

CHAPTER VII

Landscape Management

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LEARNING OBJECTIVES, CHAPTER VII

The FNGLA Certified Horticulture Professional should be able to:

- List reasons landscape management is important.
- Explain the goals of an environmental landscape management approach to maintenance.
- List and describe the nine principles of a Florida Friendly Landscape.
- Identify what determines quality in landscape maintenance.
- Define proper mowing and describe the importance of proper mowing to the health and vigor of the grass.
- Describe when (how often) grass should be mowed.
- Describe the importance of proper fertilization to the health and vigor of the grass.
- Identify the proper time to verticut a lawn.
- Name two of the grasses that may be used for winter overseeding in Florida.
- Name the types of pruning and describe the effects of each on plant growth.
- Describe the procedure (steps) in pruning landscape shrubs and trees.
- Describe the proper way to shear a hedge.
- List the three-cut method of large branch removal.
- Describe pruning tools, and the use of each.
- List benefits of mulches.
- Describe the benefits and use of seasonal color in the landscape.

Introduction

This chapter serves as a closely related follow-up to Chapter V (Using Plants). The decision-making process of plant selection for well designed landscapes goes hand-in-hand with the long-term maintenance of the site. It is impossible to achieve good landscape design expectations without also having proper maintenance. Conversely, it is impossible to maintain a landscape efficiently if no thought of maintenance went into the design process.

Landscape management (the terms “management” and “maintenance” are used interchangeably in this text) is increasingly important as a major segment of the environmental horticulture industry in Florida. While gardening remains the number one recreational activity and many high school youths still spend their summers mowing lawns, the scope, complexity and customer demand for near perfection have made the growth of commercial landscape management phenomenal. Nurseries have added landscape maintenance departments, large landscape management companies

have emerged, and many small companies and thousands of individuals are in the business. Countless condominium and business complexes have their own maintenance crews. Municipalities, park departments, golf courses and theme parks employ large numbers of people in landscape maintenance operations.

The Importance of Landscape Management

A newly installed landscape should be both functional and an aesthetic addition to our environment. Design and installation are just the beginnings of a rewarding landscape.

If properly maintained, the landscape should perpetually improve in function, beauty and value. Without proper maintenance, the landscape can change dramatically and rapidly in a negative direction, failing to be either functional or aesthetically pleasing. The decrease in quality that results from neglected maintenance forces increased costs in the long run because of the major renovations that may be required.

Again, maintenance should be a prime consideration during the planning phase as well as after the installation. Unfortunately this is frequently not the case.

Examples of good maintenance planning include: selecting plants that have few insect or disease problems; selecting plants that are in tune with the natural environment of the site (pH, salts, winter cold, summer heat, moisture and drainage); the installation of an efficient irrigation system; laying out the lawn and ornamental plant areas so that mowing is simplified; and the installation of structural edging material between lawn and ornamental plantings to facilitate mowing and restrict grass encroachment.

Landscape Quality

Quality is a commonly used, but often ill-defined, term. It involves good management, trained and dedicated labor, modern techniques, good materials properly applied, and good, well-maintained tools and equipment used properly. There is no substitute for quality. Quality implies satisfaction and pride in work.

Quality is often sacrificed by cutting corners to increase speed. However, the real goal should be efficiency, through scheduling, using the best method available, elimination of waste, and doing the job correctly. If labor savings are achieved by eliminating or reducing needed activities, it will show up in unsatisfactory results, and long term costs will often be greater. Mistakes, shortcuts and poor workmanship may not be visible when you leave the job, but days, weeks, months or sometimes even years later they may be highly visible.

Quality landscapes develop as a result of good design and installation, plus adherence to environmental management practices, such as the Florida Yards and Neighborhood program and the Florida Green Industries Best Management Practices discussed here.

Environmental Landscape Management Concepts

The Florida Yards and Neighborhoods (FYN)

program is an integrated approach to landscaping. The goal is to create landscapes that are beautiful and environmentally friendly, while helping to reduce water, fertilizer and pesticide use.

FYN is a research-based educational program that promotes the adoption of environmentally sound practices in both the design and management of Florida landscapes. The Florida Yards and Neighborhood Handbooks can be obtained from UF/IFAS. (See Bibliography.)

FYN emphasizes nine interrelated principles:

1) Right Plant/Right Place: Match the plant to the site conditions, whether it is wet, dry, shady, or in a difficult area to maintain. Aim for diversity while avoiding invasive species.

2) Water Efficiently: Overwatering does more than deplete the water supply; it also makes plants prone to pests and adds to stormwater runoff, which pollutes our water systems.

3) Fertilize Appropriately: Overfertilizing or underfertilizing can harm plants, but a proper amount yields strong, healthy landscapes. Using caution when applying fertilizers can help prevent pollution.

4) Mulch: A mulch layer around trees, shrubs, planting beds and bare ground provides benefits such as maintaining soil moisture, inhibiting weed germination and growth, easing maintenance, and providing a neat and uniform appearance.

5) Attract Wildlife: Florida has the third most diverse wildlife population of any state. Florida yards can provide habitat for wildlife in two major ways: by increasing biodiversity, in part by using a variety of plants, and by creating landscaped islands and natural corridors of plants that connect bordering properties to foster wildlife.

6) Manage Yard Pests Responsibly: Integrated Pest Management (IPM), which is described in Chapter IV, emphasizes the use of a combination of environmentally friendly methods that focus on preventing pest problems rather than utilizing only

chemical means of control later.

7) Recycle Yard Waste: Landscape management activities like mowing, pruning and raking generate yard waste that you can return to the soil, recycling valuable nutrients.

8) Reduce Stormwater Runoff: A properly designed and managed landscape can help slow down and filter stormwater runoff. Following FYN landscaping guidelines will reduce nonpoint sources of pollution.

9) Protect the Waterfront: A landscape that borders a waterfront of any sort requires a strong focus on the natural environment, as well as on environmental impact. Landscape decisions can influence the health of Florida's natural waterways.

Best Management Practices (BMPs)

The goals of the Green Industry's BMPs are to reduce non-point source pollution and promote the efficient use of water as follows:

- Reduce the off-site transport of sediment, nutrients and pesticides through surface water or ground water
- Use appropriate site design and plant selection
- Use appropriate rates and methods of applying fertilizer and irrigation
- Use Integrated Pest Management (IPM) to minimize pests and apply chemicals only when appropriate

University studies throughout the country, including Florida, have shown that properly managed turfgrass and landscapes do not significantly contribute to non-point source pollution. Pollution occurs when less-than-adequate management techniques are used. Developing low-risk irrigation, fertilizer and pesticide programs, and ensuring that these programs are administered and periodically reviewed, reduces the possibility of nutrient movement off-site.

The effectiveness of any program is only as good as the understanding of the personnel responsible for final

application. BMPs are no exception. For BMPs to be effective, the technicians in the field must understand their role in protecting our water resources. This understanding can only come from the development and implementation of employee-training programs.

And, whenever possible, professionals should educate their clients on landscape BMPs that encourage water conservation and pollution prevention.

Turfgrass Management

Selection and installation of the proper grass, and good maintenance practices are all important in the quest for a good lawn. Attaining the desired lawn is often considered more difficult than having our ground cover beds, shrubs and trees reach our expectations. There are a couple of good reasons for this. We normally don't walk on ground cover beds, shrubs or trees (where ground cover beds are walked on they show disastrous results) or play football on them, or park cars on them, etc., and we don't once a week cut off nearly half their leaves. If we did, it would probably be impossible to have them meet expectations.

Mowing and Edging

Good mowing and edging practices have great effect on the groomed appearance of the lawn and on the overall long-term health of the grass. Good mowing practice requires good equipment that is properly maintained. A sharp blade and proper length of cut are absolutely essential. Three injurious practices are mowing with a dull blade, mowing infrequently and mowing the grass too short.

Grass should be mowed often enough so that you do not remove more than one third of the length of the grass blade at each mowing. This is not just a rule of thumb; it is a guideline that affects the health and vigor of the grass. Where the finest quality is demanded, for example at golf courses and theme parks, there is adherence to this guideline. These guidelines can usually be met with efficient landscape management on a weekly schedule.

Table 1: Recommended mowing heights

Species	Height (inches)
Bahiagrass	3.0 - 4.0
Bermudagrass	0.5 - 1.5
Centipedegrass	1.5 - 2.0
St. Augustinegrass	2.5 - 4.0
Zoysiagrass	1.0 - 2.0

The frequency of mowing rule means that if you are mowing your grass at two inches, you should mow it before it reaches three inches. If your mowing height is three inches, then you should mow before the grass reaches four and one half inches. If you are mowing it at four inches, it should be mowed again before it reaches six inches. The higher the initial mowing height, the more the grass can grow in height before it needs to be mowed again.

Generally, increasing the height of cut improves the energy efficiency of the lawn. Taller grass shades the soil surface. This keeps it cooler, and results in less water use, less weed competition (and thus less herbicide use), and less clipping volume.

A simple adjustment to a higher mowing height during that part of the season when the grass is most vigorously growing can get you close to the rule of thumb. If you are concerned about exceeding the recommended mowing heights, they are really recommended **minimum** mowing heights. You might also want to look at your fertilization program to see if you are pushing more growth than needed.

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. Recommended mowing heights for turf species commonly grown in Florida are listed in Table 1.

All of the grasses recommended for Florida may be mowed with a rotary mower, but to attain a finished precision cut on improved Bermudagrass and zoysiagrass requires a reel mower. The secret of a good cut with rotary mowers is the blade. It must be in good condition and be sharp. If the blade is properly sharpened it will cut, rather than tear, the leaf tissue. You can easily see the brownish cast on a lawn that has been cut with a dull blade; examination of the individual blades will reveal the shredded ends where they have been torn off. In addition to being sharp, the blade must be of the type designed for the mower to give the grass the proper lift while mowing, and the wings opposite each cutting edge must be in good condition. Discard any blade that has damaged or eroded “wings.”

Rotary mower blades can be sharpened with a file or on a grindstone. In sharpening, the original bevel of the blade should be maintained. If the blade angle is too blunt, it cuts poorly, and if it has too much bevel, the edge is so thin it dulls quickly. Care should also be taken to retain a straight cutting edge. The blade must also balance from end to end. If one end is allowed to become heavy, the unbalanced blade will cause vibration and can cause excessive engine wear. Balance can be checked on an inexpensive balancing spindle or on the edge of a knife.

Edging may be done mechanically or chemically. A great deal of the finished appearance of a newly mowed lawn relates to the edging. Mechanical edging gives a better appearance but is labor intensive. Monofilament trimmers are replacing solid blade edgers in many applications. They don't give quite the finished appearance of blade edgers, but are more versatile. However, much damage has been done to trees and shrubs by misuse of trimmers. Chemical edging (with herbicides and/or growth regulators) may need to be the method of choice for large-scale maintenance contracts.

Clippings

Clippings should be left in place to help recycle nutrients in our sandy soils. The nutrients in clippings are pollutants when they end up in stormwater systems and water-bodies. They should be removed only if large

amounts are left on top of the grass. If clumping occurs, distribute the clippings by re-mowing or by lightly raking. You can also use a leaf blower to distribute clippings. But never direct clippings into bodies of water or onto impervious surfaces.

Grass clippings are composed mostly of water. Research has shown that the clippings do not contribute to thatch development. Clippings have significant nutrient value and decompose rapidly, returning some fertilizer and organic matter to the soil. Further, it is expensive, wasteful and irresponsible to add yard waste to our decreasingly available landfill space. As a result of Florida's Solid Waste Management Act (1988), yard wastes have been handled separately from municipal solid waste since 1991. It makes sense to recycle as much of a site's landscape waste as possible on-site, which eliminates the need to use energy to move it.

Fertilization

There are approximately four million acres of residential and commercial lawns in Florida. Florida is not only surrounded by surface water, but is also home to many miles of rivers, streams, springs, lakes, and karst areas. In addition, the water table in many parts of the state is close to the soil surface. All of these conditions lead to the potential for environmental impairment of ground and surface waters from agricultural and urban horticultural activities.

This has led to development of Best Management Practices (BMPs) for many agricultural industries, including commercial and residential turfgrass and landscapes. How we fertilize and irrigate our lawns and landscapes can have a direct impact on our environment, so it is imperative that the green industry and homeowners alike adopt environmentally friendly landscape maintenance practices.

Fertility and irrigation needs of recently established lawns differ from those of mature lawns. During establishment, turf is less able to support itself and generally requires more fertilizer and water.

One of the first steps in developing a turfgrass fertilization management program involves a basic

knowledge of the soils on which the turfgrasses are being grown. Individuals with only limited training in soils can discern whether a soil is mostly sand or predominately clay, and whether the soil contains flakes of free calcium carbonate or shell. These properties may significantly affect a turfgrass fertilization management program.

The timing of fertilization is tied to the turfgrass species, maintenance level goal, season of the year, the location in the state where the turfgrass is being grown, and the fertilizer source being used. One of the most important principles of fertilization timing is avoiding fertilizer application to dormant or nongrowing turfgrass. During dormancy, turfgrasses take up very small quantities of nutrients and applied nutrients are more likely to leach. Slow-release sources also influence the timing of fertilization, in that fertilization is required less frequently. Do not apply fertilizer when heavy rains are imminent.

Turfgrass fertilization guidelines, fertilization needs by species and location, and maximum application rates for nitrogen and phosphate were presented in Chapter III. More information on turf fertilization is included in the IFAS publication *General Recommendations for Fertilization of Turfgrasses on Florida Soils* (see Bibliography).

When applying fertilizers near any waterway, it is imperative to leave an untreated buffer zone to protect the water quality of the waterway. When applying liquid fertilizers, this "Ring of Responsibility" should be at least 3 feet from the edge of the water. The same is true for applying granular fertilizers with a fertilizer spreader that features a deflector shield. If you are applying fertilizer without a deflector shield, the Ring of Responsibility should extend at least 10 feet from the edge of the water.

Thatch Control

Thatch is an accumulation of living and dead plant material and organic debris above the soil level but below the grass blades. Heavy thatch makes mowing more difficult and may contribute to insect and disease problems.

Good mowing practices, combined with a good fertilization program and proper watering will help to

reduce thatch development. *Verticutting* (or power raking in bahiagrass) is a method of mechanically removing much of the thatch. Detailed information from current recommendations should be obtained for the specific grass before verticutting.

The best possible time to verticut the lawn is when the grass is rapidly growing in the spring, if irrigation is available. If irrigation is not available, it is best to wait until the beginning of the summer rainy season. After the verticutting procedure, the lawn should be thoroughly cleaned by raking or vacuuming.

Winter Overseeding

It may be desirable to overseed lawns in the colder parts of the state to maintain a green color during the winter months. Bentgrass, bluegrass, common or improved ryegrass, or combinations of these may be used for overseeding. Additional information is found in the *Florida Lawn Handbook*, available from the UF/IFAS (see Bibliography).

Maintenance of Landscape Ornamentals

Landscape maintenance of ornamental plants includes the maintenance of ground cover plantings, annual and perennial beds, shrubs, trees, and sometimes container plants. Good maintenance practices are essential to the health and appearance of these plantings.

Pruning

Pruning is the selective removal of plant parts, typically shoots and branches, to improve health; control growth; or enhance fruiting, flowering or appearance. Basic pruning begins in the nursery, but continued pruning is required in the landscape throughout the life of the plant. Briefly, an overview of reasons we prune follows.

Plants are diverse in their shapes, sizes and habits, but their basic means of survival and growth are generally similar. As Chapter II explained, leaves produce sugars from sunlight, water and carbon dioxide. Branches and trunks support the leaves, expose them to light, and

produce new ones. They also transport water and minerals from the roots to the leaves and foods that have been manufactured in the leaves to the roots. Roots supply water and minerals to the rest of the tree, and provide anchorage and support. There is an interrelationship and balance between the plant parts.

Pruning alters the balance between roots and shoots, and temporarily changes the resulting growth patterns. If part of the branch system is removed, the excess supplying capacity of the roots results in a vigorous flush of new shoots. Similarly, if roots are pruned, new feeder roots develop, rapidly using the excess food supply from the intact shoot system. Weather conditions may delay this rapid growth pattern. If we prune in winter, the growth flush will be delayed until the weather is warm enough for growth.

Pruning stimulates growth in plant parts near the cuts, but overall, it is a dwarfing process. This is due to removal of existing plant parts and reduction of the food or water-supplying capacity of the plant. If excessive amounts of either branches or roots are removed, the plant will be weakened. 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. Begin routine pruning about one year after transplanting to develop appropriate form and structure.

Reasons to 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 sweet viburnum shrubs are selected as foundation plants, because this plant can quickly grow to 25' to 30' tall. Using a low-growing juniper, Wheeler's dwarf pittosporum, Indian hawthorn or other compact shrub in such a location would greatly reduce or eliminate

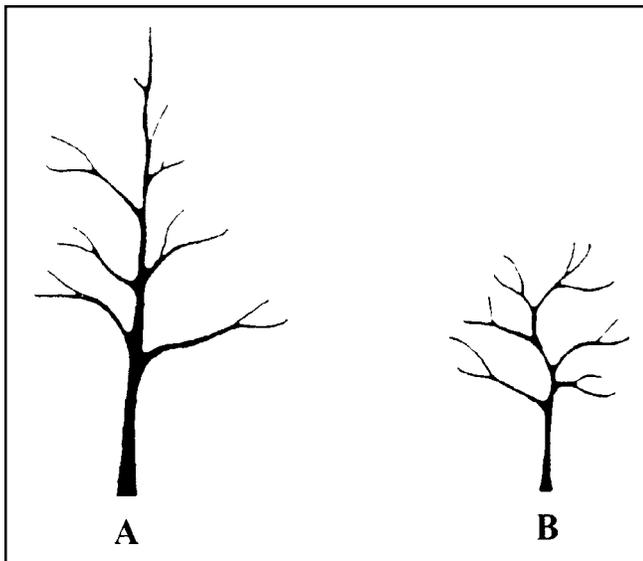


Figure VII-1: A) Desirable form and branching pattern on a young large-sized shade tree such as live oak, sycamore or southern magnolia. Major limbs are spaced 12-24" apart along the trunk, not clustered at the same point on the trunk. B) Desirable form on a young, small-sized patio tree such as dogwood, redbud or frangipani. Major limbs can be spaced closer together on the trunk.

required pruning. It is less time consuming, and less costly, to select and install the proper sized plant than to choose one which will require frequent, timely pruning.

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 Vigor

Removal of dead, dying, or damaged wood and diseased and insect infested plant parts is an effective way to stop 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.

Control Plant Size and Form

A common objective of pruning is to maintain or develop a desired size or form. To accomplish this, pruning should be a routine part of landscape maintenance and not delayed until the plant is overgrown. Installing the proper species or cultivar for the space and avoiding over-fertilization can largely eliminate this problem; many compact and dwarf shrubs are now available. Overgrown plants can be tall and leggy with little foliage close to the ground; they cannot be pruned to desired size in a single pruning without severely damaging the plants. Consequently, these plants must be pruned back gradually over a period of several years.

Selective pruning can be used to shape plants or produce either a thin or thick canopy. A thinner canopy 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 to 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.

Create Desired Shapes

There are several reasons to train plants. Pruning young trees can dramatically influence their long-term health, function and survival. Early pruning 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 branches on a young sapling (See Figure VII-1). Always work with the natural form of a plant. Encourage only one central trunk to develop by removing competing, upright trunks or branches. This should begin within the first 2-3 years after the tree is propagated. Tree training continues for 10 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. In all but the highest maintenance landscapes,

do not attempt to dramatically alter the natural form; instead, choose a species that 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 a 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. Small-leafed plants such as boxwood, Surinam cherry, natal plum, or pyracantha, are the best choice for topiaries, because they can be more easily trained into a specific form. Another technique uses a wire mesh frame packed tightly with sphagnum moss. Appropriate plant species, including begonias, English ivy and creeping fig, can be planted in the sphagnum, forming a fully grown topiary in several months to 2 years.

The practice of growing plants against a wall (espalier) requires frequent pinching and pruning. Plants trained in this manner are used as specimen plants. Not all plants are adaptable to this pruning technique; pyracantha, sea grape, fatshedera, magnolia, yaupon holly, podocarpus, and loquat make excellent espalier plants.

Plants many consider to be large shrubs such as ligustrum, 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. This should not start before the plants are 8' tall, so that the main trunks can develop properly. 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.

Enhance Flower and Fruit Production

Larger fruit 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 that flower on current season's growth, such as crape myrtle,

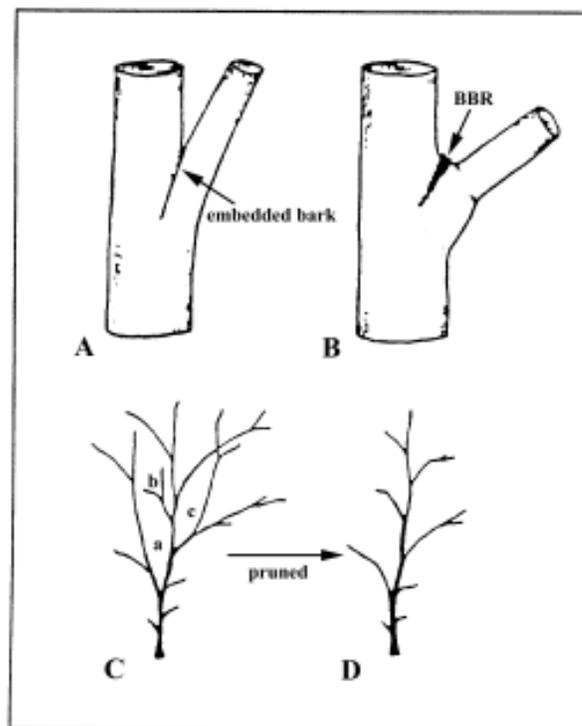


Figure VII-2. A) Remove limbs with embedded bark. They are poorly attached to the tree, and can split from the tree as they grow older. Embedded bark is bark that is squeezed between stems. The union of the two stems appears as a “V.” B) Retain limbs with raised branch bark ridge at the union of the stems. The crotch between these stems appears as a “U,” and represents a strong union between stems. C) & D) The crotches between the trunk and branches a, b and c will develop embedded bark. They should be removed when the tree is young in favor of the remaining wider angled branches.

will generally stimulate vegetative growth and produce fewer, but larger flower clusters. On species that flower terminally (e.g., azalea, cassia, crape myrtle), pinching new vegetative growth during the growing season will stimulate growth of lateral shoots and will increase the number of blossoms produced. Additionally, removal of developing seed heads on crape myrtle will promote a second, and perhaps a third flower display.

Promote Safety

The manner in which stems are attached to each other and to the trunk influences the structural strength of the tree. Remove branches with embedded bark having narrow “V” shaped crotches in favor of wider angled “U” shaped crotches (Figure VII-2). Large decayed, broken, or poorly attached tree limbs should be

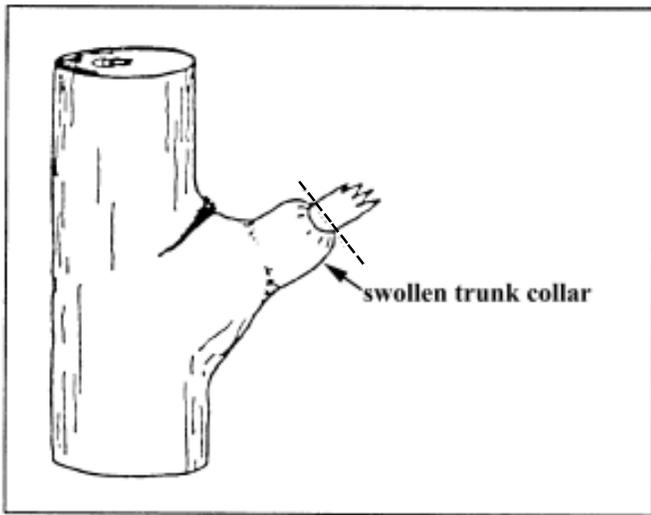


Figure VII-3. Proper removal of a dead branch. Do not cut into the swollen collar growing around the dead branch. This will injure the trunk because the collar is composed of trunk tissue. Cut along the dashed line.

recognized and promptly removed by a professional before they fall. Remove dead branches and branch stubs as they can lead to serious trunk decay (Figure VII-3). Periodic tree inspection by a professionally trained tree specialist (arborist) can help prevent these situations from becoming unsafe conditions.

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 and dogwoods in late spring before the flower buds set for the next season (Table 2). These plants set their flower buds on the previous season's growth; 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 VII-4). 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.

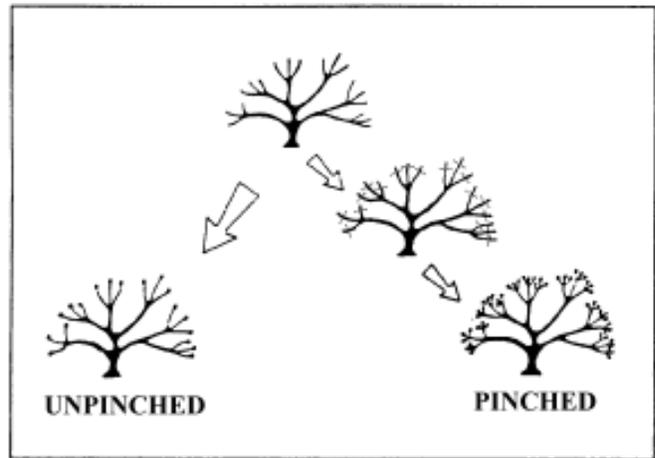


Figure VII-4. Pinching new spring or early summer growth on plants which flower on subsequent shoot growth will encourage more flower bud formation for next year's flower display. Azaleas respond well to pinching.

Plants that produce flowers on current season's growth such as abelia, hibiscus and rose are usually pruned while dormant or just before the spring growth flush (Table 3). 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, maples, hickory and other large shade trees, late in the dormant season or several weeks following a growth flush. Pruning at other times frequently promotes undesirable sprouting. Trees sprout excessively and are easily damaged when pruned during active shoot elongation. The worst times to prune are when leaves are forming. Do not prune trees that are under stress.

Most evergreens, such as podocarpus, holly, boxwood, ligustrum, juniper, and wax myrtle can be pruned anytime. Terminal growth of pines can be controlled by removing one-half of the new shoot in the spring just prior to needle expansion (Figure VII-5). This encourages new bud formation at the pinch, slows growth on the pinched branch, and creates a more compact plant. Never pinch a pine at other times of the year since new buds will not form.

To encourage rapid shoot development and greatest overall plant growth, prune just prior to bud swell in the spring. To retard growth for maximum dwarfing effect, prune just after each growth flush, when leaves have expanded fully. Late summer pruning may stimulate an additional flush of shoot growth on species that flush

several times each year. These shoots could be damaged by an early frost.

Closure (*callusing*) 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. In addition, cold injury can be reduced if pruning is conducted close to spring bud break. 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 beneath improperly executed pruning cuts, even if growth is not stimulated by pruning. This is particularly true of plants that 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 usually harmful to the tree, but the dripping sap is often objectionable. Trees that show this tendency should be pruned in late fall or early winter.

Table 2. Winter and Spring flowering plants which can be pruned after flowering but before flower buds form for next year’s show.*

Shrubs	
azaleas	spireas
some hydrangea	Indian hawthorn
banana shrub	wisteria
camellia	star and saucer magnolia
Trees	
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 3. Plants producing flowers on current season’s growth which can be pruned during the dormant season.*

Shrubs	
allamanda	plumbago
abelia	thryallis
hibiscus	golden dewdrop
oleander	bougainvillea
rose	vitex
Trees	
frangipani	acacia
bottlebrush	golden rain tree
cassia	princess flower
jacaranda	royal poinciana
crape myrtle	

* Structural pruning can be done at any time.

Pruning Techniques

Heading back is the selective cutting of terminal ends of twigs or young branches back to an axillary bud or node. When heading back trees or shrubs, make the

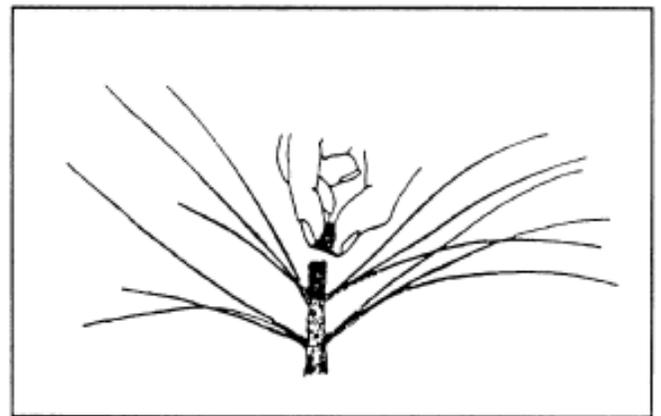


Figure VII-5. Prune pines by pinching one-half of the new shoot before the needles elongate.

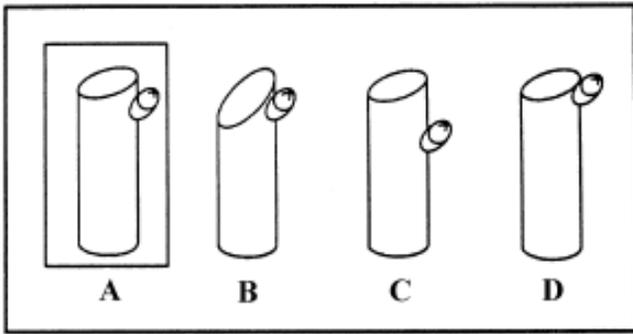


Figure VII-6. Proper pruning angle. (A) is a correct cut. (B) is too slanted. (C) is too far from the bud. (D) is too close to the bud.

cut on a slight slant 1/4 inch above a healthy bud (Figure VII-6). The bud should be facing the direction preferred for new growth.

In nearly all plants, active growth of the terminal bud suppresses the growth of the buds below. Removing the terminal bud of a shoot or branch releases more than one of the lower buds to begin development, and thus increases branching and fullness. Usually the buds closest to the cut develop and inhibit the growth of buds below them. Because the uppermost bud will probably be the most vigorous, the direction toward which it points will be the direction of the new growth. New growth can be directed in a desired direction by pruning back to selected buds. The new foliage that develops may be so thick that it shades the lower growth forming a top heavy plant. This can be avoided in shrubs by heading back shoots to several different heights (Figure VII-7).

If the pruning cut is made too far above a healthy bud, regrowth will not occur below the cut and a stub will develop. The stub will die because there are no leaves to supply food and maintain water conduction. The dead stubs then offer entry for wood-rotting fungi and wood-eating insects, as well as making the plant unsightly. This is one way in which trees become hazards. The decay spreads, creating a hollow, unstable tree.

In some plants, notably many of the conifers, lateral buds on older wood lose the ability to resume active growth, and cutting these plants back to only old wood will result in the death of the limb or tree if it is the main trunk.

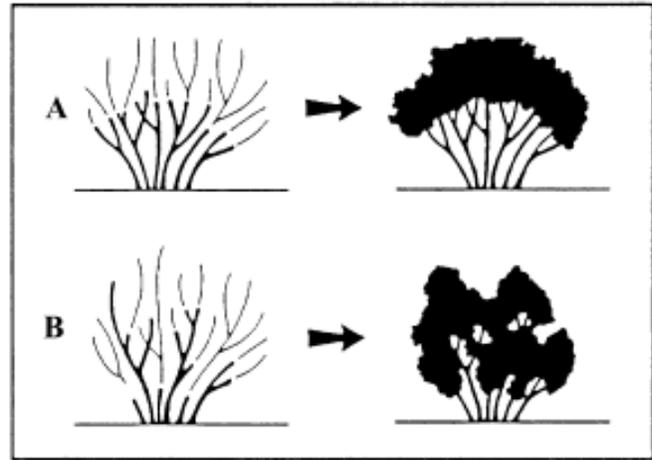


Figure VII-7. Heading back shrubs is cutting back terminal shoots to a bud or node. A) Heading back all shoots to the same height produces a leggy, top heavy shrub. B) Heading back shoots to several different levels produces a more natural, fuller looking shrub.

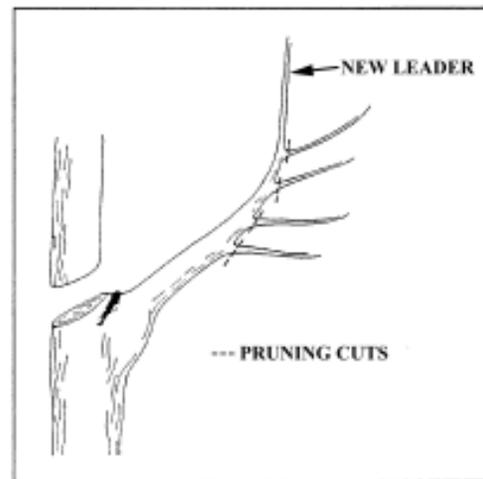


Figure VII-8. Heading back trees is rarely necessary if they were properly placed in the landscape. Heading back large limbs is very damaging and shortens the life span of the tree. Proper heading (called *dropcrotching*) in trees is pruning back to a fork with a living branch. This branch will become the new leader.

Heading back (stubbing) trees is rarely warranted in landscape sites. If it is necessary, e.g., to prune beneath power lines or to clear a tree from interfering with a structure, always head back to a fork where there is a live branch (called *dropcrotching* - Figure VII-8). Within several months, prune out all sprouts growing in response to the pruning cut. Never “hat-rack” a landscape tree, i.e., cut all branches back to about the same length without regard for their location (Figure

VII-9). This type of pruning has no place in horticulture and is not recommended.

Thinning (Figure VII-10) is the complete removal of branches back to lateral branches or 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 are not likely to develop. This technique is used primarily on shrubs to control size while maintaining a natural appearance. 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 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.

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 alcohol to 9 parts water) to prevent the spread of disease between plants. Remove branches that cross or touch each other and those that 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 feet taller than desired, heading (Figure VII-7) and thinning (Figure VII-10) may be desirable. Do not use hedge shears; 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.

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 that are allowed to develop into their natural shape. Annual pruning consists of thinning and heading back just enough to maintain desired height and width.

Formal or clipped hedges require a specialized pruning, which may become a continuous job during the growing season. The desired appearance of a formal hedge is a soft outline of foliage from the top of the hedge to the ground.

There are two important factors to remember when pruning formal hedges: 1) Hedges should be clipped while new growth is green and succulent; and 2) plants should be trimmed so the base of the hedge is wider than the top (Figure VII-11). 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 that does not give desired privacy.

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

Rejuvenation of Shrubs

Rejuvenation is a drastic method of pruning old shrubs that have become much too large or have a large

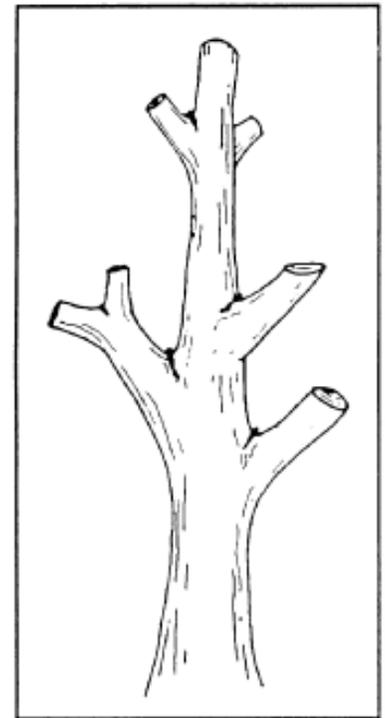


Figure VII-9. Never hat-rack a tree by heading back all branches to an indiscriminate location.

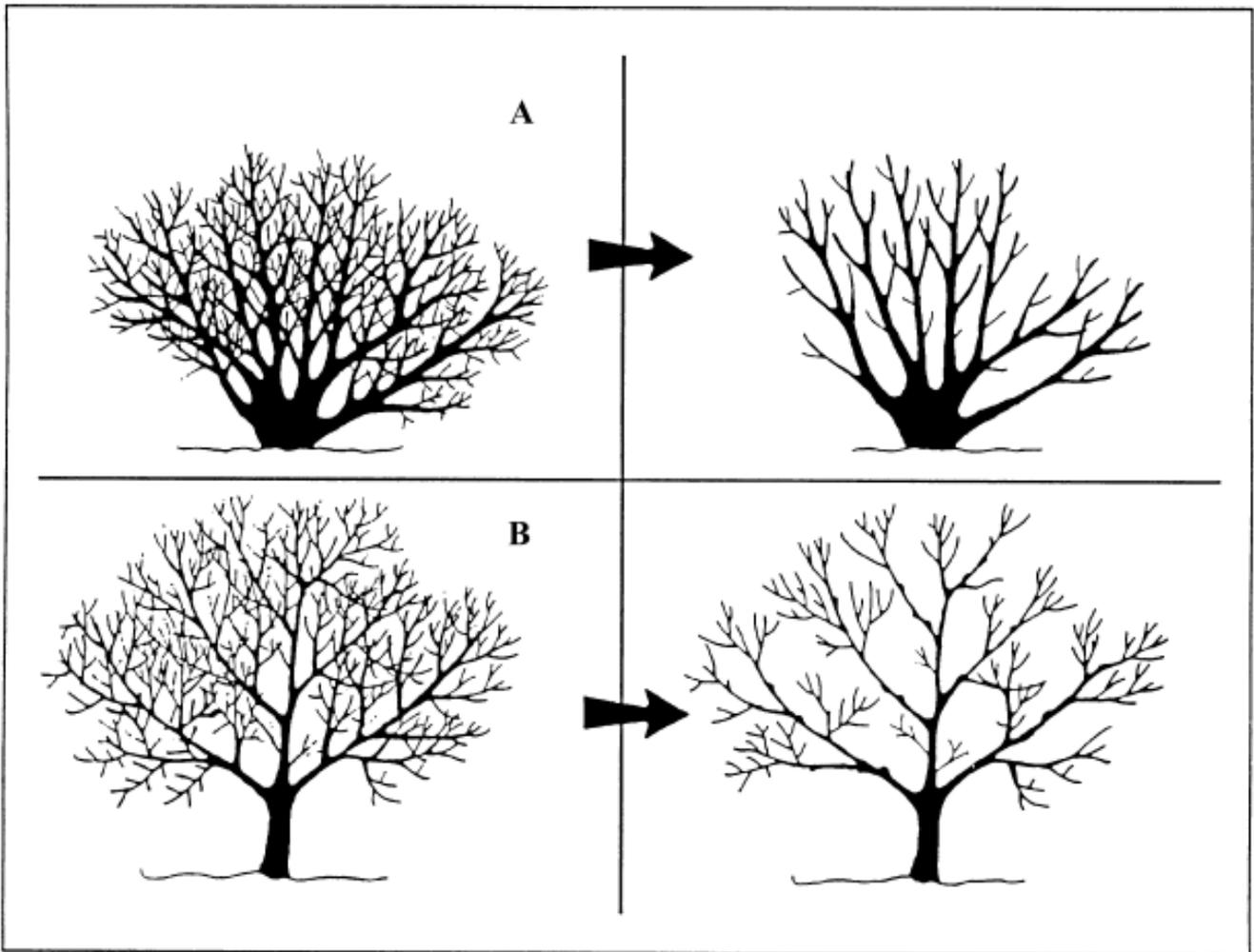


Figure VII-10. A) Thinning is complete removal of branches back to a lateral or the main trunk or, in shrubs, to the ground. B) Proper thinning of shade trees first removes branches rubbing, crossed over each other, dead, diseased or dying. If further thinning is desired, remove branches back to major limbs to create an open crown. Space remaining branches along the major limbs to give each room to develop. Removing upright branches creates a more spreading tree; remove horizontal branches to create a more upright form. Grass grows better beneath thin trees.

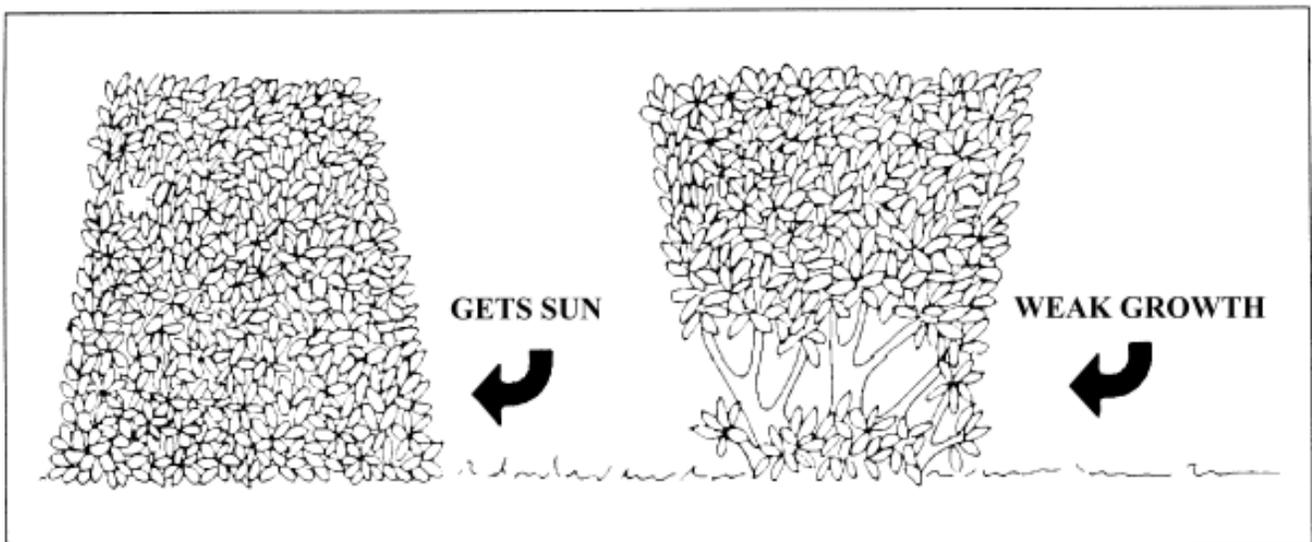


Figure VII-11. Plants pruned as a solid hedge should be wider at the bottom than the top.

amount of nonflowering 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 VII-12). One-third to one-half of the old growth is removed each year.

Multiple stem shrubs are rejuvenated by cutting back all stems at ground level over a period of 3 years (Figure VII-13). 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. Remove the remaining old wood and head back the long new shoots in the third season.

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, 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

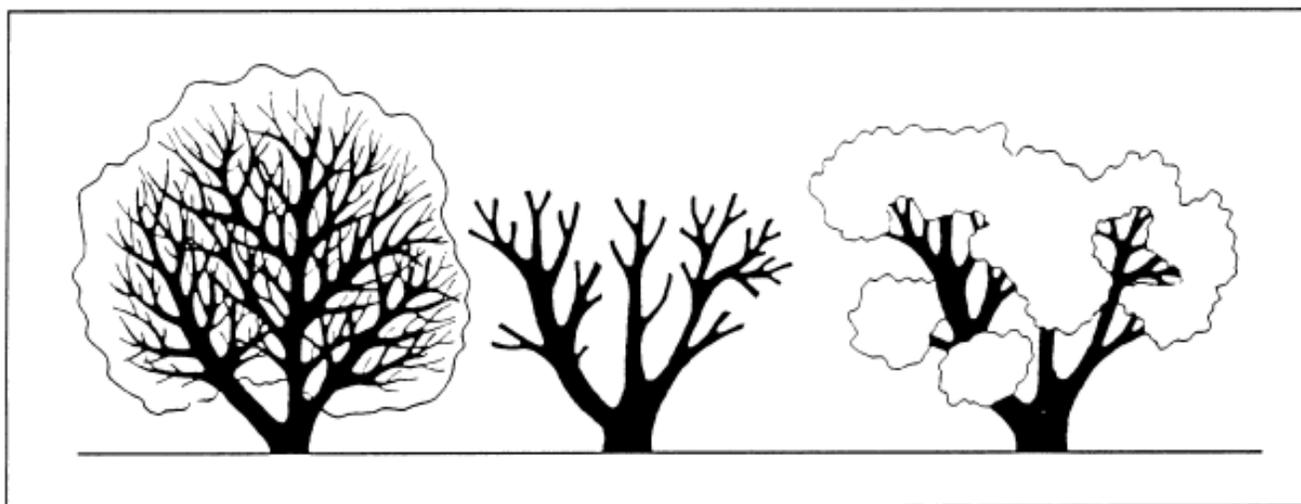


Figure VII-12. Rejuvenation on a single stem and grafted shrubs is carried out by severe thinning out to the basic framework.

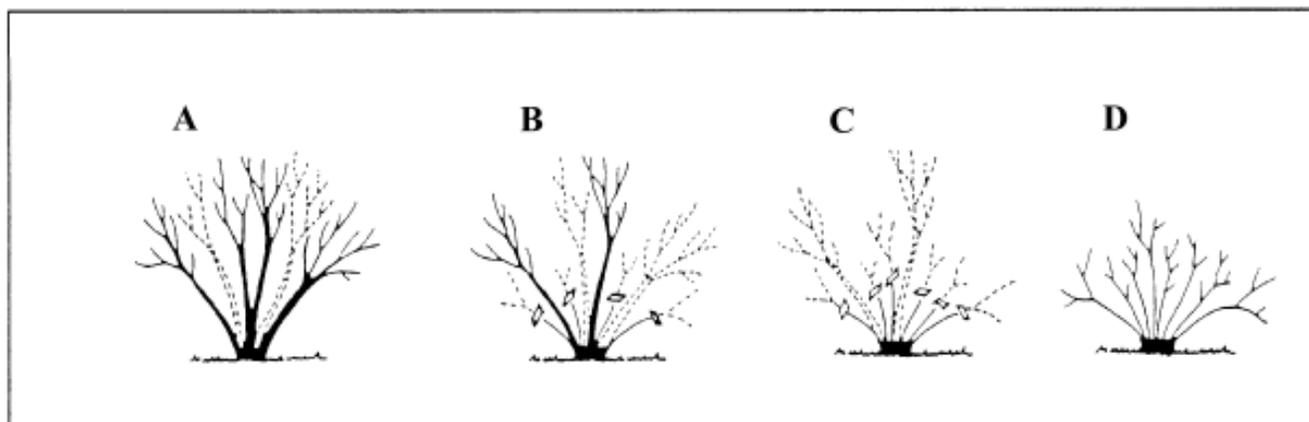


Figure VII-13. Rejuvenation of multiple stem shrubs. A) First year, remove 1/3 of old, mature stems near ground level. B) Second year, remove 1/2 of the remaining old stems and head back long regenerated shoots from last year's growth. C) Third year, remove the remaining old stems and head back the long new shoots. D) Growth at the end of the third season (rejuvenated shrub).

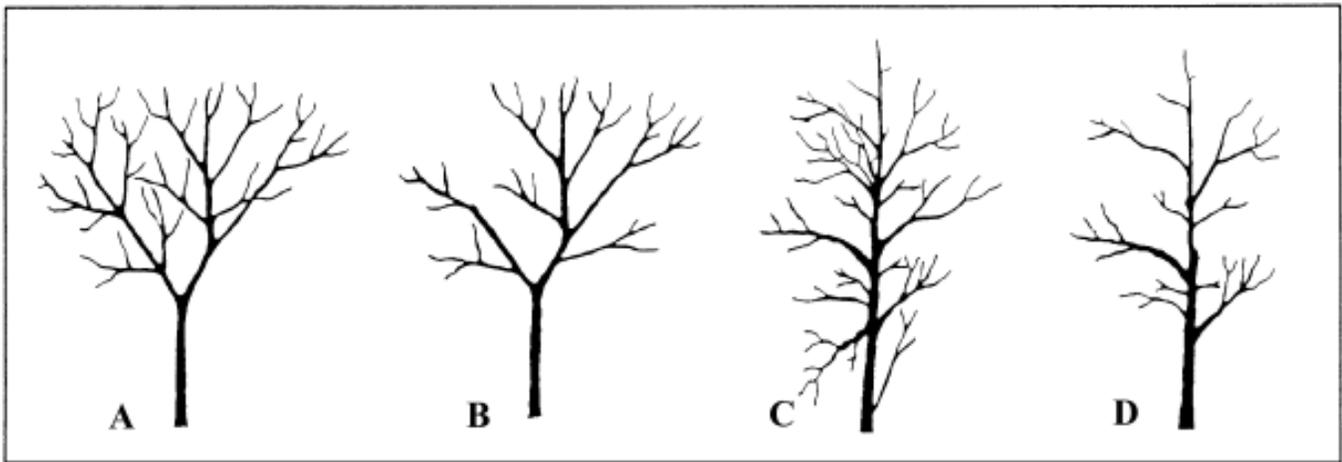


Figure VII-14. A & B) A tree maturing at less than 30' tall before and after pruning. No two permanent limbs should originate from the same point. Tree "A" has a bad fork which should be eliminated. Pruning the upright portion of the left fork now will slow the growth on that branch and encourage growth in a central leader. C) & D) A large-maturing tree before and after pruning. Permanent major branches are spaced 18-24" or more along the trunk. Always encourage central leader development. The central leader may be difficult to maintain higher than 8' from the ground in species such as live oak, royal poinciana, and jacaranda. These can be trained with several codominant stems spaced 24" apart.

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

The characteristic form of a tree should be known before any live branches are removed because, in many landscapes, little or no attempt should be made to significantly change the characteristic growth habit common to the species. 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. Permanent branches should be spaced between 6-24" apart on the trunk, depending on the ultimate mature size of the tree. For dogwoods, 6" spacing is adequate; whereas, for oaks, 18-24" spacing is best (Figure VII-14). Next, remove fast growing suckers at the base of, and along, tree trunks; or on large, interior limbs.

Young trees should be pruned to a single leader (stem) after locating the straightest and best leader to retain (Figures VII-1 and VII-15). Most trees can be grown in this form when they are young, but the growth habit

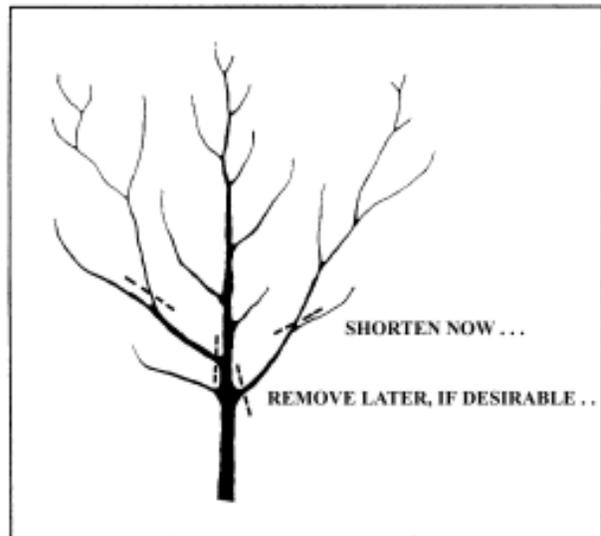


Figure VII-15. In forming the tree crown, remove lateral branches which grow upright. They will compete with the leader and form a weak, multiple leadered tree.

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. Crotches of 45 to 90 degrees from the vertical are less likely to split than narrow "V" crotches of less than 40 degrees. Branches with a narrow angle of attachment should be removed as soon as possible (Figure VII-16). Any branches that are 1/3

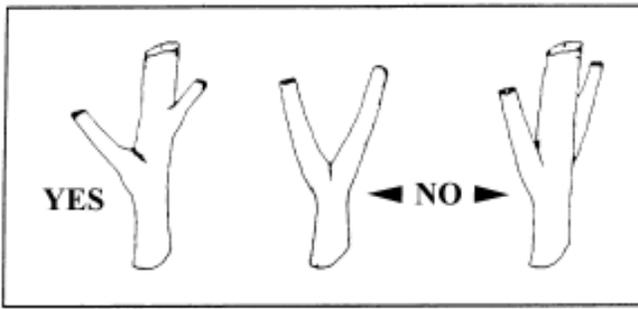


Figure VII-16. Angle of branch attachment. Select branches with a wide angle to the trunk, and remove those growing in a nearly vertical position. Forked trunks are dangerous. One of the forks should be removed as soon as it is recognized.

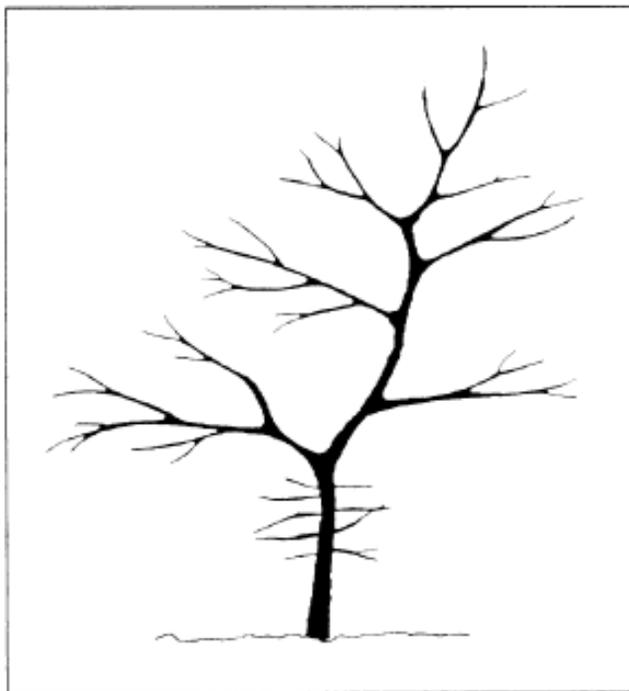


Figure VII-17. Prune branches along the lower trunk to 8-12" long twice each year. These temporary branches help produce a sturdier tree by increasing trunk diameter, and protect the trunk from accidental damage. They can be removed over a period of two years once the tree is two inches in diameter. Remove a lower temporary branch any time it grows larger than 1/4" diameter.

the diameter of the trunk or larger should be removed at once all the way back to the trunk.

When training a young tree, prune lower branches back to about 8" from the trunk (Figure VII-17); do not remove them entirely. Lower branches that are larger than 1/4" in diameter should be removed immediately. By keeping the lower, smaller diameter branches on the

trunk, the tree will grow faster, develop a thicker trunk, and the trunk will be better protected from sun burn and vandalism. Removing the lower branches too soon will result in a poorer quality plant. When the tree approaches 2" to 3" in diameter, remove temporary lower branches beginning with the largest diameter branches.

Removing Large Tree Branches

Large branches 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 VII-18). The second cut is made downward from the top of the branch about 18 inches from the main trunk 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 *branch collar* swelling on the lower side of the branch (Figure VII-19). This is usually accomplished by cutting at a right angle to the branch bark ridge (Figure VII-20). Research has conclusively shown that this causes extensive trunk decay because wood is cut that is actually part of the trunk. Flush cuts should never be made since they injure the trunk.

When large branches are cut, it is not always possible to cut to a distinct bud because the bark may obscure the dormant (latent) buds. In such cases, a large number of latent buds may begin to grow very rapidly, producing

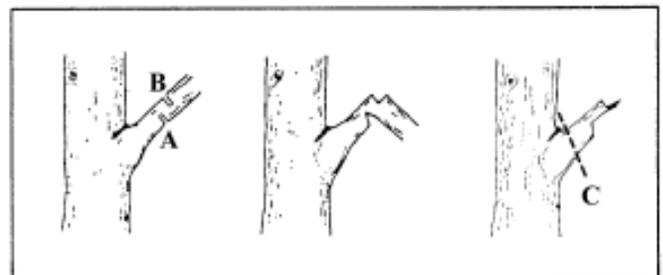


Figure VII-18. Removing a branch over 1-1/2" diameter. First cut at "A" until saw binds, then cut at "B" 2-4" beyond "A" until the branch falls, then at "C," outside of the branch collar (see Figure 19).

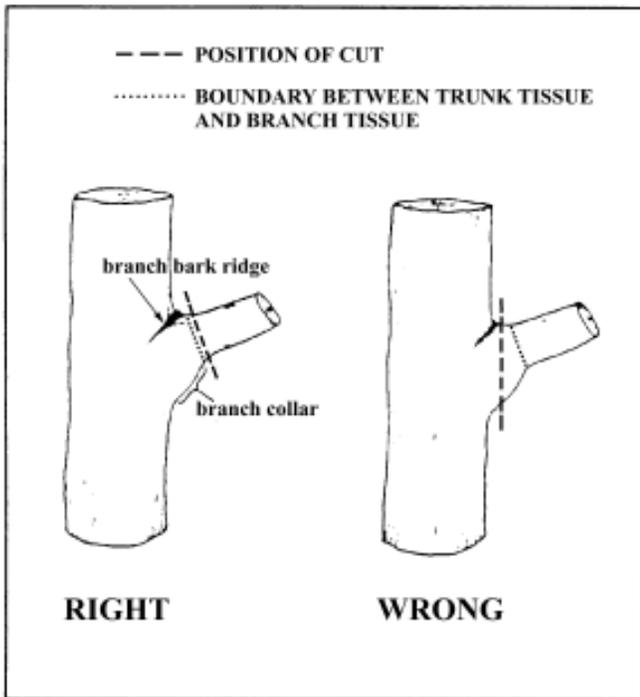


Figure VII-19. Correct and incorrect final pruning cut. All branches, large and small, should be cut in this manner. Do not cut into the branch collar. It is trunk wood, and the trunk can decay if this tissue is damaged. Begin the cut on the outside of the branch bark ridge. This ridge is usually rough and always darker than the surrounding bark and is fairly obvious on most species. Angle the cut so it ends just above the swelling (branch collar) beneath the branch. Never make a flush cut.

excessively vigorous shoots called watersprouts. These watersprouts should be thinned out, leaving the more desirable and properly located ones to become branches.

Painting wounds with tree wound dressing has become a controversial practice. The standard recommendation was to paint wounds with a quality tree wound dressing to protect the cut surface from wood rotting organisms and cracking upon drying. Research has shown, however, that wound dressings do not prevent decay. When exposed to the sun, the protective coating often cracks, allowing moisture to enter 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. In situations where aesthetics are important, the practice may be justified.

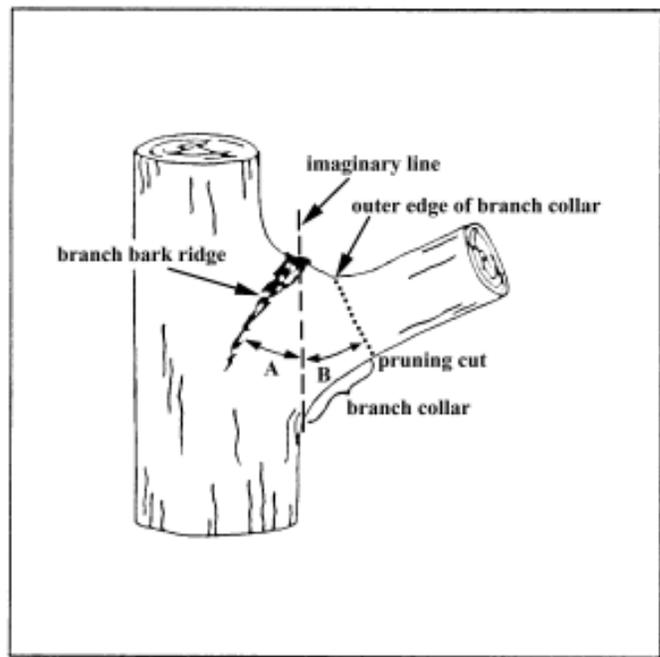


Figure VII-20. When the bottom of the branch collar is hard to see, estimate angle "A" by drawing an imaginary vertical line as shown above. Beginning on top of the branch at the outer edge of the branch collar, make pruning cut so angle "B" is the same as angle "A."

Pruning Palms

Care must be taken when pruning palms not to cut or otherwise injure the terminal bud, or the whole tree will die. Remove palm leaves by cutting them from the underside to avoid tearing the fibers of the palm's stem.

Several palm species retain their leaves (fronds) after they have turned brown. Other species look bedraggled when certain nutrient deficiencies appear in the older leaves. Old leaves that persist on palms, such as Washington palm, should be removed as they often harbor insects and rodents, may become a fire hazard, or simply are not aesthetically pleasing. However, palms naturally translocate nutrients to younger foliage from the browning fronds, and frond removal can deprive the tree of needed nutrients.

Palms such as royal palms shed their heavy leaves; if they are growing where falling leaves may be hazardous, remove them 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 that develops.

Repeated hurricane pruning produces a phenomenon known as "pencil top", a narrowed trunk just below the fronds. This weakens the palm and may cause premature death of the tree. To avoid problems associated with overpruning, remove only dead leaves, and do not remove fronds that are held above the horizontal.

Pruning Tools

Basic tools used in pruning are hand pruners, loppers, hedge shears and saws (Figure VII-21). Hand pruners are used for small branch and twig cleanup, loppers for branches up to 1/2" in diameter, pruning saws for larger branches and hedge shears only to trim closely clipped formal hedges. Both loppers and saws are available on poles that are handy to use in pruning difficult to reach branches.

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

Mulching

Mulches are desirable around many plantings because they help to moderate soil temperature, conserve moisture, reduce weed competition and improve appearance. Practically anything can be used as a mulch; the type to be used depends on personal preference, design considerations, availability and cost. Any mulch requires maintenance. Organic mulches decompose and must be renewed. Inorganic mulches must be cleaned.

Organic mulches should be kept a few inches away from the trunks of shrubs and trees to prevent stem rot. Initial application rates of organic mulches should be a minimum of three inches in depth with annual renewal of at least one inch of mulch. Refer to Table 4 to get an idea of the different types being used in the industry.

A large, aesthetically pleasing mulched area should be maintained around trees and shrubs. A general rule is to maintain a 2-foot diameter mulched area for each inch of trunk diameter on newly planted trees, i.e. a tree with a 2-inch diameter trunk would grow best with a 4-foot diameter mulched area.

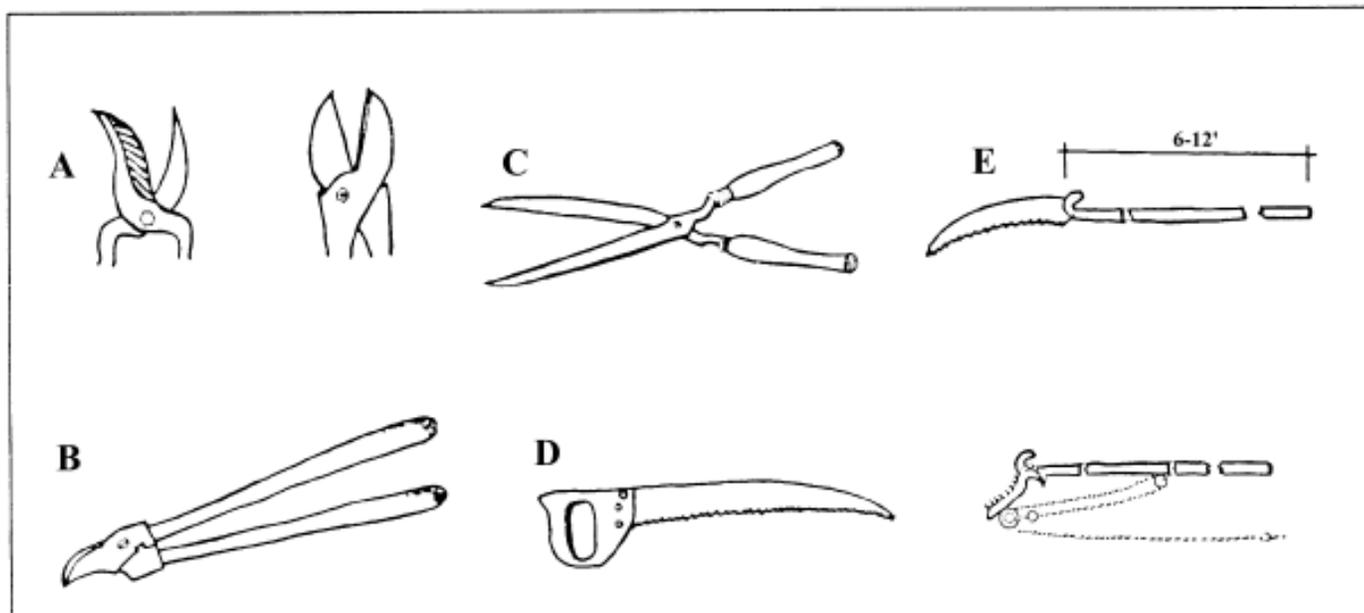


Figure VII-21. Pruning tools. A) Hand pruners are used to cut branches less than 1/4" in diameter. B) Loppers are used to cut branches up to 1/2" in diameter. C) Hedge and gas-powered (not shown) shears are used to shear formal hedges. D) Saws are used to remove larger branches. E) Both shears and saws are available on poles which are handy to prune difficult-to-reach branches.

The size of the mulched area can be increased as plant size increases. This mulched area promotes faster tree establishment by eliminating grass root competition for water and nutrients. Also, the maintenance of turf areas adjacent to plant trunks is not recommended because it is difficult to trim the turf without damaging trunks. However, other ground covers that are not such strong competitors for water and nutrients can be planted near trees.

Table 4: Common Mulches for Landscape Applications

<i>Mulch Type</i>	<i>Organic</i>	<i>Synthetic</i>
Cypress, Shredded and Chipped	X	
Pine Straw	X	
Pine, Chips and Bark	X	
Eucalyptus	X	
Melaleuca	X	
Other Hardwoods	X	
Deco Stone or River Rock		X
Lava Rock		X

Seasonal Color

Landscape firms have found installation and maintenance of seasonal color to be a major growth area for their businesses. Seasonal color equates to the use of flowering annuals and perennials. These plants, with their seemingly infinite variety of flower color and plant form, fit into almost any landscape situation. They provide that necessary touch of color to an often drab landscape. Container plantings can also add a splash of color to a porch, deck, or patio area.

Many plants commonly considered tropical foliage plants are now being used in the landscape to add color and interest in shady areas. These plants are more familiar to us when used indoors; however, they make excellent additions to our selection palette when they are used as annuals in the landscape setting.

Seasonal color is especially valuable in Florida. Many annuals and perennials bloom during winter months, contributing splendidly toward a colorful landscape. Other species grow and flower during the trying months of summer, persistently blooming through heat and heavy rains. The culture of seasonal color in Florida is different from that in most states, because Florida has three distinct climatic regimes. During winter, nights are cool with an occasional freeze in central and south Florida and frequent freezes in north Florida. In early spring and late fall, nights are cool. High night temperatures, heavy rains, and high relative humidity are typical during summer and early fall.

Careful attention must be given to these climatic

regimes to develop rotation schedules for seasonal color to be successful in Florida. Annuals must be planted two to three times per year to maintain the continuous vigor and color demanded in public areas. Although perennials and foliage plants are considered long-lived and relatively low-maintenance plants compared to annuals, they also require maintenance, such as dividing or thinning, and occasional replacement to eliminate unsightly plants.

Winter temperatures in many parts of the state are often not low enough to completely kill tender flowering and tropical plants. Although many of these plants may perform as perennials and grow outdoors for several years in mild climates, they should be treated as annuals and replaced periodically with new, vigorous, disease- and insect-free plants. This will eliminate tall, unattractive plants and prevent the buildup of pathogens and insects.

Planting sites should be tilled at least six inches deep before planting. Incorporate 2 to 3 inches of organic matter into planting beds to increase nutrient and water holding capacities of sandy soils common in Florida. A slow release fertilizer should be incorporated at planting time and repeated as necessary.

Buy young, healthy, pest free plants with dark green foliage; it is not necessary that plants be in bloom when purchased. Annuals in small pots may have pot-bound root systems; if planted intact, the root system will be slow to establish in the surrounding soil and plants will suffer moisture stress. Loosen and untangle the root system without breaking the soil ball prior to planting; plants will usually recover rapidly and become

established quickly as a result. Tall and spindly plants should be pruned to half their original size to produce more attractive plants with additional flowers.

Spacing of plants in a bed should be based on the mature size of a particular plant. Provide adequate room for growth to prevent crowding and lack of air circulation, which could induce disease. Use caution not to plant too deep; you should be able to see the top ½" of the soil surface when finished.

Allow plants to dry slightly between watering to encourage flower production. This will also reduce the overall plant height, discourage fungus from developing, and reduce excessive fertilizer release. Morning watering is strongly recommended.

The addition of seasonal color to the landscape will increase maintenance tenfold compared to turf. Infertile sandy soils, insects, and heavy rains often necessitate repeated applications of fungicides for disease control, insecticides for insect control, and fertilizer to maintain adequate nutritional levels. Additionally, annual and perennial plants must have spent flowers removed to extend the blooming period, a practice known as deadheading.

Weeds should be controlled either by hand weeding or mulching. Mulching materials should not come in contact with plant stems. The high moisture environment created by mulch increases the chances of stem rot, which can result in plant death. In many situations, mulching is not recommended for annual plantings, except at the outside edges or perimeter of the bed.

Disposal of Landscape Material

Lawn and landscape maintenance involves the removal of leaves, clippings, pruned branches and even whole plants. Careless disposal may spread invasive plants to areas where they don't belong. It may also spread insects and diseases.

Depending on the situation and local ordinances, several options are available to dispose of plant material. Living plant tissue can be destroyed on-site through burning, composting in bins or putting it in or under heavy plastic. Material may also be dumped in designated disposal areas.

Problem Solving

Problem solving is the activity in landscape management that requires the most knowledge and skill. The complexities of the environment with problems that can be caused by air, water, soil, light, temperature and pollution, as well as problems caused by insects, nematodes, plant pathogens, pets and humans, create an often baffling array of different plant ailments. Many of these problems are addressed in Chapter IV (Plant Problems). It may be beneficial to have a person who is assigned the special duty of inspecting plantings on a scheduled basis to detect problems before they can become serious. This so-called "scouting" for problems is one of the fundamental principles of Integrated Pest Management and Florida Friendly landscapes.

Sample Questions — Landscape Management Chapter VII

True-False:

61. Young trees are best pruned using the heading back technique.
62. The results of poor maintenance may not be immediately apparent, but may show up over a period of weeks, months or years.
63. Research has shown that staking can have undesirable effects on trees.
64. Regardless of how well designed or installed, a landscape is only as good as it is maintained.
65. Of the turfgrasses used in Florida, bermudagrass has the highest overall recommended cutting height.

Multiple Choice:

66. Mulch will not help which of the following:
 - A. Disease control
 - B. Moisture retention
 - C. Soil temperature
 - D. Weeds
 - E. Appearance
67. Thatch is:
 - A. An accumulation of dead roots
 - B. An accumulation of stolons and roots above and below the soil surface
 - C. An accumulation of live roots
 - D. An accumulation of plant material and organic debris between the soil and grass blades
 - E. None of the above
68. The best guide for determining when to mow grass is
 - A. Often enough so the grass never reaches mowing height
 - B. Often enough so the grass never exceeds 4 inches
 - C. Once a week
 - D. Often enough so you never remove more than 1/3 of the grass blade
 - E. None of the above

(continued)

69. The best time to verticut a lawn is
- A. In late fall or winter
 - B. In the spring with irrigation
 - C. In the summer rainy season
 - D. B or C
 - E. Any time
70. Plants that bloom on the current season's growth, such as roses and hibiscus, should be pruned
- A. While dormant or between flushes of growth
 - B. While actively growing
 - C. In March
 - D. Whenever they need it
 - E. In late fall

Note: A number of the questions from this chapter may be included in the Open Book section of the exam. These questions will involve the correct use of terms using your manual as a reference.