Economic Impacts Of Cover Crops On New York Farms

Presented by Cedric W. Mason, Ph.D

cwm77@cornell.edu

Research Support Specialist, Cornell University

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Benefits of Healthy Soil

- Supports food production
- Protects water resources
- Mitigates climate change
Benefits of Healthy Soil

Healthy soil supports food production

✓ Organic matter holds and supplies water and nutrients
✓ Intact soil biome improves nutrient availability and protects against crop diseases
✓ Pore space conducive to rooting and drainage
Benefits of Healthy Soil

Healthy soil protects water resources

✓ Increased infiltration and water holding capacity reduces nutrient and chemical transport to surface water and aquifers

✓ Lower irrigation requirements

✓ Less erosion and sedimentation in waterways
Benefits of Healthy Soil

Healthy soil mitigates climate change

✓ Carbon is stored in the soil and not the atmosphere

✓ Less need for fertilizer, pesticides and their associated energy use
Comprehensive Assessment of Soil Health (CASH)

- Aggregate stability
- Surface hardness
- Soil pH
- Extractable K
- Soil respiration
- Active carbon

Soil Health

Physical

Chemical

Biological
Detriments to Soil Health in New York

✓ Compaction
✓ Erosion & runoff
✓ Loss of organic matter & biota
Practices that enhance soil health also provide other benefits

✓ Reduced tillage
✓ Cover crops
✓ Compost, manure, biochar
Practices that enhance soil health also provide other benefits

✓ Cover crops hold soil in place, break-up compaction, add organic matter, fix nitrogen, suppress weeds

✓ Cover crops provide pollinator habitat, livestock forage & co-products
• Cover crops are one of the best tools for improving soil
• Only used on 10% of NYS cropland in 2012
• Not enough time after corn grain and soybean harvest
• Interseeding can overcome barriers to adoption
NEW YORK SOIL HEALTH

- Quantifying economic and environmental benefits
- Strengthening partnerships and outreach
- Soil Health Roadmap and Summit
- Innovative cropping systems research
- Evaluation of composts and biochar amendments
- Soil health and natural climate solutions
On-farm Economic Benefits

Partial Budget Analysis

Expense
- Less fertilizer & pesticides
  + effect

Income
- Greater yields
  - effect

- Cover crop seed
- Special Equipment
- Less land in cash crops
On-farm Economic Benefits

**FIGURE 2.** 2012-16 Overall Budget Impact of Cover Crops, Diaz Farm, $/acre

<table>
<thead>
<tr>
<th>Year</th>
<th>Positive impact</th>
<th>Negative impact</th>
<th>Net impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>$(100.00)</td>
<td>$(83.23)</td>
<td>-$83.23</td>
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<tr>
<td>2013</td>
<td>$(50.00)</td>
<td>$(60.00)</td>
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<tr>
<td>2014</td>
<td>$50.00</td>
<td>$30.04</td>
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<tr>
<td>2015</td>
<td>$150.00</td>
<td>$(49.91)</td>
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<tr>
<td>2016</td>
<td>$150.00</td>
<td>$(40.00)</td>
<td>$(59.00)</td>
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</tbody>
</table>

Source: Datu Research, LLC; Diaz Farm Case Study, 2017.
Survey of Soil Health Practices in New York State

✓ Specific farm level partial budget components
✓ Provides “big picture”; numerous farms
✓ Encompasses all crops, systems, farm sizes
✓ Captures various levels of farmer experience
✓ Includes the effect of rare weather challenges
Survey of Soil Health Practices in New York State

Objectives:

1. Prioritize specific farm costs and benefits
2. Determine delay period for benefits
3. Resilience to extreme weather events
The Survey

✓ Dec. 20th to March 24th, 2018
✓ Paper and online via newsletters, list-serves, meetings & conferences
✓ Examined farm costs and benefits of
  - Reduced tillage
  - Cover cropping
  - Soil amendments
✓ Chi-squared test to evaluate associations
Number of survey responses (n=182)

182 respondents
46 counties in NY
172,215 acres of cropland
Crop Production Constraints in New York

1) Poor drainage
2) Compaction
3) Erosion
4) Poor weed control
5) Insufficient labor
6) Crop disease
7) Low soil fertility
8) Insect pests
9) Inadequate water retention
10) Flooding
Prioritizing specific farm costs and benefits

Cover Crops
Cover Crops
Total number in each crop type

Crop type
- Corn, Soy: for feed
- Vegetables
- Grains, oil seeds, dry beans
- Alfalfa, pasture, hay
- Tree fruit, grapes
- Berries
- Other
- Other forage

Count
Prevalent Costs & decreases in revenue of Cover Crops

1) Cover crop seed costs (89.9%)
2) Cover crop termination costs (51.0%)
3) Planting or rolling equipment (45.0%)

Additional components: Additional research, scouting, or labor (18.8%), Greater nitrogen requirements (12.8%), An outside party is hired to plant and manage my cover crops (6.7%), Lower yields of cash crops (3.4%), Other (4.1%).
Prevalent **Benefits** of Cover Crops

1) Less erosion or sedimentation repair (83.9%)

2) Greater yields of cash crops (50.3%)

3) Lower fertilizer inputs (47.0%)

Additional components: Source of animal forage (32.2%), Lower herbicide inputs (28.9%), Less labor, fuel, or equipment (19.5%), Access to cost share programs or incentives (15.4%), Easier or faster harvest (15.4%), Avoided drainage investments (13.4%), Less irrigation (11.4%), Less insecticide inputs (9.4%), Other (2.7%).
Cover Crops
Greater cash crop yields

Crop group
- All crops
- Corn & Soy
- Vegetables

Corn & Soy vs. Veg p-value = 0.0076
Cover Crops
Decreased fertilizer inputs

Crop group:
- All crops
- Corn & Soy
- Vegetables

Corn & Soy vs. Veg p-value = 0.11
Cover Crops
Used as source of animal forage

Corn & Soy vs. Veg p-value = 0.03
Profitability of Cover Crops

Response
- Green: Increases profitability
- Yellow: Neutral impact on profitability
- Red: Decreases profitability
- Gray: Other impact on profitability
Delay Period for Benefits

Cover Crops
Cover Crops
Greater yields of cash crops

Chi-square p-value = 0.032

% of group

Experience
1-5 yrs
5-10 yrs
10-20 yrs
20+ yrs

1-5 yrs
5-10 yrs
10-20 yrs
20+ yrs
Cover Crops
Lower yields of cash crops

Chi-square p-value = 0.061
Cover Crops
Less erosion or sedimentation repair

Chi-square p-value = 0.63

Experience
1-5 yrs
5-10 yrs
10-20 yrs
20+ yrs

% of group
Resilience to Extreme Weather Events
Weather Resilience

Flooding prevention
Drought resilience
Less erosion

Practice
- Cover crops
- Reduced tillage
- Amendments

% of practitioners
The New York State Soil Health Initiative

newyorksoilhealth.org

- PIs: David Wolfe; Matt Ryan; Harold van Es.
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- Other collaboration: USDA-NRCS; NYS Ag&Mkts; SWCDs, CCE; growers; others.
Questions?

Contact: cwm77@cornell.edu