Project Objectives

(1) Analyze wheat stubble burning effects (SOM; C, N, P losses).

(2) Assess crop rotations that benefit from retaining the residues in DS systems.

(3) Investigate effects of wheat straw management and rotation alternatives on root pathogens.
Cook Agronomy Farm
Direct Seed and Precision Farming Systems

Location of Field Studies based on the 3 Objectives
Field Studies and Lab Analyses

DOE-1 Field Study (12 x 12 ft plots)

- 15 sites with 6 treatments (Fall ‘09 Burn, Spg. ‘10 Burn, Control, Fertilized/Nonfert.)
- Collected residue after each harvest.

DOE-2 Field Study (12 x 12 ft plots)

- Rotations after Fall Burn: (1) ww-sb-sw; (2) ww-cp-sw; (3) ww-ww-sw.

DOE-3 Field Study (10 x 50 ft plots)

- 2 rotations (ww and ww-l) and 3 tillage
DOE 3 Field Study Parameters

- 2 different rotations:
  - continuous ww
  - ww-legume
- 3 types of tillage:
  - conventional
  - cross slot
  - Horsh
- 4 replicates taken
Methodology Used to Accomplish the Objectives

• Measured soil chemical and physical characteristics (soil pH, POM, bulk density, water content, nutrient contents).

• Assessed the residue loads (biomass, yields, C and N contents, net collected weights).

• Accounted for C, N, and P losses (mass balance on soil, plants, and residue).

• Evaluated micronutrient fluxes (PRS probes).
Soil pH Variance per Treatment

Soil pH (1:1, soil:water)
Bulk Density Variance per Treatment

![Graph showing bulk density variance per treatment with plot IDs and bulk density values.](image-url)
Water Content at Each Treatment

Plot ID

Water Content (%)
It employs an ion exchange resin membrane to provide a dynamic ion flux in soil and other heterogeneous media. When chemically pre-treated, the anion and cation exchange resin membranes exhibit surface characteristics and nutrient sorption phenomena that closely resemble a plant root surface. When buried in soil, the PRS™-probe can assess nutrient supply rates by continuously adsorbing charged ionic species over the burial period.
Preliminary PRS Probe Data

For Field Deployment of Probes

Over a 3-week Interval

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- denotes a value below the detection limits

It is only a fraction of the data for this time interval.
A subset of the data is shown for comparison purposes.
# Average Yield Data (wet wts.) for the 6 Treatments from DOE-1

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Treatment</th>
<th>Fertilizer Applied</th>
<th>Average Plot Yields for 15 locations (bu/ac)</th>
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Tasks Accomplished To-date
(Data still needs to be analyzed.)

- Particulate Organic Matter (POM) on 45 samples
- N Mineralization for a 5-week incubation study
- Plant C & N content for 10 plots using PRS probes
- Residue Loads for Fall Burn (60 samples)
- Residue Loads for Spring Burn (90 samples)
- PRS probe Nutrient Analyses (both for the field deployment and lab study)
Major Items to Complete

- Complete residue separations and preparation for analysis (20 are left).
- Analyze residue C and N contents for both Fall and Spg. Burns (150 samples).
- Perform soil total N content collected in October 2010 (450 samples).
- Examine POM C content (45 samples).
- Carry out a statistical analysis on the data.
- Assemble results and compile a final report.
It has been a real pleasure working on this project with such talented people.