Nutrient Control
Best Management Practices

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BMP Topic Includes

- BMP definition and goal
- Effectiveness of BMPs in the EAA
- The (4+1) Rs of Nutrient Stewardship
  - Fertilizer Recommendation
    - Plant Tissue Testing
    - Soil Testing
    - Optimum Yield
- Spill Prevention

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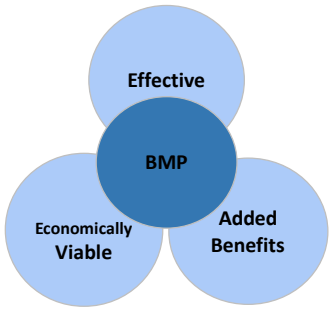
BMP Definition:

An alternative management practice that is **technically feasible**, **economically viable**, **socially acceptable**, and **scientifically sound.**

The Main Goal of BMPs is when it is implemented, it should effectively **reduce P concentrations and loads** exiting farms in the EAA while **maintaining agricultural productivity**.



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Best Management Practices in Florida

- The **University of Florida/IFAS** started its P concentration and load reduction agricultural BMP R&E program in 1986.
- **In January 1995, SFWMD,** incorporated specific BMPs into a regulatory program, making their implementation mandatory**.**
- Since 1995, EAA growers have successfully reduced P loads by **over 50%,** exceeding legal requirements reduction.

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Reducing P concentration in drainage water:

- **Reduces P loads off the farm**
- Prevents algal blooms
- Limits aquatic weed growth which could reduce drainage capacity
- Helps maintain adequate dissolved oxygen levels

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The use of fertilizer BMPs is part of the (4+1) Rs of nutrient stewardship

The (4+1) Rs philosophy leads to **enhanced environmental protection**, **increased production**, **increased farmer profitability, and improved sustainability**.

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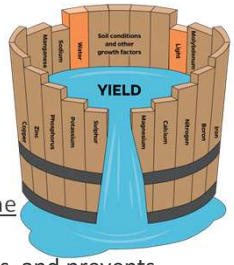
Nutrient Balance leads to Reach Optimum Yield

Fertilizer Recommendation:

1- Integrating Soil Testing

2- Plant Tissue Analysis

3- Optimum Yield



❖ Applying an adequate amount of nutrients saves the producer money, helps protect the environment, maximizes crop yields, conserves valuable resources, and prevents nutrient imbalances.

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Plant Tissue Analysis:

- Critical Nutrient Level (CNL) approach and the Diagnosis and Recommendation Integrated System (DRIS).
- Plant tissue testing, when used in conjunction with soil testing, can be a valuable tool for refining fertilizer recommendations and improving crop yield.
- It provides a current snapshot of the plant's nutrient status, aiding in adjusting future fertilizer applications as needed.

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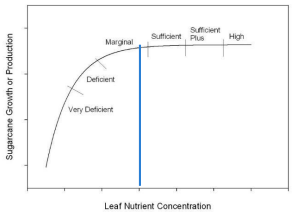
Sugarcane Leaf Nutrient Ranges



Nutrient	Optimum Range	Est. 5-10% Loss	Est. 25% Loss
	----------%----------		
N	2.0-2.6	1.8	1.6
P	0.22-0.30	0.19	0.17
K	1.0-1.6	0.9	0.8
Ca	0.22-0.45	0.20	0.18
Mg	0.15-0.32	0.13	0.11
Si	≥0.60	0.50	0.20
	----------mg/kg----------		
Fe	55-105	50	40
Mn	20-100	16	12
Zn	17-32	15	13
Cu	4-8	3	2

† Very Deficient: Estimated production losses > 25%
Deficient: Estimated production losses 6%–25%
Marginal: Estimated production losses 1%–10%

The CNL: nutrient concentration at which production losses reach 5% to 10% and are considered as a minimum acceptable level of nutrient concentration.

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Additional Leaf Analysis Information

McCray, J. M., and R. Mylavarapu. 2020. **Sugarcane nutrient management using leaf analysis.** http://edis.ifas.ufl.edu/AG435

McCray, J.M., V.I. Ezenwa, R.W. Rice, and T.A. Lang. 2019. **Sugarcane plant nutrient diagnosis.** http://edis.ifas.ufl.edu/SC075

Ezenwa V.I., J.M. McCray, P.R. Newman, and R.W. Rice. 2021. **Sugarcane leaf tissue sample preparation for diagnostic analysis.** http://edis.ifas.ufl.edu/SC076

Excel Spreadsheet to calculate DRIS indices for Sugarcane http://erec.ifas.ufl.edu/DRIS/DRISCalculator.zip

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Importance of soil Testing:

- Soil testing was accepted as an essential tool to formulate how to use lime and fertilizer properly in the late 1940s.
- However, with increased emphasis on **environmental quality** and **the rising cost of fertilizer materials**, soil testing is becoming an important tool to

determine areas where adequate or excess fertilization has occurred.

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Soil Testing: From Sampling to Recommendation

1. Soil Sampling:

Collection of Soil Samples

Handling and Submitting

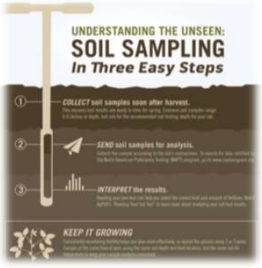
2. Laboratory Extraction and Analysis:

Sample Preparation

Extraction and Measurement of Nutrients

3. Interpretation and Fertilizer Recommendation:

Research-based fertilizer recommendations for Specific crops



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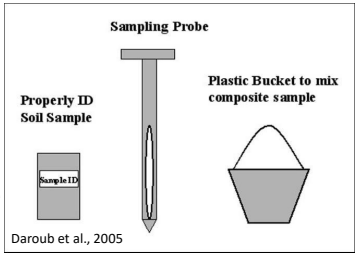
1- Soil Collection

- Use a proper sampling tool
- Zig-zag, V-pattern
- Take a representative sample
- Take samples from the crop root zone
- History of previous samples should be considered



Daroub et al., 2005

- 20-25 cores (40 acre block) are needed for a composite sample; and mixed well

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1- Soil Collection

- Take separate samples from areas with different fertilizer or cropping history
- Don't take samples within 100 ft of field ends or 30 ft of ditches. **Why?**
- Clearly label and identify the sample and include contact information
- Fill out the appropriate information sheets and submission forms.

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2- Laboratory Analysis:

Sample Preparation and extraction

- Soil samples should be air-dried before shipping to the laboratory for analysis.
- Soil tests are available for pH, P, K, Ca, Mg, Si, and Fe.

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Laboratory Analysis: Measurement



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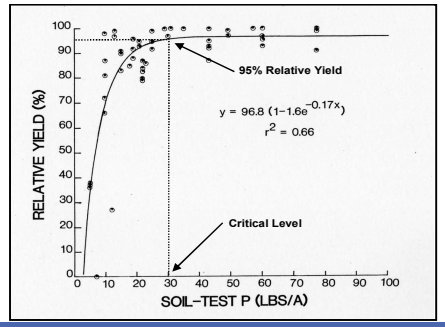
3. Interpretation and Recommendation: Response of Crisphead Lettuce to Soil Test P Levels



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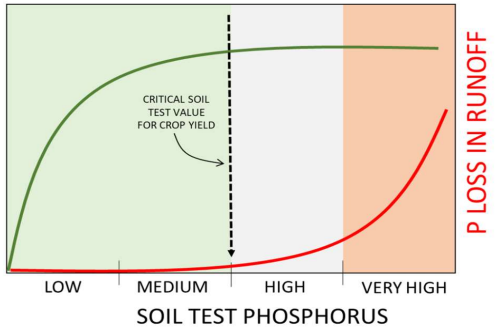
Relationship Between Soil Test P, Crop Yield, and Potential for Environmental Problems due to Excessive Soil P



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Right Place: Banding P Fertilizer

- More efficient P uptake
- Less P fixation in soil
- Reduces overlapping application
- Reduces P rate, especially for vegetables

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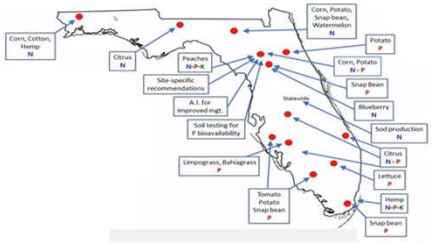
Right Rate: Nutrient Management Research

New Recommendations for Sugarcane on Mineral and Transitional Soils

- P, K, Si, N, and S
- Carrots N
- Potato P
- Strawberry N
- Turf grass P, N
- Citrus Ca, Mg, Mn, and Zn



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Prevent Fertilizer Misapplication

- Don't apply nutrients at higher than recommended rates
- Turn off the spreader at the ends of fields
- Calibrate equipment
- Train personnel

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Recommendations to Reduce Fertilizer Spills:

- Limit the number of loading sites
- Contain spills on tarps
- Have buckets and shovels available for cleanup
- Apply small spills to target field
- All personnel should be trained in handling spills
- Park fertilizer trailers away from canal banks
- Loading sites should be on level ground

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Take Home Summary

By implementing BMPs, farmers can effectively control fertilizer application to optimize crop productivity while minimizing negative environmental effects.

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New Comprehensive Sugarcane Nutrition Guide in EDIS

Nutritional Requirements and Fertilizer Recommendations for Florida Sugarcane

https://edis.ifas.ufl.edu/publication/SC028

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