Pruning Shade Trees
And Repairing Their Injuries

United States Department of Agriculture

PREPARED BY Agricultural Research Service and Extension Service

Home and Garden Bulletin Number 83
## Contents

**Developmental and Maintenance**

**Pruning**
- Young Trees 1
- Older Trees 1

**Seasons for Pruning**
- Deciduous Trees 2
- Evergreens 2

**Pruning Techniques**
- Deciduous Trees 3
- Evergreens 5

**Repairing Injuries**
- Bark Injuries 6
- Lightning Damage 9
- Preventing and Repairing Split Trunks and Crotches 9
- Uprooted Trees 10
- Insect Protection 10

**Special Pruning Problems**
- Flowering Ornamentals 10
- Palms 11

**Equipment** 12

Revised November 1983
Pruning Shade Trees and Repairing Their Injuries
Curtis May and L. R. Schreiber

Pruning is an important step in the overall care of your shade and landscape trees.

If you remove unsightly twigs and branches at the right time, you can help your trees grow to their natural beauty and shape, and keep them strong.

To keep your trees healthy, check them regularly for dead or dying branches, and repair all injuries as soon as you find them.

With a regular maintenance schedule, you can easily correct defects that would later require major tree surgery.

The basic tools for pruning and their uses are described on page 12.

Developmental and Maintenance Pruning

Young Trees

At the time of planting young trees, remove all damaged branches and those that cross or rub other branches. No other pruning should be needed. However, if the roots have been damaged, prune off about one-third of the length of twigs and small branches to compensate for root loss.

Do not cut branches on the lower part of the tree at this time. To do so leaves the tree with a tuft of branches on a slender stem. Such a tree may sway in the wind so much that the roots are loosened.

A year or two after planting, the tree may need pruning to improve its form. Begin at this time to choose the tree's permanent scaffold branches (the branches which form the major framework of the tree).

When possible, choose branches having wide-angled crotches rather than V-crotches. Branches used as permanent scaffold branches should be spaced some distance apart on the trunk. When several branches grow from the same level on the trunk, their crotches are weak and will break sooner or later.

Older Trees

Here is a list of things to look for, and prune, in established trees:
- Dead, dying, or unsightly parts.
- Sprouts growing at or near the base of the tree trunk.
- Branches that grow toward the center of the tree.
- Crossed branches. If branches cross and rub together, disease and decay fungi can enter the tree through the abraded areas.
- V-crotches. If it is possible to do so without ruining the appearance of the tree, remove one of the members forming a V-crotch. V-crotches split easily, and their removal helps to prevent storm damage to the tree.
- Multiple leaders. If several leaders develop on a tree that normally has only a single stem (such as spruce or pine) and you wish the tree to develop its typical shape, cut out all but one leader. This restores dominance to the remaining stem.
- "Nuisance" growth. Cut out branches that shade street lights or overgrow sidewalks and curbs to interfere with pedestrian and vehicular traffic. Cut off lower limbs that shade...
the lawn excessively. Call the telephone and electric companies to remove branches that interfere with utility wires.

Seasons for Pruning

Deciduous Trees

Deciduous trees may be pruned at any season. If you wait until the leaves are fully developed, you can visualize the effect that pruning will have on the form of the tree. On the other hand, wound healing may occur most rapidly after dormant season pruning.

Some kinds of trees will “bleed” clear sap from pruning cuts if they are pruned in late winter or in early spring before growth starts. Birch, dogwood, elm, maple, and yellowwood are excessive bleeders. This bleeding is not seriously harmful to the tree, but it usually causes concern to the tree’s owner.

Healthy trees usually stop bleeding after leaves develop. If trees continue to bleed, they may be infected with a bacterial disease called slime flux. This disease is seldom cured, but you can relieve the symptoms and possibly save the tree by installing a pipe through the bark and wood to drain the fluxing area. Consult your local professional arborist for disease confirmation and more detailed treatment information.

Evergreens

Needle-leaf evergreens can be divided into two general groups according to their type of growth. The proper time and methods for pruning or shearing these trees depend on the group to which they belong.

Pine and spruce trees are good examples of the group of evergreens that bear branches in a pattern. Branches radiate from the trunk in whorls, like spokes from a hub. There is a length of bare trunk between the whorls (fig. 1). Also in
Figure 2.—a. and b. Prune back to where a branch, twig, or side bud grows in the direction you want the tree to grow. c. Dormant buds for next season’s foliage form near leaf bases. Pruning stimulates these buds to form new branches and leaves during the current season.

this group are fir, monkey puzzle tree, umbrella pine, and sequoia.

These trees may be pruned in late winter, in spring before or at the time growth begins, or in midsummer.

Arborvitae is a good example of the other group of evergreens. Branches of trees in this group are arranged randomly along the trunk. Other evergreens of this type are juniper, hemlock, cypress, false-cypress, China-fir, Cryptomeria, golden-larch, incense-cedar, larch, Podocarpus, Torreya, and yew.

These trees may be pruned or sheared at any time. In the North, however, late-summer shearing may stimulate new growth that is susceptible to frost injury.

If healthy needle-leaf evergreens of either group are sheared just before growth begins in spring, new foliage grows rapidly, covers pruning cuts, and soon gives the tree a pleasing appearance.

Pruning Techniques

Deciduous Trees

Pruning small branches.—Small branches and twigs are commonly pruned just above a side bud or a fork that points in the direction you want the new growth to go. New growth normally develops on small branches and twigs a short distance below pruning cuts (fig. 2). Pruning to a fork or bud that is toward the outside of the tree’s crown tends to induce growth that broadens the crown. However, the amount of light the tree receives, the direction of the light, and the nature of the tree also affect the direction of new growth. Some trees do not broaden regardless of the way they are pruned.

Pruning large branches.—When you remove large branches that have wide-angled crotches, use the stub-cutting method (fig. 3). This method prevents the bark below the cut from being ripped off by the weight of the falling branch. The stub-cutting method requires three saw cuts. Make the first cut on the lower side of the limb, 1 to 2 feet farther out on the limb than the final cut will be made. Saw upward about halfway through the limb, or until just before the wood pinches the saw blade. Make the second cut a few inches farther out on the limb. Cut downward from the top until the limb is severed. Finally, saw off the stub. The top of the cut should be flush with the trunk or larger limb from which you
are removing the branch. The cut may angle out to a narrow ledge at the base. Make this cut as smooth as you can; smooth it with a chisel, if necessary.

Protruding stubs left on trees usually die. These dead stubs are points through which decay and disease organisms can enter the tree.

Pruning V-crotches.—Remove one member of the V-crotch by stub-cutting as described previously. Cut off the remaining stub at the point where the two members join solidly (fig. 4). Because this point of solid juncture is usually lower than it appears to be, first make a cut from the outside of the stub to the apparent point of juncture. Then, using a chisel, carefully chip away the wood at the crotch until you reach the actual point where the wood joins.

When you have found the point of juncture, shape the cut so it slopes downward from this point. Make the angle of the slope no larger than is necessary to permit normal closing—an angle of 10 to 45 degrees is about right. A sharper angle leaves too large a wound. A shallower angle commonly retards closure, presents more opportunity for water to soak into the wood, and encourages the growth of decay fungi.

Pollarding.—One other pruning method—pollarding—is sometimes used on old trees. Pollarding is the practice of removing the top of the tree, leaving only the major limbs. These limbs are expected to produce a new crown. Avoid pollarding except in instances where the tree crown presents a hazard to life and property that cannot be corrected by other pruning methods.

---

**DANGER**

Pruning big trees can be dangerous. Large limbs are very heavy. A falling limb may maim or kill workers or bystanders, or cause extensive property damage.

A misstep while climbing in a tall tree, a momentary loss of balance, or misplaced confidence in the strength of a branch can cause a serious or fatal fall.

For greatest safety, engage professional arborists or tree surgeons to remove large limbs or climb in tall trees.

Select tree workers who are insured against personal injury and property damage.
Pollarding is rarely recommended. It is satisfactory on only a few trees. Silver maple, poplars, willows, London plane, and sycamore can withstand pollarding. But even these trees have an unattractive appearance until they grow new crowns.

If you think any of your older trees would benefit from pollarding, consult a professional arborist.

Preventing sunscald.—Many large, old trees are sunscalded if they are heavily top-pruned or if they were once part of a forest where most of their companions trees were cut down. Their bark is killed when it is exposed suddenly to full sunlight after growing in the shade. Trees with thin bark—sugar maple, red maple, apple, linden, and beech—are most susceptible. Some oaks are also susceptible.

To prevent sunscald, prune only part of the treetop in any one year. Thin old forests and groves by cutting and removing unwanted trees over a period of years rather than all at once.

**Evergreens**

Pine and spruce and others of this group of evergreens are usually shaped by pruning individual parts. To thicken the crown of these trees, pinch back the young “candle” growth in spring while it is still soft. This encourages the development of numerous small branches.

To promote overall denser growth, shorten small branches in spring by cutting at a fork. Remove only the growth of the previous season (indicated by lighter colored or greenish bark). Dormant buds farther back on the branches will soon begin to grow and form new branches.

If drastic pruning is required on pines or similar trees, remove some whole limbs, but do not prune branches to leafless stubs. These seldom develop new foliage.

If the leader is broken or cut from the top of pines, spruces, or other trees of this group, the tree often fails to develop a new central stem. Top growth is retarded and the tree develops a low, broad shape that is not typical of the species.

You may be able to avoid this by helping the tree develop a new leader. First, select a pliable branch in the uppermost whorl of growth.
Bend this branch upward and hold it in a vertical position by tying it to a splint that is attached to the tree's main trunk (fig. 5).

After a year or two, the vertical branch should begin to grow as a leader, and new branches will grow from it in the typical whorled pattern. When this branch formation is apparent, the splint can be removed.

Arborvitae and other evergreens of that group are generally pruned by shearing the entire tree to the desired shape. This overall pruning will activate dormant buds farther in on the branches to produce new branches and foliage.

**Repairing Injuries**

Injuries that expose wood or kill the bark may allow disease and decay organisms to enter a tree. Prompt treatment can keep the tree from becoming unsightly or a hazard, and may save it from death.

**Bark Injuries**

If bark has been crushed or knocked from the trunk, two methods of treatment are possible.

**Method 1.**—If bark is knocked off in a large piece, it is sometimes possible to get it to grow back on the tree.

Nail the bark back in place immediately, before its inner side or the exposed wood has dried.

Now place a layer of damp paper, cotton or sphagnum moss about 2 inches thick over the wound and cover it with a sheet of polyethylene film. This bandage should cover the entire wound and extend beyond it a few inches.

Seal the edges of the plastic to the tree with asphalt paint. If necessary, smooth the bark around the wound to make a good seal.

After sealing the edges, bind the bandage to the tree with twine. The bandage holds sufficient moisture to prevent drying of the inner side of the wound until a natural union is made between the replaced bark and the wood.

No water should be allowed to collect inside the bandage. If water does get in, punch a small hole in the bottom of the plastic for drainage.

If the attempt to replace the bark fails, treat the wound as described under method 2.

**Method 2.**—Cut away all damaged bark in the wound area. These islands of bark usually die and do not assist in healing. Remove all splintered wood and smooth the surface of the exposed area.

For fastest healing, shape the edge of the wound as nearly as possible to an elongated ellipse (fig. 6). If you cannot achieve this exactly, try to make a point at the top and bottom of the wound even if you have to enlarge the wound.

---

*Figure 6.—Bark injury. The bark around the injury should be trimmed as indicated by the dotted line to promote rapid healing.*

*Figure 7.—A, A rope and tackle are used first to pull the limbs together; then a cable is attached to a lag screw hook in each limb. The rope is then removed. B, Parallel bolts are used for extra support in an undamaged tree, or to mend a split trunk or V-crotch. C, A safety bolt, secured with countersunk washers and nuts at each end. D, provides additional support to parallel bolts. E, One or more lip bolts are used to pull together a long split down the side of a limb or trunk.*
Figure 8.—These storm-damaged branches should be removed and the wounds smoothed and shaped.
Inspect large wounds occasionally to be sure that they are healing properly. If any decay has developed in the wound, it should be cut away. A wound dressing is not necessary or recommended, but may be used for cosmetic purposes.

**Lightning Damage**

When a tree is struck by lightning, you usually cannot determine how extensively it has been damaged until a year later. Trees that seem to be seriously damaged may live, whereas others may die that are apparently only mildly injured.

Treat all exposed wood on lightning-damaged trees as described above. Remove all shattered parts and dangerously hanging limbs.

**Preventing and Repairing Split Trunks and Crotches**

To prevent damage by wind, ice, or snow, the limbs of some trees may be braced with cables. The lives of such weak-wooded trees as ash, willow, yellow poplar, and linden can be prolonged by cabling, because this will prevent splits and keep decay-causing fungi from entering.

Cabling is important for safety when branches extend over buildings, play areas, or sidewalks. Also, consider cabling trees that have heavy foliage, tight V-crotches, or valuable old trees that are beginning to have decay problems.

If a trunk or crotch has already split, it is often possible to mend it by restoring the damaged part to its original position and holding it there permanently with cables and bracing rods (fig. 7).

Whether a tree needs only one cable for support, or several cables and bracing rods for repair, the procedure requires expert judgment in choosing the right materials and locating them properly in the tree. The job may also be dangerous, and is best done by a crew of two or three people. It is recommended that a professional tree service be called in to cable valuable trees or to repair a split trunk or crotch.

The general procedure for cabling and bracing a tree is as follows:

1. A rope is used to pull two limbs together, and a lag screw hook is screwed into each limb at a point about two-thirds the distance from the crotch to the limb’s end.

2. A cable is then slipped onto the hooks to connect and support the two limbs, and the rope is removed.

3. If a split trunk or crotch is being repaired, the limbs are drawn together by rope first, and then parallel bolts (side by side) are installed above the crotch. The bolts and the rope are used to draw the parts together, and then a cable is installed for support as previously described.

4. The mended split may be further braced with additional sets of parallel bolts.

5. A safety bolt may be added above the parallel bolts. When using a safety bolt, notches (countersinks) must be cut in the outer bark of the tree, and the ends of the bolt are fastened with washers and nuts.

**POWERLINES**

CAUTION: Beware of damaged powerlines when surveying or repairing tree damage after a windstorm or ice storm.

Before approaching a damaged tree, inspect the area carefully to be sure there are no downed powerlines. If electric wires pass through or near damaged trees, DO NOT touch the trees. If wires are either down or touching the tree, immediately notify your electric company. Do not try to correct the trouble yourself. The electric company has emergency crews who will remove dangerous branches and repair downed wires.
6. Lip bolts may be used to “sew up” a long split in a limb or trunk. Limbs that are too severely damaged to be repaired should be removed (fig. 8).

**Uprooted Trees**

You can often save partly or wholly unrooted small trees by prompt action.

Cover the exposed roots immediately to keep them from drying until you can make arrangements to restore the tree to upright position. Use wet burlap, hay, sand, mud, plastic sheets, or any other convenient material to retard drying. Just before you right the tree, cut away any shattered roots.

If you cannot put the tree back by hand, try block and tackle, winch, dragline, jacks, or even a bulldozer. Protect the bark with padding where pressure is applied.

If the tree has been blown over while in foliage, spraying the leaves with an anti-wilting preparation or stripping the foliage may help the tree recover. When using anti-wilting preparations, follow the manufacturer’s directions, carefully, to prevent plant damage. If the root system has been partly destroyed, it may be advisable to prune away part of the crown to compensate for the root loss. Water the tree during dry weather until new roots have formed.

After the tree is restored to its original position, install guy wires to hold it in place until the root system regenerates. Use at least three guy wires; more may be better.

Anchor the wires to the main trunk about one-third of the way down from the top of the tree. Make sure the trunk is strong enough to withstand pressure from the wires during high winds. If wires are placed too low, the swaying of the top of the tree may loosen them and make them useless as supports. A crotch is a good place to anchor the wires.

Use a short length of rubber or plastic hose around each wire to protect bark from injury. Loop the hose-covered wire around the trunk and twist the end of the wire back around the main wire. Do not wrap the loop so tightly that the growth of the trunk is restricted.

Fasten the wires securely to sturdy stakes or other solidly anchored objects. If you use three guy wires, choose anchor positions that approximate, as closely as possible, the corners of an equilateral triangle. Place one anchor where the wire braces the tree against the prevailing winds.

Remove wires in 1 or 2 years. Do not leave them in place until they start to cut into the bark and interfere with growth.

**Insect Protection**

Trees weakened by storm damage or other injury need protection from bark- and wood-boring insects. Use any garden-type insecticide whose container label recommends it for use against these insects. Spray the trunks of small trees and the major branches, limbs, and trunks of larger trees. This may help to save some injured trees, especially those with thin bark. For more detailed information on the control of wood- and bark-boring insects, consult your county Extension agent or contact your State agricultural experiment station.

**Special Pruning Problems**

**Flowering Ornamentals**

Prune flowering trees after they bloom. Some trees produce flower-buds during the summer for next year’s bloom. Examples of trees of this type are eastern dogwood, flowering cherry, and spring-flowering magnolias. If you wait until fall or winter to prune them, you will cut off next year’s flowers.

Other trees produce flower buds later in the same season. Examples of this type of tree are crepe myrtle and redbud. Pruning too late in the
spring will remove the current season's flower buds.

Here are some pointers to follow in pruning specific trees:

**Arbutus (Pacific Madrone).—**Arbutus may be cut back in the spring when growth starts. Ordinarily, it requires very little pruning.

**Holly.**—Prune holly in early spring or late autumn just after Thanksgiving. Heavy pruning in spring or summer may reduce the current season's production of berries. Extensive pruning after the berries have ripened also will reduce the next year's crop. Cutting some branches to use for indoor decorations, however, will tend to promote compact growth of the tree.

**Rhododendron.**—Remove dead branches with wilted leaves promptly—whenever they occur. Do all other pruning after flowers fade.

When the flowers fade, carefully remove the supporting soft spur at its base. Removing this spur encourages growth of the leaf buds around it. Flower buds for the next year's display form on new growth from these leaf buds.

When pruning the plant for shaping, cut as close as possible above a fork or cluster of leaves, because dormant buds at the leaf bases will develop new growth. Do not leave a long, bare stub.

If plants have long, straggly stems, cut them back to 1 or 2 feet in length in late winter before growth starts. Do not cut stems any shorter than that; even with this amount of stem, some plants will not produce new growth.

To make sure that the plant will bloom well the next year, it is a good idea to prune back no more than one-third of the total number of branches each season.

Most named varieties of rhododendron are grafted. Cut off sprouts originating below the graft, as they will not produce the right kind of flowers.

**Magnolia.**—Pinch off faded flowers to stimulate new growth and thicken the crown. Prune sprout growth that develops below the union on grafted plants. Cutting back southern magnolia usually reduces the next year's flower crop, because this tree blooms in the summer and forms the following year's flower buds by late summer.

**Palms**

Never prune the terminal bud at the top of a palm tree stem, or the whole tree will die.

Multiple-stemmed palms produce new shoots from below the soil surface. You can improve the appearance of palms of this type, without harming the plant, by periodically cutting out the oldest stems. Cut them off as close to the ground as possible. Remove any diseased leaves from the remaining stems.

Except for the pruning described in the two previous paragraphs, palm trees need be pruned only to prevent them from becoming nuisances or hazards.

Dead leaves of most kinds of palms form a skirt around the trunk beneath the crown. These clusters of dead, dry leaves may become a fire hazard. Also, they often harbor rodents and insects. It is best to remove the leaves on these palms as soon as they begin to discolor and droop.

Some palms shed their leaves—the Royal palm is one example. These leaves may be heavy. When trees of this type are growing near sidewalks, their dying leaves should be removed before they drop. Cut the leaves off from the underside to avoid tearing the fibers of the tree's stem.

Coconuts and other large fruits also can be dangerous to persons passing beneath the tree. To prevent the formation of fruit on large-fruited palms, remove the flower stalks after they have bloomed.

Some palm trees have spiny trunks. It may be necessary to prune off the spines from the lower
Figure 9.—Pruning tools: A, Pruning saw and scabbard; B, hand pruners; C, hedge shears; D, lopping shears; E, chain saw.

trunk to prevent injuries to people passing by.

**Equipment**

The basic tools for pruning are hand pruners, hedge and lopping shears, a pruning saw, and a chain saw (fig. 9). Hand pruners can be used for cutting twigs and small branches. The hedge shears, similar to large scissors, are used for shearing foliage. The saw, chain saw, and lopping shears are used for removing limbs too large to cut with hand pruners.

Pruning saws have coarser teeth than carpenter saws, and are not as likely to bind when cutting green wood. The teeth are designed to cut on the pull stroke; this is an advantage over push-cutting saws for operators working from a precarious position on a ladder or tree limb.

Chain saws are particularly useful in removing branches or entire trees. Before using a chain saw,
carefully read and then follow safety manual directions. Never use a chain saw when working alone, while standing on a ladder, or when in any position of precarious balance.

A pole pruner and a pole saw are useful if you have many trees to prune. With these tools you can reach high parts of the trees while you are standing on the ground.

If you must remove large limbs, especially those forming V-crotches, you will need a mallet and straight-bladed wood chisel to smooth the cuts.

Keep all cutting tools sharp.

To prevent spread of disease and decay organisms, disinfect all tools with denatured alcohol or chlorine bleach after pruning each tree.

For pruning the tops of tall trees, you will need ladders and ropes. Be sure the ladders are sound. Use nylon or manila rope at least one-half inch in diameter, and make sure it is in good condition.

For safety, consider having professional arborists prune or repair your tall trees instead of doing the work yourself.