

Reducing the Health Impacts of the Nitrogen Problem

A Virtual Workshop from the
Environmental Health Matters Initiative

**Cover Crops by Region: The Good, the
Bad, and the Ugly in the Midwest**

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Cover Crops by Region: The Good, the Bad, and the Ugly in the Midwest

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Photo courtesy: PFI

➤ What is a cover crop?

- A plant that covers the soil between cash crops

➤ Why use cover crops? (THE GOOD)

- Water Quality
- Soil Health (↓ soil erosion)
- Pest management (?)
- Iowa Nutrient Reduction Strategy :
%reduction in Nitrogen load 29%
%reduction in Phosphorous load 28%



Photo courtesy: PFI

➤ Adoption rate? (THE BAD)

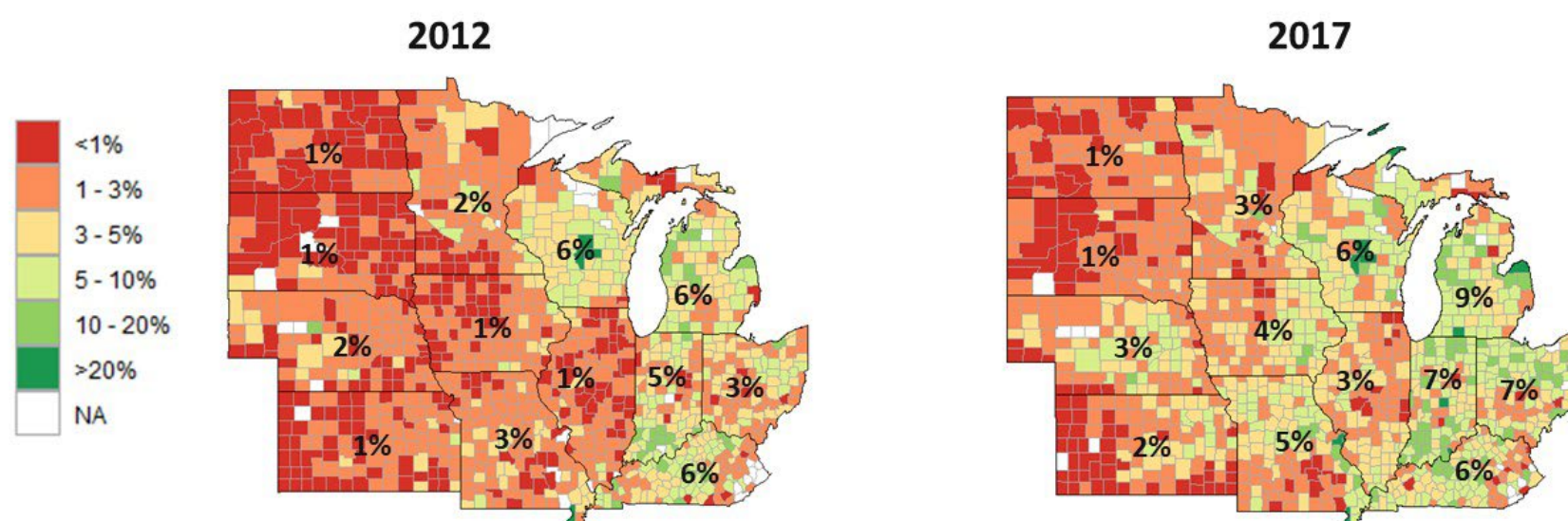
- Iowa 1% in 2012 to 4% in 2017 (Census of Ag)

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Why is the adoption rate so low?

1. In crop-only Midwestern production systems, cover crops are not profitable for most farmers (THE UGLY)
2. Cost-share payments make net returns less negative among program participants, but only few experience positive profits
3. In mixed production systems with cows, cover crops can be profitable under the “right” conditions

Percent of Cropland in Cover Crops (2012-2017)



Study 1: Regional Online Survey

Study 2: Statewide Mail Survey (Iowa)

Study 3: Experimental Plots in Iowa

Partial Budgets

**CHANGES IN COSTS
AND REVENUES:**

Fall/Winter

Spring-Fall



**COVER
CROPS**

**NO COVER CROPS
(fallow)**

CORN

SOYBEANS



**Corn after
fallow**

VERSUS

**Corn after
Cover Crops**

Regional Online Survey MN IA IL ND IN NE OH MI MO SD WI (n=79) 2017

<https://works.bepress.com/alejandro-plastina/23/>

Sources of changes in net profits	Cover crops terminated with herbicides followed by corn for grain (\$/acre)	Cover crops terminated with herbicides followed by soybeans (\$/acre)
<u>A. Changes in revenue:</u>		
1. Cash Crop Yield	-9.18	31.74
2. Cost-share program	25.33	28.07
<i>Subtotal</i>	<i>16.16</i>	<i>59.81</i>
<u>B. Changes in costs:</u>		
1. Cover crop planting	31.84	31.14
2. Herbicide expenses	4.05	3.82
3. Other Costs	1.02	-0.27
<i>Subtotal</i>	<i>36.91</i>	<i>34.69</i>
<i>Net change in profit (A-B):</i>	<i>-20.76</i>	<i>25.13</i>
<i>Net change in profit without Cost-Share</i>	<i>-46.09</i>	<i>-2.95</i>

1

Average Extra Costs: \$35-\$37 per acre

2

Average Payments from Cost-Share Program: \$25-\$28

3

Corn yield drag ~ 2 bushels/acre
Soy yield bump ~ 3 bushels/acre
Average Net Returns to cover crops:
-\$21 preceding corn
+\$25 preceding soy

4

Net Returns Excluding Cost-Share:
-\$46/acre preceding corn
-\$3/acre preceding soy





Statewide Mail Survey IA (n=440; 35% Resp. rate) 2017

<https://docs.lib.purdue.edu/jafe/vol2/iss2/2/>

Source of Change in Profits	Median Value of Change in \$/acre	
	CC followed by Corn	CC followed by Soybeans
CC Seed cost	\$16	\$15
CC Planting	\$16	\$17
Extra herbicide cost	\$3	\$2
+/- Other costs	\$0	\$0
A. Subtotal Extra Costs	\$35	\$34
Cost-share	\$20	\$15
Value of yield change	\$0	\$0
B. Subtotal Extra Revenue	\$20	\$15
C. Net Returns (B-A)	-\$15	-\$19
Feed cost savings	\$22	\$20
D. Net Returns w/ Livestock	+\$7	+1

1

Median Extra Costs: \$34-\$35 per acre

2

Median Payments from Cost-Share Program: \$15-\$20

3

Median Corn and Soy yields same as following fallow
Median Net Returns to cover crops (including cost-share payments):
-\$15/a preceding corn
-\$19/a preceding soy

4

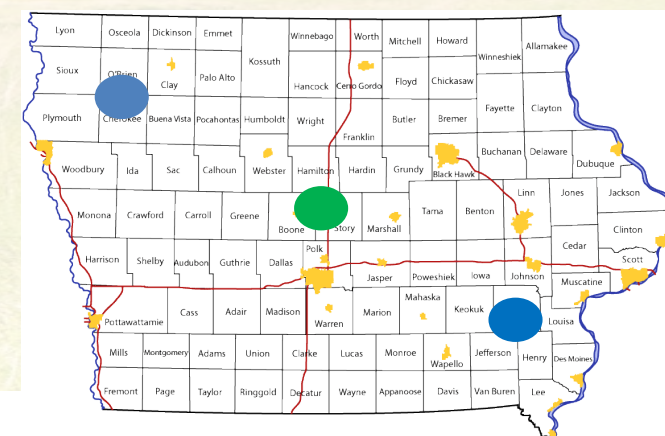
Net Returns in Mixed Crop-Livestock system (incl. feed cost savings):
+\$7/a preceding corn
+\$1/a preceding soy

Net Returns to Cereal Rye preceding Corn Treated vs. check plots (324 data points)



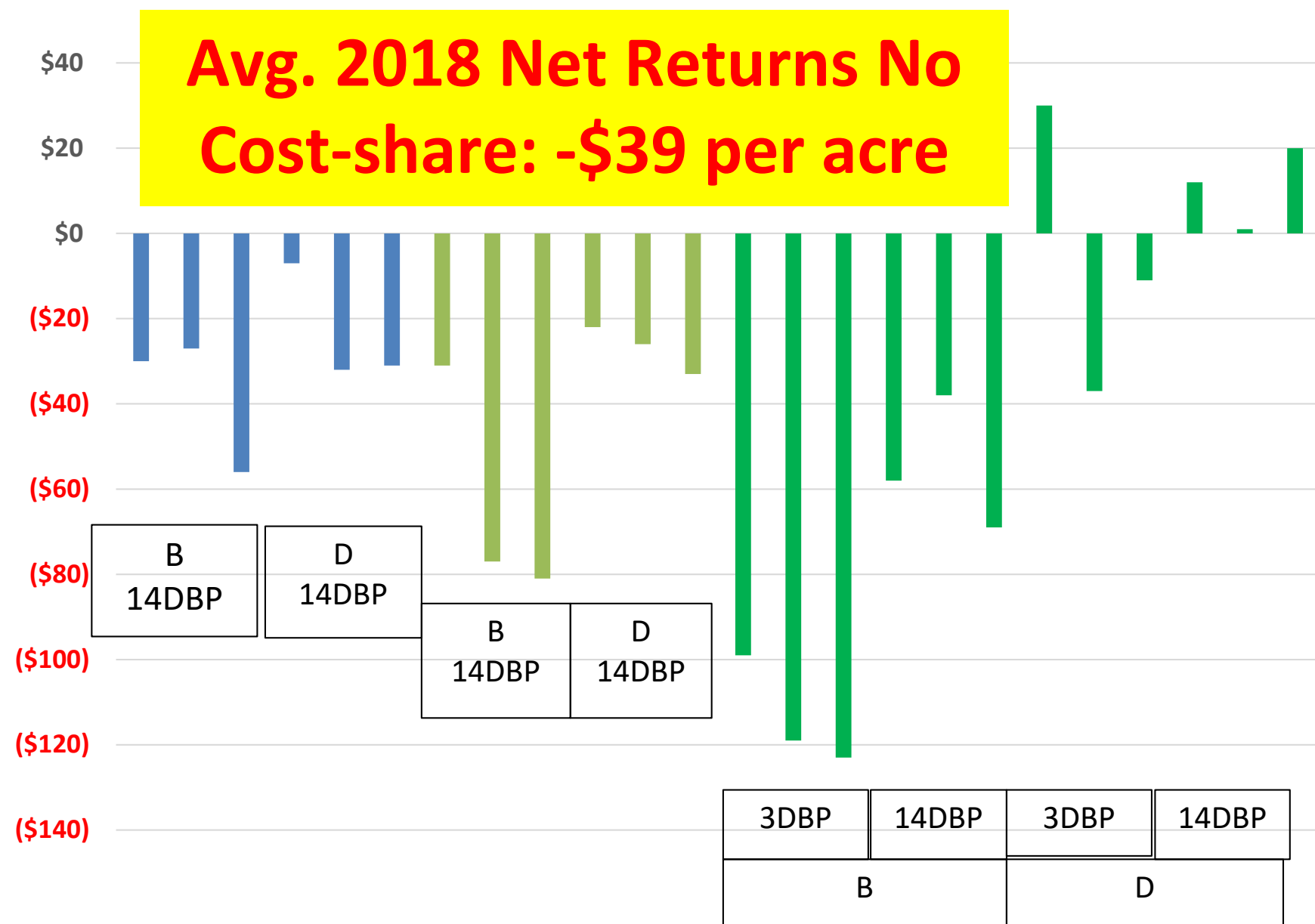
IOWA STATE UNIVERSITY
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PIs: Alison Robertson and Mark Licht.



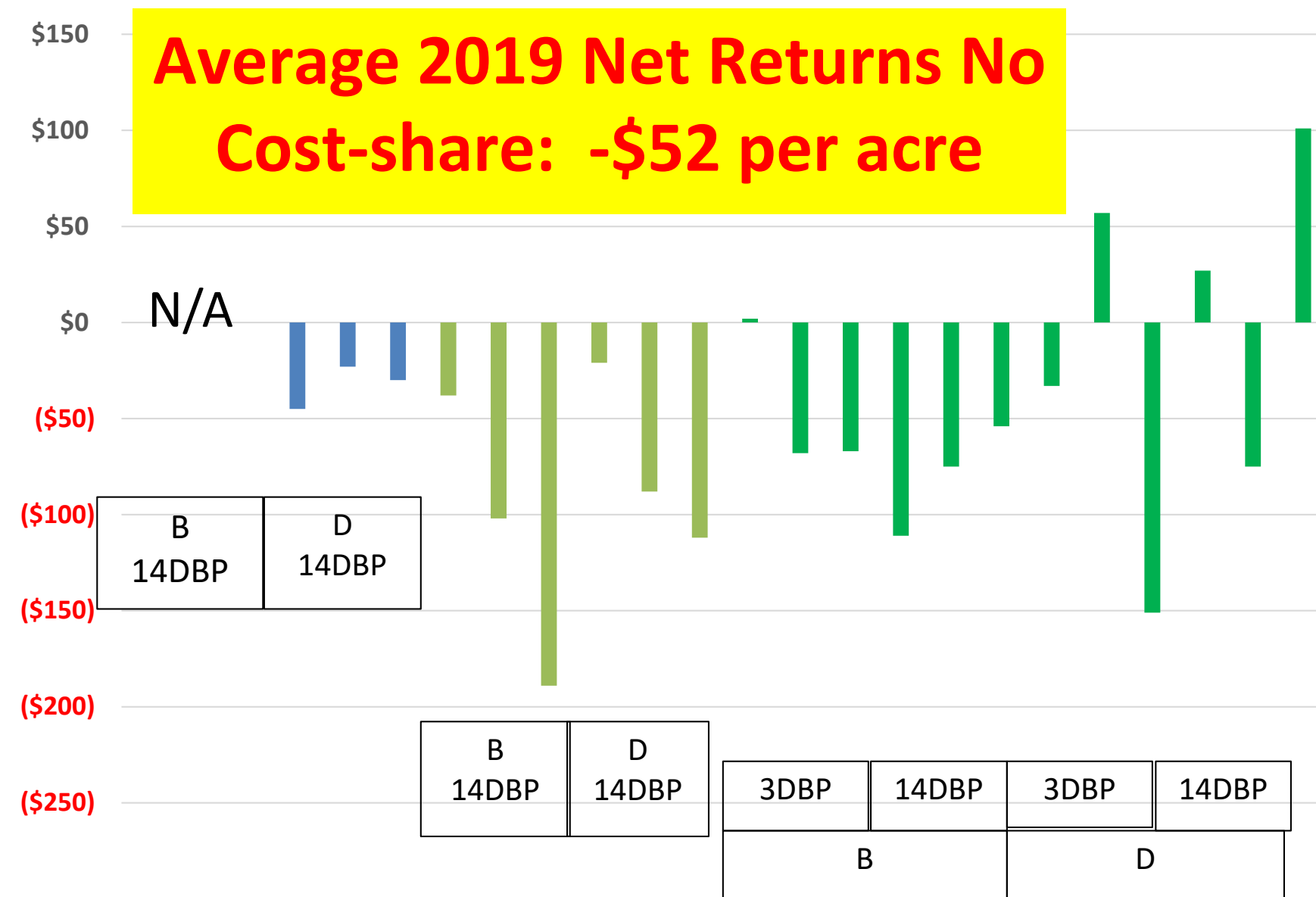
Cereal Rye Planted Fall 2018

North-West South-East Central



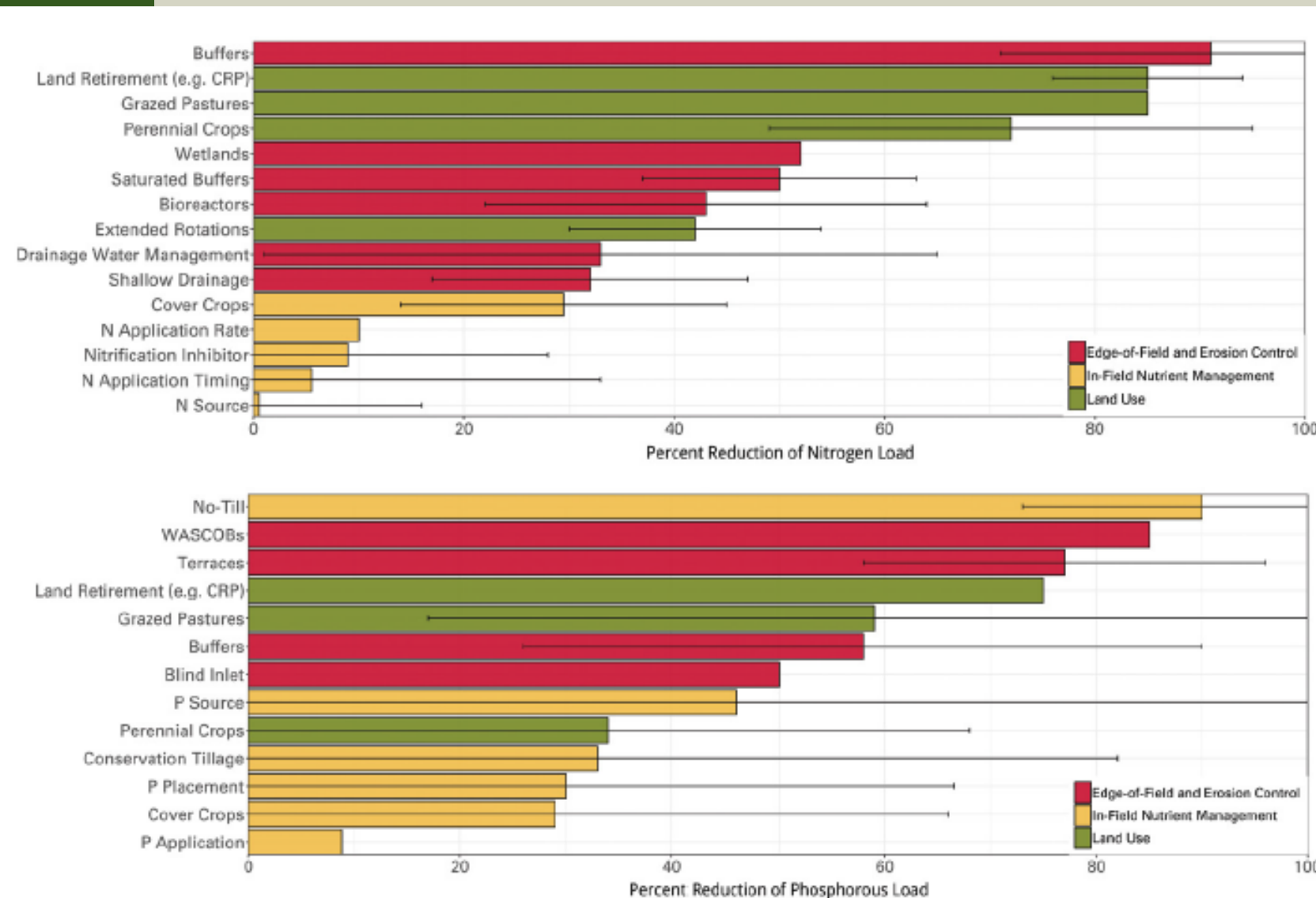
Cereal Rye Planted Fall 2019

North-West South-East Central



Final considerations

- Feed cost savings from grazing cover crops (in mixed production systems) depend on above-ground biomass in early spring → Little biomass, little value
- Social benefits from cover crops also depend on biomass and precipitation:
 - No precipitation, little runoff/leaching, little social value
 - Little biomass, little social value



- The Iowa Nutrient Reduction Strategy ranks Cover crops 11th and 12th in Nitrogen and Phosphorous load reduction, respectively
- Cost-share payments are not always sufficient to cover all costs incurred by farmers
- Long-term: monetization of soil health, carbon seq. limited by disagreement on soil health metrics