Water Soluble Fertilizer Sample Preparation Comparison

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Introduction

- Water soluble fertilizers pose a number of challenges for testing
- Cannot be easily ground due to coatings – difficult to homogenize
- Samples are hydroscopic
- Varying particle sizes

Background

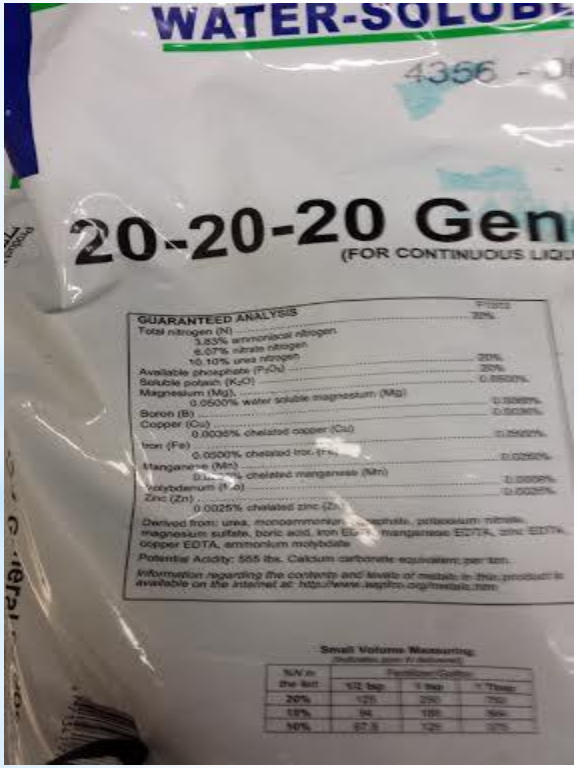
- Water soluble fertilizer products have been determined to be deficient for N, P or K upon analysis by CO Dept of Ag Biochemistry Laboratory

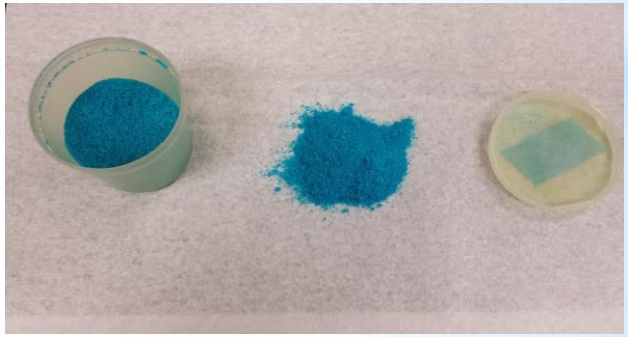
- The manufacturer suggested that the samples were determined to be deficient based upon the conventional sample preparation method which was ‘not optimal’ for this type of sample

Background

- The manufacturer suggested an alternative sample preparation method
- The alternative method was presented at the Jacksonville, FL 2015 AAPFCO mid-year meeting
- The Laboratory Services Committee formed a work group to look at the alternative sample preparation method

Product Example





Conventional Method

- Bag shaken, rolled, quartered
- Subsamples removed and riffle split
- Approximately 50 g hand ground with a mortar & pestle
- Samples analyzed* for N by combustion and P, K by ICP-OES

*Samples prepared and analyzed by Scott Roalofs and Sudhi Rao of the CDA Biochemistry Laboratory

Alternative Method

- Weigh a 250g subsample into a 1000 mL volumetric flask
- Fill 2/3 full with DI water
- Place mixture on a stir plate; insert a stir bar and stir until sample is visibly dissolved
- Allow the sample to sit at room temperature for at least 15 hours
- Remove stir bar and bring to volume with DI water; mix thoroughly
- Resulting solution is a 25% fertilizer solution
- Make 1% and 0.1% dilutions; bring to volume with DI water
- (Make 0.01% dilution for high P or K containing samples)

Alternative Method

Analysis Results

Water Soluble Fertilizer Comparison					
	N - Combustion	Guarantee	Inv Allow	Status	SD
CDA-1	16.3	20%	≥ 19.27		
CDA-2	18.3	20%	≥ 19.27		
CDA-3	17.4	20%	≥ 19.27		
CDA-4	21.0	20%	≥ 19.27	Pass	2.01
Solution - 1	18.0	20%	≥ 19.27		
Solution - 2	18.2	20%	≥ 19.27		
Solution - 3	17.8	20%	≥ 19.27		
Solution - 4	17.5	20%	≥ 19.27		0.30

Analysis Results

Water Soluble Fertilizer Comparison					
	P_2O_5 - ICP-OES	Guarantee	Inv Allow	Status	SD
CDA-1	18.2	20%	≥ 19.28		
CDA-2	18.9	20%	≥ 19.28		
CDA-3	21.4	20%	≥ 19.28	Pass	
CDA-4	18.0	20%	≥ 19.28		1.56
Solution - 1	17.4	20%	≥ 19.28		
Solution - 2	19.1	20%	≥ 19.28		
Solution - 3	17.9	20%	≥ 19.28		
Solution - 4	17.4	20%	≥ 19.28		0.80

Analysis Results

Water Soluble Fertilizer Comparison					
	K-ICP-OES	Guarantee	Inv Allow	Status	SD
CDA-1	20.0	20%	≥ 18.92	Pass	
CDA-2	21.6	20%	≥ 18.92	Pass	
CDA-3	19.2	20%	≥ 18.92	Pass	
CDA-4	20.2	20%	≥ 18.92	Pass	0.998
Solution - 1	18.0	20%	≥ 18.92		
Solution - 2	20.4	20%	≥ 18.92	Pass	
Solution - 3	19.1	20%	≥ 18.92	Pass	
Solution - 4	18.5	20%	≥ 18.92		1.03

Summary

- Results are indicative, but not conclusive
- Not a statistically-significant population
- Leaning toward not changing the conventional methods
- Interested in the Magruder results for a similar water soluble sample
- Any further work for this work group?