Breathing Easier

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2007 Agronomic Solutions for Air and Atmosphere
Helping People
Help the Land

**Venture Goals**
- Clean Air
- An Adequate Energy Supply
- Working Farm and Ranch Lands
• What can we do for Air Quality?
Conservation
Cropping Practices
provide more than
Reduce Erosion and
Water Contamination!

No-Till
Nutrient Management
Cover Crops
Buffers
No-Till/Strip-Till Systems

Doubling the acres of No-Till Nationally would reduce fuel consumption by 434,000,000 gals.
Compare Tillage Systems

- **Mulch-Till**: These systems involve primary tillage of chisel plows or other non-inversion implements followed by one or more secondary tillage.

- **No-till/Strip-Till**: These systems consist of fertilizer and planting operations in narrow strips or slots that involve disturbance of less than one third of the inter row area.
Step 2: Crop Management Zone

These crops were identified as having the greatest harvested crop acreage in the crop management zone identified by your zip code using production data from the National Agricultural Statistics Service for 2004. They may not be the most common crops in your immediate neighborhood but are significant crops in the crop management zone indicated in red on the map.

Enter the number of acres you plant for each of these crops:

<table>
<thead>
<tr>
<th>Crops</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>1000</td>
</tr>
<tr>
<td>Oats</td>
<td></td>
</tr>
<tr>
<td>Sorghum</td>
<td></td>
</tr>
<tr>
<td>Soybeans</td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td></td>
</tr>
</tbody>
</table>

Last Modified: 02/23/2006
**Step 4: Fuel Cost**

If you want to checkout different fuel prices, enter a different price per gallon and click "RECALCULATE": $2.70

**Total Diesel Fuel Cost Estimate (in dollars per year) based on $2.70/gallon**

<table>
<thead>
<tr>
<th>Crop</th>
<th>Acres</th>
<th>Conventional Tillage</th>
<th>Mulch-Till</th>
<th>Ridge-Till</th>
<th>No-Till</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>1,000</td>
<td>$13,446</td>
<td>$11,097</td>
<td>$8,991</td>
<td>$7,479</td>
</tr>
<tr>
<td>Total Fuel Cost</td>
<td></td>
<td>$13,446</td>
<td>$11,097</td>
<td>$8,991</td>
<td>$7,479</td>
</tr>
<tr>
<td>Potential Cost Savings over Conventional Tillage</td>
<td></td>
<td>$2,349</td>
<td>$4,455</td>
<td>$5,967</td>
<td></td>
</tr>
</tbody>
</table>

**Total Farm Diesel Fuel Consumption Estimate (in gallons per year)**

<table>
<thead>
<tr>
<th>Crop</th>
<th>Acres</th>
<th>Conventional Tillage</th>
<th>Mulch-Till</th>
<th>Ridge-Till</th>
<th>No-Till</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>1,000</td>
<td>4,980</td>
<td>4,110</td>
<td>3,330</td>
<td>2,770</td>
</tr>
<tr>
<td>Total Fuel Use</td>
<td></td>
<td>4,980</td>
<td>4,110</td>
<td>3,330</td>
<td>2,770</td>
</tr>
<tr>
<td>Potential Fuel Savings over Conventional Tillage</td>
<td></td>
<td>870</td>
<td>1,650</td>
<td>2,210</td>
<td></td>
</tr>
<tr>
<td>Savings</td>
<td></td>
<td>17%</td>
<td>33%</td>
<td>44%</td>
<td></td>
</tr>
</tbody>
</table>

27% reduction

Last Modified: 02/23/2006
Wooster OH Carbon Study (0-2 inches)

**Continuous corn**

Martens et al.

**Wooster 1962-1998**

- **No-tillage**: NT 34.5% > PT
- 0.35 g C per year
Organic Carbon to Total Nitrogen Relationship
(Silty soil, 130 years)

Sharpsburg soil, Nebraska

Martens et al
Voluntary Reporting Carbon Management Tool
COMET-VR (Beta)

Step 1. Enter the State Information: Select the State where the parcel is located from the list of State Names.

State Selection:
Select a State: Indiana

Go to | Reset | State |

Location Information:
Parcel Information:
Soil Information:
Management History:
Voluntary Reporting  Carbon Management Tool COMET-VR

Carbon Storage Report

Report Year: 2007

<table>
<thead>
<tr>
<th>Parcel Description</th>
<th>Parcel Management History</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parcel Name: Parcel 1</td>
<td>Historic: upland non-irrigated (pre 1970's)</td>
</tr>
<tr>
<td>Parcel Size: 1 Acres</td>
<td>70's to 90's: dryland: corn-soybean-winter wheat; Intensive Tillage</td>
</tr>
<tr>
<td>Location: FOUNTAIN, Indiana</td>
<td>Current: dryland: corn-soybean; Reduced Tillage</td>
</tr>
<tr>
<td>Soil: Non-hydric Silt Loam</td>
<td>Report Period: dryland: corn-soybean; No Till Tillage</td>
</tr>
</tbody>
</table>

Predicted Change in Soil Carbon for the Parcel

Annual Change for 2007

<table>
<thead>
<tr>
<th></th>
<th>Change in Carbon</th>
<th>% Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Tons Carbon per year:</td>
<td>0.08</td>
<td>7.73</td>
</tr>
<tr>
<td>Total Tons CO2 Equivalent per year:</td>
<td>0.30</td>
<td>7.73</td>
</tr>
</tbody>
</table>

Values recorded in English units. One ton of carbon is equivalent to 3.664 tons of carbon dioxide.
Soil Quality is Good for the Air

- Each 1% of O.M. contains:
  - 10,000 lbs. of C
  - 1000 lbs. of N
  - 100 lbs. of P
  - 100 lbs. of S
The Potential Impact of No-Till Adoption on Air Quality Improvement is Huge!
Nitrogen Costs More Than Nitrogen Costs More Than
Doubled in the Past Two Seasons

What can we do about Nitrogen costs?...

...while offering solutions for the off-site risk potential?
Nitrogen Management
The Key is to Manage the Fate of Nitrogen

Nitrogen transformations

urea-N → hydrolysis → NH₄⁺ → nitrification → NO₃⁻ → leaching

organic-N → mineralization → NH₄⁺ → volatilization → NH₃ → denitrification → N₂, N₂O, NO

N₂, N₂O, NO

NH₃
**Step 4: Alternatives**

**Comparison of Nitrogen Fertilizer Management Systems**

The table below indicates your nitrogen fertilizer cost by crop under your current nitrogen management system and compares it with our projected cost under the most efficient and cost-effective nitrogen management alternative for the crop(s) you selected. Factors considered in the analysis include availability, cost and efficiency of nitrogen materials, timing of fertilizer application, fertilizer placement, and the use of a nitrogen loss inhibitor. *This tool does not provide field-specific recommendations.* It evaluates alternatives based on user input. Application rates for alternative practices will effectively supply the same level of N to the crop as the user’s current practice.

<table>
<thead>
<tr>
<th>Corn, Grain or Silage</th>
<th>Current</th>
<th>Alternative Practice(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Form Of Nitrogen:</strong></td>
<td>UAN</td>
<td>Anhydrous Ammonia</td>
</tr>
<tr>
<td><strong>Application Timing:</strong></td>
<td>Spring</td>
<td>Split Spring</td>
</tr>
<tr>
<td><strong>Fertilizer Placement:</strong></td>
<td>Surface Broadcast</td>
<td>Incorporate/Inject</td>
</tr>
<tr>
<td><strong>N-loss Enhanced Efficiency Product:</strong></td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td><strong>Fertilizer Cost ($/lb N):</strong></td>
<td>$0.44</td>
<td>$0.44</td>
</tr>
<tr>
<td><strong>Acres Planted:</strong></td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td><strong>Application Rate (lb N/acre):</strong></td>
<td>180</td>
<td>146</td>
</tr>
<tr>
<td><strong>Cost:</strong></td>
<td>$79,200</td>
<td>$64,114</td>
</tr>
<tr>
<td><strong>Savings:</strong></td>
<td>$15,086</td>
<td>$35,858</td>
</tr>
</tbody>
</table>

To see a more in-depth analysis of management alternatives for Corn, Grain or Silage, [click here](#).

* Numbers in parentheses represent an increase in cost compared with the current practice.
* The above calculations do not consider application methods or the cost of any enhanced efficiency product. For these products to be economically feasible, their cost must be offset by a reduction in fertilizer cost.

To return to the Programs in IN homepage, select any of the following: Cooperative Extension, NRCS, or University Extension Service.
Carbon and Nitrogen Cycles Can Be Managed On a Broad Scale

- General rule of thumb- 20# of N is mineralized from every 1% of organic matter.
- To get this mineralization a relative amount of CO2 must be released.
- Mineralization happens later in the season in No-Till.
Annual Ryegrass Cover Crop

Mike Plumer- U of I plots

• 84# N from top growth
Farmers will need to reinvest $$ in New Conservation Systems
Technical Assistance is Key to Management Changes

Capture the potential!