Pruning

If the right plant species is selected for the right spot and purpose in the landscape, it is usually unnecessary to prune mature, well-established trees and shrubs. When done improperly, pruning can be one of the most destructive horticultural practices, destroying the shape and structure of a tree and predisposing it to severe future problems. Topping mature trees (heading back the main leader) is not usually recommended because it seriously injures trees and disfigures them. When proper techniques are used, however, judicious pruning of woody plants serves several useful functions. Pruning can be used to train young plants, groom for appearance, control shape and size, influence flowering and fruiting, invigorate stagnant growth, and remove damaged or pest-infested growth.

Types of Pruning Cuts

The two main types of pruning cuts are head, or heading back, and thin, or thinning out, and a woody plant responds differently to each type of cut. Heading back is cutting the plant back to a stub, lateral bud, or small lateral branch (fig. 13.4). Depending on the severity of pruning, heading back results in a flush of vigorous, upright, and dense new growth from just below the cut. New shoots formed on older, larger limbs are weakly attached and split out easily (figs. 13.5 and 13.6). Thinning (fig. 13.7) is removing a lateral branch at its origin or shortening a branch's length by cutting to a lateral large enough to assume the terminal role. A woody plant responds to thinning by becoming more open but retaining its natural growth habit and does not usually produce a flush of new vigorous growth from the cut. Foliage grows more deeply into the tree because more light can penetrate the canopy.

Making the Cut

Pruning shears (or loppers) are used for cutting small limbs, and saws are used for large ones. If diseased plants are pruned, disinfect pruning equipment after each cut to prevent spreading disease. Denatured alcohol or a chlorine bleach solution can be used to do this. When pruning trees and shrubs that have been grafted, remove new shoots that start below the graft union, but be careful not to remove all of the stems that start above the graft union. Small limbs, including suckers and water sprouts, should be cut close to the trunk or branch from which they arise. Cuts are made most easily with a single, upward cut of the blade. On most kinds of trees, new shoots will be less likely to grow from remaining latent buds if small limbs are cut closely.

Figure 13.4

Heading back is cutting to a stub, small lateral, or bud. *Source:* After Harris et al. 1981, p. 3.

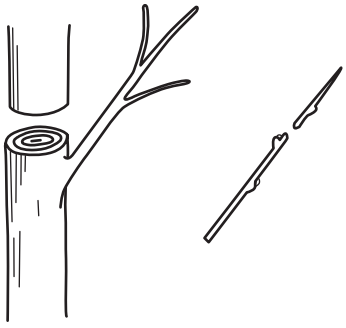
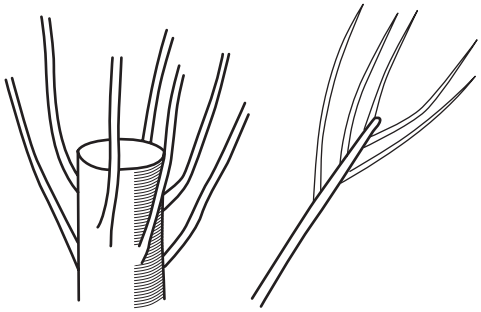


Figure 13.5

Vigorous upright growth stimulated by heading. *Source:* After Harris et al. 1981, p. 4.



When heading back trees or shrubs, cut small stems back to about ¼ inch (0.6 cm) from a lateral bud or branch. Make the cut on a slight slant away from the bud or branch. New growth will usually grow in the direction the bud or branch points (figs. 13.8 and 13.9).

Large tree limbs must be cut with a saw. The recommended procedure is to remove a limb in two steps involving three cuts (fig. 13.10). Make the first cut on the underside of the branch 1 to 2 feet (30 to 60 cm) from the crotch and at least one-third of the diameter deep. Make the second cut, a downward one, 1 to 3 inches (2.5 to 7.5 cm) farther from the crotch than the first. The limb should then split cleanly between the two cuts without tearing the bark. The third cut to remove the remaining stub is made at the crotch, but its exact position is important to ensure rapid closure of the wound.

Most trees form ridges, called branch bark ridges (BBR) or shoulder rings, on the top and bottom of branches where they are attached to the trunk. The third cut should be made just outside the branch bark ridge (fig. 13.11). The cut will not be flush or parallel to the trunk but will be out from it slightly, with the lower edge of the cut farther away from the trunk than the top one. Such a cut will form a smaller wound than a flush cut and it will close more quickly.

Protecting pruning cuts with an asphalt emulsion or other coating material is of no value and could even be harmful to the tree. Coatings and coverings can trap moisture and increase the chances of decay and retard wound closure. The best practice is simply to let the wound dry in the air.

Painting water-based paint on the southwestern portions of the newly exposed trunk and branches after pruning may prevent bark injury from sunscald.

Pruning Trees at Planting

Landscape trees should not be pruned at planting time except to remove damaged branches or to correct those that show serious structural problems, such as branches with extremely narrow crotch angles and branches that cross or rub other branches. (Fruit trees are often treated differently. See chapters 17, 18, and 19.) In the past, it was commonly recommended to prune a portion of the shoots at planting. Recent research, however, has shown that the removal of terminal buds and leaf area

Figure 13.6

New shoots forced on older limbs are weakly attached and split out easily. *Source:* After Harris et al. 1981, p.4.

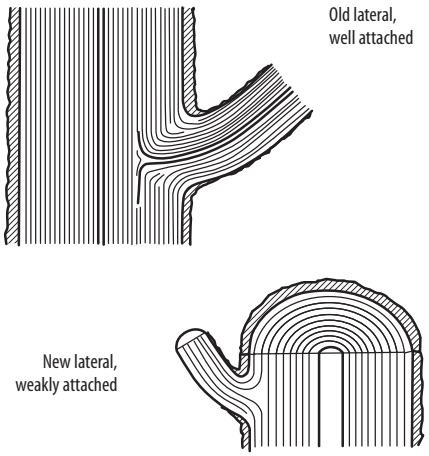
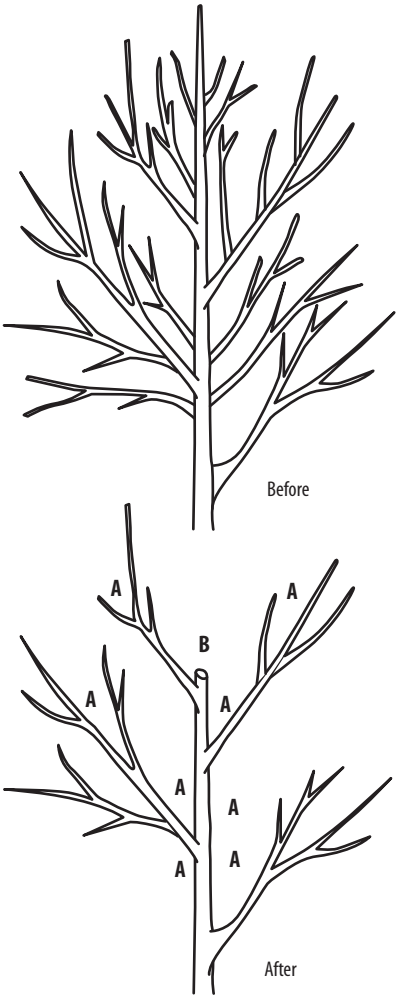


Figure 13.7

Thinning removes a branch (A) or cuts to a larger one (B). *Source:* After Harris et al. 1981, p.4.



can delay and reduce root system growth. Because the survival and establishment of a transplanted tree depend greatly on the growth and development of new roots, the practice of pruning at transplanting is no longer standard.

There is one exception, however. If irrigation is unavailable after planting, or if severe drought is anticipated after planting, limited thinning-type pruning may increase the chances of tree survival. Although this pruning may restrict root growth, thinning cuts remove foliage and thereby reduce transpiration and water loss.

Pruning To Train Young Trees

Directing the growth of young trees is important if the trees are to perform properly in the landscape when mature. The growth habit of a plant and its landscape use largely determine the extent to which a tree must be trained to obtain the desire form. Pruning is usually the most effective way to direct the growth habit of a plant. Young trees with a strong central leader, like conifers and liquidambar, may need little or no pruning. Other tree species, such as Chinese pistache and some flowering fruit trees, lack a strong central lead, have more irregular growth, and need a higher degree of training. Street trees should have higher scaffold branches than trees used for visual screening or windbreaks.

Prune a tree only enough to direct its growth effectively and correct any structural weaknesses. The height of the first permanent branch above the ground depends on the tree's intended landscape use. The lowest scaffolds on trees in lawn and garden areas are normally no higher than 6 to 8 feet (1.8 to 2.4 m) from the ground. Those on trees along streets and sidewalks should be 8 feet (2.4 m) above a sidewalk and 8 to 10 feet (2.4 to 3 m) above the street. The position of a limb on a trunk remains essentially the same throughout the life of the tree (fig. 13.12). Branches selected for permanent scaffolds should have wide angles of attachment, smaller in diameter than the trunk, and 18 to 24 inches (45 to 60 cm) apart vertically (fig. 13.13). Radial branch distribution should allow five to seven scaffolds to fill the circle of space around the trunk.

Many trees produce an abundance of lateral growth. Direct this growth during the growing season by heading back or thinning out shoots competing with the leader or interfering with

those selected for scaffold branches. During the first and perhaps the second season, more shoots should be left unpruned than will finally be selected for scaffolds, allowing more choices later for selection of the best lateral branches. Often, on lightly or unpruned trees, the more vigorous branches will be naturally well-spaced, and other branches become rather weak.

If a tree seems reluctant to develop laterals for future scaffolds, pinch out (head back 1 to 2 inches [2.5 to 5 cm]) the tip during the growing season when the growing point reaches a height at which a lateral branch is desired (fig. 13.14). Select the most vigorously growing new shoot that developed from the buds below the pinch as the new leader. Then choose as a lateral a second developing shoot growing in the desired direction by pinching the tips of the other shoots that were formed. Repeat this process as the leader develops until the desired number and spacing of laterals is obtained. A vigorously growing tree may permit forcing as many as three well-spaced laterals where they are wanted in one season.

Pinching during the growing season is much more effective, requires removing a much smaller quantity of shoot material, and results in less dwarfing effect of the plant than dormant pruning. A growing-season pinch of only 1 to 2 inches (2.5 to 5 cm) is just as effective and will make unnecessary the removal of a large branch later on during the dormant season. Without pinching during the growing season, the leader would require severe heading to the height at which the lowest lateral is desired during the dormant season.

Figure 13.8

Make pruning cuts about ¼ inch (6 mm) above a bud and slightly angled away. *Source:* After Caldwell et al. 1972, p.10.

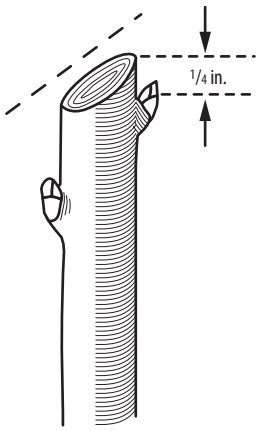
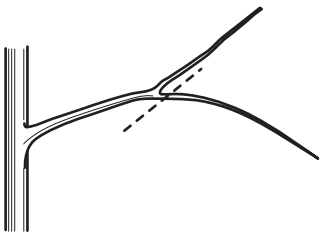


Figure 13.9

Prune back horizontal limbs to a more upright lateral or to an upward-growing bud. *Source:* After Harris et al. 1981, p.18.



Pruning Mature Trees

Once well-spaced scaffold branches and the main structure of a tree have been selected, usually by the third or fourth year, the tree will probably need little or no pruning for several years, especially if it is the right tree for the right place and purpose. Mature trees, however, may need to be pruned for health and appearance, size control, and flowering and fruiting response. Pruning the leader of a central-leader tree and wholesale topping (heading back) of mature trees are inappropriate. These practices destroy a tree's natural form, create large wounds, and force many vigorous upright shoots that are weakly attached (fig. 13.15).

Removal of dead, weak, diseased, and insect-infested limbs will improve tree health and appearance. Remove low, broken, and crossing limbs for appearance and safety. Open up the top of the tree to let in more light so that interior leaves and branches can remain healthy. Judicious pruning consisting of moderate thinning can open a tree to view and emphasize an attractive or picturesque feature to the viewer.

Although pruning for size control is a less preferred alternative to initial proper species selection, it may be necessary in some instances. If trees were planted too closely together or if the particular function or purpose for which a tree was originally selected has changed, size control through pruning could be the best alternative to removal or replanting.

Figure 13.10

To remove a large limb, make first cut at (A), second at (B), third at branch bark ridge (C). *Source:* After Harris et al. 1981, p. 5.

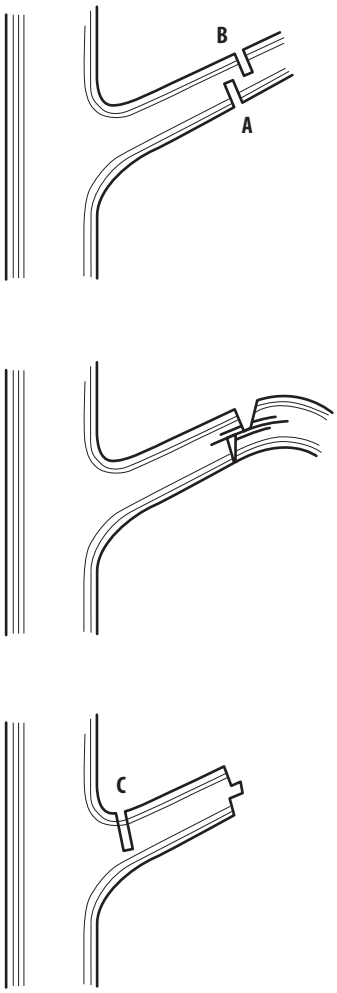
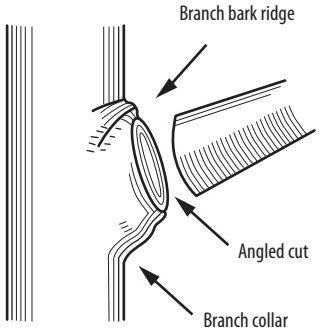


Figure 13.11

Pruning cuts should be made just outside the branch bark ridge (top of cut) and the collar (bottom of cut) so that the bottom of the cut is angled slightly outward. *Source:* After International Society of Arboriculture 1995, p. 3.



Thinning, perhaps even the complete removal of some limbs, can be used to reduce the height and spread of a tree. A thinned tree retains its natural shape and is less prone to the formation of vigorous water sprouts than a headed tree (fig. 13.16). Pruning for size control, however, is most effective as soon as a tree reaches the desired size. Delaying pruning until the tree is larger makes pruning more difficult and less effective, leaves more noticeable scars, and encourages excessive growth. Heading and stubbing, while much more rapid and drastic in their effect, are in most cases much less desirable.

Severe pruning delays the onset of flowering in species that flower on 1-year-old growth, such as the flowering fruit trees. Once the tree has begun flowering, only a light annual thinning to remove 10 to 15 percent of the leaf area and to reduce crowding or weak branches is usually necessary. Perform such thinning at or near the end of the bloom period to encourage vigorous growth on which to bear next year's bloom.

On the other hand, trees flowering on current year's growth, such as crape myrtle, Japanese pagoda tree, and jacaranda, usually flower earlier and more profusely if pruned to stimulate and maintain vigorous growth. Plants with such flowering habits should be pruned more severely and during the winter before growth begins.

Pruning Conifers and Other Narrowleaf Evergreens

Although conifers usually require less pruning than broadleaf trees, the same basic principles apply for controlling size, creating special effects, and shaping. The crown configuration cannot be controlled as easily as with broadleaf trees. Dead, diseased, crowded, and structurally unsound branches should be removed first. Double leaders should be thinned to one unless the natural growth habit includes several main branches. Encourage branches with wide angles of attachment and smaller than the trunk from which they arise.

Pruning conifers differ from pruning broadleaf trees in several important ways. Conifers usually do not need pruning for spacing of laterals. Several branches arising at or near one level on the trunk seldom subdue the main leader of a conifer; thus, whorls of branches or those arising close together can remain, because it is unlikely they will crowd out the

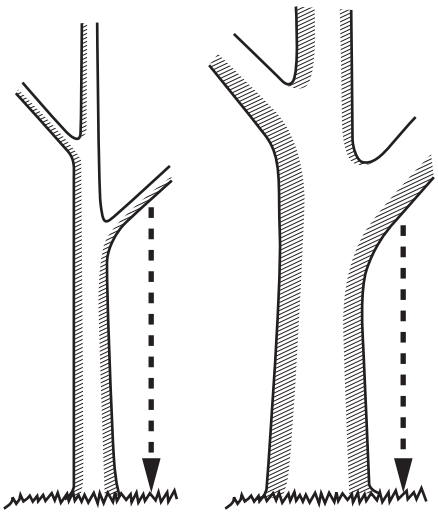
Table 13.3

PRUNING GUIDELINES FOR CONIFERS

Plant	Branch pattern	Latent buds on old wood	Type of growth	Method of pruning for given response: Reduce size, direct growth	Slow growth Increase density	(Dwarf)	Comments
Abies spp.	whorled	no	All new growth from preformed buds.	Thin branch back to laterally growing shoot. Do not cut behind last remaining needles.	Remove apex of laterals only; do not pinch leader.	Root prune; prune late in summer.	Pruning not needed except to remove dead and diseased wood.
Juniperus spp.	random	some	Growth continues as long as conditions are favorable.	Thin branch back to laterally growing shoot.	Can be sheared or clipped, and some can be headed to old wood.	Root prune; prune late in summer.	
Picea spp.	whorled	no	All new growth from preformed buds.	Thin branch back to laterally growing shoot. Do not cut behind last remaining needles.	In spring, clip new shoots one-half their length when needles are one-half expanded.	Root prune; prune late in summer.	Pruning not needed except to remove dead and diseased wood.
Pinus spp. (most but not all)	whorled	no	All new growth from preformed buds	Thin branch back to laterally growing shoot. Do not cut behind last remaining needles.	Pinch candle when expanding in spring. Branching is induced between existing whorls by girdling trunk between whorls.	Root prune; prune late in summer.	
Pinus canariensis	whorled	yes	Often makes single flush of growth, but growth can continue under favorable conditions.	Thin branch back to laterally growing shoot.	Pinch candle when expanding in spring. Branching is induced between existing whorls by girdling trunk between whorls. Laterals can be headed to desired length.	Root prune; prune late in summer.	
Podocarpus spp.	random	no	Growth continues as long as conditions are favorable.	Thin branch back to laterally growing shoot. Do not cut behind last remaining needles.	Can be sheared, but form is retained by removing only apex of each shoot.	Prune late in summer.	
Pseudotsuga spp.	whorled	no	All new growth from preformed buds.	Thin branch back to laterally growing shoot. Do not cut behind last remaining needles.	In spring, clip new shoots one-half their length when needles are one-half expanded.	Prune late in summer.	
Sequoia spp.	random	yes	Growth continues as long as conditions are favorable.	Thin branch back to laterally growing shoot.	Can be sheared, but form is retained by removing only apex of each shoot. Can be headed back into old wood.		
Taxus spp.	random	yes	Growth continues as long as conditions are favorable.	Thin branch back to laterally growing shoot.	Can be sheared, but form is retained by removing only apex of each shoot. Can be headed back into old wood.	Prune late in summer.	Foliage of some is poisonous. Dispose of clippings safely.
Thuja, Chamaecyparis, Cupressus, Calocedrus spp.	random	no	Growth continues as long as conditions are favorable.	Thin branch back to laterally growing shoot. Do not cut below foliage.	Can be sheared or clipped.	Prune late in summer.	

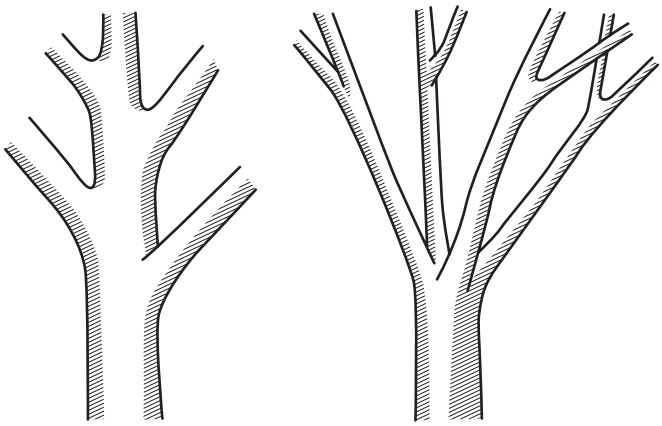
Source: Adapted from Harris et al. 1981, p. 27.

Figure 13.12



Branches retain their position on the trunk but become slightly closer to the ground as they increase in diameter. *Source:* After Harris et al. 1981, p. 11.

Figure 13.13



Well-spaced branches (left) are less likely to split or break than those close together (right). *Source:* After Harris et al. 1981, p.12.

leader. Adequate vertical spacing between individual branches along the trunk occurs naturally in most conifers. The branches may be thinned to reduce wind resistance or to achieve aesthetic effects. For a strong, well-tapered trunk, branch whorls or laterals remain along the trunk.

Growth habit determines the severity of pruning. Conifers with a tall, straight trunk and central leaders are said to have *excurrent* growth. Almost all conifers are excurrent when young. Conifers are usually most attractive if the excurrent habit is preserved. Thus, the primary pruning removes or subdues any laterals that challenge the leader. Other conifers, like many mature broadleaf trees, develop a wide-spreading crown after forming a short trunk and are said to have a diffuse, random branching habit. Some conifers may develop the diffuse branching habit if they have been propagated by cuttings from side branches. The diffuse branching pattern allows more latitude in pruning.

The distribution of latent buds or growing points often limits the severity of pruning conifers (table 13.3). In some conifers, all growth derives from buds formed in the previous growing season. When the preformed buds have expanded, growth ceases. These trees may have all their lateral buds in whorls just below the terminal bud (most pines), or lateral buds may be scattered along the shoot. Conifers with whorled buds should be pruned back only to active laterals or, in current season's growth, before the needles develop fully. If pruning is done early enough, new buds will develop near the cut for the following season's growth. In conifers with latent buds scattered along the younger shoots, prune back to a latent bud. These buds will become active and develop a new growing point.

Canary Island pine (*Pinus canariensis*) is a notable exception. Many latent buds survive just under the bark on large branches and even the trunk. Many of these buds grow when stimulated by heavy pruning into old wood or after a fire has killed the smaller branches.

If conditions are favorable, some conifers with preformed buds, including some pines, may have several growth flushes during a growing season. Young, expanding shoots may be pruned in any or all of these flushes. If there are no visible latent buds, pruning into old wood will usually result in a stub from which no new growth will arise.

Other conifer species have buds or dormant growing points (no bud scales formed) with shoots that continue to elongate. Such species usually have abundant latent buds that produce new growth even when severely pruned into old wood. Trees of these species usually have a spiral or random branching habit. Despite their tolerance of severe pruning, these species look most attractive when thinned. Conifers with an intermediate growth habit have a large number of latent buds randomly spaced along stems or retain active laterals or short shoots for many years on older wood. Growth continues as a series of flushes.

Pruning Spreading-Type Narrowleaf Evergreens. Plants such as junipers have a spreading growth habit. Prune junipers by cutting back enough growth to prevent leggy or uninhibited growth and to prevent needles from dropping off lower branches because of shading by upper branches. Cut back the longer branches that develop on top from a few inches to half the branch so the lower branches will be exposed to light, as illustrated in figure 13.17. Cut back some growth annually to prevent plants from getting out of bounds. Pfitzer juniper is an example of a vigorous, spreading narrowleaf evergreen that can produce 12 to 18 inches (30 to 45 cm) of growth annually. It may be necessary to cut back into the previous year's wood to maintain the desired size and shape of the plant.

Pruning Rounded-Type Narrowleaf Evergreens. Brown yew and globe arborvitae are good examples of rounded-type evergreens. They are normally globe-shaped and should not be sheared. Both can be maintained at whatever height and size desired, however. Because brown yew develops as a broad, rounded specimen, prune about one-fourth to one-half of the previous year's growth to keep it bushy and compact. Thinning individual branches, rather than shearing, yields a more attractive, natural-looking growth habit. Globe arborvitae requires little, if any, pruning because of its formal growth habit.

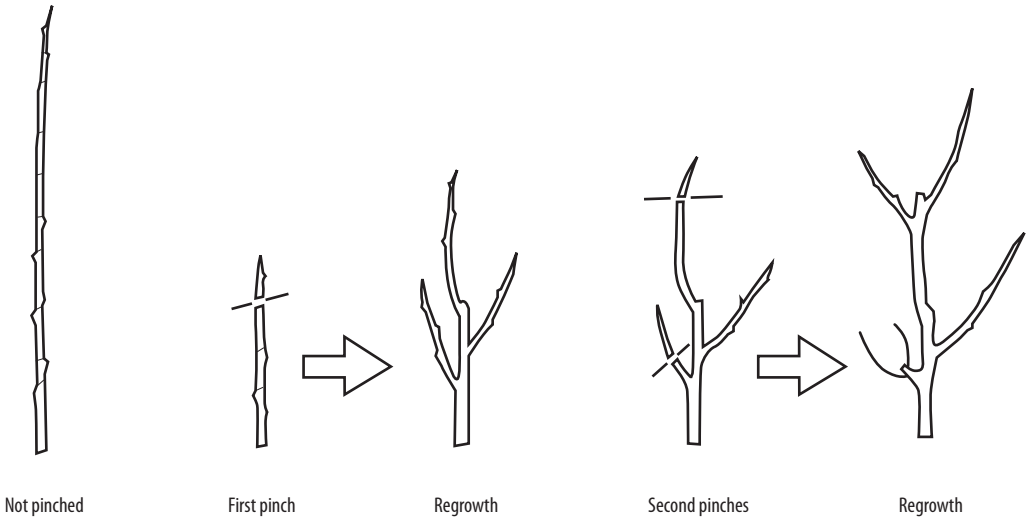
Pruning Hedges

Hedges should be pruned back to the point of the last cut. The tops of hedges should be slightly narrower than the bottoms to ensure that adequate light reaches lower leaves to maintain density (fig. 13.18).

Pruning Broadleaf Shrubs

Prune shrubs to keep their natural shape unless they are used as formal hedges. Shearing (heading cuts) should not be widely used; thinning of older, taller growth should be the primary type of pruning. Cut off the largest, oldest branches at or very near the ground and leave the younger, shorter stem (fig. 13.19). These may be headed back if they are very weak or very sparse. New shoots that develop can be thinned and headed as needed to reshape the plant. For extremely large, overgrown plants that need to be rejuvenated, it is best to cut out all old growth near the ground over a 2- to 3-year period so as not to destroy the plant's natural shape or flowering habit. Judicious thinning and selective heading of new shoots and young stems can then be used to shape and control growth until rejuvenation is required again. Rejuvenated plants may not

Figure 13.14



During the growing season, a nonbranching leader can be pinched to induce development of laterals. The two pinches induce branches to grow at the heights desired (leaves removed). *Source:* After Harris et al. 1981, p.14.

bloom for one or more years depending on their growth rate and flowering habit.

Pruning Ground Covers

Pruning ground covers is usually necessary only to remove unhealthy tissue, awkward or straggling branches, or to keep a plant from becoming too invasive. Many ground covers are prone to decline as they age, however.

Figure 13.15

A headed tree will force many vigorous upright shoots, causing the tree to lose its natural form. *Source:* After Harris et al. 1981, p. 22.

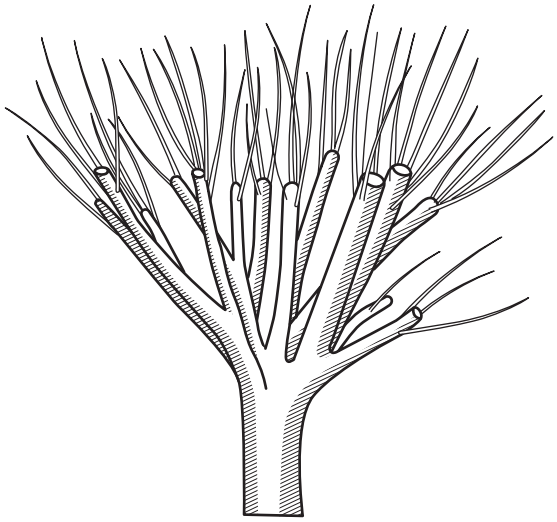
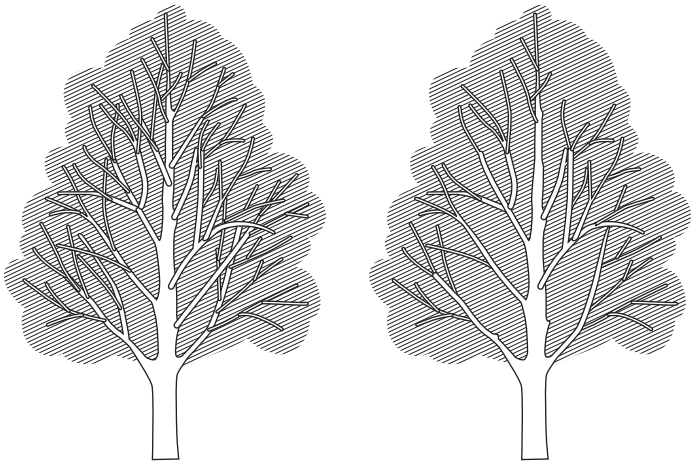


Figure 13.16

Thinning reduces height and opens up a mature tree (left), retaining the natural appearance and form of the tree (right). *Source:* After Harris et al. 1981, p. 22.



Others are so vigorous that controlling their growth is an ongoing maintenance task. Periodic mowing is one way you can keep ground covers vigorous, neat, and healthy with no significant loss of attractiveness. Mowing is a convenient way to check rampant growth, thin out excessive stem buildup and rejuvenate old, declining ground covers. Mowing also helps minimize problems with trash, vermin, fire, and sprinkler interference.

Suitable Ground Covers. Not all ground covers are suitable for mowing. Less vigorous varieties recover slowly, leaving an unsightly area prone to weed infestation for up to a year. Species with recovery times as long as 4 months still can gain in overall quality from mowing, however. Vigorous species, which usually recover within 1 or 2 months, respond well to mowing. Mowing can check their growth without harming visual appeal for an extended period. For example, in recent field studies at the University of California, mowing kept the growth of lantana in check yet had a negligible effect on overall quality. Other species, such as African daisy and coyote bush, responded similarly. Varieties with herbaceous or nonfibrous stems are also good candidates for mowing because it is easy to cut and bag their stems.

Timing of Mowing. Mowing ground covers at the correct time (table 13.4) is important to ensure quick recovery with little weed invasion or loss of aesthetic value. Mow spring-flowering species after they have finished blooming. Mowing too early reduces or delays flowering. Spring mowing is appropriate for varieties that flower in summer or fall. Avoid late-summer and fall mowing because the tender regrowth may be susceptible to early frost damage, and regrowth can be slow allowing weeds to invade the planting.

If ground covers develop heavy, succulent, or woody stems, they may become too difficult to mow. Mowing chops up the fleshy growth of succulent species, such as ice plant, making it impossible to collect and remove the cut debris. Large stems of woody species can clog or jam a mower. To achieve acceptable results, start mowing ground covers when they are young—just after establishment—and continue mowing regularly thereafter.

Mowing Techniques. Use an ordinary commercial rotary turf mower for ground covers with thin, nonfibrous stems and little thatch buildup, such as trailing lantana and

garden verbena. Use a flail mower on ground covers with thick, woody stems or thatch buildup. Though flail mowers are relatively cumbersome, they may be necessary for the initial cut. A rotary mower should be adequate for subsequent mowings, if you perform them regularly.

Mow ground covers at or slightly above the branching points on stems—in most cases, 4 to 6 inches (10 to 15 cm) high. Although you usually cannot set mowers this high, a rotary turf mower tends to ride up on top of the ground cover as you mow. Thus, if you set the mower at its maximum cutting height, the cut should be acceptable. Mowing too low slows recovery, and mowing too high will not achieve the desired result. You may have to experiment to determine the best mowing height for a particular ground cover and condition.

Table 13.4

MOWING TIMES FOR SELECTED GROUND COVERS

Scientific name	Common name	Mowing time
Achillea tomentosa	woolly yarrow	spring
Ajuga reptans	carpet bugle	summer
Baccharis pilularis	coyote bush	spring
Ceanothus gloriosus	Point Reyes ceanothus	summer
Ceanothus glorosus × 'Anchor Bay'	Anchor Bay ceanothus	summer
Cotoneaster dammeri	bearberry cotoneaster	spring
Drosanthemum hispidum	pink ice plant	summer
Euonymus fortunei 'Colorata'	purple-leaved winter creeper	spring
Hedera helix	English ivy	spring
Hypericum calycinum	Aaron's beard, St. Johnswort	spring
Juniperus spp.	juniper (prostrate forms)	spring
Lantana montevidensis	trailing lantana	spring/ summer
Lonicera japonica 'Halliana'	Hall's honeysuckle	spring
Mahonia repens	creeping mahonia	spring
Myoporum parvifolium	prostrate myoporum	summer
Osteospermum fruticosum	trailing African daisy	summer
Pachysandra terminalis	Japanese spurge	spring
Polygonum spp.	knotweed	spring
Potentilla tabernaemontanii	spring cinquefoil	spring
Rosa banksiae	Lady Banks' rose	spring
Rosa creeping varieties	alba meidiland, fairy	spring
Sedum spurium	stonecrop	spring
Trachelospermum jasminoides	star jasmine	summer
Vinca major	periwinkle	summer

Mow in the same pattern as an irregular turf area. Back-and-forth movement, keeping to the contours of the site, is best. Manually collect heavy clippings if the ground cover is so dense that the clippings remain on top as unsightly debris. Otherwise, let the clippings fall into the ground cover where they will decompose, or collect them in the mower bag as you would when mowing turf.

- For rapid recovery and to ensure good ground cover vigor, irrigate and fertilize with 1 to 2 pounds (0.45 to 0.9 kg) of nitrogen per 1,000 square feet (93 square meters) after mowing.
- Use a preemergence herbicide if recovery is slow and the ground cover is sparse. Check crop registrations and follow all label directions.
- Delay postbloom mowing if ground cover has a showy display of fruits.
- Consider an additional mowing to remove old, unsightly flowerheads or objectionable seeds or fruits. Set the mower height to remove seeds or fruit but not vegetative growth.

Pruning Vines

Vines usually need pruning to limit growth, to thin stems and branches, and to remove dead or damaged wood. Some vines, such as honeysuckle, grow so fast and become so thick that considerable pruning may be necessary, but other vines need little pruning. Prune most vines in the dormant season, including the summer-flowering clematis (Jackmani type). The Florida and Patens types, including *Clematis montana*, blossom on 1-year-old wood and should be pruned by thinning out in spring before growth. Prune dead, diseased, and damaged vines back to healthy wood. Interfering branches of woody vines, such as wisteria, should be cut back below the point of interference or all the way back to the junction with the main stem.

In general, prune out the top third of overgrown woody vines and prune by a third or more old, mature stems that are declining in vigor. Each year, prune stems of wisteria to promote new growth and flowers. Prune back plant tops to force out new branches. Pruning wisteria extensively during the dormant season may encourage rampant vegetative growth the

next spring. Instead, prune out long, straggly growth in July, except branches needed for climbing. This technique is more likely to induce flowering. Shoots should be cut back to one-third to one-half of their length, which will induce production of short spurs on which next season's flower clusters will be borne.

Pruning Garden Roses

The proper time and technique for pruning roses are subjects of controversy. Certain fundamental pruning practices pertain to all garden roses regardless of type:

- Remove any canes that have been broken or damaged by insects or disease.
- Remove one of two rubbing canes.
- Remove spindly canes or those smaller in diameter than the size of a lead pencil.
- Make clean cuts just above a bud or shoot that points toward the outside of the plant (see fig. 13.8).

When bare-root roses are planted, the tops should be cut back to 12 to 15 inches (30 to 37.5 cm). Remove any damaged or broken roots. For potted roses, these two pruning practices have probably already been performed before purchase. After pruning hybrid teas, floribundas, and grandiforas according to these general recommendations, cut them to a height of 18 to 24 inches (45 to 60 cm) or to a height in balance with other plants in the rose bed. Climbing roses are generally pruned according to the basic principles described above. In addition, cut out very old, heavy canes growing in the center of the plant that are not producing many leaves or flowers by pruning them completely to the ground. The newer canes will produce more growth and flowers. When the canes become quite long, prune them back to keep them in the desired area.

Timing for Pruning Trees

The time to prune depends on the kind of plant and the desired results. The following types of pruning can be done anytime: light pruning; pruning to remove unwanted growth when it is small; and removal of damaged, weak, or diseased branches. Rapid growth can be maintained by pruning before the period of most rapid growth, usually in the spring. Prune deciduous trees during the dormant period and evergreen trees just before growth resumes in the spring.

Conversely, to retard plant growth, prune when growth is nearly complete for that season. For many plants, this time for maximum dwarfing is late spring to middle summer. Directing the growth of young trees is done best during the growing season.

Generally, spring-flowering plants should be pruned as soon as the flowers fade and new growth begins. Their flower buds form on growth produced during the previous year, so

Figure 13.17

Spreading-type narrowleaf evergreens. Prune spreaders by cutting back longer upper branches as shown. Long branches should be cut back from a few inches to half the branch, as shown, to prevent shading of lower branches. *Source:* After Caldwell et al. 1972, p. 11.

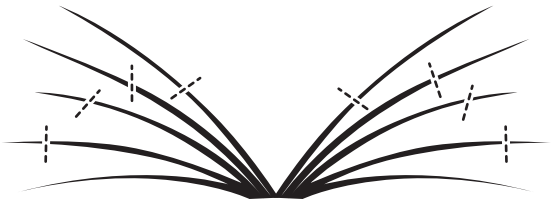
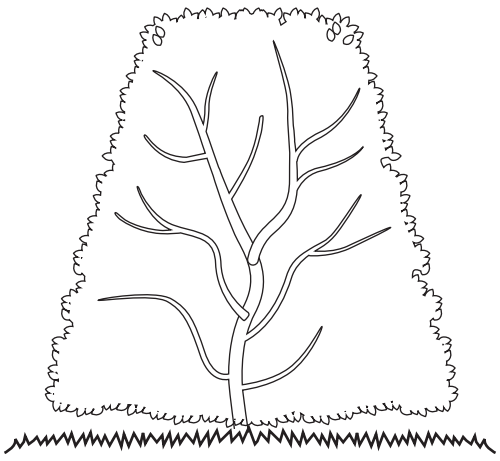


Figure 13.18

Prune hedge so that the base is broader than the top. Regular pruning is needed. *Source:* After Caldwell et al. 1972, p. 13.



pruning these plants in the winter or just before they flower removes many of the flowers. Summer- and fall-flowering plants should be pruned in the winter or dormant season, because their flowers form on growth produced in the same growing season.

Fertilizing Woody Plants

Most mature woody trees and shrubs established in the landscape and growing in a healthy manner need little or no fertilization. In fact, fertilizing healthy trees can be detrimental by encouraging excessively vigorous growth that unnecessarily increases plant size and foliage density, produces succulent weak growth, and predisposes the plant to diseases, pests, and environmental stresses. In addition, excessive fertilizer is a significant contributor to groundwater contamination of aquifers. Do not fertilize plants unless they need it.

In most cases, trees and shrubs growing poorly in the landscape do not need extra fertilizer since the causes of their poor growth are usually not nutritionally related. Fertilizers may be helpful but only after the problem(s) causing poor growth are corrected. Poorly growing plants may exhibit one or more of the following symptoms:

- light green or yellow leaves
- leaves with dead spots
- smaller leaves than normal
- fewer leaves or flowers than normal
- stunted twig growth or dieback
- wilting

Any number of problems may be responsible for these symptoms, including compaction, poor soil drainage or aeration, improper soil pH, diseases and pests, and adverse climatic conditions. Fertilizing will not remedy these problems.

In general, woody plants should not be fertilized at the time of planting, because fertilizer that is mixed with backfill or otherwise applied at this time may inadvertently injure roots. It is good insurance, however, to fertilize plants soon after planting. Fertilizing young, newly planted trees and other woody plants may promote more rapid growth so that the plants attain their optimal size more quickly. Fertilizing mature woody plants, vines, and ground covers is not routinely necessary unless plant vigor is low because of inadequate essential nutrients. As long as plants have good leaf color, leaf size, shoot growth, and canopy density, there is no need to fertilize them. In nearly all cases, however, if fertilizer is needed, only nitrogen is necessary, because other nutrients usually occur in adequate amounts in most soils. A notable exception are palm trees, which need potassium in nearly the same amounts as nitrogen. Potassium deficiencies often occur in palms growing on sandy, well-drained soils and those subject to frequent, heavy irrigation, such as occurs in turfgrass areas (see the discussion under "Fertilizing Palms," below).

The use of complete fertilizers (those containing nitrogen, phosphorus, and potassium) is usually not recommended for woody plants because soils are rarely deficient in all three elements. Even if such conditions did exist, it would be difficult to amend the soil satisfactorily with a complete fertilizer. For example, in a potassium-deficient soil, using a complete fertilizer to apply enough potassium would apply too much nitrogen.

Application to the soil surface is the easiest, quickest, and most effective method of applying nitrogen to woody plants. Slow-release

Figure 13.19

Prune broadleaf shrubs to keep their natural shape by using mostly thinning cuts. Avoid making heading cuts or shearing the whole plant.