

# International Conference on Enhanced-Efficiency Fertilizers

An IFA-New Ag International Event

23-24 March 2010

Hotel Hyatt Regency, Miami, FL, USA

**NEW AND IMPROVED METHODS FOR DETERMINING  
NUTRIENT RELEASE CHARACTERISTICS OF EEF**

**Lydia Carolina MEDINA**

University of Florida (Soil & Water Science Dept.), USA



# New and Improved Methods for Determining Nutrient Release Characteristics of EEF

Carolina Medina  
Soil & Water Science Dept.

International Conference on  
Enhanced-Efficiency Fertilizers  
March 23, 2010



## Drivers for Method Development

- **New technologies**
  - New products for Ag and specialty.
  - New Claims.
- **Environmental drivers**
  - Water & air pollution.
  - Nutrient Management.
- **Regulatory issues**
  - No official method to measure longevity claims.
  - Consumer confusion or lack of protection.



## Goals of Taskforce

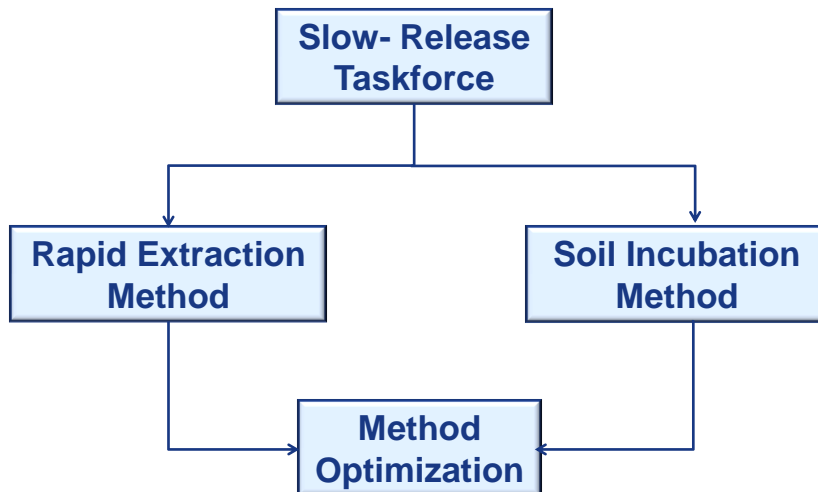
- Can be used to verify longevity claims.
- Must be able to be used as a regulatory method- it must be fast.
- Does not change claims of current products.
- Uses common laboratory & analytical equipment.
- Measure release, no what fails to release.
- Can be used to extract multiple nutrients.
- Can be correlated to a biologically active method.

## Stakeholders

- **Regulatory Tool**
  - Use as a method to verify SR claims of specific longevities.
  - International harmonization efforts for regulation and analysis of SR materials.
- **Industry-QA/QC**
  - As final QC check before shipment of products.
  - To evaluate storage or attrition of materials.
  - As a predictor of performance based on release rate.

## Stakeholders

- **Users, blenders & advisors**
  - Use method as a tool to formulate blends that closely match plant needs.



## Accelerated Lab Extraction Method



## Overview of Methodology

Four extraction sequences:

**Extraction #1-** 2 hrs @ 25 C

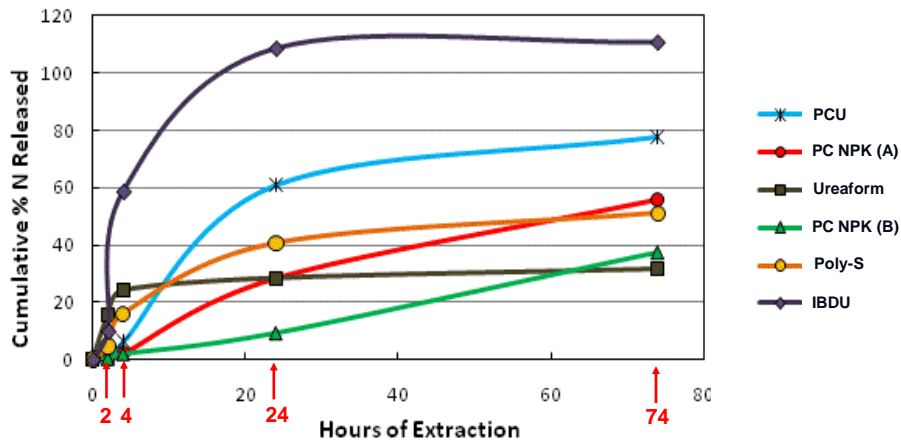
**Extraction #2-** 2 hrs @ 50 C

**Extraction #3-** 20 hrs @ 55 C

**Extraction #4-** 50 hrs @ 60 C



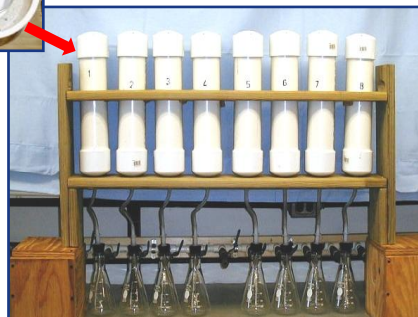
## Accelerated Lab Extraction Method



## Soil Incubation Method

### Procedure

- 1710 g sand + 90 g soil.
- 450 mg N.
- Mix N source with entire sand/soil mix.
- Ammonia trap.



Incubation Lysimeters

## Soil Incubation Method

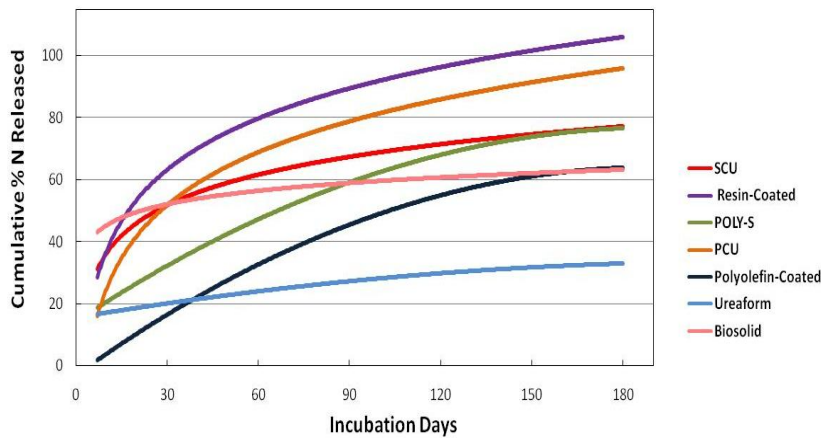


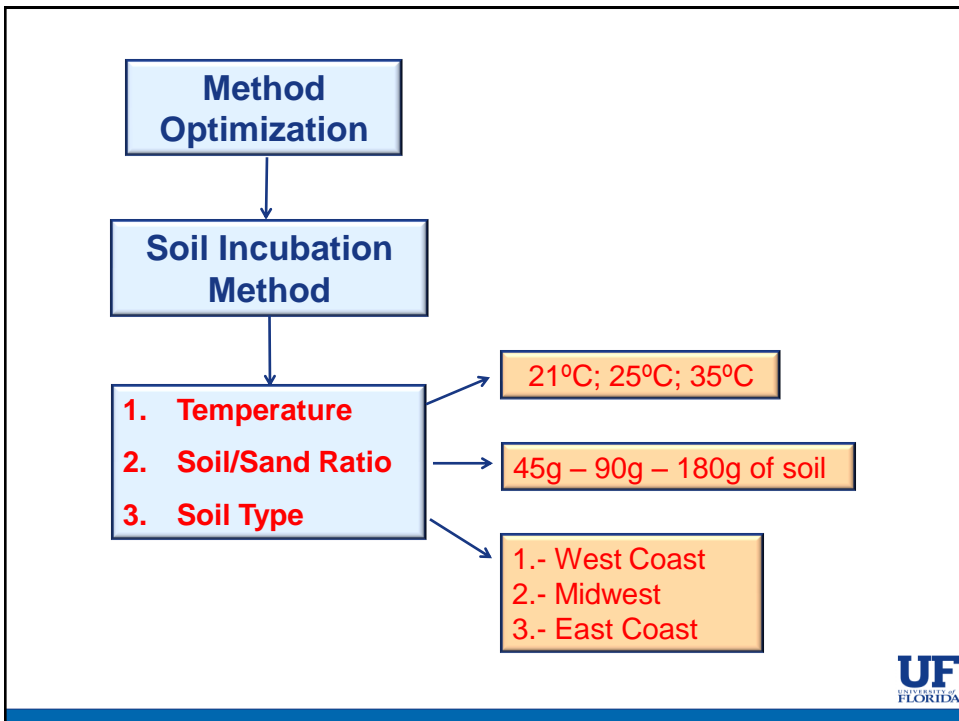
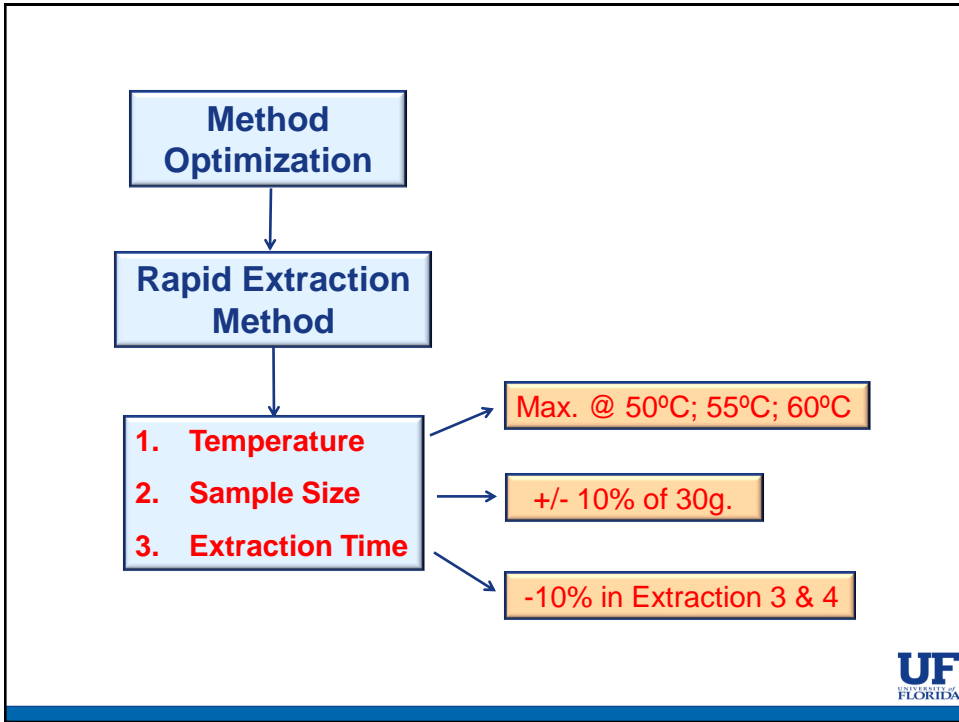
Column Leaching



Leachates

## Soil Incubation Method







## Results- Method Optimization

- **Rapid Lab Extraction**
  - Temperature effect.
  - Rest of the variables had no effect on N release.
- **Soil Incubation Method**
  - Coated-fertilizers
    - No temperature effect between 70 & 77°F.
    - Soil/sand ratio had *no effect* on N release rate.
  - Slow-release fertilizers
    - Great temperature effect at 95°F.
    - Soil/sand ratio had *an effect* on N release rate.

## In-house Validation of Lab Method

- Ruggedness testing
  - Evaluates the effect of small changes of several factors on the results of the method.
  - Youden & Steiner Experimental Design. “Statistical manual of the Assoc. of Official Analytical Chemist.” AOAC. Washington, DC, 1975.
  - Methodology appears to be robust.

## Conclusions

- **Lab Extraction Method**
  - Highly optimized.
  - Robust & reliable.
- **Soil Incubation Method**
  - No volatile ammonia.
  - 98% of applied soluble N recovered.
  - Nitrification occurring – microbes active.

## On-going / Future Tasks

- Statistical correlation of lab extraction method with soil incubation method.
- Multiple laboratory validation of the lab extraction method.
- Get lab method accepted by APPFCO for use in state fertilizer labs for verification of controlled release claims.