IOWA WATER QUALITY INITIATIVE

Moving From Strategy to Implementation
United States
4.5% of World Population

Iowa
0.04% of World Population
Total Grain Production (Metric Tons)
Iowa – 55 Million
Canada – 45 Million

Source: Earth Policy Institute – 2011
Total Soybean Production (Metric Tons)
China – 15 Million
Iowa – 14 Million

Source: Earth Policy Institute–2011
Nutrient impairment is not mainly due to mismanagement of fertilizers and manures, but more to historic changes in land use and hydrology.

- Current major cropping system leaves soil vulnerable to erosion and nutrient leaching.
- Markets and Technological Advances have shifted cropping patterns and increased productivity.
- Have the most tools available to date and will continue to develop and adopt to new understanding and technology.
NUTRIENT REDUCTION STRATEGY

Corn, Hay, Small Grains, & Soybeans Harvested Trends 1866–2008

- Barley
- Corn Grain Harvested
- Flaxseed
- Hay Alfalfa
- Hay Other
- Oats
- Rye
- Sorghum
- Soybeans Harvested
- Wheat
Nitrogen moves primarily as nitrate-N with water.

Phosphorus moves primarily with eroded soil.

### Nitrogen Practices

<table>
<thead>
<tr>
<th>Practice</th>
<th>Comments</th>
<th>% Nitrate-N Reduction</th>
<th>% Corn Yield Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timing</strong></td>
<td>Moving from fall to spring pre-plant application</td>
<td>6 (25)</td>
<td>4 (16)</td>
</tr>
<tr>
<td></td>
<td>Spring pre-plant/side dress 40-60 split</td>
<td>5 (28)</td>
<td>10 (7)</td>
</tr>
<tr>
<td></td>
<td>Side dress – Compared to pre-plant application</td>
<td>7 (37)</td>
<td>0 (3)</td>
</tr>
<tr>
<td></td>
<td>Side dress – Soil test based compared to pre-plant</td>
<td>4 (20)</td>
<td>13 (22)</td>
</tr>
<tr>
<td><strong>Source</strong></td>
<td>Liquid swine manure compared to spring-applied fertilizer</td>
<td>4 (11)</td>
<td>0 (13)</td>
</tr>
<tr>
<td><strong>Nitrogen Application Rate</strong></td>
<td>Nitrogen rate at the MRTN (0.10 N:corn price ratio) compared to current estimated application rate.</td>
<td>10</td>
<td>-1</td>
</tr>
<tr>
<td><strong>Nitrogen Transformation Inhibitor</strong></td>
<td>Nitrapyrin in fall – Compared to fall-applied without Nitrapyrin</td>
<td>9 (19)</td>
<td>6 (22)</td>
</tr>
<tr>
<td><strong>Cover Crops</strong></td>
<td>Rye</td>
<td>31 (29)</td>
<td>-6 (7)</td>
</tr>
<tr>
<td></td>
<td>Oat</td>
<td>28 (2)</td>
<td>-5 (1)</td>
</tr>
<tr>
<td><strong>Living Mulches</strong></td>
<td>e.g. Kura clover – Nitrate-N reduction from one site</td>
<td>41 (16)</td>
<td>-9 (32)</td>
</tr>
</tbody>
</table>

### Phosphorus Practices

<table>
<thead>
<tr>
<th>Practice</th>
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<th>% P Load Reduction</th>
<th>% Corn Yield Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phosphorus Application</strong></td>
<td>Applying P based on crop removal – Assuming optimal STP level and P incorporation</td>
<td>0.6</td>
<td>0</td>
</tr>
<tr>
<td><strong>Source of Phosphorus</strong></td>
<td>Soil Test P – No P applied until STP drops to optimum</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td><strong>Phosphorus Management Practices</strong></td>
<td>Liquid swine, dairy, and poultry manure compared to commercial fertilizer – Runoff shortly after application</td>
<td>46 (45)</td>
<td>-1 (13)</td>
</tr>
<tr>
<td></td>
<td>Beef manure compared to commercial fertilizer – Runoff shortly after application</td>
<td>46 (96)</td>
<td></td>
</tr>
<tr>
<td><strong>Placement of Phosphorus</strong></td>
<td>Broadcast incorporated within 1 week compared to no incorporation, same tillage</td>
<td>36 (27)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>With seed or knife bands compared to surface application, no incorporation</td>
<td>24 (46)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Cover Crops</strong></td>
<td>Winter rye</td>
<td>29 (37)</td>
<td>-6 (7)</td>
</tr>
<tr>
<td><strong>Tillage</strong></td>
<td>Conservation till – chisel plowing compared to moldboard plowing</td>
<td>33 (49)</td>
<td>0 (6)</td>
</tr>
<tr>
<td></td>
<td>No till compared to chisel plowing</td>
<td>90 (17)</td>
<td>-8 (8)</td>
</tr>
</tbody>
</table>

### Land Use Change

<table>
<thead>
<tr>
<th>Practice</th>
<th>Comments</th>
<th>%</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perennial Vegetation</strong></td>
<td>Energy Crops</td>
<td>34 (34)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Land Retirement (CRP)</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td><strong>Erosion Control and Edge-of-Field Practices</strong></td>
<td>Terraces</td>
<td>77 (19)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Buffers</td>
<td>58 (32)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>Sedimentation basins or ponds</td>
<td>85</td>
</tr>
</tbody>
</table>
Iowa Water Quality Initiative
IOWA DEPARTMENT OF AGRICULTURE & LAND STEWARDSHIP

NUTRIENT MANAGEMENT

N WATCH
By: Growmark

Adapt-N
A tool for adaptive nitrogen management in corn
By: Cornell University

Maximum Return to Nitrogen (MRTN)

Iowa Certified Crop Advisers
Trusted Advice to Help You Grow

Photo: Hagie Mfg

THE CLIMATE CORPORATION

encirca™
COVER CROPS
WOODCHIP BIOREACTOR
SATURATED BUFFERS
BUFFERS/STRIPs

*Strategic placement of buffers can provide disproportional benefits.*
Iowa Water Quality Initiative
IOWA DEPARTMENT OF AGRICULTURE & LAND STEWARDSHIP

OVERVIEW

- Currently have the best information available to move forward on addressing nutrient issues, but continue to investigate and develop better understanding and tools to appropriately assess and mitigate impacts from food, fuel, and fiber production.
- Advance environmental stewardship while maintaining/increasing agricultural production and profitability.
- Pair best infield management with edge-of-field practices.
- Target and capture multiple benefits in delivery of conservation practices.
- Advance programming that provides information and resources to farmers and landowners to make informed decisions of management practices.
ADDITIONAL INFORMATION

www.nutrientstrategy.iastate.edu

www.CleanWaterIowa.org

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