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Florida Best Management Practice Use: Examining Multiple-BMP Use

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The views expressed in this presentation are those of the researchers and not those of the Florida Department of Agriculture and Consumer Services.

Introduction:
Growers' Multi-BMP or BMP Bundle Use

BMP Bundle: Simultaneous use of stable combinations of BMPs

Motivation: Several BMPs are thought to have additive benefits when used simultaneously.

Rationale: Growers who already use BMPs may be more likely to use additional practices than growers who do not use.

Objective: To examine BMP bundles (the simultaneous use of multiple BMPs).

- Identify the frequency of BMP bundle use
- Identify specific BMP bundles

Potential Impact: BMP bundle use may

- ✓ Improve water quality through increasing BMP use,
- ✓ Increase BMP benefits or acres on the same farms or fields, and
- ✓ Reduce the cost of BMP education or conservation program implementation.

Introduction

Florida growers use multiple production systems.

Different production systems will require different BMPs:

- ✓ Plasticluture – BMPs that maximize the use of plastic mulch.
- ✓ Bare ground – BMPs that help with bed preparation.
- ✓ Sugarcane – BMPs for muck farming regions.
- ✓ Hay and silage – BMPs for management of crop maturity to harvest.

We focus on Irrigation and Nutrient management BMPs in plasticulture production.

Why plasticulture?

- The most used production system for high-value vegetable crops.
- Florida leads in use of plasticulture.

Florida's Agricultural Best Management Practices Program

Florida designed a unique agricultural BMP program to protect water resources.

- Field staff from the Florida Department of Agriculture and Consumer Services (FDACS) visit farms and identify applicable BMPs.
- BMPs come from FDACS BMP manuals.
- Growers then sign Notices of Intent (NOI) to indicate if they have (or will) implement the practices.
- Growers are required to keep records that demonstrate BMP implementation.
- Participating growers are presumed to be compliant with the program requirements.
- Participation in the program outside of a Basin Management Action Plan (BMAP) is voluntary.
- Participation makes growers eligible for cost-share funds.
- FDACS visits farms every 2 years to verify BMP use.

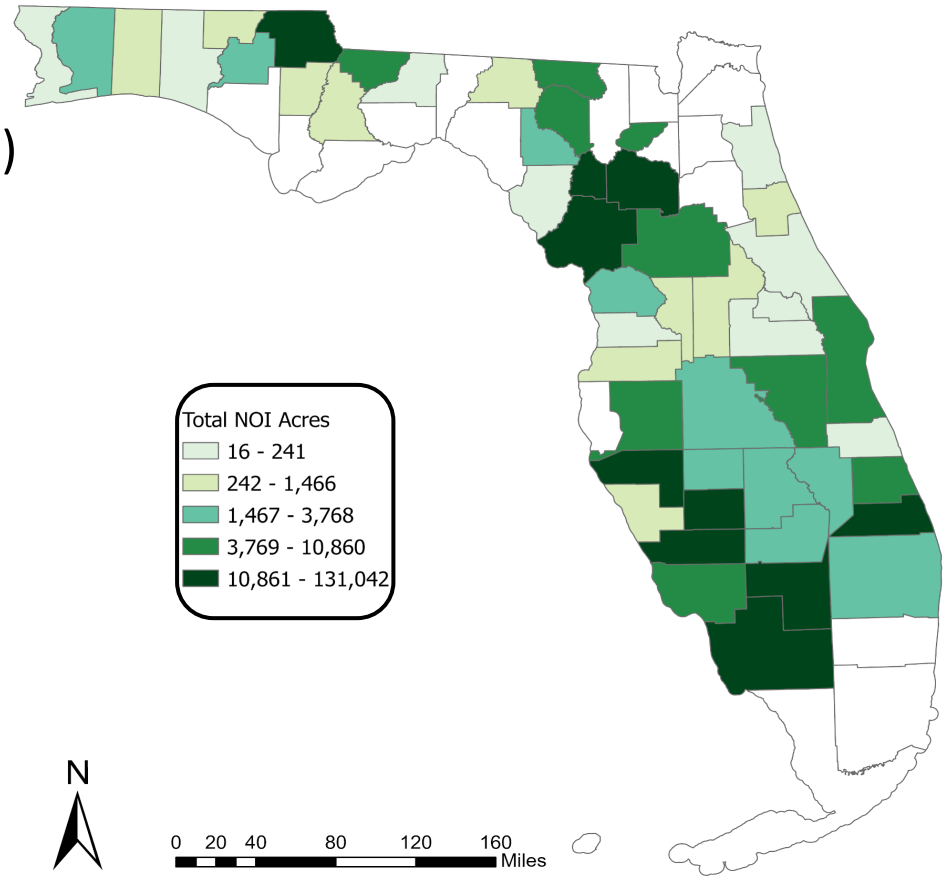
In 2021, 61% of the agricultural acreage in Florida (excluding silviculture) is enrolled in the BMP Program (FDACS 2022).

Data

Statewide analysis of BMP use by vegetable and agronomic crop (VAC) producers using plasticulture

- Statewide "Notice of Intent" (NOI) database
  - ✓ Vegetable and Agronomic Crops BMP manual (2015)
  - ✓ Collected in May 2020
  - ✓ Florida:

    911 growers; 444,209 acres
  - ✓ Farm-level data
- FDACS cost-share enrollment



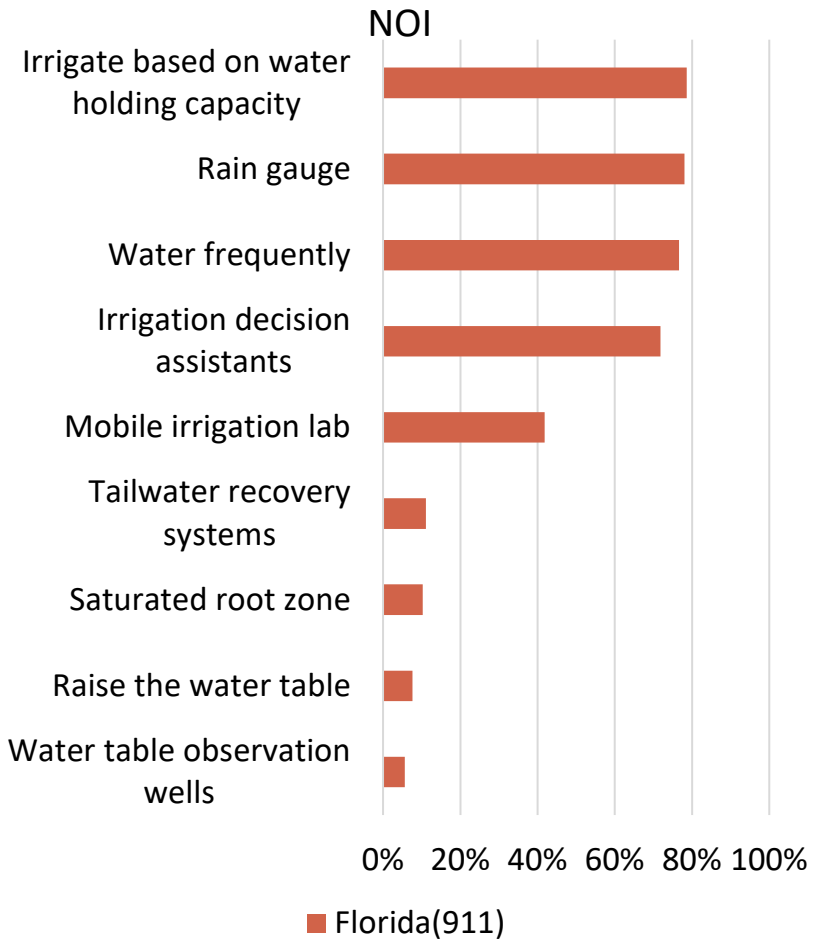
Plasticulture BMPs in the 2015 Vegetable and Agronomic Crops (VAC) Manual

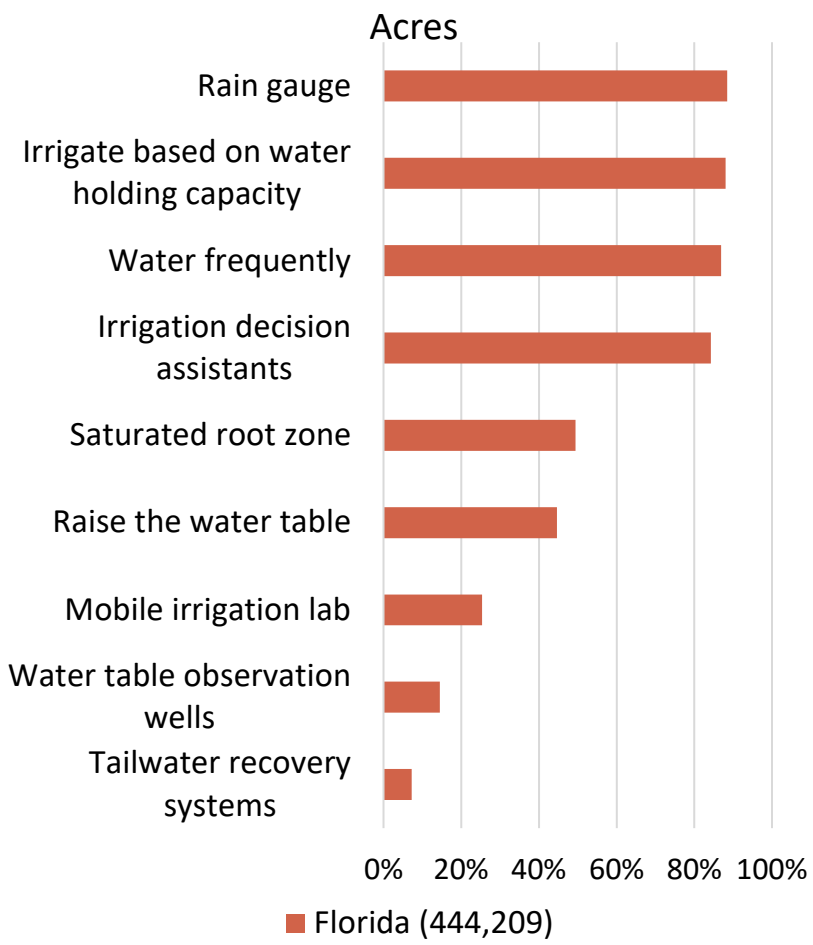
Irrigation Management BMPs (9)	Nutrient Management BMPs (11)
Rain gauge	Keep nutrient application records
Irrigate based on water holding capacity	Calibrate fertilizer equipment
Water frequently	Soil tests
Irrigation decision assistant	Remove plastic
Saturate root zone	Consult UF's rate recommendations
Raise the water table	Tissue tests
Mobile irrigation lab	Linear bed foot system
Water table observation wells	Incorporate nutrients in the bed
Tailwater recovery systems	Soil sample
-	Field consultation
-	Retain surface water

Source: https://www.fdacs.gov/Agriculture-Industry/Water/Agricultural-Best-Management-Practices

VAC Growers' Use of Irrigation BMPs

Four BMPs are used by about 50% of Florida growers.





* The percentage is number of NOIs (acres of farm) using each BMP over total number of NOIs (total acres of farm)

Irrigation BMPs With Cost-Share

Based on this sample,
Florida growers with large farms and cost share use BMPs at higher rates.

BMP	Florida		
	Small (31)	Medium (45)	Large (45)
Rain gauge	83.9%	73.3%	93.3%
Irrigate based on water holding capacity	80.6%	71.1%	91.1%
Water frequently	80.6%	68.9%	88.9%
Irrigation decision assistants	77.4%	64.4%	86.7%
Mobile irrigation lab	41.9%	35.6%	44.4%
Saturated root zone	3.2%	6.7%	33.3%
Raise the water table	0%	6.7%	28.9%
Water table observation wells	0%	4.4%	17.8%
Tailwater recovery systems	6.5%	11.1%	15.6%

* Small: 0 < acres < 180, Medium: 181 < acres < 500, Large: 501 < acres
* The percentage is number of NOIs using each BMP with cost-share over total number of NOIs in each farm size

Irrigation BMPs Without Cost-Share

Growers with large farms and without cost-share use most BMPs at higher rates.

BMP	Florida		
	Small (525)	Medium (164)	Large (101)
Rain gauge	75.8%	77.4%	84.2%
Irrigate based on water holding capacity	78.9%	72.6%	84.2%
Water frequently	76.2%	72%	83.2%
Irrigation decision assistants	71.2%	66.5%	78.2%
Mobile irrigation lab	46.5%	29.9%	38.6%
Saturated root zone	3.8%	11.6%	34.7%
Water table observation wells	1.7%	6.1%	21.8%
Raise the water table	3.2%	9.8%	19.8%
Tailwater recovery systems	11.4%	11.6%	7.9%

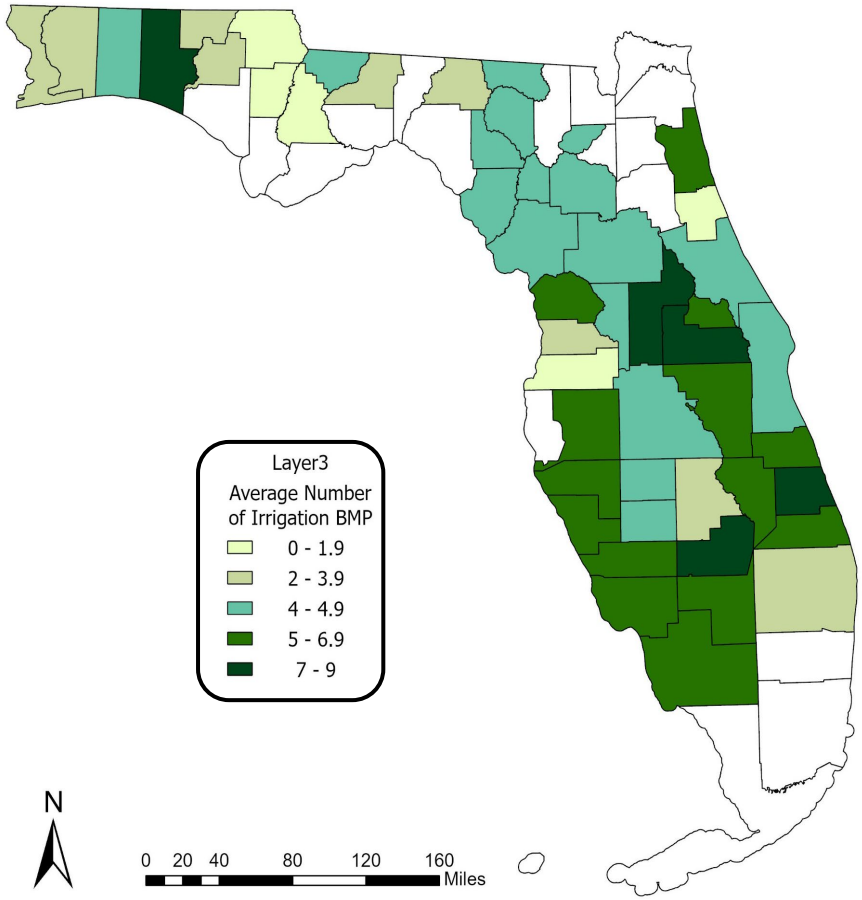
* Small: 0 < acres < 180, Medium: 181 < acres < 500, Large: 501 < acres
* The percentage is number of NOIs using each BMP without cost-share over total number of NOIs in each farm size

Multiple-BMP Use:
Number of Irrigation BMPs Used

For those who use more than 1 BMP – 80.6% of Florida growers
Most of Florida growers use 4 BMPs simultaneously

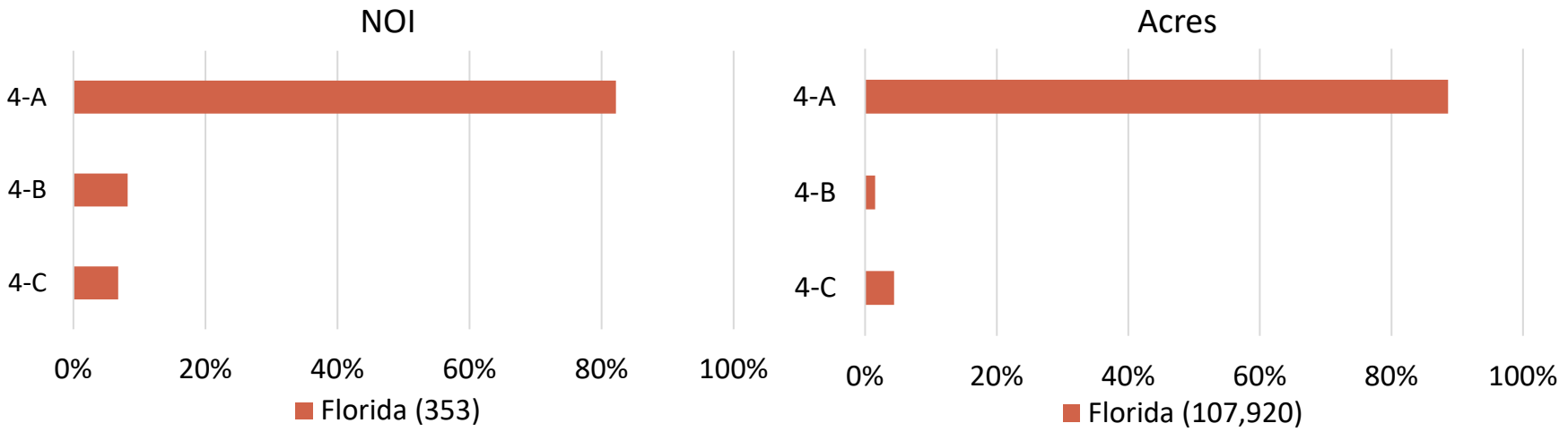
Number of BMPs	NOIs (911)	Acres (444,209)
1	4.1	2.1
2	1.8	1
3	2.9	1.5
4	***38.7***	***24.3***
5	22.2	11.7
6	9.7	37.1
7	3.1	10.4
8	0.9	1.1
9	1.4	2.2

Average Number of Irrigation BMPs per Farm



Irrigation BMPs Bundle Use

For VAC producers who use 4 BMPs - 82% of growers use Bundle 4-A.



4-A: Rain gauge / Irrigate based on water holding capacity / Water frequently / Irrigation decision assistants

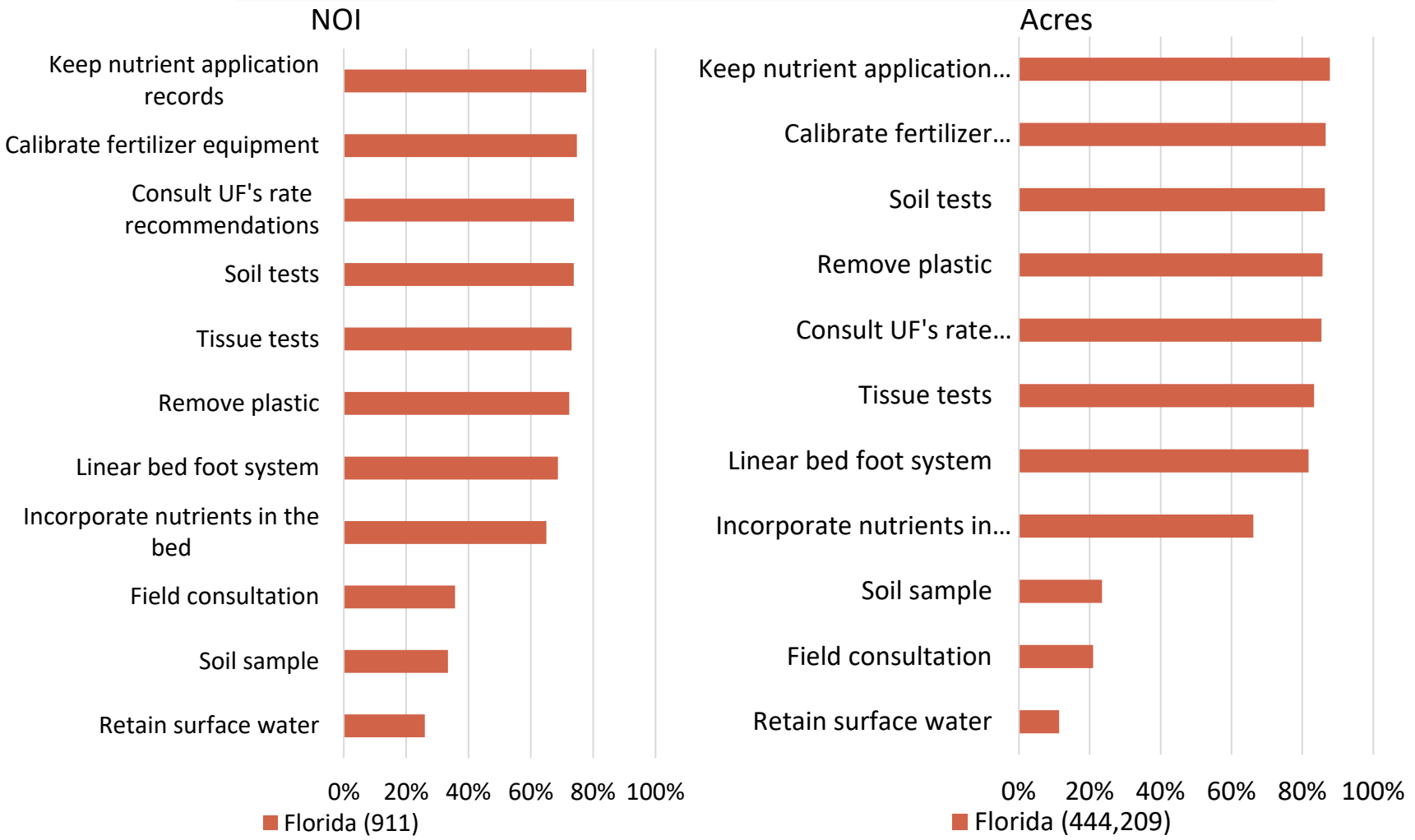
4-B: Irrigate based on water holding capacity / Water frequently / Irrigation decision assistants / Mobile irrigation lab

4-C: Rain gauge / Irrigate based on water holding capacity / Water frequently / Mobile irrigation lab

* The percentage is number of NOIs (acres of farm) using each BMP bundle over total number of NOIs (total acres of farm)

VAC Growers' Use of Nutrient Management BMPs

Eight BMPs are used by almost 70% of Florida growers.



* The percentage is number of NOIs (acres of farm) using each BMP over total number of NOIs (total acres of farm)

Nutrient BMPs With Cost-Share

Based on this sample,
Florida growers with large farms and cost share are more likely to use BMPs.

BMP	Florida		
	Small (31)	Medium (45)	Large (45)
Keep nutrient application records	80.6%	75.6%	88.9%
Calibrate fertilizer equipment	77.4%	71.1%	86.7%
Soil tests	77.4%	68.9%	86.7%
Remove plastic	74.2%	64.4%	86.7%
Consult UF's rate recommendations	77.4%	68.9%	86.7%
Tissue tests	67.7%	68.9%	82.2%
Linear bed foot system	74.2%	66.7%	82.2%
Incorporate nutrients in the bed	64.5%	60%	80%
Field consultation	29%	35.6%	28.9%
Soil sample	35.5%	26.7%	22.2%
Retain surface water	16.1%	33.3%	20%

* Small: 0 < acres < 180, Medium: 181 < acres < 500, Large: 501 < acres
* The percentage is number of NOIs using each BMP with cost-share over total number of NOIs in each farm size

Nutrient BMPs Without Cost-Share

Growers with large farms and cost share are more likely to use BMPs.

BMP	Florida		
	Small (525)	Medium (164)	Large (101)
Keep nutrient application records	77.5%	73.2%	82.2%
Calibrate fertilizer equipment	73.7%	71.3%	81.2%
Soil tests	72.8%	69.5%	81.2%
Remove plastic	72%	65.9%	81.2%
Consult UF's rate recommendations	73.3%	59.5%	79.2%
Linear bed foot system	66.1%	67.7%	77.2%
Tissue tests	73.7%	70.1%	74.3%
Incorporate nutrients in the bed	65%	58.5%	71.3%
Soil sample	38.1%	22%	34.7%
Field consultation	39%	34.1%	25.7%
Retain surface water	28.4%	29.9%	9.9%

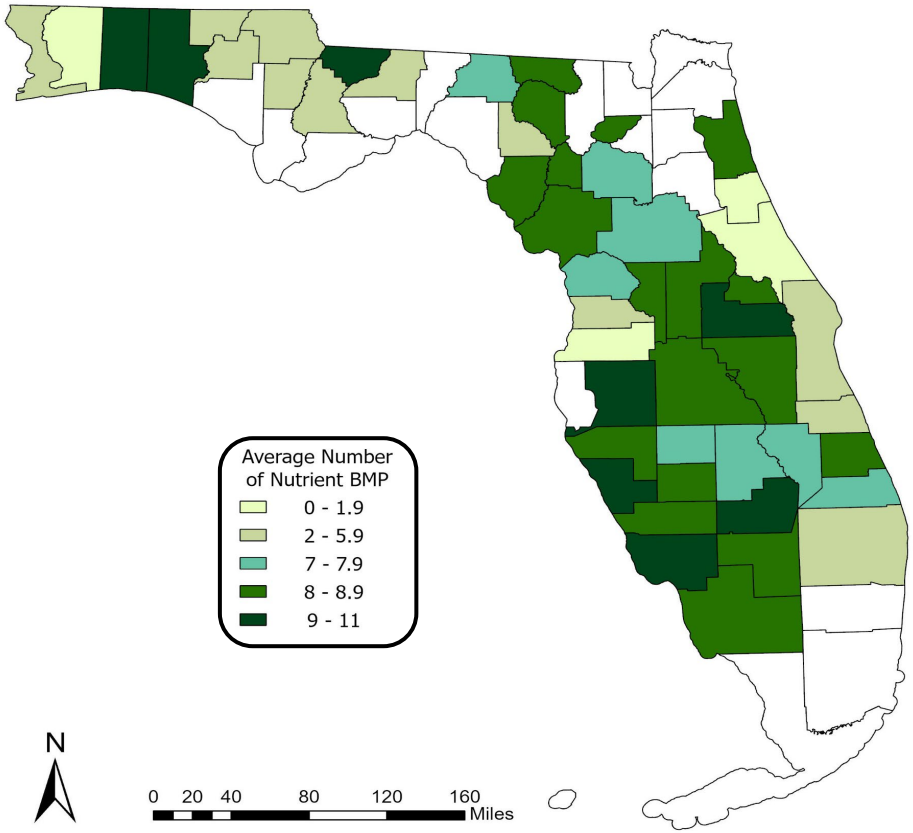
* Small: 0 < acres < 180, Medium: 181 < acres < 500, Large: 501 < acres
* The percentage is number of NOIs using each BMP without cost-share over total number of NOIs in each farm size

Multi-BMP Use:
Number of Nutrient BMPs Used

For those who use more than 1 BMP - 91.8% of Florida growers
Most of growers use 8 nutrient BMPs simultaneously

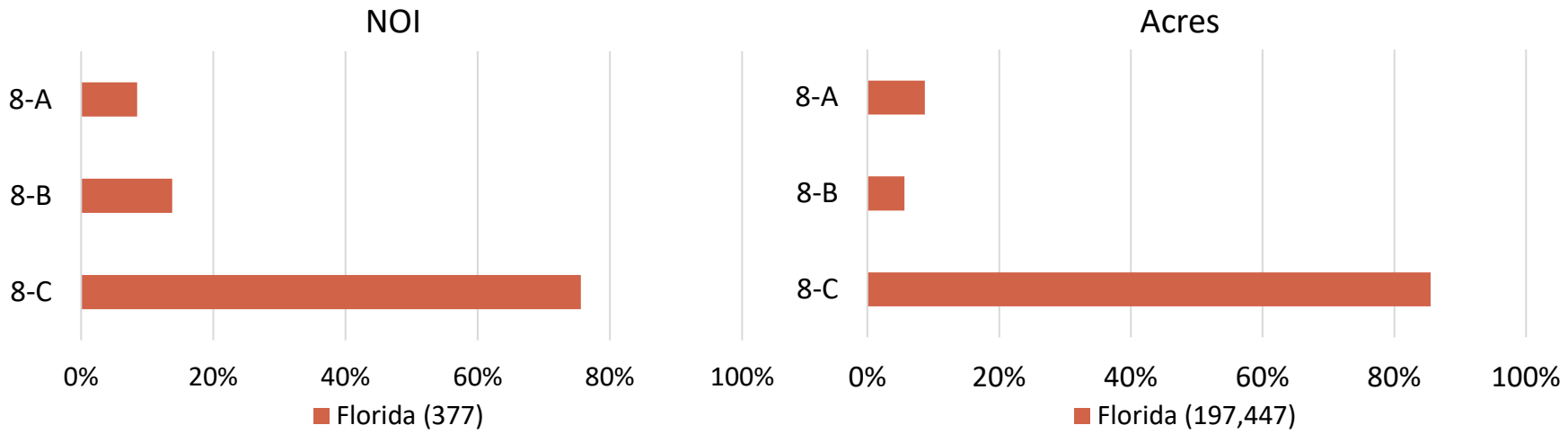
Number of BMPs	NOIs (911)	Acres (444,209)
0	6.1	5.4
1	2.1	1
2	14.2	5.8
3	2.1	0.5
4	1	0.6
5	0.7	0.1
6	1.4	1.1
7	4.2	20.5
8	***41.4***	***44.4***
9	13.6	10.3
10	6.9	8.2
11	6.4	1.9

Average Number of Nutrient BMP per



Nutrient BMP Bundle Use

For VAC producers who use 8 BMPs - 85% of growers use Bundle 8-C.



8-A: Keep nutrient application records / Calibrate fertilizer equipment / Soil tests / Remove plastic / Consult UF's rate recommendations / Tissue tests / Incorporate nutrients in the bed / Soil sample

8-B: Keep nutrient application records / Calibrate fertilizer equipment / Soil tests / Remove plastic / Consult UF's rate recommendations / Tissue tests / Linear bed foot system / Soil sample

8-C: Keep nutrient application records / Calibrate fertilizer equipment / Soil tests / Remove plastic / Consult UF's rate recommendations / Tissue tests / Linear bed foot system / Incorporate nutrients in the bed

* The percentage is number of NOIs (acres of farm) using each bundle over NOIs (total acres of farm) using 8 nutrient BMPs

Summary

- If BMPs have additive benefits, then bundling can help improve water quality.

- Growers use multiple BMPs:

✓ 80.6% use 2 or more irrigation management BMPs.

✓ 91.8% use 2 or more nutrient management BMPs.

- Farm size and cost-share
  - ✓ Growers with large farms are more likely use BMPs and enroll in cost-share programs.
    - More applicable BMPs
    - Better able to take advantage of the cost-share programs

- We can identify specific bundles:
  - Irrigation BMP bundles with 4 practices
  - Nutrient BMP bundles with 8 practices

- Identifying BMP bundles can help design conservation policy (e.g., incentives for multi-BMP use or encourages good stewardship).

Acknowledgements

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Reference

Florida Department of Food and Agriculture Customer Service (FDACS). 2022. *Status of Implementation of Agricultural Nonpoint Best Management Practices Report*. FDACS Office of Agricultural Water Policy, Tallahassee, FL. July 1, 2022. FDACS-P-01924 07/22. Available at https://www.fdacs.gov/ezs3download/download/104912/2726091/Media/Files/Marketing-Development-Files/09124-FDACS-OAWP-Annual-Report-2022.pdf

Questions???

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