

SUMMARY OF FLORIDA GREEN INDUSTRIES

BEST MANAGEMENT PRACTICES FOR PROTECTION OF WATER RESOURCES IN FLORIDA



JUNE 2002

GOALS OF THE MANUAL

This handy summary booklet is meant to be carried around in your truck. It provides easy reference to the main points of the full BMP manual. It is also helpful to show to customers or others who may not understand that you are using BMPs, or why.

The full manual provides information and guidance on turfgrass and landscape management practices to conserve and protect Florida's water resources. These practices cover both the establishment of new turf and landscapes and the care of existing turf and landscapes, including construction activities, irrigation, nutrient management, and pest management.

The manual is designed as an educational guide for professional service providers and other interested parties. It does not substitute for the services of a landscape architect, engineer, or other design professional. Design issues are discussed as they apply to the service industry and their clients.

This document should be used to enhance the professional knowledge and judgement of turfgrass and landscape managers, and should not be viewed as a regulatory standard to be rigidly applied in all cases. Turfgrass and landscape managers should use the information provided here as general guidance, but specific situations may require more restrictive measures to protect sites that are at particularly high risk for adverse effects on surface water and ground water.

The full manual is available from your local UF-IFAS Cooperative Extension Service office and through several cooperating professional organizations including the Florida Turfgrass Association, the Certified Pest Control Operators Association, the Florida Pest Management Association, the Florida Nurserymen and Growers Association, and at cooperating service companies and fertilizer and equipment distributors. It is also available on the web at <http://www.dep.state.fl.us/water/stormwater/pubs.htm>.

GENERAL

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

EDUCATIONAL

- Inform employees of pertinent information on their job duties, especially job safety and DOT/OSHA regulations.
- Train employees about BMPs and job safety.
- Retrain employees annually and when changes are made.
- Train employees to document and retain records of activities.

LANDSCAPE INSTALLATION

- Design the landscape before installing the irrigation system.
- Conduct a site evaluation.
- Select plants with attributes that match the characteristics of the planting site. Ask what type of lawn is desired or expected, what level of maintenance can be provided, and what are the environmental conditions at the planting site.
- Select and position plants for specific functions.
- Select plants that will not outgrow their allotted space.
- Prepare the soil properly before planting grass to ensure establishment.
- Till the soil deeply if it is compacted. Tillage of sand is unnecessary.

PLANTING TREES AND SHRUBS

Before digging the hole:

- Inspect the root ball and remove all soil from above the topmost root.
- Measure the distance between the topmost root and the bottom of the root ball. Dig the hole about 10 percent shallower than this depth and as wide as possible (at least one and a half times the width of the ball and even wider in compacted soils).
- Apply mulch.

LAWNS

Practices that reduce environmental stresses include the following:

- Moderating nitrogen fertility.
- Mowing at proper heights.
- Irrigating when the grass needs water.
- In shaded situations, doing as follows:
 - Increase the mowing height;
 - Reduce fertilizer applications;
 - Reduce water use substantially;
 - Avoid the effects of foot traffic;
 - Monitor for weed pressure;
 - Monitor for disease pressure;
 - Consider other ground covers.

IRRIGATION

NEED FOR IRRIGATION

The following visual indicators are guidelines to determine the need for irrigation:

- Grass has a dull bluish-gray coloring.
- Foot tracks remain in the grass.
- Leaf blades are folded in half on at least a third of the site.
- Soil samples from the root zone are dry and crumbly.
- Indicator landscape plants (such as impatiens and azaleas) have drooping leaves.

IRRIGATION SYSTEM DESIGN

- The application rate must not exceed the ability of the soil to absorb and retain the water applied during any one application.
- The design operating pressure must not be greater than the available source pressure.
- The design operating pressure must account for peak use times and supply line pressures at final buildout for the entire system.
- Distribution devices and pipes should be designed for optimum uniform coverage. The first and last distribution device should have no more than a 10 percent difference in flow rate. This usually corresponds to about a 20 percent difference in pressure.
- Flexibility must exist to meet a site's peak water requirements and allow for the modification of the system's operation to meet seasonal irrigation changes or local restrictions.

- Distribution equipment (such as sprinklers, rotors, and microirrigation devices) in a given zone must have the same precipitation rate.
- Turf and landscape areas should be zoned separately based on plant water requirements.
- The design package should include a general irrigation schedule with recommendations and instructions on modifying the schedule for local climatic and growing conditions.
- If required by the plant species, the design should account for the need to leach out salt buildup from poor-quality water. Otherwise, use species that are tolerant of these conditions.
- Water supply systems (such as wells and pipelines) should be designed for varying control devices, rain shut-off devices, and backflow prevention.
- Water conveyance systems should be designed with thrust blocks and air release valves, such that flow velocity is 5 feet per second or less.
- Pipelines should be designed to provide the system with the appropriate pressure required for maximum irrigation uniformity.
- Pressure regulating or compensating equipment must be used where the system pressure exceeds the manufacturer's recommendations.
- Equipment with check valves must be used in low areas to prevent low head drainage.
- Nonplanted areas, including impervious surfaces and underneath roof overhangs, should not be irrigated.

IRRIGATION SYSTEM INSTALLATION

- Only qualified specialists should install the irrigation system.
- The construction must be consistent with the design.
- The designer must approve any design changes before construction.
- Construction and materials should meet existing standards and criteria.
- Acceptable safety practices must be followed during construction.
- All underground cables, pipes, and other obstacles should be identified and their locations flagged.
- Obtain all permits before construction.
- Always give the owner a copy of the as-built plans, operating manuals, warranties, and written instructions on how to change the irrigation system's timers/clocks/controllers.
- At the end of construction, the site must be cleaned of all construction materials.

IRRIGATION MANAGEMENT

- Irrigation controllers/timers should be reset seasonally to account for plant growth requirements and local climatic conditions.
- Properly calibrated flow meters, soil moisture sensors, rain shut-off devices and/or other automated methods should be used to manage irrigation.
- Irrigation rates should not exceed the maximum ability of the soil to absorb and hold the water applied in any one application.
- Irrigation quantities should not be larger than the available moisture storage in the root zone.
- Never overirrigate.

- Use soil moisture sensing devices, rain gauges, and the visual observation of irrigation runoff or puddles to prevent overirrigation.
- When possible the irrigation schedule should coincide with other cultural practices (such as the use of fertilizer, herbicides, or other chemical applications).
- When fertilizing (other than when watering restrictions apply), irrigate with 1/4 inch following fertilization to avoid the loss of nitrogen and increase uptake efficiency. If water restrictions apply, you may irrigate as you are allowed, but more than 1/2 inch may cause some nitrogen to be leached past the root zone.
- Proper cultural practices (such as mowing) should be employed to promote healthy, deep root development and reduce irrigation requirements.
- Contact local and state regulatory agencies (such as the county, city, Florida Department of Environmental Protection, water management districts, and health department) to determine current irrigation regulations and criteria.
- Abide by all permit conditions and current water restrictions when operating the irrigation system.
- If necessary, obtain any desired regulation variances before irrigating.

IRRIGATION SYSTEM MAINTENANCE

- Perform visual weekly inspections to identify leaks, broken sprinkler heads, and other system malfunctions.
- Replace or repair all broken and worn components before the next scheduled irrigation.
- Replacement parts should have the same characteristics as the original components.
- Application/distribution efficiencies should be checked annually. Implement a preventive maintenance program to replace worn components before they cause fertilizer/chemical and water waste.

MULCHING

- Apply mulch deeply enough (2 to 3 inches after settling) to suppress weeds.
- Use mulches made from recycled materials (sustainable sources).
- Do not pile mulch against a tree. Leave a clear space for air to reach the trunk.

MOWING

- Pick up all stones, sticks, and other debris before mowing to avoid damaging the mower or injuring someone with flying objects.
- Avoid mowing wet turf with a rotary mower because clippings can clog the machine. Mow only when the turf is dry.
- Sharpen the mower blade frequently enough to prevent a ragged appearance to the turf.
- Use the highest acceptable mowing height for the grasses being grown.
- Avoid removing more than a third of the foliage at one time.
- Mow in a different direction every time the lawn is cut.
- Do not remove clippings. If clumping occurs, distribute the clippings by re-mowing or by lightly raking. You can also use a leaf blower to distribute clippings.
- Check your mower every time it is used. Follow the manufacturer's recommendations for service and adjustments.
- Adjust the cutting height by setting the mower on a driveway or sidewalk and using a ruler to measure the distance between the ground and the blade.

- Never fill a hot mower with gasoline.
- Always wear heavy leather shoes when mowing the lawn.
- Wash the mower after use to reduce rusting and weed seed movement.
- Practice grass recycling, and return nutrients to the soil.
- Compost if you must collect clippings. Use the compost as a soil modifier or mulch.
- Do not direct clippings into bodies of water or onto impervious surfaces. Sweep or blow back onto the lawn any clippings that are blown onto sidewalks and driveways.
- When using mowers, string trimmers, edgers, and other equipment, avoid mechanical damage to trees and shrubs.

PLANT DISPOSAL

- Never sweep or blow debris into a storm drain.
- Be careful with yard waste! Careless disposal may spread invasive non-native plants.
- To minimize the chance of accidental propagation, plants can be pruned before fruit is mature, and leaf raking can be done before the seeds of surrounding plants have dropped.
- Whenever practical, and if the homeowner is amenable, yard wastes should be composted on-site and retained for use as mulch. This avoids transportation and disposal costs and reduces the need for purchased materials.

FERTILIZATION

- Water-soluble fertilizers should be applied at no more than 0.5 pound N/1000 ft² per application. The application rates of controlled-release fertilizers depend on the release rates of the product.
- Remember that **the application of “weed and feed” herbicide/fertilizer mixtures to lawns for hire requires a pest control business license and a certified operators certificate** from the Florida Department of Agriculture and Consumer Services.
- There is no significant difference between liquid or dry applications of fertilizer. Turfgrasses take up nitrogen in the form of nitrate and ammonium, and all dry fertilizers have to be dissolved by water before they benefit the turf. To protect the environment, the proper application of fertilizer is more important than the type of product.
- Solution fertilizers do not leach more readily than granular fertilizers once they have reacted with the soil components. Solution fertilizers are often used in lawn fertigation programs in which small amounts of nutrients are frequently applied. When used in this manner, solution fertilizer programs may actually reduce environmental impacts because fewer losses occur from runoff or leaching.
- It is imperative that the **proper quantity** of water be applied following the application of soluble fertilizer, if rainfall is not anticipated in 8 to 12 hours.
- A mixture of soluble and slow-release nitrogen sources is recommended, especially in environmentally sensitive areas.
- **You should not apply fertilizer when heavy rains are imminent.**
- The surface application of ammonium-N and/or urea-containing fertilizers to high-pH soils without watering in (with 1/4 inch of irrigation) is not recommended.

- Supply nutrients to achieve a clearly defined objective, such as the following:
 - increasing shoot growth, root growth, flowering, or fruiting;
 - establishing newly planted trees and shrubs;
 - enhancing foliage color and plant appearance;
 - correcting or preventing nutrient deficiencies.
- If landscape plants exhibit nutrient deficiency symptoms, they may not be suited to that site. Consider replacing such plants with others adapted to the site's conditions.
- If you suspect deficiencies in a palm tree, take a leaf to the Cooperative Extension Service for assistance. Palms have different nutritional requirements than most other landscape plants. In general, fertilizers or supplements should be applied to supply nitrogen-phosphorus-potassium-magnesium (N-P-K-Mg) at about an 8:1:12:4 ratio.
- Fertilization may NOT be required:
 - If homeowners or clients are pleased with the appearance of their landscape plants;
 - If plants are established;
 - If plants are flowering or fruiting, since exposure to high nitrogen at this stage may impede development;
 - For trees, unless nutrient deficiencies exist.
- Before fertilizing, soil and/or foliar nutrient analysis should be used to determine whether any need exists for phosphorus fertilizer.

- Prior to fertilizing, pests may be controlled and/or soil modified to improve nutrient uptake or plant responses to fertilizer.
- Plants with pests or other problems that could increase to damaging levels with fertilization should be fertilized only in conjunction with a treatment program. Without a treatment program, fertilizer may increase the severity of the damage.
- Soil pH should be considered when selecting the fertilizer.
- The amount of fertilizer applied should be the minimal amount needed to achieve the defined objective.
- Phosphorus fertilization should be based on reliable soil test recommendations. Many Florida soils are high in extractable phosphorus and may never require phosphorus fertilization for optimum turfgrass growth.
- Unvegetated or thin, low-quality turfgrass areas are more likely to produce runoff and off-site contamination than healthy, well-maintained turfgrass areas; therefore, maintain turfgrass optimally.
- Adequate potassium levels can usually be maintained at a 3:1 or 2:1 ratio. Ideally, turfgrass potassium fertilization should be based on soil test recommendations.
- Read and follow all label instructions and safety precautions.

ESTABLISHMENT AND RECOVERY

Establishment and recovery are special situations:

- Newly established turf often requires different rates and timing of fertilization to grow and develop a dense stand.
- Underfertilized turf may be stimulated back to health by nitrogen fertilization.
- Soluble fertilizer may be necessary to provide a rapid response on weakened turf.
- Lower total rates of soluble fertilizer can produce desired turf improvement when applied frequently.
- Use iron and manganese to supplement lower rates of soluble fertilizer. Micronutrients provide an initial color response, while soluble nitrogen thickens turf density and improves root development.
- Slow-release fertilizer may be an advantage when nutrients cannot be applied as frequently.
- New sod typically does not require fertilizer until it has firmly rooted into soil. This usually takes about one month. Plugs can be fertilized at the time of installation to encourage spreading of the runners. A quick, complete ground cover is the ultimate goal.

SHORELINE FRONTAGE

- Make sure that fertilizers and other lawn chemicals do not come into direct contact with the water or with any structure bordering the water such as a sidewalk, brick border, driveway, or street.
- Leave a “Ring of Responsibility” around or along canal, lake, or waterway shorelines by not fertilizing close to the body of water.

- When applying liquid fertilizers or granular fertilizers with a fertilizer spreader that features a deflector shield, the Ring of Responsibility should be at least 3 feet from the edge of the water.
- Without a deflector shield, the Ring of Responsibility should extend at least 10 feet from the edge of the water.

FERTILIZER STORAGE AND HANDLING

- Always store nitrate-based fertilizers separately from solvents, fuels, and pesticides, since nitrate fertilizers are oxidants and can accelerate a fire.
- Prevent contamination of nearby ground water and surface water by storing fertilizer in an area that is protected from rainfall.
- Load fertilizer into application equipment away from wells or surface waterbodies.
- Clean up spilled fertilizer materials immediately.
- Wash water generated should be collected and applied to the target crop. Discharge of this wash water to waterbodies, wetlands, storm drains, or septic systems is illegal.

PESTICIDES

- If any application of any pesticide is made to a lawn as part of a service provided by a person or business, then a pest control business license and a certified operators certificate are needed. This includes the application of “weed and feed” herbicide/fertilizer mixtures to lawns. Failure to obtain a license for pesticide application can result in fines up to \$5,000.
- Proper records of all pesticide applications should be kept
- USE Integrated Pest Management (IPM).
- The basic steps for IPM programs are as follows:
 - Identify key pests on key plants.
 - Determine the pest’s life cycle.
 - Use cultural, mechanical, or physical methods to prevent problems.
 - Decide which pest management practice is appropriate.
 - Determine if the “corrective actions” worked. Record and use this information when making similar decisions in the future.
- Read and follow all label directions. The label is a legal document.

PESTICIDE SELECTION

- The identification or recognition of pests is essential to proper pesticide application and selection. Once the pest has been identified, the best control method must be chosen. If a pesticide is to be used, the applicator must know the proper application technique and read the label thoroughly.
- Train employees in proper pest identification and pesticide selection techniques.

- Choose the product most appropriate for the problem or pest.
- Mix only the quantity of pesticide needed, in order to avoid disposal problems, protect nontargeted organisms, and save money.
- Spot treat pests whenever appropriate.
- Make note of any ground water advisories on the label.

GENERAL PESTICIDE USE

- **Labels**—Observe all directions, restrictions, and precautions on pesticide labels. It is dangerous, wasteful, and illegal to do otherwise.
- **Storage**—Store pesticides behind locked doors in original containers with their labels intact.
- **Rate**—Use pesticides at the correct application rate and recommended intervals between applications to avoid injury to plants and animals.
- **Rinsing**—Triple-rinse containers into the spray tank. Never pour pesticides down a drain or into an area exposed to humans, animals, or water.
- **Disposal**—Dispose of used containers in compliance with the label directions so that the contamination of water and other hazards will not result.
- **Clothing**—Always wear protective clothing when applying pesticides. At a minimum, wear a long-sleeved shirt, long-legged pants, rubber gloves, boots (never go barefoot or wear sandals), eye protection, and a wide-brimmed hat. Additional protective gear may be listed on the pesticide label.
- **Handling**—Never eat, drink, or smoke when handling pesticides, and always wash with soap and water after use.

PESTICIDE STORAGE

- The best way to minimize storage problems is to minimize the amount you store. Limit inventory, and purchase only the amounts needed.
- Design and build pesticide storage structures to keep pesticides secure and isolated from the surrounding environment. Store pesticides in a roofed concrete or metal structure with a lockable door.
- Keep pesticides in a separate facility, or at least in a locked area separate from areas used to store other materials, especially fertilizers, feed, and seed.
- Do not store pesticides near flammable materials, hot work (welding, grinding), or in shop areas.
- Do not allow smoking in pesticide storage areas.
- Store personal protective equipment (PPE) where it is easily accessible in an emergency, but not in the pesticide storage area.
- Do not put pesticides in containers that children and others might mistake for food or drink.
- Dry bags should be raised on pallets to ensure that they do not get wet.
- Do not store liquid materials above dry materials.
- Keep containers closed tightly.
- Inspect inventory frequently and watch for damaged containers.
- Store flammable pesticides separately from nonflammable pesticides.
- Segregate herbicides, insecticides, and fungicides to prevent cross-contamination and minimize the potential for misapplication.

PESTICIDE HANDLING

- Use extreme caution when handling concentrated chemicals.
- Locate operations well away from ground water wells and areas where runoff may carry spilled pesticides into surface waterbodies.
- Keep application equipment properly calibrated and in good repair.
- Do not calibrate equipment near wells, sinkholes, or surface waterbodies.
- Mix the pesticide and load the spreader or sprayer carefully to avoid spills.
- Mix and load pesticides on an impervious mix/load pad with provisions for collecting and reusing spilled or waste material.
- Use excess pesticide mixtures on a site that the label specifies for their use.
- Consider closed systems for loading and mixing.
- Calibrate your spreader or sprayers.
- Triple-rinse containers, pour the rinsate into the spray tank, and use according to the product label.

PESTICIDE DISPOSAL

- Maintain and follow labels on all pesticide containers.
- Triple-rinse, puncture, and crush empty containers. Clean all visible chemical from the containers, including the cap and cap threads. Follow the label directions for container disposal.

- Use dilute rinsates or excess mixture as a pesticide. Apply at or below the manufacturer's recommended (label) rates. Rinsate may be applied as a pesticide (preferred) or stored for use as make-up water for the next compatible application. Otherwise it must be treated as a (potentially hazardous) waste.
- For cancelled, suspended, or unusable pesticides, contact the Florida Department of Agriculture and Consumer Services, Bureau of Compliance Monitoring, at (850) 488-3314 or go to <http://doacs.state.fl.us/~aes/compli.htm> for guidance.

PESTICIDE SPILL MANAGEMENT

- Keep spill cleanup equipment available when handling pesticides or their containers.
- Clean up spills as soon as possible.
- Control actively spilling or leaking materials.
- Contain the spilled material.
- Collect spilled material.
- Store the containers of spilled material until they can be applied as a pesticide or appropriately disposed of.

REMEMBER!

THE PENALTY IS NOT IN REPORTING A SPILL, IT IS IN FAILING TO REPORT A SPILL.

State Warning Point	24 hours Toll-Free	1-800-320-0519
National Response Center	24 hours Toll-Free	1-800-424-8802
CHEMTREC (Emergency only)	24 hours Toll-Free	1-800-424-9300

FLORIDA COOPERATIVE EXTENSION SERVICE TELEPHONE NUMBERS

<u>County</u>	<u>City</u>	<u>Telephone</u>
Alachua	Gainesville	(352) 955-2402
Baker	Macclenny	(904) 259-3520
Bay	Panama City	(850) 784-6105
Bradford	Starke	(904) 966-6299
Brevard	Cocoa	(321) 633-1702
Broward	Davie	(954) 370-3725
Calhoun	Blountstown	(850) 674-8323
Charlotte	Punta Gorda	(941) 639-6255
Citrus	Inverness	(352) 726-2141
Clay	Green Cove Springs	(904) 284-6355
Collier	Naples	(239) 353-4244
Columbia	Lake City	(386) 758-1030
Dade	Homestead	(305) 248-3311
Desoto	Arcadia	(863) 993-4846
Dixie	Cross City	(352) 498-1237
Duval	Jacksonville	(904) 387-8850
Escambia	Pensacola	(850) 477-0953
Flagler	Bunnell	(386) 437-7464
Franklin	Apalachicola	(850) 653-9337
Gadsden	Quincy	(850) 627-6317
Gilchrist	Trenton	(352) 463-3174
Glades	Moore Haven	(863) 946-0244

Gulf	Wewahitchka	(850) 639-3200
Hamilton	Jasper	(386) 792-1276
Hardee	Wauchula	(863) 773-2164
Hendry	LaBelle	(863) 675-5261
Hernando	Brooksville	(352) 754-4433
Highlands	Sebring	(863) 386-6540
Hillsborough	Seffner	(813) 744-5519
Holmes	Bonifay	(850) 547-1108
Indian River	Vero Beach	(772) 770-5030
Jackson	Marianna	(850) 482-9620
Jefferson	Monticello	(850) 997-2986
Lafayette	Mayo	(386) 294-1279
Lake	Tavares	(352) 343-4101
Lee	Ft. Myers	(239) 338-3247
Leon	Tallahassee	(850) 487-3004
Levy	Bronson	(352) 486-2165
Liberty	Bristol	(850) 643-2229
Madison	Madison	(850) 973-4138
Manatee	Palmetto	(941) 722-4524
Marion	Ocala	(352) 620-3440
Martin	Stuart	(772) 288-5654
Monroe	Key West	(305) 292-4501
Nassau	Callahan	(904) 879-1019
Okaloosa	Crestview	(850) 689-5850

Okeechobee	Okeechobee	(863) 763-6469
Orange	Orlando	(407) 836-7570
Osceola	Kissimmee	(407) 846-4181
Palm Beach	West Palm Beach	(561) 233-1712
Pasco	Dade City	(352) 521-4288
Pinellas	Largo	(727) 582-2100
Polk	Bartow	(863) 533-0765
Putnam	East Palatka	(386) 329-0318
Santa Rosa	Milton	(850) 623-3868
Sarasota	Sarasota	(941) 793-2728
Seminole	Sanford	(407) 323-2500
St. Johns	St. Augustine	(904) 824-4564
St. Lucie	Fort Pierce	(772) 462-1660
Sumter	Bushnell	(352) 793-2728
Suwannee	Live Oak	(386) 362-2771
Taylor	Perry	(850) 584-4345
Union	Lake Butler	(386) 496-2321
Volusia	DeLand	(386) 822-5778
Wakulla	Crawfordville	(850) 926-3931
Walton	DeFuniak Springs	(850) 892-8172
Washington	Chipley	(850) 638-6180

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