# FLORIDA BEST MANAGEMENT PRACTICE ADOPTION: EXAMINING MULTIPLE-BMP USE

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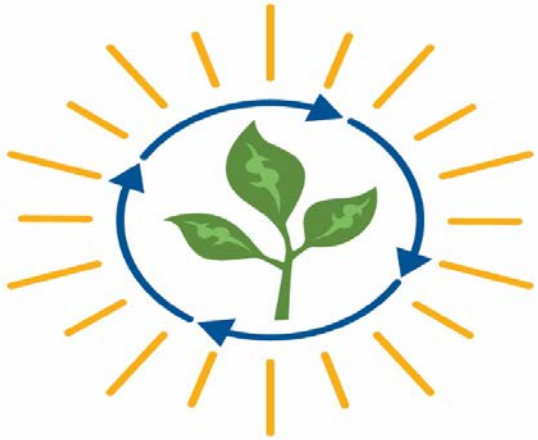


AGRICULTURE AND
NATURAL RESOURCE
ECONOMICS PROGRAM

*"Helping growers reach their economic and conservation goals in efficient ways"*

# Grower Multi-BMP Adoption

## Work with Moonwon Soh (PhD Student) & Dr. Tatiana Borisova

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

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

**Objective:** To examine the simultaneous adoption of multiple BMPs.

- Identify the frequency of multi-BMP adoption
- Identify drivers of multi-BMP adoption
- Identify practices that growers treat as complements

**Potential Impact:** Results from this study may

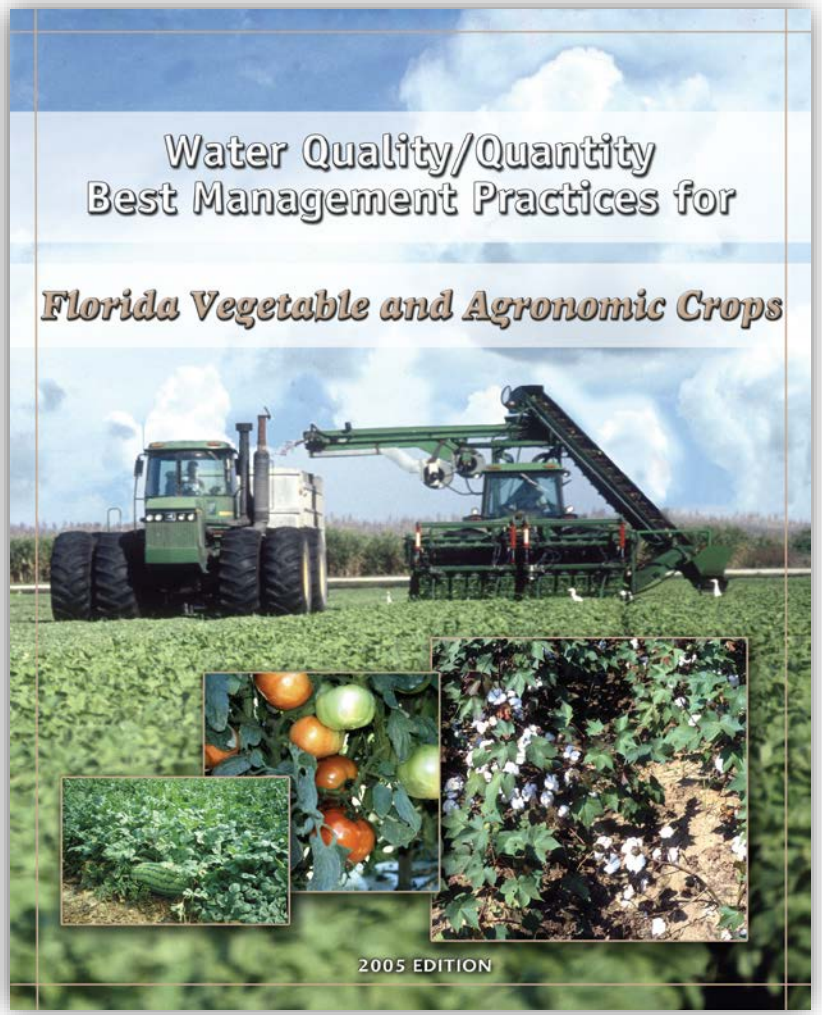
- ✓ Improve water quality through more BMP use,
- ✓ Increase BMP benefits or acres on the same farms or fields, and
- ✓ Inform conservation policy design (e.g., incentives for multi-BMP adoption or encourages good stewardship).

# Grower Multi-BMP Adoption-Preliminary

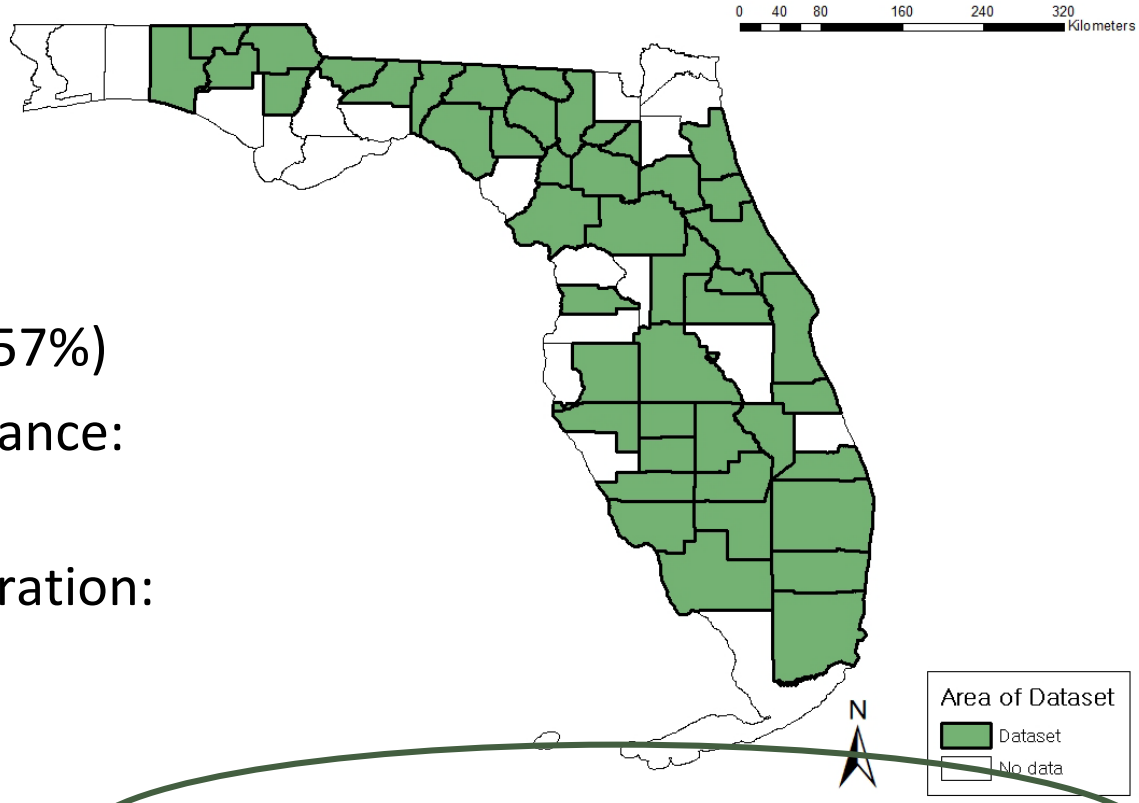
## Work with Moonwon Soh (PhD Student) & Dr. Tatiana Borisova

**Data:** FDACS Notice of Intent (NOI), 2006 Vegetable and Agronomic Crop manual

- Responses as of December 2018
- 739 growers
- 639,260 acres
- average farm size is 864 acres
- 46 counties
- 9 practices



# Practices and Rates: 639,260 acres (739 growers)




- **Water Conservation BMPs**
  - Cover crop: 39% (65%)
  - Irrigation schedule: 36% (57%)
  - Irrigation system maintenance: 37% (53%)
  - Pesticide equipment calibration: 45% (75%)

- **Nutrient Management BMPs**
  - Soil survey: 40% (67%)
  - Soil pH test: 45% (77%)
  - Cover crop: 39% (65%)
  - Controlled release fertilizer: 11% (17%)
  - Optimum fertilizer management: 43% (67%)
  - Tissue test: 34% (48%)

# Multi-Water Conservation BMP Use

Growers use multiple water conservation BMPs

| | Number of water conservation BMPs | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | **4** |
| **Acres** | 1.3% | 6.7% | 9.4% | **28.4%** |
| **Growers** | 3.9% | 18.3% | 10.4% | **44.7%** |

| Cover Crops | Irrigation Schedules | Irrr. System Maintenance | Pesticide Equip. Calibration | Acres (%) | Growers (%) |
|---|---|---|---|---|---|
| X | | | X | 5.6 | 15.6 |
| | X | X | X | 4.5 | 6.0 |
| X | X | | X | 1.7 | 3.0 |
| | X | | X | 0.3 | 1.4 |
| | X | X | | 0.7 | 0.9 |
| X | X | X | | 0.6 | 0.9 |
| X | | X | X | 2.6 | 0.5 |
| | | X | X | 0.1 | 0.4 |
| X | X | | | 0 | 0 |
| X | | X | | 0 | 0 |

# Multi-Nutrient Management BMP Use

Growers use multiple nutrient management BMPs

| | Number of nutrient management BMPs | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | **4** | 5 | 6 |
| **Acres** | 0.1% | 1.7% | 3.5% | **12.3%** | 22.1% | 6.4% |
| **Growers** | 0.3% | 3.2% | 8.8% | **29.9%** | 17.3% | 8.5% |

| Soil Survey | Soil pH Test | Cover Crops | Optimum Fertilizer Management | Tissue Test | Acres (%) | Growers (%) |
|---|---|---|---|---|---|---|
| X | X | X | X | | 5.7 | 14.5 |
| X | X | X | | X | 1.9 | 7.3 |
| X | X | | X | | 1.0 | 3.4 |
| | X | X | X | | 1.6 | 3.4 |
| X | X | | X | X | 2.1 | 3.1 |
| | X | X | X | X | 1.9 | 2.7 |
| | X | | X | | 0.9 | 1.8 |
| X | X | X | | | 0.5 | 1.4 |
| | | X | X | | 0.7 | 0.9 |
| | X | X | | | 0.1 | 0.3 |
| | X | | X | X | 0.2 | 0.3 |
| X | X | | | | 0.1 | 0.1 |
| | | X | | X | 0.1 | 0.1 |
| X | X | | | X | 0.1 | 0.1 |

# Water Conservation with Nutrient Management BMPs

Growers do 4 or 5 nutrient management BMPs with single water conservation BMPs.

| | | Number of nutrient management BMPs | | | | |
|---|---|---|---|---|---|---|
| **Water Conservation BMPs** | | **2 (%)** | **3 (%)** | **4 (%)** | **5 (%)** | **6 (%)** |
| **Cover Crops** | Area | 0.8 | 2.2 | 10.0 | 19.6 | 6.4 |
| | Grower | 1.2 | 4.9 | 25.7 | 24.6 | 8.5 |
| **Irrigation Scheduling** | Area | 0.8 | 2.4 | 8.5 | 18.6 | 6.0 |
| | Grower | 1.5 | 5.5 | 18.9 | 23.8 | 7.2 |
| **Irr. System Maintenance** | Area | 0.9 | 2.1 | 7.6 | 20.3 | 6.0 |
| | Grower | 1.2 | 4.6 | 17.3 | 23.1 | 7.2 |
| **Pesticide Equip. Calibration** | Area | 1.5 | 3.3 | 11.4 | 21.7 | 6.4 |
| | Grower | 2.7 | 8.1 | 28.6 | 26.9 | 8.4 |

# Nutrient Management with Water Conservation BMPs

Growers do 4 water conservation BMPs with single nutrient management BMPs.

| | | Number of Water Conservation BMPs | | | |
|---|---|---|---|---|---|
| **Nutrient Management BMPs** | | **1 (%)** | **2 (%)** | **3 (%)** | **4 (%)** |
| **Soil Survey** | Area | 0.7 | 6.3 | 8.2 | 24.8 |
| | Grower | 2.3 | 17.5 | 8.5 | 38.6 |
| **Soil pH Test** | Area | 1.3 | 6.7 | 9.2 | 28.0 |
| | Grower | 3.9 | 18.1 | 10.0 | 43.8 |
| **Cover Crops** | Area | 0.1 | 5.6 | 4.9 | 28.4 |
| | Grower | 0.3 | 15.6 | 4.5 | 44.7 |
| **Optimum Fertilizer Management** | Area | 1.2 | 5.9 | 8.9 | 26.9 |
| | Grower | 3.7 | 16.8 | 9.1 | 37.3 |
| **Tissue Test** | Area | 0.2 | 2.2 | 8.1 | 23.3 |
| | Grower | 0.4 | 5.0 | 7.6 | 34.5 |

# Interactions between water conservation and nutrient management BMPs

| Water Conservation | | Nutrient Management | | | | |
|---|---|---|---|---|---|---|
| | | Soil Survey (%) | Soil pH Test (%) | Cover Crop (%) | Opti. Fert. Man.(%) | Tissue Tests (%) |
| Cover Crop | Area | 34.2 | 38.2 | - | 36.0 | 29.0 |
| | Grower | 56.8 | 63.7 | - | 54.8 | 41.3 |
| Irrigation Schedule | Area | 31.6 | 35.8 | 30.7 | 34.2 | 29.7 |
| | Grower | 48.8 | 55.9 | 48.6 | 48.3 | 42.8 |
| Irrigation System Maintenance | Area | 32.6 | 36.3 | 31.5 | 35.4 | 30.5 |
| | Grower | 46.4 | 52.4 | 46.1 | 46.1 | 40.6 |
| Pesticide Equipment Calibration | Area | 38.8 | 43.8 | 38.3 | 41.5 | 32.9 |
| | Grower | 65.0 | 73.6 | 63.7 | 64.5 | 46.5 |

Acres: 639,260
Growers: 739

# Next Steps Using the 2015 VAC Manual

- Examine other BMPs
  - Drs. Borisova and Wade are doing this with cluster analysis.
  - We are identifying bundles of practices that growers or FDACS agent select.
- Identify complementary practices and factors affecting adoption
  - This work focuses on irrigation systems and water conservation BMPs.
  - We use bivariate probit analysis.
  - The model examines the effects of climate, freezes, springs, water management districts, and county characteristics on the use of multiple practices.
- Conduct similar analysis on practice verification data.

# Acknowledgements

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# Questions???

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