

# ***Cover Crop Economics for a Mid- Sized Crop & Livestock Operation***

J. Alan Weber  
December 8, 2017





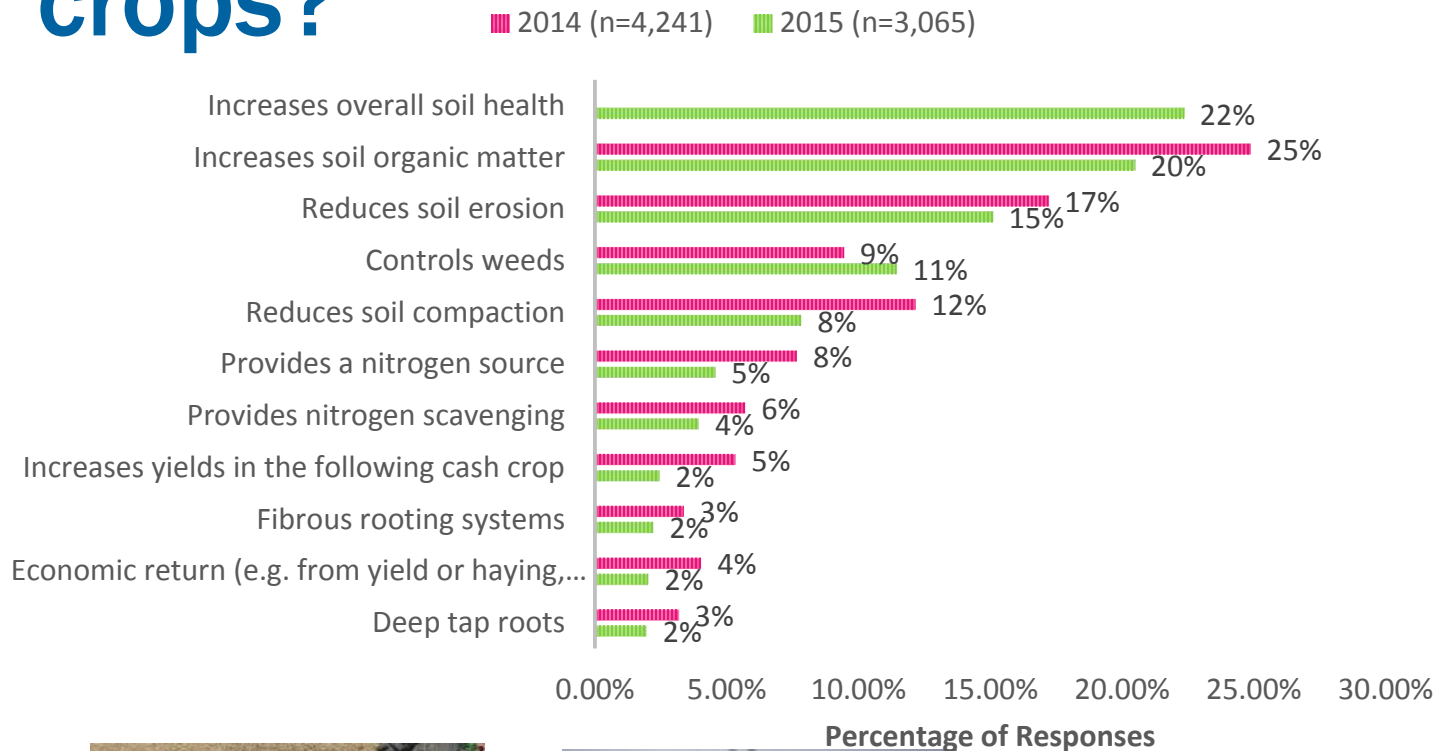
- **Our Story**

- **Balancing Economic Expectations**

- **Playing the Long Game**

# **Our Story—Farming in the Laplands**

# Why are producers interested in cover crops?



Weed Control



Compaction



Nutrients




Disease Suppression



Erosion



- 
- **Our Primary Goal of Cover Crop Use**
    - Increase Water Holding Capacity of Soils
  - **Secondary Goals**
    - Forage Availability
    - Increase Water Infiltration
    - Reduce Soil Erosion
    - Reduce Weed & Pest Pressure
  - **Also Important**
    - Nutrient Management

# Cover Crop Choices (and mixes)



Red Clover



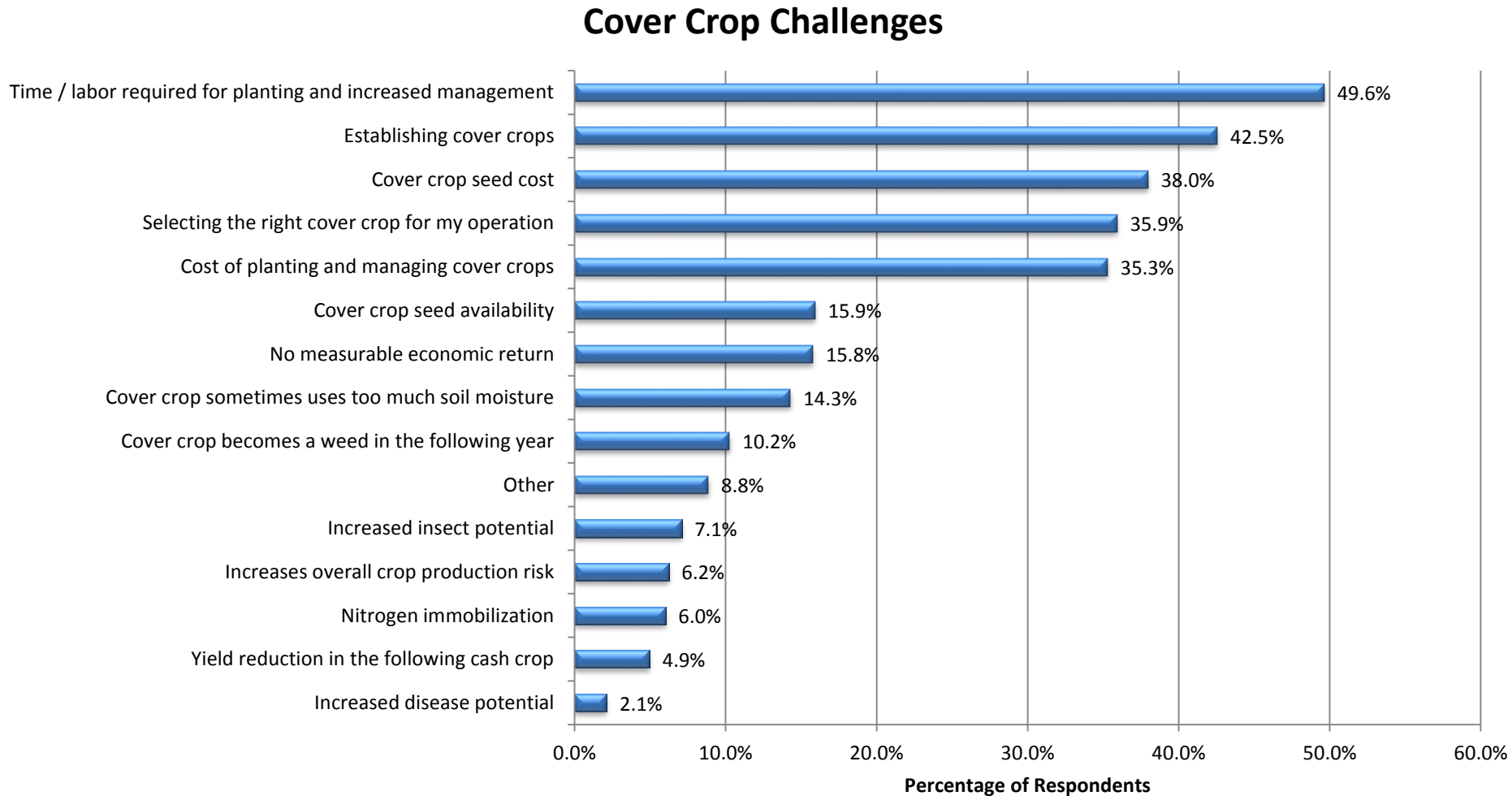
Cereal Rye



Winter Canola



# Biggest Cover Crop Challenges



# Cereal Rye After Corn





# Seeding Options *(that we've tried)*



# Cereal Rye After Corn



Fall Growth



Spring Grazing Prior to Termination



# Winter Canola After Corn



Oct



Dec 7<sup>th</sup>



Dec 21<sup>st</sup>



# No-till Beans After Cover Crop





# No-till Beans After Cover Crop



# Corn/Soybean Baseline

- Utilized 2016 Crop Inputs
  - Yield
  - Price
  - Input Prices
- Labor, machinery repair, fuel & lube derived from 3<sup>rd</sup> party estimates

Corn Cost-Return Budget			
<b>Estimated Returns/Acre</b>			
Estimated Yield/Acre (bu)	174		52
Price (per bu)	\$3.190		\$9.490
Freight (to processor/delivery point)	\$0.100		\$0.100
Net Price (per pound)	\$3.090		\$9.390
<b>Estimated Total Returns/Acre</b>	<b>\$537.66</b>		<b>\$488.28</b>
<b>Estimated Operating Costs/Acre</b>			
Seed	\$86.25		\$47.85
Fertilizer			
N	\$52.50		\$0.00
P	\$28.70		\$22.55
K	\$26.60		\$20.90
S	\$8.60		\$0.00
Crop Chemicals/Fungicide/Insecticide	\$35.00		\$51.00
Machinery Fuel & Oil	\$14.39		\$17.66
Machinery Repair	\$17.08		\$13.97
Custom Hire and Services	\$18.50		\$5.75
Operator and Hired Labor	\$16.22		\$13.78
Crop Insurance	\$0.00		
Misc.	\$5.00		\$5.00
Operating Interest (7% for 60 months)	\$10.81		\$6.95
<b>Total Operating Costs/Acre</b>	<b>\$319.64</b>		<b>\$205.40</b>
<b>Estimated Ownership Cost/Acre</b>			
Machinery Depreciation, Ins., Taxes, & Int	\$53.91		\$44.74
Real Estate Taxes, Depreciation, and Interest (mort)	\$125.00		\$125.00
<b>Total Ownership Costs/Acre</b>	<b>\$178.91</b>		<b>\$169.74</b>
<b>Estimated Total Costs/Acre</b>	<b>\$498.55</b>		<b>\$375.14</b>
<b>Estimated Production Costs/Acre Excluding Land Charges</b>	<b>\$373.55</b>		<b>\$250.14</b>
<b>Net Return Over Operating and Ownership Costs</b>	<b>\$39.11</b>		<b>\$113.14</b>



# Annual Considerations for Cover Crop Use—Cash Flow Impact

## Cash Flow Impacts of Integrating a Cover Crop Post-Corn Harvest

### Additional Inputs

Operation	Cost	Optional Cost	Notes
Vertical Tillage (post-corn harvest)	\$0.00		Conducted with or without covers
Seeding Cover Crop	\$5.25		Labor, fuel, machine depreciation
Cost of Cereal Rye	\$11.25		45 lbs/ac
Cost of adding HEAR		\$3.60	4 lbs/ac
Winter Canola (vs. cereal rye)		\$15.00	10 lbs/ac
Termination of Cover Crop	\$0.00		Conducted with or without covers
Additional Herbicide		\$7.00	2,4-D if clover utilized
<b>TOTAL ADDITIONAL INPUT COST</b>	<b>\$16.50</b>		

# Average Producer Costs

	Cost per acre
Seed	\$20-30
Planting the seed	\$10-12
Terminating the cover crop	\$0-10
Total	\$30-50

Average cost for seed and  
seeding the cover crop: \$37/acre,  
based on SARE/CTIC/ASTA  
cover crop survey data.

# Additional Returns from Grazing



Grazing Canola in December

- **Winter Canola**
  - 20 to 25% crude protein
  - Wait for hard freeze
  - Ensure roughage available (access to fescue hay mix)
- **Cereal Rye**
  - Withstands fall grazing
  - Primary grazing in Spring
  - Concern with cattle compaction



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**TOTAL ADDITIONAL INPUT COST** \$15.60

### Additional Annual Benefit

Grazing Benefit	\$15.75	150 lbs biomass/inch @ 7" valued at \$12 per AUM hay use (22 to 25% reduction)
<b>TOTAL ADDITIONAL BENEFIT</b>	<b>\$15.75</b>	

Note: No cost savings noted for herbicide/fertilizer & no yield benefit adjustments noted

# **Balancing Short and Long Term Economic Expectations**



# Weed Management





# Herbicide Resistance





# Can You Identify?





# Decreased Soil Erosion

- Use of cover crops to reduce soil erosion will
  - Maintain yield potential
  - Decrease loss of nutrients
- What is the most credible way to monetize this benefit?





# Benefits Build Over Time

## Long-term Benefits Accruing with Cover Crop Use

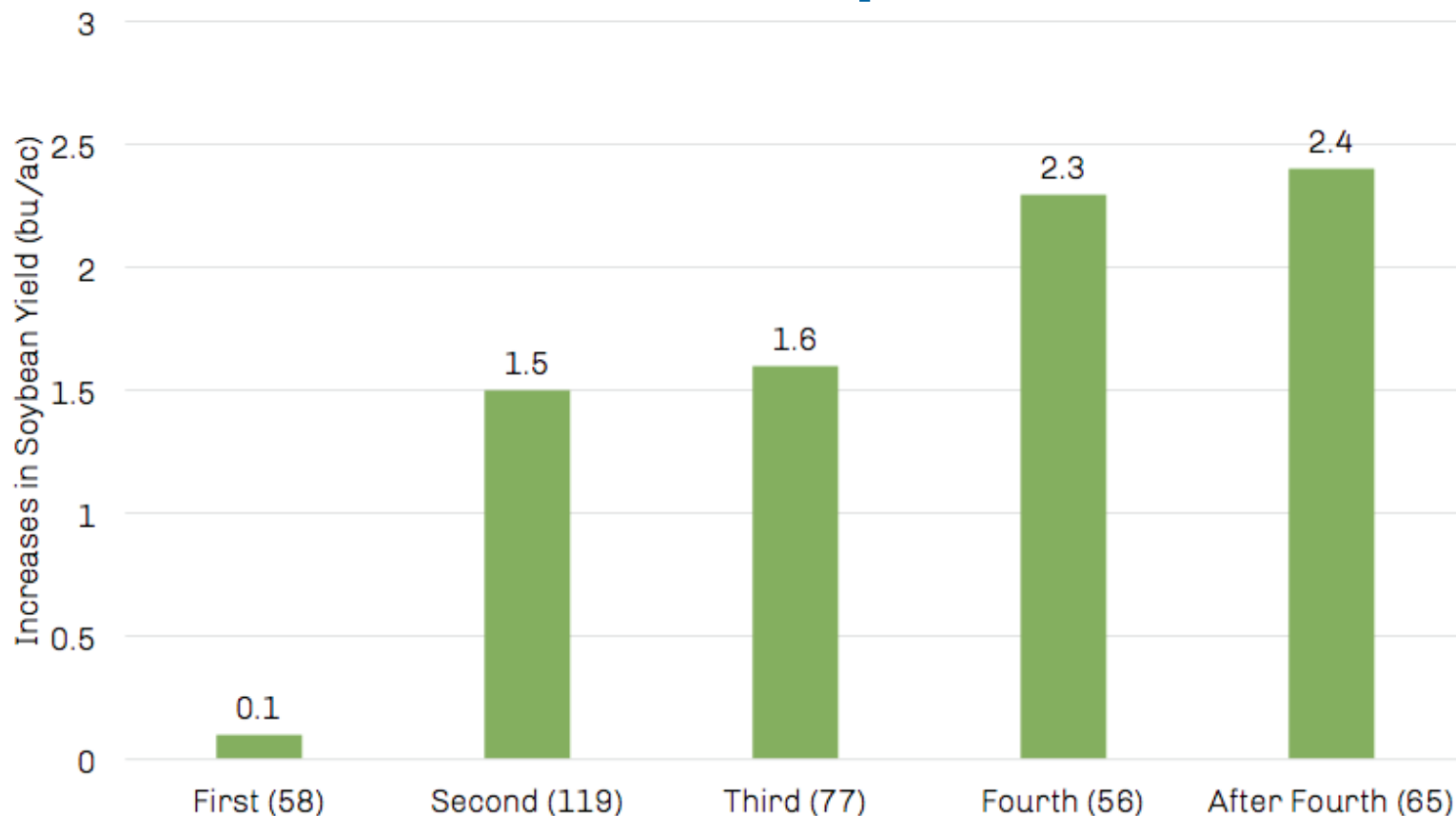
Increased Soil Organic Matter (Nutrient Value)	+
Increased Soil Organic Matter (Water Holding Capacity)	+
Decreased loss of topsoil due to erosion	+
Decreased soil compaction	+
Recycling of nutrients	+
Reduced weed pressure	+
Reduced disease pressure	+
Increased water infiltration	+
Resilience during stress	+
Soil temperature buffer	+

# NACD/Datu Research, LLC

- During the three-year study period, corn-soybean farmers experimented with cover crops and/or no-till, and quantified the year-by-year changes in income they attributed to these practices compared to a pre-adoption baseline. They found that while planting costs increased by up to \$38 per acre:
  - Fertilizer costs decreased by up to \$50 per acre
  - Erosion repair costs decreased by up to \$16 per acre
  - Yields increased by up to \$76 per acre



# Yield Impacts—Increases in soybean yield over time (years) since starting the use of cover crops



# Yield Impact

2-12% yield increases reported in corn and soybean crops planted after a cover crop

Crop Year	Corn	Soybeans
2012*	9.6%	11.6%
2013	3.1%	4.3%
2014	2.1%	4.2%
2015	1.9%	2.8%

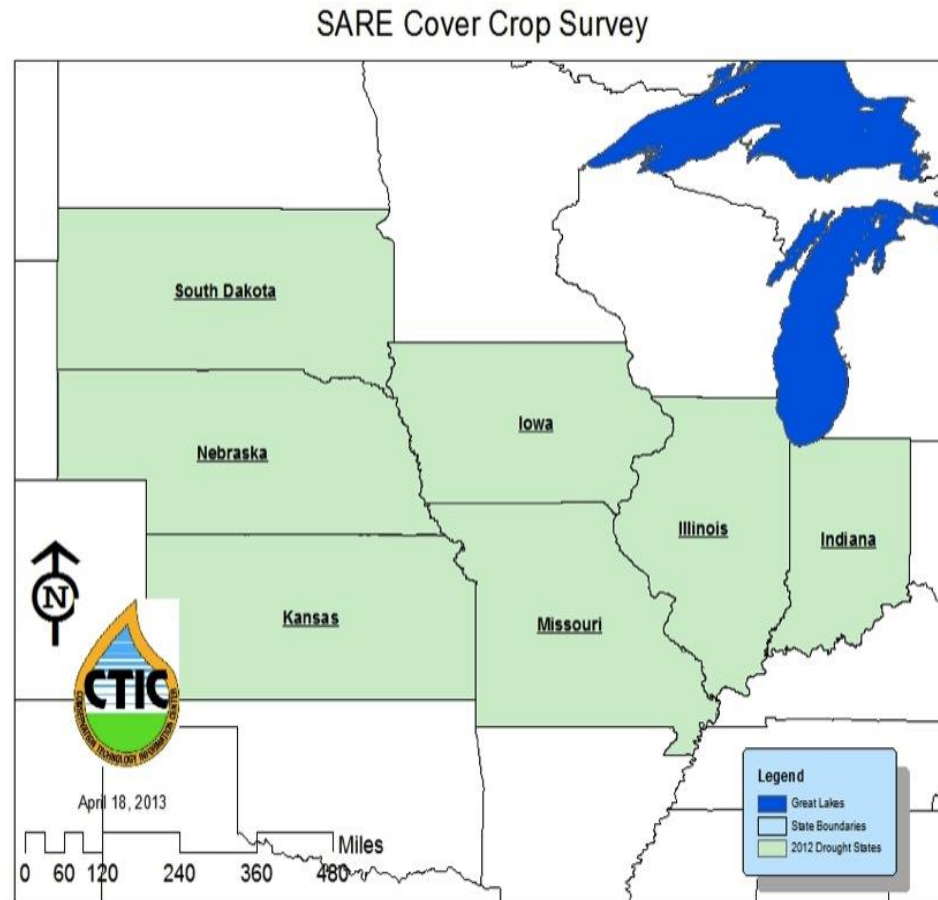
*Data provided from farmers in the SARE/CTIC national cover crop survey. Differences are statistically significant based on analysis by Purdue University. 2012 was a major drought year, where cover crop benefits were striking due to better soil moisture management.*



# **Playing the Long Game**

- 
- **Risk Management**
  - **New Cover Crops**
    - Breeding
    - Novel Oilseeds
  - **Land Value**
  - **Voluntary vs Regulatory**

# Risk Management—Are Cover Crops Good Insurance?



States Significantly Affected by the 2012 Drought

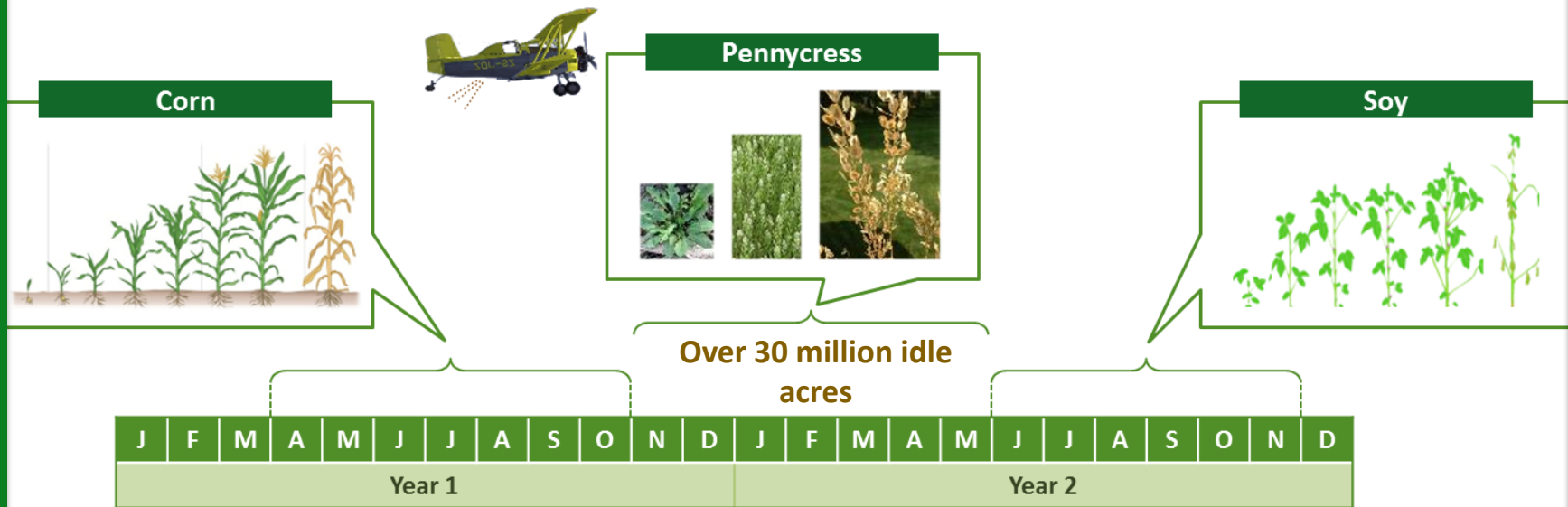


# Drought States Commodity Crop Yields as Impacted by Cover Crops in 2012

- Broke the data down to look at yield impact in seven of the states hit hardest by drought (specifically NE, KS, SD, MO, IA, IL, and IN)

Group of respondents	Corn	Soybeans
All respondents with side-by-side field comparisons	9.6% Yield Increase	11.6% Yield Increase
Drought states (7 states)	11.0% Yield Increase	14.3% Yield Increase

# The Pennycress Idea: grow sustainable and profitable crop over winter idle land



- Farmers gets another revenue crop
- Idle land used for fuel from non-food crop
- Revenue from cover crop – reduce nitrogen runoff

# Land Value

- What if organic matter was a key component of land value (thus RENT)?
  - CSR2 in Iowa

**CSR2 = S-M-F-W-D-C $\pm$ EJ**

Where:

**S** is the taxonomic subgroup class of the soil series

**M** is the family particle size class

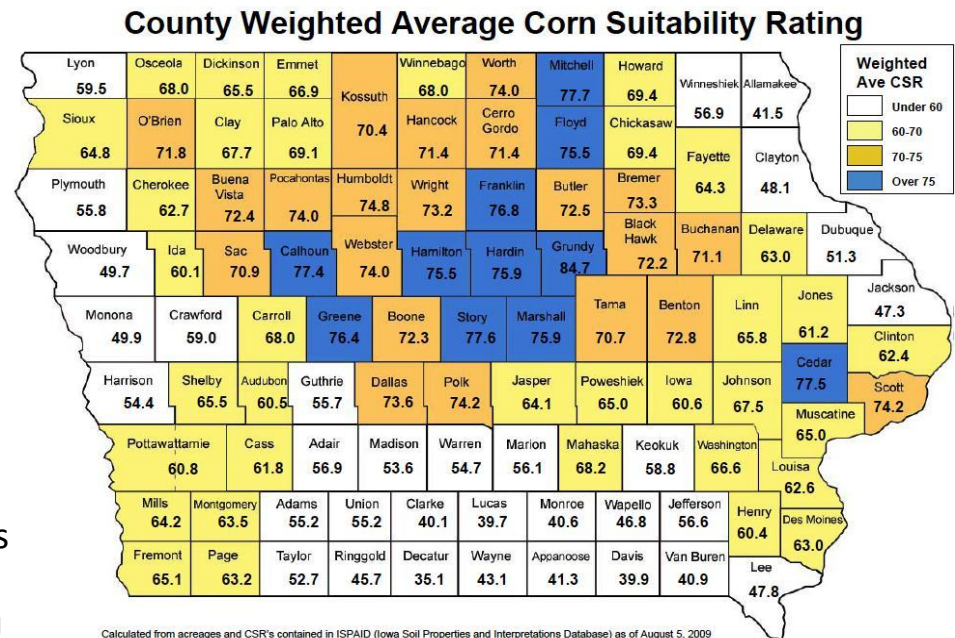
**F** refers to the field conditions of a particular SMU

**W** is the water holding capacity of the series

**D** is a soil depth & tolerable rate of erosion factor

**C** refers to the climate

**EJ** is an expert judgment correction factor



Calculated from acreages and CSR's contained in ISPAID (Iowa Soil Properties and Interpretations Database) as of August 5, 2009  
Prepared by Gerald A. Miller and Thomas E. Fenton, Professors of Agronomy, and Brad O Neal, Department of Agronomy, Iowa State  
University, Ames, Iowa 50011

Iowa's New Corn Suitability Rating -- May 08, 2012





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# Questions to Ponder

- **What additional information is needed for producers to understand the long-term benefits justify annual costs?**
- **What new traits (breeding improvements) would you like to see?**
- **Would you consider a winter annual that has the benefits of a cover crop?**
- **Do you believe land values may be linked to soil health in the future? Do you believe this beneficial?**