

## Tree Care

The type and frequency of tree care depends on the species, age, location, climate, and other factors that affect a tree's growth. The first step is to educate yourself about your trees and understand their needs. It is important to understand that proper tree care is a lifelong process, and that planting and caring for a tree is a long-term commitment, not just a one-time deal.

Pruning is the cutting or removing of branches or parts of trees for improving the shape or growth of trees. This is the most common tree maintenance procedure. Usually, trees are pruned preventatively or as a corrective measure to remove dead branches, crowded or rubbing limbs, eliminate hazards, and increase light and air penetration. Since each cut to a tree has the potential to change the growth, it is important to educate yourself, considering that branches should not be removed without an appropriate reason.

### Hire an Arborist

Pruning large trees can be dangerous. If pruning involves working above the ground or using power equipment, it is best to hire a professional arborist. An arborist can determine what type of pruning is necessary to improve the health, appearance, and safety of your trees. A professional arborist can provide the services of a trained crew, with all of the required safety equipment and liability insurance. There are a variety of things to consider when selecting an arborist:

- Membership in professional organizations such as the International Society of Arboriculture (ISA), the Tree Care Industry Association (TCIA), or the American Society of Consulting Arborists (ASCA).
- Certification through the ISA Certified Arborist program.
- Proof of insurance.
- A list of references (Don't hesitate to check.)
- Avoid using the services of any tree company that:
  - Advertises topping as a service provided. Knowledgeable arborists know that topping is harmful to trees and is not an accepted practice.
  - Uses tree climbing spikes to climb trees that are being pruned. Climbing spikes can damage trees, and their use should be limited to trees that are being removed.
  - Pruning Young Trees

Proper pruning is essential in developing a tree with a strong structure and desirable form. Trees that receive the appropriate pruning measures while they are young will require little corrective pruning when they mature. There are a few simple principles that everybody should understand before they set out to prune a tree.

- Each cut has the potential to change the growth of the tree. Always have a purpose in mind before a cut is made.
- Proper technique is essential. Poor pruning can cause damage that lasts for the life of the tree. Learn where and how to make the cuts before picking up the pruning saw.
- Trees do not heal the way people do. When a tree is wounded it must grow over and compartmentalize the wound.
- As a result, the wound is contained within the tree forever.
- Small cuts do less damage to the tree than large cuts. This is why proper pruning (training) of young trees is critical. Waiting to prune a tree when it is mature can create the need for large cuts that the tree cannot easily close.

## Making The Cut

Where you make a pruning cut, it is critical to make a proper cut to ensure the proper response from the tree in growth and wound closure. Pruning cuts should be made just outside the branch collar. Since the branch collar contains trunk or parent branch tissues, the tree will be damaged unnecessarily if you remove or damage it. In fact, if the cut is large, the tree may suffer permanent internal decay from an improper pruning cut. If a permanent branch is to be shortened, cut it back to a lateral branch or bud. Internodal cuts, or cuts made between buds or branches, may lead to stem decay, sprout production, and misdirected growth.

## Pruning Tools

When pruning trees, it is important to have the right tool for the job. For small trees, most of the cuts can be made with hand pruners. The scissor type, or by-pass blade hand pruners, are preferred over the anvil type. They make cleaner, more accurate cuts. Cuts larger than 1/2 inch in diameter should be made with lopping shears or a pruning saw. Never use hedge shears to prune a tree. Whatever tool you use, make sure it is kept clean and sharp.

## Establishing a Strong Scaffold Structure

A good structure of primary scaffold branches should be established while the tree is young. The scaffold branches provide the framework of the mature tree. Properly trained young trees will develop a strong structure that will require less corrective pruning as they mature. The goal in training young trees is to establish a strong trunk with sturdy wellspaced branches. The strength of the branch structure depends on the relative sizes of the branches, the branch angles, and the spacing of the limbs. Naturally, this will vary with the growth habit of the tree. Pin oaks and sweetgums, for example, have a conical shape with a central leader. Elms and live oaks are often wide-spreading without a central leader. Other trees, such as lindens and Bradford pears, are densely branched. Good pruning techniques remove structurally weak branches while maintaining the natural form of the tree.

## Trunk Development

For most young trees, maintain a single dominant leader. Do not prune back the tip of this leader. Do not allow secondary branches to outgrow the leader. Sometimes a tree will develop double leaders known as co-dominant stems. These can lead to structural weaknesses, so it is best to remove one while the tree is young. The lateral branches contribute to the development of a sturdy well-tapered trunk. It is important to leave some of these lateral branches in place, even though they may be pruned out later. These branches, known as temporary branches, also help protect the trunk from sun and mechanical injury. Temporary branches should be kept short enough not to be an obstruction or compete with selected permanent branches.

## Permanent Branch Selection

Nursery trees often have low branches that may make the tree appear well-proportioned when young, but low branches are seldom appropriate for large growing trees in an urban environment. How a young tree is trained depends on its primary function in the landscape. For example, street trees must be pruned so that they allow at least 16 feet of clearance for traffic. Most landscape trees only require about eight feet of clearance.

The height of the lowest permanent branch is determined by the tree's intended function and location in the landscape. Trees that are used to screen an unsightly view or provide a wind break may be allowed to branch low to the ground. Most large growing trees in the landscape must eventually be pruned to allow head clearance. The spacing of branches, both vertically and radially, in the tree is very important. Branches selected as permanent scaffold branches must be well-spaced along the trunk. Maintain radial balance with branches growing outward in each direction.

A good rule of thumb for the vertical spacing of permanent branches is to maintain a distance equal to 3% of the tree's eventual height. Thus, a tree that will be 50 feet tall should have permanent scaffold branches spaced about 18 inches apart along the trunk. Avoid allowing two scaffold branches to arise one above the other on the same side of the tree. Some trees have a tendency to develop branches with narrow angles of attachment and tight crotches. As the tree grows, bark can become enclosed deep within the crotch between the branch and the trunk. This is called included bark. Included bark weakens the attachment of the branch to the trunk and can lead to branch failure when the tree matures. You should prune branches with weak attachments while they are young. Avoid over-thinning the interior of the tree. The leaves of each branch must manufacture enough food to keep that branch alive and growing. In addition, each branch must contribute food to grow and feed the trunk and roots. Removal of too many leaves can starve the tree, reduce growth and make the tree unhealthy. A good rule of thumb is to maintain at least half the foliage on branches arising in the lower 2/3 of the tree.

### Newly Planted Trees

Pruning of newly planted trees should be limited to corrective pruning. Remove torn or broken branches and save other pruning measures for the second or third year. The belief that trees should be pruned when planted to compensate for root loss is misguided. Trees need their leaves and shoot tips to provide food and the substances which stimulate new root production. Un-pruned trees establish faster with a stronger root system than trees pruned at the time of planting.

### Pruning Mature Trees

Pruning is the most common tree maintenance procedure. Although forest trees grow quite well with only nature's pruning, landscape trees require a higher level of care to maintain their safety and aesthetics. Pruning should be done with an understanding of how the tree responds to each cut. Improper pruning can cause damage that will last for the life of the tree, or worse, shorten the tree's life.

### Reasons for Pruning

Since each cut has the potential to change the growth of the tree, no branch should be removed without a reason. Common reasons for pruning are to remove dead branches, to remove crowded or rubbing limbs, and to eliminate hazards. Trees may also be pruned to increase light and air penetration to the inside of the tree's crown or to the landscape below. In most cases, mature trees are pruned as a corrective or preventative measure. Routine thinning does not necessarily improve the health of a tree. Trees produce a dense crown of leaves to manufacture the sugar used as energy for growth and development. Removal of foliage through pruning can reduce growth and stored energy reserves. Heavy pruning can be a significant health stress for the tree. Yet if people and trees are to coexist in an urban or suburban environment, then we sometimes have to modify the trees. City environments do not mimic natural forest conditions. Safety is a major concern. Also, we want trees to complement other landscape plantings and lawns. Proper pruning, with an understanding of tree biology, can maintain good tree health and structure while enhancing the aesthetic and economic values of our landscapes.

### When to Prune

Most routine pruning to remove weak, diseased, or dead limbs can be accomplished at any time during the year with little effect on the tree. As a rule, growth is maximized and wound closure is fastest if pruning takes place before the spring growth flush. Some trees, such as maples and birches, tend to "bleed" if pruned early in the spring. This may be unsightly, but is of little consequence to the tree. A few tree diseases, such as oak wilt, can be spread when pruning wounds allow spores access into the tree. Susceptible trees should not be pruned during active transmission periods. Heavy pruning just after the spring growth flush should be avoided. This is when trees have just expended a great deal of energy to produce foliage and early shoot growth. Removal of a large percentage of foliage at this time can stress the tree.

## Making Proper Pruning Cuts

Pruning cuts should be made just outside the branch collar. The branch collar contains trunk or parent branch tissue and should not be damaged or removed. If trunk collar has grown out on a dead limb to be removed, make the cut just beyond the collar. Do not cut the collar. If a large limb is to be removed, its weight should first be reduced. This is done by making an undercut about 12-18 inches from the limb's point of attachment. A second cut is made from the top, directly above or a few inches further out on the limb. This removes the limb leaving the 12-18 inch stub. The stub is removed by cutting back to the branch collar. This technique reduces the possibility of tearing the bark.

## Pruning Techniques

Specific types of pruning may be necessary to maintain a mature tree in a healthy, safe, and attractive condition.

### Cleaning:

The removal of dead, dying, diseased, crowded, weakly attached, and low-vigor branches from the crown of a tree.

### Thinning:

The selective removal of branches to increase light penetration and air movement through the crown. Thinning opens the foliage of a tree, reduces weight on heavy limbs, and helps retain the tree's natural shape.

### Raising:

Removes the lower branches from a tree in order to provide clearance for buildings, vehicles, pedestrians, and vistas.

### Reduction:

Reduces the size of a tree, often for clearance for utility lines. Reducing the height or spread of a tree is best accomplished by pruning back the leaders and branch terminals to lateral branches that are large enough to assume the terminal roles (at least 1/3 the diameter of the cut stem). Compared to topping, this helps maintain the form and structural integrity of the tree.

## How Much Should Be Pruned?

The amount of live tissue that should be removed depends on the tree size, species, and age, as well as the pruning objectives. Younger trees will tolerate the removal of a higher percentage of living tissue than mature trees. An important principle to remember is that a tree can recover from several small pruning wounds faster than from one large wound.

A common mistake is to remove too much inner foliage and small branches. It is important to maintain an even distribution of foliage along large limbs and in the lower portion of the crown. Over-thinning reduces the tree's sugar production capacity and can create tip-heavy limbs that are prone to failure. Mature trees should require little routine pruning. A widely accepted rule of thumb is never to remove more than ¼ of a tree's leaf bearing crown. In a mature tree, a pruning even that much could have negative effects. Removing even a single, large-diameter limb can create a wound that the tree may not be able to close. The older and larger a tree becomes, the less energy it has in reserve to close wounds and defend against decay or insect attack. The pruning of large mature trees is usually limited to the removal of dead or potentially hazardous limbs.

## Why Topping Hurts Trees

Topping is perhaps the most harmful tree pruning practice known. Yet, despite more than 25 years of literature and seminars explaining its harmful effects, topping remains a common practice. This brochure explains why topping is not an acceptable pruning technique and offers better alternatives.

## What is Topping?

Topping is the indiscriminate cutting of tree branches to stubs or lateral branches that are not large enough to assume the terminal role. Other names for topping include "heading," "tipping," "hat-racking," and "rounding over." The most common reason given for topping is to reduce the size of a tree. Often homeowners feel that their trees have become too large for their property. People fear that tall trees may pose a hazard. Topping, however, is not a viable method of height reduction and certainly does not reduce the hazard. In fact, topping will make a tree more hazardous in the long term.

## Topping Stresses Trees

Topping often removes 50-100% of the leaf-bearing crown of a tree. Since the leaves are the food factories of a tree, this can temporarily starve a tree. The severity of the pruning triggers a sort of survival mechanism. The tree activates latent buds forcing the rapid growth of multiple shoots below each cut. The tree needs to put out a new crop of leaves as soon as possible. If a tree does not have the stored energy reserves to do this, it will be seriously weakened and may die.

A stressed tree is more vulnerable to insect and disease infestations. Large, open pruning wounds expose the sapwood and heartwood to attacks. The tree may lack sufficient energy to chemically defend the wounds against invasion, and some insects are actually attracted to the chemical signals trees release.

## Topping Causes Decay

The preferred location to make a pruning cut is just beyond the branch collar at the branch's point of attachment. The tree is biologically equipped to close such a wound, provided the tree is healthy enough and the wound is not too large. Cuts made along a limb between lateral branches create stubs with wounds that the tree may not be able to close. The exposed wood tissues begin to decay. Normally, a tree will "wall off" or compartmentalize the decaying tissues, but few trees can defend the multiple severe wounds caused by topping. The decay organisms are given a free path to move down through the branches.

## Topping Can Lead to Sunburn

Branches within a tree's crown produce thousands of leaves to absorb sunlight. When the leaves are removed, the remaining branches and trunk are suddenly exposed to high levels of light and heat. The result may be sunburn of the tissues beneath the bark. This can lead to cankers, bark splitting, and death of some branches.

## Topping Creates Hazards

The survival mechanism that causes a tree to produce multiple shoots below each topping cut comes at great expense to the tree. These shoots develop from buds near the surface of the old branches. Unlike normal branches that develop in a socket of overlapping wood tissues, these new shoots are anchored only in the outermost layers of the parent branches. The new shoots grow very quickly, as much as 20 feet in one year, in some species. Unfortunately, the shoots are very prone to breaking, especially during windy conditions. The irony is that while the goal was to reduce the tree's height to make it safer, it has been made more hazardous than before.

## Topping Makes Trees Ugly

The natural branching structure of a tree is a biological wonder. Trees form a variety of shapes and growth habits, all with the same goal of presenting their leaves to the sun. Topping removes the ends of the branches, often leaving ugly stubs. Topping destroys the natural form of a tree. Without the leaves (up to 6 months of the year in temperate climates) a topped tree appears disfigured and mutilated. With the leaves, it is a dense ball of foliage, lacking its simple grace. A tree that has been topped can never fully regain its natural form.

## Topping is Expensive

The cost of topping a tree is not limited to what the perpetrator is paid. If the tree survives, it will require pruning again within a few years. It will either need to be reduced again or storm damage will have to be cleaned up. If the tree dies, it will have to be removed. Topping is a high maintenance pruning practice, and there are some hidden costs of topping. One is the reduction in property value. Healthy, well maintained trees can add 10-20% to the value of a property. Disfigured, topped trees are considered an impending expense. Another potential cost of topped trees is the potential liability. Topped trees are prone to breaking and can be hazardous. Since topping is considered to be an unacceptable pruning practice, any damage caused by branch failure of a topped tree may lead to a finding of negligence in a court of law.

## Alternatives to Topping

There are times when a tree must be reduced in height or spread. Providing clearance for utility lines is an example. There are recommended techniques for doing this. If practical, branches should be removed back to their point of origin. If a branch must be shortened, it should be cut back to a lateral that is large enough to assume the terminal role. A rule of thumb for this is to cut back to a lateral that is at least 1/3 the diameter of the limb being removed. This method of branch reduction helps to preserve the natural form of the tree. However, if large cuts are involved, the tree may not be able to close over and compartmentalize the wounds. Sometimes the best solution is to remove the tree and replace it with a species that is more appropriate for the site.

## Trees and Turf

Woody plants and turf grasses are both critical components of design plans for homes, offices and parks. Trees and turf offer distinct personal, functional, and environmental benefits. Personal preferences for color, fragrance and form should complement the functional properties of size, shape, density, and placement of plant material. We've all seen thinning grass under large shade trees; large surface tree roots that cause safety hazards and mowing obstacles; young trees that don't seem to grow; and tree trunks badly damaged by lawn mowers or string trimmers.

All of these undesirable affects can be caused by trees and turf growing too closely together.

Turf grasses provide many of the same environmental benefits as trees. They

- Change carbon dioxide into the oxygen we breathe
- Cool the air by changing water into water vapor
- Stabilize dust
- Entrap air polluting gases
- Control erosion.

Turf grasses, in addition to being environmentally beneficial, are attractive in formal and informal designs. There are many advantages to combining trees and turf in the landscape.

## Selection

When trees and turf are used in the same areas, extra attention must be given to plant material selection in addition to the usual hardiness, climatic, and soil needs. An effort should be made to make the trees and lawn compatible. Grass is generally a sun-loving plant. Most grass species will not grow well in areas that get less than 50% open sunlight; however, new varieties with improved shade tolerance are being introduced. Consult your garden center specialist or sod producer for recommendations of shade-tolerant grasses for your area. In areas where the lawn is the primary design feature, select woody plants that do the least damage to grass growth and maintenance. The woody plants should be small, have an open canopy (trees that allow sunlight to penetrate to the ground), or have a high canopy. Select trees that do not root near the soil surface; surface rooting is most serious where shallow topsoil is present. Remember, tree roots get larger as the tree gets older.

## Competition

Trees, shrubs, ground covers and lawn grasses all require sunlight, water and rooting space for growth. Each plant in the landscape competes with the neighboring plant regardless of type or species. Some even produce chemicals that are exuded from roots to restrict growth of nearby plants. For each plant to do well, it must have adequate space. Since perennial woody plants increase in size each year, they require additional space over time. The landscape design should provide adequate space for these plants to mature.

While shade is the biggest, most obvious problem trees create for turf growth, a tree's roots also contribute to poor turf performance. Contrary to general thinking, most tree roots are in the top 2 feet of soil. More important, the majority of fine, water absorbing roots are in the top 6 inches of soil. Grass roots ordinarily occupy a much greater percentage of the soil volume than tree roots and out-compete them for water and nutrients, especially around young trees. However, grass root density is often much lower in areas where trees were established first. In these situations, tree roots compete much better for water and nutrients and prevent or reduce the success of establishing new turf.

Competition is especially important when transplanting, seeding, or sodding. The newest plant in the area must be given special treatment and must receive adequate water, nutrients, and sunlight. This frequently means that competing sod should be removed from around transplanted trees and shrubs, or that some of the lower branches should be removed from existing trees above a newly sodded lawn. In any case, DO NOT do any tilling around trees.

Mulching is an alternative to turf around trees and its use eliminates potential competition. A 2-4 inch layer of wood chips, bark, or other organic material over the soil under the drip line is recommended because it:

- Helps to retain soil moisture
- Helps to reduce weeds and controls grass
- Increases soil fertility when mulch decomposes
- Improves appearance
- Protects the trunk from injuries caused by mowing equipment and trimmers that often result in serious tree damage or death
- Improves soil structure (better aeration, temperature, and moisture conditions).

## Maintenance Practices

Maintenance practices for trees and turf are different, and treatment of one can unintentionally damage the other. Because tree and grass roots exist together in the upper 6-8 inches of the topsoil, treatment of one may damage the other. Fertilizer applied to one plant will also be absorbed by the roots of a nearby plant. Normally this is good, but excessive fertilization of either trees or turf can result in tree-crown or grass-blade growth greater than that desired.

Many herbicides or weed killers that are used in turf can cause severe damage to trees when misapplied. This can occur on windy days, causing the drift to fall on non-target plants or on hot days when the herbicide may vaporize and diffuse into the air. While most herbicides do not kill tree roots, some, such as soil sterilants and a few others, do. Herbicides that can cause tree damage have statements on their labels warning against using the product near trees.

Watering of lawns is beneficial to trees if the watering is done correctly. Trees need the equivalent of one inch of rain every seven to ten days. Frequent, shallow watering does not properly meet the needs of either trees or turf and can be harmful to both.

Turf growing under or near trees should be mowed at the top of its recommended mowing height. Mowing off no more than 1/3 of the grass blade's height and letting the clippings remain on the lawn will

do much to ensure a healthy and vigorous lawn. In an ideal situation, tree and turf maintenance would be handled by the same individual in order to maximize the benefits of all maintenance practices.

#### Special Situations

- Placing fill dirt around existing trees. Fill dirt is frequently added around existing mature trees so that a level or more visually desirable lawn can be established. Fill dirt changes the ratio of oxygen to carbon dioxide around tree roots and the roots may die. Consult a tree care expert before adding fill or constructing soil wells around tree trunks.
- Establishing lawns around existing trees. Preparation of a seedbed for lawns requires disruption of the upper 4-6 inches of topsoil. This soil contains the feeder roots of trees. Damage to tree roots often results in declining tree tops.
- Creating tree root buffers with turf. A sufficiently wide strip of turf grass between trees and hard surfaces such as building foundations, sidewalks and roads can help to reduce the potential damage caused by tree roots as well as provide an area where water and nutrients can soak into the soil and be beneficial to both turf and trees.
- Lawn watering in arid sites. Homes are sometimes built in woodlots. In the West, the watering that is required to maintain grass is especially damaging to dry land trees. Excess water at the tree trunk encourages growth of fungi that can kill trees. Thin turf grass growing around trunk-scarred weak trees does not need to be a common sight in the landscape. With proper planning, proper plant selection and placement, and reasonable management, the many and varied benefits of both trees and turf can be readily achieved.