FLORIDA GUIDE TO ENVIRONMENTAL LANDSCAPING

Edward F. Gilman and Sydney Park Brown

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Why This Guide was Developed

Exciting changes are taking place in Florida gardens. People are seeking ways to have healthy, attractive landscapes using environmentally safe and energy conscious products and practices. Florida is blessed with a sunny, warm climate that provides nearly year-round growing conditions for our lawns and landscapes. The state receives over 50 inches of rain each year, but it's concentrated between June and October. At other times, there are drought periods and a need for irrigation. Fine weather also means high pest populations--insects, diseases, weeds and nematodes which enjoy this favorable climate as much as we do. This combination of factors has resulted in the significant use of fertilizers, water and pesticides. To complicate this scenario, we have sandy, well-drained soils which don't retain the water, fertilizer and some pesticides we apply. The unwise use of these materials may jeopardize the aquifers which provide more than 85% of our drinking water. During five to seven months of the year, the weather is hot and humid and we depend on air conditioning to stay comfortable. Residential energy use comprises almost 25% of the total state energy expenditure. Add to this the energy consumed in maintaining landscapes not just the fuel for power tools, but also the energy required to produce and transport equipment, water, fertilizers and pesticides. For these reasons, and others, it's important for every resident and visitor to realize that the way we design and manage our landscapes can have significant impacts on the state's environment.

This environmental landscaping guide is a package of research-based information which can help you design and maintain your outdoor home (Table 1). It supports and builds on the principles of xeriscaping. If it is designed and maintained with energy and the environment in mind, your landscape can reduce home heating and cooling costs by 30% and water bills by up to 50%. Another benefit is that attractive, healthy landscapes increase the value of your home (Figure 1a-- Invest in a good landscape design to increase the value of your property by up to 15%-- and Figure 1b. A house with a little

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The authors would like to thank the following for their contributions to this publications. Gary Knox, North Florida Research Center-Quincy, for direction and guidance in developing this guide. The authors wish to thank the numerous people who reviewed this guide prior to publication.
landscaping is less valuable than one that has a well-designed landscape.

How to use this GuideThere are four main sections in this guide - (1) "Planning a Landscape", (2) "Selecting Plants", (3) "Planting and Establishment", and (4) "Managing an Established Landscape". The "Planning a Landscape" section is written for those who are designing a new landscape or considering modifications to an existing one. The "Selecting Plants" section will show you how to identify which plants are most suited for your landscape, and will provide tips on choosing plants from the nursery. The "Planting and Establishment" section will show you the best techniques for installing a landscape and caring for it until it is established. The "Managing an Established Landscape" section is meant to be used as a guide for those maintaining an established landscape. Following the practices in this guide will help you create a beautiful yard, save you money, enhance the environment and help conserve energy, water and other resources. For more information about this topic, contact your local County Cooperative Extension Service Office about Environmental Landscape Management (see Appendix 1).

SECTION I - PLANNING A LANDSCAPE

*** Save time and money later with proper evaluation now *** Sketch the Property

Plants to Keep for Maximum Energy Savings

Determine Shade Patterns

Locate Areas with Hard Soil and Poor Drainage

Locate Utility Lines

Collect Soil for pH Testing

Coastal Concerns

Designing or Modifying the Landscape

*** Here are ways to reduce landscape maintenance *** Protect Your Trees

Prevent Soil Compaction

SECTION II - SELECTING PLANTS

Selecting Trees, Shrubs and Ground Covers

Select the Right Lawngrass

At the Nursery - Shop Tough

Select Plant With the Correct Form

Select Healthy Plants From the Nursery

SECTION III - PLANTING AND ESTABLISHMENT

Newly installed plants, particularly trees which are more than 2 inches in diameter, will require intensive management (especially water) to get them established. It's important to put adequate thought, time and money into this initial period. This effort will pay you back later in healthier plants. Planting Trees and Shrubs

Don't Prune at Planting

Newly Installed Plants Need T.L.C.

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Mulching

Watering and Fertilizing

When Can a Landscape Be Considered Established?
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Controlling Pests the Environmental Way
Integrated Pest Management
Check Plants Regularly
Work With Nature
Treat Problems Early
Spot Treat
Be Biorational
Mistaken Identity
Recycle, Reduce and Reuse Yard Waste

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FLORIDA GUIDE TO ENVIRONMENTAL LANDSCAPING

by

Edward F. Gilman and Sydney Park Brown

Authors

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Acknowledgements

The authors would like to thank the following for their contributions to this publications. Gary Knox, Associate Professor, Monticello Research and Education Center, for direction and guidance in developing this guide. The authors wish to thank the numerous people who reviewed this guide prior to printing.

Illustrations by: Ian Breheny and E. F. Gilman

Edited and designed by: Susan B. Grantham and Travis D. Green
1. Lantana
2. Dwarf Jasmine
3. Blue rug Juniper
4. Indian Hawthorn
5. Crape Myrtle
6. Schellings Holly
7. Winged Elm
8. Dwarf Burford Holly
9. Chinese Elm
10. St. Augustinegrass

The ENERGY EXTENSION SERVICE is a cooperative program between the FLORIDA ENERGY OFFICE and the FLORIDA COOPERATIVE EXTENSION SERVICE of the Institute of Food and Agricultural Sciences. The FLORIDA ENERGY EXTENSION SERVICE receives funding from the FLORIDA ENERGY OFFICE, DEPT. OF COMMUNITY AFFAIRS. The information contained herein is the product of the FLORIDA ENERGY EXTENSION SERVICE and does not necessarily reflect the views of the FLORIDA ENERGY OFFICE.
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INTRODUCTION

Why This Guide was Developed

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Fine weather also means high pest populations— insects, diseases, weeds and nematodes — which enjoy this favorable climate as much as we do. This combination of factors has resulted in the significant use of fertilizers, water and pesticides. To complicate this scenario, we have sandy, well-drained soils which don’t retain the water, fertilizer and some pesticides we apply. The unwise use of these materials may jeopardize the aquifers which provide more than 85% of our drinking water.

During five to seven months of the year, the weather is hot and humid and we depend on air conditioning to stay comfortable. Residential energy use comprises almost 25% of the total state energy expenditure. Add to this the energy consumed in maintaining landscapes — not just the fuel for power tools, but also the energy required to produce and transport equipment, water, fertilizers and pesticides. For these reasons, and others, it’s important for every resident and visitor to realize that the way we design and manage our landscapes can have significant impacts on the state’s environment.

This environmental landscaping guide is a package of research-based information which can help you design and maintain your outdoor home (Table 1). It supports and builds on the principles of xeriscaping™. If it is designed and maintained with energy and the environment in mind, your landscape can reduce home heating and cooling costs by 30% and water bills by up to 50%. Another benefit is that attractive, healthy landscapes increase the value of your home (Figure 1).

Xeriscape™ is a registered trademark of the National Xeriscape Council, Inc.

Table 1. This guide will show you how to design and manage landscapes in an environmentally sensible way. You will learn how to:

- Design and install your landscape
- Choose proper plants
- Reduce home energy use
- Retain wildlife habitat
- Conserve water
- Use fertilizers wisely
- Apply less pesticides
- Reduce, reuse and recycle yard clippings

1. This document was published as Circular 922, Florida Cooperative Extension Service, reviewed 3/91. For more information, contact your county Cooperative Extension Service office.

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SECTION I - PLANNING A LANDSCAPE

Determine What You Have

Save time and money later with proper evaluation now

Sketch the Property

The first step in designing a new landscape or modifying an older one is to determine the attributes and problems of the site. Do this by making a bird’s eye sketch on a large piece of graph paper (Figure 2). Your builder may be able to provide a plat plan for you. Show on the sketch the approximate location of property lines and existing or planned "hard" structures—the house, driveway, walks, deck or patio. Draw in the significant trees and plants you wish to keep on the site. Use this sketch to record characteristics about the site such as condition of existing plants, sunlight patterns, soil characteristics, water runoff and location of utility lines. Techniques for evaluating these are given below. This information will be extremely useful later when you choose and install plants.
Plants to Keep for Maximum Energy Savings

Trees and other plants can modify the effects of Florida’s hot and humid climate on your home. Determine the shading patterns cast by existing trees and shrubs onto the building. Save plants which shade the east or west walls to reduce air conditioning costs (Figure 3). Allow the winter sun to reach southern and western walls to help heat the home. This can be done by saving or planting deciduous trees and by pruning existing trees so sun light shines through or under them onto the walls. Shade the air conditioner unit for an additional 10% savings. Note where more shade may be needed.

A professional tree expert or urban forester can evaluate the health and soundness of trees. Do not save trees which are unhealthy, but consult local ordinances and landscape codes before removing them.

Determine Shade Patterns

During a sunny day note how many hours of direct sun each area of the landscape receives (Figure 4). Are some areas shaded all day or only in the morning or afternoon? Some shade loving plants will do poorly if they receive as little as an hour or two of afternoon sun, even during the winter. Many plants require sun for at least four or five hours each day. Remember, the sun is at it’s highest point in the sky in late June. In winter, the sun is low in the southern sky and will shine under trees which provided mid-day shade in June.

Locate Areas With Hard Soil and Poor Drainage

Compacted and poorly drained soils contain little oxygen--an element that plant roots need to survive and grow. Compaction results when vehicles or heavy equipment are parked or operated on the site.

Poor drainage can be a product of compaction or natural soil conditions. To check for compaction and drainage, dig several holes 18” deep in each section of the site (Figures 5 and 6 a). Compacted areas will be difficult to dig in. Proper soil preparation, plant selection and planting are essential in soils which are compacted or have poor drainage.

When rain occurs, study the flow of water across your property. Note where changes should be made in the slope of the land to prevent erosion and runoff.

Locate Utility Lines

To avoid damaging utility lines while digging, have the utility companies locate underground gas, water, sewer, phone, cable TV, and power lines (Figure 7). They will often do this free of charge. Above-ground power lines should also be noted as you will want to avoid planting large trees near them.
Collect Soil for pH Testing

The pH of a soil governs the availability of nutrients to plants and also affects the activity of soil microorganisms. If soil pH is alkaline, micronutrient deficiencies may develop on some plants. A pH test should be conducted in two or three areas of your lot wherever the soil color or texture appears distinctly different, or where special gardens or plants will be grown (rose bed, vegetable garden, etc).

Dig about 10 small holes in each area of the yard with a trowel or shovel (Figure 8). Remove a slice of soil from the side of each hole from the surface down to 6 inches deep. You might choose to use a soil coring device to collect the samples if one is available. Mix the soil together in a plastic bag or jar. Contact your local County Cooperative Extension Service for more information on soil testing. See Appendix 1 for
As you dig the cores, take note of the color and texture of the soil. Indicate on your landscape sketch which areas contain loose, sandy soil, which contain limerock and which contain dense clay or other types of soil (Figure 8). This information will help you later in your irrigation and site preparation decisions.

The office nearest you. The test report will include corrective measures for adjusting the pH if required.

Coastal Concerns

If you live near the coast, you should identify the areas of your landscape which receive salt spray during storms or high winds (Figure 9). You should also test well water used for irrigation to determine the level of salts. Coastal wells contaminated by salt water can damage many plants. Most County Cooperative Extension Service offices or local labs can conduct this simple test.

Designing or Modifying the Landscape

Here are ways to reduce landscape maintenance.

Protect Your Trees

Trees provide enormous benefits to the landscape and the environment (Table 2). Save healthy trees and other existing vegetation because less maintenance and little irrigation will be needed (Figure 10).

If you are fortunate enough to have existing trees on your site you must protect them from the devastating effects of land alteration, fill, soil compaction and building construction. Homeowners are frequently dismayed when the trees on their lot begin to die. They often end up paying twice for the trees — when they buy the lot and again when dead trees are cut down.
Table 2. Benefits trees provide are that they:

- Lend permanence to landscape
- Cool air temperature
- Reduce the “greenhouse effect”
- Produce oxygen
- Provide homes and food for wildlife
- Prevent erosion and runoff
- Reduce home energy costs
- Healthy trees increase property value
- Offer pleasant setting for outdoor activities.
- Intercept air pollution

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Figure 10b. Trees with severely damaged bark can become hazards and should be removed.

Figure 11 illustrates diagrammatically what the root system of a tree looks like beneath the soil. Notice that more than half the root system is outside the leaf canopy of the tree. Also note the fine roots are located within several inches of the soil surface. This emphasizes the need for protecting roots, especially beneath the canopy. If roots beneath the canopy are left undisturbed, the tree has a good chance of surviving, provided it is irrigated regularly during and following construction.

Do not store or spread *any* amount of soil beneath the canopy of the trees which are to be saved (Figure 13). Be sure that soil grade changes do not channel water toward these trees. Both activities suffocate and kill roots. The trees usually die, although it may take them several years to die.

Trees which were not adequately protected are often attacked and killed by borers. These insects prefer stressed trees. Look for small holes in the bark or the characteristic pile of fresh, light colored saw dust or frass at the base of the tree. The best treatment is to cut down the tree, dispose of the wood and treat the bark of nearby trees with a pesticide labeled for borer control. This will help prevent the spread of the insects to nearby trees.

Figure 13a. Consider removing a tree if heavy equipment is operated beneath the canopy. Much of the root system was damaged and the tree will eventually die.
**Prevent Soil Compaction**

Compacted soils damage existing trees and retard growth of new plants. The only way to prevent this is to eliminate all vehicular traffic from the site. Since this is not practical, reduce the effects of construction equipment by confining vehicles to one or two well marked paths on the site.

Spread a 6-10 inch layer of mulch over the paths. For maximum protection, cover the mulch with steel plates. If vehicles must pass beyond the paths, insist that the vehicle drive on a cushioning layer of mulch. This mulch can later be used in the landscape beds. Also, don’t store construction and grade changes, construct sturdy fences outside their canopies to ensure enough roots are left undisturbed.
equipment or materials under trees (i.e. block, brick, lumber, etc.) and don’t park cars and trucks beneath trees. If the site is compacted during construction, trees will often decline or die over a period of several years.

**Landscapes to Fit Your Lifestyle**

Decide how the landscape is or will be used and prioritize your needs (Table 3). You can install the landscape in phases over a period of years according to these priorities. Consider the trade-offs of initial cost versus maintenance. For example, decks or patios provide extra living space for your family and cost from several hundred to several thousand dollars. Will the low maintenance costs of these structures offset the initial cost?

<table>
<thead>
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<th>Table 3. Possible landscape uses.</th>
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<td>Fruit Garden</td>
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<td>Picnic area</td>
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<td>Children’s play area</td>
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<td>Outdoor entertainment</td>
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<td>Water garden</td>
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<tr>
<td>Pet area</td>
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<td>Wildlife habitat</td>
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**Create the Design**

Once you have examined your landscape site and prioritized your needs, you are ready to create the landscape plan. A well designed landscape allows you to efficiently use and maintain it and adds beauty to the yard. Landscape design advice, books, computer programs and brochures are available through book stores, garden centers, the Cooperative Extension Service and libraries. Or you may wish to hire a professional landscape designer or landscape architect to prepare the plan.

People often wonder which plants are best for reducing landscape maintenance. However, an appropriate landscape design is as much or more responsible for reducing maintenance as proper plant selection.

To get started, place tracing paper over the sketch of your property and draw in a rough design. First draw in the bed lines (the line separating the lawn from the landscape beds), then add the trees, ground cover and shrubs. You will probably have to sketch several before you create the right one. A lawn area plays an important role in the landscape due to its high resistance to wear. Therefore locate it where it serves that function: children’s play and yard game areas, and as access to other parts of the landscape.

Arrange lawn areas so their width is at least half their length. Place the lawn in the center of the yard, surrounded by ground covers and shrubs. This looks attractive and allows for more efficient irrigation. Don’t use grass on steep slopes or in narrow strips where it will be difficult to mow and irrigate. Use ground covers or low growing shrubs instead. Also, design the size and shape of the landscape beds so they can be irrigated efficiently.

Figure 14 suggests two designs for the same property based on different lifestyles. The working or retired couple may use the landscape primarily for entertaining. They may have little time for or interest in maintenance and upkeep. A small turf area to set off the landscape combined with lots of ground cover and shrubs may be suitable. The family with children may need a play area and a larger lawn area.

Design flaws can be easily spotted and corrected by hiring a reputable landscape maintenance firm to review your design before it is installed. This might reduce costs
and simplify maintenance. Be sure not to make the mistakes shown in Figure 15.

Consider two designs created for the same backyard. The traditional one provides a spacious lawn area for recreational games. This design could be suitable for the family which requires a large lawn area for sports or other activities.

Fig 14b. This design may be more suitable for the family with children because it has a larger lawn area.

A low maintenance landscape (Figures 16 a-c) provides a smaller lawn area. Mowing time, pesticide and irrigation costs will be further reduced in this yard if pest resistant, low water requiring plants are installed. This landscape also includes flowering trees and shrubs, and a deck and patio which can be used for outdoor entertaining. Initial cost would be higher, but less regular maintenance would be required in this yard. Wildlife would be more attracted to this yard because of the diversity of plants.

Fig 15. Reduce maintenance by avoiding design pitfalls.
(see 15b for key to design pitfalls)

Fig 15b. Key to design pitfalls
1. Locate large trees at least 5-feet away from curbs and sidewalks to avoid damage.
2. Locate trees in beds or mulched areas to avoid difficult mowing conditions.
3. Smooth out bed lines. Wavy lines often distract from an otherwise good design.
4. Don’t place obstacles in the lawn, put them in beds.
5. Large shrubs in the parking lot block visibility.
6. Eliminate narrow strips of grass. They add to mowing costs and are difficult to irrigate.
7. Don’t complicate the design with too many kinds of plants.
8. Allow at least a 10 X 10 foot soil-area for proper tree growth. Trees planted in small areas grow poorly or raise the curb.
9. Eliminate individual shrubs growing in lawn. They increase maintenance and distract from a good design.
10. Locate annuals in beds, not in the lawn.

Design for Water Conservation

Most trees and shrubs are relatively drought tolerant once they are well established. Grasses such as bahiagrass and centipedegrass are also drought tolerant. Despite this, there may be dry times during the year when even these plants need supplemental irrigation.

Many annuals and some other plants require frequent watering. Florida rainfall amounts to over 50 inches of rain a year, but it’s concentrated in the summer. Irrigation to supplement rain is often desirable or
necessary during periods of low rainfall.

**Water efficient landscape design** - Irrigation can be applied efficiently, only if the landscape and the irrigation system are designed properly. Group plants with similar water requirements together so that they can be irrigated together and water will not be wasted on plants that don’t need it. For example, placing azaleas, which require shade and more irrigation in the same bed with junipers which are drought tolerant and require full sun will waste water and demand more maintenance. The drought tolerant junipers will be over watered and unhealthy.

**Mass planting** - Planting large areas with the same kind of plant looks nice and allows for efficient irrigation and maintenance (Figure 17 a). A large mixture of plants in one area of the yard is difficult to maintain, wastes resources and can look messy and unorganized. Leave areas of undisturbed native vegetation, since they require almost no irrigation (Figure 17 b).

Efficient irrigation systems - Consider how you will irrigate the landscape as you design it. If you select a permanent, in-ground irrigation system, it should be installed before the landscape plants. Employ the services of a qualified landscape irrigation designer/installer to ensure purchase of a properly designed, properly installed, and efficient system.

Multi-zoned systems - The most efficient system waters the lawn separately from beds of ground covers, shrub beds or tree groupings. In addition, use separate zones for shady and sunny areas since plants in sunny areas require more frequent irrigation during the summer. A multi-zoned system allows you to water only those areas that need it. This saves significant amounts of water and energy. Remember that annuals and other plants requiring frequent irrigation should be located so they can be watered easily with a hose, with a separate irrigation zone, or with a micro-irrigation system (Figure 18).

You will pay extra to install this more sophisticated design.
Fig 18a. Water conserving landscapes can include color. Impatiens require frequent irrigation.

Fig 18b. Other plants provide year-round color (lantana) with little irrigation.

Micro-irrigation system - A micro-irrigation system is another way to water efficiently. Water is dripped or sprayed at the base of plants through small nozzles called emitters (Figure 19). They conserve water by dispensing it at a slow rate. Poor water quality or debris can clog up these emitters, so they need to be checked frequently. A micro-irrigation system can be used to irrigate shrubs, ground covers, annuals, and fruit and vegetable gardens.

Fig 19. Save water by installing a micro-irrigation system.

Group plants together with similar water requirements.

Micro-irrigation kits are available at many home and garden stores and are easy to assemble. Many can be simply connected to hoses or faucets. More sophisticated systems can be designed and installed by a professional. Contact an irrigation or plumbing supply store that sells the equipment.

Operating an irrigation system - Time clocks are not needed to operate an irrigation system efficiently. You (not a time clock) are the best judge of when plants in a particular area of the yard need water (see page 20, Section IV - "Managing an Established Landscape - Water — the Misunderstood Resource"). If you have a well-designed system, you can irrigate only those areas which require water on a given day.

If you want the system controlled automatically, purchase a time clock which will allow you flexibility in scheduling. However, set the time clock to "off" and manually switch on the system only when you determine that plants need water. Only operate those zones containing plants that need water that day. Unfortunately, many inexpensive time clocks water every zone every time the system comes on. This is usually unnecessary and wastes water and energy. The "automatic" setting on the time clock is useful when you will be away from the property for more than a few days.

How often have you seen a sprinkler system operating in the rain? This obvious waste of water can be prevented by installing a rain shut-off device. This device overrides the system and prevents it from turning on in the rain. It is relatively inexpensive and easy to install, even on an existing system.
Modifying an existing irrigation system - You don’t have to live with the existing irrigation system. Have an irrigation specialist evaluate the system for efficiency. Sometimes small modifications such as installing a different type of sprinkler head, replacing worn out heads or redesigning a portion of the system can eliminate needless water waste. Read page 9, Section I - "Design for Water Conservation" for details on efficient irrigation design.

Design for Energy Conservation

A home or other building can be made more energy efficient by planting trees, shrubs and vines on the east and west sides to shade the windows and walls (Figure 3). Vines trained to grow on a trellis placed about 1 foot from the house will shade a wall. Small to medium sized trees and shrubs planted within 20 feet of the home will provide shade within five years. Trees planted close to the home provide more benefit because they shade for a longer period of time during the day and over a greater part of the summer season.

Trees and well placed shrubs combined with good building insulation can reduce energy consumption in the Florida home by up to 30%.

If you depend on air conditioning to cool your home, divert breezes away from the house to save energy. A windbreak can be designed along the side of the home receiving the breezes. Shrubs can be planted close to walls to create a dead air space that will also reduce the cost of heating and cooling the home (Figure 20).

Preparing the Site for Planting

Break up Compacted Soils

Compacted soils can be rototilled, but avoid doing this beneath the canopy of existing trees. Significant root damage will occur and the tree may die. A coring machine or pitchfork can also be used to aerate compacted soil. If the site is located in a low area where surface water collects from surrounding areas, rototilling will not help. Correct the effects of poor drainage with underground drains, diversion ditches or adding soil to raise the land. Or you can plant trees and shrubs which tolerate wet sites. Be sure not to divert water where it will stand near existing trees because this could kill them. Consult page 16, "Section III - Planting and Establishment" for additional tips.

Ideally, top (fill) soils brought onto the site should be mixed together before they are spread. This helps prevent problems caused by layering of different soil types. It is costly but will reduce landscape maintenance. If this is not practical, fill soils should be as uniform as possible. The texture of the fill soil should be about the same as or slightly coarser than the texture of the existing soil. If different types of fill soil are used, the landscape will probably require more labor to maintain due to their different moisture and nutrient holding capacities (Figure 21).
Reduce Water-runoff

Water running off the site can carry soil, pesticides and fertilizers which contribute to environmental degradation. Grade (shape) the soil surface to minimize runoff. Installing gutters along the roof can also reduce water runoff from the landscape. Direct the water to a dry well or other area that collects water so it percolates through the soil and doesn’t run off the site. Shallow ditches can be constructed to direct the flow of water. Direct it away from poorly drained areas. Eliminate berms, mounds and slopes by constructing a terrace. Building retaining walls helps to level the site allowing water to percolate through the soil instead of running off. They can add to the attractiveness of the yard if they are properly designed and installed (Figure 22).

Improve the Soil

It is difficult to improve most Florida soils. The exceptions are limerock soils or areas with very restricted soil space. The latest information indicates that organic soil amendments decay quickly and provide only short-term improvements in nutrient- and water-holding capacity. Annual plants like vegetables and flowering annuals can benefit from peat and compost that is mixed into sandy soil before planting. Colloidal phosphate, a byproduct of phosphate mining, can be used as an inorganic amendment for sandy soils. Its improving effects can last 10 years or more. Synthetic soil amendments also are being developed and may be useful in the future. If soil amendments are used they should be mixed into the top 6-12 inches of large areas of soil before planting.

Low, acidic pH can be corrected with dolomite or lime. Alkaline soil, with a naturally high pH cannot be corrected permanently by any practical means. Unless the high pH was caused by overliming, applications of elemental sulfur will provide only a temporary drop in soil pH. This could help prevent nutrient deficiency symptoms by allowing uptake during this short period of time. A better solution is to use plants that tolerate high pH.

SECTION II - SELECTING PLANTS

Choosing Plants for the Landscapes

Selecting Trees, Shrubs and Ground Covers

Now you are ready to begin selecting specific plants for your landscape design. To some, the ornamental benefit of a plant requiring high maintenance is worth the extra care. Others would be better off selecting a different plant which might provide the same ornamental or functional benefits at a fraction of the maintenance.

One common mistake is planting a fast-growing shrub for a hedge. The plants grow to the desired size rapidly, but you will pay for this convenience with frequent pruning (Figure 23). A better alternative is to choose a moderate- or slow-growing plant.
Match plants to the site (Table 4). Begin in Step 1 by checking the site characteristics which match those found in the specific areas where you will be planting. Remember that site characteristics can differ for different parts of the same landscape. Proceed to Steps 2 and 3 and select characteristics which you would like your plants to have. Now develop a plant list and make your final selections in Step 4. See Figure 24 and the front and inside cover for an example of the plant selection process.

**Select the Right Lawngass**

Select a grass according to the site characteristics, its anticipated use and maintenance requirements (Table 5).
large-growing trees which have two or more trunks because these can become hazards as the tree grows larger (Figure 26b). Except for small-growing, multi-stemmed plants such as crape myrtle and ligustrum, select specimens with a single trunk and spreading branches (Figure 26c). Do not purchase any shrub or tree with injury to the trunk.

Select Healthy Plants From the Nursery

Healthy plants establish quickly in the landscape. Plants in poor health attract pests and require more maintenance. Examine the leaves and shoots. Plants with yellow or spotted leaves should be rejected (unless this is a normal characteristic of the plant). Select those which have an abundance of leaves. Never install sod or plants which contain weeds or which have diseases or insects. This is one way that various pests are introduced to your site (Figure 27).

Slip the container from the root ball. The root ball should stay together but be somewhat pliable when the container is removed. Do not purchase pot-bound plants. A pot-bound plant has many roots circling around the outside of the root ball, or the root ball may be very hard (Figure 28). These plants may have trouble establishing, and the circling roots may choke it as it grows older.
Table 5. Lawngrass selection guide.

<table>
<thead>
<tr>
<th>Turfgrass Name</th>
<th>Drought tolerance</th>
<th>Salt tolerance</th>
<th>Shade tolerance</th>
<th>Wear tolerance</th>
<th>Maintenance level</th>
<th>Establishment methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahiagrass</td>
<td>Excellent</td>
<td>Very Poor</td>
<td>Poor</td>
<td>Good</td>
<td>Low</td>
<td>Seed, Sod</td>
</tr>
<tr>
<td>Bermuda-grass</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Very Poor</td>
<td>Excellent</td>
<td>High</td>
<td>Sod, Sprigs, Plugs, Seed</td>
</tr>
<tr>
<td>Carpet-grass</td>
<td>Very Poor</td>
<td>Poor</td>
<td>Fair</td>
<td>Poor</td>
<td>Low</td>
<td>Seed, Sprigs</td>
</tr>
<tr>
<td>Centipede-grass</td>
<td>Good</td>
<td>Poor</td>
<td>Fair</td>
<td>Poor</td>
<td>Low</td>
<td>Seed, Plugs, Sprigs</td>
</tr>
</tbody>
</table>
| St. Augustinegrass | Fair       | Good           | Good (Cultivar
dependent) | Fair          | Moderate         | Sod, Plugs, Sprigs   |
| Zoysia-grass   | Excellent         | Good - Excellent | Fair          | Excellent     | High             | Sod, Plugs, Sprigs   |

Fig 26. Buy quality trees. Avoid large-growing trees with, a) only upright branches, or b) double or multiple trunks. c) Select trees with a central trunk.
Fig 27. Don’t buy plants which look off color or those with weeds in the root ball.

Fig 28. Avoid pot-bound plants.

SECTION III - PLANTING AND ESTABLISHMENT

Newly installed plants, particularly trees which are more than 2 inches in diameter, will require intensive management (especially water) to get them established. It’s important to put adequate thought, time and money into this initial period. This effort will pay you back later in healthier plants.

Planting Trees and Shrubs

Two of the most common causes of poor plant establishment are planting too deep and under or over watering.

The planting hole should be as deep as or slightly shallower than the root ball of the plant (Figure 29). Disturbing the soil beneath the plant may cause it to settle too deep in the soil. Never plant so the top of the root ball is below the surface of the soil. In poorly drained soils, dig a hole only 2/3 as deep as the root ball and construct a mound or berm to cover the sides of the root ball. Newly installed plants (except aquatics) will not grow if they are inundated by water on a regular basis.

Installing Individual Plants

Dig the hole 2 to 3 times the diameter of the root ball for planting individual trees and shrubs. Prior to planting trees in compacted soils, also rototill the area prior to planting 10-15 feet or more in diameter around the tree. This will help the plant become established because the lateral roots will grow rapidly into the loosened soil.

After placing the root ball into the planting hole, backfill with existing soil. According to the best information now available, amendments incorporated only into the planting hole around trees and shrubs generally provide no benefit, except when planting in limerock or in other areas with very restricted soil space. In this case, obtain good soil to fill in around the root ball to allow roots to grow out of the root ball. Construct a soil ring around the edge of the root ball to hold irrigation water (Figure 29).

Installing Groups of Plants

The best way to prepare the soil for a group of shrubs or ground covers is to loosen the entire bed to a 6 to 12 inch depth. The backfill soil added to the planting hole need not be amended. However, there may be some benefit to amending the entire planting bed (see page 12, "Section I - Preparing the Site for Planting-Improve the Soil"). Then dig holes to accommodate the root balls and backfill with soil.
Fig 29. a) Never plant trees or shrubs too deep. b) In most soils the top of the root ball should be planted even with the soil line. c) In poorly-drained soil, 1/3 of the root ball should be above grade.

**Don’t Prune at Planting**

Do not prune the plant to compensate for root loss at planting. The latest research indicates that this does not help the plant overcome transplanting shock as long as the plant receives adequate irrigation. Begin pruning for structural development 6 to 12 months after planting (see page 26, “Section IV - Managing an Established Landscape - Pruning”).

**Newly Installed Plants Need T.L.C.**

**Staking**

Many container-grown trees or those moved with a tree spade do not require staking. Read this section to determine if staking is needed. If not, don’t use them. There are 3 types of staking, each used for a different purpose: protective staking, support staking and anchor staking.

**Protective staking** serves to protect the tree from accidental injury from lawn maintenance equipment. Three or more stakes are driven into the ground several feet from the trunk, but they are not attached to the tree. These stakes can remain indefinitely.

**Anchor staking** is used to hold the tree upright in the soil until roots grow to sufficient length and density to anchor the tree. These are required when the tree is top heavy and the root ball tilts when the wind blows. In most instances, these should be removed within 1 year after planting. If anchor stakes are required for more than a year, there is a problem with the tree.

**Support staking** is used to hold a weak trunk straight, in the upright position. Trees grown under poor nursery practices often require this type of staking. The best alternative to support staking is not to plant trees which have a weak trunk.

The trunk should be secured to the anchor or support stake with material which is wide and smooth. This will damage the trunk less than any other type of securing mechanism. Wire threaded through garden hose is frequently used to secure the trunk to the stake. This system of attachment can damage the trunk as it moves in the wind and rubs against the hose. It can also begin to girdle the tree if it is not removed 6 to 12 months after planting.

**Mulching**
For maximum benefit, apply mulch in a 3-inch deep layer (Table 6). Mulch entire beds of shrubs and ground covers. When planting trees, create a circle of mulch about 2 feet in diameter for each inch of trunk diameter (Figure 30). Increase the size of the mulched area as the tree grows. This technique will establish a tree quickly by eliminating competition from turf and other plants. Pull mulch 1 to 2 inches away from tree trunks and shrub stems to prevent moisture from promoting bark decay.

**Table 6. Benefits of mulch.**

- Reduces water loss from soil
- Insulates soil temperatures
- Enhances root growth
- Inhibits weed growth
- Adds a finished look to landscape

Plant annuals close enough together (8 to 10 inches apart for many, see instructions on the plant tag) so that the plants will touch each other within 3 to 4 weeks. Mulch will not be needed because weeds will be shaded out.

Organic mulches provide the greatest benefits (Table 7). From an environmental standpoint, the best organic mulches are "renewable" (shed leaves and pine needles), "by-products" (pine bark, pecan hulls, etc.) or "recycled" (chipped or composted yard wastes, etc.). The most environmentally sound and least expensive mulch is compost, chipped branches or leaves generated on the property.

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**Watering and Fertilizing**

When new plants die, blame is often placed on "bad plants" or pests. However, many plants die from too little or too much water during the first few months after planting. Specific recommendations for watering are impractical due to varying soil and environmental conditions around the state. You must determine when to water by familiarizing yourself with the characteristics of your site. Strive to maintain constant moisture in the root ball, but avoid keeping it saturated.

The first few weeks after planting, apply small amounts of water to the root ball every day. Ask the nursery operator how much was applied and apply this amount. Plants installed during the cooler months may need less frequent irrigation, depending on the weather. One week after planting, gently dig a small hole just outside of the root ball to check soil moisture. Squeeze some soil in the palm of your hand. If water drips out between your fingers, you are watering too much (Figure 31 a). If the soil stays together as you open your fingers, soil moisture is just right (Figure 31 b). If the soil crumbles and falls out of your hand as you open your fingers, you are watering too little (Figure 31 c). Several weeks or months after planting, you may be able to cut back irrigation to every other day or every third day. Gradually decrease the frequency of irrigation.
In a well drained sandy soil, it may be beneficial to water large trees and shrubs (1”-3” trunk diameter) almost daily for several months or more. Gradually increase the area irrigated around recently installed trees and shrubs to accommodate root growth. Roots of trees and shrubs grow about 1 inch or more per week during the first 2-3 years after planting.

Apply a small amount of slow-release fertilizer to the top of the root ball 4 to 6 weeks after planting. Annuals generally benefit from an application of slow-release fertilizer immediately at planting.

WHEN CAN A LANDSCAPE BE CONSIDERED ESTABLISHED?

Established plants are tolerant of drought and other adversities. See Table 8 for general guidelines.

Table 8. Time required for landscape establishment.

<table>
<thead>
<tr>
<th>Plant</th>
<th>Size</th>
<th>Time to establish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees</td>
<td>all sizes</td>
<td>6 to 12 months per inch trunk diameter</td>
</tr>
<tr>
<td>Shrubs and ground covers</td>
<td>1 gallon container</td>
<td>6 to 12 months</td>
</tr>
<tr>
<td></td>
<td>3 gallon container</td>
<td>1 to 2 years</td>
</tr>
<tr>
<td>Grass</td>
<td>sod</td>
<td>1 month</td>
</tr>
<tr>
<td></td>
<td>sprigs/plugs</td>
<td>3 months</td>
</tr>
</tbody>
</table>

SECTION IV - MANAGING AN ESTABLISHED LANDSCAPE

Determine What You Have

The maintenance of a landscape can have significant impacts on energy and water consumption and on the environment. The following guidelines are designed to reduce pesticide, fertilizer and water use, and protect the environment. The result will be a healthier, lower maintenance landscape and much less work on your part. The dollar savings can be significant too!

You should start with a map of your property. Write the plant names on the map. If you do not know them, take samples to a local nurseryman, landscape consultant
or County Cooperative Extension Service office (see Appendix 1 for the office nearest you).

**DEVELOP A PREVENTIVE MAINTENANCE PLAN**

Preventive maintenance works as well for plant health as it does for human health. However, preventive maintenance does not mean to apply cover sprays to the entire landscape as was practiced in the past. A landscape will be healthier and more problem free if some simple principles are recognized:

1. The landscape is an ecosystem. A natural "balance" can be achieved if the landscape is designed and managed properly. This means less maintenance inputs from you.

2. A few problem plants can demand lots of time & resources. Remove plants which are not growing well because they are not adapted to existing conditions, or are insect or disease infested. Replace with hardy, pest resistant ones.

3. Fertilizer, water and pesticides are best applied on an as needed basis.

4. Cultural practices affect each other and the environment. The way you water affects fertilizer usage. The way you fertilize affects pest populations. Mowing affects irrigation requirement, weed infestations and so on. The following sections will show you how to manage a landscape.

**Maintain Your Mulch**

The cost of mulch is quickly recovered in labor saved and plant benefits (for benefits and precautions, see page 17, "Section III - Planting and Establishment". "Newly Installed Plants Need TLC").

Mulching reduces maintenance time and costs.

It’s important to maintain mulch by replenishing it as it degrades (Figure 32). Mulch may need replenishing every year or two in some areas. Apply it so you have no more than a 3-inch thick layer around trees and in landscape beds. Shallow plant roots grow up and into the moist mulch and they will die if the mulch is allowed to decay or wash away. There is no need to add additional mulch for a "freshened" look. Gently rake the existing mulch to expose the layers underneath.

Shrub and ground cover beds located close to or beneath trees receive leaves and other debris from the tree. Often, this eliminates the need to add additional mulch in these areas. Leaves raked from the lawn can be spread in these beds for additional cover. Beds which are not close to large trees may need additional mulch every year or two.

**Water - The Misunderstood Resource**

**Problems Caused by Overwatering**

The most prominent environmental issue in Florida is probably water (Figure 33). It’s use is regulated throughout the state to help ensure continued, high quality supplies of water. More than 85% of our drinking water comes from aquifers below ground, and they can be impacted by landscape maintenance and other land use practices.
Many people irrigate with the philosophy that "if a little is good, more must be better". We all know that plants need water to survive, but you may not realize how overwatering increases problems for you, your plants and the environment (Table 9).

Table 9. Consequences of overwatering.

- Increases landscape maintenance costs
- Wastes water
- Promotes plant disease
- Increases weed infestation
- Increases mowing/pruning requirement
- Leaches fertilizer and some pesticides

**Landscape plants** - The best way to determine when to water is to check the plants for wilting. If a plant continues to wilt into the evening hours, water it the following day (Figure 34). Some, like impatiens and coleus, regularly wilt during the heat of the day, but no amount of water will prevent this.

During a summer drought some established plants (see page 19, Table 8) growing in sandy soils in full sun may need water every 3-5 days. The same plant growing in a little shade or in a heavier soil may only need water once a week, or less.

Some plants wilt before others do and require more frequent irrigation. Drought tolerant plants need less frequent irrigation. It is wasteful to turn on the whole irrigation system just to satisfy a few wilting plants. Instead, hand water only those that need it with the hose or with a portable sprinkler. Better yet, relocate these plants with other "thirsty" plants and allocate a separate

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**Fig 33.** Home uses of water. As much as 50% of residential water use is for irrigation, pools and other outdoor uses.

No established plant (including grass) ever needs daily irrigation. Irrigation during the summer is not normally required for at least 3-5 days following a rainfall (or irrigation) of at least 1 inch. You can wait much longer during the cooler months, or in a heavier soil. For this reason, it is important to have a rain gauge. This could be any straight-sided container or a purchased device placed in an open area of the landscape.

**Fig 34.** Water plants when they remain wilted into the evening hours.

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**Household water use**

- **Outdoor 50%**
- **Toilet 18%**
- **Faucets 6%**
- **Bath/shower 14%**
- **Laundry/dishwashing 12%**

*Sources: South Florida Water Management District; Brown and Caldwell (1986).*
irrigation zone just for these. This will save water and reduce the handwatering requirement.

**Trees** - Many trees and shrubs never wilt. It is difficult to determine when these require water. Because of the extensive root system on established trees and shrubs, the irrigation requirement may be less than you think. Most of these plants will not need irrigation except during prolonged periods of drought.

**Lawngrass** - Irrigate grass only when 30-40% of it shows water deficiency symptoms (Figure 35). Significant amounts of water can be saved with this approach and the quality of the lawn is not diminished. Water when the grass blades fold together, exposing their bases or, the lawn takes on a dull blue-green color, or, footsteps on the lawn remain compressed for more than a few seconds. Significant amounts of water can be saved with this approach and the quality of the lawn is not diminished.

![Fig 35. This grass needs to be watered.](image)

**How Much Irrigation**

When you irrigate, apply 1/2 to 3/4 inch of water to most Florida soils. It may be necessary to apply only 1/4 inch of water at a time to prevent runoff and to allow water to be absorbed by the soil. After water is absorbed, apply the next 1/4 inch. Calibrate your irrigation system to determine how long it takes your system to deliver this amount (Table 10).

**Operating an Irrigation System**

There are three ways to operate an automatic, in-ground sprinkler system: with a time clock, with a soil moisture sensor or manually. Scheduling irrigation with a time clock is easy but wasteful. The time clock turns the system on rain or shine, whether the plants need it or not. Soil moisture sensors show promise for operating irrigation systems efficiently, but most current soil moisture sensors either require a lot of maintenance or are not accurate.

Therefore, set time clocks to "off" and manually switch on the system only when you determine that plants need water (see page 21, "Section IV - Water - The Misunderstood Resource-When to Irrigate"). Only operate those zones containing plants that need water that day. The automatic position on the time clock is useful when you are away from the property for more than a few days. Even then, the clock can be made to operate more efficiently by installing a rain shut-off device that overrides the system when rain occurs.

**Irrigate Legally**

When you decide it is time to irrigate, be sure that it is in accordance with local and regional water regulations. Many areas only allow irrigation on certain days and during specified hours. If you have a choice,

<table>
<thead>
<tr>
<th>Table 10. Calibrating the irrigation system.</th>
</tr>
</thead>
<tbody>
<tr>
<td>For an in-ground system, place several coffee cans or straight sided, flat-bottomed containers randomly throughout the irrigated area. For portable, hose-end sprinklers, the containers should be arranged in a straight line away from the sprinklers to the edge of the water pattern.</td>
</tr>
</tbody>
</table>

**Step 1.** Turn sprinklers on for 15 minutes.

**Step 2.** Measure depth of water in each container.

**Step 3.** Add the depths together.

**Step 4.** Divide by the number of containers. This gives you the amount of water applied by your system in 15 minutes.

**Step 5.** If your system applied this much in 15 minutes: irrigate.

<table>
<thead>
<tr>
<th>Amount of Water</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/8 inch</td>
<td>1 to 1.5 hours</td>
</tr>
<tr>
<td>1/4 inch</td>
<td>30 to 45 minutes</td>
</tr>
</tbody>
</table>
irrigate at night or in the early morning hours when it is cooler and calmer. Also, check the local weather channels for the possibility of rain before turning on the sprinklers. You can save a lot of water using this technique.

**Convert to a More Efficient Irrigation System**

This may be the best investment you can make in a landscape. An existing irrigation system can be redesigned to deliver water more uniformly and efficiently (see page 9, "Section I -Designing or Modifying the Landscape - Design for Water Conservation").

**FERTILIZER - THE RIGHT STUFF WHEN PROPERLY USED**

**Problems Caused by Over-Fertilizing**

Many lawn pest problems are increased when the lawn is overstimulated with soluble nitrogen: chinch bugs, sod webworms, nematodes and brown patch (Figure 36 a-d). Too much nitrogen also promotes excessive growth and thatch buildup which greatly increases maintenance costs. Mowing and pruning increase proportionately. Disposing of tree and shrub clippings is an additional expense to you and your community.

Application of too much soluble nitrogen can take an environmental toll as well if it leaches into water supplies or pollutes surface waters like lakes, rivers, bays and retention pounds.

**When to Apply Fertilizer**

Most established landscape plants (including lawngrases) grow well with 2 (north Florida) or 3 (south Florida) fertilizer applications per year. One application is normally scheduled in late winter/early spring and another in late summer/early fall. A third application in south Florida can be made during the summer and supplies mainly slow-release nitrogen.

Iron sulfate (2 oz in 3 to 5 gallons of water per 1000 square feet of lawn) can be applied in spring and/or summer to green-up the lawn without stimulating growth.

**How and Where to Apply Fertilizer**

The fertilizer should be broadcasted over the surface of the landscape--for lawn, trees and shrubs alike. Fertilizer can be applied directly on top of the mulch. There is no need to place it below the mulch because it
quickly moves downwards with water. It is easier to apply fertilizer with a rotary spreader than with a drop spreader. However, drop spreaders should be used when applying fertilizers containing weed killer to the lawn. This helps prevent the material from coming in contact with nearby ground covers, shrubs and trees which could be harmed by the herbicide.

Since most feeder roots on trees and shrubs are shallow (within the top 12 inches of soil) there is no need to inject or place fertilizer deep in the soil. However, shallow soil injections (4 to 6 inches deep) on mounds, berms and slopes, in compacted soil, and in other areas where runoff is likely would reduce the amount of the fertilizer washing off the landscape. To minimize leaching, always use a slow-release fertilizer when injecting into the soil (see section below).

Applying too much fertilizer causes problems in the landscape.

Most established trees growing in landscapes where the lawn, ground covers and shrubs are fertilized do not need additional fertilizer. Their root systems extend throughout the lawn and landscape (Figure 11), and receive nutrients when these areas are fertilized. In south Florida, supplemental applications are needed beneath the canopy for some trees, especially palms, or nutrient deficiencies can develop.

Supplemental fertilizer may also be applied to young trees and shrubs to encourage faster growth. However, never make more than six applications per year since most plants do not utilize more than this amount. Apply supplemental fertilizer under the canopy and 1 1/2 to 2 times beyond the canopy (Figure 37).

Fig 37. Apply fertilizer evenly on the mulched and unmulched surfaces out to about 1.5 - 2 times the canopy diameter.

Trunk injection of micronutrients is another method of tree fertilization which should be used only as a last resort when conventional fertilization is not possible or is ineffective. Trees are permanently damaged by trunk injections and the potential benefits must outweigh this damage. Consult a tree specialist (arborist or urban forester) for more information.

What Type is Best?

Look for the "guaranteed analysis" section on the fertilizer bag. It will list the percentage of nitrogen, phosphorus and potassium, respectively, in the fertilizer. Most Florida soils have adequate phosphorus, so this is generally not needed in your fertilizer unless your soil test indicates otherwise. A good fertilizer would have 1 1/2 to 2 times as much nitrogen as potassium.

Look for terms like "slow release", "controlled release", "sulfur coated urea", "resin coated", "plastic coated", IBDU, water insoluble, and ureaformaldehyde. These are all forms of fertilizer which are released slowly to plants. At least 30% of the nitrogen (preferably more) should be in a slow-release form. This is beneficial because it is available to plants over a long period of time, less nitrogen is leached and pest problems are not stimulated. You will pay more for these types of fertilizers and the benefits they provide.
Fertilizer containing water soluble nitrogen (either granular or liquid) is less expensive but it leaches quickly through the soil. In sandy soils, most of it may leach past the root system after only several inches of rainfall or irrigation. In more fertile marl, clay or muck soils leaching will be slower, but runoff may be greater. If you use soluble fertilizers, apply it more frequently than slow release forms, but use less of it each time you fertilize. (For example, make four applications of 1/2 pound of soluble nitrogen per 1000 square feet during the year instead of two 1-pound applications of slow-release fertilizer. - see the next section).

Apply a complete fertilizer containing micronutrients each year. Despite this preventive treatment, certain plants growing on high pH soils may still develop nutrient deficiencies. These can be treated with specially formulated fertilizer or foliar sprays (for micronutrient deficiencies). Only in the case of severe deficiencies should you consider applying one micronutrient alone because of the danger of applying excessive amounts. In alkaline soils, plants may benefit from the temporary local reduction in pH provided by so called "acid forming" fertilizers containing ammonium nitrogen.

### Slow-release fertilizer supplies a more uniform level of nutrients.

**How Much Fertilizer?**

Many people overfertilize. Each time you fertilize, apply a maximum of one pound of "actual" nitrogen per 1000 square feet of lawn, ground cover or shrub bed area. This sounds complicated, but it is easy to calculate from the information given on every fertilizer bag.

**Example:** You have purchased a 10-5-10 (N-P-K) fertilizer. Divide the nitrogen (N) content (10) into 100.  
100/10 = 10 pounds

To apply the correct amount, spread 10 pounds of 10-5-10 per 1000 square feet of lawn and landscape area.

**Other Considerations**

When unthrifty plants do not respond to fertilizer, the plant is being stressed from other problems, or the incorrect fertilizer was used. In fact, some nutrient deficiency symptoms are actually due to the plant’s inability to absorb the nutrients from the soil, not a soil deficiency. Perhaps the roots are diseased or damaged, the soil pH is incorrect, the site is too wet or compacted or the plant was planted too deeply. Read page 2, "Section I - Planning a Landscape" and page 16, "Section III - Planting and Establishment" to find out how to determine site conditions, and how you would modify your landscape to correct the problem.

More information on using and understanding fertilizers can be obtained from your County Cooperative Extension Service (see Appendix 1 for the office nearest you).
MOW PROPERLY - INCREASE LAWN QUALITY IMMEDIATELY

Mowing Height

Increasing the mowing height of a lawn will save you money, water, fertilizer, pesticides and work.

Mowing too low ruins many lawns (Table 11). When a lawn is mowed higher, more leaf surface is available to absorb sunlight and produce food. As a result, a denser lawn and a deeper root system develops. A thick lawn looks nice and shades out weeds and reduces the need for manual or chemical weed control. The deeper, more extensive root system is more efficient at absorbing the nutrients and water applied and more capable of tolerating damage from pests like mole crickets and nematodes.

<table>
<thead>
<tr>
<th>Turfgrass name</th>
<th>Optimal mowing height (inches)</th>
<th>Frequency (Days)</th>
<th>Best Mower Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahiagrass</td>
<td>3.0 - 4.0</td>
<td>4 - 7</td>
<td>Rotary/flail</td>
</tr>
<tr>
<td>Bermudagrass</td>
<td>0.5 - 1.5</td>
<td>3 - 5</td>
<td>Reel</td>
</tr>
<tr>
<td>Carpetgrass</td>
<td>1.0 - 2.0</td>
<td>10 - 14</td>
<td>Rotary</td>
</tr>
<tr>
<td>Centipedegrass</td>
<td>1.5 - 2.0</td>
<td>10 - 14</td>
<td>Rotary</td>
</tr>
<tr>
<td>St. Augustinegrass</td>
<td>2.5 - 4.0</td>
<td>4 - 7</td>
<td>Rotary</td>
</tr>
<tr>
<td>Zoysiagrass</td>
<td>1.0 - 2.0</td>
<td>10 - 14</td>
<td>Reel</td>
</tr>
</tbody>
</table>

Mowing infrequently can also stress grass. Mow often enough so that no more than 1/3 of the grass blade is removed per mowing (Figure 38). For example, if the recommended mowing height is 3 inches, it should be mowed when it reaches a height of about 4 inches. Never cut the grass when it is wet since this can spread disease.

Keep the Blade Sharp

Mowing prunes and wounds grass. The larger this wound, the greater chance disease pathogens have of establishing. A dull mower blade makes a ripping cut, creating two or three large wounds on each grass blade (Figure 39). A sharp mower blade makes a clean cut and reduces incidence of disease. Inspect your grass after mowing it. A white, ragged cut means its time to sharpen your mower blades.

Don’t Collect the Clippings

On most lawns, clippings should be left on the grass to recycle nutrients. If you enjoy the exercise, they can be collected and spread in a very thin layer in shrub beds.
for mulch. They can also be incorporated into a compost pile. However, you will need to apply more fertilizer to the lawn (and less to the shrub bed) since you are removing a valuable source of nutrients from the lawn. There is one situation were clippings should be collected. That is to help prevent the spread of a lawn disease or weed which you are trying to control.

**Pruning**

**Properly Removing a Branch**

The proper cut removes the branch just to the outside of the branch collar, a swollen area of tissue at the base of the branch (Figure 40 a). Branch collars contain chemically active areas that provide barriers to disease and decay organisms that attempt to invade the exposed wood. Most of us were taught to remove a branch flush with the trunk but recent
b) Topping damages trees; c) Most trees should be trained in this way; d) Heading back shrubs to several different heights creates a fuller looking plant.

research has conclusively shown that flush cuts are extremely detrimental to trees.

Don’t Top Trees

Topping is a sure way to shorten the life of a tree. In many areas of the state, trees are regularly topped (also called sheared, headed back, dehorned, etc.) in perceived fear that they are getting too big (Figure 40 b). This procedure is very damaging to trees and is not recommended. There are two courses of appropriate action. One, plant trees which are small at maturity, or

Never cut off a branch flush with the trunk. This causes severe injury to the tree.
two, regularly thin to increase resistance to storm damage (Figure 41).

**Proper Tree Thinning**

| A thinned tree is more resistant to storm damage. |

Start thinning and training the tree when it is young (Figure 41). A thinned tree allows wind to pass through it. This is accomplished by removing certain branches by a technique called drop crotching. It is best to have the tree thinned lightly on a regular basis, since severe pruning can generate undesirable sprout growth and can initiate decay. To help reduce unwanted sprouting, never remove more than about 25% of the foliage at one pruning.

**Proper Tree Structure**

Large-sized shade trees should be trained to one central trunk with well spaced branches along the trunk (Figure 40 c). Branches should form wide, not narrow, angles with the trunk. Trees which mature at a small size can have multiple trunks if desired.

**Pruning Shrubs**

Shearing produces shrubs which have all the foliage on the outer perimeter of the plants. Constant shearing will ultimately weaken some plants. Natural pruning is recommended. Hand shears are used to reduce and shape the plant (Figure 40 d). It is a more precise form of pruning which results in healthier landscape plants more natural in appearance. If you do shear hedges, be sure the top is slightly narrower than the bottom. This will prevent the bottom of the hedge from becoming thin and sparsely foliated.

**When to Prune**

The best time to prune trees and shrubs is toward the end of the dormant season. The next best is any time the plant is not making new leaves. Pruning while the shoots and leaves are growing often encourages formation of sprouts, which are undesirable in trees and some shrubs.

**CONTROLLING PESTS THE ENVIRONMENTAL WAY**

### Integrated Pest Management

| Overwatering, overfertilizing, improper mowing and incorrect pruning all contribute to pest and other problems. |

The use of insecticides has unfortunately become a one-dimensional approach to pest control and problems have resulted: environmental contamination, pest resistance, misuse, destruction of beneficial organisms and outbreaks of secondary pests.

The environmental alternative is a combination of pest control strategies called IPM -Integrated Pest Management. Avoid cultural practices which make lawns and landscapes susceptible to pests. This reduces the need to spray pesticides. When they are needed, use them to minimize pests and their effects, not eradicate them.

**Check Plants Regularly**

Most plants have few problems if they are properly located in the landscape and moderately cared for. They demand little more than an occasional watering, fertilizing and light pruning. Only a few problem-prone species are routinely damaged by nutritional deficiencies, insects or diseases. These are called key plants.

Make it a habit to walk around your yard at least every two weeks and closely look at plants. By this regular monitoring, you will quickly learn which are the problem prone key plants in your landscape. Your pest control program can be focused on this small handful of key plants. Table 12 lists some of the common key plants along with their typical, "key pests" you would want to monitor for. Notice that a plant (except some lawngrasses) rarely has more than one major problem. Lawns can be damaged or killed quickly by insects such as chinch bugs, mole crickets, worms or grubs. Therefore, lawn areas may require weekly monitoring during summer and fall.
Table 12. Key plants and their typical problems.

<table>
<thead>
<tr>
<th>Key Plant</th>
<th>Key Pest/Problem</th>
<th>Time of Year Occurring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oleander</td>
<td>Oleander caterpillar</td>
<td>warm months</td>
</tr>
<tr>
<td>Pittosporum</td>
<td>Root rot, Leaf spot</td>
<td>warm, wet months</td>
</tr>
<tr>
<td>Roses</td>
<td>Black spot</td>
<td>warm months</td>
</tr>
<tr>
<td>Lawngrass</td>
<td>Many</td>
<td>year-round</td>
</tr>
<tr>
<td>Camellias</td>
<td>Tea scale</td>
<td>year-round</td>
</tr>
<tr>
<td>Junipers</td>
<td>Spider mites</td>
<td>warm, dry months</td>
</tr>
<tr>
<td>Red tip photinia</td>
<td>Leaf spot</td>
<td>warm months</td>
</tr>
<tr>
<td>Azalea</td>
<td>Mites, lace bug</td>
<td>warm months</td>
</tr>
<tr>
<td>Mahogany</td>
<td>Caterpillars, borers</td>
<td>warm months</td>
</tr>
<tr>
<td>Sweet gum/hickory</td>
<td>Fall webworm</td>
<td>fall</td>
</tr>
<tr>
<td>Flowering dogwood</td>
<td>Twig borers, leaf spot</td>
<td>spring, warm months</td>
</tr>
<tr>
<td>Crape Myrtle</td>
<td>White powdery mildew</td>
<td>spring</td>
</tr>
<tr>
<td>Some palms</td>
<td>Lethal yellowing</td>
<td>year-round</td>
</tr>
<tr>
<td>Ixora/some palms</td>
<td>Nutrient deficiency</td>
<td>year-round</td>
</tr>
</tbody>
</table>

Work With Nature

Perfect, complete control isn’t practical in the landscape and pests should be treated only when significant damage is likely. Pesticides are often used on pests which, left alone, would never have become a problem. In fact it may be best if some of the destructive insects are not killed. This will help maintain the populations of beneficial insects and organisms which provide natural, biological control (Figure 42). Planting a variety of flowering plants in the landscape may also increase the population of beneficial insects.

Treat Problems Early

Your options for controlling a pest problem are greatly increased if you detect it early. This is where regular monitoring comes in handy. Early stages of insect infestations on small trees and shrubs can be simply hand picked or pruned from the plant.
When chemical treatment is warranted, be sure to just treat the affected plant or plants. There is no need to spray every plant in the landscape. On lawns, spray the affected area and a 5 foot buffer area around it. Blanketing the lawn or landscape with pesticides is wasteful and could be environmentally damaging. Beneficial organisms and insect predators are killed when pesticides are used indiscriminately. Beneficial populations are usually slower to rebuild following a pesticide application than the pests!

Some pesticide labels only give directions for mixing 1 or more gallons of spray. Use the conversions in Table 13 for mixing smaller quantities. Use effective pesticides which are least toxic to the applicator and the environment (Table 14). The label on the pesticide will indicate the toxicity. *Always read the label before mixing and applying pesticide.*

<table>
<thead>
<tr>
<th>Table 13. Handy conversions for mixing small amounts of pesticide.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 teaspoon (tsp)/gallon = 1/4 tsp/quart</td>
</tr>
<tr>
<td>1 tablespoon (tbsp)/gallon = 3/4 tsp/quart</td>
</tr>
<tr>
<td>2 tablespoons = 1 ounce (oz.)</td>
</tr>
<tr>
<td>3 teaspoon = 1 tablespoon</td>
</tr>
<tr>
<td>1 pound (lb) = 16 ounces</td>
</tr>
</tbody>
</table>
Table 14. Choose the least toxic pesticide.

<table>
<thead>
<tr>
<th>If label says</th>
<th>The pesticide has a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caution</td>
<td>low user toxicity</td>
</tr>
<tr>
<td>Warning</td>
<td>moderate user toxicity</td>
</tr>
<tr>
<td>Danger</td>
<td>high user toxicity</td>
</tr>
</tbody>
</table>

Be Biorational

Insecticides which are safe for the environment and people who use them are termed "biorational". Products such as refined horticultural oil, Bacillus thuringiensis (BT), and insecticidal soaps are biorational and are effective against most of the insect pests of trees and shrubs encountered in the landscape. They also tend to be less damaging to beneficial insects than some conventional pesticides.

Biorational pesticides are effective against insects and safe for the environment.

Mistaken Identity

Keep in mind that plant problems are frequently caused by something other than an insect or disease. Yellow leaves may be caused by drought, cold damage, too much sun, nutrient imbalances and root problems. Target the problem with a specific treatment. Never apply a variety of chemicals in hopes that "one of these chemicals has to help".

Recycle, Reduce and Reuse Yard Waste

Disposing of yard wastes such as twigs, leaves and grass clippings is a headache for the homeowner and a serious problem for our state. Plant clippings make up 15% or more of many communities’ solid waste (Figure 43). During summer, this amount increases up to 50% with grass clippings accounting for much of it. Not only is this a tremendous burden on waste disposal systems, it wastes energy and a valuable resource--organic matter.

Here are five ways to recycle, reduce and recycle yard waste:

1) Use it as a mulch. The best source of mulch may be your own yard. Tree leaves, pine needles, shredded twigs and branches, and grass clippings all make good, free mulch. And they’re renewable.
2) Leave grass clippings where they fall. Bagging and throwing away grass clippings is a lot of work and a waste of free fertilizer. Do not bag clippings. Research shows that contrary to popular belief, they will not harm your lawn.
3) Compost it. Garden and landscape by-products can be converted into usable mulch or soil amendment, through composting.
4) Reduce lawn and landscape clippings. The easiest and most energy efficient way to cope with yard wastes is to reduce the amount you generate. Choose slow-growing shrubs which mature at the height suited to their place. Reduce the amount of water and fertilizer which you apply. This will help keep plant growth in check.
5) Create "self-mulching" areas. Plant shade tolerant ground covers or shrubs beneath the trees. When leaves are shed they can remain where they fall as a mulch.

A beautiful, high-quality landscape can be created and managed with minimal environmental impacts and without huge expenditures of energy, time and money.
For more information on any of the topics discussed in this guide, contact your county’s Cooperative Extension Service regarding the Environmental Landscape Management (ELM) program.

**APPENDIX 1**

**LIST OF COOPERATIVE EXTENSION OFFICES IN FLORIDA.** Some counties have more than one extension office. The phone number to the main office is listed here.

<table>
<thead>
<tr>
<th>County</th>
<th>Phone Number 1</th>
<th>Phone Number 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alachua</td>
<td>904-336-2402</td>
<td>904-259-3520</td>
</tr>
<tr>
<td>Baker</td>
<td>904-784-6105</td>
<td>904-964-6280</td>
</tr>
<tr>
<td>Brevard</td>
<td>407-632-9505</td>
<td>305-370-3728</td>
</tr>
<tr>
<td>Calhoun</td>
<td>904-674-8323</td>
<td>813-639-6255</td>
</tr>
<tr>
<td>Citrus</td>
<td>904-726-2141</td>
<td>813-284-6355</td>
</tr>
<tr>
<td>Collier</td>
<td>813-774-8370</td>
<td>904-572-5384</td>
</tr>
<tr>
<td>Dade</td>
<td>305-248-3311</td>
<td>813-494-0303</td>
</tr>
<tr>
<td>Dixie</td>
<td>904-498-3330</td>
<td>813-387-8850</td>
</tr>
<tr>
<td>Escambia</td>
<td>904-477-0953</td>
<td>904-437-3122</td>
</tr>
<tr>
<td>Franklin</td>
<td>904-653-9337</td>
<td>904-627-6315</td>
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<tr>
<td>Gilchrist</td>
<td>904-463-2022</td>
<td>813-946-0244</td>
</tr>
<tr>
<td>Gulf</td>
<td>904-229-6123</td>
<td>904-792-1276</td>
</tr>
<tr>
<td>Hardee</td>
<td>813-773-2164</td>
<td>813-675-5261</td>
</tr>
<tr>
<td>Hernando</td>
<td>904-796-9421</td>
<td>813-382-5248</td>
</tr>
<tr>
<td>Hillsborough</td>
<td>813-621-5605</td>
<td>904-457-3602</td>
</tr>
<tr>
<td>Indian River</td>
<td>407-567-8000</td>
<td>904-482-9620</td>
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<tr>
<td>Jefferson</td>
<td>904-997-3573</td>
<td>904-294-1279</td>
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<td>Lake</td>
<td>904-343-4101</td>
<td>813-335-2421</td>
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<tr>
<td>Leon</td>
<td>904-487-3003</td>
<td>904-486-2165</td>
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<tr>
<td>Liberty</td>
<td>904-643-2229</td>
<td>904-973-4138</td>
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<tr>
<td>Manatee</td>
<td>813-722-4524</td>
<td>904-629-8067</td>
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<tr>
<td>Martin</td>
<td>407-288-5654</td>
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<tr>
<td>Nassau</td>
<td>904-879-1019</td>
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<td>Okeechobee</td>
<td>813-763-6469</td>
<td>407-244-7570</td>
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<td>Osceola</td>
<td>407-846-4181</td>
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<td>Polk</td>
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<td>Pinellas</td>
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<td>813-951-4240</td>
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<tr>
<td>St. Johns</td>
<td>904-824-4564</td>
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<tr>
<td>St. Lucie</td>
<td>407-323-2500</td>
<td>813-951-4240</td>
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<tr>
<td>Sumter</td>
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<td>Union</td>
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<td>Wakulla</td>
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<td>Walton</td>
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<td>Washington</td>
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