Take Back Your Community From Nitrates

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Project Background

- Elevated Nitrates
- Intensive Agriculture and Irrigation
- Sandy Outwash Aquifer
- Multiple Partners
Verndale
Drinking Water Supply Management Area (DWSMA) MN-00390
10 year Time of Travel

Public Water Supply Well
- Primary

Emergency Response Area
Wellhead Protection Area (WHPA)
DWSMA

High Vulnerability

0.2 0.2 Miles

Approved July 26, 2006
Private Well Network - Monitors Nitrate Levels
What is the Nitrate Source?

- Nitrogen/Oxygen Isotopes Results Inconclusive
- Well 1 and 2 Same Results
- No Sanitary Sewer Line by Well 2
- Nitrates Source Likely Commercial Fertilizer and Manure
- Exact Ratio is Unknown
City Steps Up Big...

City receives grant and sets up two field demo sites!!

- Soil Testing
- Basal Stalk Tests
- Nutrient Management
- Irrigation Management
- Nitrogen Inhibitor Products Instinct and Agrotain
Location of Nutrient Management Initiative Program Field

- Irrigated Corn
- 40 Acres
Nutrient Management Initiative (NMI) Program Highlights

- USDA Program – Compares farmer nutrient rates to NRCS rates.
- Farmers compensated $1408
- Required to work with Certified Crop Advisor (CCA)...CCA paid $400
- Sign-up through Producer Agreement via EQIP Contract.
NMI Program
Key Points (cont.)

• Comparison between 2 N rates... replicated 3 times.
• Must have check strip
• Nitrogen rates 30lbs difference
• Corn acres only
• Commercial fertilizer only
• No manure or alfalfa
NMI Application Rates

- Farmer Nitrogen Rate 180 lbs/acre
- Nitrogen applied three different times during growing season
Lysimeters draw soil water into porous tip (vacuum applied)

- Catch the “environmental pulse” of land applied N (water & nitrogen that will no longer be taken up by the roots)
- water collected through sample line
Location of Permanent Lysimeters
Installation

Bucket auger holes for lysimeters - 2 ft below trench

Hole at bottom of the trench (4 ft Total)

Trench runs are 2-feet deep

Pushing lysimeter into hole and silica mix

Mixing silica flour & coating ceramic tips

Ready for PVC
Early May Installation
Nitrogen application rate comparison trials (NMI Program)
Cross section of nitrogen rates

Sample port

189 lbs N
159 lbs N
0 lbs N Check
Location of BMP Challenge Field

- Eight Temporary Lysimeters Installed
- 120 Acres
- Irrigated Corn
- Compared Inhibitor Products
BMP Challenge Program Highlights

• Agriflex, American Farmland Trust and other partners.

• Apply normal farmer fertilizer rates to a check strip. Remainder of the field, apply recommended BMP fertilizer rates.

• Only corn acres

• At harvest assess yields...if a loss...payment based on yield loss minus fertilizer savings.

• 19 states...California, Minnesota, Iowa, Illinois, Indiana, Michigan, Wisconsin, Nebraska, Ohio, Missouri, Delaware, Pennsylvania, Virginia, Maryland, New York, South Dakota, Vermont, Idaho and North Carolina.
185 lbs Nitrogen
No Agrotain

155 lbs Nitrogen
With Agrotain

155 lbs Nitrogen
With Instinct

185 lbs Nitrogen
No Agrotain

• We compared various N rates and inhibitor products
• Nitrogen was applied three times throughout growing season
Worked with local Co-op and Certified Crop Advisor throughout the process.
NMI Field Water Quality & Yield Data

Verndale 2011

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Nitrate concentration (ppm)

- Check strip
- 159 lb rate
- 189 lb rate
NMI Site Highlights

- Statistically Significant Results
- Higher N rates did not equal higher yields...however weather promoted mineralization.
- Increased nitrates leached from higher application rates
- Approximately 530lbs less N applied
BMP Challenge Site Highlights

• Yields – Low N rate same as high N rate
• Water Quality – All across the board...temporary lysimeters did not function reliably
• 2,290lbs less N applied
Summary

- Successful project bringing city and farming community closer together
- Interest in long term study
- Permanent lysimeters more accurate
- Increased groundwater awareness
2012 Year To Date

• Continued to monitor field (soybeans)
• Installed two monitoring wells
Cumulative Nitrate-N Leaching Loss in Verndale, MN over Length of Corn/Soybean Rotation

Source: MDA, Gallus and Stamper
Cover Crop

- Planted Forage Radishes
- Scavenge residual nitrogen
- Comparison between cover crop vs. no cover crop
2013 - Where We Going?

• Continue trying new products/rates...
• Field wide cover crops

Radishes Starting to Grow
Planted First Week Sept.
"That's All Folks!"
A State of Minnesota Production

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