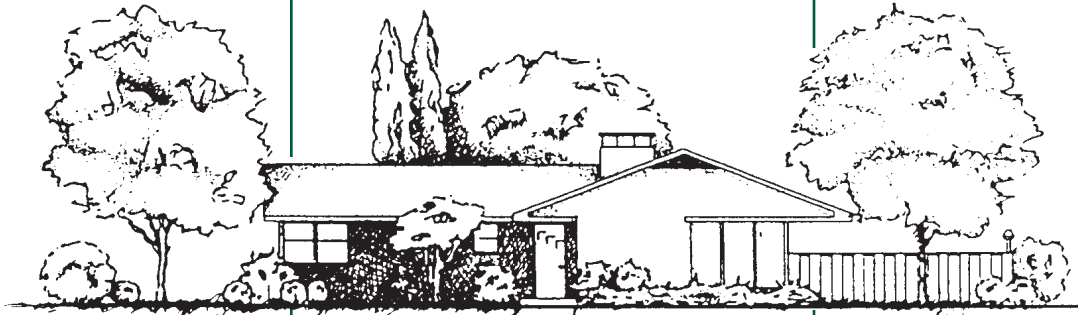


ALL ABOUT PRUNING



Pruning Deciduous Trees

Correct pruning is as important for the long life of a tree as is disease and insect control.

Most of the pruning and tree training operation can be done by homeowners once they understand the principles involved. This section has been prepared to help you understand these principles. When large trees need pruning, which involves high climbing and the removal of heavy limbs, it is best to hire professional arborists. Before hiring a person to do your tree maintenance, check his or her qualifications and ability to do good work. This publication will help you in appraising work done by an arborist so you can be your own judge before hiring a professional.

What is Pruning?

Pruning is the methodical removal of parts of a plant with the object to improve its form and to improve growth and cultivation. Pruning involves removal of branches with minimum damage to cambium or growing tissue so that the wound will heal properly in the shortest possible time with the least possibility of wound infection.

Main Parts of a Tree

Anyone pruning a tree should know how a tree grows, and understand the needs of a tree for its successful cultivation. From a growth point of view, the tree is made up of roots, stem, branches, and leaves. (Figure 1)

Roots. The roots of a tree have two main functions. The first one is to anchor the tree into the ground. The second one is to absorb, water and food elements.

Stem. The main stem or trunk of a tree is a support for the branches. It carries just beneath its bark microscopic channels along which water and food elements pass between roots and leaves.

A cross section shows the structure of a tree trunk. (Figure 2) The cambium is the cell layer responsible for uniting grafts and healing deep wounds. The wound healing tissue is called callus. Cambium cells should never be allowed to dry out. They are killed easily by such substances as turpentine, tar oil and creosote.

The layer of cells outside the cambium is called phloem. The newly laid-down layers of phloem tissue are involved in the upward movement of nutrients from the roots, and in return transport manufactured foods from the leaves to the roots. Cutting, or in any way constricting the phloem layer, will cause an accumulation of sugars in the top of the plant and eventually death of the roots through starvation. This is the reason why extensive damage to a layer of bark by rodents or accident often will result in death of the tree. The bark does form a protective layer and serves as an insulator against rapid changes in temperature. The sapwood is part of the wood layer; and its function is water movement longitudinally and horizontally and strength. The heartwood is dead wood which is retired sapwood; and its function is only support with the pith as center.

Branches. The branches of a tree are the extensions of the main stem and are generally arranged in such a way that the leaves have an equal chance to absorb light. Their internal structure is the same as that of the main stem. Damage to the branches may result in their death, which if neglected, may attract disease, which in turn may influence the health of the whole tree and can cause its death.

Leaves. The leaves may be regarded as the factories of the tree. Water, carrying food elements, arrives from the roots and in the presence of light, energy essential for growth is produced and carried away to all parts of the tree's system. During this process, which is called photosynthesis, carbon

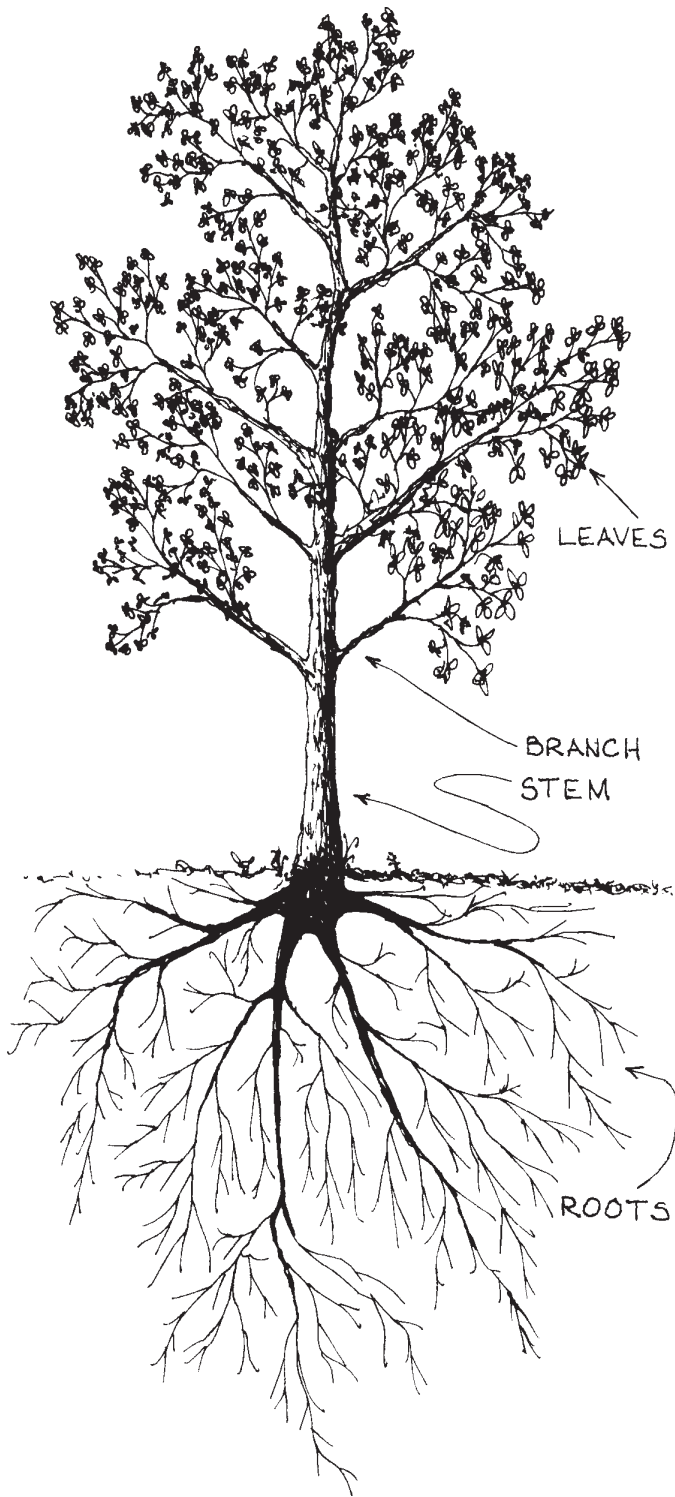


Figure 1. The main structural parts of a tree, roots, stem, branch and leaves.

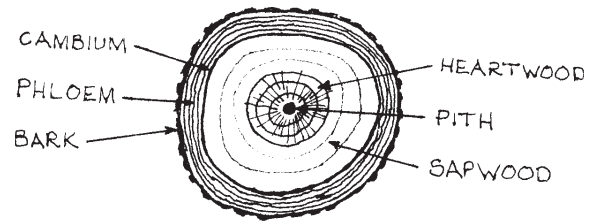


Figure 2. Cross section of tree trunk or large branch showing pith, heartwood, sapwood, cambium, phloem and bark.

dioxide is consumed by the leaves and oxygen is released into the atmosphere.

The flowers, sometimes conspicuous and sometimes very ornamental, are solely concerned with the production of seed. Their varied forms, colors and scents are intended purely for the attraction of insects. Man is able to enjoy them for their beauty and select them for these characteristics in plantings.

Tree Form

Having looked at how a tree grows, now let's take a look at what form it will assume. Not every tree has the same form. When pruning, you must know the characteristic form of the tree before any live branches are cut out. Little or no attempt should be made to change the characteristic habits of growth, which are common to every species. (Figure 3)

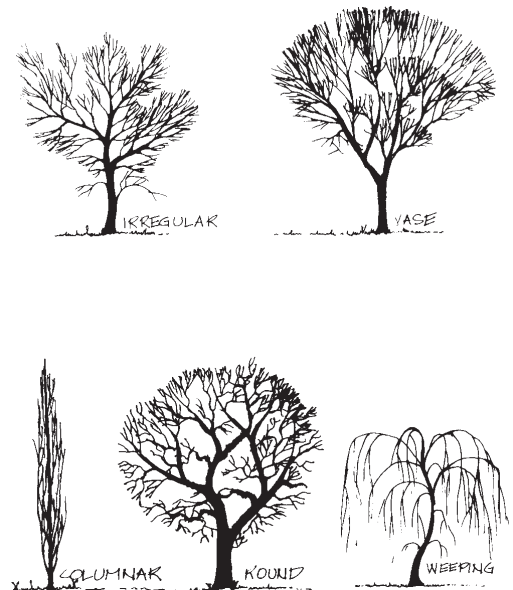


Figure 3. Seven different tree forms.

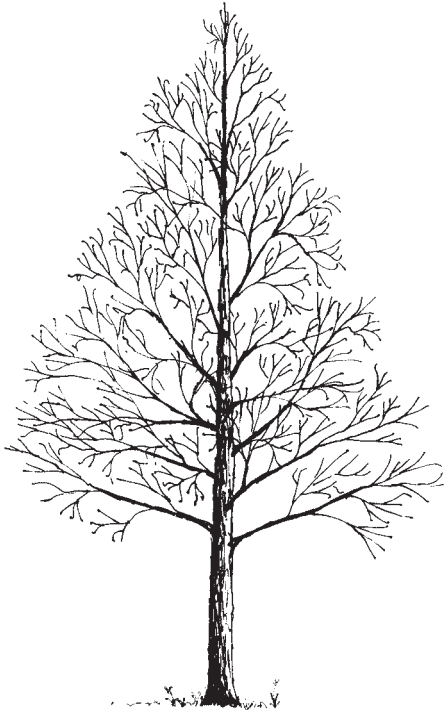


Figure 4.

When the crown has become asymmetrical, it may be advisable to do some corrective pruning, but avoid at all times severe cutting, topping, or dehorning. Tree species naturally strong in structure and regular in shape and form will need a minimum of limb removal other than cutting out dead material (e.g., pinoak, sweet gum). (Figure 4)

Trees with diffuse branching habits will need more attention the first 15 years of their lives and especially the first five years to establish a strong crown structure capable of supporting the heavier and more rambling types of crown which will develop as the tree grows older (e.g. hackberry, elm, silver-maple). (Figure 5)

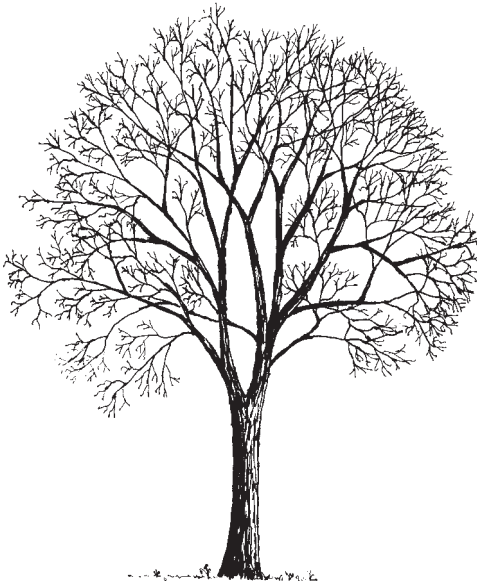


Figure 5.

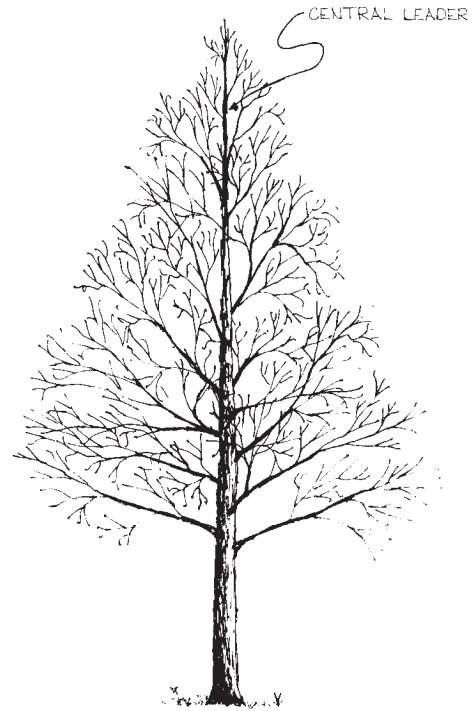


Figure 6.

When trees are dormant and have lost their leaves, their structure and individual shape can be studied more easily. Realizing that species have their own characteristic form of growth, you can now understand why it is important not to cut back or remove the leader of trees with a central leader, such as shagbark hickory, pin oak and sweet gum. (Figure 6)

A true central leader tree should be restricted to one trunk. The central growing point is kept dominant by heading back any side branches which appear to compete with it. The result of this type of growth is a relatively tall, very strong tree. On trees with a modified leader, such as maple or linden, the terminal may be thinned back lightly to a lateral (sidebranch) which then becomes the new leader. (Figure 7)

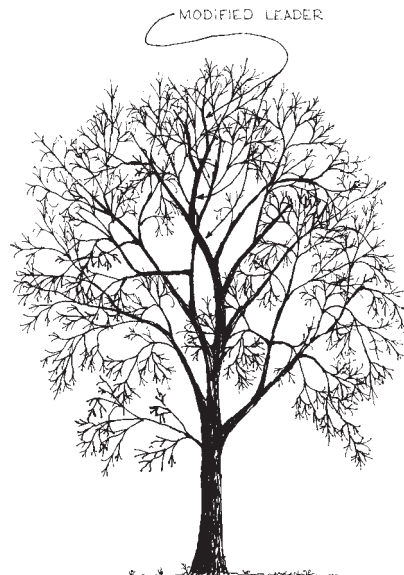


Figure 7.

Why Prune?

One of the first occasions when a tree may require pruning is when it is planted. At the time of transplanting, roots have been disturbed and partly destroyed. The branch structure should be brought into relationship with the remaining root system. Pruning at this time consists of thinning out, concentrating on the prevention of weak crotches and of branches which cross over each other. Thinning out is the removal of a lateral branch at its point of origin or cutting it back to a lateral which assumes the terminal role. This type of pruning retains the natural shape of a tree.

Pruning of a tree later in its life is done to correct other conditions which develop as the tree grows. Nature's way of pruning is through dying branches and twigs. This is normal, but such branches should be pruned out of ornamental trees without leaving stubs. In mature trees there is a natural tendency for heavy leaf growth at the tips of the branches. If this dense growth is thinned out, better light and air circulation to the center of the tree is the result which stimulates growth in the center of the tree and prevents early dieback. This thinning process also allows better spray penetration and leaf coverage when insects and disease are controlled with chemicals. Excessive thinning should be avoided because of the danger of sunscald to the main trunk and interior branches. This is especially true for the smooth barked trees such as maple.

When a tree is severely pruned, it is subjected to considerable shock; and if such a major pruning is necessary, it should be carried out over a period of two growing seasons. With severe pruning, the leaf area is restricted. This limits the amount of food manufactured by the tree. When new growth occurs to replace the lost leaf area, food stored in the roots is used and if depleted, it can cause the tree to weaken. On the other hand, a more systematic removal of a few branches from a large tree has little effect, and the adjustment between root and crown growth is made with little difficulty.

When maximum tree growth is wanted, little or no pruning should be carried out. For an ornamental tree, the rate of growth is not the only criterion; attractive shape and strong branch structure are equally important.

Maintenance Pruning

Maintenance pruning carried out on a regular basis should remove undesirable growth to prevent the need for an expensive pruning job later. Such pruning will take care of the following:

- Dead or diseased and other unsightly branches.
- Water sprouts growing near the base of the tree trunk or in the tree.
- Any branch or part of it that grows toward the center of the tree.
- Any cross branch which causes rubbing and consequent damage to the bark.
- Narrow V crotches should be eliminated through early corrective pruning by eliminating one of the branches.
- Competition with central leader if more than one leader

develops in a tree that normally has one single stem. The competing branch should be pruned out to restore dominance to the main stem.

- Branches that are likely to interfere with telephone or electric wires should be thinned out. Try not to cut the whole branch out causing a large gap; but see if a simple thinning out, allowing the wires to run through the tree will not be all that is needed. Such pruning allows the tree to retain its exterior form and, aesthetically, it will be more pleasing.
- Prune out branches that cut off desirable summer breezes.
- Remove lower branches to open up an attractive view. Remove no more than one branch or part of a branch at a time before studying the result, because often little pruning is needed to open up a view.
- To control size. When correct tree is selected for site, this kind of pruning would be minimal.
- Sometimes, the removal of lower sweeping branches is necessary to allow more sun on the turf. One should be careful not to prune too drastically and cause sunscald on the now bare trunk.
- Overcrowded tree conditions along streets, in parks, and on school grounds may call for thinning of side branches or removal of trees to allow for natural form on remaining specimens.
- Trees on construction sites or near ditches, etc., where part of their roots have been destroyed benefit from thinning and pruning to allow for the loss of roots. Of course it would be much better not to destroy the root system of good trees and plan around them, making existing trees part of the new landscape.

Pruning should help develop a tree's characteristic form. Have a mental picture of what this characteristic form should be in order for the tree to become a perfect specimen.

When to Prune

Deciduous shade trees may be pruned at any season. The ideal time to prune most trees, however, is during the dormant season before new growth starts. Pruning while the tree is in leaf affords the opportunity to better visualize the effect that pruning will have on the tree form, but makes it difficult to see problem areas. Shake the branch to be removed so one can observe by the movement of the leaves in the canopy what the effect of its removal will be.

Spring flowering trees bloom on last year's wood. If maximum flowering is to be enjoyed, prune after trees have bloomed. Summer flowering trees bloom on this year's wood. To have maximum flower display, prune in early spring or during winter.

Some trees will bleed clear sap from pruning wounds if they are pruned during late winter or early spring. This "bleeding" is not harmful but it is difficult to cover it with tree wound dressing. Trees which show this tendency such as birch, maple, and walnut should be pruned during mid-summer while they are in full leaf.

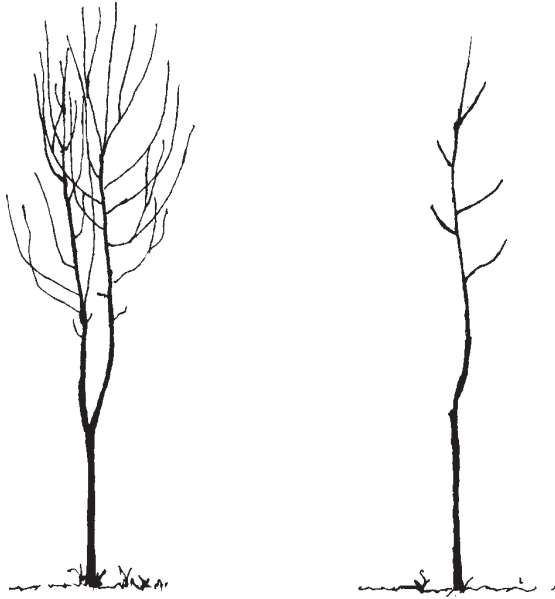


Figure 8. Selection of leader through removal of competing branch on a young tree.

Pruning Young Trees

When selecting a tree, look for a healthy moderate size tree with approximately $\frac{1}{2}$ to $\frac{1}{4}$ inch trunk diameter and 5 to 6 feet tall. Such a tree is generally better structured than a larger one. Don't select a tree with low lateral branches of large size, as most of these will have to be pruned off to form the new tree.

At planting time select the most upright and vigorous branch to become the leader. (Figure 8) If there is a second branch high enough above the ground you can select it for the first scaffold. Remove other branches if they are too close or less than 8 inches. The height of the first permanent branch above the ground will depend on the function the tree performs in the landscape. The position of the limb on the trunk remains the same throughout the life of the tree; only the diameter of the branch increases. (Figure 9)

Selection of Scaffold Branches

It is important to select the main scaffold or lateral branches that grow at wide angles to the trunk. (Figure 10)



Figure 9. Center of branches remain at same distance from ground level as tree matures.



Figure 10. While trees are young select scaffold branches for wide angles to trunk.

The major scaffold branches should be spaced at least 8 inches vertically apart, but better is 18 to 25 inches. To appreciate these distances, go and look at the structure of a fully grown specimen tree and you can see that some mature trees have their lateral branches spaced up to 10 feet apart. Encourage radial branch development. (Figure 11)

Lateral branches should be smaller in diameter than the main trunk. Select scaffold or lateral branches that grow at a wide angle to the trunk. These branches will be stronger as they have more connective wood at the top, Figure 12, than a narrow angled crotch. (Figure 13) As the latter grow and become heavier, especially under a load of snow or ice, they are very likely to split during a storm. (Figure 14)

Remember, branches selected for permanent scaffolds should have a wide angle of attachment with the trunk.

Formation of a Sturdy Trunk

Temporary branches on the lower part of the trunk will strengthen the trunk and give protection. (Figure 15) The trunk

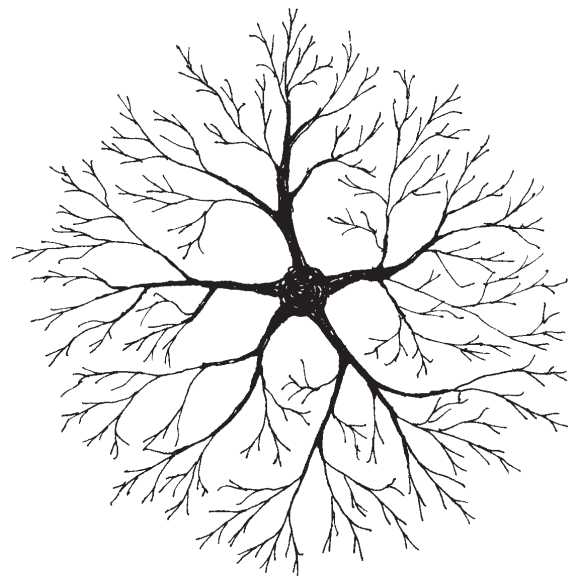


Figure 11. Select branches carefully to encourage radial branch development.

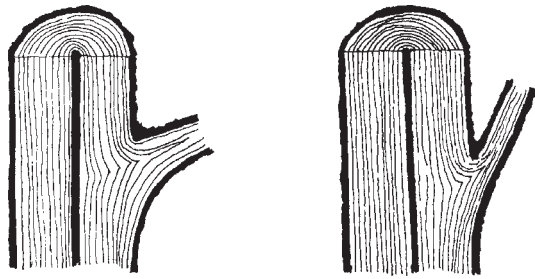


Figure 12 (left). Lateral branches should be smaller than trunk to form strong wood fiber connection.

Figure 13 (right). Narrow angle crotch does not have a strong wood fiber connection.

will increase more rapidly in base diameter as the leaves and growing points on these branches provide food and hormones for more rapid trunk growth. Temporary branches shade the trunk and reduce the likelihood of sunburn injury to the bark and cambium, particularly on the southwest side of the trunk.

This low growth acts also as a guard and helps protect the trunk from possible injury caused by mowers, cars, animals, etc.



Figure 14. A split branch—the result of a narrow angled crotch.

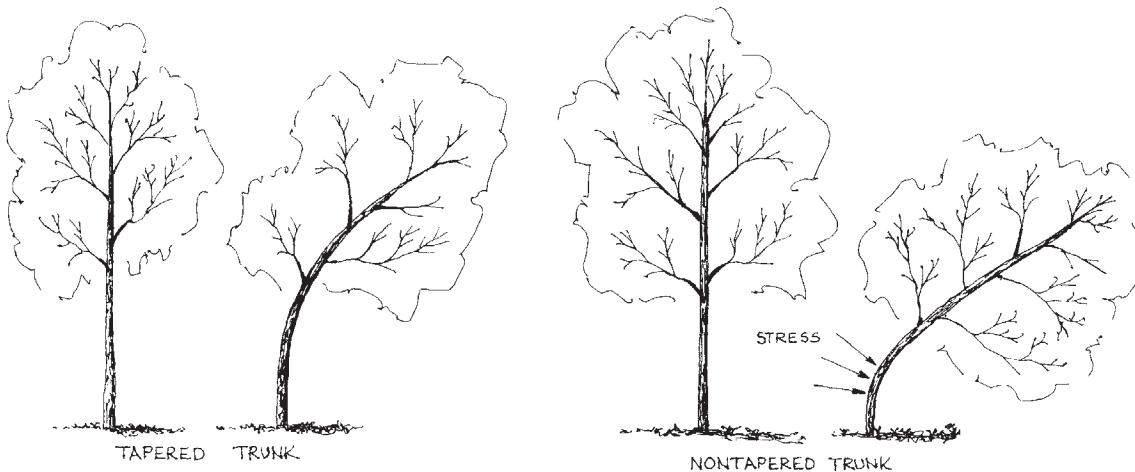


Figure 16. A well tapered trunk permits uniform distribution of stress making the trunk stronger. A non-tapered trunk may snap under strong wind.

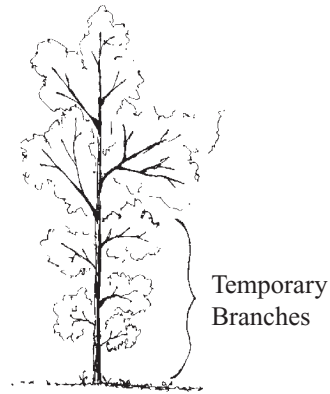


Figure 15. Temporary branches protecting trunk and helping it grow into a strong support for scaffold branches.

Leaving temporary branches along the trunk and allowing the tree trunk to flex in the wind not only will increase the trunk diameter near the base, but will also increase the trunk taper. A well tapered trunk permits a more uniform distribution of stress, Figure 16, reducing the danger of a broken trunk when exposed to strong winds. During the growing season the leader may bend so far that it is parallel to the wind load. This relieves almost all stress of the immature wood of the tip.

Young trees bought at the nursery often have a small trunk diameter in relation to tree height. Such a tree needs support. When staking, keep in mind that the main stem will become strong quicker when the top of the tree is free to move in the wind. Have posts stand in line with the tree at least a foot away from the trunk. (Figure 17)

Keep stakes neat and use a broad bandage to prevent damage to the trunk. Tie tree as low as possible on the trunk, but high enough to hold tree upright under calm conditions. Under wind conditions, the tree should return immediately to the vertical after the wind has stopped blowing.

Container Grown Trees

At time of transplanting, remove the container from container grown plants and check the root growth. Prune off

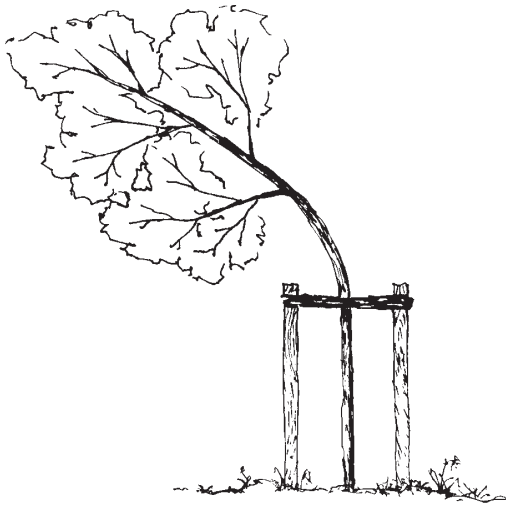


Figure 17. Support tree as low as possible, allowing the top to bend with the wind.

broken and damaged roots and prune approximately a third of length of twigs and small branches to compensate for loss of roots. By removing part of the top, you compensate for root loss. If roots have grown in a circular pattern or if the roots cross each other, spread them out or prune them back. Crowding and root girdling in time stunt a tree's growth and may even kill it. If girdling roots are noticed on a tree, they should be cut away. (Figure 18) It is not necessary to disturb the ball as the damaging root restriction occurs along the perimeter.

Young Trees Without a Leader

Sometimes young trees have been headed back in the nursery, which encourages many laterals below the cut, and often results in too many branches too close together and loss of the leader. When planting, select the most upright and vigorous branch for the leader. Select a second branch as the first lateral if the branch is high enough off the ground. If a third branch can be selected for lateral, do so or wait until later for further development of the tree's framework. Prune out remaining branches. (Figure 19)

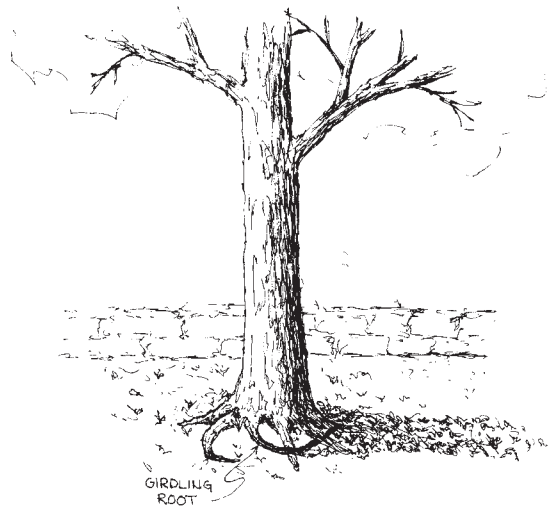


Figure 18. Remove girdling roots; they can kill a tree or slow its growth.

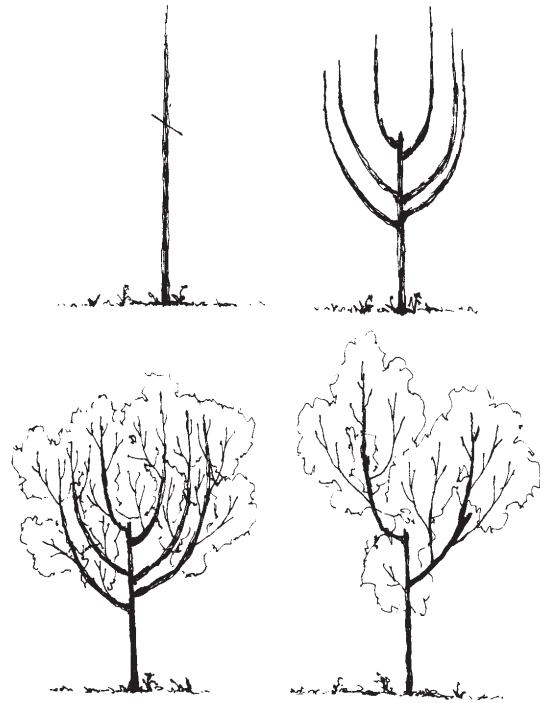


Figure 19. A young tree headed back in the nursery, resulting in too many branches of which are selected to form scaffold branches while others are pruned out.

When planting the tree, plant the off balance main leader branch into the direction of the summer wind. (Figure 20)

Trees often develop lateral branches more extensively on the down wind side, giving the tree an off balance appearance and although this can give very attractive form to a tree, it sometimes is undesirable. Remedial pruning can help control this tendency by opening up the canopy of the tree so that leaves will offer less wind resistance. Also thin back branches on the down wind side to keep the canopy more symmetrical. To keep an upright leader, prune top back to a near vertical lateral which now in leadership position will keep tree growing upwards. (Figure 21)



Figure 20. Plant a young tree with the main leader facing the direction of strong summer winds. The southwest winds help branch to straighten up.



Figure 21. To keep a near up-right growing leader in wind-swept trees, keep top pruned back to near vertical lateral.

To help control growth, it is not always necessary to remove the branches by pruning. Pinching the terminal branch buds will reduce the competition with the leader. Pinching merely consists of removing the bud and, thereby, preventing its development into a branch. Growth is then stimulated into other parts.

Pruning Mature Trees

If during the first five years growth of a young tree, the scaffold branches have been carefully selected, the tree may need little pruning for several years. As the tree grows older, the characteristic branch structure of the grown tree can be made more distinct through moderate thinning, and an average mature tree can become a specimen tree in the landscape.

When a tree is becoming too large for its site and it must be controlled by pruning (a point to keep in mind whenever planting a tree), start when the tree begins to reach the desired height. Do not wait with pruning to control size until the tree is much larger because by that time, pruning will be more difficult. Larger cuts will have to be made and the shock to the tree will be greater.

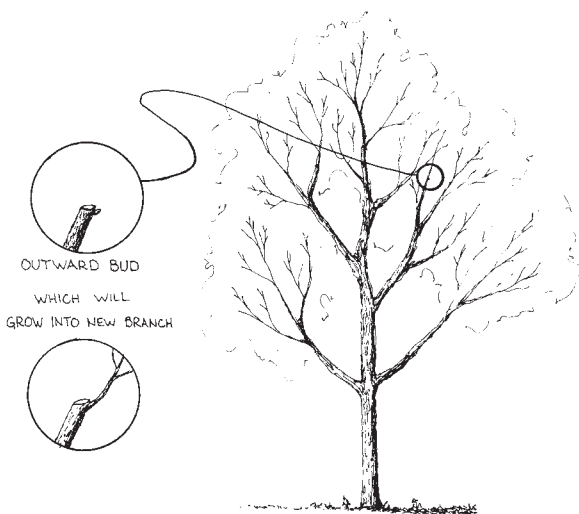


Figure 23. Prune laterals always back to outward growing buds.

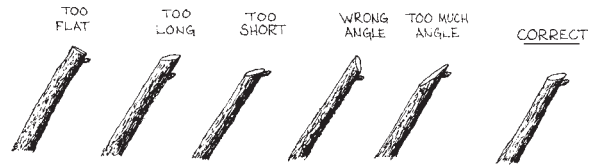


Figure 23. Incorrect and the one correct pruning cuts. The correct cut should be about 1/4 inch above the bud and slightly slanted away from it.

Reduce size by thinning out branches to lower laterals. Some entire limbs may need to be removed. Thin a tree to retain its natural characteristic form.

Many large old trees are likely to sunscald if they are heavily top pruned. This problem may also occur when removing a tree from a group of trees. Sunscald is likely to result in bark splitting. Trees with thin and smooth bark, such as sugar maple, linden and apple, are most susceptible.

To prevent sunscald prune out only part of the tree top in any one year. Thin out groups of trees by cutting down trees selectively over a period of years, instead of all at one time.

How to Prune

The principle behind pruning small twigs is always to cut back to a bud which is directed out ward and will produce new growth. (Figure 22)

Make slanted cuts back to healthy wood. The proper pruning cut should be about 1/4 of an inch above the bud, slanted away from it. (Figure 23)

In case of too many branches forming too dense a canopy, a branch is cut off at its point of origin with the main lateral branch. (Figure 24A and B) Never leave short stubs as they do not heal over properly, and encourage disease and insect infestation. (Figure 25) Pruning cuts should be flush with the parent branch. Small branches of which the weight can be held to prevent bark stripping, can be directly flush with the main branch or trunk.



Figure 24. Do selective pruning when thinning out. Thinning out produces a more open canopy allowing strong winds to partly blow through crown of tree and do less damage to tree canopy.

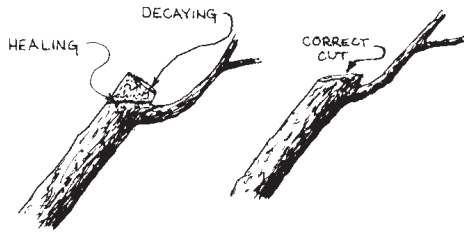


Figure 25. Wrong pruning cut when leaving a stub—such stubs often start a decay process.

Larger branches which are too heavy to be held require three separate cuts to prevent bark stripping. (Figure 26) The recommended cuts for a large branch are outlined in cuts 1, 2, and 3. (Figure 27) The first cut is made underneath the branch upward, about 15 inches away from the trunk. Stop before the saw is jammed. The second cut is made about 17 inches from the main trunk, but should be out slightly with the lower edge which will result in a smaller wound than when cut parallel to the trunk. (Figure 28) Hold stub by hand or tie with rope when too heavy to make sure no bark stripping occurs. If bark stripping does occur, try to save it by tacking it back immediately before cambium dries out and cover wound with treecoat.

Cuts made too close to the trunk will leave unnecessarily large wounds. Neither should stubs be left. (Figure 29) Also, a smooth healing surface will heal more rapidly than a rough one. An elliptical wound will heal more rapidly than a round one because of improved sap flow. The sap flow, which is largely parallel to the trunk or limb, diverts and forms an el-

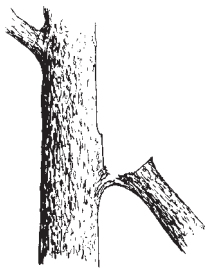


Figure 26. Bark stripping is the result of improper pruning technique when removing a large branch.



Figure 27. Correct removal of large branch through three successive cuts—resulting in a clean cut. Pruning cuts are made in order of 1-2-3.

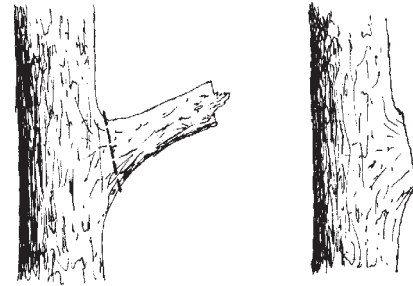


Figure 28. Make the last cut (#3) so that the lower cut is slightly out from the tree trunk. This results in a smaller wound.

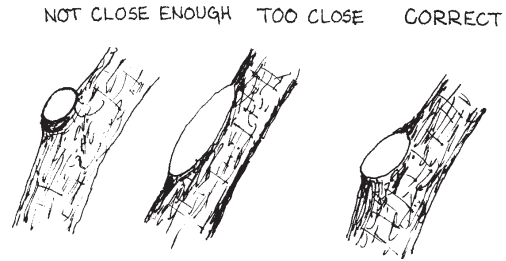


Figure 29. Large wounds which take longer to heal are the result when a pruning cut is made too close to the trunk. Do not leave a stump by making a pruning cut too far from the trunk. Correct pruning cut.

liptical pattern when a wound is encountered. (Figure 30) Most rapid cambium growth is along the same pattern and, consequently, rapid healing is stimulated when wounds are treated accordingly. (Figure 31)

The decision to remove one of the branches, making a tight “V” crotch is always a very difficult one, as it generally means being left with only half a tree. Such tight “V” crotches are subject to breakage, and this is one of the reasons for emphasizing early pruning for strong laterals. Where a tree’s form would be ruined, a tree surgeon can increase the branch’s structural strength through the use of bolts together with cables to hold the branches together. (Figure 32) If one branch of a “V” crotch has to be removed, be aware that the true intersection is often lower than one expects because of heavy bark accumulation. (Figure 33) To remove the branch, make two preliminary cuts as indicated, then remove the major part of the branch; last, make a final cut at the tree intersection. (Fig-

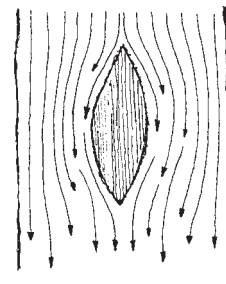


Figure 30. Diagram showing improved sap flow, resulting in quicker wound healing because of elliptical cut.

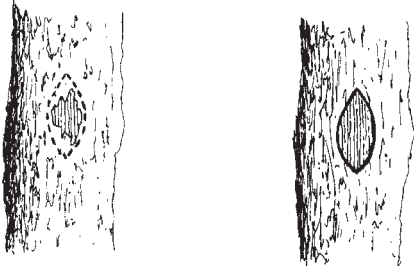


Figure 31. Rough wound which was shaped into elliptical form with cambium growth restoring bark cover.

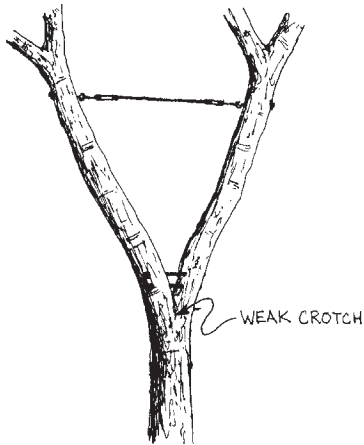


Figure 32. Location of bolts and cables used to strengthen a weak crotch.

ure 34) Remember trees with narrow “V” crotches are subject to wind, ice and snow damage. A branch making such a weak union should be removed while young.

Stubbing Mature Trees

It was mentioned earlier that nurserymen do head back young trees to give them a fuller form and to make handling easier. Unprofessional tree maintenance crews sometimes do the same type of heading back on mature trees. (Figure 35) This is an unsatisfactory way to prune a tree. This method is referred

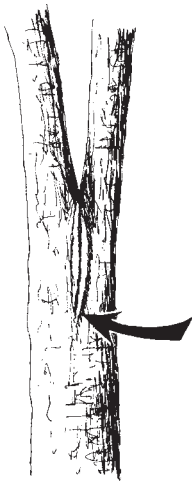


Figure 33. Study a narrow V crotch to find the true intersection before removing the limb.

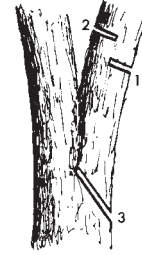


Figure 34. Pruning cuts are made in order of 1, 2 and 3 to remove a side limb. This prevents splitting.

to as “tree topping.” Where large branches or mature trees are headed back or stubbed, a number of shoots develop at the end of each stub. (Figure 36) These stubs are crowding each other, and are weakly attached to the stem; consequently, they split out easily. Worst of all, trees headed or topped in this fashion lose their natural form and often are ugly and grotesque, slowly dying because the dieback of the stubs invites decay.

Safety

When pruning, it is a good practice to start in the top of the tree and work down. This way, hanging brush can be removed with a minimum of retracing movements. Remove dead wood, diseased branches, and small crossing limbs first. Do not hesitate to step down and study the effect removal of larger

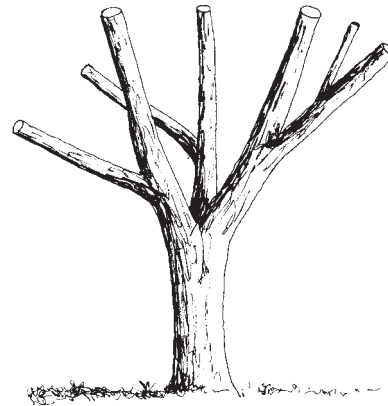


Figure 35. Stubbing or tree topping is not the way to prune trees. The result is an ugly deformed tree with weak branches. Very often decay start and kills the tree.

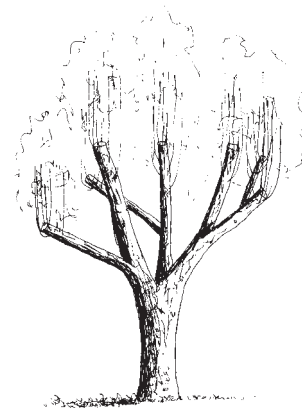


Figure 36. The result of tree topping—many weakly attached branches—early death of tree.

tree limbs has on the form of the tree before actually cutting them out.

While climbing a tree, limbs should be inspected before allowing your weight to rest on them. By standing on different branches you spread your weight. A rotten or decayed limb is never safe to stand on or to hold on to, so remove them first so you are not tempted to use them for support.

Pruning Tools

Pruning shears are used when cutting small limbs up to $\frac{1}{2}$ to $\frac{3}{4}$ inches in diameter. The larger shears are used for the larger diameter. Although each comes in different sizes, there are mainly two types to choose from. One has a curved blade and has a scissor-type action, Figure 37, and is best used for close cutting when used upside down. (Figure 38) The other type has a straight blade and cuts against a flat anvil. (Figure 39) The anvil type of pruning shear is good for general pruning.

When the branch is larger than shears can handle, or if you are just not strong enough to close the clippers and cut the branch, do not twist or wrench the pruning shears. This will strain and weaken them. If the branch is too large, use lopping shears, Figure 40, which can cut a branch up to $1\frac{1}{2}$ inches and provide greater leverage and more force on the cutting blades to do the pruning job. For larger limbs use a pruning saw. Pruning saws have narrow blades, coarse teeth, and they are designed to cut on the pull stroke. (Figure 41)

Both clippers and saw are available on poles which are handy to prune smaller branches hard to reach from the ground.

Remember when pruning, don't reach so far that you lose your balance while working in your tree. Don't trust dead branches to stand on. Do not select thin branches to support your weight. Make sure that stepladders are secure before climbing them. If the pruning job is too large, ask a tree maintenance professional to do the job for you.

Pruning Evergreen Trees

Evergreens, like trees and shrubs, come in different forms. Basic form characteristics are the upright pyramidal form, the low growing spreading form and upright spreading form. The pyramidal evergreens, such as pine and spruce, often need no pruning or only light pruning to maintain their natural outline. The central stem must never be removed if it is desired that the

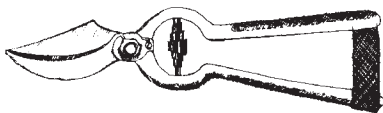


Figure 37. Hand pruning shears with curved blade.

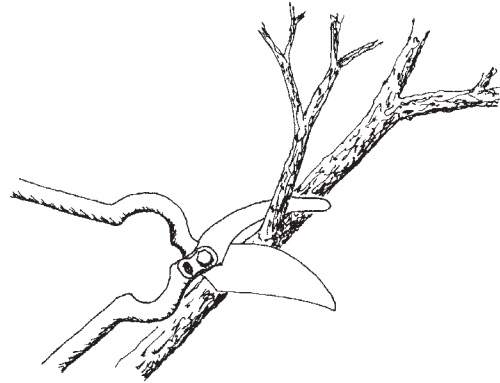


Figure 38. Curved blade hand pruning shears used upside down to make a very close cut.



Figure 39. Hand pruning shears with straight blade.

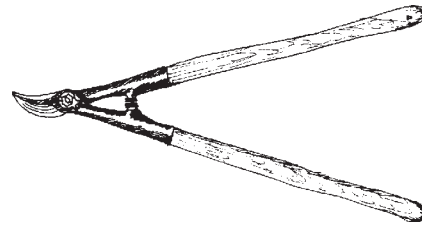


Figure 40. Lopping shears used for large branches and difficult to reach places.

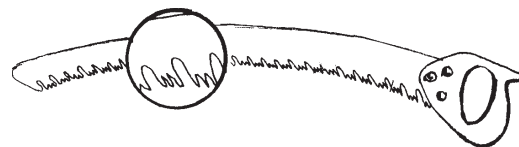


Figure 41. Pruning saw which saws on the pull stroke.

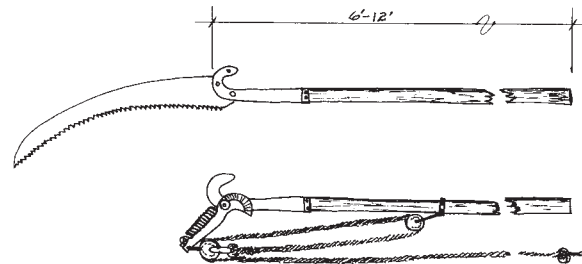
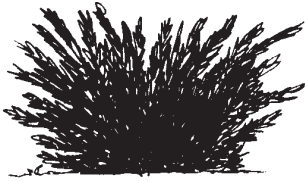


Figure 42. Pole pruner and saw to prune high hard to reach branches.



Large



Low spreading



Medium

tree should grow tall and maintain a symmetrical form. If the main stem has been destroyed, a new one may be developed by fastening a strong light pole to the main axis and tying a side branch near the top of the tree in an upright position. (Figure 43)

This side branch will soon become fixed in this position and develop into the main leader of the tree. When selecting such a branch to replace the broken leader, select one on the side from which the major wind force comes. This helps to keep the new leader growing straight up.

Evergreen plants include needleleaf trees and shrubs and broadleaf evergreen shrubs. Each group has its own characteristics which determine how and when they should be pruned. Before pruning any evergreen, the plants natural or desired form should be considered and pruning needs established. By selecting the correct plant, especially in respect to height, width and depth, for the particular location, much unnecessary pruning can be eliminated.

Needleleaf Trees

This group of evergreen includes pine, spruce, hemlock and fir. These tall growing evergreens, called conifers, normally grow into broad pyramid-shaped trees with a central leader. Little pruning is required when they are planted in open areas. Some annual pruning may be needed to restrict growth

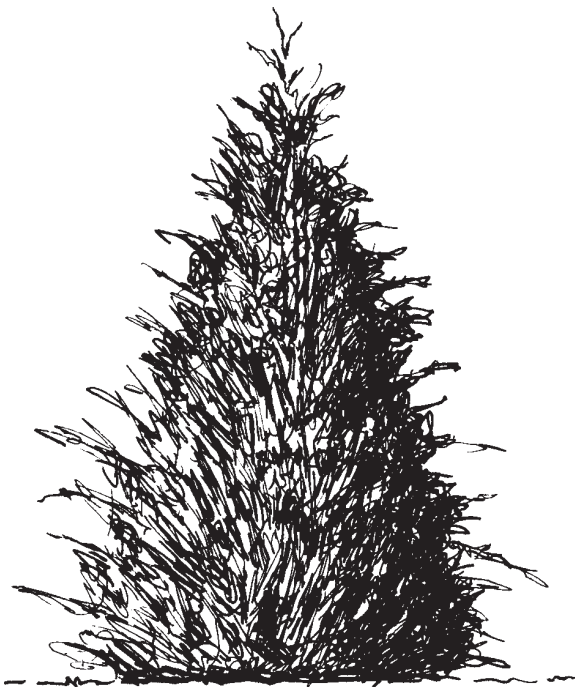
when they are planted close to buildings or other trees. Conifers should have only one central leader. A developing second leader should be pruned out while the tree is small.

Pines

The pines can be recognized by their needles, which generally are arranged in bundles of two's, three's, or five's with a papery sheath, and the base. The pines, except in special circumstances where older wood must be taken out, are pruned only in late spring when the buds have made most of their elongation. The tree is full of candles and the needles are beginning to grow in length.

By pruning the candle-like terminal growth back half to two-thirds, the height and width of pine trees can be controlled and a more dense growth encouraged. (Figure 44) Allow the central leader to grow its length, then cut it back to approximately 12 inches. Terminals of top side branches (laterals) are cut 4 inches shorter than the leader. All other side laterals and other strong branches are cut as needed to achieve the desired pyramidal form. Pine trees seldom produce new buds or shoots along existing branches or from cuts made in older wood. New growth is produced from buds already formed. Therefore, a basic rule in pruning conifers is to remove only part of the new growth after it has formed in the spring.

To prune the candles, do not use hedge shears, as this tends to damage the needles around the candles, and the brown ends will give the tree an unsightly look. Pinch the candles in half or use hand clippers and use only the front end of the clippers.



Upright

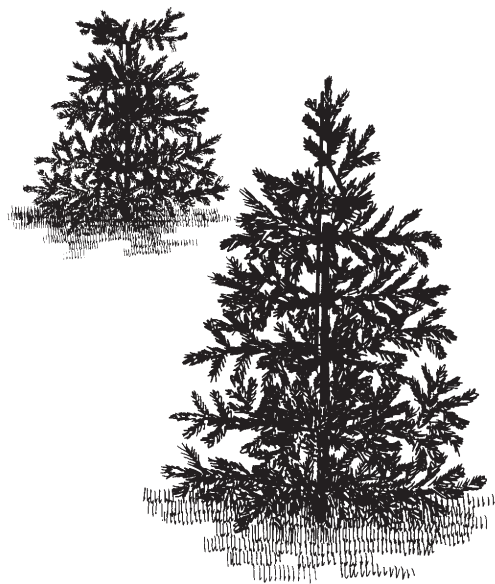


Figure 43. A fixed side branch developing into a new, main leader.

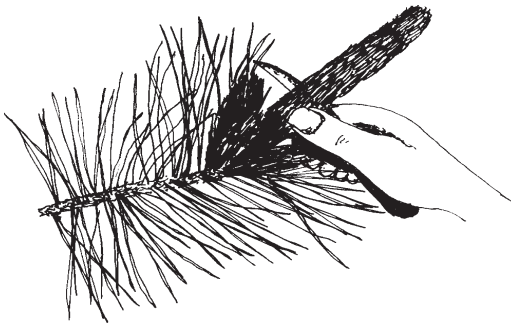


Figure 44. Remove one-third to one-half of candle after it is fully grown.

Spruces

Spruces are conifers that are primarily cold loving trees. Their short needles are usually four sided, stiff and sharp. When the needles are peeled away from the stem they leave a rough projection. This helps identify them from fir trees.

Branches of spruce grow in layers or whorls around the main trunk. New growth occurs once a year from existing buds. New buds or shoots generally do not develop between the branches. (Figure 45) This problem can be solved through timely pruning.

The preferred method of pruning consists of cutting back on 1-year-old shoots (last year's growth) making the cut to one of the lateral side buds. Pruning can start in early spring before new growth begins. Leaders can be shortened to reduce open spaces or produce a more compact tree. If older wood is to be removed, cut back to another shoot or branch, do not leave stubs.

Junipers

The group of junipers includes pyramidal, upright, spreading and creeping types. During early spring, prune dominant branches back to a side branch. To retain a plant's size it may be necessary that an entire branch should be removed as often vigorous lateral branches develop from each dominant limb.

When severe pruning of leading bark is necessary, part of the top limbs may have to be removed. When this is done some exposure of a dead zone is very likely. When some healthy green foliage remains on top, the plant will survive and these remaining green branches will send new growth to cover the exposed area.

When pruning junipers, identify what form of juniper you are pruning and of the dead zone. (Figure 46)



Figure 45.

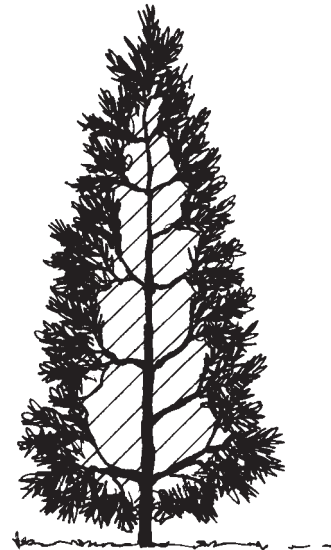


Figure 46. Dead zone as found in a juniper.

A dead zone develops in junipers and arborvitae when older plants lose their needles in the center because of lack of light. New growth in that area will only develop from surviving green twigs. Sometimes when sunshine does reach the dead zone an occasional shoot will develop.

Arborvitae

Arborvitae can be pruned like the juniper. Here, too, one should be careful not to prune into the dead center. Where heavy corrective pruning is necessary, it is best done before new growth appears in mid-March through April, prior to the second push of new growth.

Hemlock

Young trees may require some pruning to maintain a simple central leader. Little pruning is required on mature trees.

Taxus

Taxus cultivars are also widely varied in plant habit since end growth in the particular natural form and need should be a guide in pruning.

Taxus, too, have a dead zone, but more drastic pruning can be carried out. Cuts made well into this dead zone will result in new growth as dormant buds will develop and produce new green growth. The best time to prune is before new growth



Figure 47. Dead zone as found in an arborvitae.

starts in early spring. If heavy pruning is delayed until summer, the dormant buds already present may not grow until next spring.

Firs

Fir trees need pruning only to remove injured or diseased branches. A single central leader should be maintained.

In brief, when pruning evergreens always prune back to another branch or bud and cut back to healthy wood. Any cut should start parallel to a bud or twig that will produce new growth. This “thinning’ out” method of pruning is recommended for most evergreen shrubs in the landscape. A branch is cut off at its point of origin to the parent stem or to a lateral side branch. (Figure 48) This method of pruning is least conspicuous, results in a more open plant, and does not stimulate excessive new growth. Also, much growth can be removed and not change the plant’s natural appearance. Evergreen shrubs can be maintained for years at a desired height and spread by thinning-out. This method of pruning is best done with hand pruning shears or a sharp knife, not hedge shears.

Broadleaf Evergreens

If pruning is needed on broadleaf evergreens, do so in early spring by thinning out. Those that flower should be pruned after flowering. Old flower clusters should be pruned or pinched off to prevent seed formation and to encourage new growth and flower buds. Although broadleaf evergreens require little pruning, if planted with adequate room for their mature size, occasional faster growing branches can be thinned out or headed back to maintain a more uniform appearance and to encourage new growth near the base and side of the plant. Tall, leggy, overgrown plants can be thinned out or rejuvenated by removing the oldest branches at the ground in early spring.

Vines

The purpose for pruning vines is to remove dead wood, thin branches and limit growth as well as to promote new growth and improve flowering. Some vines can be severely cut back which holds growth close to the ground, while others require periodic pruning or complete cutback at or near the



Figure 49.

ground level. If severe pruning is needed, it should be done in early spring before new growth begins.

The growth habit of vines is influenced by the type of support they have. It is important to know how a vine clings in order to achieve the best support and care of maintenance.

Some vines have rootlike holdfasts, Figure 49, others modified tendrils with circular discs, Figure 50, and others wind tendrils around the support, Figure 51, or wind around the support. (Figure 52)

Pruning vines follows the same general principles of deciduous shrubs. Prune back to a lateral branch, twig, or bud and do not leave a stub. Prune off dead, injured or weak wood back to healthy wood. It is good practice to annually remove the old, weak stems. This will encourage new growth. When vines become too crowded, thin them by removing the old stems back to ground level. In contrast to the great need for pruning thick, fast growing vines, weak, slow vines will require very little pruning.

Some vines make fast growth with little side branching and need the leader pinched back prior to the growing season to promote branching. The horizontal branches tend to grow slower and produce more leaves and flowers.

The best time to prune most vines is while they are dormant just before new growth begins. These vines with early



Figure 48.



Figure 50.

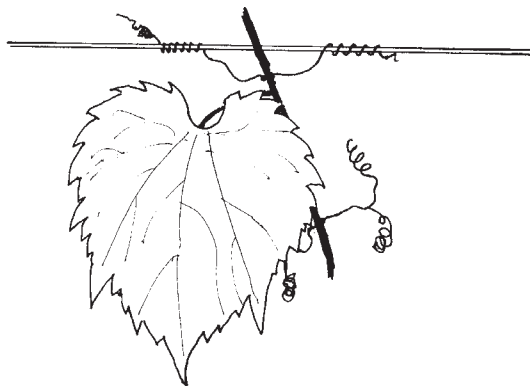


Figure 51.

spring flowers should be pruned following their flower, since the flower buds develop on the previous season's growth.

Groundcovers

Groundcovers may need pruning to keep them retained, to remove dead or old growth, or to rejuvenate the planting. Newly planted groundcovers can be pruned back to encourage new growth. Established plantings of groundcover become overgrown with old scraggly branches which should be removed to rejuvenate the planting. Many groundcovers will benefit from periodic pruning to encourage vigorous new growth and keep the planting in neater appearance and more disease free.

Pruning Deciduous Shrubs

Pruning shrubs is the methodical removal of parts of a plant with the object to improve its shape without changing its natural form, to stimulate blooming and to improve growth. Pruning involves removal of branches with minimum damage to cambium or growing tissue so that the wood will heal properly in the shortest possible time with the least possibility of wood infection.



Figure 52.

Why Prune?

One of the first occasions when a shrub may require some pruning by a homeowner is when it is planted. At the time of transplanting when roots have been disturbed and partly destroyed, the branch structure should be brought in relation to the remaining root system. Pruning at this time consists of cutting of all damaged and broken roots and heading back any overgrown branches without causing loss of characteristic form of the shrub.

The natural way of pruning is through death of branches and twigs which is normal, but in ornamental shrubs such branches should be pruned out without leaving stubs requiring excessive maintenance pruning.

Maintenance Pruning

Maintenance pruning carried out on a regular basis should remove undesirable growth to prevent the need of a major pruning job later. Such pruning will take care of the following.

- A. Broken, dead and diseased branches. Good sanitation helps keep the rest of the plant clean.
- B. Control size. By selecting the right size shrub for a particular site, much unnecessary pruning can be prevented.
- C. Any branch which causes rubbing and consequent damage to the bark.
- D. Any competing branch such as a fast growing sprout.
- E. To open up the center of a shrub to allow more air and light to enter.
- F. To make a leggy shrub look fuller, prune to encourage low placed limbs to break, to initiate new branch growths.
- G. To remove flower clusters and developing seed pods. On shrubs such as lilac the seed pods develop at the expense of next year's growth. Therefore, if maximum growth is wanted, all faded flowers should be removed.
- H. To rejuvenate an old declining shrub. Pruning out older wood on many shrubs stimulates the growth of new wood. The new wood will produce better flowers and form.
- I. To develop special shape or form as in hedges and topiary work. Shearing is used more than pruning for creating particular shapes.
- J. To correct winter damage caused by ice or snow.

Remember, when pruning a shrub, you should help develop its characteristic form. To do the pruning job correctly have a mental picture of what this characteristic form should be in order for the shrub to become a perfect specimen.

When to Prune

Corrective pruning to control a fast growing sprout can be carried out at any time during the growing season; otherwise, the flowering time of your shrub will indicate the optimum time to prune. Because it is for the flowers or berries that many shrubs are selected, pruning should encourage such display.

The simple rule is that shrubs that bloom in the spring should be pruned immediately after their flowering period. Their flowers were produced on wood which grew the summer before. Therefore, to stimulate wood growth through current growing season and abundant bloom the following spring, prune immediately after spring flowering.



V-shaped



Horizontal weeping



Upright—leggy



Horizontal oval



Low spreading



Vertical oval



Round



Upright

Shrubs that bloom in the summer bear their flowers on wood which grew that season. These shrubs should be pruned in the fall when dormant, or must be pruned very early in the spring of next year before the growth starts. Their flowers are produced on wood grown the current year.

Do not prune any shrub during late summer as this may stimulate a second flush of growth, which if not hardened off before the first cold spell may be killed back by an early frost causing an excess of dead branch tips and some loss of growth next season. More detailed pruning would be required to correct the frost damage done.

Container Grown Shrubs

At this time of transplanting remove the container of container grown plants and check the root growths, especially large shrubs grown in small containers. Prune off broken and damaged roots and remove some of top growth to compensate for loss of roots. If roots grow in a circular pattern, or if roots cross each other, spread them out or prune them back. If girdling roots are noticed, they should be pruned back. It is not necessary to disturb the ball as the damaging root restriction occurs along perimeter.

How to Prune

There are basically three methods of pruning shrubs. They are thinning, heading back and rejuvenating. Each of these can be applied to one of the two common growth forms of shrubs, multi-stem or single stem. (Figure 53 A and B)

Thinning. Thinning, also called renewal pruning, is the least conspicuous of all pruning and is best applied to plants which are too dense. Thinning is cutting off twigs or side branches where attached to the main stem, Figure 54A, or in

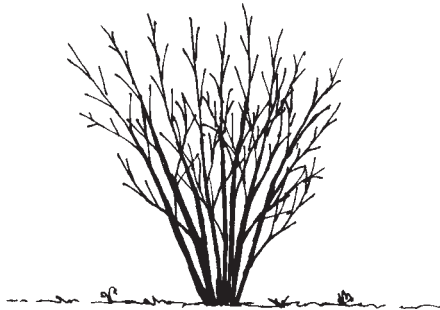


Figure 53A. Multiple stem.

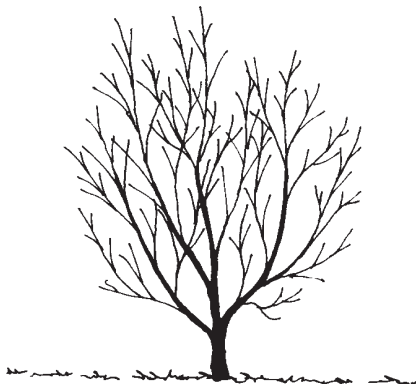


Figure 53B. Single stem.

case of multi-stem shrub, even removal of the older branches at ground level.

Figure 81B. By cutting off most of the inward growing twigs just above an outward growing bud you can influence the remaining twigs to send shoots toward the outside of the shrub and open the shrub up. (Figure 55)

Heading back. Heading back is a selective cutting of terminal portion of a branch back to a bud, Figure 56, or another branch and is especially useful for leggy shrubs as it stimulates the development of many smaller buds and shoots lower on the stem, resulting in a denser growth. (Figure 57) Heading back is not topping or shearing a shrub, resulting in an ugly disfigured cube, Figure 58, with undesirable weak new growth mainly along the top of a shrub. (Figure 59)

Too extensive heading back may stimulate too much new growth and the danger is that the shrub's natural form is changed.

On larger, vigorous shrubs, heading back and thinning can work together to keep the shrub within bounds. Thinning helps open up the center and heading back controls the height of the plant.

The shapes of the shrub can be controlled to some extent by the bud's location at the end of the cut. An inward pointing bud will stimulate growths toward the center of the shrub making it a denser plant; an outward growing bud will do the opposite.

Rejuvenation. Rejuvenation is the most severe method of pruning shrubs and can be carried out in different degrees on older plants that have become too large or have a large amount of nonflowering wood. The degree of rejuvenation depends on growth form.

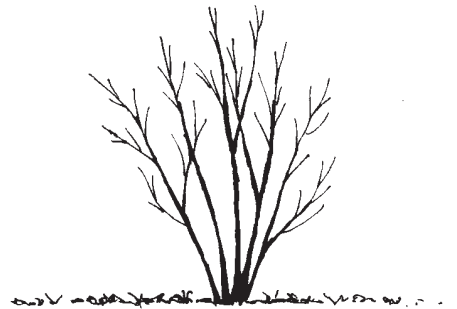


Figure 54A. Multiple stem after pruning.

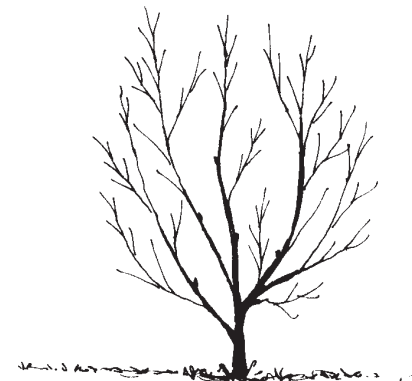


Figure 54B. Single stem after pruning.

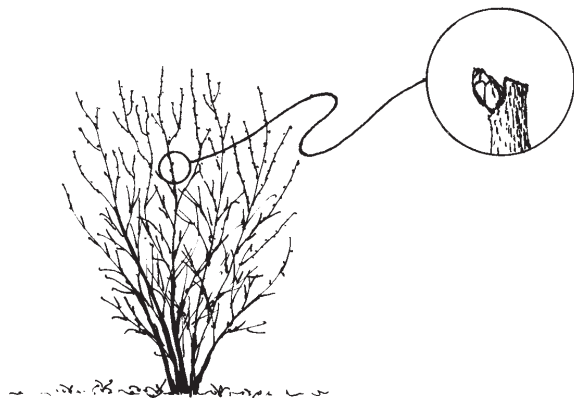


Figure 55. Prune back to outward growing bud.

On single stem or grafted shrub, rejuvenation is carried out by detailed heading back to the basic limb frame work. (Figure 60)

On multiple stem shrubs, rejuvenation is complete cutting back of all stems down to 3- to 5-inch stubs. (Figure 61) This method of pruning is justified when multi stem shrubs have become too large with too many old branches to justify saving 1- and 2-year-old wood. The spirea, forsythia, japonica and other multi-stem shrubs respond well to this treatment.

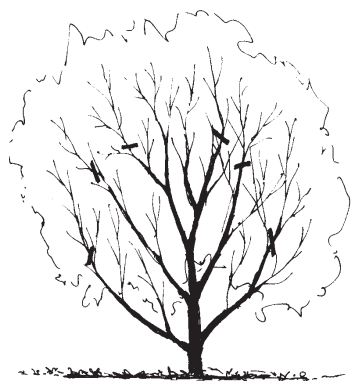


Figure 56. Selective pruning of terminal branches.

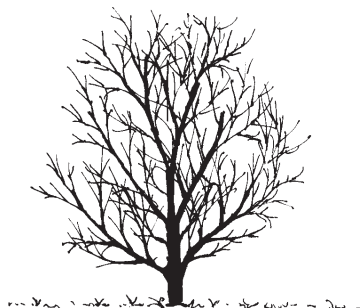


Figure 57. Resulting in desired, denser growth.



Figure 58. Never top.

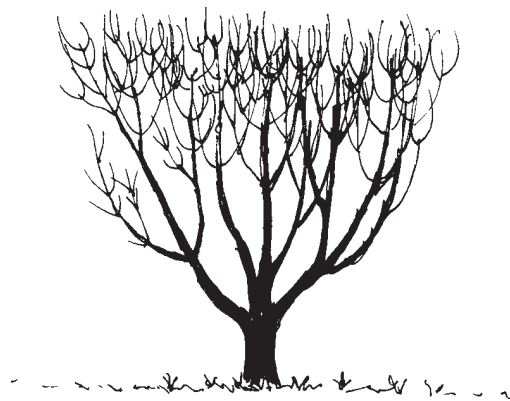


Figure 59. Topping results in weak and ugly "witches brooming" deforming the shrub's natural appearance.

The best time for rejuvenation is in February or March. Do not rejuvenate large old shrubs during late summer. Spring blooming shrubs should be rejuvenated immediately after blooming so flowers are enjoyed first.

Shrubs That Winter Kill

Plants that winter kill, such as hydrangea and crape myrtle, should be pruned back to ground level in early spring, removing dead wood to soil level and cutting back live wood to 6 or 12 inches. This will increase flower production and grow stronger stems which hold their flowers erect as in the case of hydrangea. A straw mulch provides good winter protection for hydrangea.

Grafted Plants

Sprouts developed below the graft on single stem shrubs should be pruned off at all times. The reason being that any branch developed below the union would not be or bloom true to type. (Figure 62)

How to Prune

When pruning shrubs, first remove all dead broken diseased or crisscrossing branches. Then consider the natural shape of the shrub and the size and density you desire. Remove stems and branches that do not contribute to the mental image. Anticipate the change that will occur when a particular cut is made. The natural way for growing is so that shrubs soon cover upgrowing errors and it won't take long for empty places to fill in.



Figure 60. On single stem or grafted plants, rejuvenation is carried out by detailed heading back to basic limb framework.



Figure 61. On multiple stem shrubs, rejuvenation calls for cutting back all stems to 3- to 5-inch stubs.

The principle behind pruning small twigs (thinning out) is always to cut back to a level which is directed outward and will produce new growth. Make cuts to healthy wood and slanted. The proper pruning cut should be about $\frac{1}{4}$ of an inch above the bud, started away from it. (Figure 63) In cases where the shrub is too dense, a branch is cut off at its point of origin with the main lateral branch or at ground level. When cutting back to a main branch, never leave short stubs as they do not heal over properly and encourage disease and insect infestation. Pruning cuts should be flush with the parent branch. When removing entire branch and pruning back to ground level, prune back as close to ground as possible.

Pruning Deciduous Hedges

There are two types of hedges, the informal, Figure 64, and the formal, Figure 65. The informal hedge is generally formed by a row of shrubs planted close together, but the shrubs are allowed to grow normally. The annual pruning may consist of thinning out the oldest wood to maintain a desired height and width. Although growing naturally, the shrubs no longer show

their individually characteristic form, but they create a new mass effect.

The formal hedge is pruned or sheared to a definite size and shape one or more times each growing season.

Starting a Hedge

It is extremely important to prune a newly planted hedge immediately to encourage ample shoot development close to the ground so that the plants will grow into dense, bushy shrubs out of which good hedges can be made. Cut the small shrubs back to 6 to 12 inches above the ground. (Figure 66) Delaying this initial pruning in a leggy, unsatisfactory hedge later.

The next important step is shaping the season after planting. The shape of a formal hedge should be a narrow pyramid. The top of the hedge should be narrower than the base. For example, good proportions for a hedge 5 feet tall would be $2\frac{1}{2}$ feet wide at the base and about 1 foot at the top. (Figure 67) If hedges are not pruned in this way, lack of light will cause



Figure 62.



Figure 63.

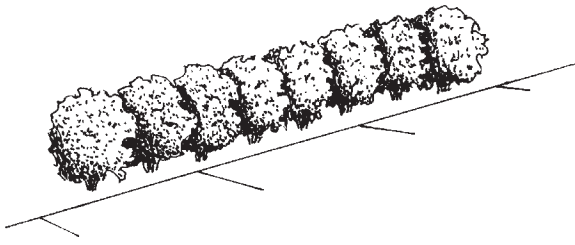


Figure 64. Informal Hedge

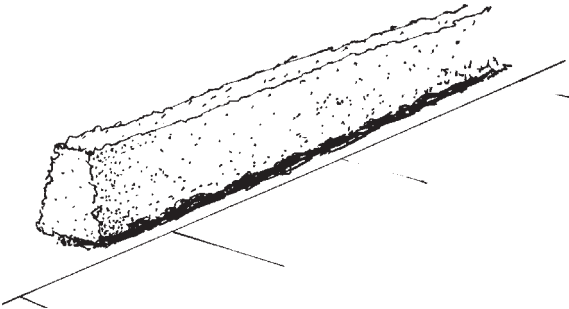


Figure 65. Formal Hedge

dieback of lower branches and of leaves. The condition will worsen as the plant matures. The result will be sparse growth at ground level and leggy, nonfunctional hedge which does not give the wanted privacy. (Figure 68)

In addition to regular shearing, mature hedges can be kept vigorous for years by annually thinning out some of the oldest branches with hand pruners and saws (renovating). To maintain a good cover of foliage, shearing should allow for an



Figure 66. Prune back newly planted hedge shrubs.

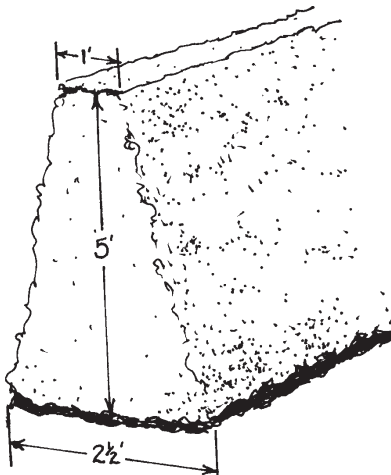


Figure 67. Correct shaping of formal hedge.



Figure 68. Incorrect pruning results in dieback of lower branches.

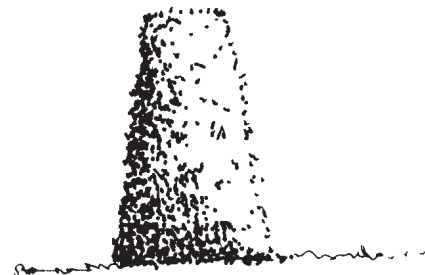
inch or so of growth. If in time the hedge grows out of bounds, prune the hedge framework back to desired size (rejuvenating) in early spring.

Renewal of Old Deciduous Hedges

An overgrown, leggy, deciduous hedge can be restored by a combination of heading back, thinning and regular shearing. If a hedge is in very poor shape, rejuvenation of multiple stem may be done by pruning back to ground level. On single stem shrubs forming a hedge, cut back into frame at least 8 inches inside the desired width and height in early spring and follow up by shearing the new growth for a thick twiggy effect. This form of rejuvenation is only recommended for hedges made up of deciduous shrubs (those which lose their leaves). At all times remember to develop a pyramidal hedge form of which the base is wider than the top so that lower branches are not shaded out, but receive ample light to stimulate new leaf growth.



Pointed



Flat topped

Carefully consider the shape in which the top of your hedge is to be pruned. Some people prefer a rounded or more pointed form since a flat topped hedge is more difficult to maintain, and is more easily broken down by weather causes, such as excessive loads of snow.





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Landscape and Environmental Horticulture

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