Our Cropping System:

PRODUCTIVE & SUSTAINABLE

- 4th Generation family farm
- North Central Indiana
- 100% No-Till since 1989
- 90% CB Rotation, 10% CAC
- 15 years cover crops
- Liquid Hog manure 320 a/yr (No-Till)
- 1 acre grid management w/ full VRT
- Conservation is the best economic model
- We are accountable for what leaves our farm

We are a Legacy Farm
SUSTAINABLE REQUIRES
CARBON CAPTURE TECHNOLOGY
Healthy Soil is a System

- No-Till (infiltration/OM/cover/biology)
- Cover Crops (rooting/temp/OM/feed biology)
- Soil Carbon/Soil Health
- Drainage (Managing Air/Water)
- VRT N, P, K, Seed etc.
- VRT Lime/Gypsum/amendments/Manure
- Variety Selection (Plant health and Yield)
- Balance
- Compaction/Controlled traffic
What healthy soil returns to us:

- Increased Yield
- Increased Biology (Big and Small)
- Nutrient Efficiency and Cycling
- Drought Tolerance/decreased soil temp/evaporation
- Increased water infiltration/water holding
- Improved Plant Health (reduced disease and insects)
- Improved Structure=Improved Trafficability (Timing)
- Improved Economics/Agronomics
What we do to manage soil Quality:

- Continuous No-Till – not rotational
  - Eliminate catastrophic tillage events
  - Allow soil to build structure and biology
What we do to manage soil quality:

- Drainage – Foundational to No-till and soil quality
What we do to manage soil Quality:

- 1 Acre grid Fertility
- Hi-Cal Lime/Gypsum
- Balanced Soil is More Stable
What we do to manage soil Quality:

- Low Disturbance N-Applicator/Manure
What we do to manage soil Quality:

- Cover Crops
- Manage for long term soil health-FAST
Cover Crops on Our Farm

- Remove compaction without tillage (Soil repair)
- Transition from tillage to no-till
- Rotational Advantage
- Take no-till and soil quality/Biology to the next level
- Trap nitrogen from manure/carryover/soybeans
- Erosion Control
- Break disease cycle in CAC
- Cycle expensive nutrients
- Build Organic Matter/Structure
- Economics/Agronomics
- Grandpa used cover crops and he was pretty smart
What do you want from a cover crop?

- Choose the right cover for your goal
  - Compaction removal
  - Ease of management
  - Disease control
  - Nutrient cycling
  - Erosion control
  - Enhance Rotations
Cover Crop Choices on Our Farm

- Cereal (winter) Rye, Annual Rye Grass
- Oats, Radish, Clover, Rape, Barley
- Austrian Winter Peas, Vetch, Mixes of all the above

For others see the SARE cover-crop handbook
www.sare.org/publications/covercrops/covercrops.pdf
Fall 2017 Mixes

CORN 18
25# Oats
2# Radish
3# Rape
5# Crimson Clover
15# Cereal Rye

SOYBEAN 18
25# Oats
2# Radish
3# Rape

35# Cereal Rye
## Rulon Enterprises Fall 2017 Cover Crop Plan

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<tr>
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<th>Ingredients</th>
<th>#/Acre</th>
<th>$/Lb</th>
<th>$/Acre</th>
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<th>$/lb</th>
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Total Seed Cost = $75,407

Cost Per Acre Planted = $14.50

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Cost Per Acre Planted = $14.50

Acres

18
### Planting Dates (Central Indiana) With Soil Contact

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<tr>
<th>Date</th>
<th>Cover Crop Choice</th>
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<td>Summer (Aug 10)</td>
<td>Lots of Choices</td>
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<tr>
<td>September 15</td>
<td>Austrian Peas</td>
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<td>October 1</td>
<td>Oats/Radish/Clover</td>
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<tr>
<td>October 21</td>
<td>Annual Rye Grass/Rape</td>
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<tr>
<td>November 10</td>
<td>Cereal Rye</td>
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**CORN and SOYBEAN MATURITIES MATTER**

Check out Midwest Cover Crop Council
Cover Crop Selection Tool
http://www.mccc.msu.edu(selectorINTRO.html)
Planting Methods

- Aerial/Surface
- Air Cart/harrow/VT
- No-Till Drill
- Precision Planter

CONSIDER:

- Seed size (Hopper size)
- Planting date (Timing)
- Moisture required to germinate
- Fall growth needs
- Seeding rates and cost
- Mixes
- Coatings
- Inoculants
Planting Methods

- Precision Planter
- CONSIDER:
  - Seed size (Plate selection)
  - Planting date
  - Moisture required to germinated
  - Fall growth needs
  - Seeding rates and cost
  - In row spacing
  - Mixes
  - Inoculants/coatings
Planting Methods

- No-Till Drill/VT
- CONSIDER:
  - Seed size (rate/depth)
  - Planting date
  - Moisture required to germinate
  - Fall growth needs
  - Seeding rates and cost
  - In Row Spacing
  - Inoculants
  - Coatings
  - Mixes
Planting Methods

- Aerial Seeding/Surface APP
- CONSIDER:
  - Seed size (expense/suitability)
  - Planting date (crop stage)
  - Moisture required to germinate
  - Fall growth needs
  - Seeding rates and cost
  - Mixes
  - Inoculants
  - Coatings
Planting Methods
Surface Application Vs. In Soil
Mixes

- Root types
- Growth rate
- Planting date/Method
- Feeder/Scavenger/Storage
- Legume/Grass/Brassica
- Build OM
- Boost cash crop
- Save on inputs
- Improve winter survival
- Termination method/timing
Other things to worry about

- Quality Seed Source/Supply
- Bulk blending/delivery
- Spring germination of fall seeding
- Aerial misapplication
- Seeding rates
- Chemical Programs
  - Residuals from cash crop
  - Termination of cover crop
- Test Strips
- Tile lines (Roots?)
- Voles
What do roots look like in our tiles?

COOL

GOOD

NOT GOOD
**Crop Type**
- Annual Ryegrass: (18#)
- Cereal Ryegrass: (35#)
- Oats/Radish Mix: (32# & 2.5#)

Considerably less vole holes in the Oats/Radish mix strips.
INCREASE SOIL CARBON CONTENT: AVG = .5%

Organic Matter 2002 vs. 2012 = + 1.1%

2.47 (1.4 to 4.0)

3.58 (1.8 to 6.1)


2017 CCSI Plot Harvest Data

Final Yield Average:
- Oats/Radish = 219.32 bu/ac
- Cereal Rye = 205.03 bu/ac
- Annual Rye = 204.25 bu/ac
- No Cover = 209.06 bu/ac

Cover Crop Yield + 10.26 bu/ac
(Oats/Radish Vs No Cover)
Final Yield Average:
- Oats/Radish = 177.1 bu/ac
- Cereal Rye = 176.8 bu/ac
- Annual Rye = 166.9 bu/ac
- No Cover = 164.3 bu/ac

Cover Crop Yield + 12.8 bu/ac
More Data! (2013)

### Cover Crop vs N Rate Study 2013

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<thead>
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<th>Nitrogen Rate</th>
<th>Cover</th>
<th>Rep1</th>
<th>Rep2</th>
<th>Avg</th>
<th>Rank</th>
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<td>153</td>
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<td>No Cover</td>
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<td>150.4</td>
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<td>203.7</td>
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<td>183.4</td>
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<td>178.8</td>
<td>179.8</td>
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<td>180.6</td>
<td>176.6</td>
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<td></td>
<td>No Cover</td>
<td>173.3</td>
<td>173.7</td>
<td>173.5</td>
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<td>190.45</td>
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<td></td>
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<td>168.5</td>
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<thead>
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<th>Actual N Applied</th>
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<td>30# N on planter</td>
<td>55 + 80 = 135#</td>
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<td>50# Bean Credit</td>
<td>95 + 80 = 175#</td>
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<td>115 + 80 = 195#</td>
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<td>135 + 80 = 215#</td>
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<td>175 + 80 = 255#</td>
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**Final Yield**
- Corn/Oats+Radish = 190.5
- Corn/Rye = 187.6
- Corn/No Cover = 183.4

Cover Crop Yield + 7.1 bu/ac
### 2012, 2014, 2016 CCSI Plot Soybean Harvest Data Summary

#### Cover Crop vs N Rate Study - Bean Average Yields

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<th>Year</th>
<th>Cover</th>
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<th>Rep2</th>
<th>Avg</th>
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<tr>
<td></td>
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<td>-</td>
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<td></td>
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<td>56</td>
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*Rep #1 in 2012 was harvested by 2 different combines and data was too inaccurate to summarize.

**Cover Crop Yield + Up To 7.9 bu/ac Over No Cover in Long term test**

- **2012 Annual Rye** = +5.3 bu/ac
- **2014 Oats/Radish** = +2.95 bu/ac
- **2016 Oats/Radish** = +7.9 bu/ac
- **Three Year Avg** = +5.4 bu/ac
Less temp change = less stress

Dr. Eileen Kladivko
Agronomy Department
**WHAT ARE THE ECONOMIC BENEFITS OF COVER CROPS?**

**BECK’S Soybean After Cover Crop Study - 2014**

- **PLANTED:** April 24, 2014
- **HARVESTED:** September 30, 2014
- **POPULATION:** 130,000 seeds/A
- **ROWS:** Four 30’ Rows
- **REPLICATIONS:** Three (averaged)
- **PREVIOUS CROP:** Various Cover Crops/Corn
- **TILLAGE:** No-Till
- **Tillage Herbicide:** Burndown: 1 qt. Roundup PowerMAX®
- **Herdicide:** 4 oz. Authority®-XL, 1 qt. Roundup PowerMAX
- **INSECTICIDE:** 1 ct. Roundup PowerMAX Escalate®

**PURPOSE:**
Many farmers have been experimenting with cover crops to determine their ability to scavenge nitrogen, improve soil tilth and reduce compaction. The goal of this study is to evaluate how the use of cover crops before a soybean rotation affects yield and returns of that crop. Two cover crops (Beck’s Cereal Rye and Beck’s Bean Builder Mix) were planted in the fall preceding the soybean crop. The Beck’s Been Builder Mix was burned down before planting, and Beck’s Cereal Rye was burned down after planting. Both cover crops were seeded on September 24, 2013.

<table>
<thead>
<tr>
<th>Brand &amp; Treatment</th>
<th>Percent Moisture</th>
<th>Bushels¹ Per Acre</th>
<th>Bu./A Difference</th>
<th>Net* Return</th>
<th>Return on Investment</th>
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<td>Control</td>
<td>11.3</td>
<td>57.5</td>
<td>+6.3</td>
<td>$744.00</td>
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<tr>
<td>40 lb. Beck’s Cereal Rye</td>
<td>11.5</td>
<td>63.0</td>
<td>+6.5</td>
<td>$766.20</td>
<td>-$40.32</td>
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<tr>
<td>24 lb. Beck’s Bean Builder Mix</td>
<td>11.6</td>
<td>54.9</td>
<td>-2.6</td>
<td>$577.08</td>
<td>-$66.33</td>
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<tr>
<td><strong>BECK 328R2</strong></td>
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<tr>
<td>Control</td>
<td>10.9</td>
<td>57.9</td>
<td>-1.5</td>
<td>$675.96</td>
<td>-$14.10</td>
</tr>
<tr>
<td>40 lb. Beck’s Cereal Rye</td>
<td>10.8</td>
<td>67.6</td>
<td>+9.7</td>
<td>$866.48</td>
<td>+$88.24</td>
</tr>
<tr>
<td>24 lb. Beck’s Bean Builder Mix</td>
<td>10.8</td>
<td>60.7</td>
<td>+2.6</td>
<td>$842.64</td>
<td>-$5.84</td>
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<tr>
<td><strong>BECK 358R4</strong></td>
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<tr>
<td>Control</td>
<td>11.3</td>
<td>63.8</td>
<td>---</td>
<td>$714.56</td>
<td>-$51.04</td>
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<tr>
<td>40 lb. Beck’s Cereal Rye</td>
<td>11.2</td>
<td>67.5</td>
<td>+3.7</td>
<td>$735.60</td>
<td>+$21.04</td>
</tr>
<tr>
<td>24 lb. Beck’s Bean Builder Mix</td>
<td>10.8</td>
<td>57.5</td>
<td>-3.3</td>
<td>$606.60</td>
<td>-$107.75</td>
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<td><strong>COVER CROP SUMMARY</strong></td>
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<tr>
<td>Control</td>
<td>11.2</td>
<td>62.9</td>
<td>---</td>
<td>$670.93</td>
<td>+$21.04</td>
</tr>
<tr>
<td>40 lb. Beck’s Cereal Rye</td>
<td>11.2</td>
<td>66.0</td>
<td>+6.3</td>
<td>$733.70</td>
<td>+$64.56</td>
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<tr>
<td>24 lb. Beck’s Bean Builder Mix</td>
<td>11.1</td>
<td>57.7</td>
<td>-2.0</td>
<td>$608.52</td>
<td>-$60.22</td>
</tr>
<tr>
<td><strong>AVERAGE</strong></td>
<td>11.2</td>
<td>61.1</td>
<td>+2.2</td>
<td>$670.59</td>
<td>+$2.17</td>
</tr>
</tbody>
</table>

¹Bu./A: increased by 1% moisture. Net return is gross income (Bu./A x $11.30/Bu.) minus treatment cost. ²Return on investment is Bu./A difference x $11.20/Bu. minus treatment cost and applic. cost, if applicable. $0.36/lb. Beck’s Cereal Rye, $1.30/lb. Beck’s Bean Builder Mix and $.00/A, application cost.

**SUMMARY:**
The use of Beck’s Cereal Rye resulted in yield increases across all varieties, with a 6.3 Bu./A, average advantage over the control. The Beck’s Bean Builder Mix, on the other hand, was less successful. A positive yield response was only recorded in one variety and a 2 Bu./A yield loss was realized overall. Return on investment was affected similarly. Beck’s Cereal Rye provided a $64.56/A, average return, while the use of the Beck’s Bean Builder Mix resulted in a $60.22/A loss. It will be interesting to see how the two crops work to reduce soil compaction, improve tilth and control erosion over time. Looses may be recouped in the future if overall soil health is improved to promote yield increases in later growing seasons.

Visit [www.beckshybrids.com/pfrvideos](http://www.beckshybrids.com/pfrvideos) to view more information about Beck’s new Flo-Rite Seed Fillers.
In Conclusion…

- There are many potential benefits to cover crops
- Match the cover crop to your goals
- It’s not cheap or easy and may not show immediate returns
- No-Till is not easy, Cover crops may be able to help with some of the challenges
- Soil Quality Should Be the GOAL
There are many potential benefits to cover crops. Match the cover crop to your goals. It's not cheap or easy and may not show immediate returns. No-Till is not easy, Cover crops may be able to help with some of the challenges.
There are many potential benefits to cover crops. Match the cover crop to your goals. It's not cheap or easy and may not show immediate returns. No-Till is not easy, Cover crops may be able to help with some of the challenges.