National Network for Use of FGD Gypsum in Agriculture

Agricultural and Industrial Uses of FGD Gypsum Workshop

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National Network of Sites

Objective
Increase use of FGD products in agricultural applications

The network will serve to:
• Demonstrate agricultural benefits across different regions, soil types, and crops
• Address environmental acceptability of agricultural use
• Act as a resource for technical questions
• Aid in marketing to the agricultural community
National Network of Sites

- The Ohio State University coordinates all network activities
  - Development of uniform protocols for all sites
  - Laboratory analysis
  - Data evaluation
  - Report preparation
  - Website

- Utility Sites
  - Co-funded
  - Local soils, crops
  - Local agricultural expert
## Experimental Design

<table>
<thead>
<tr>
<th>Replicate 1</th>
<th>Replicate 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>FGD gypsum (3 rates)</td>
<td>FGD gypsum (3 rates)</td>
</tr>
<tr>
<td>Replaced material (3 rates)</td>
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<tr>
<td>Control (no application)</td>
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</tbody>
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<table>
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<th>Replicate 3</th>
<th>Replicate 4</th>
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Randomized complete block
Data Collection

• Crop yield
• Soil quality
• Soil water quality
• Plant tissue metals
• Mercury
• Meteorological data
Data Collection

- Analysis of FGD Gypsum and Other Amendments
  - Total neutralizing power and pH
  - Soluble salts (electrical conductivity)
  - Total S, N, C
  - Total composition (digestion & ICP)
    - P, K, Ca, Mg, S, Al, B, Cu, Fe, Mn, Mo, Na, Zn
    - As, Ba, Be, Cd, Co, Cr, Li, Ni, Pb, Sb, Se, Si, Sr, V
  - Hg by cold vapor atomic fluorescence spectrometer
Data Collection

Soil Analysis

- Lime test index & pH
- Available P (Bray 1 extraction)
- Exchangeable K, Ca, Mg, Na (ammonium acetate extraction)
- Cation exchange capacity and percent base saturation
- Soluble salts (electrical conductivity)
- Total S, N, C
- Organic matter by loss on ignition
- Mehlich 3 extraction with ICP analysis (P, K, Ca, Mg, S, Al, Cu, Fe, Mn, Zn)
- Total composition (digestion & ICP)
  P, K, Ca, Mg, S, Al, B, Cu, Fe, Mn, Mo, Na, Zn
  As, Ba, Be, Cd, Co, Cr, Li, Ni, Pb, Sb, Se, Si, Sr, V
- Hg by cold vapor atomic fluorescence spectrometer
Data Collection

- **Plant Tissue Analysis**
  - Total S, N, C
  - Total composition (digestion & ICP)
    P, K, Ca, Mg, S, Al, B, Cu, Fe, Mn, Mo, Na, Zn
    As, Ba, Be, Cd, Co, Cr, Li, Ni, Pb, Sb, Se, Si, Sr, V
  - Hg by cold vapor atomic fluorescence spectrometer

- **Soil Water Analysis**
  - Anions
  - Dissolved constituents (ICP)
    P, K, Ca, Mg, S, Al, B, Cu, Fe, Mn, Mo, Na, Zn
    As, Ba, Be, Cd, Co, Cr, Li, Ni, Pb, Sb, Se, Si, Sr, V
  - Hg by cold vapor atomic fluorescence spectrometer
National Network of Sites

• North Dakota
  – 2 test plots
  – Planted in Spring 2007
  – Recently harvested

• New Mexico
  – Delayed in Spring 2007
  – Planned for Fall 2007

• Indiana
  – Planned for Fall 2007

• Arkansas
  – Planned for Fall 2007

• Alabama/Tennessee
  – Planned for Spring 2008