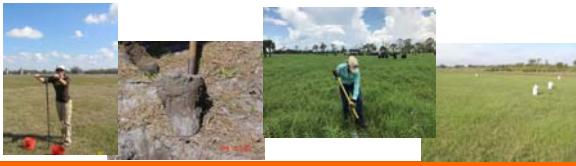


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## How to interpret your soil test results

(Article published in FCA Magazine, Feb., 2018)

**Maria L. Silveira**  
Soil & Water Science Program, UF/IFAS Range Cattle REC



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Purpose of Soil Testing

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- Obtain a reasonably accurate measure of soil pH and plant available nutrient concentrations
- Make sound fertilizer/lime decisions
- Monitor long-term impacts of soil fertility program

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## “Chance of Error”



5 main components of soil testing

1. Soil sampling
2. Soil handling and submission to the lab
3. Laboratory analysis (samples preparation, extraction, analysis, report/recommendations)
4. Results interpretation
5. Fertilizer and lime recommendations

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## Most common mistakes and how to avoid them



### 1. Improper Sample Collection

- Test results are only as good as the sample taken
- Improper sampling may result in large spatial or seasonal fluctuation in soil nutrient concentrations
- The goal is to collect a composite sample that represents the area of interest

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## Most common mistakes and how to avoid them



### How to Ensure Proper Sample Collection

- A composite samples should consist of a minimum of **15-20** individual cores taken at random over a given area
- If an insufficient number of cores are pulled for a composite sample, the sample results can be biased either too high or too low
- All individual cores should be thoroughly mixed together and a sufficient amount of sample should be placed in a properly labeled container for lab analysis

**Don't discard your sample until the lab results are received**

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### Most common mistakes and how to avoid them



#### How to Ensure Proper Sample Collection

- Sampling design should account for differences in soil type, previous fertilization or management (fences, feedlots, etc.)
- Problematic areas (low forage production, stunt or yellowing)
- Sampling depth should be consistent (4 to 6 inches) across the entire field
- Sample handling (storage, contamination)
- **Keep accurate records**

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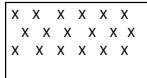
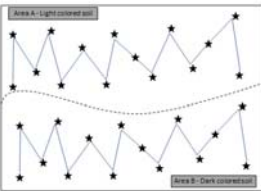
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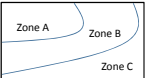
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### Soil sampling approaches



Staggered pattern



Management Zones

A screenshot of the 'Web Soil Survey' website. It includes a search bar, a list of soil types, and a grid of sampling points. The text on the page describes the survey's purpose and provides instructions for users.

Gridded pattern

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### Sample handling



2 most common "culprits"

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### Sample handling

**Nutrition Facts**  
Serving Size: about 1/3 cup (40g)  
Servings Per Container: about 45

Amount Per Serving		Calories from Fat 5	
			% Daily Value*
Total Fat	1g		1%
Saturated Fat	0g		1%
Cholesterol	0mg		0%
Sodium	500mg		21%
Potassium	100mg		5%
Total Carbohydrate	30g		10%
Dietary Fiber	1g		5%
Sugars	3g		
Protein	4g		
Vitamin A	0%	Vitamin C	0%
Calcium	5%	Iron	6%
Phosphorus	20%		

\*Percent Daily Values are based on a diet of other people's secrets. Your daily values may be higher or lower depending on your calorie needs.

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### Sample handling

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### Most common mistakes and how to avoid them

**Time of the year**

- Soil nutrients levels can change during the year, depending on soil temperature and moisture levels
- Samples should be taken at the same time each year so results from year to year can be compared
- The best time to sample is 3 to 6 months prior to spring fertilization or planting. If lime is needed, it is better to apply it during the fall to allow it enough **time** to react with the soil

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Most common mistakes and how to avoid them



2. Laboratory Selection

- Labs offer a wide range of soil parameters and test procedures
- Different goals (agronomic, environmental, architect/construction)
- Ensure the lab is accredited [North American Proficiency Testing (NAPT); Agricultural Laboratory Proficiency Program (ALP)]
  - Differences in extractant solution

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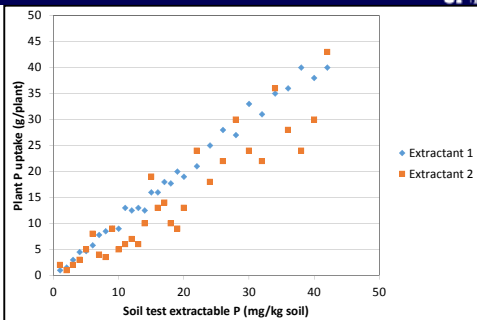
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Extractant Solutions



Slide source: Dr. George Hochmuth

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Most common mistakes and how to avoid them



2. Laboratory Selection

- Labs offer a wide range of soil parameters and test procedures
- Different goals (agronomic, environmental, architect/construction)
- Ensure the lab is accredited [North American Proficiency Testing (NAPT); Agricultural Laboratory Proficiency Program (ALP)]
  - Differences in extractant solution
  - Differences in extraction procedure: shaking times, soil:extractant ratio, analysis procedure
  - Units reported (ppm, mg/kg, lb/acre)
  - Index interpretation (low, medium, or high)
  - "More" may not be better

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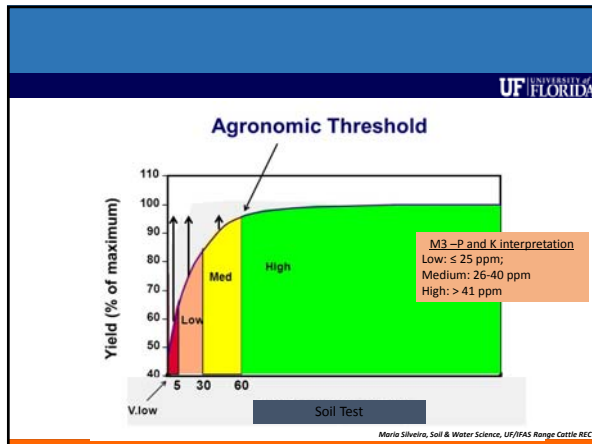
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Most common mistakes and how to avoid them

### 2. Laboratory Selection

Mehlich 3 is the standard soil test procedure in Florida

Lime recommendations are based on Adams-Evans procedure

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Most common mistakes and how to avoid them

### 3. Laboratory Analytical Error

The best approach to identify analytical error is to compare current results with prior reports

- Drastic changes in soil test results ( $\pm 15\%$  difference is acceptable)
- Some soil characteristics are variable both in time (temporal) and space (location in the pasture or on the farm), it is best to sample at the same time each year
- Zero values
- Analytical discrepancies (high pH and low Ca levels)
- When in doubt, resubmit a new or achieve sample or contact the lab to repeat the analysis

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Most common mistakes and how to avoid them



4. Fertilizer recommendations

Soil fertility approaches commercial vs. land grant university labs

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Most common mistakes and how to avoid them



- *Build-Up and Maintenance* : The goal is to build up the soil fertility level to the *high* category with additions of specific nutrients whose indexes were interpreted as *medium* or lower per the soil test. Nutrients removed with harvested crop should be replaced to maintain high nutrient status.
- *Basic Cation Saturation Ratio (BCSR)* : This concept was developed in the early 1940's and it attempts to maintain desired ratios of cations [potassium (K), magnesium (Mg), and calcium (Ca)] on the soil cation-exchange complex. Recycling of nutrients in the soils is not considered.
- *Crop Nutrient Requirement (CNR)*: Soil tested medium or above for a particular nutrient can supply 100% of crop nutrient requirement

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Most common mistakes and how to avoid them



Given the environmental conditions and coarse soil texture, most soils in Florida have limited ability to retain nutrients, therefore "build up" approach is not appropriate

Extensive research has been done to determine the relationship between soil test, fertilizer application, and yield responses ("Field calibration")

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**UNIVERSITY OF FLORIDA IFAS** **UF/IFAS Analytical Services Laboratories Extension Soil Testing Laboratory**  
 Wallace Building 613 P.O. Box 110740 Gainesville, FL 32611-0740  
 Email: [soil@uifas.ufl.edu](mailto:soil@uifas.ufl.edu) Web: [soil.uifas.ufl.edu](http://soil.uifas.ufl.edu) Phone: 352-392-1370

**Bahia Producer Test Report**

For further information contact:  
 Name: Ed  
 Phone County Coop Ext. Service  
 28702 18 02  
 Duval City, FL 32211-5118  
 Tel: 352-718-5278  
 Email: [ed@uifas.ufl.edu](mailto:ed@uifas.ufl.edu)

To: [Redacted]

Client Identification: Bahias Set Number: E36479 Lab Number: ER0215 Report Date: 08-Apr-18  
 Crop: Bahiagrass

**SOIL TEST RESULTS AND THEIR INTERPRETATIONS**

Target pH: 5.5 This is the pH at which the disease onset will grow at its minimum.  
 pH (1:2 Sample:Water): 4.9 This is the pH of your sample in the water medium.  
 A-C Buffer Value: 7.20 Buffer pH is the pH of your soil in Adams-Carew Buffer-A-C Buffer. This is done to determine the lime requirement, which will help increase the soil pH to the target pH level desired by the user.

MEGACAL EXTRACTABLE	LOW	MED	HIGH
PHOSPHORUS (mg/kg or ppm P)	154		
POTASSIUM (mg/kg or ppm K)	20		
MAGNESIUM (mg/kg or ppm Mg)	34		
CALCIUM (mg/kg or ppm Ca)	280		

**LIME AND FERTILIZER RECOMMENDATIONS**

Crop: Bahiagrass  
 Lime: 2891 lbs per acre  
 Nitrogen(N): 102 lbs per acre  
 Phosphorus(P<sub>2</sub>O<sub>5</sub>): Since the soil has high P and the tissue has 0.27% P, there is no P recommendation.  
 Potassium(K<sub>2</sub>O): Please refer to Section 131 for Potassium recommendations based on the N option & usage.  
 Magnesium(Mg): 20 lbs per acre

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**Summary**

- Soil testing is an important tool to determine the portion of the crop nutrient requirement that can be supplied from the soil
- Sources of error include improper soil sampling/handling, soil testing procedure, laboratory analysis, results interpretation, and fertilizer recommendations
- Collect representative soil samples
- Select a reputable lab that runs tests compatible with University of Florida fertilizer and lime recommendations
- Keep accurate records (sound/feasible soil sampling protocol, analysis report, and management records)
- Consult your local county extension agent or other university personnel

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**THANK YOU!**

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 Email: [mlas@ufl.edu](mailto:mlas@ufl.edu)  
 Phone: (863) 735-1314




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