The utilization of municipal organics (biosolids / food waste) in the manufacture of a green sustainable fertilizer

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VitAg Overview

- Manufactures an Enhanced Efficiency Fertilizer (EEF)
  - high nutrient content and slow release
  - broad market applicability
  - demonstrated strong crop performance
  - low odor process and product
- Unique business model for municipal organics company
Modification of an Ammonium Sulfate Process

\[ 2\text{NH}_3 + \text{H}_2\text{SO}_4 = (\text{NH}_4)_2\cdot \text{SO}_4 \]

Add organics in place of water

Heat
The VitAg Ammonium Mix ("AM") Technology

- Conversion of digested organics to high nitrogen granular fertilizer
- Reacts concentrated acid and anhydrous ammonia with organics for a two step heat drying process
- Couples nutrients to organic molecules to create a slow-release fertilizer
- Key is long reaction times under heat and pressure.
- Incorporation of high plant nutrient value
- Use of chemicals that positively reduce odorants
Ammonium Mix Process

Features

- Provides high stress hydrolytic reaction conditions
- Liquefaction of all materials
- Hydrolysis of organic molecules (protein → amino acids)
- Sterility achieved
- Fuses inorganic nutrients with organic constituents
- Removes any odor associated with input organics
- Creates a dry, hard, granular multinutrient slow-release fertilizer
AM Process Overview
Create Value With Organics

- VitAg recovers nutrients from digested organics
  - Nitrogen
  - Micronutrients
  - Organics
  - Amino acids
- Organics provide slow-release feature
- Increased crop yield with stress resistance
- Fertilizer processing advantages (hardness)
Enhanced Efficiency Fertilizer

16-0-2-17-3-16 (N-P-K-S-Fe-Org)

Characteristics:
- Spherical granules;
- 260/120/80 SGN
- 6-8 # hardness
- Dry = >98% solids
- No source organics odor

Application rates:
- Lbs/acre

Consistent with Current Agricultural Practices
Comparative Nitrogen Release Curve

- Ammonium Sulfate
- Organically Modified Ammonium Sulfate
- Biosolids
Ammonia Volatilization Testing
IFDC

Daily Volatilization - Greenville Soil

Uniform nutrient release = higher crop yield, less leaching, better for the environment
Organically Modified Fertilizer

GHG Impact

3.7 tons CO₂

1.3 tons CO₂

Nitrogen Utilized
1.0 tons

0.5 tons CO₂

Ammonia Plant

1.5 tons N

Organic Ammonia Sulfate Production

1.6 tons N

Volatilization

Runoff

Total 5.2 tons CO₂

Source: Gould (2011)

versus 8.3 tons total CO₂ if traditional fertilizer
Tomato Trial – University of Florida

**Commercial**
- 4-10-6  1000#/a
- 17-0-28 1800#/a
- 17-0-28  1800#/a

**VitAg 50/50**
- KNO3  4-10-6  1000#/a
- VitAg  1000#/a
- KNO3  1000#/a
- NH3NO3  235#/a

**VitAg 25/75**
- 4-10-6  1000#/a
- VitAg  470#/a
- KNO3  1114#/a

**Control**
Harvested Weight of the Tomatoes

TOMATO FRUIT WEIGHT AS INFLUENCED BY N SOURCE

- **VITAG 50/50**: 318 g, 120% of the control
- **VITAG 25/75**: 458 g, 172% of the control
- **COMM**: 266 g, 100% of the control
- **CTRL**: 38 g, 14% of the control
TOTAL N LEACHED BY TOMATO AS INFLUENCED BY N SOURCE

- VITAG 50/50: 354
- VITAG 25/75: 405
- COMM: 715
- CTRL: 2.6
VitAg Location – Zellwood, FL
VitAg Zellwood, FL Project

- Plant #1 (1 of 3) at this Zellwood site fully funded
- Permitted and 100% designed
- Purchased 62 acres
- 20 year supply contract
- Construction underway
- Completion by end of 2015
VitAg’s Plant Design For Zellwood
VitAg Hydrolysis Vessels
Odor Control Design

- Stack (80’)
- Multi-stage Scrubbers (3)
- Biofilter
- Fans (5)
- Cooling Tower
- Bag Houses (3)
- Venturi Scrubber
- Ammonia Vaporizer
- Ammonia Absorption Towers (2)
- Quench Towers (2)
- Grease Filters (2)
VitAg Zellwood, FL Site
VitAg Zellwood Construction Site (4-10-15)
Summary

- VitAg organically-enhanced EEF fertilizer
- Sustainability
- Targeting turf, golf course & specialty fertilizer applications
- Aggressive plant development with first VitAg plant in Zellwood, FL
- Strong investor support
Thank You