The Surplus in Soil Health
“Show Me The Money”

September 4, 2013
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Agricultural Economist

USDA - Natural Resources Conservation Service
“Essentially, all life depends upon the soil.”

-Charles E. Kellogg
USDA Soil Scientist
Improving Soil Health

Systems Approach
Improving Soil Health

- Year round cover
- Less Tillage
- Conventional to minimum tillage better to strip-till better to no-till best
Cost of Tillage Operations/Acre

- Chisel Plow: $15/A
- Chisel Disk: $16/A
- Disk Tandem: $14/A
- Field Cultivate: $13/A
- Plow: $16/A
- Soil Finishing Tools: $14/A
- Subsoil: $19/A

2013 Iowa Farm Custom Rate Survey
William Edwards, ISU Extension Economist
Other Costs

- Planter: $16/A
- No-till Planter: $18/A
- Cover Crop: $45/A

*(seed, establish & terminate)*
Value of Soil Organic Matter

Assumptions: 2,000,000 pounds soil in top 6 inches
1% organic matter = 20,000#

Nutrients:
- Nitrogen: 1000# * $0.58/#N = $580
- Phosphorous: 100# * $0.48/#P = $48
- Potassium: 100# * $0.50/#K = $50
- Sulfur: 100# * $0.50/#S = $50
- Carbon: 10,000# or 5 ton * $2/Ton = $10

Value of 1% SOM Nutrients/Acre

= $738

## 2005 Illinois demonstration results

<table>
<thead>
<tr>
<th>Tillage/cover crop</th>
<th>Yield bu./A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional tillage</td>
<td>82</td>
</tr>
<tr>
<td>No cover crop no-till</td>
<td>124</td>
</tr>
<tr>
<td>Ryegrass 1 year no-till</td>
<td>137</td>
</tr>
<tr>
<td>Ryegrass 6 years –claypan</td>
<td>165</td>
</tr>
<tr>
<td>Ryegrass 6 years no claypan</td>
<td>215</td>
</tr>
</tbody>
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Rain fall …. May- Sept. 2.3”
Productivity of Soil Organic Matter

- Michigan study: Every 1% SOM = 12% increase in crop yields.
- Baseline Yields: 150 bu corn, 50 bu soybeans
- Starting SOM = 3% and add 1% SOM
- Soybeans 50 bu * 12% = 6 bu * $14 = $84/A.
- .1 to .15% SOM increase/year = $8.40-$12.60/yr.
- Corn 150 bu * 12% = 18 bu * $5 = $90/A
- .1 to .15% SOM increase/year = $9-$13.50/yr.
Water Storage Value

- Every 1% SOM hold 1 acre-inch of water
- Value of an acre-inch of water = $12
- Value of 6% SOM vs 2% SOM =
- 4 acre-inches of water * $12/acre-inch = $48
- .1% SOM addition per year =

- .1 acre-inch * $12/acre-inch = $1.2 per year
Example Cropping System

Current system
Corn-soybean rotation, conventional tillage
150 bushel corn & 50 bushel soybeans

Proposed system
Corn-soybean rotation, no-till with cover crop
### T-Chart

<table>
<thead>
<tr>
<th>Name: Farmer Brown</th>
<th>Resource Concerns/Benchmark Condition:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date: 2013</td>
<td></td>
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**Conservation Treatment:**
Residue Management (Direct Seed/No-Till); Cover Crop; Pest Management; Nutrient Management
Increase organic matter from 3% to 4%

<table>
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<tr>
<th>Positive Effects</th>
<th>Negative Effects</th>
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**Reduced Costs**
- Eliminate planter = $16/ac/yr.
- Reduce five tillage passes over the field
  - $10/pass * 5 passes / 2 yrs. = $25/ac/yr.
- Fertilizer value from 1% O.M.
  - (N only) = $17.40/ac/yr.

**Increased Revenue**
- Corn & Soybean yield increase from 1% O.M.
  - $84+$90 / 2 yrs. * .5 = $43.50/ac/yr.

**Other**
- Improved soil and water quality

Total Dollar Benefits = $102/ac/yr.
Net Benefits = $21/ac/yr.

**Increased Costs**
- No-till planter = $18/ac/yr.
- Cover crop = $45/ac/yr
- Pest management = $16/ac/yr.
- Nutrient/fertilizer management = $2/ac/yr.

**Reduced Revenue**
- Corn yield decrease eliminated with cover crop

Total Dollar Costs = $81.00/ac/yr. plus
Questions

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