

**Florida Friendly  
Best Management Practices  
for Protection of Water Resources  
by the Green Industries**



## Chapter 4: Mulching, Mowing, and Pruning

### LANDSCAPE MULCHES

Mulch is any material applied to the soil surface to protect or improve the area covered. Mulches are frequently applied around plants to modify the soil environment and enhance plant growth. They may consist of organic material such as bark, wood chips, leaves, pine needles, or grass clippings; or they can be inorganic material such as gravel, pebbles, polyethylene film, or woven ground cloth. Mulch can be applied to the soil surface but should not rest against the stems of landscape plants.

### BENEFITS OF MULCHING

Mulching has the following beneficial effects on the soil and plants:

- Mulches can prevent the loss of water from the soil by evaporation. Moisture moves by capillary action to the surface and evaporates if the soil is not covered by a mulch.
- Mulches suppress weeds when the mulch material itself is weed-free and applied deeply enough (2 to 3 inches after settling) to prevent weed germination or to smother existing small weeds.



Figure 12. Mulch, not grass, should be used here.

- A more uniform soil temperature can be maintained by mulching. The mulch acts as an insulator that keeps the soil cool under intense sunlight and warm during cold weather.



Figure 13. Never build volcanoes. This crown will rot and the roots are smothered.

- Most mulches prevent crusting of the soil surface, thus improving absorption and percolation of water into the soil and, at the same time, reducing erosion.
- Organic materials used as a mulch can improve soil structure and tilth. As mulch decays, the material becomes topsoil. Decaying mulch may also add nutrients to the soil.
- Mulches add to the beauty of the landscape by providing a cover of uniform color and an interesting surface texture.
- Mulched plants produce roots in and directly under the mulch that surrounds them. The plants produce these roots in addition to the roots in the soil. As a result, mulched plants have more roots than plants that are not mulched.

For more information, see IFAS Publication ENH 103, *Mulches for the Landscape*, at <http://edis.ifas.ufl.edu/MG251>.

### MULCHING BMPS

- When feasible, use mulches made from environmentally friendly sources or recycled materials.
- Do not pile mulch against a tree or around the bases of shrubs. Burying the crowns can lead to crown and root rot. Leave a clear space for air to reach the trunk.
- Maintain a 2"-3" depth of mulch after settling.

## MOWING THE FLORIDA LAWN

Mowing is an important maintenance operation. Mowing at the correct height increases turf density and root health and suppresses weeds. A dense turf impedes stormwater runoff. A healthy root system ensures that water and nutrients are absorbed and not wasted. Fewer weeds mean less need for herbicides.

Clippings contain nutrients and should be recycled on the lawn. The nutrients in clippings are pollutants when they end up in stormwater systems and waterbodies.



Figure 14. This is BAD! Never direct clippings into the street where they can enter the storm drain system.

Growth rates and mowing height have the most influence on mowing frequency. As a rule of thumb, mowing should be done often enough so that no more than one-third of the leaf blade is removed at any one mowing. For example, if a St. Augustinegrass lawn is mowed at a height of 3 inches, it should be mowed when it grows to a height of 4 to 4.5 inches. Following this practice minimizes the effect of mowing on photosynthesis and helps to maintain the high percentage of leaf surface necessary for healthy root development. Research shows that returning grass clippings to the surface, sometimes referred to as grass recycling, does not increase thatch buildup on turf. Clippings have significant nutrient value and decompose rapidly, returning some fertilizer and organic matter to the soil.



Figure 15. Always remove clippings from impervious surfaces. These nutrients are going straight to a water body.

Mowing equipment and string trimmers can damage trees. Tree trunks that are bumped by mowers, or trees that are used as pivot points for turns, are injured via contact. Mechanical damage to trees can cause progressively bigger wounds, since the trees are hit in the same general area repeatedly over time. The damage eventually progresses through the phloem, cambium, and xylem of the tree. In a worst-case scenario, the tree is girdled and dies. Those trees not killed are stressed and the wounds end up as an entry point for disease and insect infestation. The whipping action of the nylon string on a trimmer can debark a young tree quickly, causing its demise.

The careful use of string trimmers and mowers in the landscape is imperative, and there is no reason to use them around trees. Replacing the grass around the base of trees with mulch provides a buffer zone. The larger the mulched area, the less the turf near the tree is stressed by shade, the more room the lawn mower has to maneuver with ease, and the less the string trimmer needs to be used. Mulch also confers other benefits, such as reduced competition from weeds and water conservation.

The growth habit and leaf width of a turfgrass species determines the optimum cutting height, frequency, and preferred mower type (Table 4). A grass that spreads

Table 4: Suggested mowing heights and mower types for Florida home lawns

Turfgrass Species	Optimal Mowing Height (inches)	Mowing Frequency (days)	Preferred Mower Type
Bahiagrass	3.0-4.0	7-17	Rotary/flail
Bermudagrass	0.5-1.5	3-5	Reel
Centipedegrass	1.0-2.0	10-14	Rotary
Seashore Paspalum	1.0-2.0	5-10	Rotary/reel
St. Augustinegrass, "Dwarfs"	3.0-4.0	5-14	Rotary
	1.5-2.5	5-14	Rotary
Zoysiagrass	1.0-3.0	10-14	Reel

\* Dwarf varieties of St. Augustinegrass ('Seville,' 'Jade,' 'Palmetto,' 'Delmar') are the only cultivars of this species that should be mowed at less than 3 inches.

## MOWING BMPS

- Adjust the cutting height by setting the mower on a driveway or sidewalk and using a ruler to measure the distance between the ground and the blade.
- Do not mow wet turf because it can promote disease and fungus, and clippings can clog the machine. Mow only when the turf is dry.
- Sharpen the mower blade frequently enough to prevent a ragged appearance to the turf.
- Mow in a different direction every time the lawn is cut. This prevents wear patterns, reduces the grain (grass laying over in the same direction), and reduces the possibility of scalping.
- Use the highest acceptable mowing height for the grasses being grown.
- Do not remove more than one-third of the foliage at one time.
- Do not direct clippings into bodies of water or onto impervious surfaces. Remove any clippings that are blown onto sidewalks, driveways, and other impervious areas.
- Do not remove clippings. If clumping occurs, distribute the clippings by re-mowing or by lightly raking. You can also use a leaf blower to distribute clippings.
- Clean the mower after use to reduce rusting and weed seed movement.
- Practice grass recycling and return nutrients to the soil.
- If you must collect clippings, compost them. Use the compost as a soil modifier or mulch.
- Avoid mechanical damage to trees and shrubs from string trimmers, mowers, and other equipment.

horizontally can usually be mowed shorter than an upright-growing, bunching grass. Grasses with narrow blades can generally be mowed closer than grasses with wide blades. Bermudagrass is mowed at very low heights because of its numerous narrow leaf blades and low growth habit. On the other hand, bahiagrass needs to be mowed higher because of its open, upright growth habit.

Turfgrass undergoes physiological stress with each mowing, particularly if too much leaf tissue is removed. The effects of this “scalping” can produce long-term damage to the turf and leave it susceptible to numerous other stresses, such as insects, disease, drought, and sunscald. It is always important to leave as much leaf surface as possible for photosynthesis to provide food for regrowth.

For mowing safety, be sure to follow these tips:

- Pick up all stones, sticks, and other debris before mowing to avoid damaging the mower or injuring someone with flying objects.
- Never fill a hot mower with gasoline.
- Always wear heavy leather shoes when mowing the lawn.
- Check your mower every time it is used. Follow the manufacturer’s recommendations for service and adjustments.

## PRUNING OF LANDSCAPE PLANTS

Pruning is another important landscape maintenance task. Through the selective removal of shoots and branches, pruning a plant can improve its health, reduce the risk of failure, control growth, and enhance fruiting, flowering or appearance. Pruning should be a part of routine maintenance and should not be delayed until the landscape is overgrown. However, close attention should be paid to proper timing, depending on the needs of various plants. Proper plant selection can eliminate many pruning requirements, especially for shrubs.

Trees should not be pruned without a clearly defined objective. Objectives can include 1) reducing the risk of failure by improving structure and removing dead branches, 2) raising or reducing the crown to provide clearance, and 3) thinning the crown to increase air and light penetration. Removing the correct stems and branches to accomplish the specified objectives is as important as making the correct pruning cuts. If the wrong branches, or too many branches, are removed even with proper pruning cuts, nothing of merit has been accomplished.

For more information, see the following:

IFAS Circular 853, *Pruning Landscape Trees and Shrubs*, at <http://edis.ifas.ufl.edu/MG087> or *Pruning Shade Trees in the Landscape*, at <http://hort.ifas.ufl.edu/woody/pruning/>.

## Mulches for the Landscape<sup>1</sup>

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Robert J. Black, Edward F. Gilman, Gary W. Knox and Kathleen C. Ruppert<sup>2</sup>

A mulch is any material applied to the soil surface for protection or improvement of the area covered. Mulches are frequently applied around plants to modify the soil environment and enhance plant growth. The mulch material may be organic such as bark, wood chips, leaves, pine needles, grass clippings or similar material; or inorganic such as gravel, pebbles, polyethylene film or woven ground cloth.

### BENEFITS OF MULCHING

Mulching has the following beneficial effects upon the soil and plants.

- Mulches can prevent loss of water from the soil by evaporation. Moisture moves by capillary action to the surface and evaporates if the soil is not covered by a mulch.
- Mulches suppress weeds when the mulch material itself is weed-free and applied deeply enough to prevent weed germination or to smother existing small weeds.
- A more uniform soil temperature can be maintained by mulching. The mulch acts as an insulator that keeps the soil cool under intense sunlight and warm during cold weather.
- Mulching will prevent crusting of the soil surface, thus improving absorption and percolation of water into the soil and, at the same time, reducing erosion.
- Organic materials used as a mulch can improve soil structure and tilth. As mulch decays, the material becomes topsoil. Decaying mulch may also add nutrients to the soil.
- Mulches also add to the beauty of the landscape by providing a cover of uniform color and interesting texture to the surface.

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- Mulched plants will produce roots in the mulch that surrounds them. These roots are produced in addition to the roots that a plant produces in the soil. As a result, mulched plants have more roots than unmulched plants.

## **ORGANIC MULCHING MATERIALS**

### **Yard Trash**

Florida law prohibits disposal of pine needles, leaves, grass clippings and plant trimmings in lined landfills. Instead, yard trash is usually placed at curbside and collected separately from the rest of our garbage for municipal disposal by burning, composting, or burial in an unlined landfill. Much of this yard trash can be recycled on-site as mulch. On-site use of yard trash offers the advantage of retaining in your landscape the nutrients found in yard trash. On-site is also more efficient and may help save tax dollars otherwise spent in transporting and disposing of the yard trash.

Pine needles, leaves and grass clippings can each be used alone as a mulch or in combination. Of the three, pine needles are the best mulching material. They are attractive, not easily removed from beds by wind or rain, and don't "mat down" excessively. However, they don't last more than 6 months due to rapid decomposition. Leaves can be used alone as a mulch but tend to blow away in windy locations and are easily washed from beds during heavy rain showers. Leaves do best as a mulching material when they are shredded. Grass clippings are the least desirable mulching material. They are easily transported by the wind, decompose very rapidly, and pack down to form a mat that can exclude air and water from the root zone. They should be spread thinly over the ground, mixed with other mulching materials or, better yet, composted with other yard waste. Plant trimmings such as twigs and small branches should be shredded before they are used as a mulch. A mechanical chipper/shredder is needed for this process.

Yard trash is readily available in many landscapes and thus is a very inexpensive source of mulch. However, there is some reluctance to use it

because it is not as attractive as some commercial mulch materials. This problem can be overcome by adding a thin layer of a more uniform mulch over the yard trash. Some people also worry that weed seed may be gathered with yard trash and then distributed with the mulch. If this is a concern, yard trash may be partially composted. In the composting process, the compost pile heats and inactivates most weed seed. However, after partially composting yard trash, use only the particles larger than 1.5 inches for mulch. Yard trash breaks down during composting, and the use of smaller particles as mulch could smother roots of landscape plants by reducing soil aeration.

### **Cypress Mulch**

In spite of being expensive, cypress mulch is a very popular mulching material. Much of its popularity is due to its rich brown color and longevity. Cypress mulch appears to have a high water-holding capacity that may reduce the amount of water reaching the plant root zone. However, once the mulch is thoroughly wet, it buffers the soil against soil-water evaporative losses. When dry, cypress mulch repels water, making it difficult to wet, particularly if it is on a mound or slope.

### **Pine Bark**

Pine bark makes a very attractive, usually dark-colored landscape mulch. It can be purchased in various particle sizes, but the large-size particles 1.5 to 3 inches in diameter (called "nuggets" or "chunks") are more attractive, last longer and are more effective for weed control than finely ground pine bark.

### **Wood Chips**

Wood chips are obtained when the bark is removed from large logs. This material contains bark and pieces of wood of various sizes.

### **Straw**

Straw can be used as a mulch but it is not attractive, decomposes rapidly, and may contain seed that will germinate and become weeds in the landscape.

### **Pecan Shells**

Pecan shells make a long lasting, attractive, dark brown mulch. Their availability is usually limited to areas where pecans are processed.

### **Peanut Hulls**

Peanut hulls can be obtained in areas where peanuts are processed. Because of their light color they are not as attractive as other mulching materials. They also may contain weed seed and lesion nematodes.

## **INORGANIC MULCHING MATERIALS**

### **Gravel, Pebbles and Crushed Stone**

These materials are permanent, fireproof and may be colored to blend in with the features of the home, patio or landscape. When used near a lawn, there is some danger that lawn mowers will pick up and throw the stones. These materials reflect solar radiation and can create a very hot landscape environment during the summer months.

### **Plastic Film**

Black polyethylene film is very effective in preventing weed growth. However, clear or translucent plastic film will not suppress weed growth because light penetrates the film. Cover plastic film with a layer of mulch such as wood chips or pine needles to reduce heat absorption and to mask the artificial appearance of the plastic film. Plastic films are not recommended for poorly-drained areas. They may cause the soil to remain too wet, which could result in root disease problems. They are also not suited for steep slopes when an organic mulch is spread over the plastic, because rain water will wash the organic mulch away.

### **Woven Ground Cloth**

Woven plastic and woven fabric materials are available in various lengths and widths. The fabric materials have been treated to resist decomposition. Unlike the plastic films, the woven materials allow water and air to move through them. They are very effective in controlling most weeds, but do little to

prevent water loss from the soil and moderation of soil temperature. Sedges and some grasses grow up through the holes in the fabric.

Moisture, temperature and better weed control can be obtained by adding several inches of another mulching material on top of these mulching fabrics. They also should be fastened down to prevent being pushed up by perennial weeds.

## **WHERE TO USE MULCH**

Mulch entire beds of shrubs, trees, annuals, perennials and/or ground covers. Mulching is an extremely important practice for establishing plantings. Mulch helps to conserve moisture in the root ball of the new plant until it establishes roots in the adjacent landscape soil. Mulch also helps discourage weeds that can compete with new plantings for water, nutrients and light.

Mulch can be used instead of grass around individual trees and shrubs in a lawn. This greatly reduces the competition for water and nutrients from the turf and increases the growth rate and health of trees and shrubs. When placed around plants in a vegetable garden, mulch can help to conserve water and control weeds.

In addition to being useful around plants, mulch can be used as a ground cover for walks, trails, driveways, and play and natural areas. It can be used temporarily to cover low-growing tender plants to protect them from frost injury. Mulch also can be composted and used as a soil amendment.

## **WHEN AND HOW OFTEN TO MULCH**

Mulch can be applied around established plants at any time. Newly-set plants should be mulched after they are planted and thoroughly watered. Because of the abundance of leaves and pine needles, fall is an excellent time to collect leaves and other yard trash for mulching plants.

Organic mulches will gradually decompose and need replenishing to function effectively as a mulch. Shallow plant roots grow up and into moist mulch and they will die if the mulch is allowed to decay or wash

away. How often mulch needs to be replenished will depend on the mulching material. Grass clippings and leaves decompose very rapidly and need to be replenished frequently. Other organic mulches such as cypress mulch, pine bark and wood chips break down very slowly and need only be replenished every year or two. Once plants in a ground cover or shrub bed have formed a solid mass by touching one another, the mulching requirement is reduced. The plants create their own mulch by dropping leaves, flowers and fruit. Leaves from surrounding trees also may fall in the beds and provide additional "free mulch." Most organic mulches will change from their original colors to a weathered grey color with age. There are several ways of restoring color to mulches. One approach is to apply a thin (1 inch or less) layer of fresh mulch to the surface of the existing mulch. This approach is labor intensive, expensive and can result in an excessively thick mulch layer. Another approach is to shallow rake the existing mulch to restore a freshly mulched appearance. A third choice is to use a mulch colorant. Mulch colorants are dyes that are sprayed on the mulch to restore its color. Manufacturers claim they are harmless to both plants and animals, but applicators should use them cautiously as they can cause skin and eye irritation.

Inorganic mulches such as gravel, pebbles and stones are considered permanent mulches and rarely need replenishing. Still, small particles will eventually move down into the soil and a thin layer of gravel will need to be added to the existing layer of gravel. Leaves and other debris also need to be regularly removed from the top of these materials to maintain a neat appearance.

## HOW TO APPLY MULCH

Mulch entire plant beds with a layer of mulching material. When mulching individual trees in lawns, create a circle of mulch about 2 feet in diameter for each inch of trunk diameter. Increase the size of the mulched area as the tree grows.

Pull mulch 1 to 2 inches away from the stems and trunks of plants. The high moisture environment created by mulch increases the chances of stem or trunk rot which can result in plant death.

## HOW DEEP TO APPLY MULCH

The amount of mulch to apply will depend on the texture and density of the mulch. Many wood and bark mulches are composed of fine particles and should not be more than 2 to 3 inches deep after settling. Excessive amounts of these fine-textured mulches around shallow-rooted plants can suffocate their roots causing chlorosis and poor growth. Course-textured mulches such as pine needles and pine bark nuggets, which allow good air movement through them, can be maintained as deep as 4 inches.

Mulches composed solely of shredded leaves, small leaves (oak leaves), or grass clippings should never exceed a 2-inch depth. These materials have flat surfaces and tend to mat together, restricting the water and air supply to plant roots.

## HOW MUCH TO BUY

If you are going to buy mulch, you need to calculate the area and the desired depth of coverage to determine how many cubic feet of mulch you should purchase. Bulk quantities of mulch are sold in cubic yard volumes.

First, determine the square foot measurement of your shrub or tree area(s) to be mulched. For instance, if you have a shrubbery border 4 feet wide and 25 feet long, the area to be mulched equals 100 square feet (4 feet x 25 feet = 100 square feet).

Next, if you are going to apply mulch 3 inches deep to this area, convert the 3 inches to a fraction of a foot. Three inches divided by 12 inches equals  $\frac{1}{4}$  foot, or .25 feet. Multiply this fraction by the square foot measurement of the area to be covered. For this example, you will need 25 cubic feet of mulch (.25 feet x 100 square feet = 25 cubic feet).

One cubic yard equals 27 cubic feet (a cubic yard measures 3 feet by 3 feet by 3 feet; 3 feet x 3 feet x 3 feet = 27 cubic feet). In the shrubbery example just given, you need 25 cubic feet of mulch, which is 2 cubic feet less than one cubic yard.

Before you purchase mulch in bulk (i.e., buy an entire cubic yard), compare the cost with purchasing your mulch in smaller units.

Bagged mulch is also available in amounts such as 1.25 cubic feet or 2.0 cubic feet. If you purchase the mulch needed for the shrubbery example given above in amounts of 1.25 cubic feet, you will need 20 bags (25 cubic feet  $\div$  1.25 cubic feet = 20 bags). If you purchase bags of 2.0 cubic feet, you will need 12.5 bags (25 cubic feet  $\div$  2 cubic feet = 12.5 bags). Therefore, you will purchase 13 bags.

However, as discussed above, always remember to pull mulch 1 to 2 inches away from the stems and trunks of plants to lessen the chances of stem or trunk rot. So, whether the shrubs are single or multi-stemmed, you will not need all of the mulch determined above; the calculations did not include either the area used by the stems and/or low branches, or the extra 1 to 2 inches around the stem(s). Therefore, you can purchase less mulch than the calculations indicate. If you are using an organic mulch and buy more bags than you need, return the extras for a refund, if possible (check store policy). Do not store organic mulches, because they will rapidly decompose in the bag. Inorganic mulches, however, may be stored.

## REFERENCES

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Stinson, J. M., G. H. Brinen, D. B. McConnell and R. J. Black. 1990. "Evaluation of landscape mulches". *Proc. Fla. Hort. Soc.* 103:372-377.

## Pruning Landscape Trees and Shrubs<sup>1</sup>

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Edward F. Gilman and Robert J. Black<sup>2</sup>

Pruning is the removal of plant parts, typically shoots, branches, fronds and flowers to improve health, control growth or influence fruiting, flowering or appearance. Roots can also be pruned and removed if they circle close to or are resting against the trunk. Pruning should be a routine part of home-ground maintenance and not delayed until the landscape is overgrown. Overgrown plants can be tall and leggy with little foliage close to the ground, and cannot be pruned to desired size in a single pruning without severely damaging the plants. These plants should be pruned back gradually over a period of several years.

The objective of this document is to present pruning techniques for Florida trees, shrubs and palms. The need for pruning, timing, types of pruning, tree pruning, shrub pruning and tools are discussed separately. Specific examples will support the pruning concepts.

### Minimize Pruning Needs with Proper Plant Selection

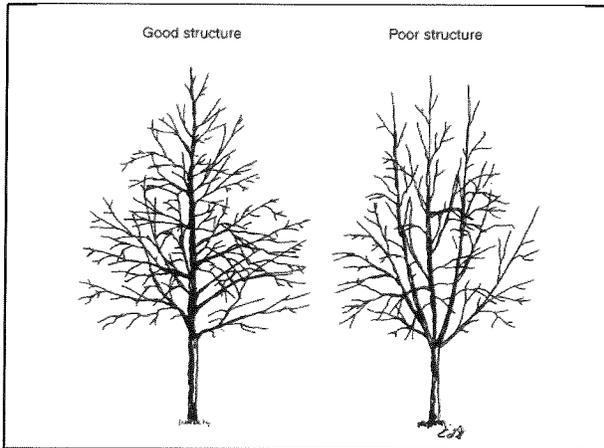
Proper tree selection at the nursery can eliminate early pruning requirements (Figure 1). Defects such as clustered branches can begin in the nursery and they should be corrected there. Shade trees should meet Florida #1 standards or better, and have one dominant trunk. Those with more than one trunk will have to be pruned soon after planting.

### Why Prune?

Proper plant selection can eliminate much of the pruning requirements in today's landscapes. Unfortunately, plants are frequently placed in the landscape according to their current size and shape, not the size which the plant is likely to attain in five or more years. The homeowner or landscape manager soon finds it necessary to clip or prune plants frequently to keep them within bounds. For instance, frequent pruning is assured when photinia shrubs are selected as foundation plants, since this plant can quickly grow to 25-30' tall. Utilizing a low-growing, compact shrub in such a location would greatly reduce or eliminate required pruning. It is less time

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  2. Edward F. Gilman, professor; Robert J. Black, professor emeritus, Environmental Horticulture Department, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL 32611. For more information, contact your county Cooperative Extension Service office.

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**Figure 1.** High quality medium and large-maturing shade trees have one dominant leader (left), whereas poor quality trees have several codominant stems (right).

consuming and less costly to select and install the proper sized plant than to choose one which will require frequent, timely pruning. Ask your nurseryman or consult a reliable source for growth rate and size of desirable plant species. If a plant needs to be pruned several times each year to control size, it may be the wrong species for that location. Many prunings can be eliminated by proper plant selection and this can save space in landfills by reducing the volume of yard waste.

Plants may be pruned for a number of reasons. Determine why you are pruning a plant before beginning.

### Maintain or Improve Health or Vigor

Removal of dead, dying or damaged branches and diseased and insect infested plant parts is an effective way to limit the spread of decay, disease and insects to other portions of the plant or to neighboring plants. For example, if several branch tips are infested with aphids or scale, prune and discard the affected shoots. This can be an effective alternative to spraying insecticides if the infestation is small and localized. Weekly checking is often necessary to detect a disease or an infestation in the early stages.

### Control Plant Size and Form

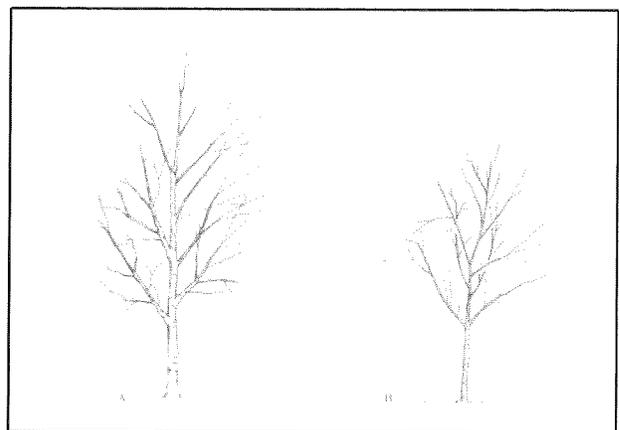
A common objective of pruning is to maintain or develop a desired size or form. However, this can be largely eliminated by installing the proper species or

cultivar and by not over fertilizing. Many compact and dwarf shrubs are now available at retail garden centers. Selective pruning can shape plants or produce either a thin or thick canopy. A thinner canopy edge will allow more light penetration and help keep interior leaves on the plant. Root pruning can be used to slow plant growth, producing a more compact plant. Prune one half the root system, wait 4-6 weeks, then prune the other half. Root pruning should be scheduled so roots will be watered thoroughly to keep the soil moist for 4-6 weeks following root pruning.

### Training Young Plants

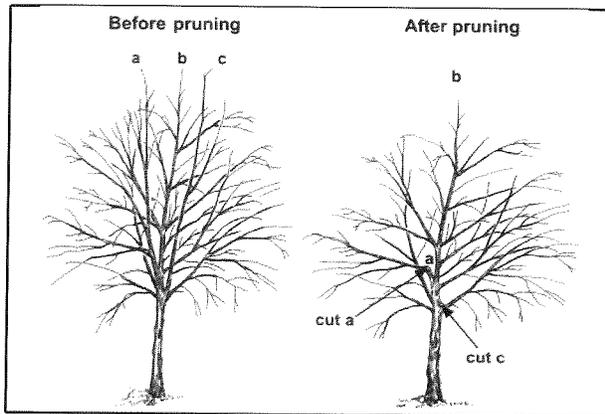
There are several reasons to train plants. Pruning young trees so they have good branch structure can dramatically influence their long-term health, function and longevity. Snipping branch ends on young shrubs encourages branching and fullness, which are frequently desirable characteristics of landscape plants.

Branch spacing and arrangement and the ultimate structural strength and safety of a tree can be controlled by selectively removing or shortening branches on a young plant (Figure 2).



**Figure 2.** (A) Desirable form and branching pattern on a young, large-sized shade tree such as live oak, mahogany, or southern magnolia. Major limbs are spaced apart along the trunk, not clustered at the same point on the trunk. (B) Desirable form on a young, small-sized patio tree such as dogwood, trumpet tree, or frangipani. Major limbs can be spaced closer together on the trunk.

Encourage only one central trunk to develop by removing or reducing the length of competing, upright trunks or branches (Figure 3).



**Figure 3.** Reduce the length of (subordinate) leader a using a reduction cut to encourage leader b to grow faster. Remove leader c back to the trunk. After pruning, the tip of leader b should be much higher than the tops of all other stems. This technique will help leader b become the dominant trunk by slowing growth on competing leaders and allowing more sunlight to reach b. In most cases on large-maturing trees, branches in the lower 15 to 20 feet of the tree should be kept smaller than half the trunk diameter using this technique. Those same branches should not be allowed to grow up into the tree to become a permanent part of the canopy. Notice that branches are spaced along the trunk.

This should begin within the first 2-3 years after planting. Tree training continues for 20 or more years on large-maturing species. Frequent light prunings several times each year encourage faster growth and prevent undesirable sprouting compared to one heavy pruning each year. Pruning trees every year or two results in a nicer tree than waiting 4 or 5 years in between pruning sessions. In all but the highest maintenance landscapes, do not attempt to dramatically alter the natural form; instead, choose a species which has more of a natural tendency to grow into the desired form. For example, a river birch, red maple or tabebuia would be better suited as a shade tree in a narrow vertical space than would live oak.

Plants can be pruned into different shapes such as balls, squares, rectangles or animal figures to create special effects. This practice (topiary) has become popular in recent years, but plants pruned in this manner become focal points and should be used sparingly in most landscapes. Topiaries can be grown by planting a small-leaved plant such as boxwood, yaupon holly or natal plum and training the plant into a specific form. Another technique utilizes a wire mesh frame which is packed tightly with sphagnum

moss. Appropriate plant species including begonias, ivy and creeping fig can be planted in the sphagnum, forming a fully grown topiary in several months to two years.

The practice of growing plants against a wall (espalier) or on a trellis requires frequent pinching and pruning. Plants trained in this manner are specimen plants and not all plants are adaptable to this pruning technique. *Pyracantha*, sea grape, *Fatsyhedra*, magnolia, yaupon holly, loquat and others make excellent espalier plants.

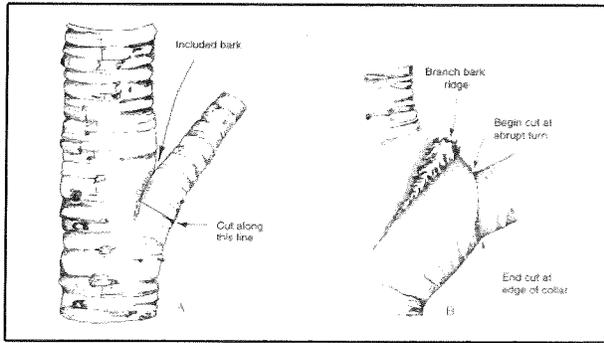
Plants which many consider as large shrubs such as photinia, wax myrtle and pittosporum can be trained into small trees by gradually removing over a period of 1-3 years, all the foliage and small branches from the lower portion of one or more stems. Small branches left along the lower trunk will build trunk caliper and create a sturdier tree. The longer they remain on the trunk, the thicker and stronger the trunk becomes.

### Influence Flowering and Fruit Production

Larger fruit on certain species can be produced by selectively removing flowers or developing fruits. Those remaining will be larger. Light pruning helps to maintain annual flowering and fruiting on fruit trees. Severe pruning on plants which flower on current season's growth such as crape myrtle will generally stimulate vegetative growth and produce fewer, but larger flower clusters. Pinching new vegetative growth during the growing season will stimulate growth of lateral shoots which on species which flower terminally (e.g. azalea, cassia, crape myrtle) will increase the number of blossoms produced. Remove developing seed heads on crape myrtle to promote a second and perhaps a third flower display.

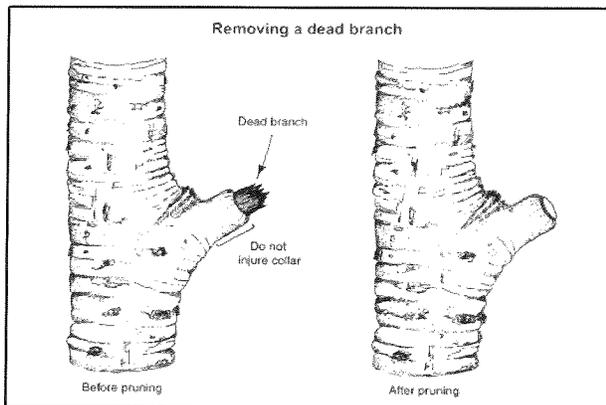
### Safety Pruning

The manner in which stems are attached to each other and to the trunk influences the structural strength of the tree. Remove branches with bark inclusions having narrow V-shaped crotches in favor of wider-angled U-shaped crotches (Figure 4).



**Figure 4.** (A) Remove or reduce limbs with bark inclusions. They are poorly attached to the tree and can split from the tree as they grow older. Included bark is bark that is squeezed between stems. The union of the two stems appears as a "V." (B) Retain limbs with raised bark at the union of the stems. The crotch between these stems appears as a "U" and represents a strong union between stems.

Large decayed, broken, cracked or poorly attached tree limbs should be recognized and promptly removed by a professional before they fall. Remove dead branches and branch stubs since they can lead to serious trunk decay (Figure 5). Periodic tree inspection by a professionally trained tree specialist (arborist) can help prevent these situations from developing into unsafe conditions.



**Figure 5.** Proper removal of a dead branch. Do not cut into the swollen collar growing around the dead branch. This will injure the trunk, since the collar is composed of trunk tissue.

### Rejuvenate Old Plants

Sometimes a shrub which is not growing well despite receiving adequate light, water and nutrients can be invigorated or "shocked" into growing by severe pruning. Typically, the plant either dies or

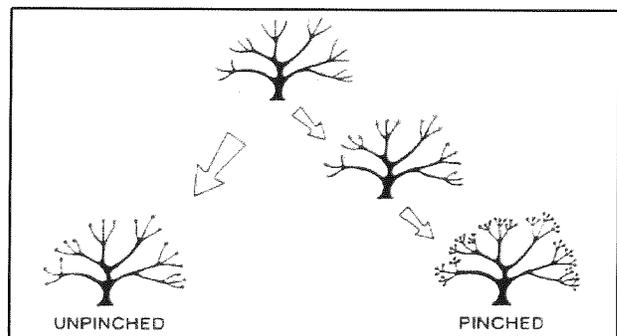
begins growing vigorously in response to this drastic treatment.

### Pruning at Transplanting

Shoot pruning for the purpose of compensating for root loss at transplanting is not recommended. Prune only to remove dead, diseased, crossed, rubbing or broken branches. About one year after transplanting, begin pruning to develop appropriate form and structure.

### When to Prune

Trees and shrubs can be lightly pruned anytime. To minimize reduction of next year's flowers, prune spring-flowering plants such as azaleas, spireas, trumpet trees and dogwoods in late spring before the flower buds set for the next season (Table 1). These plants set their flower buds on the previous season's growth and the buds over winter on this older growth. For example, dogwoods and azaleas form flower buds in July for the following year's flower display. Pruning or pinching between the end of the flower display and late spring would not reduce the number of flower buds set. Pinching the new shoots on azalea anytime from several weeks after they begin elongating through May will encourage lateral branching. Each of these laterals is likely to develop a flower bud. Thus the pinched plant produces many more flowers the following year, than an unpinched plant (Figure 6). Pruning between July and the flower display would remove flower buds and reduce the flower display but should not affect the health of the plant.

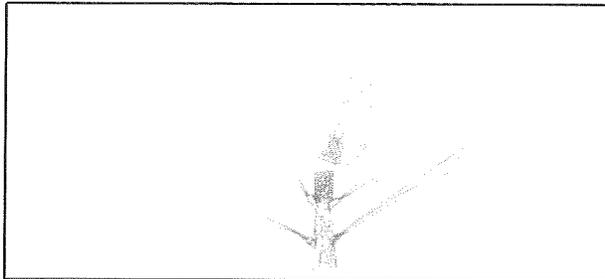


**Figure 6.** Pinching new spring or early summer growth on plants which flower on subsequent shoot growth will encourage more flower bud formation for next year's flower display. Azalea respond well to pinching.

Plants that produce flowers on current season's growth such as abelia, crape myrtle, hibiscus and rose are usually pruned while dormant or just before the spring growth flush (Table 2). Developing shoots can be pinched to encourage lateral branching which will enhance the flower display. Moderate to severe pruning may encourage production of fewer but larger blossoms or blossom clusters.

It is best to prune trees such as oaks, mahogany, black olives, hickory, and other large shade trees during the dormant season or just following a growth flush. They can be pruned at other times, but avoid pruning when trees are emerging from dormancy or entering dormancy.

Most evergreens such as podocarpus, jasmines, holly, boxwood, ligustrum, juniper and wax myrtle can be pruned anytime. Terminal growth of pines can be controlled by removing one-half of the candle in the spring just prior to needle expansion (Figure 7). This encourages new bud formation at the pinch, slows growth on the pinched branch and creates a more compact plant. New buds will not form behind pruning cuts made into older wood.



**Figure 7.** Prune pines by pinching one-half of the candle, or new shoot, before the needles elongate.

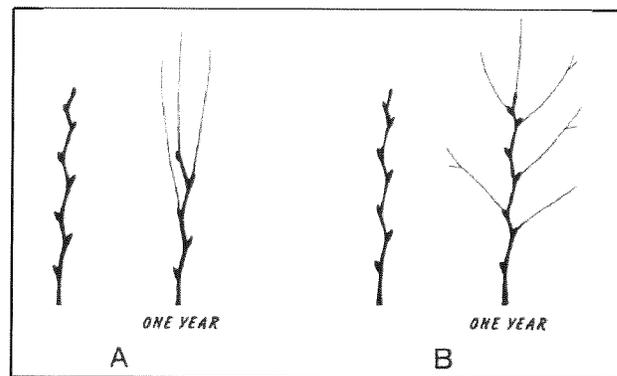
To encourage rapid shoot development and greatest overall plant growth, prune just prior to the first spring growth flush. To retard growth for maximum dwarfing effect, prune just after each growth flush. Late summer pruning may stimulate an additional flush of shoot growth on species which flush several times each year. These shoots could be damaged by an early frost.

Closure of pruning wounds on most trees and shrubs should be most rapid if pruning is conducted just before, or immediately following the spring growth flush. This is desirable because a closed

wound is more aesthetically pleasing, and insects, diseases and decay organisms are discouraged from entering the plant. Late fall and early winter pruning can stimulate new growth, particularly during a mild period during the winter. These succulent stems are not cold hardy and can be easily damaged, even by a light frost. Low winter temperatures can also cause cambium damage near pruning cuts, even if growth is not stimulated by pruning. This is particularly true of plants which are marginally hardy. If in doubt about cold susceptibility, it is best to delay heavy pruning to just before growth begins in the spring.

Some trees such as birch, maple, dogwood, elm and walnut bleed sap from pruned wounds if they are pruned during late winter or early spring. This "bleeding" is not harmful to the tree, but the dripping sap is often objectionable. Trees which show this tendency should be pruned in late fall or early winter.

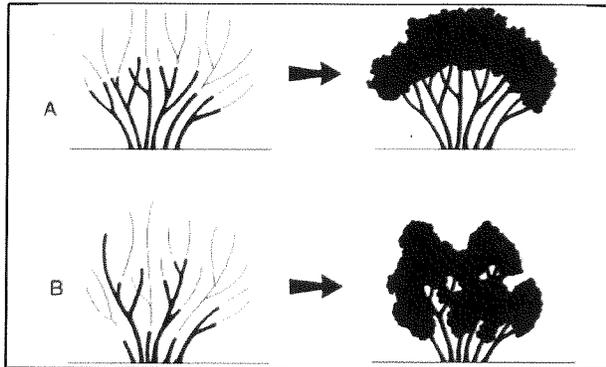
### Pruning Techniques



**Figure 8.** (A) Heading a young unbranched shoot will force two to four buds back from the cut into vigorous upright growth. Undesirable multiple leaders with included bark will develop on trees from this type of pruning, so it is not recommended; however, properly placed, these cuts can create and maintain a nicely formed shrub. (B) Growth from an unpruned shoot will be more typical of the natural form and more uniformly distributed along the stem. Note the horizontal branching habit.

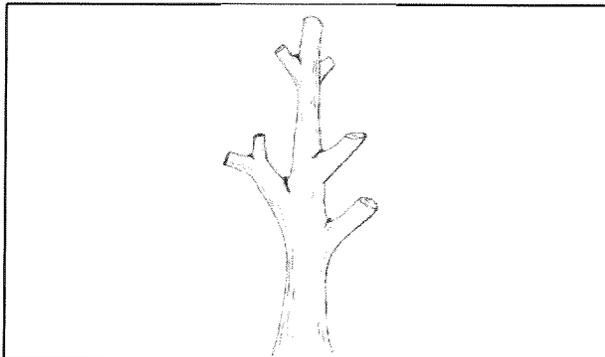
Heading (Figure 8) is the selective cutting of terminal ends of twigs or young branches back to an axillary bud or node. This technique produces a shorter shrub. However, new growth is typically vigorous and upright, developing from two to several buds just behind the pruning cut. The new foliage may be so thick that it shades the lower growth forming a top-heavy plant. This can be avoided in

shrubs by heading shoots to several different heights (Figure 9).



**Figure 9.** Heading shrubs is cutting back terminal shoots to a bud or node. (A) Heading all shoots to the same height produces a leggy, top-heavy shrub. (B) Heading shoots to several different levels produces a more natural, fuller-looking shrub.

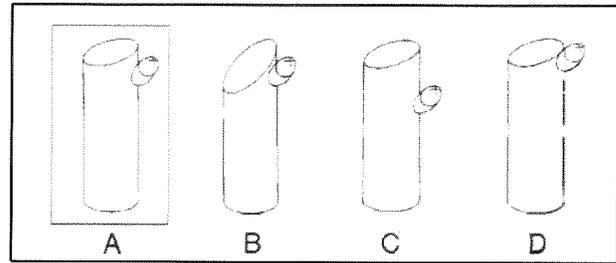
Heading (stubbing) trees is rarely warranted in landscape sites. Never "hat-rack" a landscape tree, i.e., cut all branches back to about the same length without regard for their location (Figure 10).



**Figure 10.** Never "hat-rack" a tree by heading back all branches to an indiscriminate location.

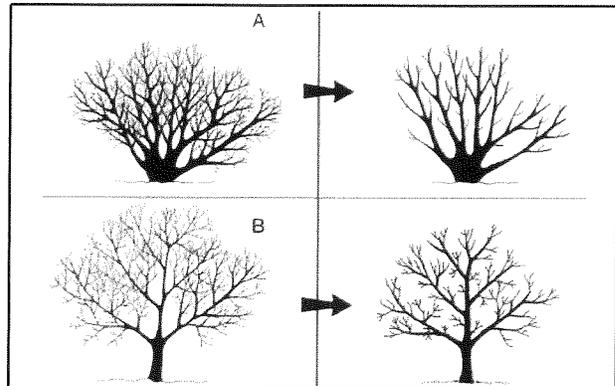
This type of pruning has no place in horticulture and is not recommended. When heading trees or shrubs, make the cut on a slight slant 1/4 inch above a healthy bud (Figure 11). The bud should be facing the direction preferred for new growth.

Thinning (Figure 12) is the complete removal of branches back to lateral branches, the main trunk, or in shrubs, to the ground. Thinning gives a plant an open appearance and can encourage new growth inside the crown depending on how the plant is thinned. If thinning is heavy, interior sprouts will develop. If the plant is lightly thinned, interior shoots



**Figure 11.** Proper pruning angle. "A" is a correct cut, "B" is too slanted, "C" is too far from the bud, "D" is too close to the bud.

are not likely to develop. This technique is used primarily on shrubs to make the canopy appear more open and see through. It contrasts to hedging or heading to the same spot on all branches which gives a shrub a manicured, controlled appearance. Trees can be thinned to increase light penetration, encouraging turf and shrub growth beneath the tree. Trees with properly thinned crowns also resist wind damage better than unpruned trees. This is a specialized technique best performed by a professional arborist. Removing live branches from mature trees can cause stress on the tree and harm it. Consider other alternatives first.



**Figure 12.** (A) Thinning shrubs is the complete removal of branches back to a lateral or the main trunk, or to the ground. (B) Proper thinning of shade trees removes branches at the edge of the canopy to create an open canopy.

## Pruning Shrubs

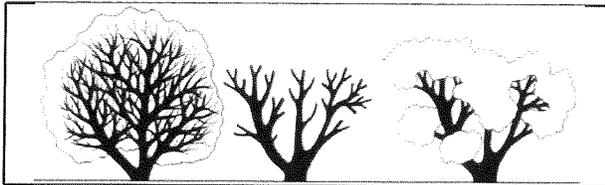
The first step in pruning a shrub is to remove all dead, diseased, or injured branches. Pruning shears and saws can be dipped in a weak alcohol solution (1 part to 9 parts water) to prevent spread of disease between plants. Remove branches that cross or touch each other and those which look out of place. If the

shrub is still too dense or large, remove some of the oldest branches. Head back excessively long branches to a bud or lateral branch that is 6 to 12 inches below the desirable plant height. If the shrub is 2 to 3' too tall, heading (Figure 9) and thinning (Figure 12) may be desirable. Cut each branch separately to different lengths with hand pruners. This will maintain a neat informal shrub with a natural shape. Plants sheared into various geometric shapes produce a formality not suitable for many modern, natural landscapes. See the following section on hedge pruning for a discussion of formal pruning.

A properly pruned shrub is a work of art and beauty and does not look as if it has been pruned. Pruning cuts should not be visible, but located inside the plant, covered up by remaining foliage.

### Rejuvenation of Shrubs

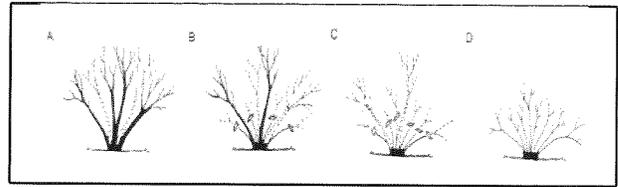
Rejuvenation is a drastic method of pruning old shrubs that have become much too large or have a large amount of non-flowering wood. On single-stem shrubs such as ligustrum and gardenia, rejuvenation is carried out over a period of 2-3 years by severe thinning out to the basic limb framework (Figure 13). One-third to one-half of the old growth is removed each year.



**Figure 13.** Rejuvenation on single stem shrubs is carried out by pruning much of the older branches and stems back to the basic framework.

Multiple stem shrubs are rejuvenated by cutting back all stems at ground level over a period of 3 years (Figure 14). Remove 1/3 of the old, mature stems the first year. The second year remove 1/2 of the remaining old stems and head back long shoots growing from the previous year's pruning cuts. The third season remove the remaining old wood and head back the long new shoots.

The best time for rejuvenation is in late winter or early spring, just before growth begins. Large, old shrubs should not be rejuvenated during late summer,



**Figure 14.** Rejuvenation of multiple stem shrubs. (A) First year, remove 1/3 of old, mature stems near ground level. (B) Second year, remove 1/2 of the remaining old stems and head back long regenerated shoots from last year's growth. (C) Third year, remove the remaining old stems and head back the long new shoots. (D) Growth at the end of the third season (rejuvenated shrub).

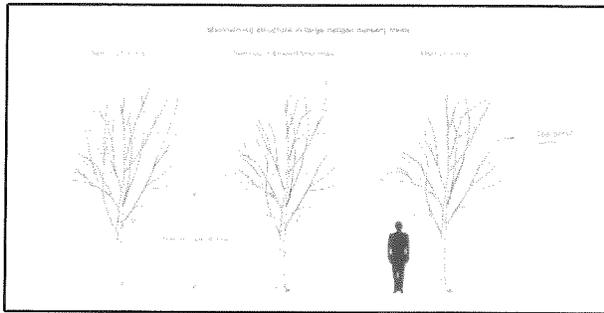
as new growth will be stimulated and possibly killed by cold weather in the winter.

Pruning cane-type shrubs such as nandina and mahonia is best done on a 2 or 3-year cycle. The tallest canes are pruned to a stub 3"-6" above the soil line during the first spring, just as growth begins. By the second spring, last year's medium sized canes have grown to become tall canes and should be cut back to a 3" stub. Canes from the first year's pruning have already begun to grow and are one to three feet tall by now. In the third spring, the canes which were the shortest in the first spring are now fairly tall and can be cut back. In this way, there is always foliage near the ground and the shrubs can be kept from becoming leggy. Cut nandina canes generally will not flower during the growing season following pruning.

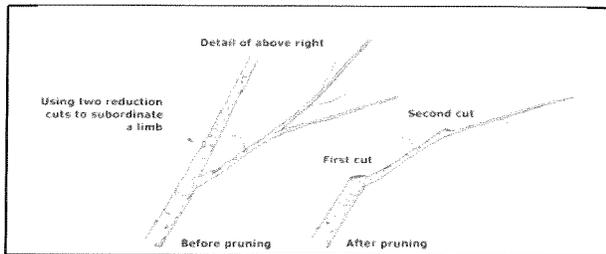
### Pruning Trees

First, prune out dead, diseased or broken twigs and branches. After studying the tree form, select the best spaced and positioned permanent branches and remove or shorten others on young trees. Permanent branches should be spaced between 6-24 inches apart on the trunk, depending on the ultimate mature size of the tree. For trees that remain small at maturity, 6" spacing is adequate; whereas, for oaks and other large shade trees, 18-24" spacing is best (Figure 15). Next, remove fast growing suckers at the base of and along the trunks. Sprouts along branches should be left intact in most cases. They typically indicate a struggling tree attempting to grow its way to health.

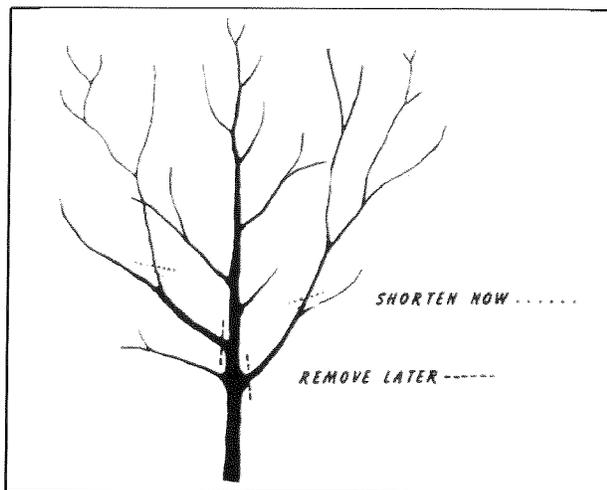
Trees should be pruned to one dominant leader (stem) after locating the straightest and best leader to retain (Figure 3 and Figure 17).



**Figure 15.** Shorten limbs a, b, and c because they are growing into the upper third of the canopy and they originate from the bottom half of the tree (left). Most, if not all, of these shortened limbs will eventually be removed from the tree as it grows in the landscape. They were shortened using reduction cuts (center). If the lateral branch left after making a reduction cut is too long, also shorten the lateral branch with a reduction cut (bottom detail). This essentially results in making two reduction cuts to accomplish subordination of a limb. Branch d was shortened because it was forming a codominant stem in the upper canopy (center).

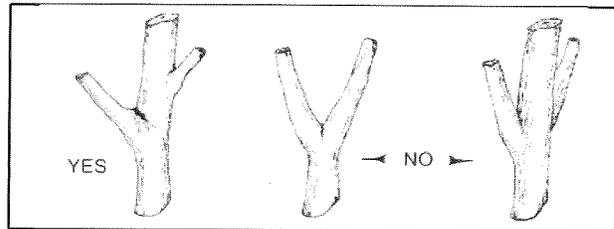


**Figure 16.**



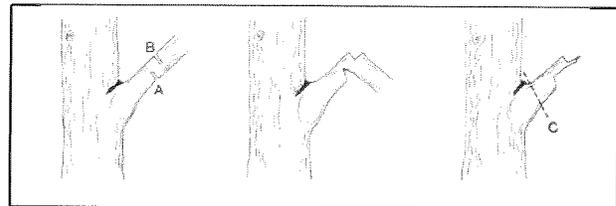
**Figure 17.** In forming the tree over a two-year period, remove lateral branches that grow upright. They will compete with the leader and form a weak, multiple-leadered tree.

Most shade trees can be grown in this form when they are young, but the growth habit of some species will change to a multi-leader spreading form as they mature. There should be no narrow forks or branches leaving the trunk at an acute angle (Figure 18). If there are, then reduce their length cutting back to a lateral branch at least half the diameter of the removed stem. Reduce length of stems and branches with bark inclusions (Figure 17).



**Figure 18.** Branches that are small in relation to the trunk are well attached (left). Those that are the same size are not as well attached (center and right). Forked trunks can be dangerous. One of the forks should be reduced in length.

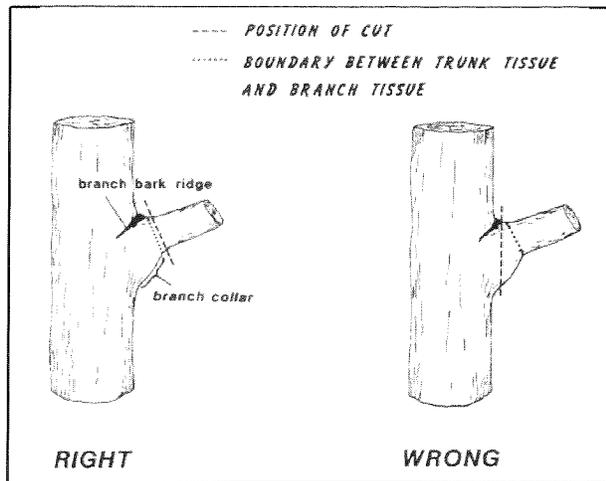
### Removing Large Tree Branches



**Figure 19.** Removing a tree branch over 1 1/2" diameter. First cut at "A" until saw binds, then cut at "B" 2-4" beyond "A" until the branch falls, then cut at "C", outside of the branch collar (see Figure 19).

Large branches that are too heavy to be held with your hand (those 1-1/2" or larger in diameter) require three separate cuts to prevent trunk bark stripping. The first cut is made on the lower side of the branch about 15 inches away from the trunk and as far up through the branch as possible before the branch weight binds the saw (Figure 19). The second cut is made downward from the top of the branch a few inches from the first cut to cause the limb to split cleanly between the two cuts without tearing the bark. The remaining stub is easily supported with one hand while it is cut from the tree. This cut should begin on the outside of the branch bark ridge and end just outside of the trunk collar swelling on the lower side of the branch (Figure 20). This is usually

accomplished by cutting at a right angle to the top of the branch. In this way, only branch tissue is cut, and there is no damage to the trunk.



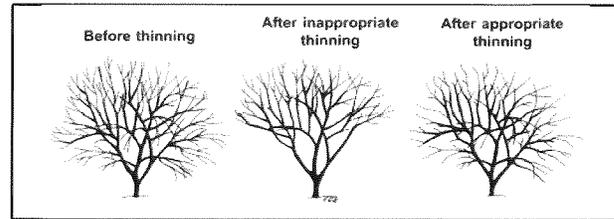
**Figure 20.** Correct and incorrect final pruning cut. All branches, large and small, should be cut in this manner. Do not cut into the branch collar. It is trunk wood and the trunk can decay if this tissue is damaged. Begin the cut on the outside of the branch bark ridge. This ridge is usually rough and always darker than the surrounding bark and is fairly obvious on most species. Angle the cut so it ends just beyond the swelling (branch collar) beneath the branch. If this swelling is not obvious, then place the cut at a right angle to the top of the branch.

The old practice had been to make the final cut flush with the trunk. Research has conclusively shown that this causes extensive trunk decay because wood is cut which is actually part of the trunk. Flush cuts should never be made since they injure the trunk.

Removing branches more than about 8" in diameter can result in trunk decay. Consider shortening the branch instead back to a live lateral branch half the diameter of the cut.

### Thinning the Canopy

Removing more than about 10% of live foliage from a mature tree can cause stress on the tree. To thin the canopy, remove 1/2-inch to 1-inch diameter stems from the edge of the canopy. Never clean out the interior of the tree by removing all of the small diameter branches attached to main branches and trunk (Figure 21).



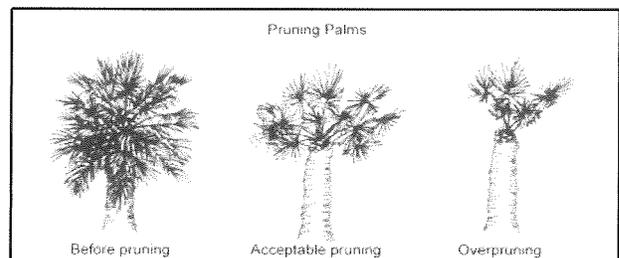
**Figure 21.** Inappropriate thinning leaves branches only at the edge of the crown (center). This situation can leave trees more vulnerable to wind damage and other stresses. Appropriate thinning (right) leaves live branches distributed all along limbs by removing live branches primarily from the edge of the crown.

### Wound Dressing

Painting wounds with tree wound dressing was standard practice. The recommendation was to paint wounds with a quality tree wound dressing to protect the cut surface from wood rotting organisms and checking (cracking) upon drying. Research has shown, however, that wound dressings do not prevent decay. Upon exposure to the sun, the protective coating often cracks, allowing moisture to enter the cracks and accumulate in pockets between the wood and the wound covering. This situation may be more inviting to wood rotting organisms than one with no wound cover, but in situations where aesthetics are important, the practice may be justified if a light coat is applied.

### Pruning Palms

Care must be taken when pruning palms not to cut or otherwise injure the terminal bud or the whole tree will die. Removing green fronds is not needed (Figure 22).



**Figure 22.** It is rarely necessary to remove green leaves from a palm. However, if you wish to do so, only remove those drooping below an imaginary horizontal line drawn through the bottom of the canopy (center). Growth will be slowed and the palm can be damaged and attract pests and diseases when green leaves are removed from above this imaginary line (right).

Old leaves that persist on palms such as the Washington palm can be removed, as they often harbor insects and rodents and may become a fire hazard.

When palms with large, heavy fronds such as the Royal palm shed their heavy leaves, they can damage property and injure people. If they are growing where falling leaves may be hazardous, remove leaves before they drop.

Large fruits of coconut palms can be dangerous to pedestrians and automobiles passing beneath the palm. Prevent formation of fruits by removing the flower stalks. Flower stalks on christmas palm and others can be left on the palm to take advantage of the ornamental characteristics of the fruit.

## Hedge Pruning

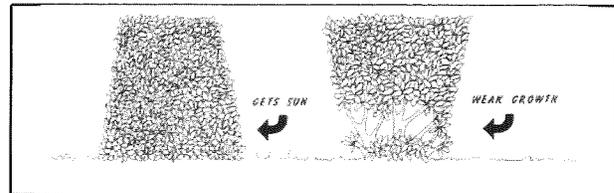
The method of pruning hedges depends on the type of hedge desired. Informal hedges generally consist of a row of closely planted shrubs which are allowed to develop into their natural shape. Annual pruning consists of thinning and heading just enough to maintain desired height and width.

The desired appearance of a formal hedge is a hard outline of foliage from the top of the hedge to the ground. Two important factors to remember when pruning formal hedges are (1) hedges should be clipped while the new growth is green and succulent and (2) plants should be trimmed so the base of the hedge is wider than the top (Figure 23). Hedges pruned with a narrow base will lose lower leaves and branches because of insufficient light. This condition will worsen with age resulting in sparse growth at ground level and an unattractive hedge which does not give desired privacy.

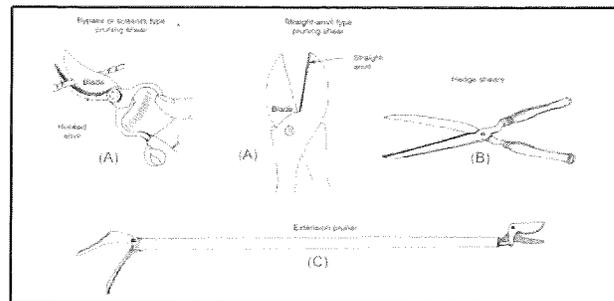
Flowering hedges grown formally should be sheared after they have bloomed since more frequent shearing reduces number of blooms. If the blooms are of secondary importance, pruning may be conducted at any time.

## Pruning Tools

Basic tools used in pruning are hand pruner, loppers, hedge shears and saws (Figure 24). Hand



**Figure 23.** Plants pruned as a solid hedge should be wider at the bottom than the top.



**Figure 24.** Pruning tools. (A) Hand pruners are used to cut branches less than 1/4 inch in diameter. (B) Hedge shears are used to shear formal hedges. (C) Extension pruners can reach higher.

pruners are used for small branch and twig cleanup, pruning saws for larger branches and hedge shears to trim closely clipped formal hedges only. Both shears and saws are available on poles which are handy to prune difficult to reach branches. Loppers should not be used for pruning on live shrubs and trees since they damage the collar on the trunk.

Tools should be kept sharp for easier cutting without injuring surrounding tissue. Injured tissues are susceptible to disease and decay, which can lead to long-term health problems for the plant.

**Table 1.** Winter and spring flowering plants which can be pruned after flowering but before flower buds form for next year's show.\*

<b>Shrubs</b>	
azaleas	spireas
some hydrangea	Indian hawthorn
banana shrub	wisteria
camellia	star and saucer magnolia
<b>Trees</b>	
dogwoods	redbud
fringe tree	magnolias
african tulip-tree	
* The only effect from pruning at other times is a reduction in the number of flower buds.	

**Table 2.** Plants producing flowers on current season's growth which can be pruned during the dormant season.\*

<b>Shrubs</b>	
allamanda	plumbago
abelia	thryllis
hibiscus	golden dew-drop
oleander	bouganvillea
rose	vitex
<b>Trees</b>	
frangipani	acacia
bottle brush	golden rain tree
cassia	princess-flower
royal poinciana	crape myrtle
jacaranda	
* Structural pruning to correct forks and multiple stems can be done at any time.	

## Mowing Your Florida Lawn<sup>1</sup>

L.E. Trenholm, J.B. Unruh, and J.L. Cisar<sup>2</sup>

Mowing is one of the most important aspects of maintaining a good quality lawn. Mowing increases turfgrass density, producing a tighter lawn that is resistant to weeds. Proper mowing practices, along with fertilization and irrigation, can largely determine the success or failure of a lawn.

The two main components of mowing are cutting height and frequency. Both of these factors depend on the turfgrass species, cultivar, and the level of lawn quality desired. Several other practices involving the use of mowers are also important in creating a quality lawn.

### Height of Mowing

The optimum cutting height is determined by the growth habit and leaf width of the turfgrass species. A grass that spreads horizontally can usually be mowed shorter than an upright-growing, bunch-type grass. Grasses with narrow blades can generally be mowed closer than grasses with wide blades. Bermudagrass is mowed at very low heights because of its numerous narrow leaf blades and low growth habit. On the other hand, bahiagrass needs to be

mowed at higher heights because of its open, upright growth habit.

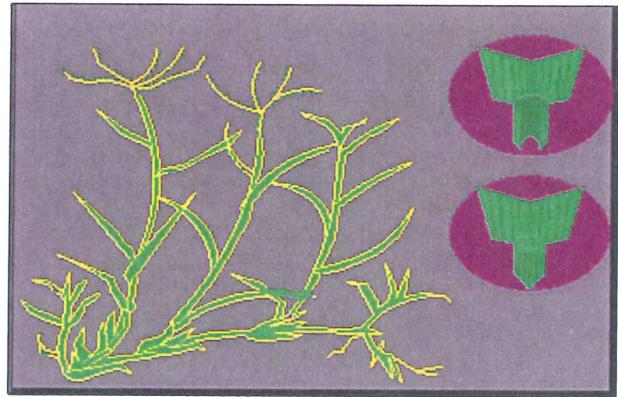


Figure 1. Bermudagrass

Turfgrass undergoes physiological stress with each mowing event, particularly if too much leaf tissue is removed. Effects of “scalping,” or removal of too much shoot tissue at one time, can produce long-term damage to the turf. This can leave turf susceptible to other stresses such as insects, disease, drought, and sunscald. Mowing also greatly influences rooting depth, with development of a

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Figure 2. Bahiagrass

deeper root system in response to higher mowing heights. Advantages of the deeper root system are greater tolerances to drought, insects, disease, nematodes, temperature stress, poor soil conditions, nutrient deficiencies, and traffic. Mowing below the recommended heights for each species is a primary cause of turf death and should be avoided.

### Frequency of Mowing

The growth rate of the lawn determines how frequently it needs to be mowed. The growth rate is influenced by grass species, weather conditions, time of year, and level of management. Slowest growth rates occur in the winter or under low fertility and irrigation, while fastest growth rates occur in the summer or under high fertility and watering practices. Bermudagrass is a rapidly growing grass compared to zoysiagrass. Low-maintenance grasses like bahiagrass and centipedegrass are frequently mowed just to remove seedheads, rather than to cut leaf blades. Mow often enough so that no more than 1/3 of the blade height is removed per mowing. For example, if your St. Augustinegrass lawn is mowed at a height of 4 inches, it should be mowed when it grows to a height of 6 inches. Stress to the grass caused by mowing can be minimized by removing only 1/3 of the leaf blade at each mowing. It is important to always leave as much leaf surface as possible so that photosynthesis can occur.

### Clipping Removal

On most lawns, grass clippings should be returned to help recycle nutrients to the soil. If the

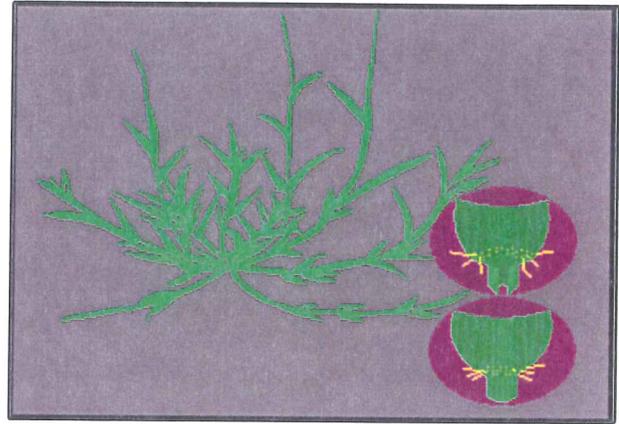


Figure 3. Zoysiagrass



Figure 4. Centipedegrass

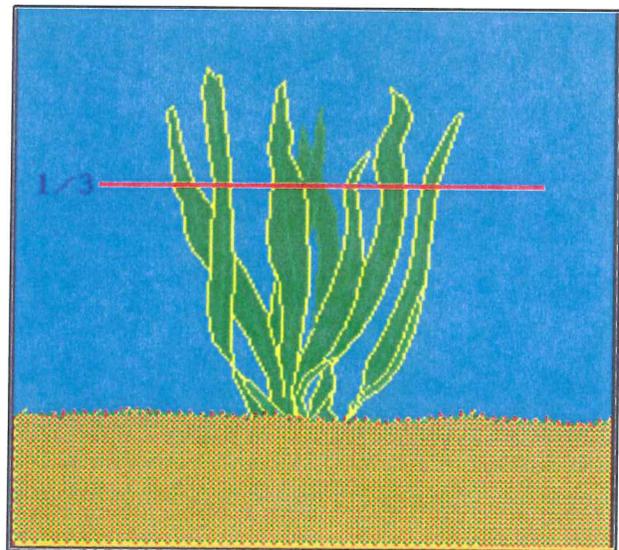


Figure 5. One-Third the Blade Height

lawn is mowed frequently enough, clippings cause few problems. Although many people believe that clippings contribute to thatch, research has shown that clippings are readily decomposed by microbial action. Thatch is the intermingled layer of already dead and decomposing organic matter on top of the soil and below the leaf blades. Excessive thatch can cause many problems for lawns, including poor water infiltration, increased insect and disease infestation, and poor turf quality. The tougher shoot components such as stems, rhizomes, and stolons are not easily degraded and may contribute to thatch. Problems may also arise when turf is mowed infrequently and excess clippings (e.g., clumping) result. When this happens, clippings can be raked to distribute them more evenly.



Figure 6. Excess Clippings

## Mowing Equipment

Lawn mowers are available in a wide variety of sizes and styles with many features. The two basic types are the reel mower and the rotary mower. Variations of these include mulching, flail, and string mowers. Most mowers can be obtained as push or self-propelled models. Front, side, and rear-clipping discharge models are also available. The choice of mower often depends on personal preference. Points to consider when purchasing a mower are lawn size, turfgrass species, and level of lawn maintenance. Rotary mowers are the most popular for home lawn maintenance because of their low cost, easy maneuverability, and simple maintenance. A large motor is required to horizontally turn the blade. The grass blade is cut on impact with the mower blade.

Rotary mowers can pose a safety problem if improperly used. Most rotary mowers cannot mow lower than 1 inch and are best used for higher mowing heights. The blade needs to be sharpened and balanced frequently for the best possible cut.

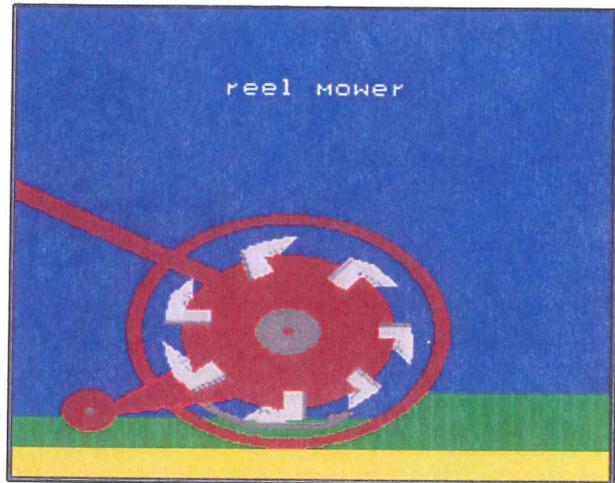


Figure 7. Reel Mower

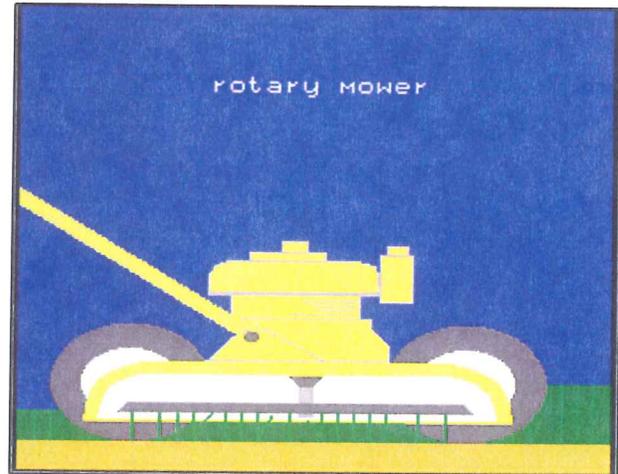


Figure 8. Rotary Mower

Mulching mowers are modifications of rotary mowers. These are designed to cut leaf blades into very small pieces that decompose more quickly than leaf blades cut by conventional mowers. The mower blades are designed to create a mild vacuum in the mower deck until the leaf blades are cut into these small pieces. Mulching mowers do not have the traditional discharge chute like most rotary mowers. Advantages and disadvantages of mulching mowers are listed below.



Figure 9. Mulching Mower



Figure 10. More Mulching Mowers

Advantages and disadvantages of mulching mowers are listed below.

Advantages of Mulching Mowers:

1. Clippings are returned to the turf where they will be decomposed very rapidly. This reduces yard waste and recycles nutrients to the turf.
2. Mulching prevents yard waste from contributing to landfill overuse and eliminates clipping collection and disposal costs.

Disadvantages of Mulching Mowers:

1. They are ineffective on wet or tall turf.
2. Blades must be kept sharp.
3. Current models are small and require higher horsepower.

Reel mowers are for highly maintained turf where appearance is important. Reel mowers cut with a scissorlike action to produce a very clean, even cut. They are used at cutting heights of 2 inches or less. The number of blades needed to produce a smooth, uniform cut will depend on the mowing height. Sharpening reel mowers is difficult and is best left to a professional mower repair service.



Figure 11. Flail Mower

Flail mowers have numerous, loose-hanging small knives that are held out by centrifugal force as the shaft rotates at high speeds. The blades sever grass by impact. Flail mowers are used for low-maintenance utility sites that are cut infrequently. Mowing quality is inferior compared to a reel or rotary mower, and the time it takes to sharpen the many small blades limits flail mower use.

String mowers are similar to rotary mowers, except the blade is replaced with a monofilament line. This is a definite safety feature when operating the mower in some hard to mow areas such as hillsides or ditch banks. A high-speed motor is needed in these mowers to spin the line fast enough for a clean cut.

## Good Mowing Practices

Follow these procedures and precautions for safe, good mowing:

- Pick up all stones, sticks and other debris before mowing to avoid damaging the mower or injuring someone with flying objects.

- Never mow wet turf with a rotary mower because clippings can clog the machine. Mow only when the turf is dry.
- Sharpen the mower blade frequently enough to prevent a ragged appearance to the turf (Figure 13 and 14).
- Mow in a different direction every time the lawn is cut. This helps prevent wear patterns, reduces the grain (grass lying over in the same direction), and reduces the possibility of scalping (Figure 15).
- Do not remove clippings. If clumping occurs, distribute these by removing or by lightly raking. A leaf blower can also be used to distribute clippings.
- Check your mower every time it is used. Follow manufacturer's recommendations for service and adjustments.
- Adjust cutting height by setting the mower on a driveway or sidewalk and using a ruler to measure the distance between the ground and the blade.
- Never fill a hot mower with gasoline.
- Always wear heavy leather shoes when mowing the lawn.
- Wash mower after use to reduce rusting and weed seed movement.



Figure 12. Ragged Turf Appearances



Figure 13. More Ragged Turf



Figure 14. Scalping

**Table 1.** Suggested mowing heights and mower types for Florida home lawns.

<b>Turfgrass Species</b>	<b>Optimal Mowing Height (inches)</b>	<b>Mowing Frequency (days)</b>	<b>Preferred Mower Type</b>
Bahiagrass	3.0 - 4.0	7 - 17	Rotary/ flail
Bermudagrass	0.5 - 1.5	3 - 5	Reel
Carpetgrass	1.5 - 2.0	10 - 14	Rotary
Centipedegrass	1.5 - 2.0	10 - 14	Rotary
Seashore Paspalum	1.0 - 2.0	5 - 10	Rotary/ reel
St. Augustinegrass	2.5 - 4.0*	5 - 14	Rotary
Zoysiagrass	1.0 - 3.0	10 - 14	Reel

\* Dwarf cultivars of St. Augustinegrass (Seville, Captiva, Delmar) are the only cultivars of this species that should be mowed at 2.5". Other cultivars should be mowed at 3.5-4".