PRACTICAL FARMERS OF IOWA
Healthy Food • Diverse Farms • Vibrant Communities

Cover Crops, not just for Conservation Anymore

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Take home messages

WHY is the Cornbelt “leaky”?

HOW does Practical Farmers work?

WHAT are our on-farm results?

PRACTICAL FARMERS OF IOWA

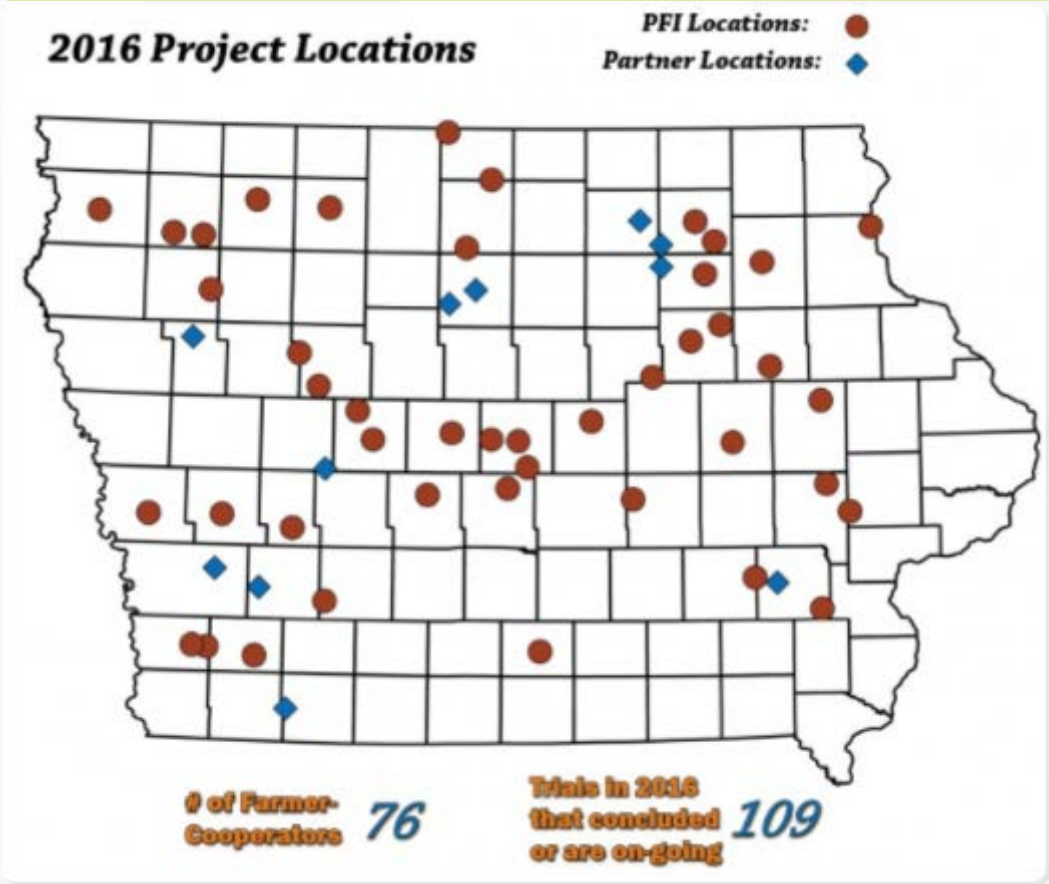
Healthy Food • Diverse Farms • Vibrant Communities

Strengthening farms and communities through farmer-led investigation and information sharing.

Member-led, non-profit organization
~3,000 members

Cooperators' Program 2016

Tim Sieren




Bruce Carney


Alice McGary

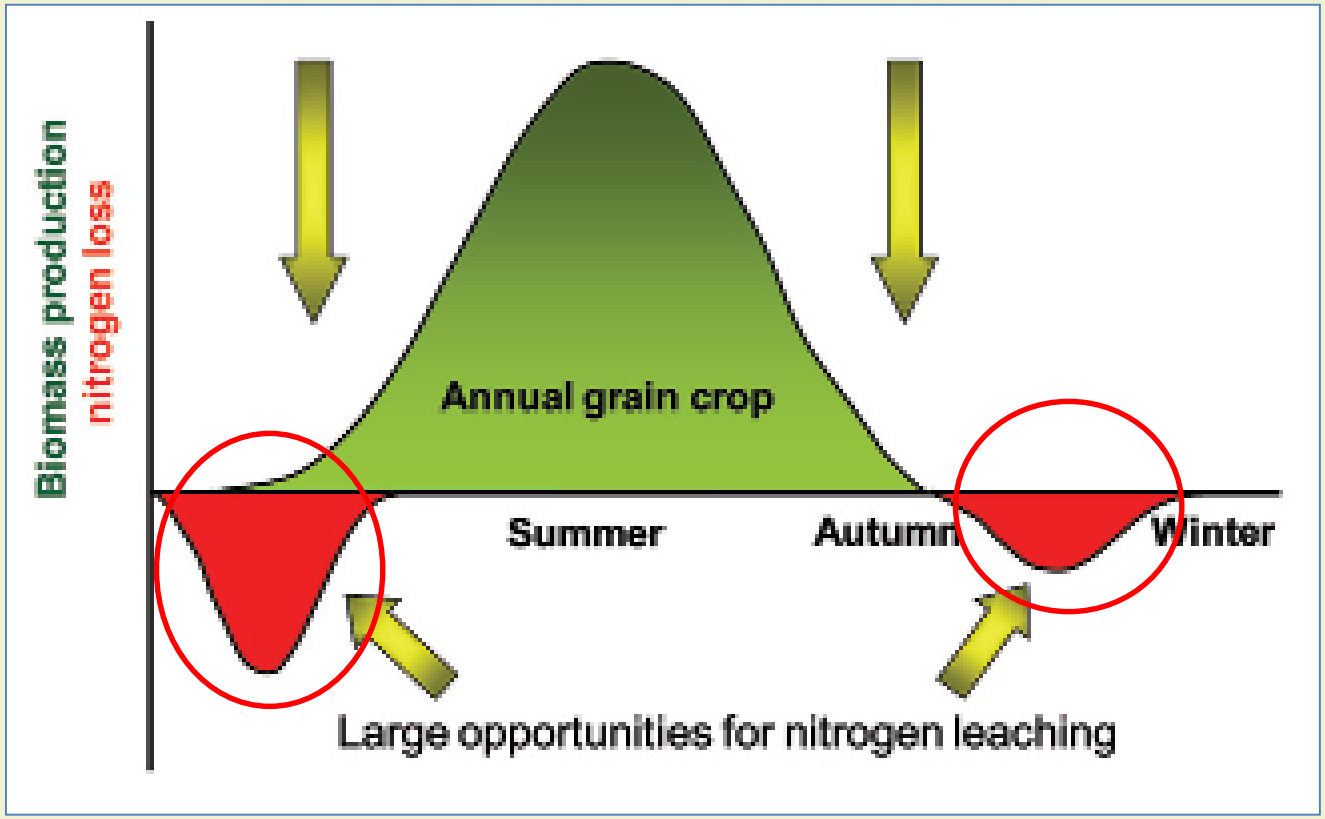
25 farmers conducted
29 cover crop trials

Randomized, Replicated Field Trials

Cover Crop Information Sharing

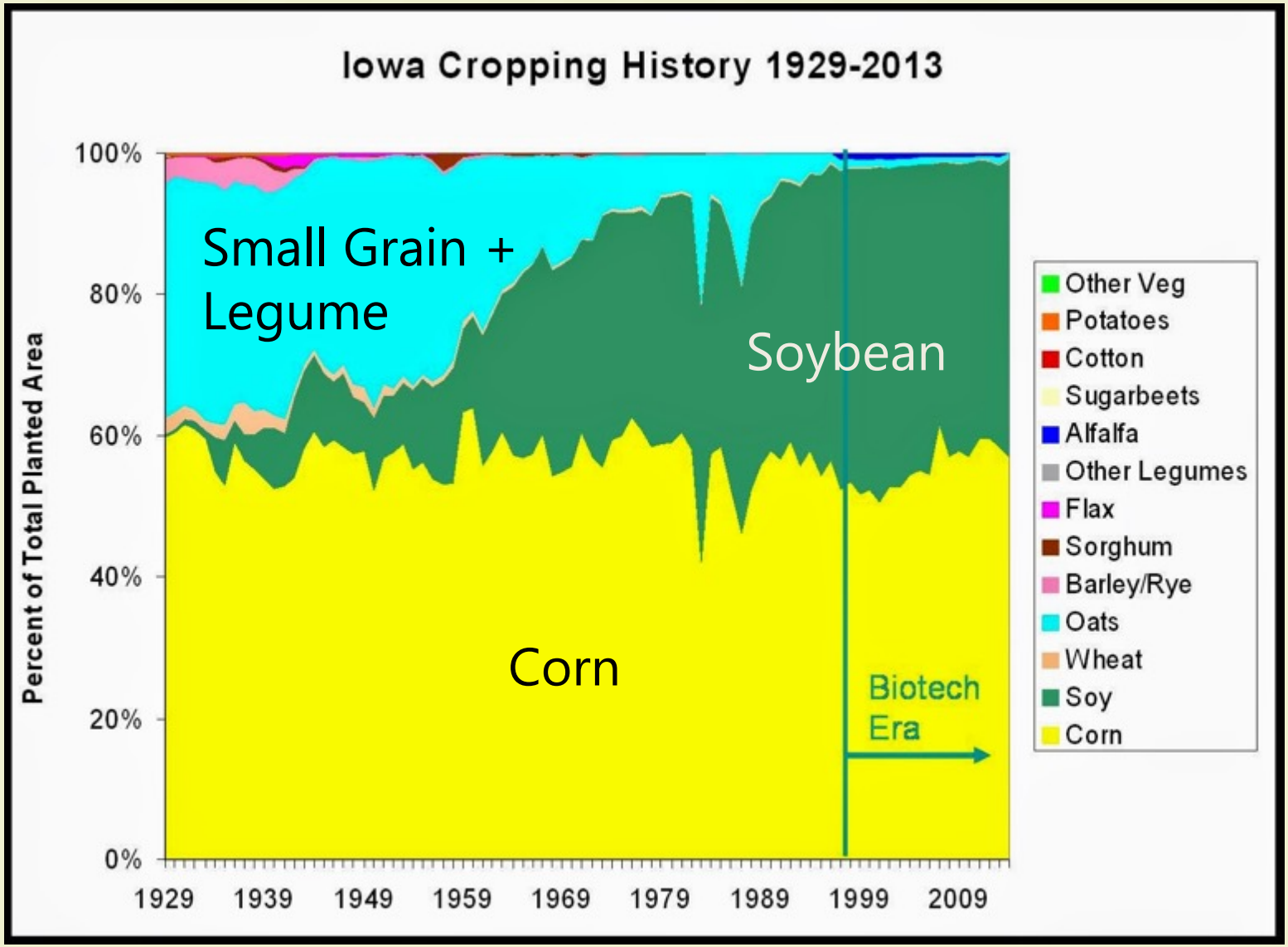
75 Cover Crop Events
Reached **9538** Farmers

Greatest loss of nutrients is outside the cropping season (Kaspar et al., 2007)



52% of precipitation occurs between Oct-May in central Iowa

Heggenstaller et al. (2008)



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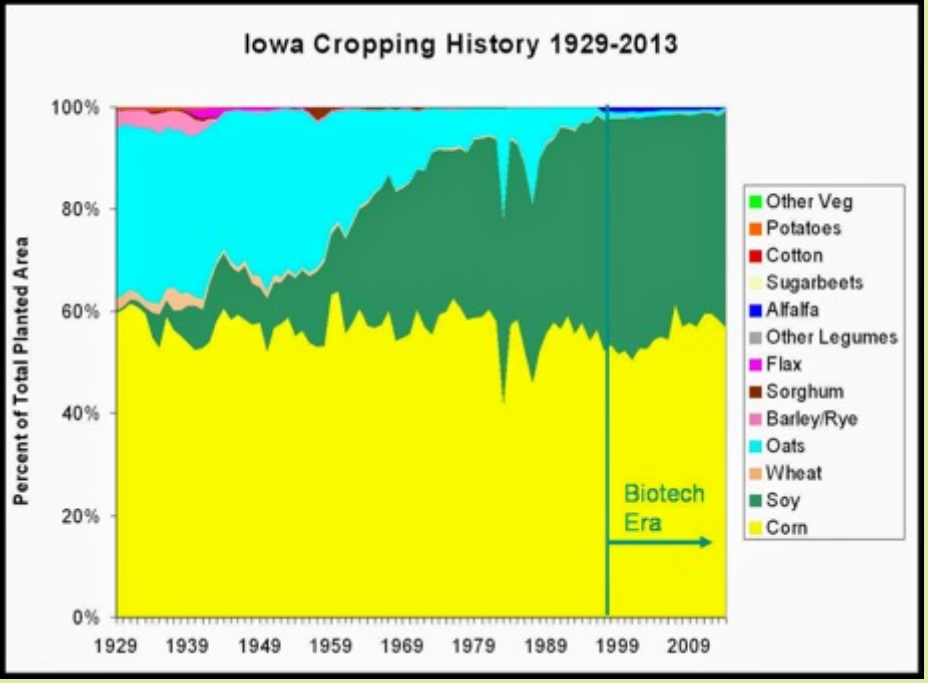
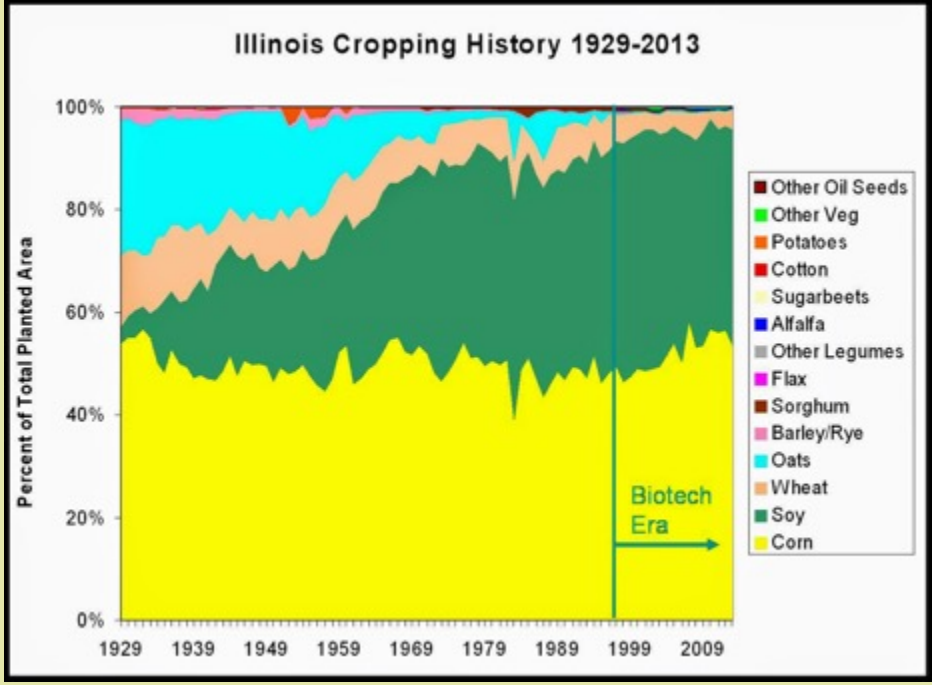
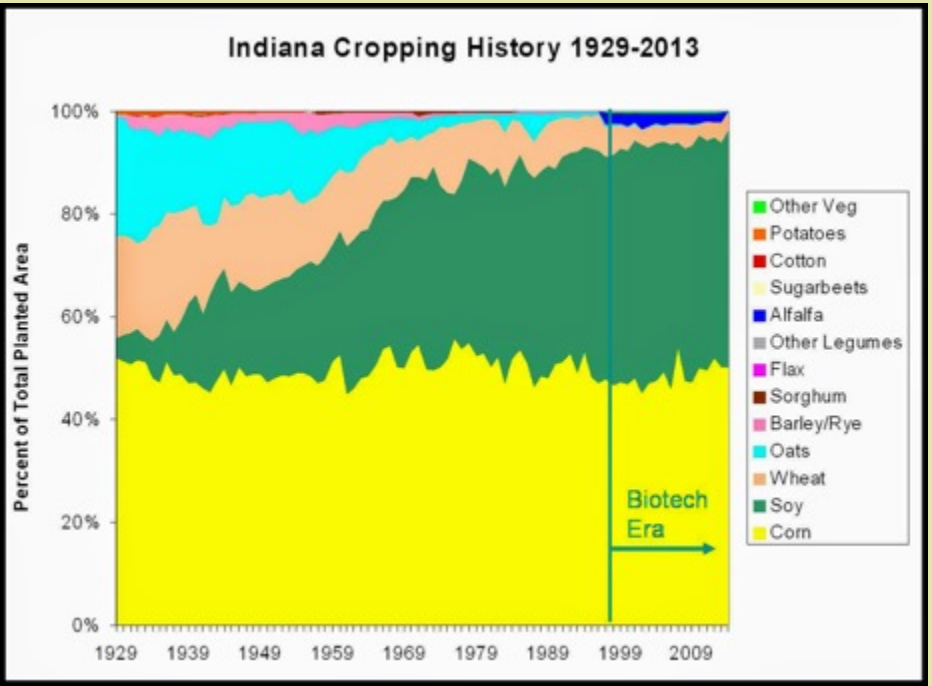

Iowa Cropping History 1929-2013
Percent of Total Planted Area
100%
80%
60%
40%
20%
0%
1929
1939
1949
1959
1969
1979
1989
1999
2009
Biotech Era
Other Veg
Potatoes
Cotton
Sugarbeets
Alfalfa
Other Legumes
Flax
Sorghum
Barley/Rye
Oats
Wheat
Soy
Corn


Illinois Cropping History 1929-2013
Percent of Total Planted Area
100%
80%
60%
40%
20%
0%
1929
1939
1949
1959
1969
1979
1989
1999
2009
Biotech Era
Other Oil Seeds
Other Veg
Potatoes
Cotton
Sugarbeets
Alfalfa
Other Legumes
Flax
Sorghum
Barley/Rye
Oats
Wheat
Soy
Corn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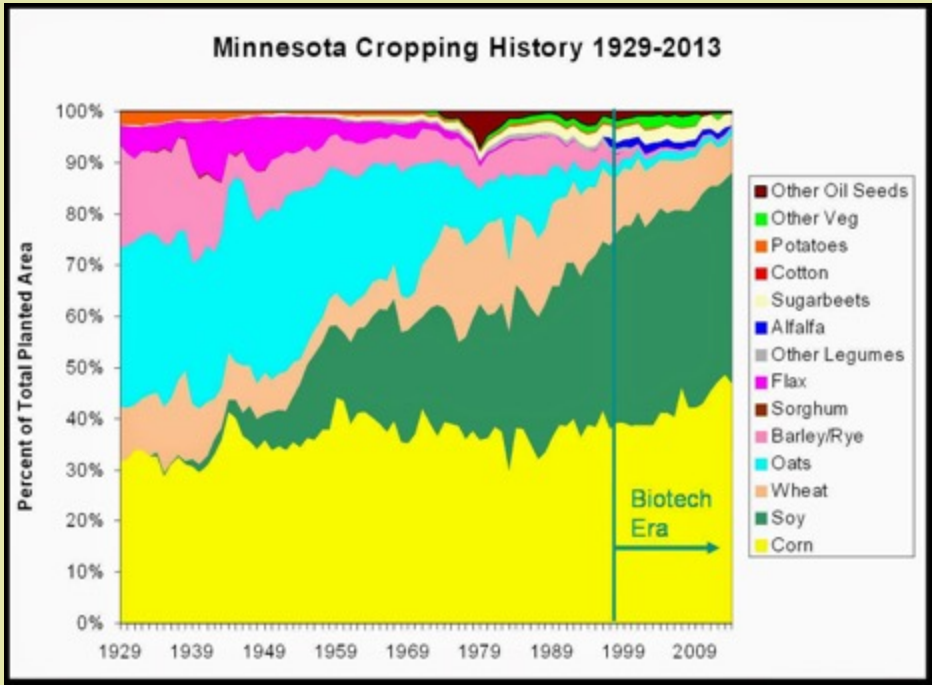
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Oats
Wheat
Soy
Corn

DON'T FARM NAKED

PLANT COVER CROPS

PRACTICAL farmers of Iowa
working together, always learning

What is a Cover Crop?

Plants that cover the soil in between cash crops

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Partial budget for cover crops terminated with herbicides followed by corn for grain - Midwest

Sources of changes in net profits	Mean ($/acre)	1st Quartile ($/acre)	Median ($/acre)	3rd Quartile ($/acre)
A. Changes in revenue	16.16	-16.50	25.00	43.36
B. Changes in Costs	36.91	48.65	30.90	23.77
C. Net change in profit (A-B)	**-20.76**	**-65.15**	**-5.90**	**19.59**
Net change in profit without Cost-Share:	**-46.09**	**-82.15**	**-30.90**	**-5.41**

Partial budget for cover crops terminated with herbicides followed by soybeans - Midwest

Sources of changes in net profits	Mean ($/acre)	1st Quartile ($/acre)	Median ($/acre)	3rd Quartile ($/acre)
A. Changes in revenue	59.81	20.00	29.78	87.30
B. Changes in Costs	34.69	42.86	34.09	27.15
C. Net change in profit (A-B):	**25.13**	**-22.86**	**-4.31**	**60.15**
Net change in profit without Cost-Share:	**-2.95**	**-42.86**	**-29.31**	**30.15**

Make Cover Crops Pay: 1. Control Costs

Cover Crop Variety Trial

- 49 cover crop entries
- 10-16 locations
- 5 years

GRASS:
Cereal Rye

BRASSICAS:
Rapeseed

LEGUMES:
Hairy Vetch

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Choosing a Cover Crop Species

Early Harvest (by Sept. 10)


Grass


Brassica


Legume

Late Harvest (after Sept. 30)
Aerial Seeding


Grass


Brassica

Late Harvest (by Sept. 30)
Drill Seeding


Grass

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Cover Crop Decision Tree

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Cover Crop Decision Tree

Seeding Rate Recommendations

based on pure live seed (PLS)

	Drilled/planted before Sept. 15	Aerial or High-clearance overseeded ~Aug. 15-Sept.15	Drilled/planted after Sept. 15
Small Grains			
Winter cereal rye*	~55 lb/ac	60-75 lb/ac	60-75 lb/ac[1]
Winter triticale**	~55 lb/ac	60-75 lb/ac	60-75 lb/ac[1]
Winter wheat**	~55 lb/ac	60-75 lb/ac	60-75 lb/ac[1]
Winter barley***	~60 lb/ac	60-75 lb/ac[1]	X
Oats***	~60 lb/ac	60-75 lb/ac[1]	X
Cool-season grass			
Annual ryegrass**	~15 lb/ac	~20 lb/ac	X
Brassicas (must be planted with grasses)			
Rapeseed**	3-4 lb/ac	4-6 lb/ac	X
Brown mustard***	3-4 lb/ac	4-6 lb/ac[1]	X
Oilseed radish***	3-4 lb/ac	4-6 lb/ac[1]	X
Turnips***	3-4 lb/ac	4-6 lb/ac[1]	X
Legumes			
Hairy vetch**	15-20 lb/ac	X	X
Common vetch**	15-20 lb/ac	X	X
Winter lentil**	50 lb/ac	X	X
Winter pea**	60 lb/ac	X	X

When using a mixtures be sure to check applicable seeding rates or talk to your retailer.
* = should not winterkill ** = could winterkill *** = will winterkill X = not recommended for this time and planting
[1] If receiving cost-share through government programs, please see USDA-NRCS Agronomy Technical Note 38: Cover Crop Management at **tinyurl.com/IANRCS38CCRecs** for NRCS recommended rates.
If growing cover crops for livestock forage, use upper range of seeding rates and see: ***tinyurl.com/PFICornHerb-CC-Grazing*** *and* ***tinyurl.com/PFISoyHerb-CC-Grazing***

Cover Crops and Heat Units

Legumes and brassicas need more heat units than small grains to be effective.

The number of heat units (base 50°F) remaining in Iowa declines dramatically throughout the month of September:

After Aug. 1: 1,385
After Sept. 1: 707
After Oct. 1: 246

Source: Iowa Environmental Mesonet

Minimum Germination Soil Temperatures

Cereal rye: 34°F
Other small grains: 38°F
Annual ryegrass: 40°F
Mustard/Rapeseed: 40°F
Turnip/Radish: 45°F
Vetches: 60°F
Lentils/Pea: 41°F

Source: Midwest Cover Crops Field Guide: 2nd Edition

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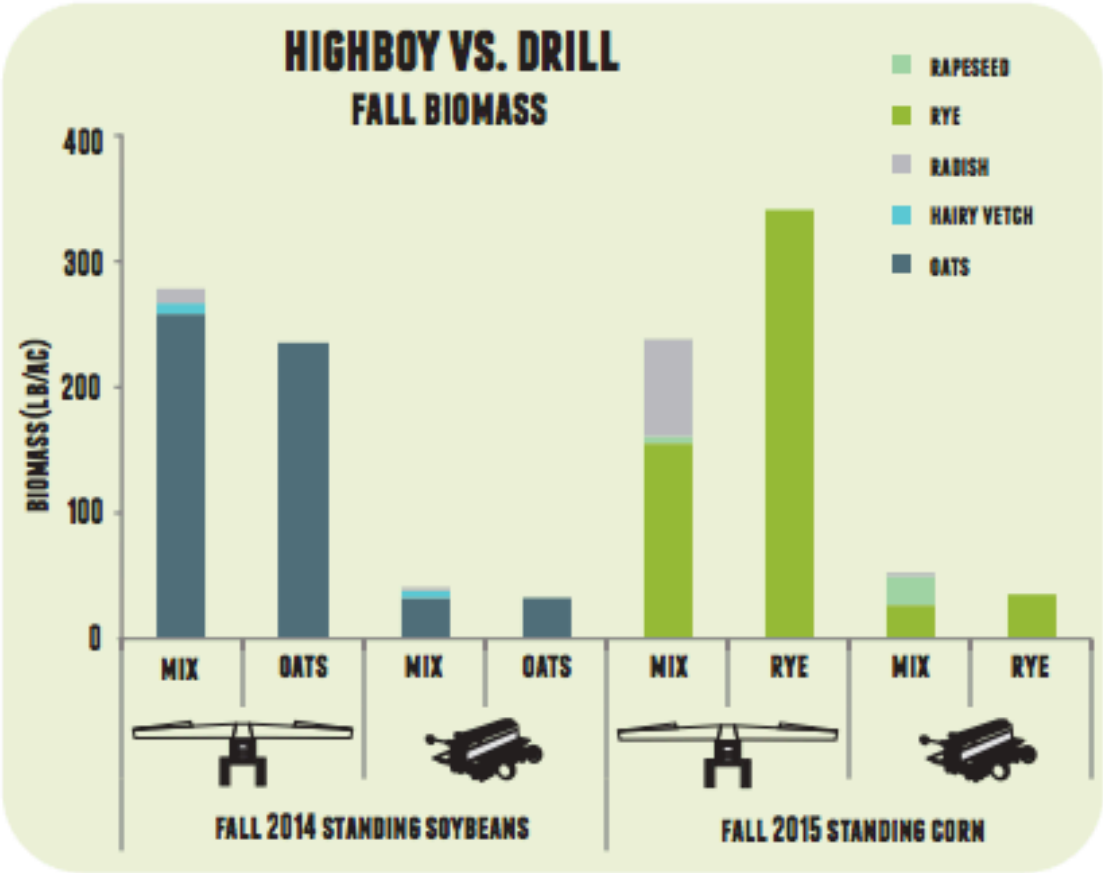
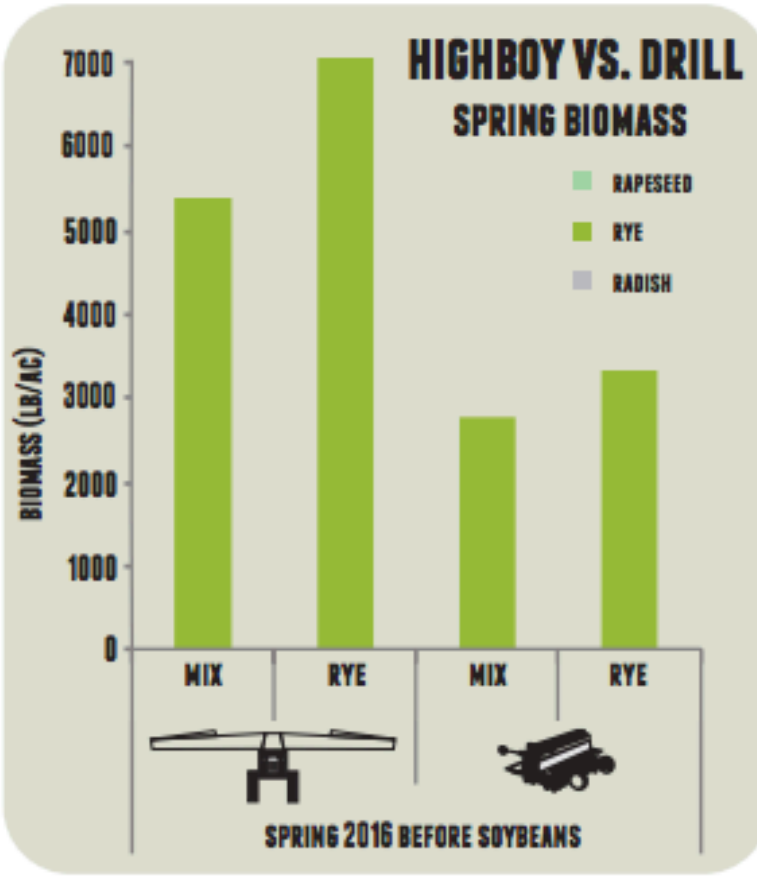
http://bit.ly/2BhOMxS

Mixes and Seeding method


Highboy seeder going through a strip at Tim Smith's farm on Aug. 27, 2015.





9-Year Cover Crop Study

Make Cover Crops Pay:
2. Protect & Increase Yield

Figure 1. Trends with respect to cover crop effect on corn yields at 10 site-years from 2009 to 2010 and 24 site-years from 2011 to 2016.

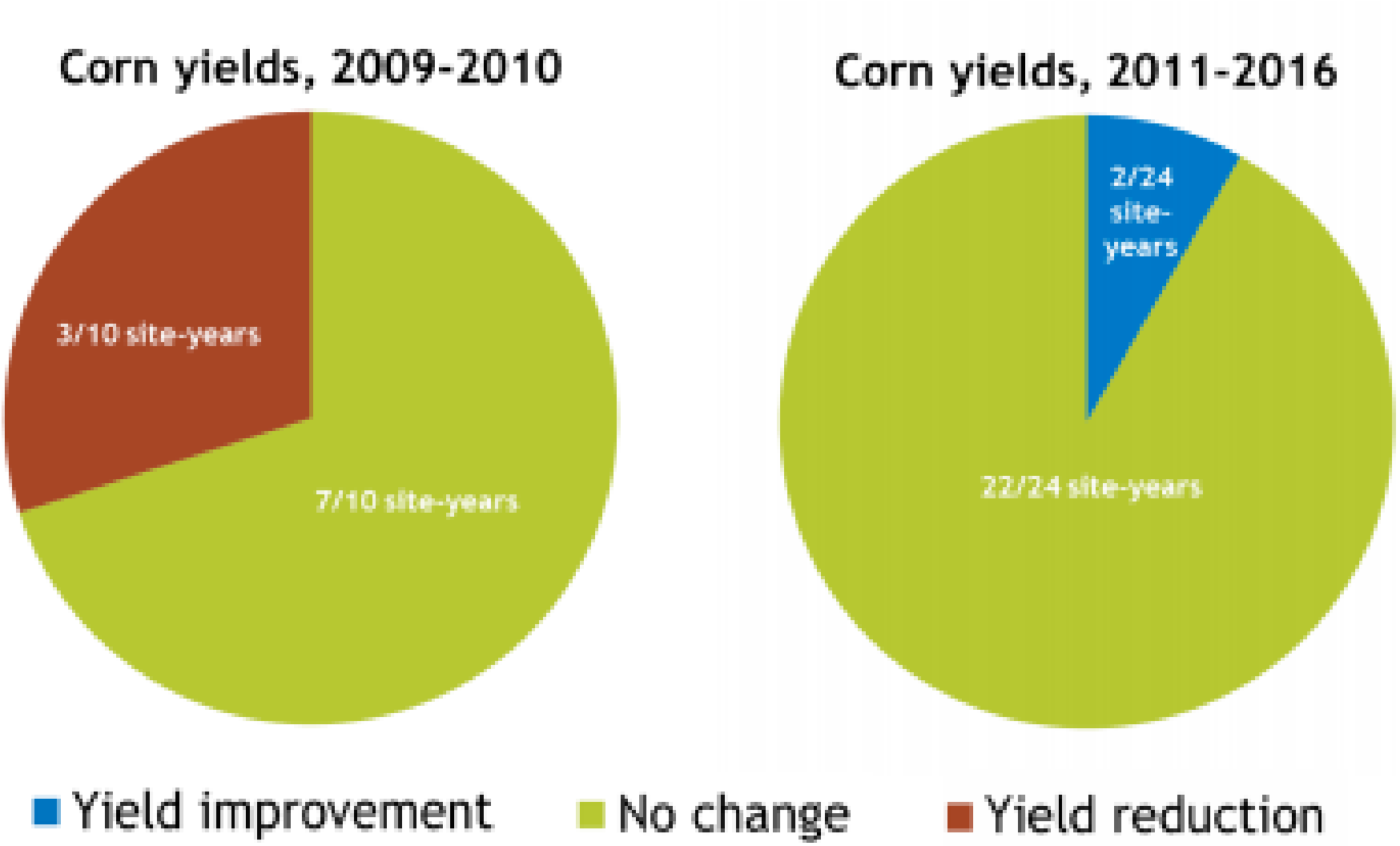
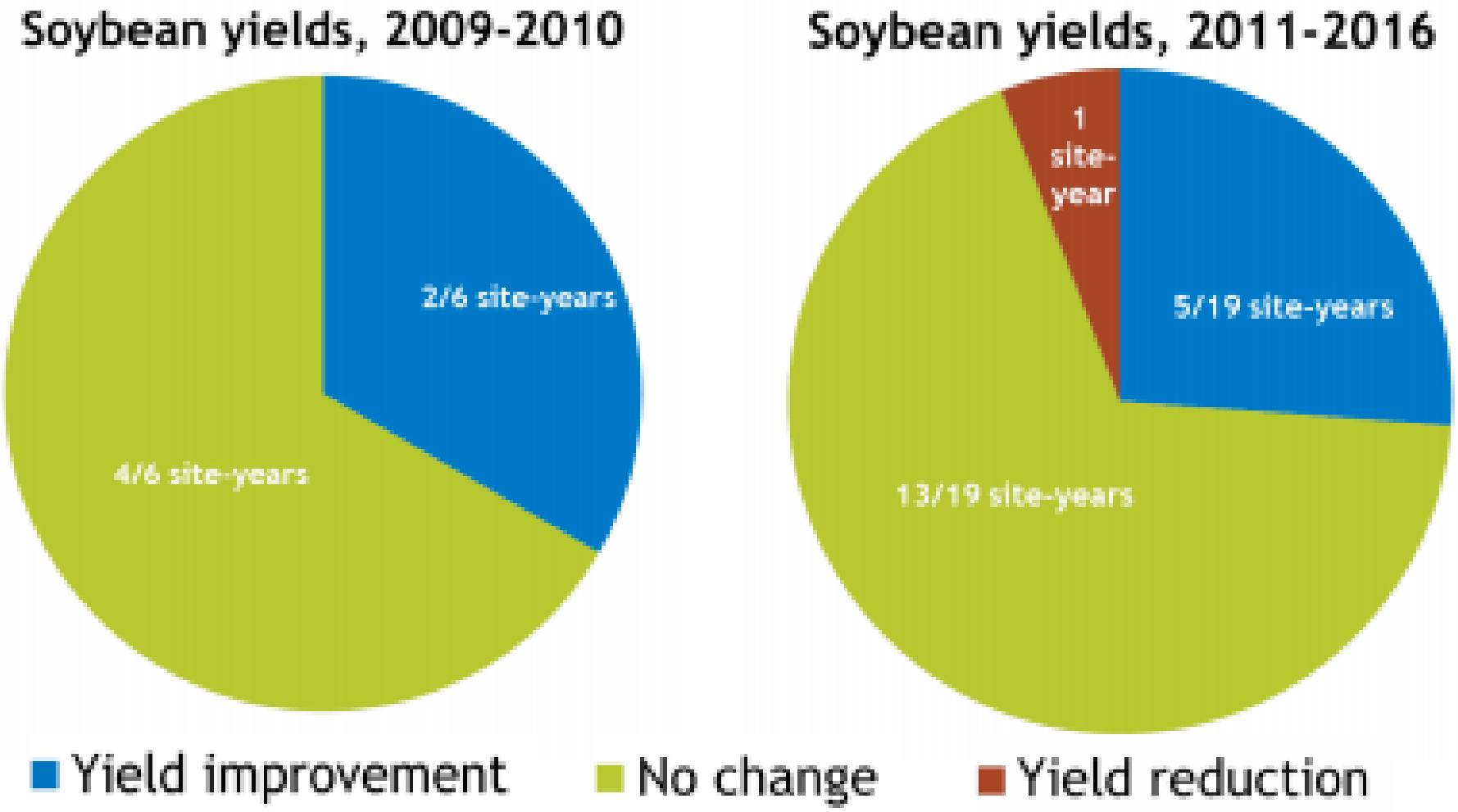


Figure 2. Trends with respect to cover crop effect on soybean yields at 6 site-years from 2009 to 2010 and 19 site-years from 2011 to 2016.



Make Cover Crops Pay
3. Reduce Weed Expenses

Randomized and replicated strips of the early and late termination treatments at Jeremy Gustafson's on May 6, 2016. Jeremy planted soybeans into these strips on May 7. Photo courtesy of Dean Houghton, *The Furrow*.

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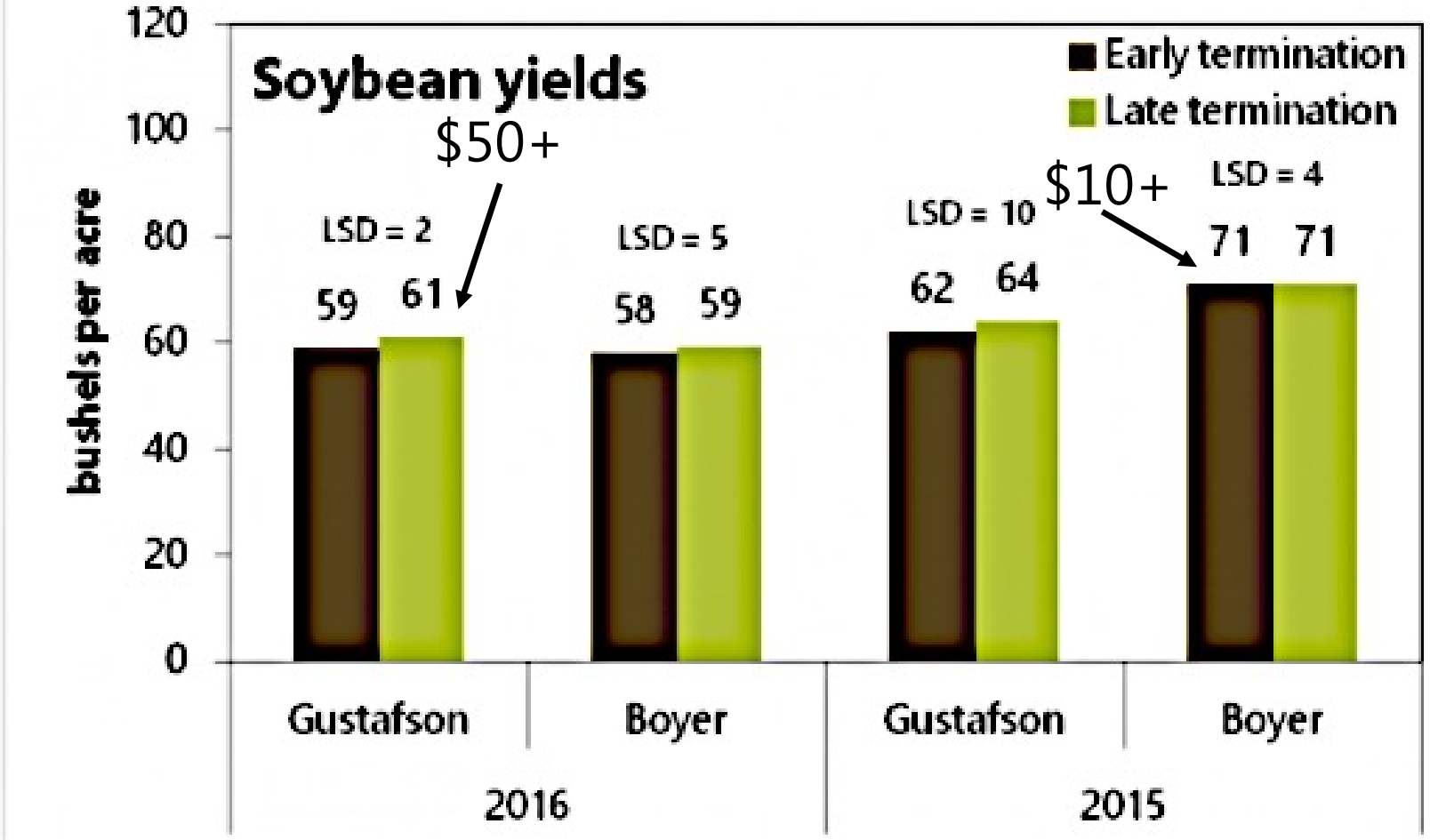
Mid-season "mulch" at Jeremy Gustafson's on Aug. 6, 2016. Jeremy was able to eliminate two weed control passes in the late termination treatment.



Soybean yields for the early and late cover crop termination treatments at Jeremy Gustafson's and Jack Boyer's in 2016 and 2015. The least significant difference (LSD) at the $P \leq 0.05$ level is indicated above each pair of mean columns for both years. By year and farm, if the difference between the treatment means is equal to or greater than the LSD, the treatments are considered significantly different.

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Table 3

Soil temperature (4 in.) and volumetric soil water content (5 in.) at the late termination date (May 8) and mid-season (July 15) at Jack Boyer's farm in 2016.

Treatment	Soil temperature (°F)		Volumetric soil water content (%)[a]	
	May 8	July 15	May 8	July 15
Early termination (4/24)	66	69	31	36
Late termination (5/8)	64	69	22	35
Diff.	2	0	9	1
LSD	--	--	3	2

[a]For soil water content, the least significant difference (LSD) is indicated at the $P \leq 0.05$ level. By date, if the difference between the two treatments is greater than the LSD, the treatments are considered significantly different.

Make Cover Crops Pay:
5. Hone in Nitrogen Management

Sloan planting corn into the late termination treatment (terminated May 3). On right is an early termination strip (terminated Apr. 17). Sloan planted corn into all strips on May 5.

Cover crop terminated Apr. 17

Cover crop terminated May 3

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Corn emerging about one month after planting in a late termination strip. Photo taken on June 6.

Nitrogen Program

05/05/16: 35 lb-N/ac (Quad5, UAN[32%], Thiosul) 2" to the side of the row

6/11/16: 105 lb N/ac as UAN(32%) sidedressed

Figure 2

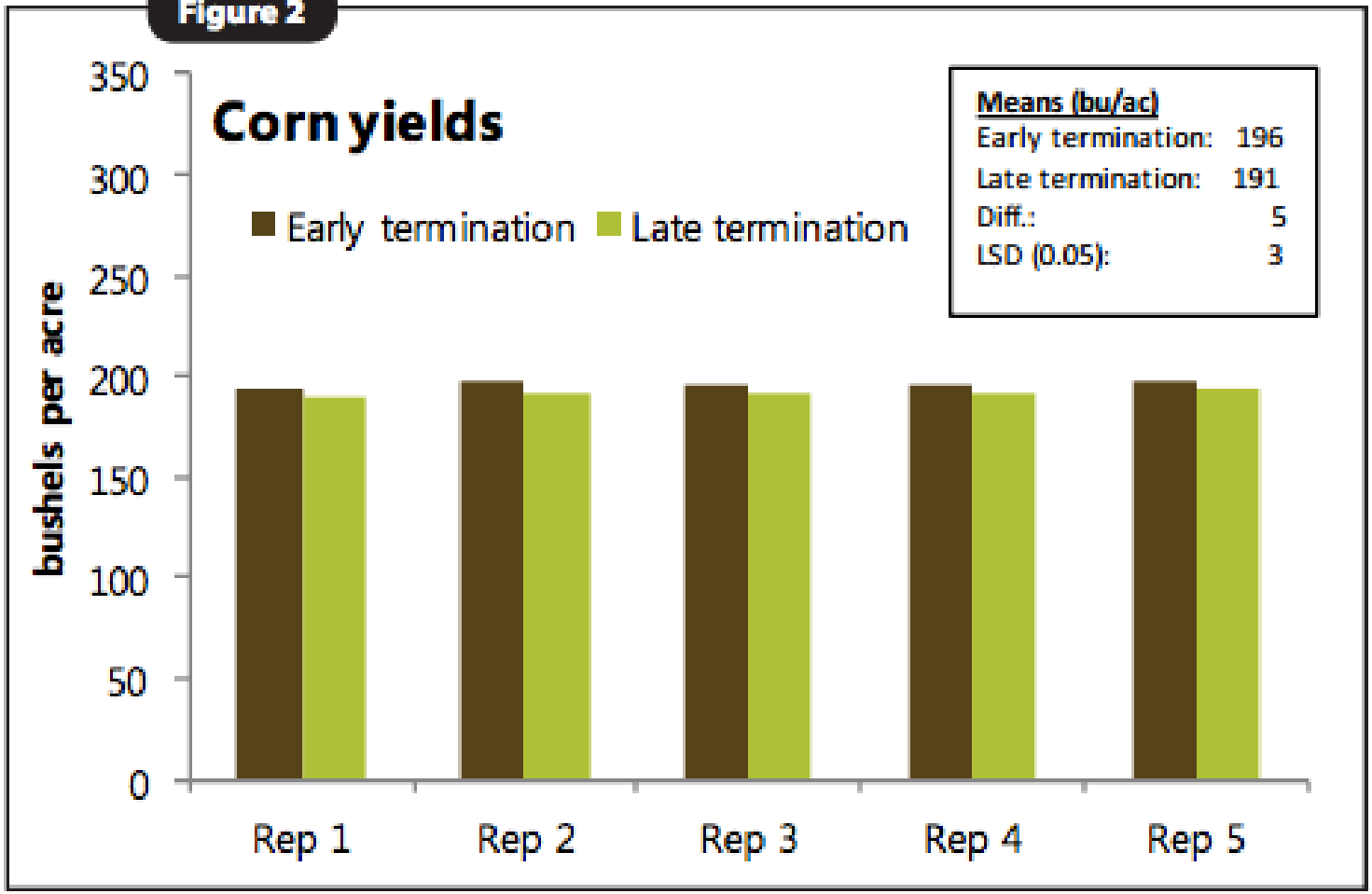


Figure 2. Corn yields for the early and late cover crop termination treatments from each Rep at Dick Sloan's in 2016. Mean yields and the least significant difference (LSD) at the $P \leq 0.05$ level are indicated in the inset table. If the difference between the two treatment means is greater than the LSD, the treatments are considered significantly different.

Figure 1

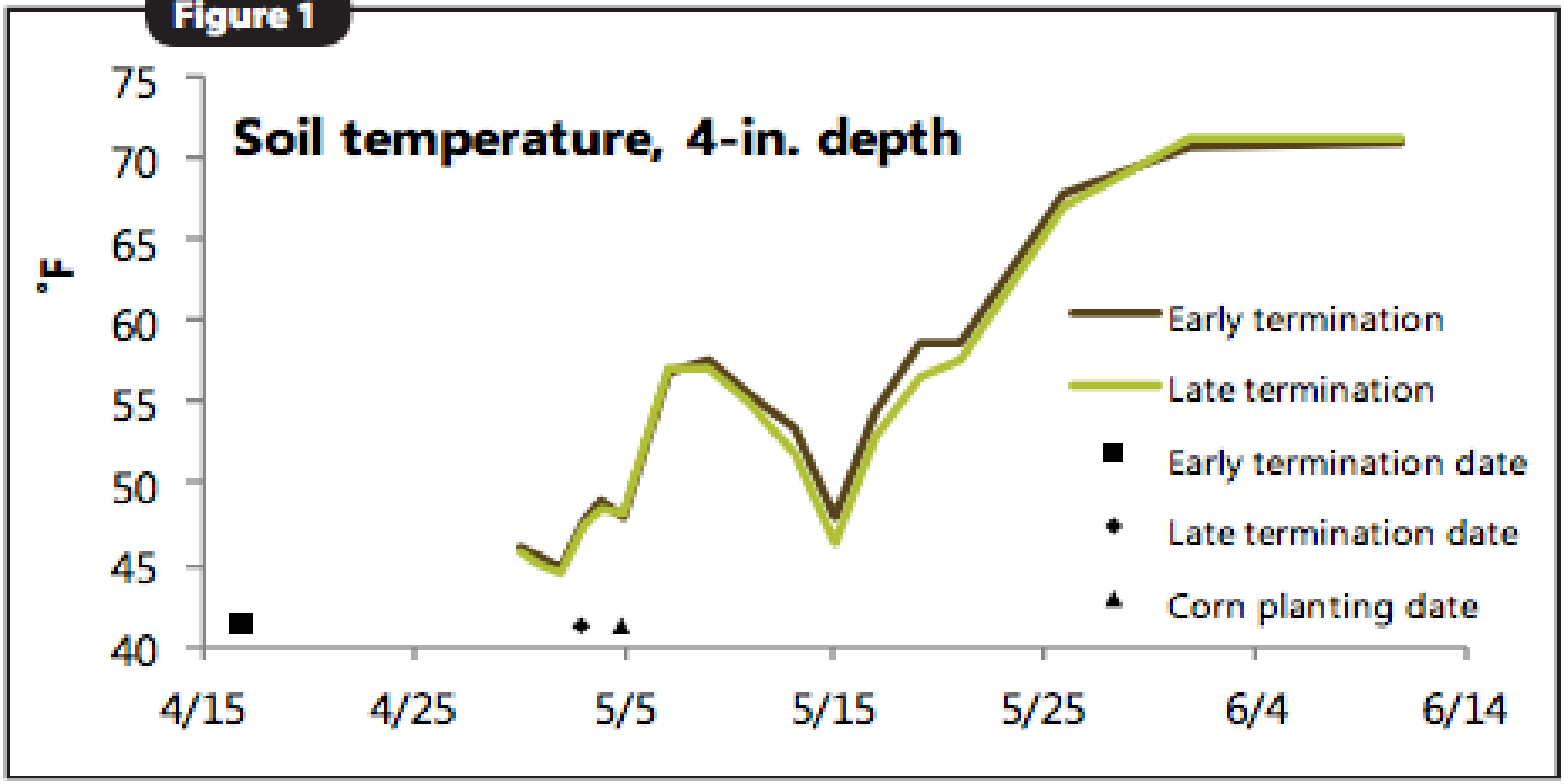
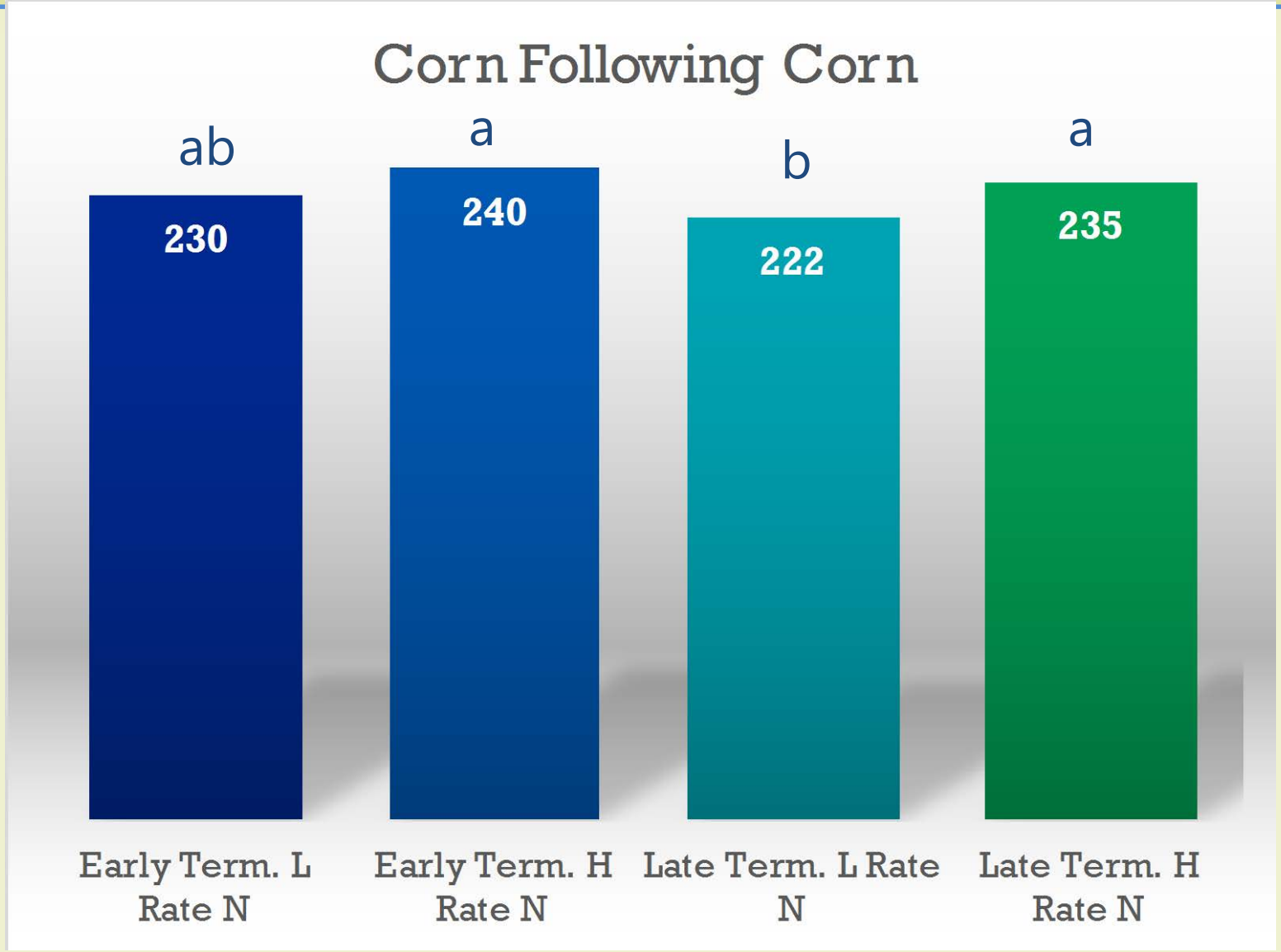


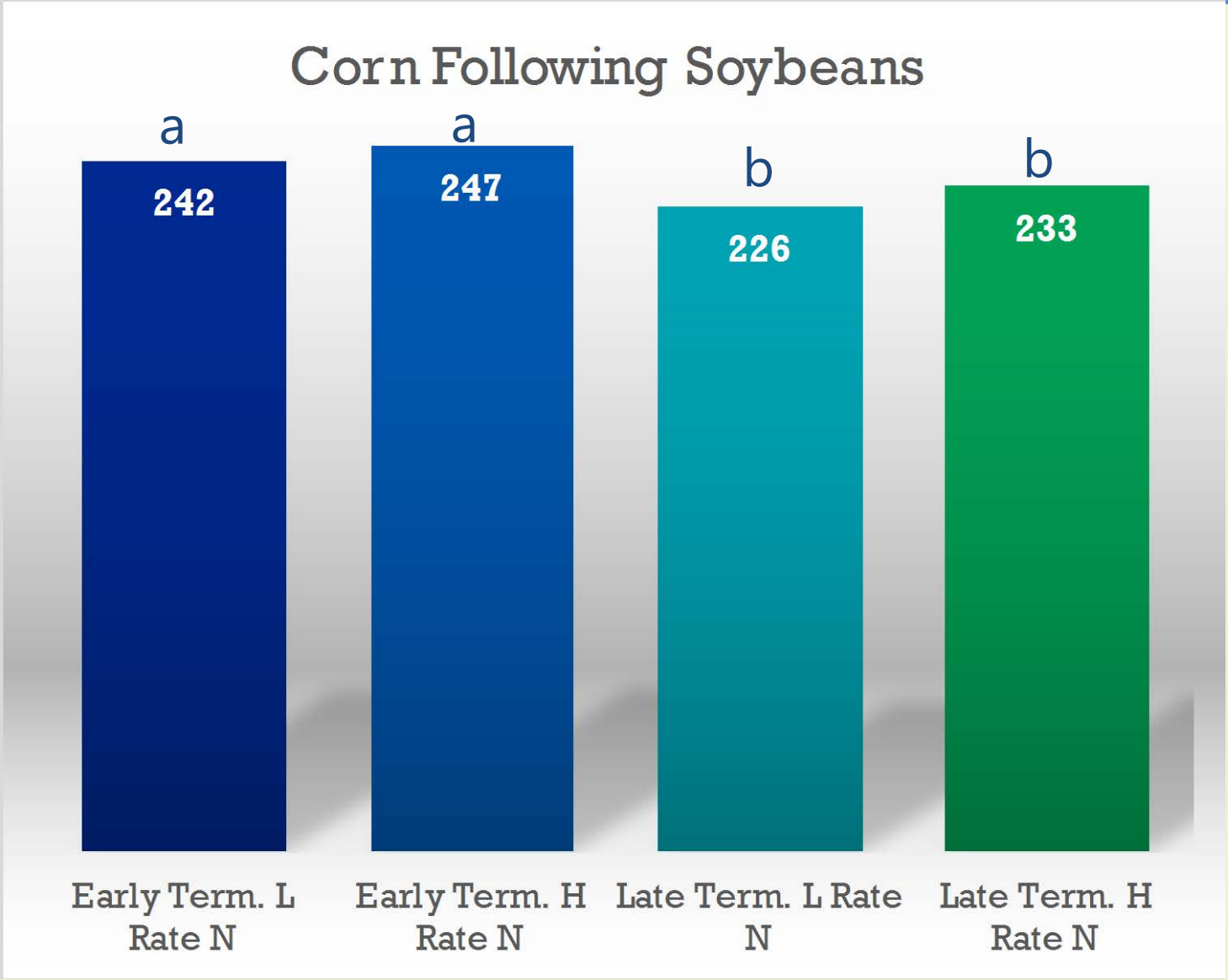
Figure 1. Soil temperatures to the 4-in. depth for the early and late cover crop termination treatments from April 30–June 11 at Dick Sloan's in 2016.

Early vs. Late Killed Cereal Rye & Nitrogen Rate Effect on Corn

Corn-on-Corn		Corn following Soybean	
Low	High	Low	High
76#N Fall Manure	76#N Fall Manure	15#N Before Planting	15#N Before Planting
35#N @ planting	35#N @ planting	35#N @ planting	35#N @ planting
70#N @ side-dress	90#N @ side-dress	100#N @ side-dress	120#N @ side-dress
181#N Total	201#N Total	150#N Total	170#N Total

Rye herbicide terminated 21 & 3 days before planting 5/8/2017


Corn Following Corn
ab
230
a
240
b
222
a
235
Early Term. L Rate N
Early Term. H Rate N
Late Term. L Rate N
Late Term. H Rate N


Corn Following Soybeans
a
242
a
247
b
226
b
233
Early Term. L Rate N
Early Term. H Rate N
Late Term. L Rate N
Late Term. H Rate N

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TURNS THIS …

into this.

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