PRUNING TREES, SHRUBS, AND EVERGREENS

Author: William Hoch
Illustrated by Rebekah VanWieren

PRUNING TREES

Goals of Tree Pruning

The primary goals of tree pruning are to maximize tree lifespan and limit hazard potential. These goals are achieved through: 1) limiting decay within the trunk by minimizing the number and size of pruning wounds, and 2) preemptively addressing branches with structural defects that would otherwise result in greater risk of failure and large trunk wounds. Aesthetics are not an explicit goal, however a healthy tree with a well-structured architecture will be aesthetically pleasing. Other reasons trees may be pruned include removal of dead, diseased or broken limbs (termed cleaning), and to provide clearance.

Terminology

Decay in Trees

An important concept of tree biology is that trees cannot heal or replace infected/damaged wood. Instead trees attempt to contain infections through a buildup of defense compounds that wall-off, or compartmentalize, infected areas. Dr. Alex Shigo, widely regarded as the father of modern arboriculture, coined the term **CODIT** to describe this phenomenon, which stands for Compartmentalization of Decay in Trees. The principles underlying modern pruning practices are based on our understanding of CODIT and how to best facilitate this process.

Studies have found that decay is effectively compartmentalized when pruning wounds are no larger than two inches in diameter, and trees that are strong compartmentalizers may resist decay in cuts as large as four inches. Trees found to be strong compartmentalizers include ash, elm, honeylocust, linden, oak and walnut. Compartmentalization is an active physiological process, and therefore functions only in living tissue. This helps explain why decay is most effectively compartmentalized in small pruning wounds, because these branches have not yet formed a core of non-living wood known as heartwood.

Branch Collar

A branch collar is the swollen area where the branch meets the trunk, which is composed of trunk tissue that wraps around the base of the branch (Figure 1A). The branch collar forms a strong branch attachment that is reinforced each year as the trunk builds additional layers of wood around the branch base. The prominence of branch collars is species-dependent, with trees such as elm and oak having less obvious collars than many other species. In addition to creating a strong connection, the branch collar is associated with formation of a branch protection zone, which is a cone-shaped region of modified wood within a collar. The branch protection zone resists movement of decay into the trunk via compartmentalization following branch death or a pruning cut.

It is important to note that collars only form around branches that are subordinate to the trunk, which normally are branches less than one-half the trunk diameter. This relationship is also referred to as the branch aspect ratio [branch diameter ÷ trunk diameter], which should be < 0.5. Branches with a diameter greater than one-half the trunk diameter (branch aspect ratio > 0.5) typically do not form a branch collar.

Branch Bark Ridge

This is the ridge of raised bark in the branch crotch where trunk and branch tissues meet (Figure 1A).

Included Bark

Included bark is the region where bark becomes included within the wood at the junction of two stems with a narrow angle of attachment (Figure 1B). This region continues to increase in size as the stems grow. Junctions with included bark normally indicate a weak branch union because a branch collar often does not develop and stress at the union increases over time as the two stems grow larger and push each other apart.

Codominant Leaders or Stems

Codominant leaders are upright stems of approximately equal size emerging from the same location (Figure 1B). Codominant leaders often have included bark and do not form a branch collar, and are therefore an inherently weaker connection than a subordinate branch attached to a dominant leader.

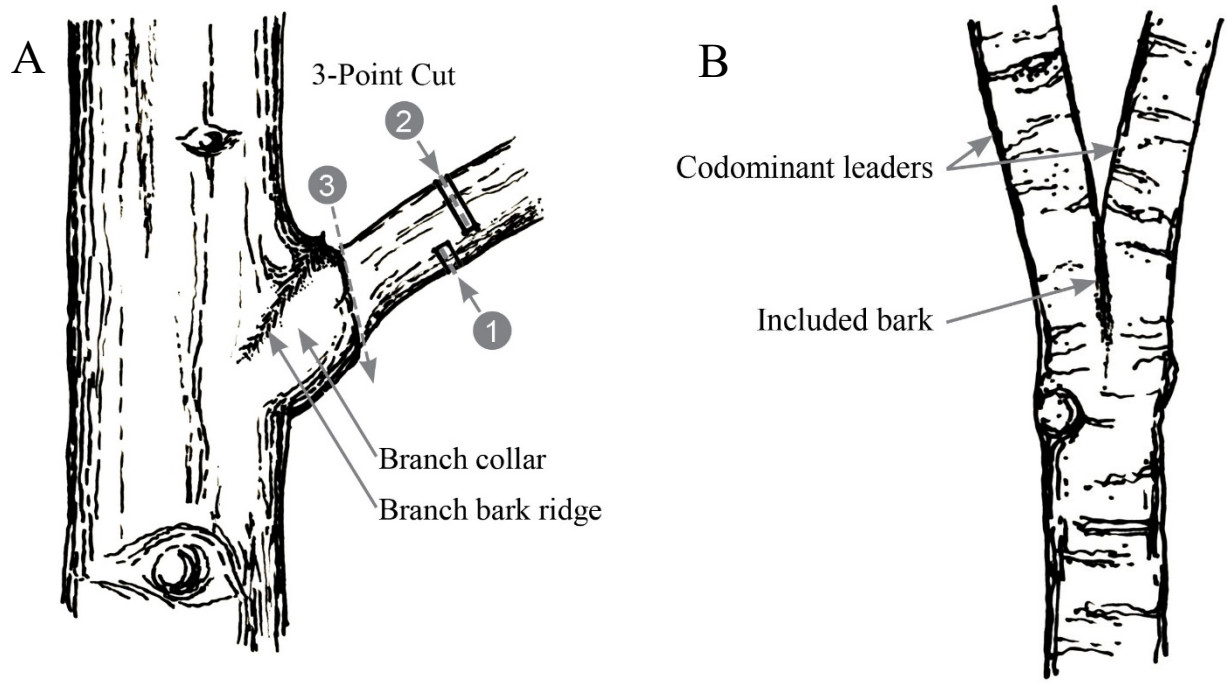


Figure 1. (A) Removal of a branch using a 3-point cut. Numbers indicate the order of cuts.
(B) Codominant leaders with included bark.

Pruning Cuts

Removal Cut (3-Point Cut)

The removal of a branch at its origin should be made just outside the branch collar. One of the most important principles of tree pruning is to always leave the branch collar intact. Cutting flush with the trunk removes the collar, creating a wound that is slow to close and greatly limiting the tree's ability to compartmentalize decay. Although branch collars are not particularly evident on some species, if a branch is subordinate to the trunk (has an aspect ratio < 0.5) it will have a collar and should be pruned accordingly. Branches too large to be easily managed with one hand while being cut should be removed using a 3-point cut (Figure 1A).

First an undercut is made (1) inside the desired location of the second cut. This creates a separation in the green pliable wood and bark on the underside of the branch that may otherwise remain attached to the falling limb, opening a large wound as it tears down the trunk. The branch is then "stub cut" (2) outside of the undercut, which removes most of the branch to facilitate a clean final cut. The final cut (3) is made just outside the branch collar.

Reduction Cut

Reduction cuts reduce the length of a branch by cutting back to a lateral branch that is at least one-third the diameter of the cut branch (Figure 2). If the cut is made back to a lateral branch with a diameter smaller than one-third the cut branch (termed a heading cut) the chance of undesirable epicormic shoots (water-sprouts) forming behind the cut are greatly increased. A reduction cut is sometimes referred to as a drop-crotch cut, and the term directional cut is often used in utility pruning to describe a reduction cut made to redirect the growth of a branch away from wires.

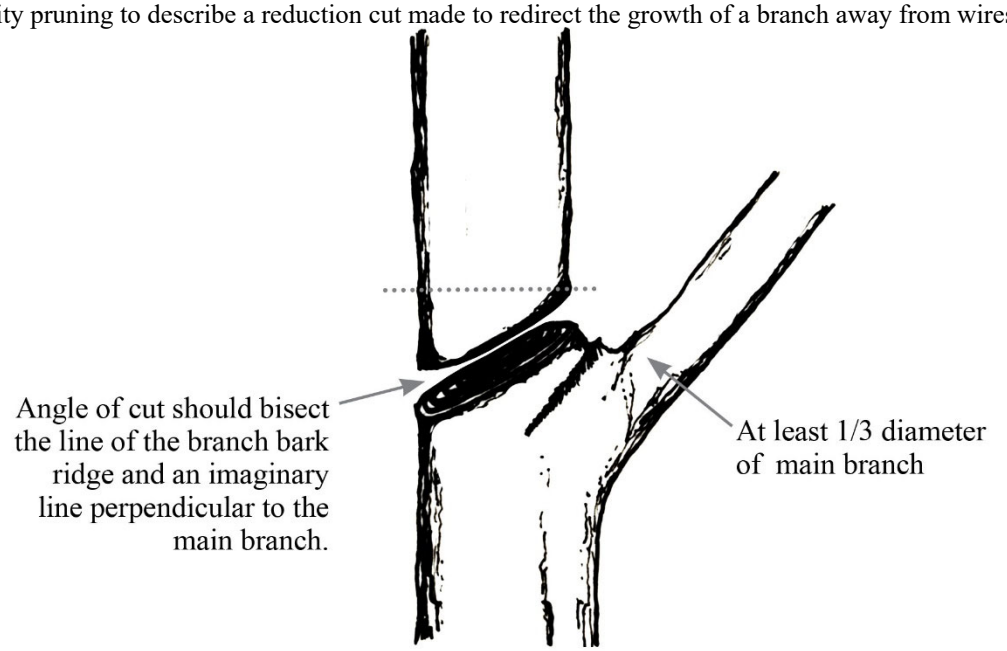


Figure 2. Reduction cuts reduce the length of a branch by cutting back to a lateral branch at least 1/3 the diameter of the cut branch.

Heading Cut

The term heading cut applies to several pruning procedures (Figure 3). In tree pruning, a heading cut reduces the length of a branch by cutting back to a point irrespective of the location of a lateral branch. Thus, a heading cut can be made to a stub or to a lateral branch that is smaller than one-third the diameter of the cut branch. In many applications heading cuts are considered an unacceptable pruning practice. The term heading cut is also used when a young shoot is cut back to a bud.

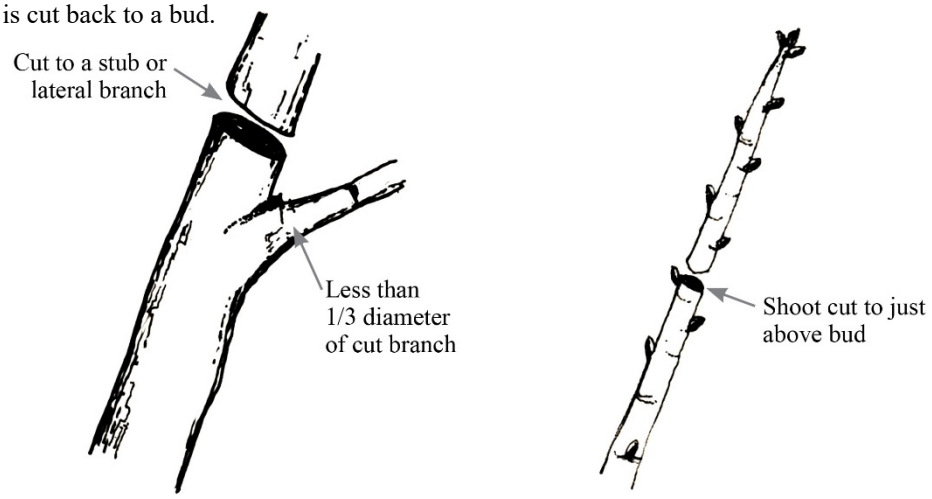


Figure 3. Heading cut refers to reducing the length of a branch by cutting back to a stub or lateral branch smaller than 1/3rd the diameter of the cut branch (left), and to cutting back a shoot to a bud (right).

Cleaning

Cleaning is the removal of dead, diseased and broken branches. The removal of water-sprouts, and crossing, rubbing and inward-growing branches may also be included in this category. Light cleaning can be performed at any time, with the exception of diseased branches, which should be removed when the plant is dormant (see When to Prune Diseased Trees below).

Suppression Pruning

Suppression pruning, sometimes referred to as subordination pruning, uses reduction cuts to slow (i.e. suppress) the growth of branches. Reduction cuts remove a significant percentage of branch photosynthetic area, which slows growth by decreasing the flow of hormones and carbohydrates within the branch.

Suppression pruning is a fundamental component of tree structural pruning where it is used to slow the growth of branches with structural defects, causing them to become subordinate to the trunk (hence the term subordination pruning). Another application of suppression pruning is on branches that will someday be removed, such as lower branches on young trees, especially street trees. It is important to periodically suppress these branches, keeping them small relative to the trunk, which promotes both the formation of branch collars and the growth of permanent branches higher in the crown.

Procedure

Suppression pruning is achieve through reduction cuts that remove one-quarter to three-quarters of a branch back to a lateral branch that is growing in the desired direction, typically towards the outside of the crown (Figure 4). In general, the greater the amount of foliage removed, the greater the reduction in branch growth. If a branch is cut back to a lateral that is smaller than one-third the diameter of the removed branch (heading cut), there will be an increased chance of vigorous epicormic shoots (water-sprouts) forming near the cut that will require later removal.

Tree Structural Pruning

Tree structural pruning (also known as formative pruning) is the most important strategy for promoting long life and minimizing hazard potential in trees. The goal of tree structural pruning is to develop a dominant central leader as high into the crown as possible with well-attached, subordinate branches. This is accomplished by suppressing branches with one or more of the following structural defects:

1) <u>Codominant leaders</u>
2) <u>Branches with included bark</u>
3) <u>Branches with a diameter greater than one-half the trunk diameter</u> (aspect ratio > 0.5 [branch dia. ÷ trunk dia.])
Note that these defects are not mutually exclusive, for example codominant leaders often have included bark.

Suppression pruning (Figure 4) helps mitigate these defects, as subordinating branches results in decreased aspect ratios and the formation of branch collars. Studies have shown a direct relationship between the amount of branch removed and the level of reduction in branch aspect ratio over time following the cut. Thus, the larger a branch is relative to the trunk, the more severe the branch reduction will need to be in order to sufficiently decrease the aspect ratio.

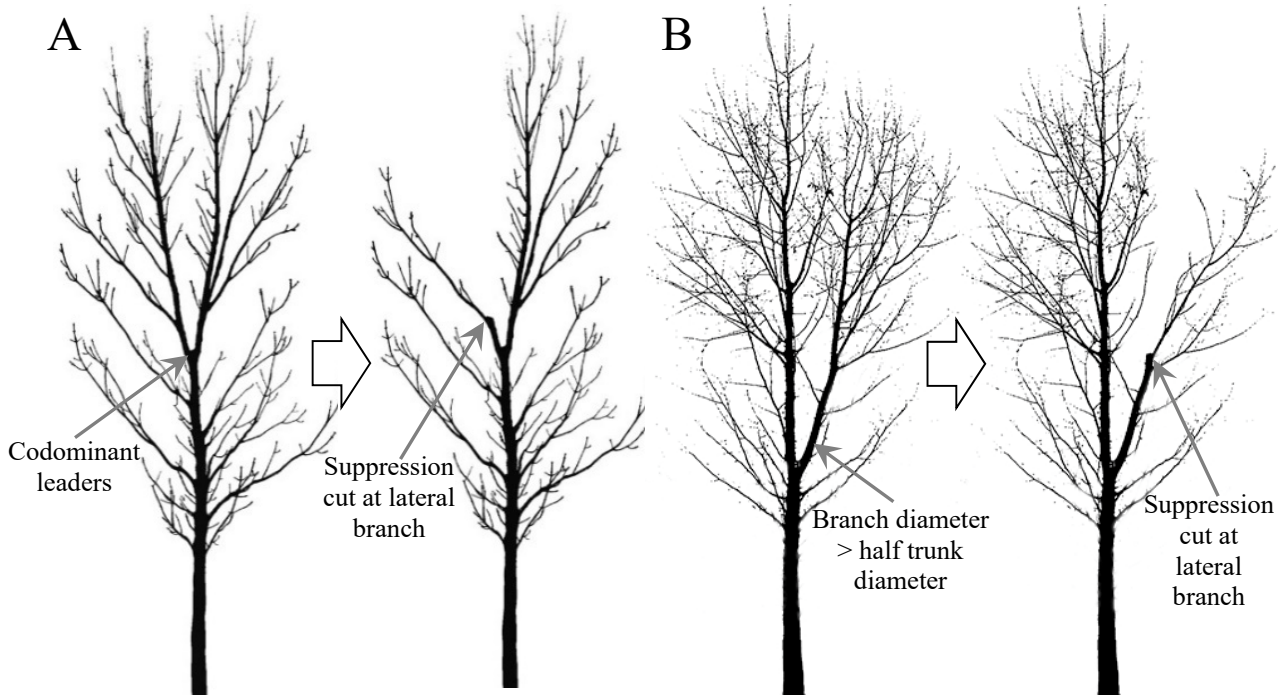


Figure 4. Suppression (subordination) pruning to mitigate structural defects: (A) codominant leaders, and (B) branch with a diameter greater than half the trunk diameter.

Therefore, suppression pruning may ultimately eliminate the need for removal of a defect-containing branch, but will nonetheless allow a collar (and therefore a branch protection zone) to develop before removal. A branch can be removed if it has a diameter of less than two inches and a collar, but because most defect-containing branches do not have collars, the first option should normally be suppression of the branch.

The importance of addressing defects when branches are small cannot be over-emphasized. The suppression or removal of small branches is far easier and will greatly limit the potential for trunk decay relative to when branches become large and serious structural problems have developed. Structural pruning of trees should begin the year after planting and be performed every one to three years thereafter.

Some species naturally develop strong central leaders (termed excurrent form) while other species possess a decurrent habit, characterized by low branches that often take on dominance within the crown. It is trees with decurrent habit, such as many species of *Acer* and *Prunus*, which require more attention to ensure the development of a strong leader.

Structural Pruning of small ornamental trees: Although trees with a mature height under 20 feet can be trained to a single leader, they are often trained to have multiple stems or even multiple trunks. The primary concerns with these trees should be to address branches with included bark and to develop well-spaced branches, discouraging multiple branches that originate from a single point.

Pruning Dose

Because removing large amounts of foliage can reduce a tree's energy reserves, a good general rule is to remove no more than 20% of the foliage at any one time (10% for large, mature trees). It is better to remove modest amounts of foliage each year or two rather than wait until large amounts of pruning are required.

Other Tree Pruning Methods

Pollarding

Pollarding originated in Europe where it was used for centuries to produce fence poles and livestock feed. It is now used mostly as an ornamental technique that can keep trees at a specified height indefinitely. Pollarding requires several years to initiate and regular pruning for as long as the pollard form is desired. Pollarding begins with a tree that has a basic structure established at the desired size (Figure 5). The initial cuts are made on one or two year-old branches. Depending on the species and the desired appearance, every one or two years the new growth is cut back to the point of the initial cuts in early spring. Over time a bulge of tissue called a pollard head develops at the cut sites. Pollarding is a proven horticultural practice because only small stems are cut and pollard heads resist decay. This is in contrast to topping trees, which is not an acceptable practice.

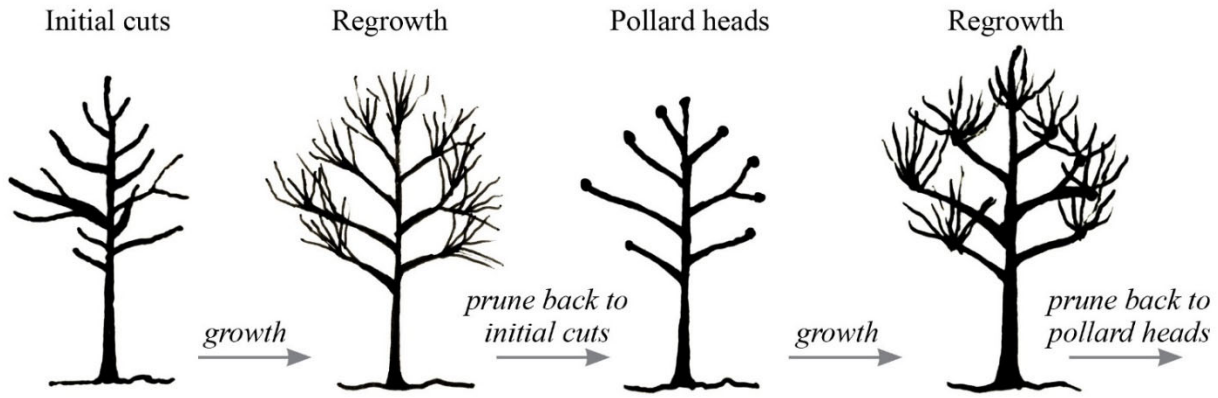


Figure 5. Pollarding cycle beginning with initial cuts.

Topping Trees

Topping reduces a tree's size using heading cuts, where branches or stems are cut back to a stub at a predetermined crown height (Figure 6). Topping trees is NOT an acceptable practice and causes numerous problems, including: large wounds that promote decay, weakly-attached shoots that emerge bellow the cuts, destruction of the tree's architecture resulting in an unnatural appearance, reduction of the tree's energy storage capacity, and an increased susceptibility to boring insects and diseases.

The appropriate way to reduce a tree's size is with reduction cuts. If a tree has become too large for a specific location, the best option is usually to replace the tree with a smaller-scale species/cultivar that is appropriate for the site.

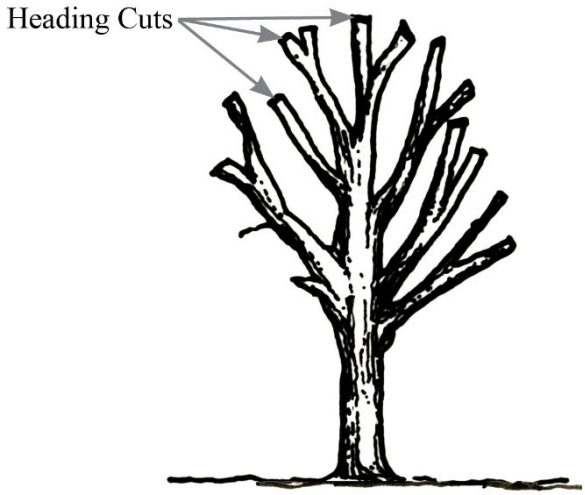


Figure 6. Topping uses heading cuts to reduce tree height.

Pruning Evergreen Trees

Evergreen trees typically develop strong central leaders with subordinate branches (excurrent form), and thus generally require only cleaning in the event of dead, diseased or broken branches. However, the principles and methods of tree structural pruning should be applied if structural defects develop.

When to Prune Trees

While light pruning can be done at any time, significant pruning should only be performed at the appropriate times, and should never be done when trees are under serious stress from factors such as drought.

There are two periods considered best for tree pruning:

1) Early spring prior to bud-break. At this time the branch structure is easily observed and wound closure responses are about to become active. Early spring (and late winter) is the best time to remove diseased branches (see When to Prune Diseased Trees).

This may not be the preferred time to prune trees that leak sap from open pruning wounds (termed bleeding). Among the most common trees that bleed from pruning cuts are birch, maple, elm, poplar and willow. This sap flow does not harm the tree, but can become unsightly if the trunk becomes stained or microorganisms grow on the sap.

2) Early summer following completion of growth. This is just as the newest leaves have fully-expanded and a terminal bud has set. Wounds made at this time close over rapidly. Pruning at this time will also limit sap leakage from trees prone to bleeding. This is a particularly good time for reduction cuts such as those used in structural pruning, as the development of epicormic shoots near the cuts is reduced.

Pruning should NOT be performed during the following times:

- During the growth flush in spring/early summer. Rapidly-growing tissues beneath the bark result in ragged cuts and can easily separate from the underlying wood.

- Late summer/early fall. Pruning at this time can stimulate growth that may not harden-off by winter. Heavy pruning in late summer may also contribute to sunburn on shade-adapted stems resulting from sudden exposure to direct sunlight.

- Late fall/winter. The living cambium exposed by pruning cuts can be damaged by winter conditions.

When to Prune Diseased Trees

Trees infected with diseases such as fire blight, cankers or black knot are best pruned when dormant, preferably late winter to early spring. The potential for disease transmission via pruning tools is greatly reduced because diseases are dormant at this time. If pruning must be done during the growing season, make cuts only during dry weather and take care to disinfect pruning tools between cuts (see Disinfecting Pruning Tools).

Pruning at Planting Time

Because transplanting is a major stress to trees that can reduce decay resistance, it is generally recommended to hold-off performing significant pruning until the year following planting. Normally the only pruning that should be done at planting is cleaning (removal of dead, diseased or broken branches).

Wound Dressing
Once considered standard practice, studies have shown that the use of wound dressing does not prevent decay, and may in some instances be harmful. One exception to this rule is to prevent the spread of oak wilt disease via insects attracted to fresh wounds. In areas where oak wilt disease has been identified, oaks should only be pruned in late winter, however if an injury does occur for any reason during the growing season, the wound should immediately be covered with a water-based wound dressing or tree paint.

Disinfecting Pruning Tools

It is good practice to regularly clean pruning tools with a disinfectant. This removes accumulated sap and dirt while eliminating potential pathogens. However, when pruning during the growing season to remove diseased branches, particularly those infected with fireblight, black knot or canker diseases, pruning tools should be disinfected between cuts.

Evidence regarding the best disinfectant to prevent the spread of plant diseases on pruning tools is equivocal. It appears that thoroughly cleaning the tool surface while disinfecting is critical to the results. This may explain why commercial brands of bleach and other disinfectants such as Lysol, which typically contain surfactants, often work better than using the active ingredients alone. Therefore it is imperative to clean tools thoroughly with the disinfectant, using a scrub pad if necessary, and allowing the tools to remain wet for several minutes.

Two of the most effective disinfectants are household bleach (10% solution) and hydrogen peroxide-based cleaners such as accelerated hydrogen peroxide (AHP) formulations. Unfortunately these disinfectants are corrosive to metal and thus can damage surfaces of expensive pruning tools. Two other common disinfectants that are not corrosive to metal are ethyl alcohol (ethanol) used at a 60-80% concentration, and quaternary ammonium compounds (referred to as quats). Quats are a common disinfectant used in a range of bathroom cleaners and disinfectant wipes (labels list various formulations of alkyl dimethyl benzyl ammonium chloride or saccharinate). As mentioned earlier, commercial formulations containing these ingredients along with surfactants and other adjuvants are convenient and effective when properly used. Lysol Disinfectant Spray is the most commonly available of these products.

PRUNING SHRUBS

Timing of Deciduous Shrub Pruning

The removal of a few broken or misshapen branches can be performed at any time. Significant pruning is best done when shrubs are dormant, preferably late winter to early spring. At this time branch structure is easily observed, and plants respond to pruning most readily following dormancy when energy reserves and hormones from the roots produce a vigorous burst of spring growth. Pruning during dormancy is particularly important for methods that remove stems near ground level, since a vigorous growth response from below the cuts is important to fill in the base of the plant and develop the future branch structure. One caveat to this rule is that dormant pruning will also remove flower buds of spring-blooming species such as lilac, which set flower buds during the previous growing season. If the loss of flower buds is of concern, pruning can be delayed until just after flowering, however the resulting growth response will be less than if pruning took place during dormancy.

Shrub Pruning Methods

Renewal Pruning

Renewal pruning is appropriate for most shrub species that have become too large or open at the base (leggy), including dogwood, honeysuckle, lilac and mockorange. This process involves removing a portion of the largest, oldest stems close to the ground (Figure 7), which stimulates new stems that fill in the base of the shrub. The number of stems removed each year will depend on personal preference and the desired effect. A common method is to remove one-third of the largest stems each year, resulting in a complete renewal after three years.

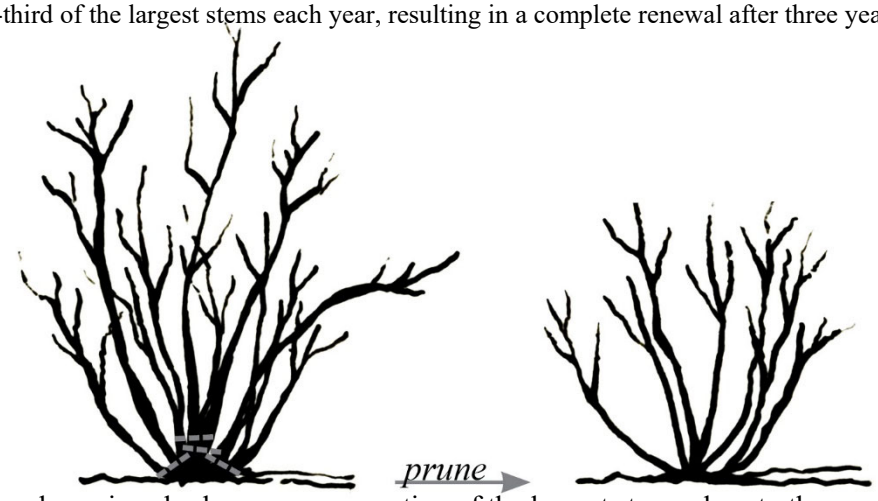


Figure 7. Renewal pruning shrubs removes a portion of the largest stems close to the ground.

Rejuvenation Pruning

The terms renewal pruning and rejuvenation pruning are often used interchangeably to describe the removal of stems near ground level, because when defined separately they differ only in dose: renewal pruning distributes large stem removal over multiple years while rejuvenation pruning removes all stems at one time. Renewal pruning is generally the preferred method for most large shrubs, as rejuvenation produces a dramatic change in plant size that can take years to regain, which may be undesirable depending on location and personal preference.

However, a type of rejuvenation pruning is the best method to manage low-growing shrubs that bloom on current-season's growth, such as potentilla and summer-blooming spirea. This method should be performed every one to three years by cutting back the entire plant to about one-third to one-quarter height (6-8") (Figure 8). After this any large, old stems can be removed near ground level. Annual rejuvenation pruning is also the preferred way to manage smooth hydrangea (*H. arborescens*) and hardy varieties of bigleaf hydrangea (*H. macrophylla*). Rejuvenation pruning can keep these plants compact and free-blooming indefinitely.

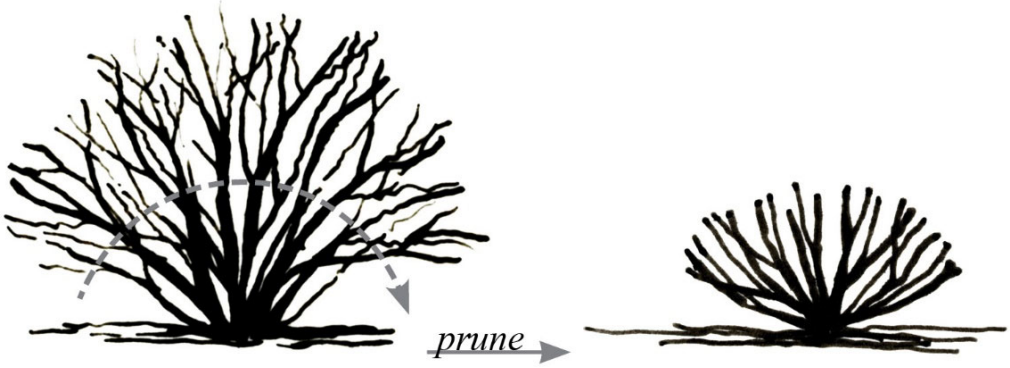


Figure 8. Rejuvenation pruning of small summer-blooming shrubs such as hydrangea, potentilla and spirea reduces the plant to about one-third to one-quarter the original height.

Reduction Pruning

Reduction pruning is used to reduce the size of shrubs when the more drastic renewal/rejuvenation pruning are not required, and for shrubs that do not respond well to having stems removed at the base, such as the burning bush (*Euonymus alata*). Reduction pruning is performed by making reduction cuts on the most prominent branches back to lateral branches inside the shrub (Figure 9). It is important to make these cuts deep within the body of the shrub and to vary the height of cuts, which will result in a more natural and full appearance.

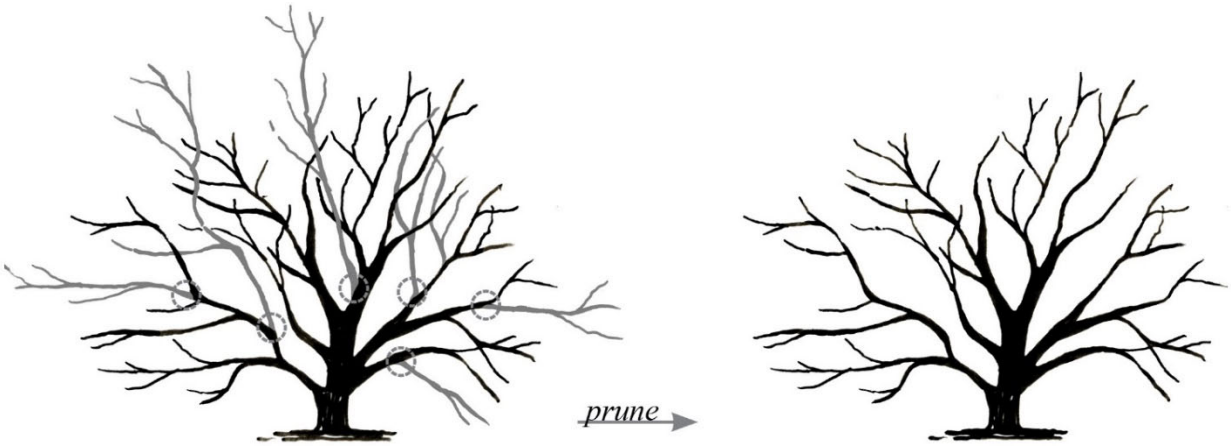
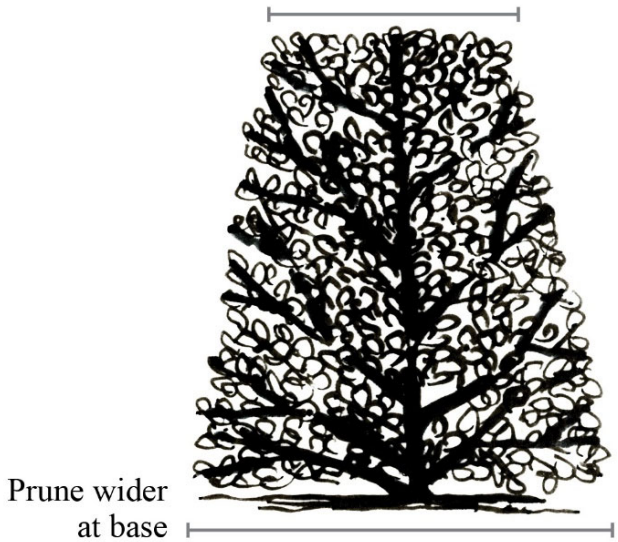


Figure 9. Reduction pruning of an overgrown shrub. Reduction cuts are indicated by circles in the image on the left.

Hedges

The most important element of hedge pruning is to keep the hedgerow wider at the base than at the top (Figure 10). Hedges pruned to have strait sides invariably become narrow and open at the base due to shading of the lower branches. Maintaining a wide base allows the lowest branches to receive enough light to support healthy growth. Hedge pruning is an exception to the general rule of pruning deciduous shrubs during dormancy. This is because shearing during the growing season is required to maintain a formal appearance, and a reduction in growth response is often beneficial, as it decreases the amount of pruning required to maintain desired size and shape. Informal hedges can be managed during dormancy using renewal or reduction pruning.

Figure 10. Pruning hedges wider at the base allows lower branches to receive adequate light.



Evergreen Shrubs

Pines

Pruning pines to maintain a shrubby habit (as with mugo pine) or to grow pines as a hedgerow requires a method unique to this genus. Pines should only be pruned in late-spring/early summer when the new growth has reached the "candle" stage, which is when the growth has elongated but the needles have not yet extended (Figure 11). At this time one-third or more of each candle can be removed. This will reduce the length of new growth and stimulate bud formation where the candle was removed, producing a more compact and well-branched habit. Candles can be cut with a shears or hand trimer, or broken-off by hand. Timing is important, since cutting candles after the needles have elongated can result in brown needle tips. This method is used in Christmas tree production, however pines grown as landscape trees should not be pruned in this manner, as it results in an unnatural two-tiered appearance after the tree reaches a height that can no longer be pruned. It is important to note that pines will not develop new shoots behind cuts made on tissue any older than the candle, thus pruning on older tissue that has become woody will not produce a growth response.

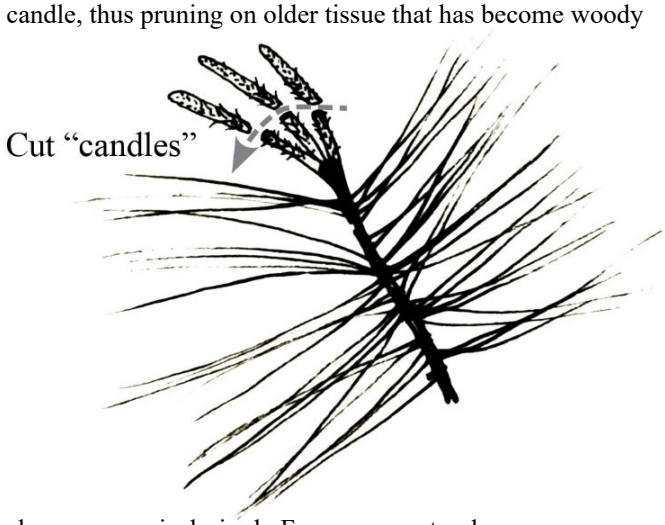


Figure 11. Pruning pines is performed by removing a portion of the new growth when in the candle stage.

Yews

Yews (*Taxus* spp.) respond well to shearing if a formal appearance is desired. For a more natural appearance, yews can be pruning using reduction cuts as described under shrub reduction pruning.

Junipers

Regular pruning on shrub and prostrate junipers is important to maintain the desired size. Junipers should only be pruning using reduction cuts, where the most vigorous shoots are cut back to a lateral branch inside the body of the plant. This hides the pruning cut, and will reduce plant size while maintaining a natural appearance. This type of pruning may be done prior to new growth in spring or in mid-summer when growth has finished.

PRUNING TOOLS

Hand Pruners

Hand pruners should only be used to cut branches less than one-half inch in diameter. There are two general types of hand pruners, bypass and anvil (Figure 12). Bypass pruners cut by moving a curved blade past a curved anvil. Anvil pruners have a strait blade that cuts against a flat anvil. Anvil pruners often result in more tissue damage than bypass types and are therefore not recommended for cutting living tissue. Quality bypass hand pruners are relatively expensive, but make clean cuts and last several times longer than inexpensive models.

Hand Saws

Hand saws (Figure 12) are used to cut branches greater than one-half inch in diameter. Hand saws are available in a variety of sizes and types, including fixed or folding handles and strait or curved blades. The finest hand saws cut only on the pull stroke, have multiple cutting angles on each tooth and are extremely sharp. High-quality hand saws make the cleanest possible cuts and therefore should be the tool of choice for most pruning cuts.

Loppers
Loppers are essentially long-handled hand pruners (Figure 12). Like hand pruners, loppers are available in both bypass and anvil types. Because of the long handles, loppers provide additional reach and greater leverage that can be used to cut wood up to one inch in diameter. The increased leverage can result in greater damage to living tissues, therefore loppers are best used only where the additional reach is required and for cutting pruned limbs during clean-up.

Pole Pruners
Pole pruners are a bypass pruner and/or hand saw blade mounted on a pole to provide extended reach (Figure 12). While pole pruners allow greater reach, the distance between the cutting tool and the operator's hands reduces control, making the execution of precise cuts difficult.

Hedge Shears
Hedge shears have long scissors-action blades that cut multiple shoots at the same time (Figure 12). These tools are best for shearing formal hedges or sculpting topiary.

Chain Saws
Chain saws are powerful and potentially dangerous tools. A safety course should be taken before operating a chain saw, and appropriate safety gear must be worn. Only a certified arborist should use a chainsaw while in a tree. Chain saws make quick work of large logs, and are highly efficient for large amounts of cutting. Chain saws do not cut as cleanly as hand saws.

Figure 12. Pruning tools (from top-left): bypass hand pruner; anvil hand pruner; hand saw; loppers; pole pruner; hedge shears.

© 2018 William A. Hoch. All Rights Reserved.

REFERENCES

American National Standards Institute (ANSI). 2001. Tree, shrub, and other woody plant maintenance; standard practices (pruning) ANSI A300 (Part 1).

Camilli, K., D.H. Appel and W. T. Watson. 2007. Studies on pruning cuts and wound dressings for oak wilt control. Arboriculture & Urban Forestry 33:132-139.

Dujesiefken, D., H. Stobbe, D. Eckstein. 1998. Long-term effects of pruning on the trunk of lime and horsechestnut. Forstw. Cbl. European J Forest Research 117(6):305-315.

Dujesiefken, D. and H. Stobbe. 2002. The Hamburg tree pruning system - A framework for pruning of individual trees. Urban Forestry and Urban Greening 1:75-82.

Eisner, N., E.F. Gilman, J.C. Grabosky. 2002. Branch morphology impacts compartmentalization of pruning wounds. J. Arboriculture. 28:99-105.

Gilman, E.F. 2012. An Illustrated Guide to Pruning. 3rd Ed. 476 pgs., Delmar Cengage Learning, Albany, NY.

Gilman, E.F. 2015. Pruning severity and crown position influence aspect ratio change. Arboriculture and Urban Forestry 41:69-74.

Grabosky, J.C. and E.F. Gilman. 2007. Response of two oak species to reduction pruning cuts. Arboriculture and Urban Forestry 33:360-366.

Shigo, A., and H.G. Marx. 1977. Compartmentalization of decay in trees. USDA Forest Service, Agriculture Information Bulletin 405. 73 pp.

Shigo, A.L. 1989. Tree Pruning: A worldwide photo guide. Shigo and Trees, Associates. Durham, NH.

Shigo, A.L. 1991. Modern arboriculture: A systems approach to the care of trees and their associates. Shigo and Trees, Associates. Durham, NH.

Chapter Review

A. What are the two primary goals of tree pruning and how are these goals achieved? _____

_____

B. What is the largest pruning wound that most trees can reliably compartmentalize?

_____

C. Define the following terms:

CODIT _____

Branch Collar _____

Branch Aspect Ratio _____

Branch Bark Ridge _____

Included Bark _____

Codominant Leaders _____

D. Describe the following types of tree pruning cuts:

Removal or 3-point cut _____

Reduction cut _____

Heading cut _____

E. Briefly describe suppression pruning and how it is performed. _____

_____

_____

F. What is the goal of tree structural pruning? _____

_____

G. What are the three primary branch defects to be addressed in tree structural pruning? _____

_____

_____

_____

H. What is the maximum amount of foliage that should be removed at any one time when pruning trees?

_____

I. Describe the primary difference between pollarding and topping trees, and list three potential problems caused by topping.

_____

_____

_____

J. When are the two best times to prune trees? _____

_____

K. When is the best time to remove a branch infected with fireblight, and why? _____

_____

L. What type of pruning should be done when a tree is planted? _____

_____

M. Describe the proper procedure for disinfecting pruning tools. _____

_____

N. Why is the use of wound dressing on pruning wounds not recommended? _____

_____

O. When is the best time to prune most deciduous shrubs? _____

_____

P. Name and briefly describe the best pruning method for each of the following plants:

Lilac _____

Potentilla and summer-blooming spirea _____

_____

Burning bush _____

_____

Hedges _____

_____

Mugo pine _____

_____

Junipers _____

_____

Q. What pruning tool makes the cleanest cuts and therefore should be the tool of choice for most pruning cuts?

_____