HS1114

UF UNIVERSITY of FLORIDA
IFAS Extension

Guidelines for Enrolling in Florida's BMP Program for Vegetable Crops[1]

Aparna Gazula, Eric Simonne, Brian Boman[2]

The BMPs developed for vegetable crops grown in Florida are described in a manual titled "Water Quality/Quantity Best Management Practices for Florida Vegetable and Agronomic Crops". The manual, which is electronically accessible at http://www.floridaagwaterpolicy.com, was adopted by reference in Rule No 5M-8.004 of the Florida Administrative Code on February 8, 2006. (The Florida Administrative Code is the official compilation of the rules and regulations of Florida regulatory agencies.) The purpose of this rule is to achieve pollutant reduction through the implementation of non-regulatory and incentive incentive-based programs determined to reduce adverse impacts to Florida's water.

BMPs are defined in s. 373.4595(2)(a), F.S. as "practices or combinations of practices determined by the coordinating agencies, based on research, field-testing, and expert review, to be the most effective and practicable on-location means, including economical and technological considerations, for improving water quality in agricultural and urban discharges". The 5M-8 rule includes information about the approved BMPs, presumption of compliance, notice of intent to implement, and record keeping. The statutory benefits for enrolling in the BMP program are: (1) obtaining a presumption of compliance with water quality standards (s. 403.067 (7)(d) Florida Statutes.), (2) receiving a waiver of liability from the reimbursement of cost and damages associated with the evaluation, assessment, or remediation of nutrient contamination of ground water (s. 376.307), and (3) eligibility for cost-share programs (s. 570.085 (1)). (The Florida Statutes are the codified, statutory laws of the state of Florida that are approved by the Florida Legislature and signed into law by the Governor of Florida). The BMP program for vegetables applies to the whole state of Florida, except for the Lake Okeechobee Priority Basin (under rule 5M-3 F.A.C.) and the EAA and C-139 basin (under rule 40E-63, F.A.C.) where pre-existing regulations are already in place.

The Future Is Here, but the Clock Is Ticking!

The BMP programs for all major agricultural commodities of Florida have been developed under the provisions of the 1999 Florida Watershed Restoration Act (FWRA .s. 403.067 F.S.). The

1. This document is HS367, one of a series of the Horticultural Sciences Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date August 2007. Visit the EDIS Web Site at http://edis.ifas.ufl.edu.

2. Arpana Gazula, doctoral student, Eric Simonne, Associate Professor, and Brian Boman, Associate Professor, Department of Agricultural and Biological Engineering, Indian River REC Ft. Pierce, Institute of Food and Agricultural Sciences, University of Florida.

FWRA specifically outlines the process for the Florida Department of Environmental Protection (FDEP) to develop and implement total maximum daily loads (TMDLs) for impaired waters of the state. TMDLs are defined as the maximum amount of a pollutant that a body of water can receive and still meet the water quality standards as established by the Clean Water Act of 1972. Section 303(d) of the Clean Water Act requires states to submit lists of surface waters that do not meet applicable water quality standards and to establish TMDLs for these waters on a prioritized schedule, "taking into account the severity of the pollution and the uses to be made of such waters".

The purpose of the FWRA was to better coordinate the numerous pollution control efforts that were implemented prior to 1999 and develop a standard to address future water quality issues. The FWRA requires that TMDLs be developed for all pollution sources “agricultural and urban” to ensure water quality standards are achieved. The FWRA affects all Floridians; thus, in order to effectively implement the TMDL program, the FDEP coordinates its efforts with a variety of entities including the Florida Department of Agriculture and Consumer Services, the Water Management Districts, the local Soil and Water Conservation Districts, University of Florida IFAS, the environmental community, the agricultural community, and other concerned citizens.

BMP measures are not laws and they are not enforced; they are strictly voluntary. As part of the BMP implementation, growers perform an environmental assessment of their operations. This process identifies which BMPs should be considered to achieve the greatest economic and environmental benefit. The adopted BMPs may be a single practice or grouping of practices that, when implemented, are designed to improve water quality. The BMPs that are selected for each parcel of land with a tax ID are specified on a *Notice of Intent to Implement* and submitted to FDACS. If the practices are not yet implemented, the dates when they will be implemented are included on the *Notice of Intent.* Once enrolled in the BMP program, landowners must maintain records and provide documentation regarding the implementation of all BMPs (i.e. fertilizer application dates and amounts or design and construction details of a water control structure).

One of the most innovative elements of the FWRA and the associated agricultural BMP program is the *Presumption of Compliance* with water quality standards to landowners who voluntarily implement adopted BMPs that have been verified to be effective by FDEP. This component of the FWRA provides a powerful incentive to encourage landowners to enroll in the BMP programs since landowners are protected from cost recovery by the state if water quality standards are not met. This unique approach to addressing water quality concerns has been well received by the environmental and agricultural communities alike and as a result is becoming the primary method for addressing water quality concerns. In addition, growers enrolled in the BMP program become eligible for cost-sharing funds to implement specific BMP practices.

In approximately 2 years, the Florida Legislature will assess the success of this non-regulatory program by examining the participation and enrolment of agricultural operations on a regional and commodity basis. By participating in BMP programs, growers are telling the Florida Legislature that the Florida agriculture industry has endorsed the challenge to remain in business while minimizing environmental impact. By making the BMP program a success, growers are also telling the Florida legislature that there is no need for a more stringent regulatory program.

How to Sign up for the Program?

Participation in the program requires that applicable BMPs are implemented and documented as noted in the manual (Table 1). Parcels of lands may be enrolled in the vegetable BMP program by:

(1) completing the “BMP checklist” (page A-5 of the manual),

(2) completing the “Vegetable production Best Management Practices Checklist” if applicable (pages A1-A3 of the BMP manual),

(3) submitting a “Notice of Intent to Implement” to FDACS, and

(4) keeping these documents and those required by the program (Table 2) on file for possible later inspection.

The BMP checklist (found on page A-1 of the BMP manual) is designed to assist vegetable growers in identifying appropriate BMPs for their specific sites and growing conditions. It should be used together with the decision tree flow chart (found on pages 7-8 of the BMP manual). Growers should check the boxes corresponding to the BMPs they are already implementing, and identify the year they plan to implement other applicable BMPs not yet implemented. It should be noted that BMP 33 “Optimum fertilization management/application” (found on pages 93-98 of the BMP manual) must be a part of all BMP plans.

Implementation Teams Are Available to Provide One-on-One Help

Vegetable growers and land owners who need one-on-one help to complete the BMP checklist and/or *Notice of Intent to Implement* may contact their UF/IFAS County Extension Agent (go to http://solutionsforyourlife.ufl.edu/map/index.html for the contact information for all counties of Florida) or the nearest BMP implementation team (http://www.floridaagwaterpolicy.com/PDF/Maps/OawpBmpImpTeams070220.pdf). In addition, implementation team members may conduct on-farm demonstrations of selected BMPs and assist in locating cost-share funds to partially offset the cost of BMP implementation.

On-Line BMP Resources Are Available from the Vegetable BMP Website

The “Best Management Practices for the Florida Vegetable Industry” web site http://www.imok.ufl.edu/bmp/vegetable was developed as a quick resource for growers, Extension educators, implementation team members and all those involved in the BMP process. Currently, the site is organized in four sections that are regularly updated:

1.The BMP manual for vegetables and agronomic crops, accessible on-line.

2.Background documents on how to participate in the BMP program. Among others, this section contains the BMP checklist for self evaluation of current BMP adoption.

3.A list of selected UF/IFAS on-line Extension publications applicable to the statewide BMP program and interim measures.

4.Additional BMP-related resources. This section contains a link to a series of frequently asked question regarding BMPs, and how to locate and contact the implementation teams.

How to Select BMPs that Apply to Specific Farming Operations?

BMP selection for vegetable farms is based on parcel location and type of production system. Based on the decision tree flow chart of the manual (p.7-8 of the BMP manual), regions of Florida with specific BMP requirements are (1) areas where a BMAP/TMDL has been established, (2) North Florida region, (3) springs recharge basins, (4) EAA or the C139 basin, (5) south Miami-Dade county, and (6) Okeechobee watershed priority basins (Figure 1). Recognized production systems are bare ground or plastic culture, drip or seepage irrigation, and permanent or temporary farming operations. Growers and/or land owners should assess their operations (Table 3) and complete the “Candidate BMP checklist” (found on page A-5 of the BMP manual; (Table 4).

Vegetable growers who follow nutrient management option 2 in BMP 33 “Optimum fertilization management/application” (found on pages 93-98 of the BMP manual) should fill out the “Vegetable production Best Management Practices Checklist” (found on pages A-1 to A-3 of the BMP manual). Option 2 (page 93 of manual) deals with production systems that use IFAS published fertilizer recommendations as a general starting point. When these rates are exceeded, growers are expected to “employ additional nutrient and irrigation BMPs to negate possible environmental impacts."

The Free Mobile Irrigation Labs (MILs) Can Help Improve Irrigation Systems

The mission of the MILs is to improve irrigation management by making customized recommendations to improve the performance of an irrigation system (overhead, drip, or other) and encourage better water management practices. Composed of qualified irrigation technicians, MILs visit farms and test pump flow rates, drip emitter and sprinkler pressures and flow rates, and irrigation uniformity (Table 5). MIL services are available free of charge and provide a confidential irrigation system evaluation with recommendations regarding system upgrades, irrigation scheduling, and other maintenance items.

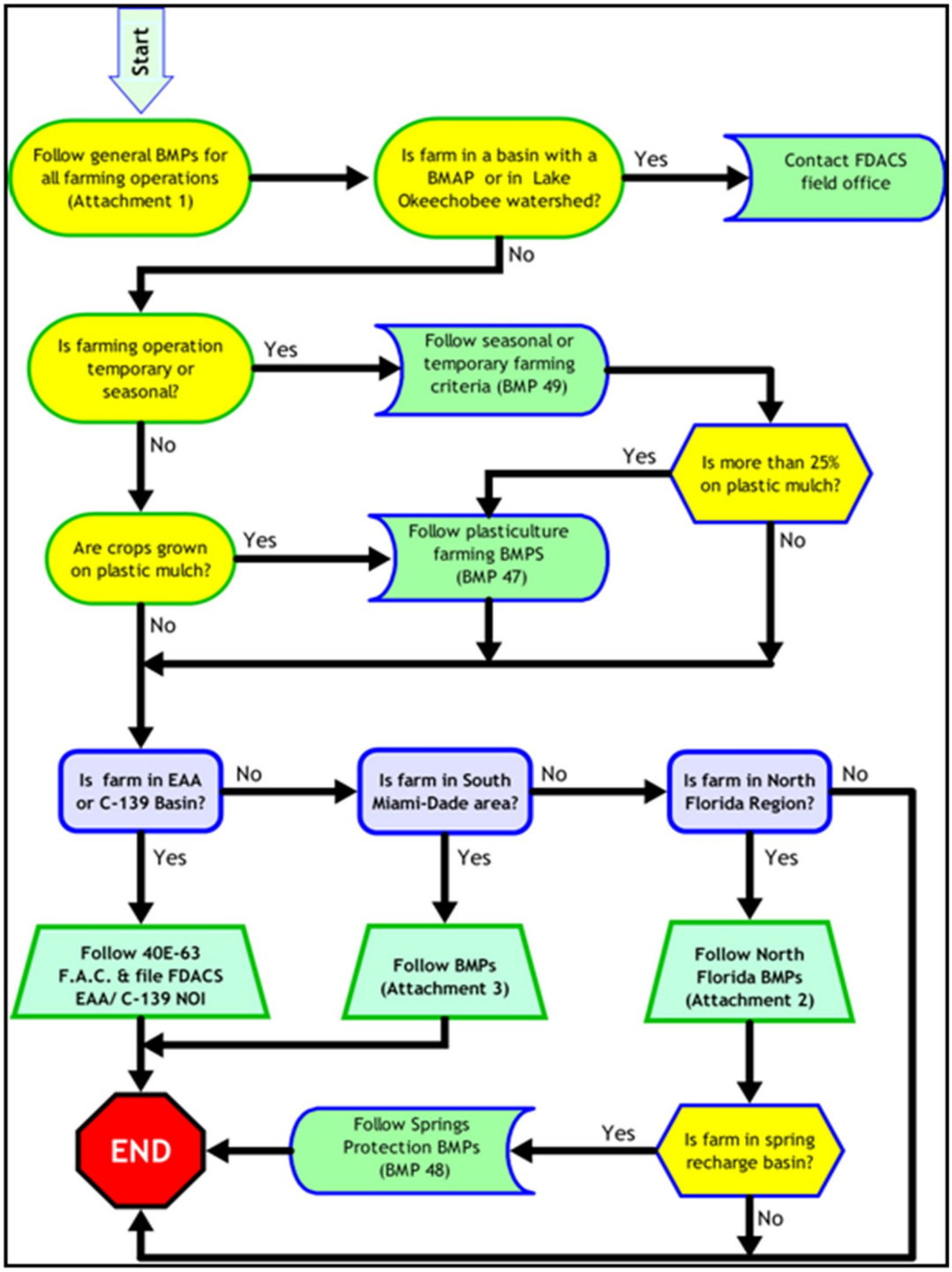

Figure 1. Decision tree in the "BMP Evaluation and Implementation Section" of the "Water Quality/Quantity Best Management Practices for Florida Vegetable and Agronomic Crops" used to select BMPs for specific cropping systems and geographical areas of Florida.

Table 1. Table of contents and corresponding BMPS of the "Water Quality/Quantity Best Management Practices for Florida Vegetable and Agronomic Crops"

Sections: General Area / Area of Application	Contents of Section: BMPs
1. Introduction	Outlines the history and purpose of the program.
2. BMP Evaluation and Implementation	Gives a general outline and how to use the manual, including information on developing a BMP implementation plan. In this section, there are decision tree flow charts and a geographic region map designed to help growers identify BMPs applicable to their operations.
3. Pesticide Management	Explains integrated pest management and how to manage pesticides.
4. Conservation Practices and Buffers	Describes aquatic ecosystems and the practices necessary to help protect water quality by preventing leaching runoff.
5. Erosion Control and Sediment Management	Explains techniques that help prevent movement of soil from agricultural fields.
6. Nutrient and Irrigation Management Pages 75-130, Sections 26-42	Provides information about soil testing and pH, water table observation wells, precision agriculture, crop establishment, double cropping in plasticulture system, proper use of organic fertilizer materials, controlled-release fertilizers, optimum fertigation management/application, chemigation/fertigation, tissue testing, water supply, tailwater recovery, tailwater refuse, and waterborne plant pathogens, irrigation system maintenance and evaluation, irrigation scheduling, frost and freeze protection, water control structures.
7. Water Resources Management	Updates industry on the most common irrigation and storm water management techniques available to date. In this section, there is a subsection focusing on plasticulture.
8. Seasonal or Temporary Farming Operations	Offers BMPs to address issues related to seasonal farming.
9. Glossary	Defines words used within manual.
10. Appendices	A. BMP Checklist, NOI Form, BMP Effectiveness Summary B. Tables • Typical Bed Spacings • Conversion of Fertilizer Rates • Irrigation Application Rates for Cold Protection • Precipitation Rates by Nozzle Flow Rate and Sprinkler Spacing C. Soil testing information D. Incentive programs for agriculture E. Federal Department of Agriculture and Consumer Services (FDACS), http://www.doacs.state.fl.us/

Table 2. Record keeping requirements for the Florida vegetable BMP program.

BMP Number	BMP Title	Record keeping requirement
5	Pesticide Equipment Calibration	Record calibration dates for future reference.
6	Well Head Protection	Maintain records of well construction.

Table 2. Record keeping requirements for the Florida vegetable BMP program.

BMP Number	BMP Title	Record keeping requirement
26	Soil Testing/Soil pH	Record or sketch where soil samples were taken within each area.
26	Soil Testing/Soil pH	Record date, rate of application, materials used, and method of lime application.
26	Soil Testing/Soil pH	Keep the soil testing lab report for each field and crop as well as information about the soil testing lab and the soil test method used.
33	Optimum Fertilization Management/Application	Keep records of the fertilizers used, the amounts applied, and dates of application.
34	Chemigation/Fertigation	On a regular basis, record the flow rate and pressure of the injection device and irrigation pump(s), as well as the energy consumption of the power unit for the irrigation pump.
39	Irrigation System Maintenance and Evaluation	Record the flow rate, pressure delivered by the pump, and energy consumption of the power unit frequently enough to gain an understanding of system performance.
40	Irrigation Scheduling	Keep records of irrigation amounts applied and total rainfall received. Flag values where rainfall rate or duration exceeds the definition of a leaching rainfall event.
49	Seasonal or Temporary Farming Operations	Keep permanent records of crop history.
49	Seasonal or Temporary Farming Operations	Keep records of flooded field including the duration, water level, and water quality analyses.

Table 3. Sample BMP list that may apply to fields equipped with drip or seepage irrigation in South Florida.

BMP Question	**Drip**	**Seep**
1. Integrated Pesticide Management		
IPM practices are used (soil preparation, crop rotation, resistant varieties, modified irrigation methods, cover crops, augmenting beneficial insects, etc.).	Y	Y
Scouting is used to monitor pest populations in order to decide when control measures are needed. (Insects, disease, weeds, nematodes, etc.)	Y	Y
Varieties are selected based on factors such as maturity, lodging resistance, climate, market value, yield potential, and pest resistance.	Y	Y
Spray/dust drift to other crops and off-site areas is minimized.	Y	Y
Classes of insecticide and fungicide are alternated to prevent resistance buildup.	Y	Y
Pesticide applications are coordinated with soil moisture, weather forecast, and irrigation.	Y	Y
2. Pesticide Mixing and Loading Activities		
Mix and load operations are conducted at locations well away from ground water wells and surface water bodies (or berms or mounds are used to keep spills out of surface waters if such areas cannot be avoided).	Y	Y
Properly constructed and maintained permanent or portable mix/load facilities are used. Or, mixing and loading operations are conducted at random locations in the field.	Y	Y
Nurse tanks are used to transport clean water to the field in order to fill the sprayer.	Y	Y
A check valve or air gap separation is *always* used to prevent backflow into the water source.	Y	Y
Adequate headspace (usually 10%) is left when filling the tank.	Y	Y
3. Spill Management		

Table 3. Sample BMP list that may apply to fields equipped with drip or seepage irrigation in South Florida.

BMP Question	Drip	Seep
Appropriate personal protective equipment (PPE) as indicated on the Material Safety Data Sheet or label is *always* used when handling pesticides.	Y	Y
Pesticide spills are properly contained and cleaned up.	Y	Y
Employees receive periodic spill response training.	Y	Y
4. Pesticide Application Equipment Wash Water and Container Management		
Required personal protective equipment is *always* worn when conducting rinse operations.	Y	Y
Empty containers are pressure-rinsed or triple-rinsed and the rinse water is added to the sprayer.	Y	Y
Pesticide containers are properly disposed or recycled after cleaning.	Y	Y
All application equipment is washed on a mixing/loading pad or at random areas in the field.	Y	Y
5. Pesticide Equipment Calibration *(Recordkeeping)*		
Equipment is calibrated at appropriate intervals based on use, spray coverage, and nozzle replacement.	Y	Y
The flow rates of all nozzles on the sprayer are checked.	Y	Y
6. Wellhead Protection *(Recordkeeping)*		
Wells are sited as far as possible from septic tanks or chemical mixing areas.	Y	Y
Abandoned or flowing wells are properly plugged or valved before constructing any new wells. The procedures provided by the Water Management District are used to plug wells.	Y	Y
Backflow prevention devices are used when fertigating or chemigating.	Y	Y
Wellheads and pads are inspected regularly for leaks or cracks and if needed, repairs are made promptly.	Y	Y
No agrichemicals are kept in the well house and there is no mixing within 100 ft of any well.	Y	Y
7. Wetland Protection		
Wetlands (>1ac=35 ft wide, 1/2-1 ac=50 ft wide) and perennial watercourses (i.e., creeks, rivers, min 25 ft buffer) have appropriate undisturbed upland buffers.	Y	Y
The use of pesticides and fertilizers around wetlands is limited and spray drift into wetlands is minimal.	Y	Y
8. Grassed Waterways		
The bottom and side slopes of grassed waterways are maintained to preserve their function and integrity.	Y	Y
Side slopes are not steeper than 2:1, and are designed to accommodate equipment crossing.	Y	Y
Tillage equipment is lifted and sprayers are shut off when crossing waterways.	Y	Y
9. Filter Strips		
Filter strip vegetation is suited to the climate and soil types of the area.	Y	Y
Heavy equipment use and grazing are avoided when filter strips are saturated.	Y	Y
Invasive plant species are controlled.	Y	Y
Rills or gullies that have formed have been repaired.	Y	Y
10. Field Borders		
Field borders (strips of permanent vegetation at the edge of or around fields) are established and maintained. They are wide enough to permit equipment to turn around.	Y	Y
Waterbars, berms, or mounds are used (if needed) to break up or redirect concentrated water flow within the borders.	Y	Y
11. Riparian Buffers		
Riparian buffers (areas of trees/shrubs) are used adjacent to natural water bodies (35+ ft wide).	Y	Y
Riparian buffers consist of two or more woody or herbaceous species, with individual plants suited to the seasonal variation of soil moisture conditions.	Y	Y
The riparian buffer is maintained, dead trees or shrubs are removed and replaced, and undesirable vegetation is controlled.	Y	Y

Table 3. Sample BMP list that may apply to fields equipped with drip or seepage irrigation in South Florida.

BMP Question	Drip	Seep
12. Contour Farming		
Row direction is established as closely as possible to the natural contour (most effective when slopes are between 2 and 10 percent).	NA	NA
The established contour line is followed for all tillage and planting operations.	NA	NA
Farming operations begin on the contour baselines and proceed both up and down the slope in a parallel pattern until patterns meet.	NA	NA
Sod turn strips are established on sharp ridge points or other areas, as needed, where contour row curvature becomes too sharp to keep machinery aligned with rows during field operations.	NA	NA
13. Land Leveling		
The design and layout for leveling land is based on a detailed engineering survey, design and layout.	Y	Y
Leveling operations are conducted in such a manner to minimize erosion.	Y	Y
Exposed areas of highly permeable soils (that can inhibit proper distribution of water over the field) are not left after leveling work is finished.	Y	Y
14. Soil Survey		
Grower is familiar with the basic characteristics of each soil series that is identified on the property.	Y	Y
The information from the soil survey is used to help make farm-management decisions related to irrigation, fertilization, erosion control, etc.	Y	Y
15. Sediment Basins		
Sediment basins constructed upstream of control structures are used to trap sediment and debris in runoff water.	Y	Y
Accumulated sediment is removed before it significantly reduces the capacity of the basin.	Y	Y
16. Access Roads		
Road widths are consistent with the type and size of vehicles.	Y	Y
Perennial vegetative cover on road banks is maintained.	Y	Y
Soils are stabilized with vegetation or armor around the ends of pipes to prevent erosion when crossing conveyance systems.	Y	Y
Access roads are sloped towards field production areas.	Y	Y
17. Critical Area Plantings		
Highly erodible areas are stabilized by well-maintained vegetation.	Y	Y
Plants are non-invasive species that are suited to the soil and climate.	Y	Y
18. Diversions/Terraces		
Diversions or terraces are used where appropriate to divert runoff water away from cropland.	NA	NA
19. Temporary Erosion Control Measures		
Temporary erosion control measures (e.g. straw bale barrier, silt fence erosion-control blankets, gabions-wire mesh containers filled with stone, or floating turbidity barriers) are used to minimize sediment transport from disturbed areas.	Y	Y
20. Raised Bed Preparation		
Old crop residues are plowed down well in advance (6-8 weeks) of crop establishment.	Y	Y
Bed height is determined by the amount of drainage needed in the field (excessively high beds are prone to rapid drying and can be difficult to re-wet).	Y	Y
Drip tube is appropriately located considering the soils, bed geometry, and crop.	Y	NA
Fertilizer rates and placement are appropriate so that leaching is minimized.	Y	Y
Plastic mulch is properly removed and recycled or legally disposed.	Y	Y
21. Grade Stabilization Structures		
Stabilization structures are used and maintained in areas that are prone to erosion due to changes in flow velocity or water level.	Y	Y

Table 3. Sample BMP list that may apply to fields equipped with drip or seepage irrigation in South Florida.

BMP Question	Drip	Seep
22. Ditch Construction and Maintenance		
Ditches are set back appropriate distances from wetlands.	Y	Y
Ditch spacings, depths, and side-slopes are consistent with soil types.	Y	Y
Ditches are cleaned when necessary and vegetation is maintained on side slopes.	Y	Y
Accumulated aquatic weeds are routinely removed.	Y	Y
23. Conservation Tillage		
Where appropriate, conservation tillage (no-till, strip-till, ridge-till, mulch till, and seasonal-till) are used to reduce soil erosion.	NA	NA
Required % of residue or groundcover being maintained.	NA	NA
24. Cover Crops		
A cover crop that is suitable for the climate, soil type, cropping system, and specific goals (i.e., nutrient uptake, nitrogen fixation, etc.) is used to protect the land from erosion until the main crop is planted.	Y	Y
25. Conservation Crop Rotation		
Crops are adapted to the local climate and soil conditions and grown in a planned, recurring sequence.	NA	NA
Alternate crops to break the pest cycle and/or allow the use of a variety of IPM strategies.	NA	NA
26. Soil Testing / Soil pH *(Recordkeeping)*		
Soil pH is tested regularly (every 2-3 years) and if needed, amendments are used to maintain soil pH between 6.0 and 6.5 for most crops.	Y	Y
27. Water Table Observation Wells		
Water table observation wells are used to monitor water table levels as a tool to aid irrigation and drainage decisions.	Y	Y
28. Precision Agriculture		
Precision application technology is used where appropriate to apply site-specific inputs (fertilizer, seed, pesticides, etc.) in order to minimize potential for leaching and runoff of applied materials.	NA	NA
29. Crop Establishment		
Weather forecasts and season are considered when planning for crop establishment.	Y	Y
Soil moisture measurement devices (such as tensiometers) and/or water table observation wells are used so that over-watering of fields is minimized.	Y	Y
30. Double Cropping in Plasticulture Systems		
Soil samples are used to determine residual fertilizer available from first crop and rates for the second crop are adjusted accordingly.	NA	NA
Soil moisture is maintained at appropriate levels between removal of the first crop and planting of the second crop.	NA	NA
31. Proper Use of Organic Fertilizer Materials		
Application rates are based on laboratory analysis of product and on individual crop requirements.	NA	NA
Fertilizer spreaders are calibrated and excessive material is not applied.	NA	NA
Uncomposted animal manure is not spread on cropland.	NA	NA
32. Controlled-Release Fertilizer		
Controlled-release fertilizers (CRFs) are applied at lower rates than that recommended rate for soluble fertilizers.	NA	NA
The CRF's release time is matched with the crop nutrient needs.	NA	NA
Do not exceed the recommended fertilization rate.	NA	NA
33. Optimum Fertilization Management/Application *(Recordkeeping)*		
(1) Published IFAS fertilizer recommendations are used (which include provisions for supplemental nutrient applications) or alternate recommendations that are supported by other credible research institutions are used; or	Y	Y

Table 3. Sample BMP list that may apply to fields equipped with drip or seepage irrigation in South Florida.

BMP Question	Drip	Seep
(2) Published IFAS fertilizer application recommendations are used as a general starting point. If these rates are exceeded, additional nutrient and irrigation BMPs are used to minimize environmental impacts; or	Y	Y
(3) For farming operations in basins that have a Total Maximum Daily Load (TMDL) for nutrients (issued by the Dept. of Environmental Protection), all recommendations set forth in the Basin Management Action Plan (BMAP) are followed.	NA	NA
Fertilizer application equipment is calibrated accurately and fertilizer is applied at the appropriate rate and position with respect to the plant's root zone.	Y	Y
A calibrated micronutrient soil test is conducted every to 2 to 3 years. Micronutrients are applied only when a specific deficiency has been clearly diagnosed.	Y	Y
A calibrated soil test is used to determine P fertilizer needs. Required P is applied to the root zone.	Y	Y
The linear bed foot system is used, where appropriate.	Y	Y
When using drip irrigation, no more than 20-40% of the N and K is applied as a cold mix in the bed.	Y	NA
Where possible, applications of the mobile nutrients are split to reduce leaching losses.	Y	Y
Supplemental fertilizer applications after leaching rainfall events is limited to less than 30 lbs. N per acre and 20 lbs $K_2$0 per acre	Y	Y
Plant tissue analysis or sap tests are that fall below the sufficiency ranges are used as a basis for supplemental fertilizer applications.	Y	Y
34. Chemigation / Fertigation *(Recordkeeping)*		
When the production system permits, chemigation and fertigation is used to apply frequent, low rates of fertilizers and agrichemicals to the crop via irrigation.	Y	NA
When chemigating or fertigating, over-irrigation resulting in chemical leaching is avoided.	Y	NA
Materials are injected only after the irrigation system is brought up to full pressure and the system is operated long enough after completion of injection to flush system.	Y	NA
Split applications are used when the required injection period would result in water and fertilizer moving below the plant root zone.	Y	NA
All chemicals applied through the irrigation system are appropriately labeled for chemigation use.	Y	NA
35. Tissue Testing *(Recordkeeping)*		
Tissue sampling is used regularly to diagnose plant nutrient status and fertilizer applications are adjusted according to results.	Y	Y
36. Water Supply		
Seepage losses on reservoir-supplied sources are reduced by lining dikes with appropriate materials or construction techniques.	NA	NA
Backflow devices are used to ensure that the water source does not become contaminated from chemigation activities.	Y	Y
37 & 38. Tailwater Recovery		
Where appropriate, tailwater recovery systems are used to collect and re-use irrigation water or rainfall that runs off cropped areas.	NA	NA
39. Irrigation System Maintenance and Evaluation *(Recordkeeping)*		
Irrigation system uniformity is periodically checked (can use Mobile Irrigation Lab, or MIL).	Y	Y
Flow meters and pressure gauges are used to determine existing operating parameters and to properly manage the irrigation system.	Y	Y
Irrigation water quality is tested at least once each year.	Y	Y
Manufacturers maintenance recommendations are followed for pumps, filters, valves, injection equipment, etc.	Y	Y
40. Irrigation Scheduling *(Recordkeeping)*		
Soil moisture content is measured and used to determine effectiveness of irrigation schedules.	Y	Y

Table 3. Sample BMP list that may apply to fields equipped with drip or seepage irrigation in South Florida.

BMP Question	Drip	Seep
Irrigation schedules are adjusted for time of year, plant size, and soil moisture status. (Irrigation application may need to be split into 2 or 3 daily applications).	Y	Y
Irrigation and fertilization are managed together, especially if liquid fertilizer is being applied through the irrigation system.	Y	Y
Excess irrigations are avoided.	Y	Y
41. Frost and Freeze Protection		
Over-application and potential offsite runoff is minimized by not initiating irrigation events too soon, or continuing protection after all the ice has melted.	Y	Y
Computers, satellite, etc. are used to access regional weather data.	Y	Y
42. Water Control Structures		
Riser-board control structures (which facilitate deposition of sediments and their accompanying nutrients or pesticides upstream) are used at outfall locations.	NA	NA
43. Flood Protection		
A water management/drainage plan has been developed to deal with potential flooding resulting from high rainfall events (e.g. tropical storms or hurricanes).	Y	Y
44. Ponds/Reservoirs and Ditches		
Detention ponds/reservoirs are used to capture and temporarily store stormwater runoff.	Y	Y
Culverts are maintained free of debris.	Y	Y
Sediment sumps are used and maintained in ditches at pump stations and where the velocity of the water creates erosion problems.	NA	NA
Vegetative cover on dikes and berms is mowed and properly maintained.	NA	NA
45. Farm Pond		
Vegetative cover of farm ponds (used for irrigation water supply and/or for holding and treating runoff water) is maintained by mowing or burning and nuisance or exotic species are controlled.	NA	NA
Pond size <1acre and <14' deep, with 4:1 side slopes.	Y	NA
46. Fields and Beds		
Soil type, field slope, and crop characteristics are considered when laying out rows with regard to length and alignment.	Y	Y
If plastic mulch is used, drip irrigation is used.	NA	NA
Fields with persistent drainage problems are leveled or re-graded to improve stormwater management.	Y	Y
47. Plasticulture Farming		
Depressions are used as catchment areas.	Y	Y
Appropriate tillage practices are used to minimize the development of plow pans.	Y	Y
Where practical, inter-row cover crops such as grasses or legumes are used to reduce runoff.	Y	Y
Plastic mulch and drip tubing is removed from farm fields shortly after harvest.	Y	Y
Undesirable weed species growing in holes in the plastic mulch are controlled.	Y	Y
48. Springs Protection		
Conservation buffer setbacks (buffer areas of perennial vegetation) are established and maintained for springs, spring runs, functional sinks, or other conduits.	NA	NA
49. Seasonal or Temporary Farming Operations *(Recordkeeping)*		
Crops on a particular piece of land are alternated to break the pest and disease cycles and to allow for the use of a variety of Integrated Pest Management control strategies.	NA	NA
All agricultural surface water management system features are restored to equivalent, pre-development, hydrologic conditions when the farming is completed.	NA	NA
Soil tests are used and fertilizer recommendations are followed to avoid over fertilizing.	NA	NA
Plastic mulch and drip tubing is removed within 30 days after harvest of the last crop.	NA	NA

Table 3. Sample BMP list that may apply to fields equipped with drip or seepage irrigation in South Florida.

BMP Question	Drip	Seep
Recommended rotation intervals including prescribed fallow periods are used for each 5-year rotation interval (2- year farming period, no more than 4 seasons; 3-year farming period, no more than 1 season per year).	NA	NA

Table 4. *Example of a Candidate BMP Checklist found on page A-5 of the BMP manual for vegetables grown with seepage irrigation based on answers provided in the BMP questionnaire (see Fig. 2).x*

Candidate BMP Checklist

Instructions: Using the *Florida Vegetable and Agronomic Crops Best Management Practices Checklist*, check “yes” for all BMPs currently practiced and “no” for BMPs not currently implemented. For those BMPs that will be implemented in future years, enter the year you plan initiate the BMP in the "year" column. Enter N/A in the “year” column if the practice is not applicable to your operation or if it conflicts with other BMPs that have been implemented.

Pesticide Management

Yes	No	Year		BMP
X			1	Integrated placePest Management
X			2	Pesticide Mixing and Loading
X			3	Spill Management
X			4	Pesticide App. Eq. Washwater and Container
X			5	Pesticide Equipment Calibration

Conservation Practices and Buffers

Yes	No	Year		BMP
X			6	Well Head Protection
X			7	Wetlands Protection
X			8	Grassed Waterways
X			9	Filter Strips
X			10	Field Borders
X			11	Riparian Buffers
		NA	12	Contour Farming

Nutrient and Irrigation Management

Yes	No	Year		BMP
X			26	Soil Testing/Soil pH
X			27	Water Table Observation Wells
		NA	28	Precision Agriculture
X			29	Crop Establishment
		NA	30	Double Cropping in Plasticulture Systems
		NA	31	Proper Use of Organic Fertilizer Materials
		NA	32	Controlled-Release Fertilizers
9/11			33	Optimum Fertilization Management/Application
		NA	34	Chemigation/Fertigation
X			35	Tissue Testing
1/2			36	Water Supply
	X	2008	37	Tailwater Recovery
	X	2009	38	Tailwater Reuse and Waterborne Plant Pathogens
X			39	Irrigation System Maintenance and Evaluation

Table 4. *Example of a Candidate BMP Checklist found on page A-5 of the BMP manual for vegetables grown with seepage irrigation based on answers provided in the BMP questionnaire (see Fig. 2).x*

X			13	Land Leveling	X			40	Irrigation Scheduling
X			14	Soil Survey	X			41	Frost and Freeze Protection
Erosion Control & Sediment Mgmt								42	Water Control Structures
Yes	No	Year		BMP	**Water Resources Management**				
X			15	Sediment Basins	Yes	No	Year		BMP
X			16	Access Roads	X			43	Flood Protection
X			17	Critical Area Plantings	2/4			44	Ponds/Reservoirs and Ditches
		NA	18	Diversions/Terraces			NA	45	Farm Ponds
X			19	Temporary Erosion Control Measures	2/3			46	Fields and Beds
4/5			20	Raised Bed Preparation	X			47	Plasticulture Farming
X			21	Grade Stabilization Structures			NA	48	Springs Protection
X			22	Ditch Construction and Maintenance	**Seasonal or Temporary Farming**				
		NA	23	Conservation Tillage	Yes	No	Year		BMP
X			24	Cover Crops	2/4			49	Plasticulture Farming
	1/2		25	Conservation Crop Rotation					

x denotes that all the sections in a BMP implemented. For example, 4/5 "Yes" for BMP 20 corresponds to 4 out of 5 sections (see Table 3 BMP 20 for more information) implemented.

Table 5. Contact Information for Mobile Irrigation Labs (MIL) of Florida (current as of April 2007; contact NRCS office for updated information)

County	Contact	Address	Phone & Fax
Lee	Garry Bailey garry.bailey@fl.nacdnet.net James (Nik) Nikolich nik.nikolich@fl.nacdnet.net	3434 Hancock Bridge Parkway Suite 209B North Fort Myers, FL 33903	Phone: 239-995-5678 ext. 3 FAX: 239-997-7557

Website: http://www.lee-county.com/utilities/Mobile%20Irrigation%20Lab/Mobile%20Irrigation%20Lab.htm

Table 5. Contact Information for Mobile Irrigation Labs (MIL) of Florida (current as of April 2007; contact NRCS office for updated information)

County	Contact	Address	Phone & Fax
Miami-Dade	Robert Perez rperez@southdadeswcd.org Michelle Codallo mcodallo@southdadeswcd.org Don Grimsley don@southdadeswcd.org	South Dade SWCD 1450 N Krome Ave., Suite 104 Florida City, FL 33034	Phone: 305-242-1288 FAX: 305-242-1292
Website: http://www.southdadeswcd.org/Mobile%20Irrigation%20Lab.htm			
Hillsborough	Gail Huff gail.huff@fl.nacdnet.net	201 S Collins Street, Suite 202 Plant City, FL 33563	Phone: 813-759-6450 x 3 FAX: 813-759-6530
Collier Hendry Charlotte Glades	Mark Siverling mark.siverling@fl.nacdnet.net Jovino Marquez	14700 Immokalee Rd. Naples, FL 34120	Phone: 239-455-4100 Cell: 239-961-4292 FAX: 239-455-2693
Website: http://www.collierswcd.org/Page315.html			
Broward	Willie Rojas browardmil@aol.com	6191 Orange Drive, Suite 6181-P Davie, FL 33314	Phone: 954-873-7594 954-584-1306 FAX: 954-792-4919 954-792-3996
Website: http://ci.ftlaud.fl.us/public_services/water/pdf/Mobile%20Irrigation%20Laboratory.pdf			
Broward Palm Beach	David DeMaio ddemaio@pbswcd.org	Palm Beach SWCD 750 South Military Trail Suite G West Palm Beach, FL 33415	Phone: 561-683-2285 ext. 3 561-385-1240 FAX: 561-683-8205
Website: http://www.pbswcd.org/AgMobileIrrigationLab.htm			
Broward	David Legg	Natural Resources Consulting Services, Inc.	FAX: 561-649-5627

Table 5. Contact Information for Mobile Irrigation Labs (MIL) of Florida (current as of April 2007; contact NRCS office for updated information)

County	Contact	Address	Phone & Fax
Palm Beach	dlegg1149@bellsouth.net	3344 Palomino Dr. Lake Worth, FL 33462	Cell: 561- 385-1240
Manatee	Jack Tichenor jtichenor@ifas.ufl.edu	1303 17th St. West Palmetto, FL 34221	Phone: 941-722-4524 ext. 262 FAX: 941-721-6608
Website: http://manatee.ifas.ufl.edu/FYN/mobile_irrigation_lab.htm			
Columbia	Doug Ulmer	Suwannee River RC&D Council	Phone: 386-364-4278
Suwannee Hamilton Jefferson Madison Lafayette Taylor	Andy Schrader	234 Court Street, S.E. Live Oak, FL 32060	FAX: 386-364-1558
Website: http://www.kineticnet.net/flrcd/suwannee.html			

* For counties not listed in the table contact your local NRCS District Conservationist for the mobile irrigation lab closest to your location.