Smart Nitrogen Application Program: 4R Nutrient Stewardship to Reduce $N_2O$ Emissions for Monetization of Carbon Offsets

C-AGG Meeting, July 20, 2011 – Chicago, IL
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The Fertilizer Institute
Nourish, Replenish, Grow
Project Team

- The Fertilizer Institute
- Camco
- Climate Check
- The Climate Trust
- International Plant Nutrition Institute
- USDA NLAE
- Michigan State University
- Colorado State University
- National Corn Growers Association
Overview

- Utilize nitrogen BMPs to reduce N$_2$O emissions
  - 4Rs – the right source at the right rate, the right time and in the right place
- Project focus on IA/IL corn – soybean rotations
- Develop a program to recruit & enroll producers
- Provide method to monitor & track fertilizer BMPs
- Use collected data to run & evaluate multiple protocols
- Use a selected protocol to quantify credits for aggregation and monetization
4R Nutrient Stewardship

• Simultaneously improve productivity & efficiency

• Match nutrient supply with crop requirements and to minimize nutrient losses from fields

• BMPs affecting fertilizer Source, Rate, Time, & Place are site specific
  • Practices chosen for a given field are dependent on soil, climate, and management conditions, crop selection, and other site specific factors
Task 1 – Develop SNAP & Nitrogen Desktop

- **SNAP** – website populated with info on:
  - Nitrogen BMPs
  - Climate change issues
  - Carbon markets
  - Water quality issues
  - Fact sheets
  - Videos

- **Nitrogen Desktop** – web enabled tool for:
  - Monitoring
  - Reporting
  - Verification

- **Grower outreach and education**:
  - Marketing literature
  - Winter association meetings
  - Expos
  - Targeted grower meetings
Task 2 – Protocol Evaluation, Road Testing, and Comparison

- Meta-analysis of 4R practices & \( \text{N}_2\text{O} \) reductions
- Modify protocols as needed with meta-analysis
- Utilize producer data to road test protocols
- Evaluate based on scalability, verifiability, effectiveness, ease of use, credit quantification

- Protocols involved:
  - Alberta NERP
  - American Carbon Registry
  - Verified Carbon Registry
Task 3 – Program Implementation

• Enroll 100 producers in IA & IL
  • Utilize SNAP in 2012 & 2013
  • Minimum of 500 acres per farm
  • Estimate 0.5 mTCO$_2$e per acre

• Work with growers and their agronomists to implement practices
  • Utilize EQIP funds for nutrient management practices

• Collect & process data through Nitrogen Desktop for carbon offset quantification and monetization
Task 4 – Program Evaluation

- Evaluate program for:
  - Producer acceptance
    - assess N management decision process
    - potential expansion to broader US
  - Program effectiveness
    - project implementation
    - environmental outcomes
    - social outcomes
    - financial benefits
<table>
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<tr>
<th>Task</th>
<th>Task and SubTask Description</th>
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<th>2012</th>
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Scientific Principles

• **Source** – ensure a balanced supply of essential nutrients, considering both naturally available sources and the characteristics of specific products, in plant available forms.

• **Rate** – assess and make decisions based on soil nutrient supply and plant demand.

• **Time** – assess and make decisions based on the dynamics of crop uptake, soil supply, nutrient loss risks and field operation logistics.

• **Place** – address root-soil dynamics and nutrient movement, and manage spatial variability within the field to meet site-specific crop needs and limit potential losses from the field.