BMP Research Update: Floating Aquatic Vegetation Impact on Farm Phosphorus Load

Samira Daroub
Everglades Research and Education Center
April 14, 2016
Presentation Outline

• EAA-BMP table and basin performance
• Floating Aquatic Vegetation (FAV) Impact on Farm P Load
  – Justification and objectives
  – Methods
  – Preliminary results
• 2015-2020 BMP Research SOW
• IFAS lab personnel and NELAC certification
20 years of BMP accomplishments
Floating Aquatic Vegetation Impact on Farm Phosphorus Load
FAV Project Update
Experiment Rationale

Anaerobic:
P flux 10X+
Max Detritus

P flux from sediment

Aerobic:
Min Flux
Min Detritus
FAV Project Update

Objectives

1. Evaluate FAV management practices in the EAA farm canals for impact on
   a) farm drainage water phosphorus (P) load
   b) P speciation of farm drainage water
   c) canal sediment properties

2. Use research results to develop a BMP for managing FAV in farm canals that further lowers farm P loads.

The goal is to provide growers an additional tool in their efforts to reduce off-farm P loading in the Everglades Agricultural Area.
Paired farms study (4 pairs)

- Two pairs each in S-5A and S-6 sub basins
- 2-yr calibration (3-yr for 4701/4702) and 3-yr treatment periods
- Calculate changes after initiation of practices
- Improved vs. typical FAV control practices
FAV Project Update
Farm Descriptions and Locations

S-5A Sub-basin
Farm 0401: 908 acres - cane/corn
Farm 2501: 823 acres - cane/corn
Farm 1813: 594 acres - cane/corn
Farm 6117: 800 acres - cane

S-6 Sub-basin
Farm 3102: 1608 acres - cane/veg/corn/rice
Farm 3103: 602 acres - cane/veg/corn/rice
Farm 4701: 630 acres - cane/rice
Farm 4702: 640 acres - cane/rice
Example: Farm Pair Aerial View
FAV Project Update
Comparative Regression Analysis For P Load

\[ Treated_i = b_0 + b_1 (Control_i) + e \]
FAV Project Status

- Control Farms: 3102 2501 1813 4701
- Treatment Farms: 3103 0401 6117 4702
- Treatment Initiation: May 1, 2013 for 3 farm pairs
- Treatment Initiation: May 1, 2014 for farm pair 4 (4701/4702)

Treatment farms:

- Monitoring of FAV growth
- Biweekly spot spraying if needed, with approved aquatic weed herbicides
FAV Project Update
Data Collection

FAV Biomass:
Species composition, Aerial Coverage, P Content, Biomass

Drainage Water:
Flow volume, velocity
TP/TDP/SRP (PP/DOP), Ca, DOC, pH, TSS

Ambient Canal Water:
TP/TDP/SRP (PP/DOP), Ca, DOC, pH, TSS
Hydrolab *in situ*: Temp, DO, ORP, SpCond

Canal Sediments:
TP, Wet Density, Dry Density, OM (LOI), ash content
Sediment depth surveys
P fractionation
Processing Samples
RESULTS

FAV COVERAGE

FARM DRAINAGE WATER
FAV Project Update
FAV Coverage and Biomass

Control

Treatment

3102

Mass of dried FAV
Ave. TP conc.

6/18/2014
8/20/2014
10/27/14
2/9/15
4/27/15

3103

Mass of dried FAV
Ave. TP conc.

6/18/2014
8/20/2014
10/27/14
2/9/15
4/27/15

3102

FAV coverage
Mass of P

6/18/2014
8/20/2014
10/27/14
2/9/15
4/27/15

3103

FAV coverage
Mass of P

6/18/2014
8/20/2014
10/27/14
2/9/15
4/27/15
Drainage Flow Relationships

**Weekly Volume - 0401 vs 2501**

\[ y = 0.8645x \]
\[ R^2 = 0.674 \]

\[ y = 1.1806x \]
\[ R^2 = 0.7628 \]

**Weekly Volume - 6117 vs 1813**

\[ y = 1.5118x \]
\[ R^2 = 0.8259 \]

\[ y = 1.1157x \]
\[ R^2 = 0.9029 \]

**Weekly Volume - 4702 vs 4701**

\[ y = 1.0821x \]
\[ R^2 = 0.5958 \]

\[ y = 0.8472x \]
\[ R^2 = 0.3477 \]

**Weekly Volume - 3103 vs 3102**

\[ y = 0.6131x \]
\[ R^2 = 0.6966 \]

\[ y = 1.0821x \]
\[ R^2 = 0.5958 \]
P Load Relationships

**Weekly P Load - 0401 vs 2501**

- BAS: $y = 1.192x$, $R^2 = 0.9799$
- TMT: $y = 1.1806x$, $R^2 = 0.7628$

**Weekly P Load - 6117 vs 1813**

- BAS: $y = 1.8616x$, $R^2 = 0.8987$
- TMT: $y = 1.1991x$, $R^2 = 0.849$

**Weekly P Load - 4702 vs 4701**

- BAS: $y = 0.7398x$, $R^2 = 0.8008$
- TMT: $y = 0.9063x$, $R^2 = 0.8412$

**Weekly P Load - 3103 vs 3102**

- BAS: $y = 1.4915x$, $R^2 = 0.4272$
- TMT: $y = 0.9063x$, $R^2 = 0.8412$
EAA-BMP Research SOW (2015-2020)

Implementation and Verification of BMPs to Reduce EAA Farm P Loads Floating Aquatic Vegetation Impact on Farm P Load
2015-2020 SOW

• Meeting between the SFWMD, EAA-EPD and UF IFAS – agreement to continue the existing SOW with few modifications:
  – Two years of treatment: Not enough to show results on a field scale
  – Encouraging results with a decreasing trend in all project farms – reflected in basin load reduction
  – Some of the Control farms are keeping FAV out of their canals which may explain the reduction in their P concentrations and loads
  – Treatments and monitoring will continue till final report issued in December 2017
  – Further Research will be planned for 2018-2020
NELAP Certified LAB: Total Phosphorus; Ortho Phosphorus Personnel

Samira Daroub, PhD  Principal Investigator
Timothy Lang, PhD  Project Manager
Viviana Nadal, MS  Head Chemist
Irina Ognevich, BS  Senior Chemist
Pablo Vital, AA  Field Technician
Johnny Mosley, AA  Field Technician
Anne Sexton  Grad Student
Stephen Jennewein  Grad Student
Mohsen Tootoonchi  Grad Student
Andres Rodrigues  Grad Student
Extension documents

Extension publications- EDIS
http://edis.ifas.ufl.edu/

BMP Presentations
http://erec.ifas.ufl.edu
Before you leave today...

• Please fill out evaluation forms (Blue sheet).
• Pesticide CEUS available
• CCAs (Certified Crop Advisor) available
• All presentations will be posted on our website. Links on yellow sheet

THANK YOU!