 inch in diameter, lopping shears for branches between 1/2 and 1 inch, and hand shears for stems less than 1/2-inch thick.

Pruning with chain saws, axes, or hatchets is extremely risky for the operator. Learn and follow chain saw safety rules, such as never cutting above chest level. (For further safety information, see PNW 224, *Safe Chain Saw Operation*).

Using axes and hatchets needlessly injures many trees. Using these tools to remove limbs usually leaves a stub (stem tissue without a visible bud) or projection of some kind. Stubs prevent the wound from closing rapidly. Poor aim with an axe can cause unnecessary trunk injury.

Disinfect all pruning tools with a bleach or alcohol solution as you move from tree to tree. (See section *Pruning Diseased Trees* on page 12).

How to Prune

Types of Pruning Cuts

Two basic types of pruning cuts are heading cuts and thinning cuts. A heading cut is also called a stub cut and results in the growth of many more shoots because the apical dominance of the shoot tip has been temporarily disrupted. A thinning cut is the removal of a branch to its point of origin or point of attachment and results in fewer branches growing near where the cut is made. Heading cuts tend to destroy the natural shape of trees so restrict most of your pruning cuts to thinning cuts.

Pruning Small Trees

Removing young, small limbs is quick and simple. If you delay pruning until limbs are large, branches are more difficult to remove. Besides affecting the natural shape of the tree, pruning creates a wound the plant must grow over. The wound after removing a small branch will be covered quickly, often within a year, but the wound from removing a large branch may take several years to grow over. If you prune and train a young tree in its formative stage, the plant will need minimal pruning later.

Selecting Scaffold Branches

Select branches that grow at wide angles from the trunk for strong support as permanent or scaffold branches. Narrow, angled crotches increase the chance of splitting during times of stress like ice, snow, or wind storms (Figure 2). Remove one of these branches as early as possible to avoid splitting after the tree becomes older.

Space scaffold branches at least 8 to 18 inches apart vertically (Figure 3). Space branches radially by selecting five to seven scaffold branches to circle the trunk. One scaffold branch should not grow directly above another one to ensure that both develop properly.

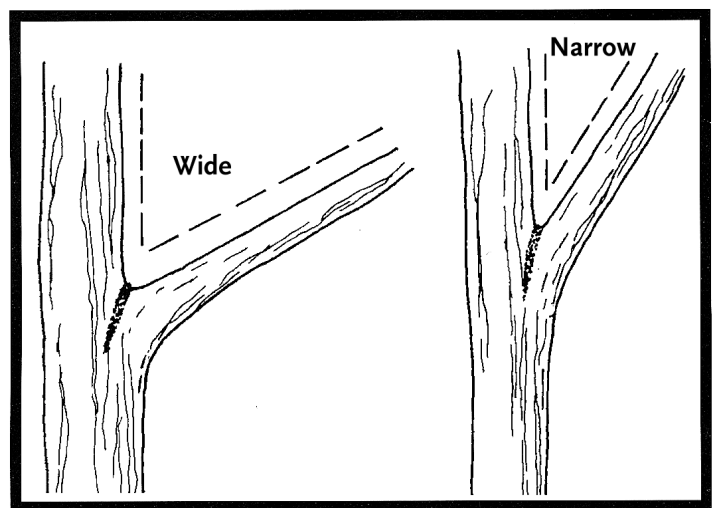


Figure 2. Select a scaffold branch with a wide angle of attachment. A branch with a narrow angle of attachment is more likely to split.

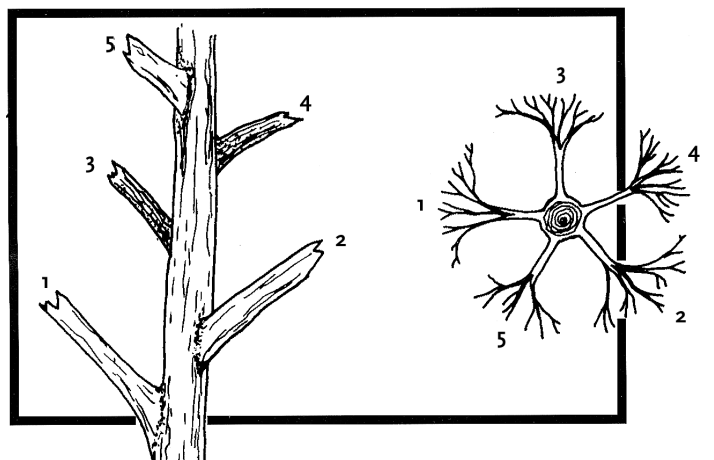


Figure 3. Scaffold branches require proper vertical and radial spacing on the trunk.

Some species, such as littleleaf linden and flowering plum cultivars, have naturally narrow angles of branch attachment. Consequently, prune these species to form a dense, crowded crown, and avoid horizontal scaffolds. The dense crown allows branches to share stress from ice, snow, or wind, and maintain plant form.

Windswept Trees

Prevailing winds can deform young trees, making them appear lopsided. Pruning can correct the deformity by moving the tree's center of gravity to a more central point over the trunk.

Cut back the leader and lateral branches on the down-wind side (direction of lean) to more upright branches (Figure 4). Prune back branches to a bud or branch pointing into the wind. If constant wind is a problem, build some type of windbreak protection or plant other species that are more wind resistant.

Pruning Mature Trees

Prune mature trees periodically. Make yearly inspections and follow up with maintenance prun-

ing. Never remove more than one-third of the total canopy at one time on a tree neglected for many years because numerous watersprouts may form. Watersprouts on large branches or trunks are weakly attached and can break off easily (Figure 13).

Excessive pruning can also weaken a tree's ability to develop structural strength and good form. Finally, excessive pruning will expose limbs to direct sunlight causing sunscald problems and allowing canker or wood-rotting organisms to invade injured tissues.

Maintaining a Leader

An upright branch often grows more vigorously than a horizontal limb. The upright branch may compete with the central leader or dominant trunk on the tree (Figure 5). Early corrective pruning will eliminate upright competing branches before they become a problem. If an upright branch on a mature tree outgrows the leader, you may let the vigorous branch take over as the new leader and remove the original leader where it attaches to the new one.

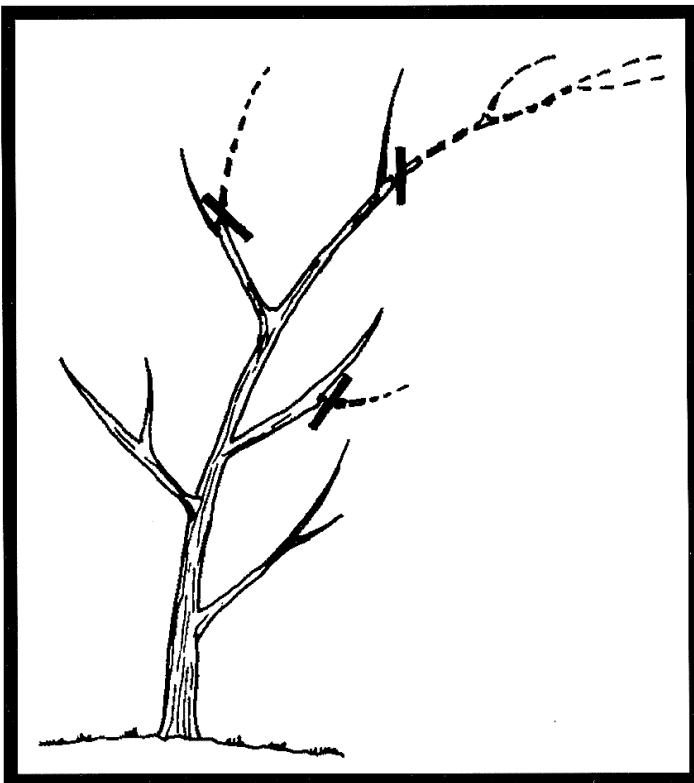


Figure 4. Cut back branches on the downwind side to upright branches.

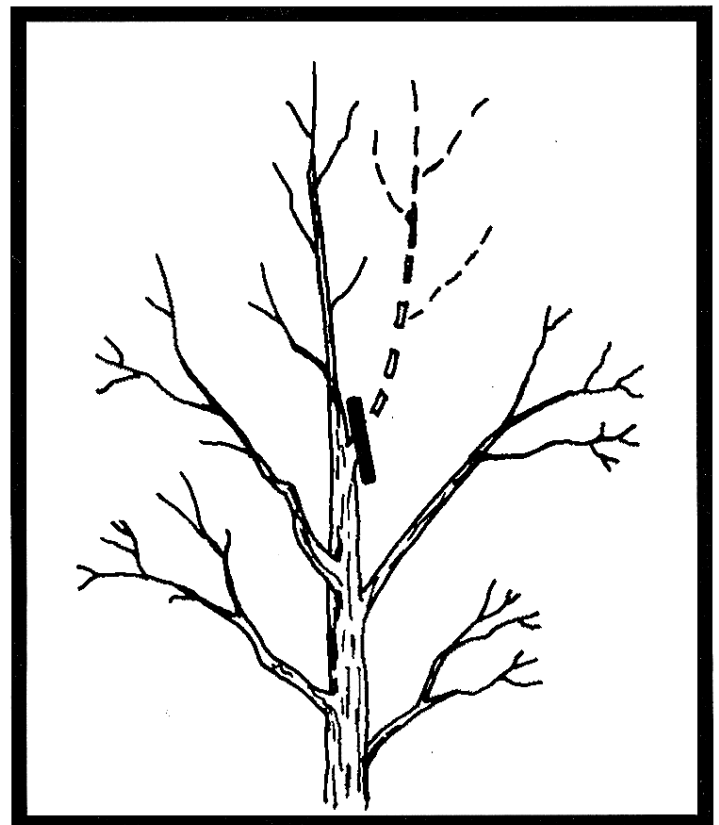


Figure 5. Eliminate a competitive upright branch before it becomes a problem.

Locating a Cut

Once you decide to cut a limb, avoid cutting too close to the trunk or leaving a stub. First, locate the branch bark ridge at the point where the top of the branch joins the main trunk. Second, note where the branch collar is located. This swollen region is on the bottom side of the branch where it joins with the trunk. Cut just outside the bark ridge and branch collar (Figure 6).

The bark ridge and branch collar region help prevent diseases from entering and decay from spreading in the plant. For this reason, avoid damaging this area. Support the branch as you cut to prevent the bark from tearing and making the wound larger.

Removing a Heavy Limb

Three cuts are required for removing a heavy limb (Figure 7). Make the first cut on the underside, 1 to 2 feet away from the base of the limb. Cut about one-fourth of the way through the branch. Make the second cut just outside the first cut, allowing the branch to fall. When you make the third cut, support the stub and cut just outside the bark ridge and branch collar.

This three-cut method will permit a smooth final cut without binding the saw and without tearing the bark. Avoid using a chain saw for the final cut as it may cut too roughly.

If you must remove one branch of a V crotch, be

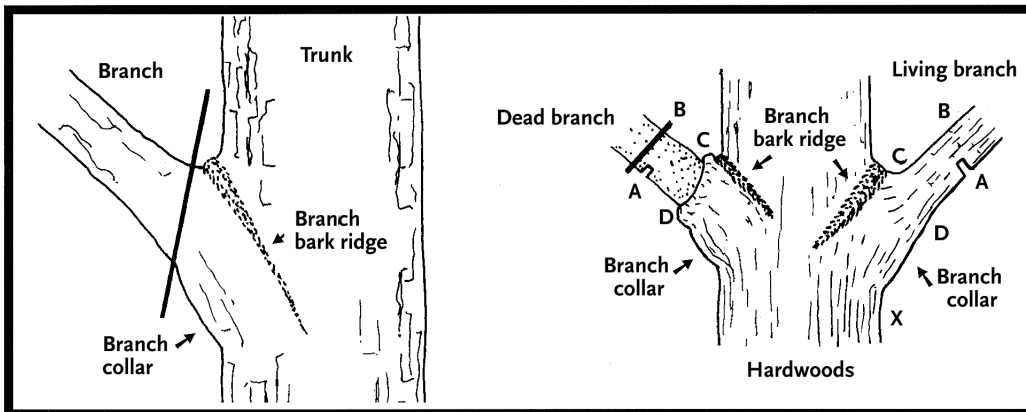


Figure 6. Locate the branch bark ridge and the branch collar before removing a branch. Cut part way through the branch at A, then finish the cut at B. Make the final cut at C-D. Do not cut along C-X.

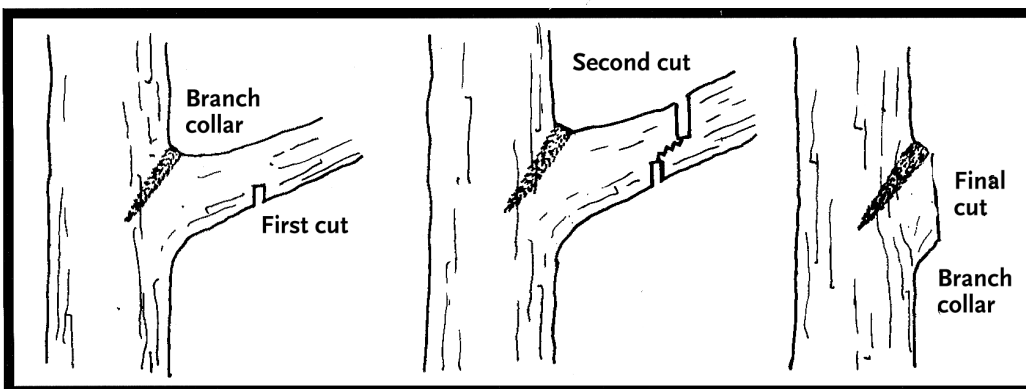


Figure 7. Three cuts are necessary to remove large limbs. This procedure prevents stripping bark down the trunk.

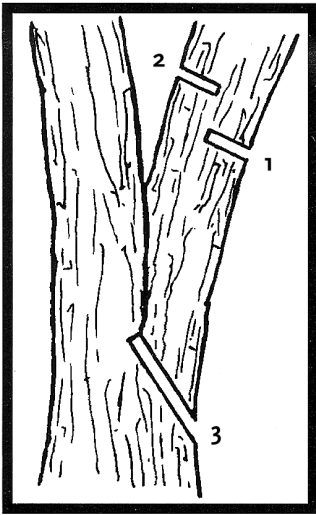


Figure 8. Make three cuts to prune a branch of a V crotch.

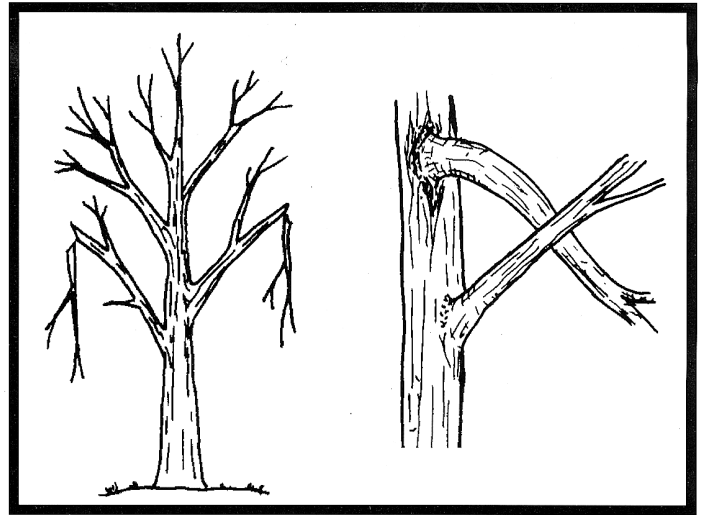


Figure 9. Remove broken branches and branches that rub against others. For rubbing branches, remove one of the offending limbs.

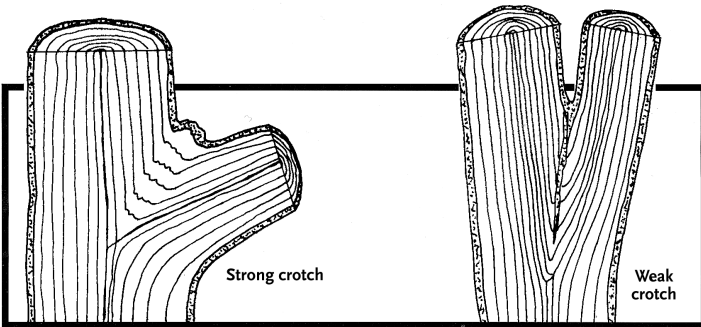


Figure 10. Ice, snow, or wind can damage trees with weak crotches.

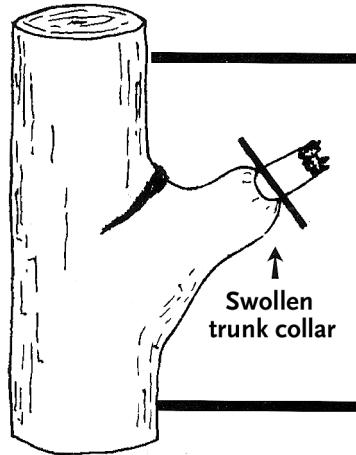


Figure 11. Cut beyond the swollen collar growing around the dead branch. Cutting the limb in the collar area will injure the trunk. Cut along black line.

aware that the actual intersection of the branches is often lower than you expect because of bark embedded at the junction. To remove this type of branch, make two preliminary cuts (Figure 8, first and second cuts), allowing the branch to fall. Make the final cut at the actual junction (Figure 8, third cut).

Remember, trees with narrow V crotches are subject to ice, snow, or wind damage. **Remove a branch with such a narrow angle of attachment while it is young, if possible.** On larger trees, removing a large branch may destroy the tree's natural shape and character.

One alternative to removing a branch forming a V-shaped crotch may be to cable and brace the tree. This practice will help reduce the likelihood of wind, snow, or ice damage by redistributing the weight loads of the entire tree crown. Consult a professional

arborist if your tree needs cabling and bracing.

Deciding Which Limbs to Remove

- ◆ Remove deadwood and broken branches (Figure 9).
- ◆ Remove structurally weakened, hazardous branches, including limbs with hollow spots or visibly fruiting structures of decay organisms.
- ◆ Remove crossover limbs or those growing out of place, including any branch that interferes, rubs on, rests on, or grows into the space of another normally oriented limb (Figure 9).
- ◆ Remove one of two limbs forming a weak crotch (Figure 10).
- ◆ Cut close to the ring of sound or live wood at the branch base to remove a dead branch. The ring of sound wood will appear swollen or enlarged at the base. Likewise, cut a dead branch stub just out-

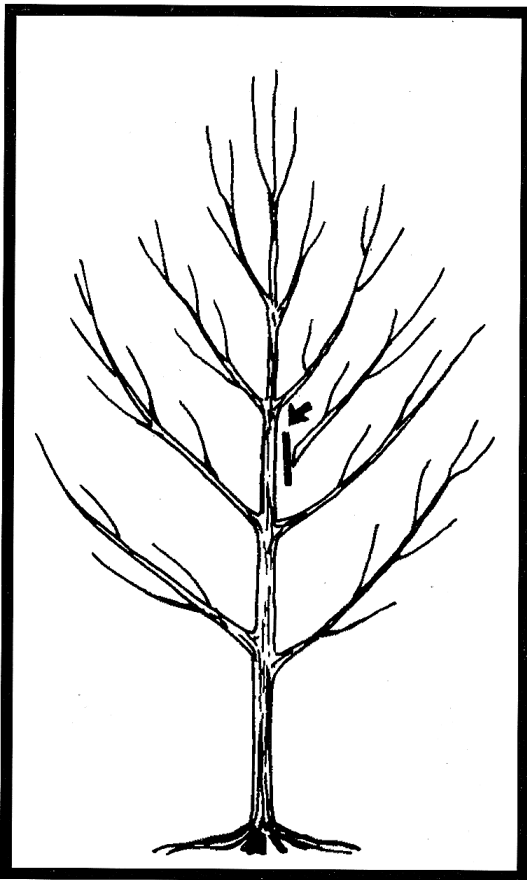


Figure 12. Prune crowded limbs.

side the collar of live wood (Figure 11).

- ◆ Remove *crowded limbs* (Figure 12). Often two limbs grow where only one is needed, or where there is only room for one to grow strong and normally.

- ◆ Remove multiple terminal shoots. On a tree with a strong, upright shape, leave only a single leader, preferably on the windward side, to dominate the tree. Terminal leaders are commonly killed or otherwise lost. When this happens, two to five equal leaders may develop. Multiple leaders formed within a small area on the trunk can create a structurally weak tree. If the tree has a strong upright shape, multiple leaders may ruin its shape.

- ◆ Remove *watersprouts* (Figure 13). Watersprouts left to grow can misshape a tree. Watersprouts, also called *epicormic shoots*, are borne singly or in clusters after severe pruning or limb breakage has opened up a tree. Remove watersprouts by rubbing them off the branch when they are less than 1-inch long and still succulent. Removal will prevent buds from regrowing at the base of the watersprout.

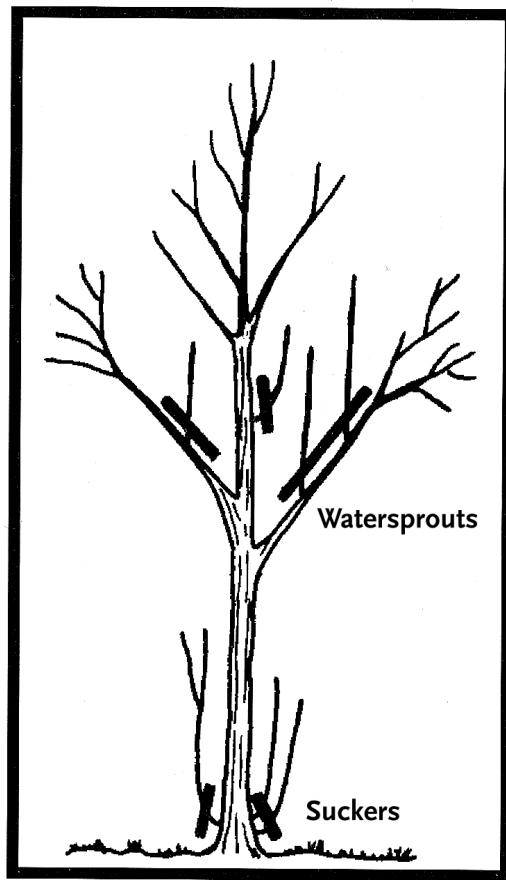


Figure 13. Remove watersprouts and suckers.

- ◆ Remove *suckers*—sprouts growing from the ground (Figure 13). Damage to the main trunk or roots, lowering the surrounding grade, or soil compaction induce sucker growth. Shallow sprinkling, rather than the preferred deep watering, also may cause sucker growth. For grafted trees, vigorous rootstocks can influence the amount of sucker growth, particularly for **crabapple** and **hawthorn** trees.

- ◆ Prune the lower limbs of shade trees, if needed, to make room for traffic underneath. Remember to leave at least two-thirds of total canopy volume.

Tree Topping - don't do it!

Heading back large branches of mature trees to leave large stubs, called *topping*, is an unsatisfactory way to prune a tree. Several shoots or dense clusters of stems can develop at the end of each stub. These shoots can break off easily and be a hazard to you or your neighbors.

Headed or topped trees lose their natural form

and are often ugly and grotesque (Figure 14). They may decline because of an insufficient amount of foliage remaining to provide the roots with an adequate supply of food. Topped trees may die slowly because the stubs usually possess internal decay or they may be killed rapidly by diseases or internally feeding (boring) insects. Topped trees are more susceptible to ice and wind storm damage than are trees pruned by thinning techniques due to internal decay or weakly attached branches.

We do not recommend topping to reduce tree size. You will be better off in the long run to plant and grow a tree that fits its area. If the tree is too large for its intended use, remove it and plant a smaller species. The practice of topping to reduce tree size or increase vigor is unjustified. **Be aware that unprofessional tree maintenance crews top trees because it requires little skill, is quick, and less expensive to complete than making thinning cuts.** (See *Who Should Prune Your Trees?* on page 3.)

Pruning Programs for Mature Trees

As a tree matures, complete pruning inspections less frequently, depending upon plant species and growing conditions. Although names for pruning operations can vary, the reasons for pruning mature trees remain the same. A description of several pruning operations for mature trees follows.

Cleaning out—This procedure primarily involves removing broken, diseased, dying, or dead branches as well as those that cross, are weakly attached (including watersprouts or suckers), and of low vigor. At this point, examine the tree for problems that might harm its growth or structural strength.

Raising the crown—This procedure involves removing lower branches from the trunk or lower parts of the tree. As trees grow, the branch weight also increases, causing limbs to bend downward. Plan the height of the lowest scaffold branch on young trees so that removing large branches (and causing large wounds) will be unnecessary. If you must remove many branches from the lower trunk, do so over

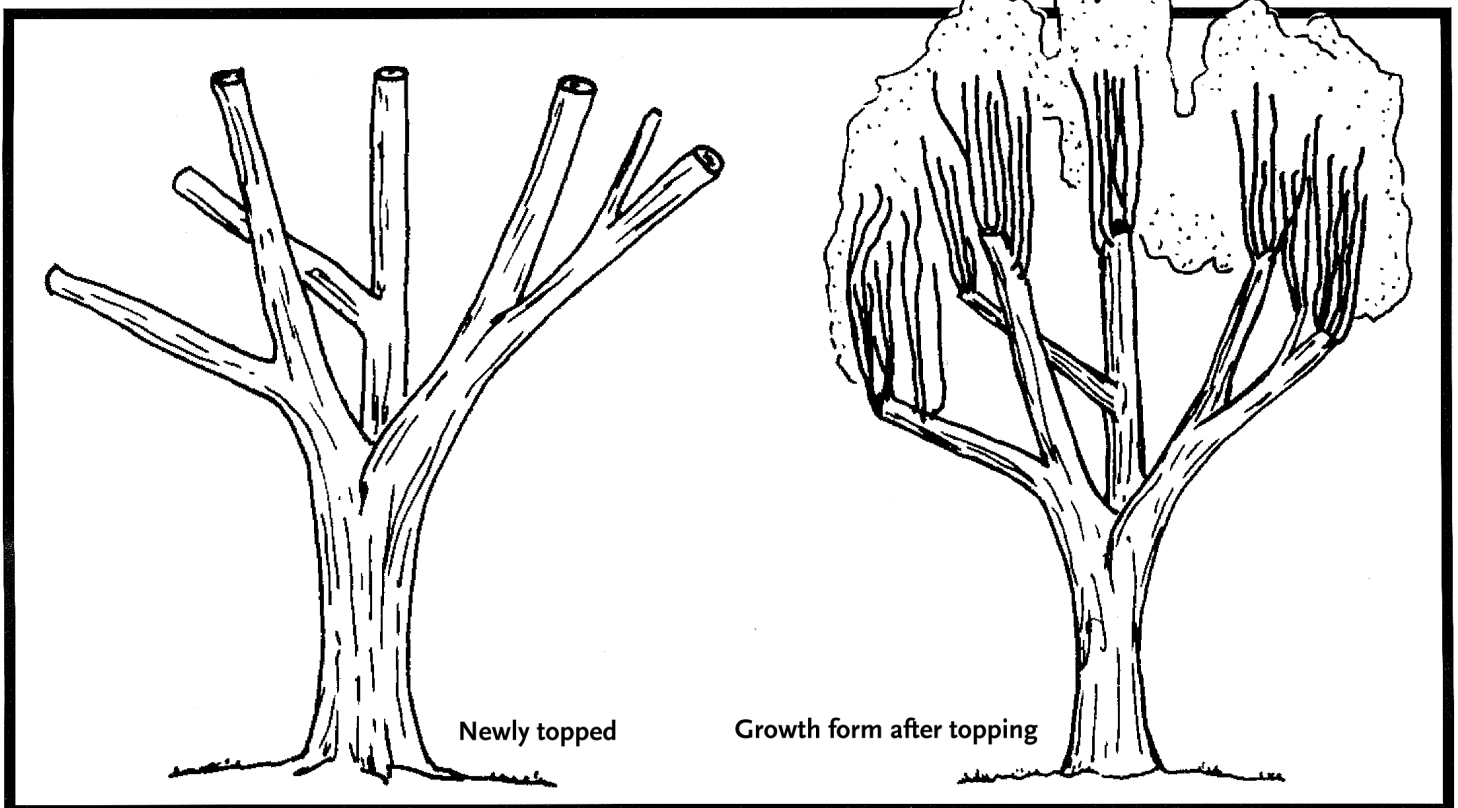


Figure 14. Topping is an unsatisfactory way to prune a tree. Topped trees lose their natural form as clusters of shoots develop on each stub.

several seasons, particularly for younger, large trees. Leave at least two-thirds of the total canopy volume.

Crown thinning—This term refers to opening up the tree canopy to permit air movement and deeper light penetration. This procedure will benefit inner leaves and tree branches. The first branches removed are those described in *Cleaning Out* on page 10. For branches that are too close together (vertically or radially) or shade each other, remove the entire branch at its point of attachment to the main trunk. Make cuts for crown thinning at the top and around the edges of the canopy (Figure 15). Choose branches 1 to 2 inches in diameter. Very few branches larger than 2 inches in diameter should need removal. Remove the branches with thinning cuts; these cuts remove a branch at its point of origin, or to a vigorous smaller branch that is at least one-third as large as the branch being removed. These types of thinning cuts avoid inducing numerous sprouts near the cut.

Crown reduction—Use this procedure to reduce the overall size of a tree canopy when it becomes larger than is desirable or safe. Although you can

roughly control tree size, pruning will become a regular maintenance task. For crown reduction, try to prune the tree just as it attains its maximum acceptable size. Delaying pruning makes maintaining an acceptable canopy size more difficult, creates larger pruning wounds, and can induce vigorous but weakly attached new shoots.

Crown reduction usually involves a thinning technique called *drop-crotching* to reduce tree height. With this technique, prune branches near the top of the tree back to a large lateral branch or to a smaller vigorous branch that is at least one-third of the diameter of the limb that you are removing. The lateral branch takes over as the leader and prevents watersprouts from growing (Figure 16). Drop-crotch pruning can reduce tree height by one-fourth to one-

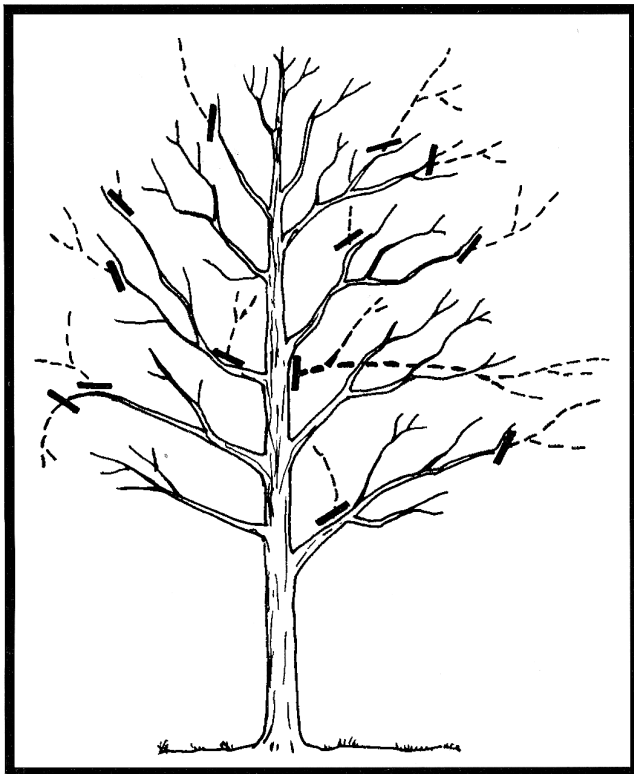


Figure 15. Crown thinning opens up the tree canopy. Use thinning cuts to remove branches that are 1 to 2 inches in diameter.

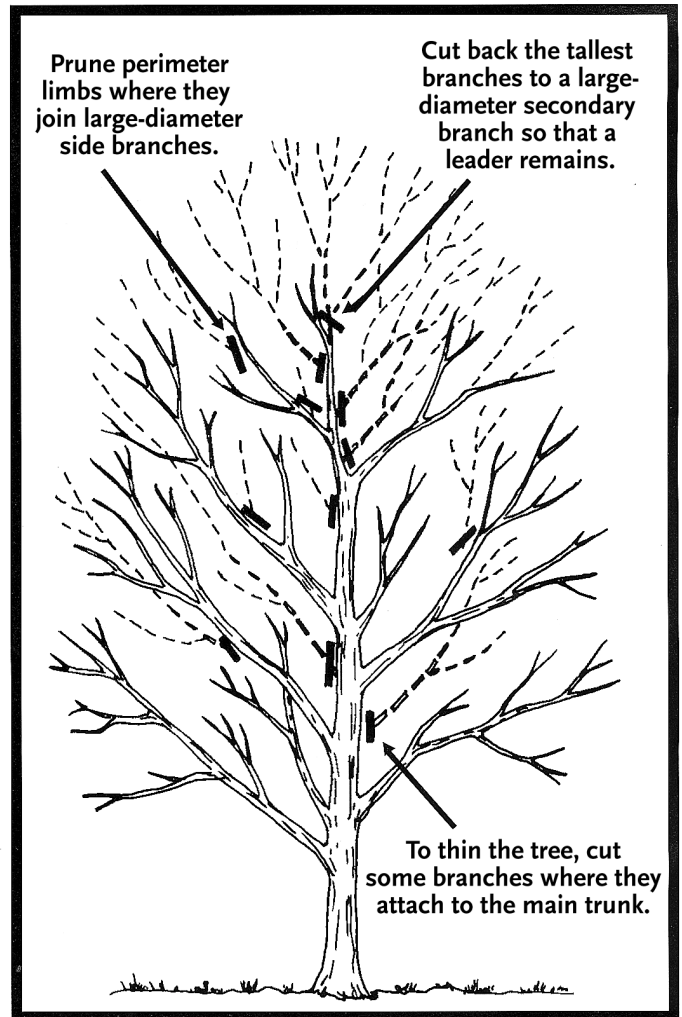


Figure 16. By using drop-crotch pruning, you can reduce tree size without weakening the tree or creating an eyesore.

third of its original size. If you reduce tree height with thinning cuts, the plant grows back to a critical height more slowly than a topped tree. Thinning also allows the tree to maintain its natural shape and minimizes potential decay problems.

Pruning Mature Trees Near Power Lines

For your safety, contact your local utility for information about pruning near overhead wires. Federal regulations prohibit unqualified, untrained persons from working within 10 feet of electrical wires.

Pruning mature trees near power lines can be hazardous if large tree branches interfere with the lines. In the past, power companies often topped trees under the wires because this process was fast and apparently economical. This practice produced short-lived results because the numerous sprouts that develop grow back rapidly into the wires. These sprouts, weakly attached to the parent tree, break easily.

Power companies are realizing that other pruning techniques are more economical in the long run,

are better for the tree, and are more acceptable to landowners and community leaders.

Side and Directional Pruning

Professional tree maintenance crews use other pruning techniques, including *side pruning* and *directional pruning*, as alternatives to topping. Side pruning involves removing side branches where they grow into the wires (Figure 17). Directional pruning involves opening paths for the wires through the tree crown (Figure 18).

An expert pruner can anticipate the direction of future growth and, by early and correct pruning, favor branches that will grow away from the wires, eliminating the need for topping.

While these two pruning methods are initially more expensive than other methods, they disfigure the tree much less than topping. They also give the most lasting benefits and cost the least in the long run. If you can not use these alternatives, completely remove the tree and replace it with a smaller tree.

Pruning Diseased Trees

You may need to prune a tree with diseased limbs to stop disease spread or for general sanitation. Under such conditions, take care that the pruning will not spread the disease. Dead branches commonly

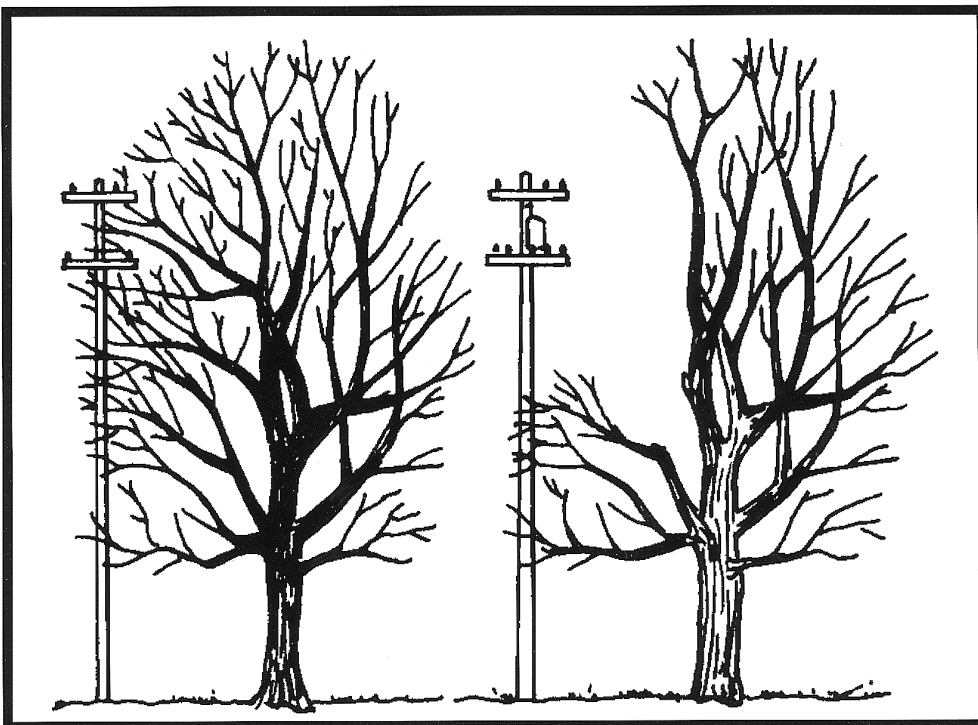


Figure 17. Side pruning removes side branches growing into electrical wires.

harbor pathogens that cutting tools easily carry. Tools often introduce *cankers*, a major disease of deciduous trees. Between each cut, disinfect all tools used to prune diseased branches. Use an alcohol or household bleach solution to kill any pathogen the tool might carry. Try using an old paint brush to swab pruning tool blades with a disinfectant. Use a 70 percent solution of methyl alcohol, ethyl alcohol, denatured alcohol, or isopropyl alcohol. Rubbing alcohol contains 70 percent isopropyl alcohol and is a suitable disinfectant right out of the bottle.

A 20 percent bleach solution (1 part bleach plus 4 parts water) makes a good general disinfectant. Bleach, however, will rust the tools rapidly. If you use bleach, lightly oil your tools daily after pruning. A 1:5 dilution of Lysol® or Pine-Sol® (1 part Lysol or Pine-Sol plus 4 parts water) makes an effective disinfectant solution.

Cut diseased limbs in healthy tissue at least 6 inches below infected wood. You may need to cut at a greater distance from infected wood for certain diseases, such as *fireblight*. Cut through noninfected tissue.

Burn infected wood from such pruning immediately and as close to the site as convenient to minimize the danger of the disease spreading. If burning is not possible, remove the infected wood from the site and dispose of it at a landfill.

Avoid pruning diseased trees in wet weather because the chance of spreading disease spores increases.

Wound Care and Dressing

Open wounds and long stubs can expose trees unnecessarily to insect and disease damage. For these reasons, make all pruning cuts so that they promote rapid wound closure. (See section *Locating a Cut* on page 7.) In general, allow wounds to dry quickly to avoid decay or insect entry.

Strong winds, heavy snow, or ice loads can break branches at their point of attachment. To help new plant tissue cover the wound quickly, carefully use a chisel or sharp knife to remove ragged edges of dead or dying tissue (Figure 19). Using a chisel or knife on a wound is unnecessary if ragged tissue is absent near the wound.

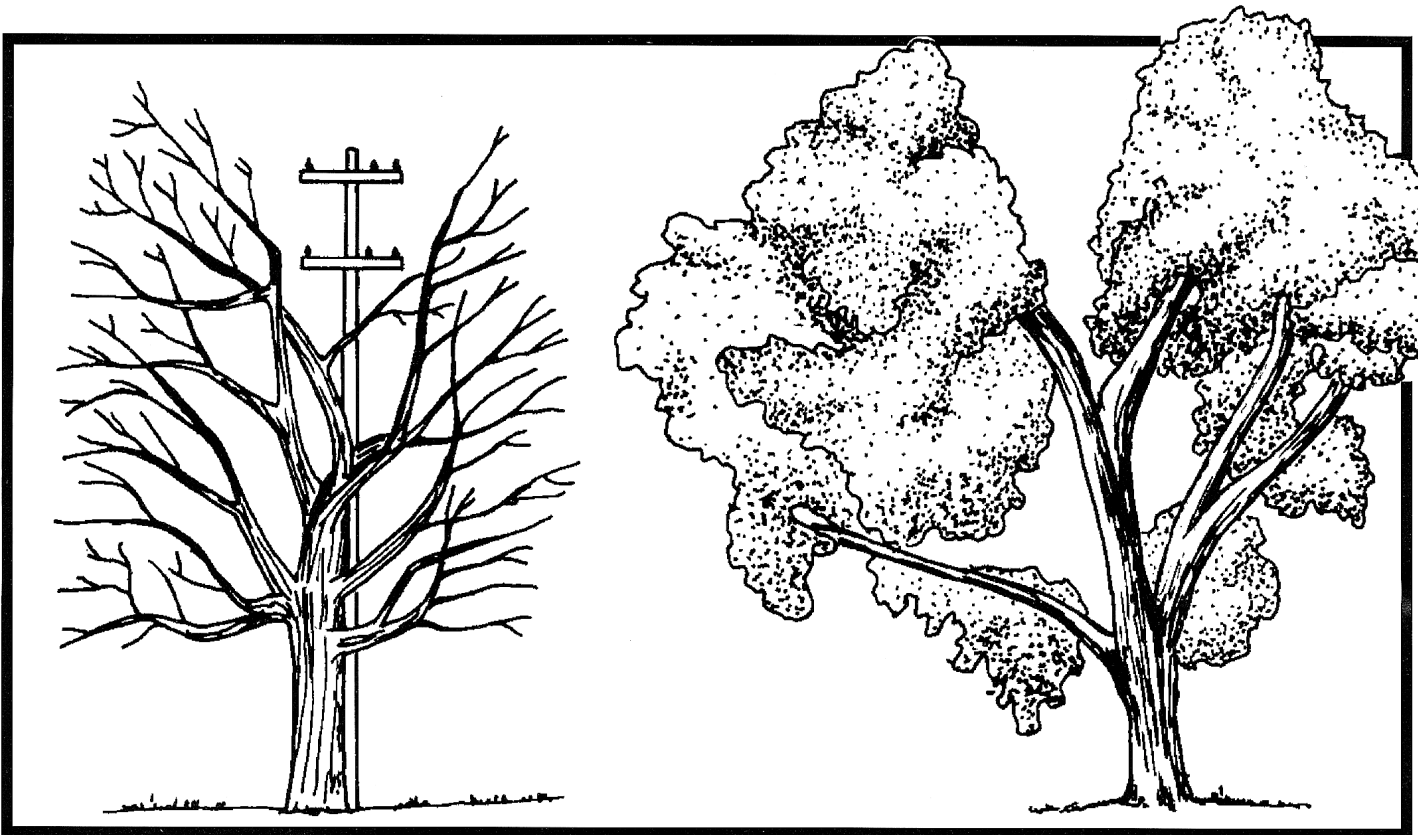


Figure 18. Directional pruning opens a path for the electrical wires through the tree crown.

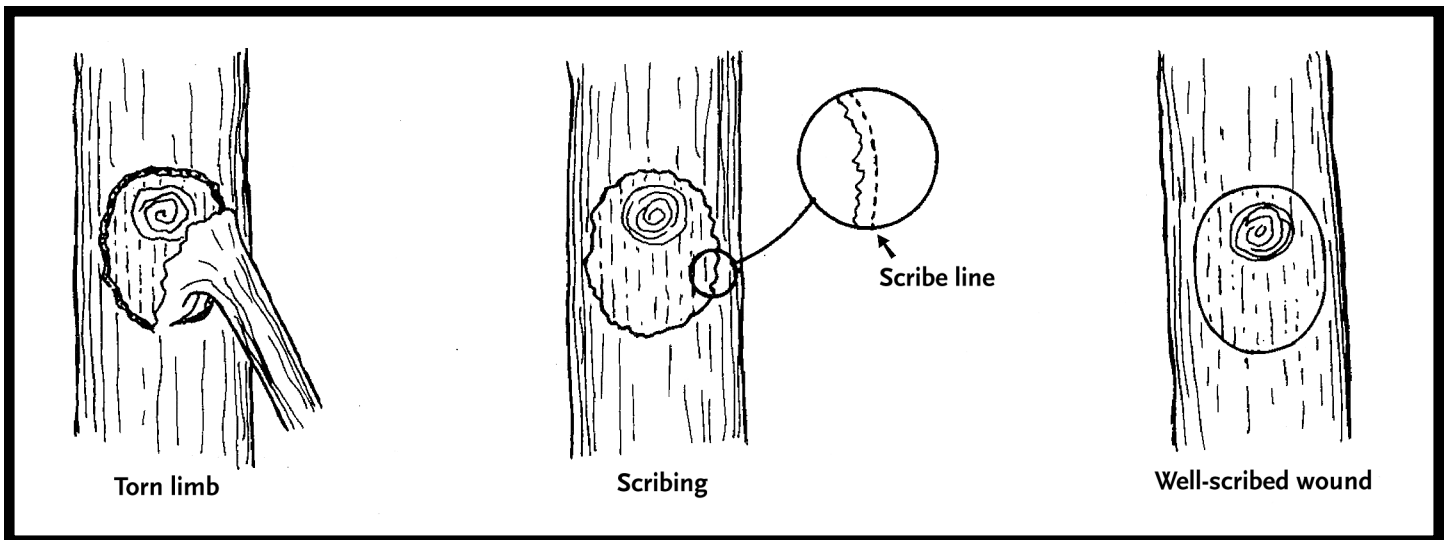


Figure 19. Remove the ragged edges of dead or dying tissue with a chisel or sharp knife to help new plant tissue cover a wound.

Try to keep the wound as small as possible, eliminating hiding places for insects or areas where water could accumulate. Avoid damaging healthy wood around wounds, including newly formed callus tissue along the edges. Damaging callus tissue may allow decay to spread into adjacent healthy tissue. Making the wound an elliptical shape is unnecessary because this does little to promote wound healing.

Trees respond to wounds by forming barriers that restrict disease or insect spread. Tree dressings and pruning paints are only cosmetic; they fail to promote healing of a properly cut surface.

You can use asphalt black tree dressings on large basal cuts to make the tree look better. Using pruning paint or tree dressing to cover a wet wound or one from which sap is seeping may entrap disease or decay-causing fungi. Covering a wet wound hampers rather than promotes healing.

Exterior house paints often kill live tree tissue, thus enlarging the wound. Generally, tree dressings and pruning paints are unnecessary and do little to help new tissue grow over the wound.

Summary

Evaluate trees yearly before pruning. If they are damaged, misshapen, insect or disease infested, proper pruning techniques will promote strong growth and ensure plant health. Thinning cuts are usually the best pruning cuts for trees.

Avoid topping to reduce overall plant height because this technique ruins the tree's natural shape. Also, it makes the tree more susceptible to disease and insect attacks as well as storm damage.

Preventing problems is always less expensive than correcting them. Therefore, examining and pruning trees on a regular basis, especially when they are young, will prevent the need for an extensive or expensive pruning job later.

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