

The Mobile Irrigation Lab Handbook



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Goal of this Handbook

This handbook is intended to serve as a guide for landscape and irrigation needs after an evaluation by the Mobile Irrigation Lab.

The goal of this Handbook is to educate Manatee County residents on practices that can be put into place to conserve water outdoors and protect Florida's water resources. Outdoor water conservation, irrigation operation & maintenance, Florida-Friendly Landscaping principles, turfgrass, and landscape plant maintenance are the main topics covered in the Handbook. The information provided in this handbook is based upon recommendations made by the Southwest Florida Water Management District, Florida Department of Environmental Protection, University of Florida and Manatee County government.

The Mobile Irrigation Lab Handbook is designed to be an educational tool to homeowners and other interested parties. It does not substitute for the services of a landscape or irrigation professional, landscape architect, engineer, or other design professional.



Who We Are

Extension is a partnership between state, federal, and county governments to provide scientific knowledge and expertise to the public. The University of Florida (UF), together with Florida A&M University (FAMU), administers the Florida Cooperative Extension Service.

The UF/IFAS Extension Manatee County's Water Conservation program is made possible by support and funding from the Utilities Department within Manatee County Government.

The mission of the UF/IFAS Extension Service is to develop knowledge in agriculture, human & natural resources, and the life sciences and to making that knowledge accessible to sustain and enhance the quality of human life.

What is the MIL?

The Mobile Irrigation Lab (MIL) is a free program available to Manatee County residents that provides research-proven information to help reduce their usage of water for irrigation while maintaining healthy and attractive landscapes. The MIL team provides homeowners with personalized irrigation & landscape evaluation reports including calculated potential water savings.

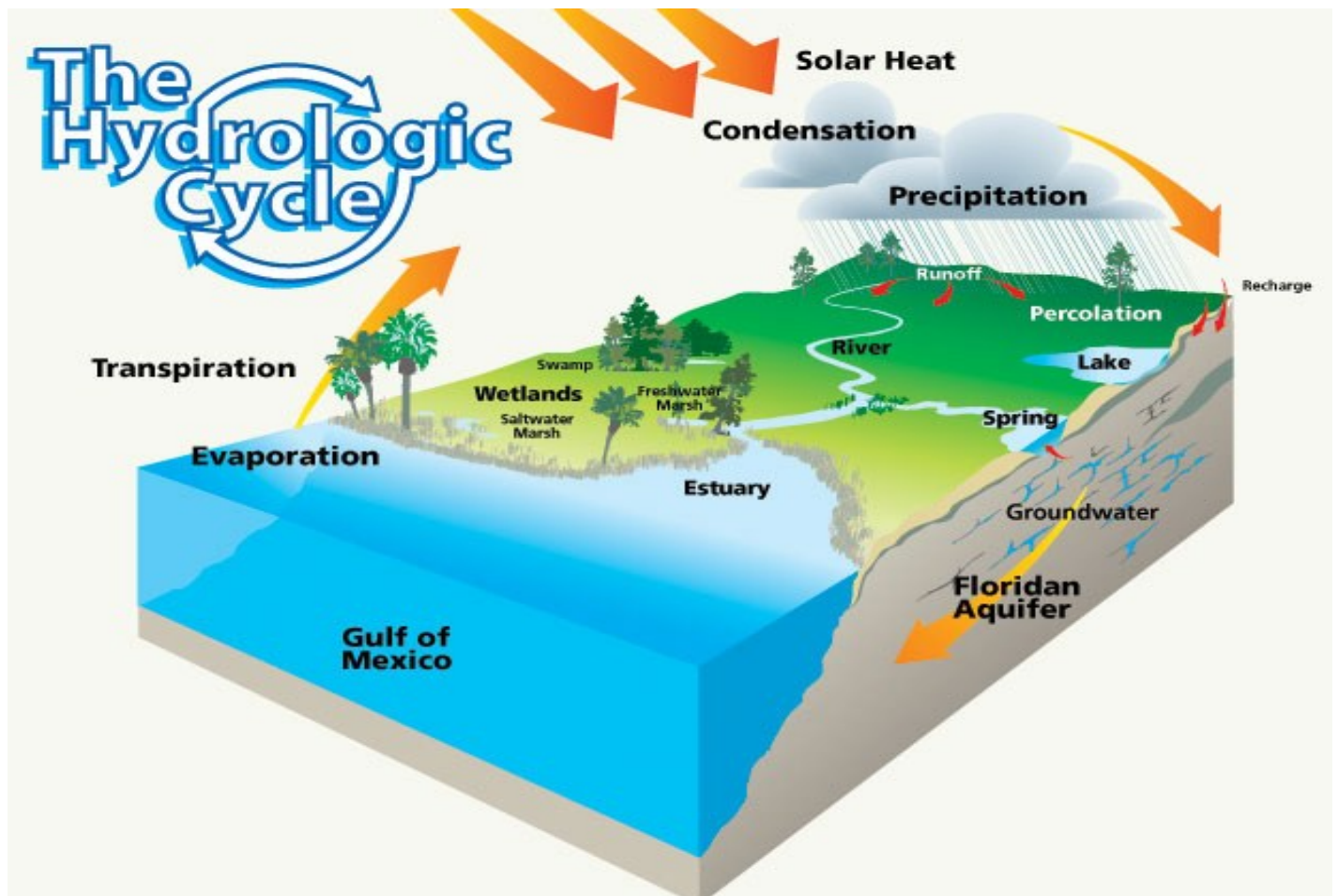


Photos courtesy of Katie Granberg

Why Conserve our Water?

Water is among Florida's most valued resources. The State has more than 1,700 streams and rivers, 7,800 freshwater lakes, 700 springs, 11 million acres of wetlands, and under-lying aquifers yielding quantities of freshwater necessary for both human and environmental needs. Although renewable, these water resources are finite, and continued growth in population, tourism, and agriculture will place increased demands on these water supplies. Florida's resources are constantly flowing through the hydrologic cycle and can be impacted by our actions.

The hydrologic cycle is the continual circulation and distribution of water on the surface of the land, in the ground, and in the atmosphere. Where water originates and how much water is available are fundamental to how water "cycles" through the environment. The five processes are: condensation, precipitation, infiltration, runoff, and evapotranspiration. It is important to remember that while Florida receives significant rainfall every year, most of this water is returned back to the environment through evapotranspiration and outflow of the rivers. Only a very small percent infiltrates into the ground to replenish the underground freshwater reservoirs/aquifers that we all depend upon for drinking water. Everyone should be aware that increasing water withdrawals from aquifers for human needs reduces the amount of water available to feed the springs, rivers, and wetlands not only now, but for years to come.

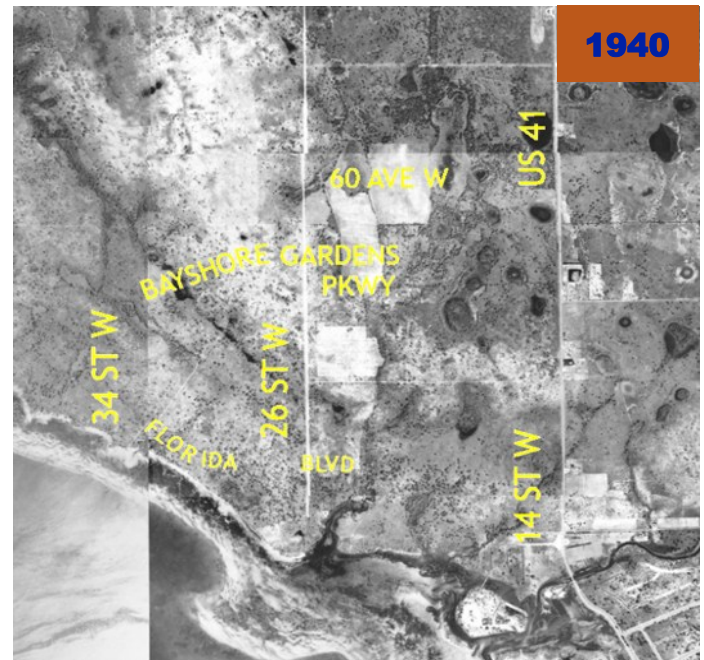


Photos courtesy of Southwest Florida Water Management District

Why Conserve our Water?

Today, water conservation is becoming an important part of Florida's future.

Saltwater intrusion and pollutants threaten Florida's limited water resources and increasing urbanization and periodic drought are placing greater demands on water supplies. For these reasons, homeowners utilizing irrigation systems should be conscious of water use and should strive to minimize waste and consumption of water in their landscapes. There have been great strides in water conservation and regulations, however there are still plenty of factors threatening Florida's water.



Photos courtesy of Manatee County GIS Property Locator Map

Non-point source pollution is one of these factors threatening our State's water resources. This type of pollution comes from sources we don't necessarily witness, like run-off. Overuse of or poorly maintained irrigation systems can contribute to the transportation of pollutants from our yards into surface waters (run-off) or to leaching into groundwater. These pollutants eventually work their way into the hydrologic cycle. As Florida's population increases, the more irrigation systems we have contributing to the non-point source pollution of our water bodies.

Florida-Friendly Principles

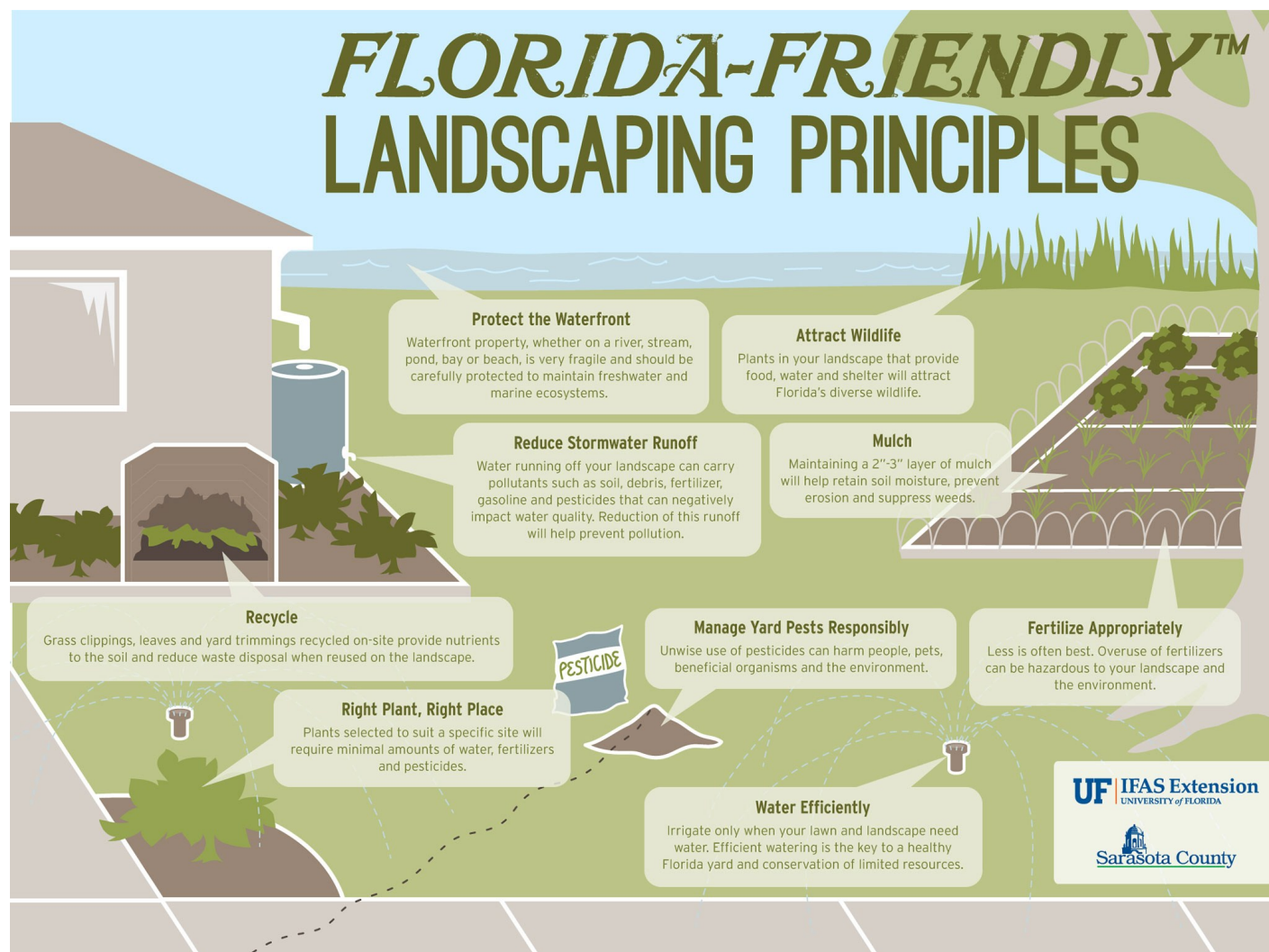
What you do in your landscape matters. From the fertilizers you apply to the water you use, your gardening choices can have an impact on land, water, wildlife, and the overall well-being of Florida's residents.



The Florida-Friendly Landscaping™ (FFL) Program is available to all Manatee County homeowners. This program helps you learn about ways to have a healthy and attractive landscape while protecting Florida's natural resources by utilizing their nine science-based principles. Which are demonstrated above.

There are a variety of benefits of a Florida-Friendly Landscape™ including:

- Minimized use of water, fertilizer and pesticides (also, money)
- Creates habitats for birds, butterflies and other wildlife
- Reduces the risk of nutrient pollution entering our water
- Can potentially be a low maintenance landscape





Before



After

Photo by S. P. Turnipseed



Watering Restrictions

The Southwest Water Management District (SWFWMD) governs Manatee County's water. SWFWMD restricts lawn watering to twice a week. Although you are allowed to water twice a week, we highly recommend watering only once a week for the health of your lawn and the environment.

- **The watering restrictions apply to all potable (drinking) water and all irrigation waters that come from wells, surface water sources including retention ponds, rivers, lakes, etc.**

- Hand watering & micro-irrigation of plants (not turfgrass) can be done on any day and time.
- Irrigating with 100% reclaimed water is not restricted to certain days or times by SWFWMD.

Watering Days:

Even Addresses: Thursday &/or Sunday

Odd Addresses: Wednesday &/or Saturday

Business/Common Areas: Tuesday &/or Friday

- Reclaimed water should be voluntarily conserved, it is encouraged to water once a week
- between 10AM and 4PM to reduce evaporative loss.
- The use of some reclaimed water blends are restricted the same as non-reclaimed water.

Outdoor Water Conservation Rebate Programs

Manatee County offers various rebate programs for outdoor water conservation to reduce the amount of drinking water drawn from fresh water sources for irrigation. These rebate programs are designed to help homeowners reduce water usage and save money on water bills. Participants may receive up to \$1,250.00 per property (one rebate application per property).



How do I apply?

- Pre-approval of projects by Water Conservation staff is required
- Pre-qualify your property for a rebate(s) by submitting an online application, calling (941)-792-8811 x5327, or emailing water.saver@mymanatee.org

Who is eligible?

- Home and business owners with in-ground irrigation systems receiving their water from the Manatee County Utilities Department for irrigation
- Customers whose property had an average water use exceeding 8,500 gallons per month in any six-month period prior to March 2003
- The property must have a current certified and approved backflow preventer and no cross connection on the property
- A working rain sensor is required, but may be included in the rebate program if the property does not have a working rain sensor

Why Do We Irrigate?

Irrigation is an age-old art and is defined as the application of supplemental water to a soil for plant growth. It also provides a mechanism for nutrients to move from the soil into a plant.

On average, Florida receives more than 50 inches of rain per year. However, the distribution and amounts of this rainfall are not always adequate to meet a plant's water demands. Providing the amount of water that a plant needs at the correct time is the key to resource conservation, reduced pollutant loading, and optimum plant growth.

Why Do We Care About Conserving?

Outdoor water use accounts for up to half of the publicly supplied drinking water in Florida. With population increases in Florida, freshwater sources are becoming scarce due to associated increases in water usage, food, infrastructure, and energy demands.

Using proper irrigation practices while designing, installing, managing and maintaining your system provides a multitude of benefits. These benefits include saving money, using irrigation efficiently, a healthy and more drought and pest-resistant landscape, and protecting the state's water resources.



Irrigation System Design

Irrigation system design is a complex issue and should be performed by trained professionals. These professionals should use existing standards and criteria, as well as the manufacturer's recommendations, to design the most appropriate system for a location.

The irrigation design for a site depends on a number of factors including location, soils, landscape vegetation, water supply, and water quality. Irrigation design must account for different site characteristics, such as soils and topography. An irrigation system needs to also be designed to meet a site's peak water requirements. Design operating pressure must not exceed the source pressure. In addition, to prevent irrigation runoff, a system's application rate must not exceed the ability of the soil to absorb and retain the water applied during any one application.

Plants (turfgrass, trees, landscape plants, etc.) should be grouped in irrigation zones based on similar water use requirements. Irrigation systems designed to service both turf and landscape areas should have enough zones to meet each area's individual water needs.

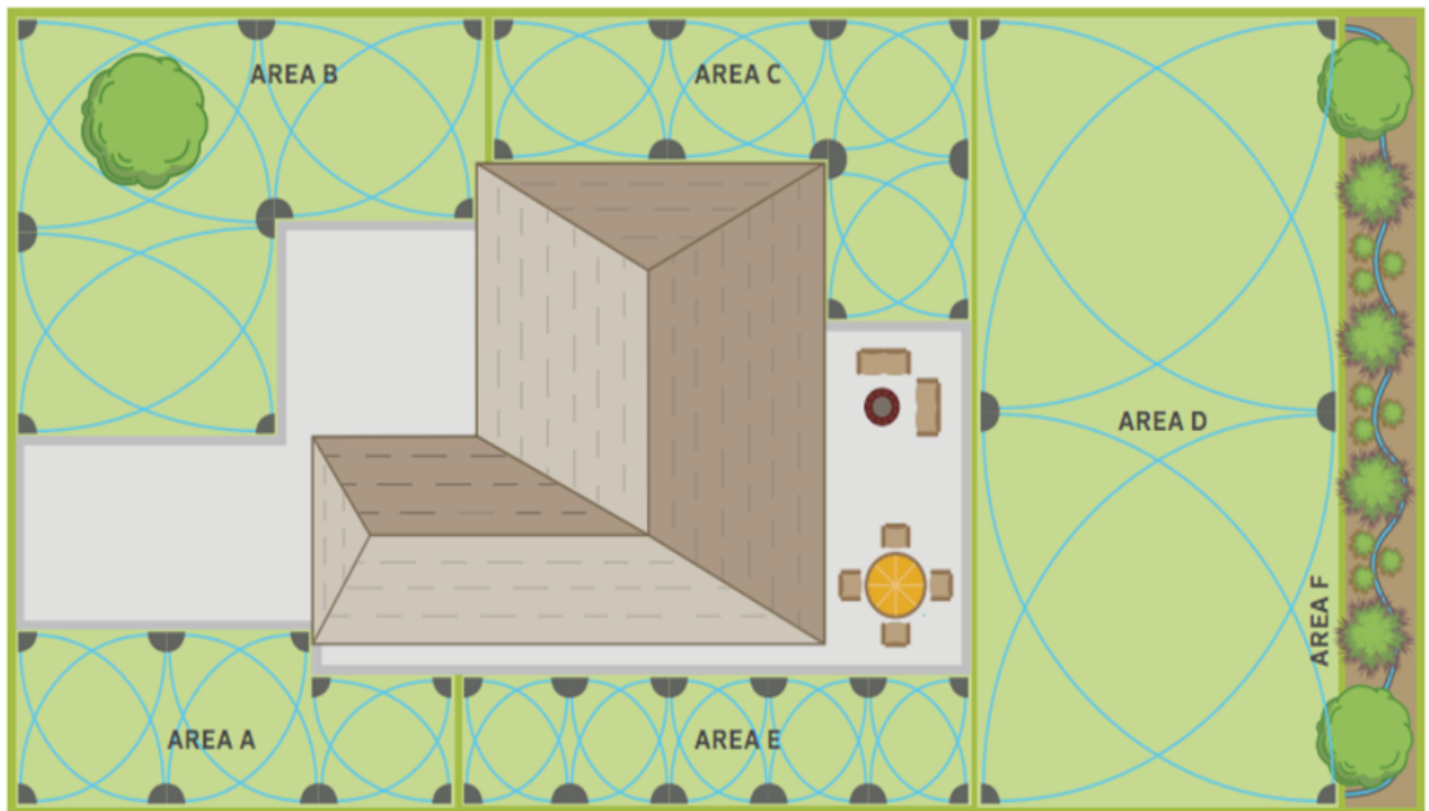


Photo Courtesy Biogreen Outdoor Services

Irrigation System Design + Components

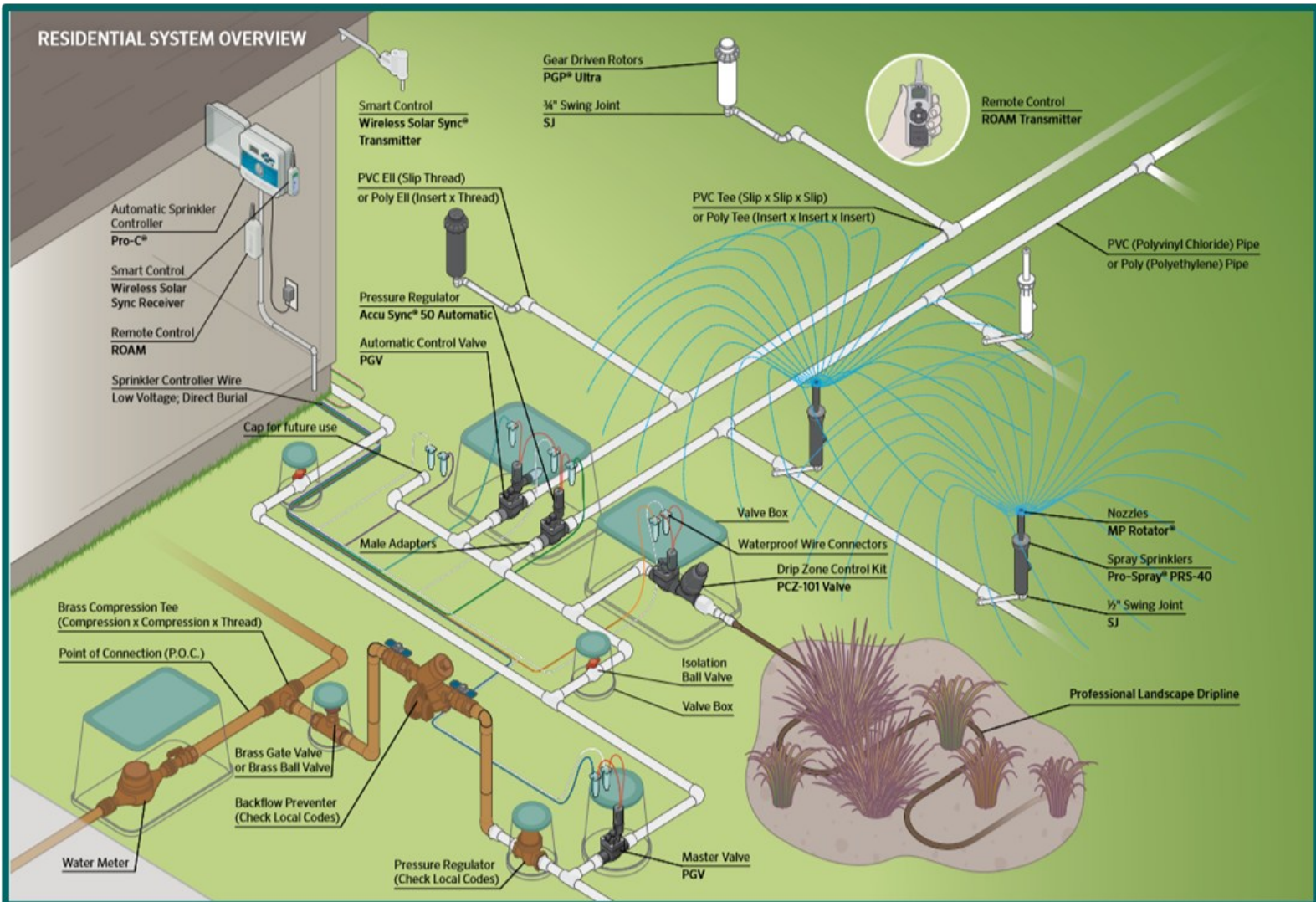
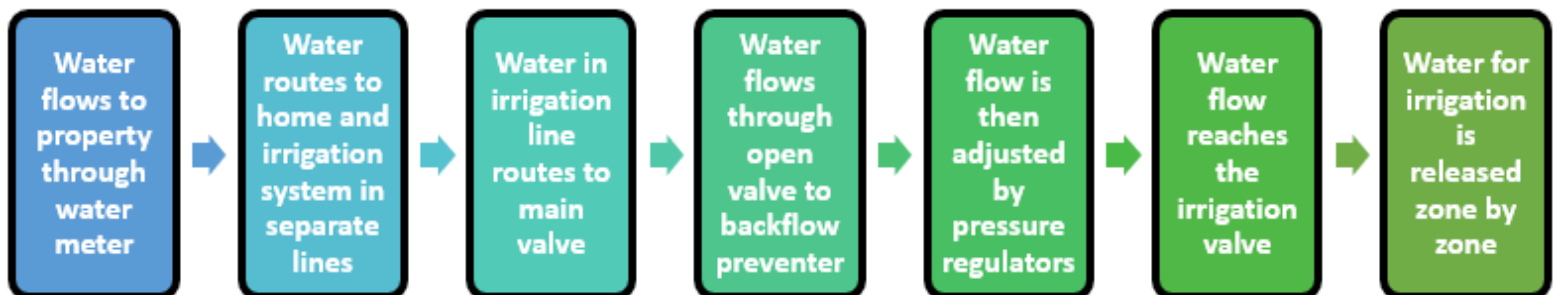


Photo Courtesy Hunter Industries



Irrigation System Components

An irrigation system consists of three main components: **water supply** (consisting of a water source, pump, filters, and valves), **water conveyance** (made up of a mainline, manifold, lateral, lateral, and spaghetti tubes) and a **distribution device** (such as a rotary sprinkler, spray or drip emitter). The water conveyance pipes should provide the system with the appropriate pressure required for maximum irrigation efficiency, uniformity, and the distribution devices should be designed for optimum uniform coverage. The distribution system should also not include the irrigation of non-planted areas like, driveways, roads, sidewalks, buffer zones, etc.

To provide for water demands and have enough flexibility to reduce water supply for different demand requirements, irrigation systems need to be designed with various control devices, rain shut-off devices, and backflow prevention.



Photo Courtesy of Melanie Stokes

Irrigation System Components

Types of Sprinklers



Rotors

- A rotor distributes irrigation in a stream at 45°-360° angles.
- Rotors are designed to irrigate large, open areas. Be mindful of irrigating non-plant areas when installing these in a smaller lawn.
- Typically operate around 45 psi or higher
- There is a vast variety of nozzles and spray patterns to choose from.
- Within the sprinkler body, is a filter basket that should be cleaned out regularly to avoid clogging and ineffective irrigation.
- These sprinklers should be used only for turfgrass areas.

Spray Heads

- A stationary sprinkler that sprays water fan-like at 45°-360° angles.
- Spray heads are more practical for an average lawn. They can be easily placed in smaller turf areas without irrigating non-plant areas.
- Typically operate around 20 - 30 psi.
- There is a vast variety of nozzles and spray patterns to choose from.
- Attached to the nozzle, is a filter basket that should be cleaned out regularly to avoid clogging and ineffective irrigation.
- These sprinklers should be used only for turfgrass areas.



Irrigation System Components

Irrigation Controller

Electronic irrigation controllers are used to operate your irrigation system automatically depending on how you program your controller.

There are many types of controllers and even more brands to choose from. When learning about your controller, refer to your irrigation controller's manual for more detailed information about how to operate your controller. Your controller has no awareness of weather, seasonal changes, or soil moisture unless you install additional devices to detect aforementioned factors.

Typically, your irrigation controller allows you to program:

- **Watering days:** Most controllers will allow for selection of certain days of the week in a 'custom' option or frequency, such as 'every 2 days', for setting frequency of irrigation
- **Run times:** The amount of time that each zones runs may be set from several minutes to several hours. The exact time depends on the system's application rate.
- **Watering percentage:** Most controllers have percentage settings so that the relative time may be adjusted. For example, if the controller is set to run 60 minutes per cycle the controller may be set to water at 75%. This will result in $60 \text{ minutes} \times 0.75 = 45\text{-minute}$ run time. Likewise, the run times in the other zones will be reduced to 75% of the zone time setting.
- **Programs:** Controllers usually have the capacity to run multiple programs with various watering days + run times. For example, on program 'A', the controller may be set to water six rotor zones for 60 minutes twice each week. If new plants are planted in a landscape bed, they may need more frequent watering to become established. In this case, program 'B' can be used to water that zone every day of the week.



Photo Courtesy Maggie Gaughan

Irrigation System Components

Consider WaterSense products!

WaterSense is a label for identifying water-efficient products and is a resource for helping you save water.



- WaterSense labeled irrigation controllers act like a thermostat for your sprinkler system, telling it when to turn on/off using local weather data.
- WaterSense labeled products are 20% more water-efficient than standard models
- Replacing a clock-based controller with a WaterSense labeled irrigation controller can reduce an average home's outdoor water use by 30% and saves up to 15,000 gallons of water annually.

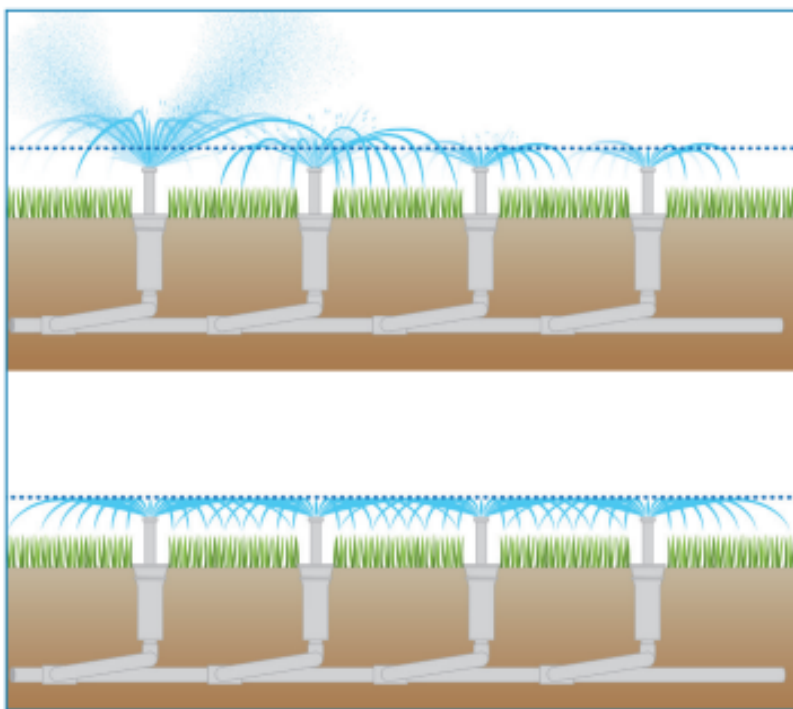


Figure 2

The top image represents a system operating at high pressure without integral pressure regulation. The bottom image shows the benefits of pressure regulation: consistent flow, reduction in misting and overspray, and improved coverage.

Graphic courtesy of EPA

Relieve Pressure & Reduce Water Waste from Spray Sprinklers

Most spray head sprinklers have operating pressures between 30 pounds per square inch (psi) and 45 psi. Operating an irrigation system at a pressure higher than recommended can cause significant water waste, due to excessive flow rates, misting, fogging, overspray, and uneven coverage.

- WaterSense labeled spray sprinkler bodies are tested for a consistent flow rate under varying upstream water pressures that are higher than ideal operating pressures for sprinkler nozzles.
- Installing WaterSense sprinklers with flow reduction could save more than 25,000 gallons of water and \$280 in water costs over a 6-month irrigation season.

Irrigation System Management & Maintenance

Management

Irrigation management (knowing when and how much to irrigate) is the cornerstone of water conservation and reducing nonpoint source pollution. It encompasses the amount of water applied and the frequency of application. To prevent excess water use that could lead to chemical leaching and runoff, fungal infestation, and disease; irrigation scheduling should take into account plant water requirements, recent rainfall, recent temperature extremes, and soil characteristics. In addition, the irrigation system must be properly designed and maintained, so that all of the plants in a given zone receive the same amount of water.

Plant irrigation requirements will differ based on a plant's ability to extract soil moisture (i.e. root zone) and its physiological ability to deal with reduced availability of moisture. Plants require more water during seed, flower, and fruit production, but will not require very much when they are dormant. During the colder months, or those with shorter periods of daylight, most turfgrasses and landscape plants are not actively growing, thus use less soil moisture and may not require irrigation. Many established, drought-tolerant landscape trees and shrubs require little or no irrigation, provided the soils do not obstruct root development.

In humid regions such as Florida, irrigation is considered supplemental because it supplements natural rainfall. Proper irrigation management must account for rainfall. Since rainfall varies from location to location, the proper use of rain gauges, rain shut-off devices, flow meters, soil moisture sensors, and/or other irrigation management devices should be incorporated into the site's irrigation schedule. Using an irrigation schedule can help prevent wasteful over-irrigation, the leaching of fertilizers/pesticides, and promote root development for drought conditions. **No more than 1/2 to 3/4 inch of water should be applied for a single irrigation event.** The exact amount of irrigation needed for each event will depend on a plant's needs for growth, fruiting, dormancy for that time of year and soil characteristics (soil moisture, infiltration rates, soil root zone depth and water holding capacities). In addition, water management districts and local requirements should be considered before irrigating.

Rain shut-off devices are required by law on all automatic irrigation systems. Rain shut-off devices and rain gauges should be placed in open areas to prevent erroneous readings. When mechanical/electronic devices are not available for irrigation management, the following visual indicators should be used as guidelines to determine the need for irrigation:

- The grass has a dull, bluish-gray coloring
- Foot tracks remain in the grass
- Leaf blades are folded in half on at least one-third of the site
- Soil samples from the root zone are dry and crumbly
- Indicator landscape plants have drooping leaves

Irrigation System Management & Maintenance

Management

Although irrigation management is a complex process, it can be boiled down to a simple checkbook (or water balance) process, where the irrigation amount consists of the difference between a plant's need for water and the effective rainfall (rainfall stored in a plant's root zone, for plant use). When possible, the timing of an irrigation event should be planned to increase irrigation efficiency, by reducing evaporative losses due to climatic conditions (for example, high temperature, low humidity, windy conditions) and by maintaining high irrigation uniformity.

Maintenance

Proper maintenance extends the life of an irrigation system and helps it to perform optimally. Maintenance begins with a visual observation of the system and the plants. Check for proper functioning of rain sensors and controllers, leaks, broken/cracked lines, proper rotation, and damaged sprinkler heads. Also, check for obstacles that may interfere with irrigation uniformity. Brown spots, unnaturally green grass, certain types of weeds, and soggy spots are indicators of problems. Damaged or defective systems should be repaired as soon as possible. Replacement parts should always have the same characteristics (that is, discharge-pressure relationship, jet size/ colors) as the original components. Otherwise, the replacement might cause more harm than the bad component. Florida law requires licensed irrigation contractors to repair defective sensors, and there may be fines and penalties for failing to report a client that refuses repairs.

Common irrigation efficiency problems include leaks, sprinkler head plugging, poor irrigation uniformity caused by nozzle wear, and poor system pressure. **Some problems** (such as repairing leaks and replacing nozzles) **can be repaired at a minimal cost, while others** (such as poor system design) **might, at first glance, seem very costly, but will pay off in the end.** Problems need to be corrected as soon as possible to prevent wasted water and the leaching of fertilizers and other chemicals. In the long term, the investment made to improve the irrigation system pays off in reduced fertilizer, chemical and water bills. Before you dig to make any fixes, call 811. This is a free service that will locate underground pipes, cables and other elements that could be damaged.



Irrigation System Management & Maintenance

Calibrate your Zones



Calibrating your sprinkler system is a way to figure out how long you need to run your irrigation system to apply the correct amount of water. It is recommended to water $\frac{3}{4}$ of an inch of water per run.

Set out 5-10 flat-bottomed cans randomly around the first zone of your irrigation system. Run the first zone and use a timer and ruler to see how long it takes for each can to collect $\frac{3}{4}$ of water.

Repeat this process for each zone.

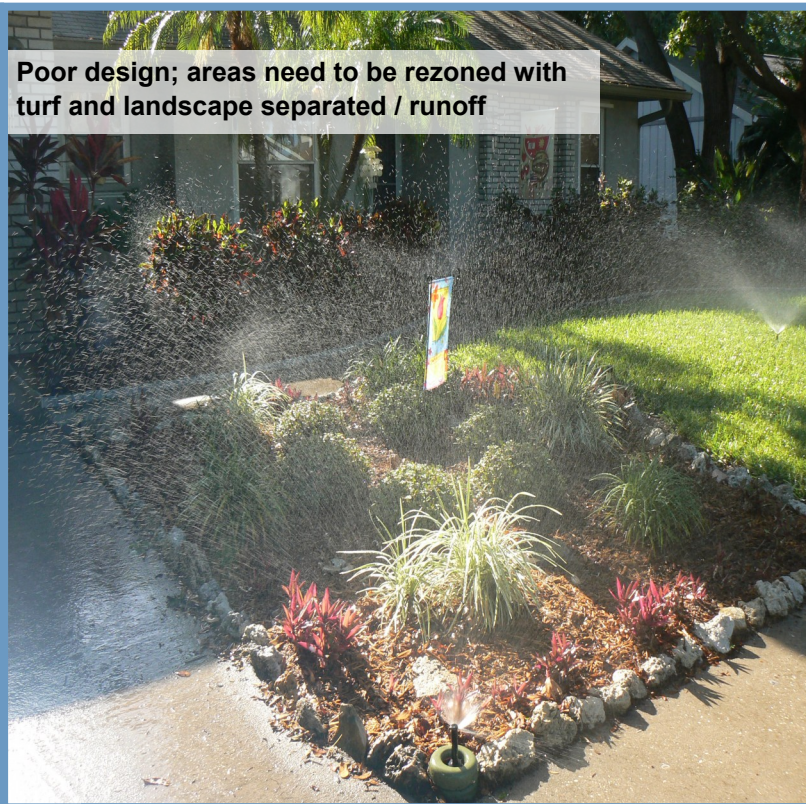


Photo courtesy of Rachio

Common Irrigation System Problems



Blocked spray pattern / spray head in the landscape bed rather than micro-irrigation



Poor design; areas need to be rezoned with turf and landscape separated / runoff



Broken head / runoff / irrigating non-plant areas



Poor design; irrigating non-plant areas

Photos Courtesy Valrie Massey

Common Irrigation System Problems



Photos Courtesy Valrie Massey

Micro-irrigation Overview

Micro-irrigation is intended for landscape beds, container gardens, or hanging baskets.

When designed and operated correctly, microirrigation, also known as drip or low-volume irrigation, is one of the most efficient methods of irrigation. It is highly manageable and provides small quantities of water directly to the plant's root zone. Low-pressure sprinklers, sprayers or drippers are also known as emitters, and they slowly release water into the soil around a plant. This saves water because only the main feeder roots receive water, and less water evaporates from the surface of the soil.

Overall, spray jets (either microsprayers or microsprinklers) are more desirable than drip emitters for most landscape applications. This is because they cover larger areas and have fewer clogging problems. Clogging and

excess water problems can be seen either by careful examination of the irrigation system or by looking at the landscape. Spray jets should not be designed or operated to irrigation non-planted areas.

Regardless of the type of microirrigation system, clogging can be a problem if the water supply is not filtered before entering the irrigation system or if the filtration system is not cleaned. The safest and easiest way to maintain the emitters in a microirrigation system is to keep a small supply of clean backups on hand. Clogged devices can be easily replaced with clean units, then placed in a small container of the cleaning fluid appropriate for the clogging material. Replacement emitters should always have the same operating characteristics (i.e. operating pressure and discharge rate) as the original emitters.



Micro-irrigation Types

Micro-irrigation type should differ based on the type of plant present

There are four main categories of micro-irrigation and they are in-line drip tubing, bubblers, drip emitters, and microsprayers also known as microjets or microsprinklers.

Drip emitters (Image 1) are used to water plants that are spread further apart from one another but can also be used for hanging baskets and container plants. They can be added into the header tubing (main line) or the spaghetti tube that is connected to the header tubing.

Bubblers (Image 2) are used to help establish larger plants such as shrubs and trees. Bubblers can be added into the main tubing line as well as added at the end of a line on a stake. They can also be used to water container gardens.

In-line drip tubing (Image 3) is used for landscape beds that contain annuals when plants are positioned in rows.

Microsprayers (Image 4) work well in landscape beds with a mixture of different plants. They disperse the most amount of water out of all the different types of micro-irrigation and can be adjusted to control the amount of water that is released.

It is important to check your micro-irrigation system as it requires more maintenance than the rest of your irrigation system.



Image 1: Drip Emitter—Photo courtesy of Adobe



Image 2: Bubbler —Photo courtesy of Adobe



Image 3: Dripline—Photo courtesy of Valrie Massey



Image 4: Microsprayer—Photo courtesy of UF Photoshelter

Micro-irrigation Retrofitting

Irrigation systems can be retrofitted to include micro-irrigation types in specific zones or areas of a zone for different landscape areas

Spray heads can be converted to micro-irrigation using a drip conversion kit as shown in image 1. Image 2 displays all of the components of the drip conversion kit.

When retrofitting, you should retrofit all of the spray heads in one zone to be micro-irrigation and not just retrofit one spray head.

The total flow of the zone should be considered when retrofitting a zone. Make sure you calculate how many gallons per minute are being emitted and make sure the micro-irrigation devices are equating to that amount.



Image 1: Photo courtesy of Rainbird



Image 2: Photo courtesy of Rainbird

A micro-irrigation system can also be installed onto an outdoor faucet

If you are not able to retrofit an entire zone or you have a smaller area like container gardens that do not need a lot of micro-irrigation, then you can consider attaching a separate system to your outdoor faucet as shown in image 3. These can be run manually or automatically using a timer and contain the components necessary for obtaining the correct flow for administering water to your plants.

As with your larger scale irrigation system, the micro-irrigation systems should also be monitored, maintained, and adjusted accordingly.

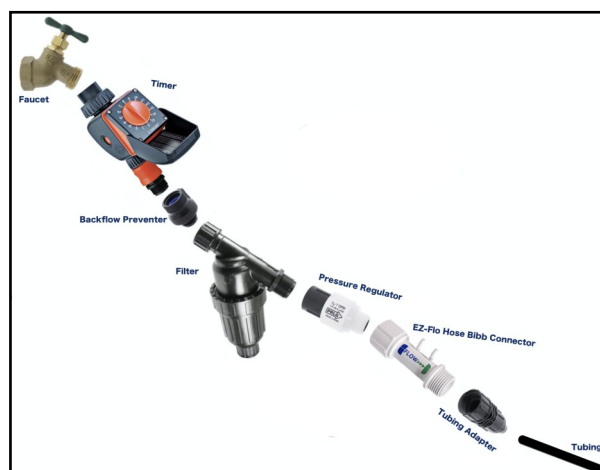


Image 3: Photo courtesy of Drip Depot

Irrigation– Newer Technology

Rotary spray heads as well as side strip sprays and end strip sprays exist so that efficiency of irrigation is increased

Rotary spray heads are a combination of rotor and spray heads. They administer water in a rotating stream at a slower and more steady rate. They increase efficiency of water because the streams of water drop to the ground more easily than water that is emitted from spray heads that release more of a mist which can travel to other unwanted locations. They reduce runoff, erosion, and water lost through evaporation and wind compared to traditional spray heads and can reduce water usage up to 30%.



Image 1: Side view of rotary spray head

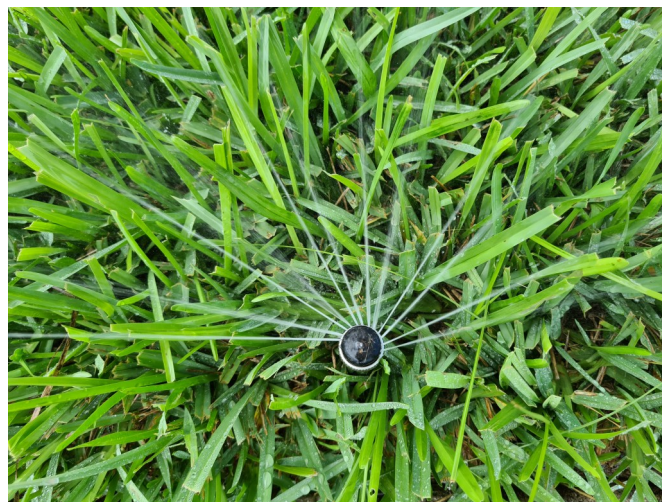


Image 2: Aerial view of rotary spray head

End strip and side strip spray heads are often used where patches of turfgrass are found between the sidewalk and the road. They are more efficient because they release water from the sides of the spray heads only rather than in a semi-circle or circular pattern, which prevents water from being sprayed onto hard surfaces more so than traditional spray heads. Images 3 and 4 depict side strip spray heads. End strip spray heads differ from side strip spray heads in that they only spray from one side rather than both sides.



Image 3: Side view of side strip spray head

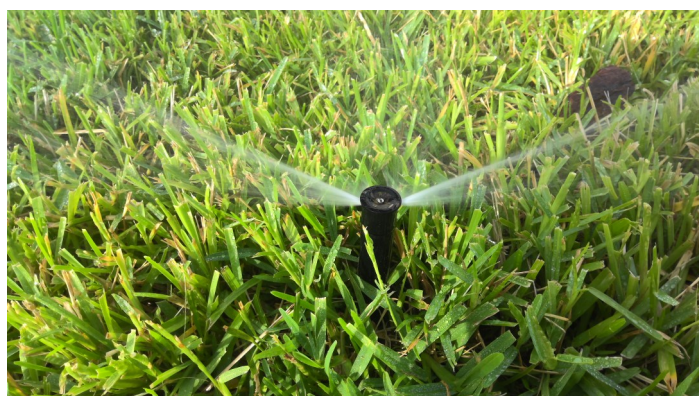


Image 4: Side aerial view of side strip spray head

Rain Sensing Devices

An operational rain sensor or other rain shut-off device is required by Florida law (FS. 373.62) for every person with an in-ground irrigation system.



	Rain Sensor	Soil Moisture Sensor	Weather Station
Function	Most commonly used rain shut-off device. Ring of corks inside swell up when rain is absorb, signals your controller to turn off until the corks are dry again.	Most accurate rain shut-off device. Sensor is buried in the root zone, measures moisture to signal your controller on & off.	Can be useful if data is being obtained from a local weather source. Sensor should be installed on the eve of your roof, the weather station is hard-wired or connected via internet.
Placement	Best place to install is the eve of your roof	Best place to install is in a low-traffic area, 5 feet from house and sprinklers	Best place to install is the eve of your roof
Cost	Inexpensive	Moderate, greater than rain sensor	Moderate, typically requires a monthly subscription

Right Plant, Right Place

Because many of the plants used in Florida vary widely in their adaptation, consideration should be given to choosing grasses and other plants that are suited to their particular environment.

Plants selected should be suited to the characteristics (requirements for water, sun, soil, etc.) of the site that were determined during an earlier site analysis in your planning phase.

Good landscape design requires that plants serve particular functions. They should reduce cooling and heating costs and improve the appearance or usefulness of the landscape. Plants should be selected and positioned to provide a transition between the structure and the landscape, a screen for privacy, shade for comfort, and wildlife habitat, or to direct traffic flow onto and within the property.



Select plants that will not outgrow their allotted space. Even though small cultivars of landscape plants may take longer to reach the desirable size, they will not have to be pruned as frequently and are less likely to need replacing in a few years.



Turfgrass

Selecting the correct grass is critical to maintaining a lawn successfully. The table below can help you select the right turfgrass for your landscape.

When determining which turfgrass to plant in your landscape, you consider these factors:

- Soil type + pH
- Drainage
- Irrigation
- Mowing capability
- Amount of sunlight
- Pest presence
- Irrigating with reclaimed water (*higher levels of chloride may require salt-tolerant plants*)



Environment	Bahiagrass	Bermudagrass	Centipedegrass	Seashore Paspalum	St. Augustine-grass	Zoysiagrass
Area Adapted To	Statewide	Statewide	N. Florida and Panhandle (one cultivar adapted to South Florida)	Statewide	Statewide	Statewide
Mowing Height	3"-4"	Cultivar Dependent	1.5"-2.5"	0.5"-2"	Cultivar Dependent	Cultivar Dependent
Soil	Acid, sandy	Wide range	Acid, infertile	Wide range	Wide range	Wide range
Leaf Texture	Coarse-medium	Cultivar Dependent Fine-medium	Medium	Fine-medium	Cultivar Dependent Coarse-medium	Cultivar Dependent Fine-medium
Salt Tolerance	Poor	Good	Poor	Excellent	Good	Good
Shade Tolerance	Poor	Poor	Fair	Poor	Good	Good
Wear Tolerance	Poor	Good- excellent	Poor	Good-excellent	Poor	Good-excellent
Drought Tolerance	Excellent	Good	Medium	Good	Fair	Medium
Nematode Tolerance	Very good	Poor	Poor	Good	Good	Good
Maintenance Level	Low	Cultivar Dependent Medium-High	Low	High	Medium	Medium-High
Establishment Methods	Seed, sod	Seed, sod, sprigs, plugs	Seed, sod, sprigs, plugs	Seed, sod, sprigs, plugs	Sod, sprigs, plugs	Seed, sod, sprigs, plugs

Turfgrass

Preparation

Proper soil preparation before grass planting is critical to ensure the establishment of quality turf. Preparation determines how quickly the lawn becomes established and its long-term maintenance requirements.

Here are some general guidelines for preparing to plant a lawn:

- Call 811 before you dig before installing any and/or all plant material.
- Clean and rough grade - remove debris and level the area to make it suitable for mowing.
- Install irrigation - if you are including an irrigation system, install it prior to planting.
- Soil analysis - determine soil pH and phosphorus and potassium concentrations. Contact the Manatee County Extension Service for information on how to do this.
- Soil amendments - add these prior to planting if you need to improve the soil's physical and chemical properties.
- Deep tillage - this loosens compacted soil and improves the establishment of turf. Tilling sand isn't necessary.
- Final grading - a final leveling makes mowing easier and safer.

Environmental Stresses

Florida lawn grasses are subjected to many environmental stresses as a result of prolonged exposure to shade, drought, nutrient deficiency, the effects of vehicle and foot traffic, salinity, and occasional cold temperatures. Biotic stresses result from living organisms such as insects, diseases, or nematodes.

Environmental stresses can be managed in two ways: 1) choosing the most stress-tolerant species or cultivar for a particular area and, 2) using proper cultural and management practices to alleviate the effects of stress.

Here are some practices to minimize environmental stresses:

- Moderate nitrogen - nitrogen encourages plants to form new tissue and grow, however, when applied in excess the grass can become more vulnerable to stresses.
- Mowing at proper heights - mowing below recommended heights removes a large portion of the leaf blades available for photosynthesis. This leaves the grass less able to support itself or recover from injury.
- Irrigating only when the grass needs water - over irrigating leads to the failure of many lawns by increasing fungal problems and limiting the root system to the top few inches of soil.

Many environmental stresses lead to increased disease or insect problems, which are often treated chemically without changing the cultural practices that initially caused the problem.

Chemical treatment in these cases will not take care of the problem until the cultural factors are handled correctly

Turfgrass

Mowing is an important maintenance operation.

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

Growth rates and mowing height have the most influence on mowing frequency. As a rule of thumb, mowing should be done often enough so that no more than one-third of the leaf blade is removed at any one mowing. Following this practice minimizes the effect of mowing on photosynthesis and helps to maintain the high percentage of leaf surface necessary for healthy root development.



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

Clippings contain nutrients and should be recycled on the lawn. Clippings have significant nutrient value and decomposes rapidly, returning some fertilizer and organic matter to the soil. The nutrients in clippings are pollutants when they end up in stormwater systems and waterbodies.

Turfgrass Species	Optimal Mow Height (inches)	Mowing Frequency (days)	Preferred Mower Type
Bahiagrass	3.0-4.0	7-14	Rotary / flail
Bermudagrass	0.75-1.5	5-7	Reel
Centipedegrass	1.5-2.5	7-14	Rotary
Seashore Paspalum	1.0-2.0	5-10	Rotary / reel
St. Augustinegrass “Dwarfs”	3.5-4.0 2.0-2.5	5-7	Rotary
Zoysiagrass	1.5-2.5	5-7	Rotary

Alternative Groundcovers

For areas where turfgrass is difficult to grow or isn't necessary, groundcovers can be used.

Groundcovers can be a great alternative to turfgrass as they can be low maintenance. mixed in with turfgrass to fill in bald spots or can fill in an area as a standalone.

When including groundcovers, if you choose multiple varieties and intermix them, then you will have a visually aesthetic groundcover year-round as different species may die-back or go dormant throughout certain seasons. Groundcovers can also offer other benefits to your landscape. They can prevent weeds from growing in an area, keep soil from eroding as well as



can increase the moisture of the soil. Some groundcovers work well for foot traffic while others do better if pathways or walkways are created because they do not tolerate foot traffic as well or may grow taller than turfgrass would. You want to make sure you are considering the right plant for the right place and choosing the right kind of groundcover appropriately. Some good examples of low-growing groundcovers for shade include frog fruit, twinflower, and Asiatic jasmine. Sunshine mimosa and frog fruit are great low-growing groundcovers that do well in full sun.

If you have to follow HOA or community landscape guidelines, make sure to check that groundcovers are acceptable in your landscape.

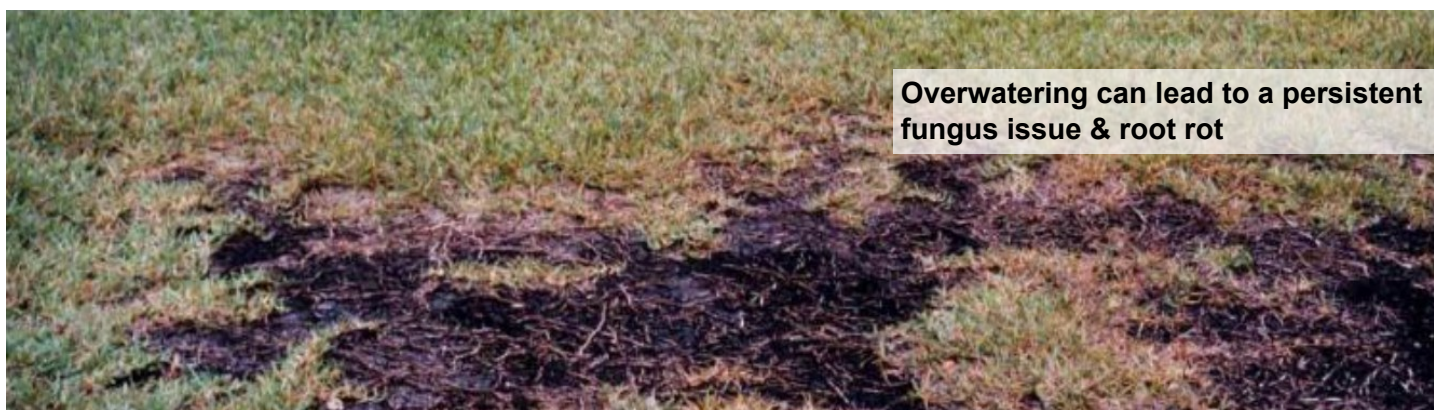
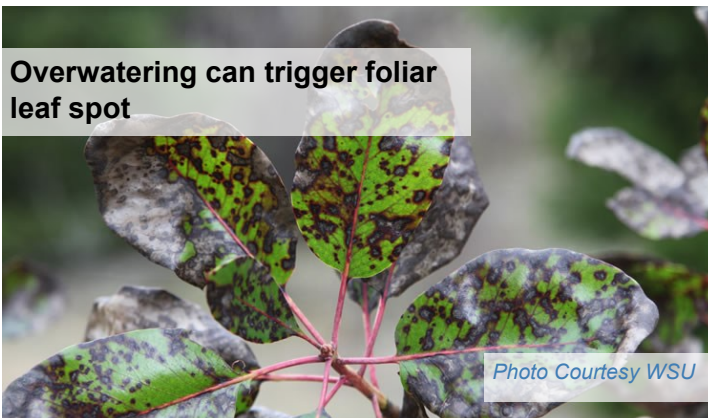


Overwatering

Overwatering can be just as detrimental to your landscape than underwatering. Having an overly wet lawn & landscape supports an environment for root rot, fungus, pests and weeds. Overwatering can also cause leeching of pesticides and fertilizers (runoff) and soil erosion.

It is important to keep in mind that, rainfall should be the primary source of water for your lawn and landscape. Irrigation should be supplemented when we do not receive adequate rainfall to meet the needs of our plants.

Before applying fertilizers and/or pesticides, determine whether or not the amount you are watering is creating a negative environment.



Watering with Reclaimed Water

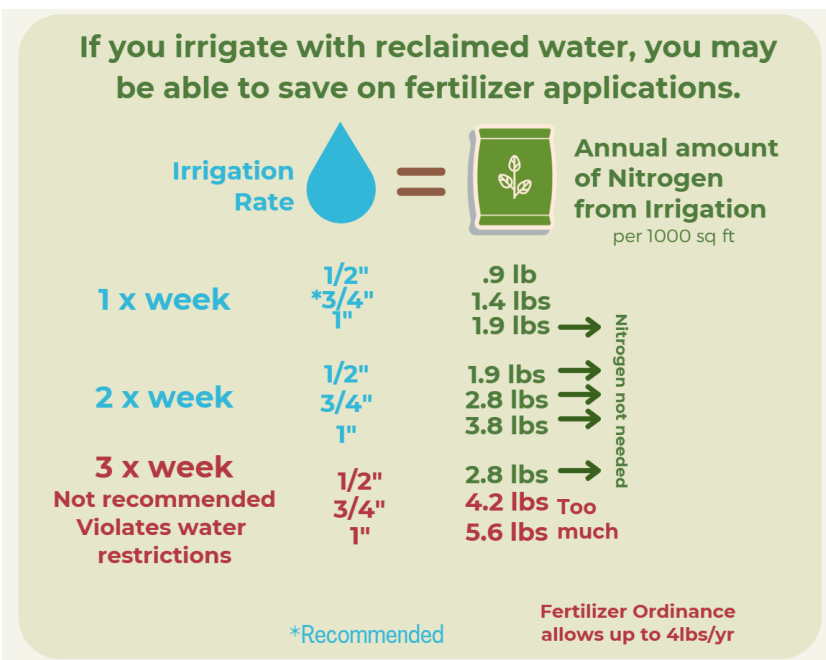
If you are connected to the purple pipe, there are some different approaches that can be taken with your landscape.

Reclaimed water is former wastewater from residential, commercial, and industrial buildings and facilities that has been treated, disinfected, and piped back into communities for reuse in a variety of agricultural, domestic, and industrial settings to name a few. It is increasingly being utilized for landscape irrigation. Although reclaimed water is the result of former wastewater, this resource is not unlimited. In times of high irrigation use, local utilities will occasionally be unable to supply enough reclaimed water to meet customer demand. This can result in the use of potable water for irrigation when reclaimed water is unavailable, increasing pressures on local water supply.

Reclaimed water contains dissolved salts and nutrients. Using reclaimed water for irrigation has the potential to provide the nitrogen and phosphorous required by turfgrass.



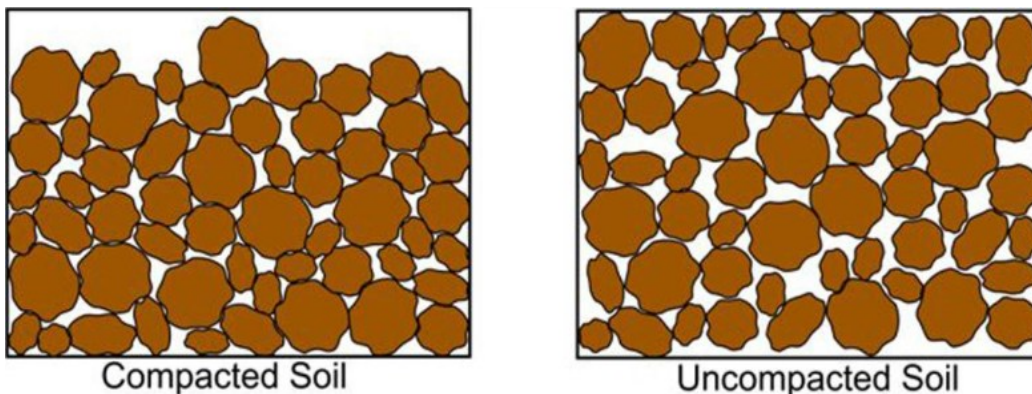
Photo courtesy of Melanie Stokes



These nutrients are necessary for plant growth and are common constituents of fertilizer yet can contribute to the impairment of Florida's waterways when plants are not able to take in these nutrients. Over-irrigation with this water source can cause pest problems in the landscape like fungus as well. Over-irrigation of reclaimed water can also contribute to the enrichment of community stormwater ponds, leading to favorable conditions for algae growth and impacting downstream waters. Therefore, if you are watering with reclaimed water, it is important to pay attention to how much water you are putting on your landscape to account for this.

Soil Compaction

Soil compaction is a consequence of urban development activities and can lead to problems with soil drainage, aeration, nutrient cycling, and plant growth.



The arrangement of individual soil particles forms the structure of the soil. The space between particles can be filled with water or air. The spaces between particles also allows for water to move through soil. Soil compaction occurs when the soil structure is compressed, thereby reducing the number and size of the pore spaces between particles (*shown above*). Soil compaction in urban areas is often caused by the use of heavy equipment during construction and constant traffic (foot or equipment) in existing landscapes.

Compacted soils provide a stable foundation for homes, but can make it difficult for plant growth and water movement through the soil. It is hard for roots to penetrate through compact soil, causing a shallow root zone that can lead to poor plant growth and increases the need for irrigation and fertilization. Which in turn, leads to increased runoff of nutrients into water bodies and potential for erosion.

If your soil is compact, it may be more efficient to water your lawn in two cycles. Cut all of your run times in half and have it run through each zone twice.

Dealing with Soil Compaction

The easy way to deal with soil compaction is to prevent it from happening during construction. But what about existing landscapes with compact soil?

Here are some ways to help amend compacted soil:

- Plug aeration
- Air tilling
- Shallow or deep tilling
- Composting
- Soil replacement



Mulch

Mulch is any material applied to the soil surface to protect or improve the area covered. Mulches are frequently applied around plants to modify the soil environment and enhance plant growth. They may consist of organic material such as bark, wood chips, leaves, pine needles, or grass clippings. Mulch can be applied to the soil surface but should not rest against the stems of landscape plants. Mulch should be maintained at a depth of 2-3 inches after settling.

Here are the beneficial effects of mulching has on soil and plants:

- Prevents the loss of water from the soil by evaporation
- Suppresses weeds when the mulch material itself is weed-free and applied deeply enough (2-3 inches) to prevent weed germination or to smother existing small weeds
- Regulates soil temperature - keeps the soil cool under intense sunlight and warm during cold weather
- Improves absorption and percolation of water into the soil and reduces erosion
- Improves soil structure and tilth - as it decays, the material becomes topsoil and adds nutrients to the soil
- Enhances the beauty of the landscape by providing a color of uniform color and surface texture
- Plants are able to produce roots in and directly under the mulch around them, creating more resilient plants with additional roots.

Mulch Errors to Avoid



Rock mulch should be used minimally in the landscape. It is recommended to use rock mulch for pathways, dry creek beds, or under downspouts.

Do not build volcanoes with mulch.
This smothers the roots and causes rot.



Mulch

Mulches Suitable for the Landscape



Pine Straw



Pine Bark



Fallen Leaves



Hardwood

Photo Courtesy Better Homes & Garden



Cypress mulch not recommended

UF/IFAS Extension & the Florida-Friendly Landscaping program do not recommend the use of cypress mulch. Cypress trees grow in Florida's forested wetlands. Leftover pieces from harvested lumber are made into mulch but ultimately, come from whole trees cut from wetlands.

Pruning

Pruning is an important landscape maintenance task. Through the selective removal of shoots and branches, pruning a plant can improve its health, reduce the risk of failure, control growth, and enhance fruiting, flowering or appearance.

Pruning should be a part of routine maintenance and should not be put-off until the landscape is overgrown. However, attention should be paid to proper timing, depending on the needs of the plants. Proper plant selection can eliminate many pruning requirements, especially for shrubs.

Why you should prune:

- Improve the plant's structure by removing dead branches
- Provide clearance by reducing or raising the crown
- Increase air and light penetration by thinning the crown

Removing the correct stems and branches to accomplish the specified objective is as important as making the correct pruning cuts. If the wrong branches, or too many branches, are removed even with proper pruning cuts, nothing of merit has been accomplished. Be sure to look up how to prune your specific plants with an easy browser search for UF/IFAS recommendations.

Remember to disinfect your tools to prevent the spread of disease-causing pathogens in your landscape.



Fertilizer

“Fertilizer” means any substance that contains one or more recognized plant nutrients and promotes plant growth, or controls soil acidity or alkalinity, or provides other soil enrichment, or provides other corrective measure to the soil.

Why Fertilize?

Clearly, plants grow in the wild without the help of humans. However, our modern urban landscapes does not have the same conditions as where our native plants evolved. Subdivisions filled with subsoils, forests cut down, and drainage modifications all combine to make our landscapes a completely different environment.

The reason for fertilizing plants should be to supply nutrients to achieve a clearly defined objective, such as:

- Increasing shoot and root growth, flowering or fruiting
- Establishing newly planted trees and shrubs
- Enhancing foliage color and the appearance of the plant
- Correcting or preventing nutrient deficiencies

Fertilize Appropriately

Proper fertilization consists of selecting the right type of fertilizer, applying it at the right time and in the right amount for maximum plant uptake and benefit.

The Florida Department of Agriculture and Consumer Services regulates labeling requirements for turfgrass fertilizers being used in residential lawns. The label and instructions that are on the manufacturer’s bag are intended to reduce potential pollution from yards and to prevent the misapplication of fertilizer. Fertilize according to UF/IFAS recommended rates and application timings to prevent nutrient runoff and leaching which can pollute Florida’s waters. Be sure to follow any local fertilizer ordinances and ensure your landscape professional is a licensed fertilizer applicator.

If landscape plants exhibit nutrient deficiency symptoms, they may not be suited to the site. Soil pH, soil drainage, soil salts, limited soil volume, irrigation quality, or the mineral content of the soil and be the causes of nutrient deficiencies and cannot be remedied with fertilizer.

Fertilizer & Reclaimed Irrigation

Depending on the level of treatment and storage, reclaimed water may contain significant amounts of nutrients. Plants in the landscape can use the nutrients present in reclaimed water, potentially reducing the need for purchasing fertilizer. One of the most important issues with reclaimed water is preventing over-irrigation. If excessive amounts of irrigation are applied, then the nutrients that come with the reclaimed water can leach through the soil or runoff from the landscape. Over-irrigation with reclaimed water could also lead to losses of nutrients previously applied as fertilizer, even if the homeowner is following UF/IFAS fertilization recommendations. This linkage is especially important with reclaimed water because reclaimed water contains Nitrogen and Phosphorus, which, even in low concentrations, can lead to pollution of nearby water bodies if lost from the landscape.

Fertilizer

**No fertilizer containing Nitrogen can be applied to
turfgrass or landscape plants between
June 1st - September 30th
of each year.**

On May 24, 2011, the Manatee County Board of County Commissioners approved a set of fertilizer rules. These rules apply to anyone who applies fertilizer, such as, homeowners, landscapers, pest control firms, and etc. **These rules aim to keep our local water clean, yet still allow beautiful and healthy yards.**

Nitrogen Applications

During the non-restricted season (October 1st - May 31st), nitrogen fertilizer must contain at least 50% slow release nitrogen. Look for the terms, time-release, slow-release or controlled-release on the product label.

Phosphorus Applications

Phosphorus cannot be applied without a soil analysis showing a phosphorus deficiency filed with the County Administrator's office.

Grass Clippings

Leave grass clippings on the grass! Grass blades contain fertilizer, and when blown onto hard surfaces (i.e. sidewalks, driveways, etc.) they then leach excess nutrients into local waterways.



**Check the weather before
applying fertilizer!**

**Rain will wash it away
onto hard surfaces and
stormwater drains!**

Photo Courtesy iStock Images

Pests

Pesticides are designed to kill or alter the behavior of pests. If they are not used wisely, pesticides may pose risks to pesticide applicators and other exposed people, and may create long-term environmental problems.

Identifying or recognizing pests is essential to proper pesticide application and selection. If a pesticide is to be used, the applicator must know the proper application technique and read the label thoroughly. Always follow the directions on the label.

These directions are the law which have been developed after extensive research and field studies on the chemistry, biological effects, and environmental fate of the pesticide. **State and federal pesticide laws require following label directions.**

If they are not used wisely, pesticides may pose risks to those exposed and may create long-term environmental problems. The most obvious method to reduce the risk from pesticides is to use them only when necessary.

Use the guidelines when using pesticides:

- Store pesticides behind locked doors in original containers with the labels intact, separate from seed and fertilizer.
- Use pesticides at the correct labelled application rate and recommended intervals between applications to avoid injury to plants and animals. It is the law!
- Never eat, drink, or smoke when handling pesticides, and always wash with soap and water after use.
- Never pour pesticides down a drain or into an area exposed to humans, animals, or water.
- Always wear protective clothing when applying pesticides. A long-sleeved shirt, long-legged pants, rubber gloves, boots, eye protection, and a wide-brimmed hat should be worn at a minimum. The label may instruct more clothing and/or equipment if needed.



Mole Cricket



Eastern Lubber Grasshopper



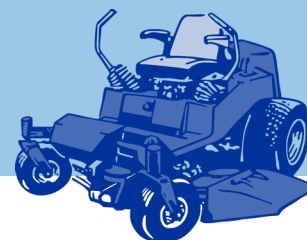
Leaf-footed Bug (adult + nymph)

Tips on Hiring a Landscape Professional

Minimum qualifications

For Landscape Maintenance:

- ☐ Landscape Best Management Practices (LBMP) can be verified with Manatee County Natural Resources Department
- ☐ Worker's compensation insurance can be verified online
- ☐ Ask for proof of their General Liability insurance



For Fertilization:



- ☐ Green Industries Best Management Practices (GIBMP) can be verified at <https://gibmp-prod.ifas.ufl.edu/certified>
- ☐ Worker's compensation insurance can be verified online
- ☐ Ask for proof of their General Liability insurance

For Pesticide and Herbicide Applications:

- ☐ Certified Pest Control Operator and Limited Commercial Landscape Maintenance Pesticide license can both be verified at <https://aessearch.fdacs.gov/PersonSearch.asp>
- ☐ Worker's compensation insurance can be verified online
- ☐ Ask for proof of their General Liability insurance
- ☐ Landscape Best Management Practices (LBMP) can be verified with Manatee County Natural Resources Department
- ☐ Green Industries Best Management Practices (GIBMP) can



For Pruning/Trimming/Removing Trees:



- ☐ International Society of Arborists can be verified at <https://www.treesaregood.org>
- ☐ Landscape Best Management Practices (LBMP) can be verified with Manatee County Natural Resources Department
- ☐ Worker's compensation insurance can be verified online
- ☐ Ask for proof of their General Liability insurance

For more information on questions and observations of your landscape irrigation professional, you can reference the publication titled, "Guidelines for Hiring a Florida-Friendly Landscape Professional" on page 50.

Programs & Services

Florida-Friendly Landscape Assistance Program



Sit down in our office with Master Gardener volunteers and/or our FFL Program Coordinator who can help guide you to find solutions for your landscape!

Our highly trained volunteers will discuss how to make Florida-Friendly Landscaping choices for your property, helping you to save time, money and resources.

For your one-on-one appointment, you may bring plant samples (for identification or diagnosis), soil samples and be sure to have plenty of photos of your landscape. For more information visit <https://sfyl.ifas.ufl.edu/manatee/lawn--garden/residential-horticulture-program/>

Master Gardeners' Educational Garden

Schedule a tour of our office's Master Gardener's garden by calling 941-722-4524 or by emailing manateeMG@gmail.com.

You can learn and see the benefits of Florida-Friendly Landscaping and more like:

- Herb gardening
- Butterfly gardening
- Vegetable gardening
- Composting
- Rain harvesting
- Mulching



Photo courtesy Katie Granberg

Programs & Services



Master Gardener Volunteer Program

The mission of the UF/IFAS Master Gardener Volunteer Program is to assist the UF/IFAS Manatee County Extension by educating residents about effective, environmentally-sound, research-based methods of cultivating plants in the home garden & landscape. Master Gardener volunteers help Manatee County residents by making plant recommendations, diagnosing plant issues, soil testing and helping with the landscape assistance program!

If you're interested in becoming a Master Gardener, visit <https://sfyl.ifas.ufl.edu/manatee/lawn--garden/master-gardener-volunteer-program/>

Cross Connection Control Program

The Manatee County Cross Connection Control Program safeguards the public drinking water supply from unintentional contamination. The backflow prevention assembly is a key component to preventing unwanted substances from entering our distribution system. In case of a drop in the public system water pressure, the backflow device will stop water from flowing in reverse and possibly contaminating the drinking water supply.

Mechanical backflow preventers have internal seals, springs, and moving parts that are subject to fouling, wear or fatigue. Therefore, all backflow preventers have to be tested periodically to ensure that they are functioning properly. **Every customer who owns a backflow device is required to have the device tested annually by a certified professional plumber.**

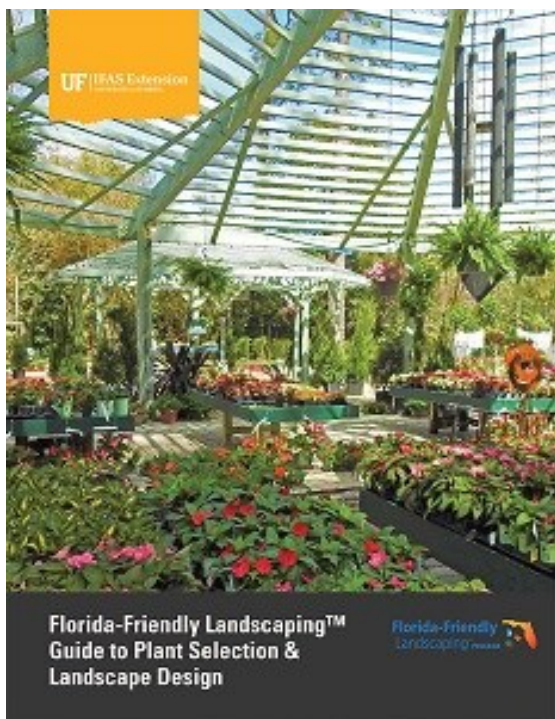
For more information on this program please visit www.mymanatee.org/water or email water.saver@mymanatee.org



Helpful Resources

Free Florida-Friendly Landscaping Publication

The FFL Guide to Plant Selection & Landscape Design is a helpful resource for determining which plants are best suited for your site and designing your landscape.



Go to the Southwest Florida Water Management District's website, www.watmatters.org

- Select "Resources"
- Select 'Free Publications'
- Filter by topic by selecting 'Florida-Friendly Landscaping' and click 'Apply'
- You have the option of downloading a free PDF

To obtain a hard copy, you can search the UF IFAS bookstore online and type "Florida friendly landscaping" into the search box at the top right and scroll down to find it.

- Click on "Add to Cart" and put in details to purchase for \$6. The cost of shipping is separate

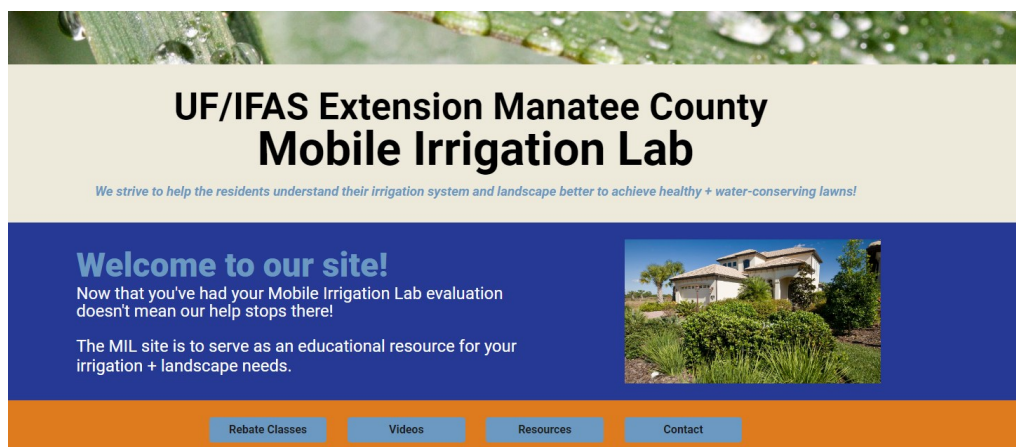
The Mobile Irrigation Lab's website

<https://sites.google.com/view/manateemil/home>

The UF/IFAS Extension Manatee County's Mobile Irrigation Lab website is available to everyone.

This is a wonderful resource for anyone

interested in learning more about their irrigation + landscape. If you are participating in the Outdoor Water Conservation Rebate program, you can use the website to complete the class requirement by following the link to the class courses under 'Rebate Classes'. If you just want to learn more, there are plenty of educational videos free to watch in the comfort of your own home!



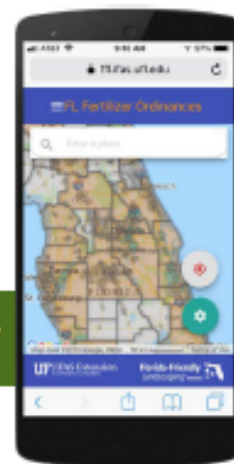
Helpful Resources

Florida Friendly Landscaping Mobile Web Applications

Florida-Friendly Landscaping™ Florida Fertilizer Ordinances

Provides a quick and convenient reference to the many local fertilizer ordinances.

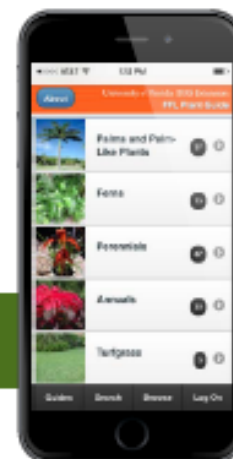
ffl.ifas.ufl.edu/fertilizer



Florida-Friendly Landscaping™ Plant Guide

Find the Right Plant for the Right Place Anytime, Anywhere

ffl.ifas.ufl.edu/plants



Helpful Resources

Agencies

- ☐ **Florida Department of Environmental Protection:** <https://floridadep.gov/>
- ☐ **Florida Fish & Wildlife Conservation Commission:** <https://myfwc.com/>
- ☐ **Florida International Society of Arboriculture:** <https://www.floridaisa.org/>
- ☐ **Florida Irrigation Society:** <http://www.fisstate.org/>
- ☐ **Florida Native Plant Society:** <https://www.fnps.org>
- ☐ **Manatee County:** <https://www.mymanatee.org/>
- ☐ **National Invasive Species Info Center:** <https://www.invasivespeciesinfo.gov/>
- ☐ **Nuisance Wildlife Removal:** <https://www.humanemanatee.org/resources/mcas-animal-control/>
- ☐ **UF/IFAS Manatee County Extension:** <https://sfyl.ifas.ufl.edu/manatee/>
- ☐ **University of Florida:** <http://solutionsforyourlife.com>

Garden Solutions

- ☐ **Ask our Master Gardeners:** manateeMG@gmail.com
- ☐ **A Better Lawn on Less Water:** Search in <https://gardeningsolutions.ifas.ufl.edu>
- ☐ **Best Management Practices for Protection of Water Resources by the Green Industries:** https://ffl.ifas.ufl.edu/media/ffl.ifas.ufl.edu/docs/GIBMP_Manual_Web_English.pdf
- ☐ **Choosing and Installing Mulches:** Search in <https://gardeningsolutions.ifas.ufl.edu>
- ☐ **How do my Yard Care Practices Affect Our Water:** <https://gardeningsolutions.ifas.ufl.edu/care/irrigation/how-do-my-yard-practices-affect-our-water.html>
- ☐ **Protecting Florida's Water Resources:** <https://gardeningsolutions.ifas.ufl.edu/care/florida-friendly-landscapes/floridas-water-resources.html>
- ☐ **Pruning – Importance of Disinfecting Tools:** Search in <https://gardeningsolutions.ifas.ufl.edu>
- ☐ **Pruning Landscape Trees and Shrubs:** Search in <https://gardeningsolutions.ifas.ufl.edu>
- ☐ **Ten Ways to Save Water:** <https://gardeningsolutions.ifas.ufl.edu/care/irrigation/ten-ways-to-save-water.html>

Programs

- ☐ **Florida-Friendly Landscaping Program:** <https://edis.ifas.ufl.edu/entity/topic/ffl>
- ☐ **UF/IFAS Manatee County Extension Events:** <https://sfyl.ifas.ufl.edu/events/?location=manatee>

Regulations

- ☐ **All About Water Restrictions:** <https://gardeningsolutions.ifas.ufl.edu/care/irrigation/water-restrictions.html>
- ☐ **Florida Fertilizer Ordinance:** <https://ffl.ifas.ufl.edu/fertilizer/>
- ☒ **Manatee County Fertilizer Ordinance:** https://www.mymanatee.org/departments/parks___natural_resources/environmental_protection/the_manatee_county_fertilizer_ordinance

References

University of Florida IFAS Extension Publications

You can utilize UF/IFAS' Electronic Data Information Source (EDIS) to find research-based information about your home and lawn, as well as, agriculture, natural resources, family & consumer sciences and youth development.



- Visit <https://edis.ifas.ufl.edu/>
- Type in whatever keywords you are interested in or the publication #s listed on the next page learning about and hit 'Go'
- You will then see a page with your search results

What can we help you with?

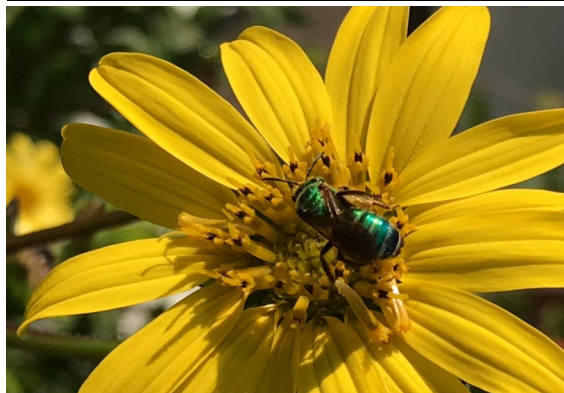
GO

Irrigation Publication Titles	Publication #
	<i>Search the Below</i>
Controllers	
☐ Controllers - How do Soil Moisture Sensor Irrigation Controllers Work	AE437
☐ Controllers - Operation of Evapotranspiration-Based Controllers	AE446
☒ Controllers - Operation of Residential Irrigation Controllers	CIR1421
☐ Controllers - Programming Guidelines for Evapotranspiration-Based Irrigation Controllers	AE445
Conservation	
☐ Estimated Water Savings Potential of Florida-Friendly Landscaping Activities	AE515
☐ Florida's Water Resources	FE757
☐ Home Irrigation and Landscape Combinations for Water Conservation in Florida	ABE355
General Info	
☐ Basic Tips for Designing Efficient Irrigation Systems	AE539
☒ Frequency of Residential Irrigation Maintenance Problems	AE472
☐ Managing Landscape Irrigation to Avoid Soil and Nutrient Losses	SL384
☐ Measuring Pump Capacity For Irrigation System Design	CIR1133
☒ Residential Irrigation System Rainfall Shutoff Devices, or Rain Sensors	ABE325
☐ Summary of UF/IFAS Turf and Landscape Irrigation Recommendations	AE436
☐ Turf Irrigation for the Home	CIR829
☐ Valves in Irrigation Systems	CIR824
☒ Watering your Florida Lawn	ENH9
Microirrigation	
☐ Micro-irrigation for Home Landscapes	AE524
☐ Micro-irrigation in Mulched Bed Production Systems: Irrigation Depths	AE72

References



Landscape Publication Titles	Publication #
	<i>Search the Be-low</i>
General Info	
☐ Guidelines for Hiring a Florida-Friendly Landscape Professional	ENH1350
☐ Concepts for Sustainable Landscape Mosaics	ENH1341
☒ Environmental Stresses and your Florida Lawn	ENH153
☐ Florida-Friendly Landscaping	ENH1343
☐ Invasive Plants – Help Protect Florida’s Natural Areas	AG108
☐ Native Plants That Benefit Native Wildlife	WEC339
☐ Reclaimed Water Use in the Landscape	SL339
☐ Salt-Tolerant Plants	ENH26
☐ Soil Sampling and Testing	SL281
Grasses	
☐ Bahia Grass	ENH6
☐ Bermuda Grass	ENH19
☐ St. Augustine Grass	ENH5
☐ Zoysia Grass	ENH11
Maintenance	
☐ Florida Gardener's Guide to Landscape Fertilizer	SL266
☒ FFL - Right Plant, Right Place	ENH1156
☒ Let Your Lawn Tell You When to Water	ENH63
☒ Mowing Your Florida Lawn	ENH10
☐ Pruning Palms	ENH1182
☐ Soil pH and the Home Landscape	SL256
☐ Soil Compaction	SL317



The Mobile Irrigation Lab Handbook has been made possible by & adapted from the Florida Friendly Landscaping Program materials and the Best Management Practices for Protection of Water Resources by the Green Industries.

Notes

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