DO COVER CROPS INCREASE OR DECREASE CORN YIELDS?

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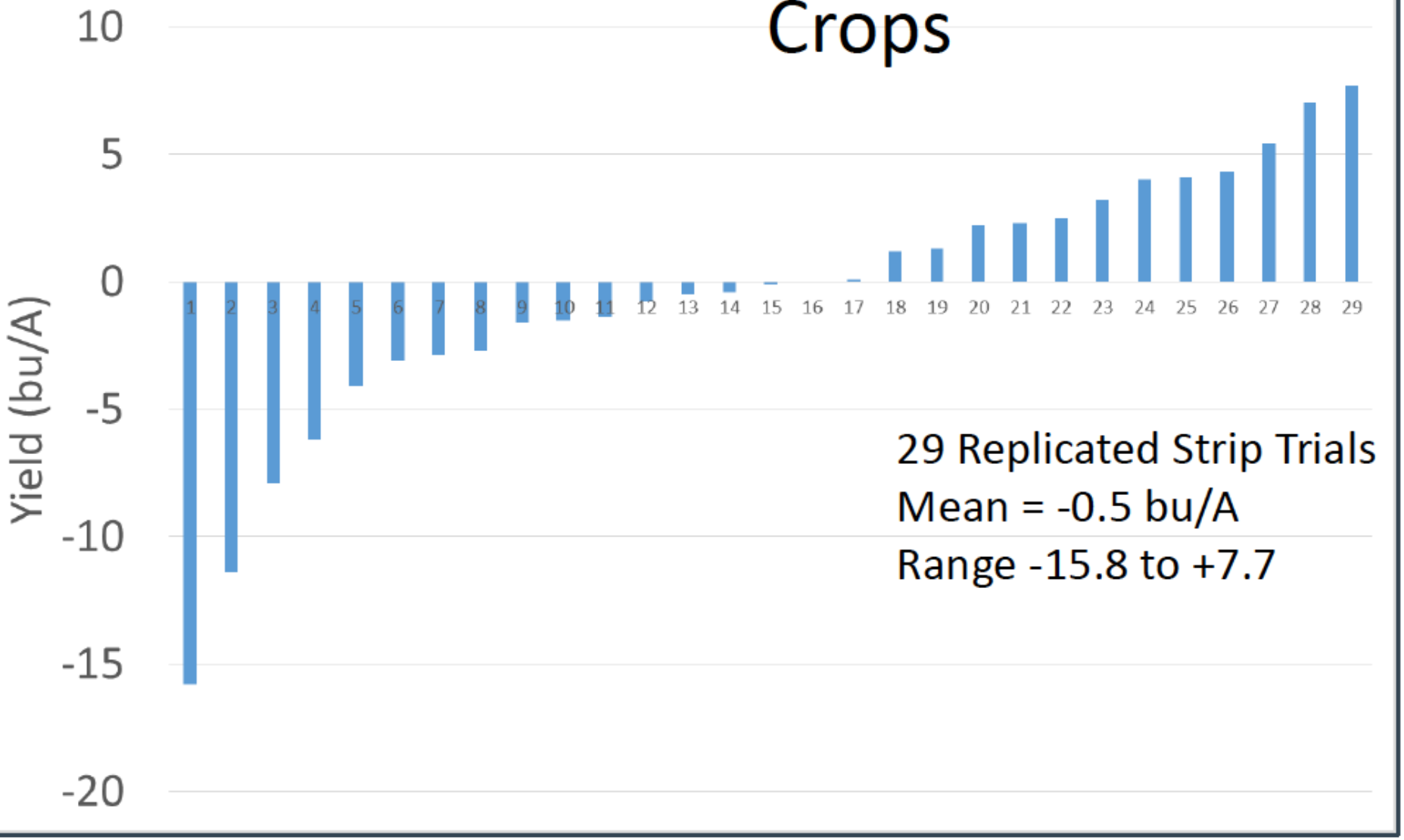
ON-FARM RESEARCH FROM IOWA SOYBEAN ASSOCIATION & ON-FARM NETWORK

http://www.isafarmnet.com/2015OFNConf/pdf/Paul_Cover_Crop_Results.pdf

Yield - Corn Following Cover



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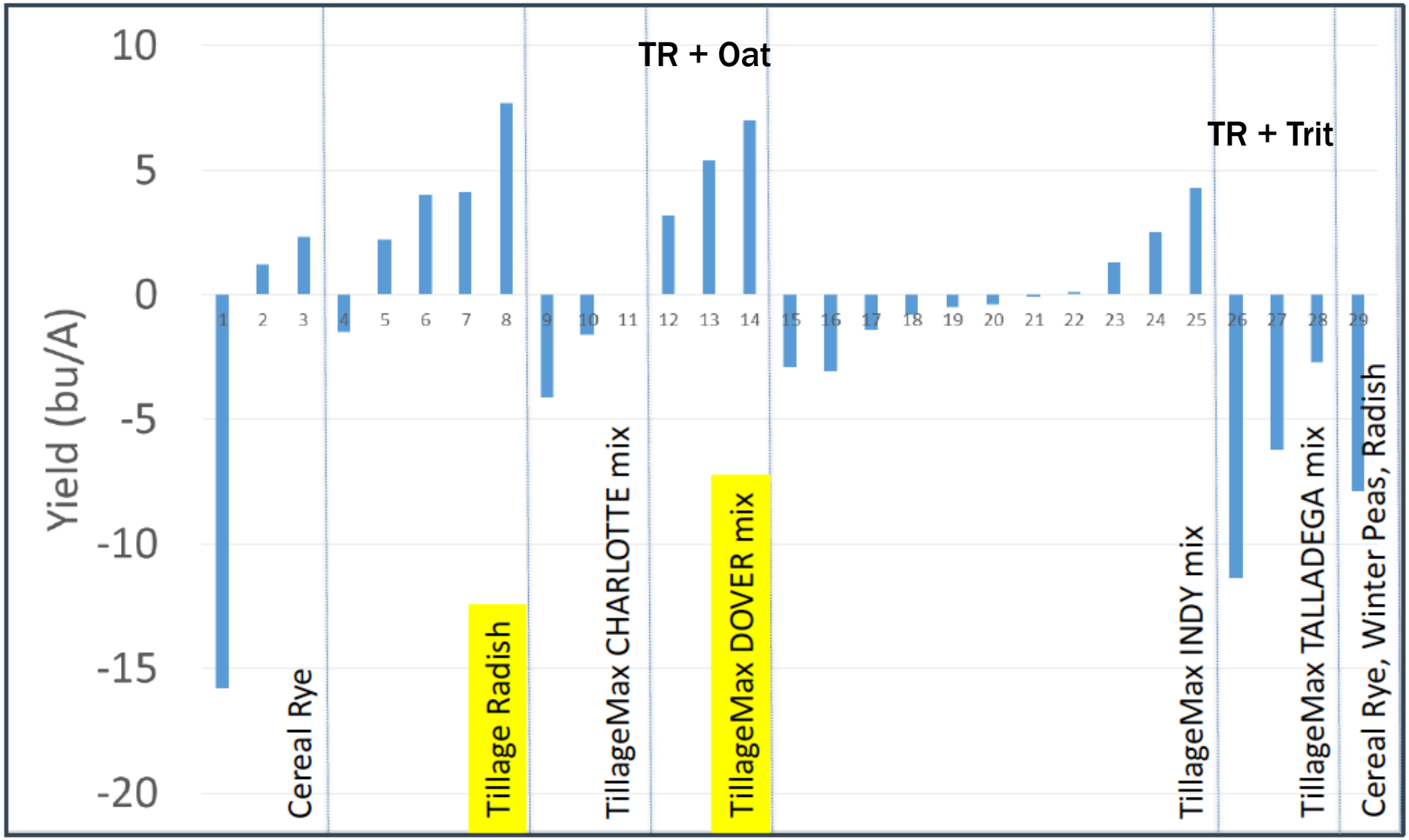
On-Farm Network



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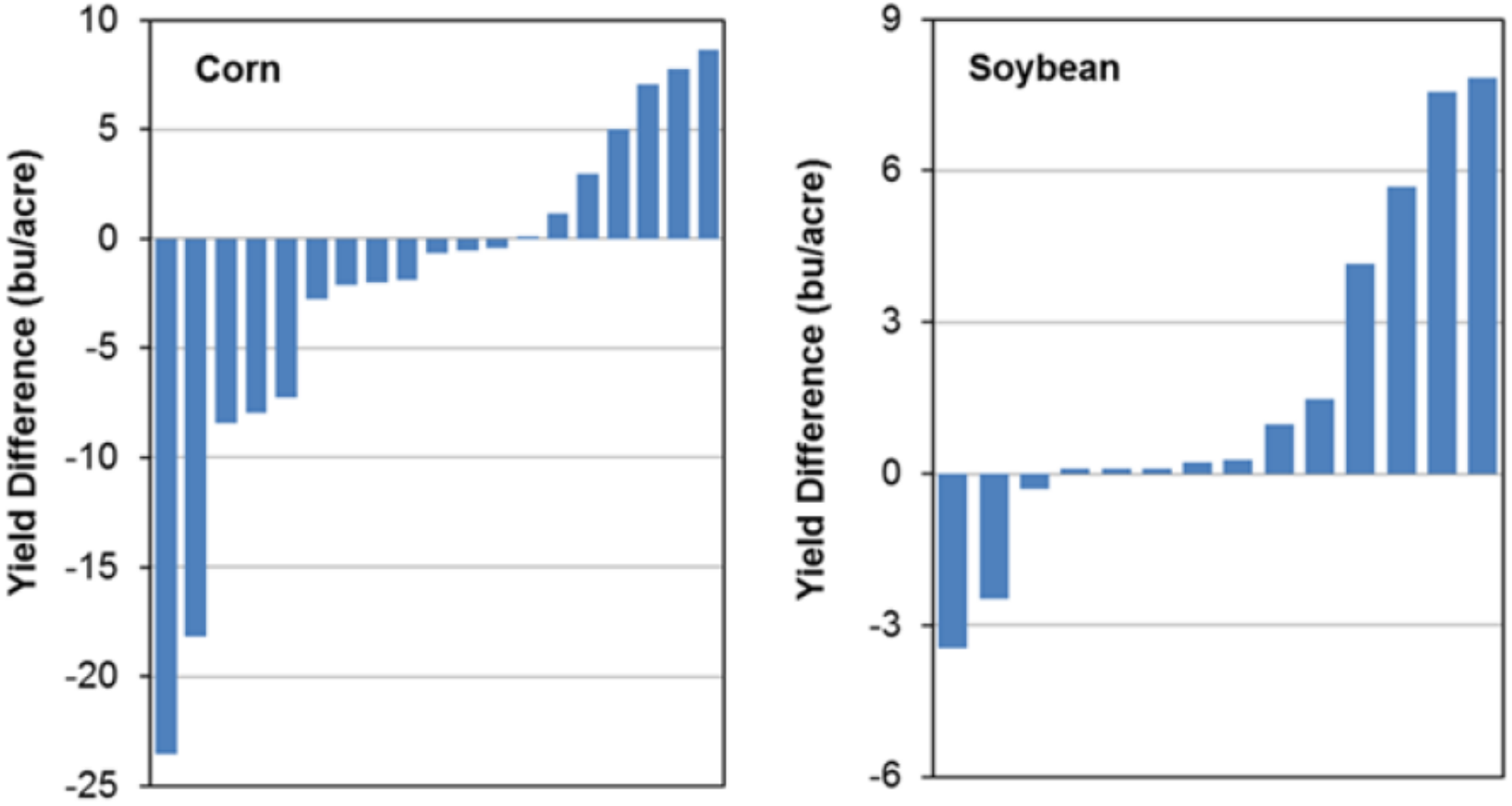
TR + Trit + Crimson

TR + Ryegrass + Crimson

On-Farm Network



Corn and soybean yield response to a cereal rye cover crop in a 4-year, on-farm trial in Iowa. Each bar represents the cover crop yield effect at 1 location in a single year. (Heggenstaller - DuPont Pioneer 2013)

On-Farm Network® Replicated Strip Trial Database

Description

This database contains summaries of individual replicated strip trials following On-Farm Network protocols. The summaries include essential management information, spatial yield data, and imagery. Scouting, soil and tissue sampling reports are included if available. The interface allows users to query by year, crop, trial type/detail and location.

Instructions

Watch the Video Tutorial

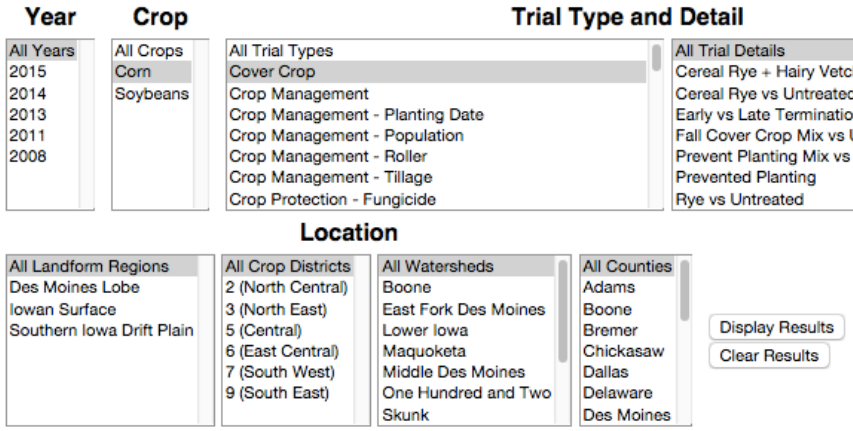
Limit trial results as desired by selecting one or more values for Year, Crop, Trial Type, Trial Detail, Crop District, Watershed, Landform Region, and County.

Hold the CTRL key and click to select multiple items.

After making all of your selections click Display Results.

If you choose just one crop you will see the average yield difference and also have the option to calculate ROI on the trials.

To reset your selections click Clear Results.



http://www.isafarmnet.com/onlinedb/

Corn

Average Yield Difference of the 50 trials displayed: **0.0** bu/acre.

90% Confidence Interval for the Average Yield Difference: from **-1.0** to **1.0** bu/acre.

Soybean

Average Yield Difference of the 12 trials displayed: **0.2** bu/acre.

90% Confidence Interval for the Average Yield Difference: from **-0.6** to **1.0** bu/acre.

Winter Cereal Rye Cover Crop Effect on Cash Crop Yield

Year 5

Iowa Learning Farms and Practical Farmers of Iowa

http://practicalfarmers.org/farmer-knowledge/research-reports/2014/winter-cereal-rye-cover-crop-effect-cash-crop-yield/

http://practicalfarmers.org/farmer-knowledge/research-reports/2015/winter-cereal-rye-cover-crop-effect-on-cash-crop-yield-year-6/

In 3 of 22 site-years, a rye cover crop reduced subsequent corn yields.

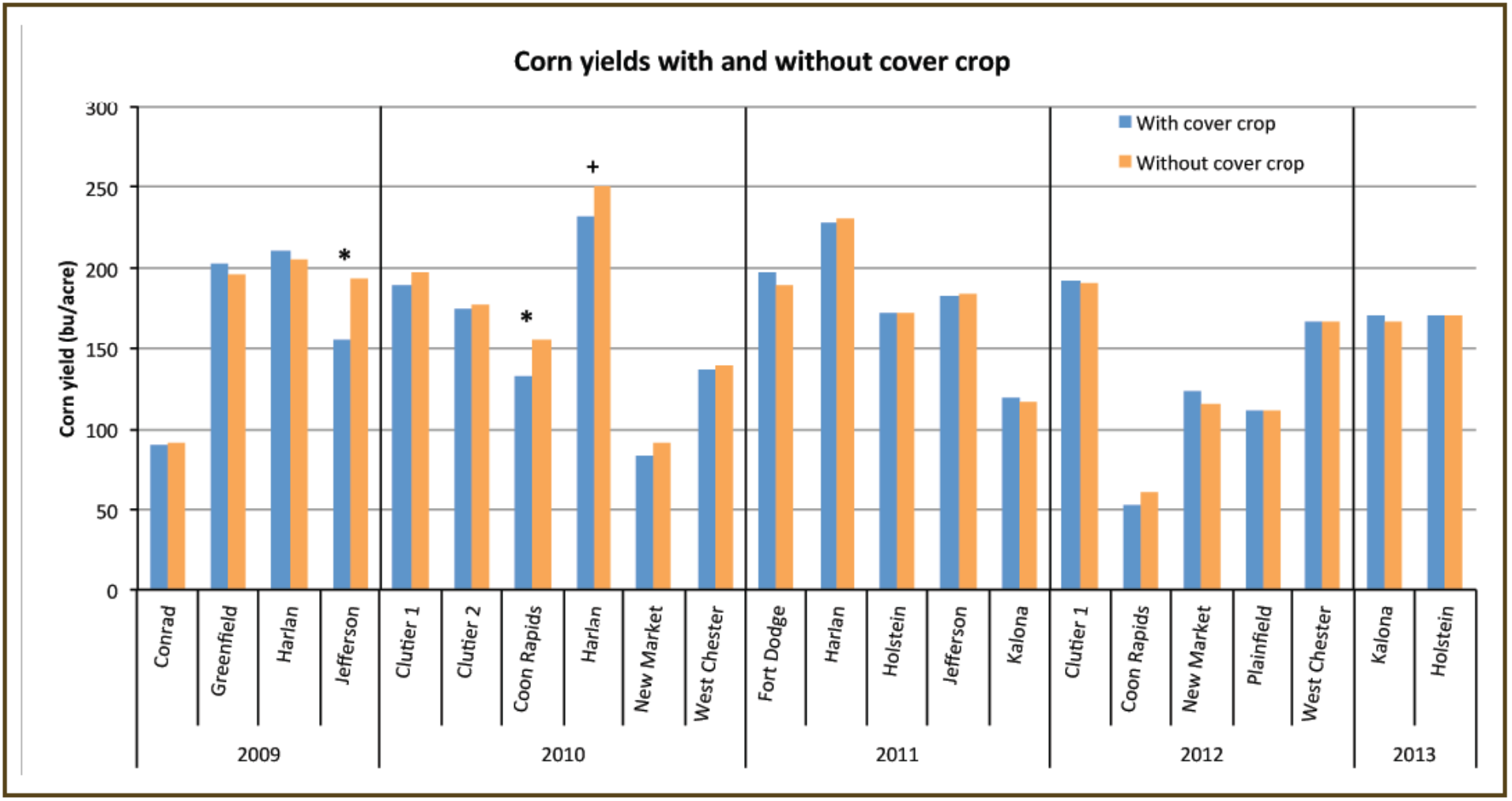


Figure 1. Corn yields with and without a winter cereal rye cover crop from 2009-2013 (22 site-years). Columns overwritten with * denote significance at $P \leq 0.05$ and overwritten with + denote significance at $0.05 < P \leq 0.10$.

In 4 of 18 site-years, a rye cover crop increased soybean yields.

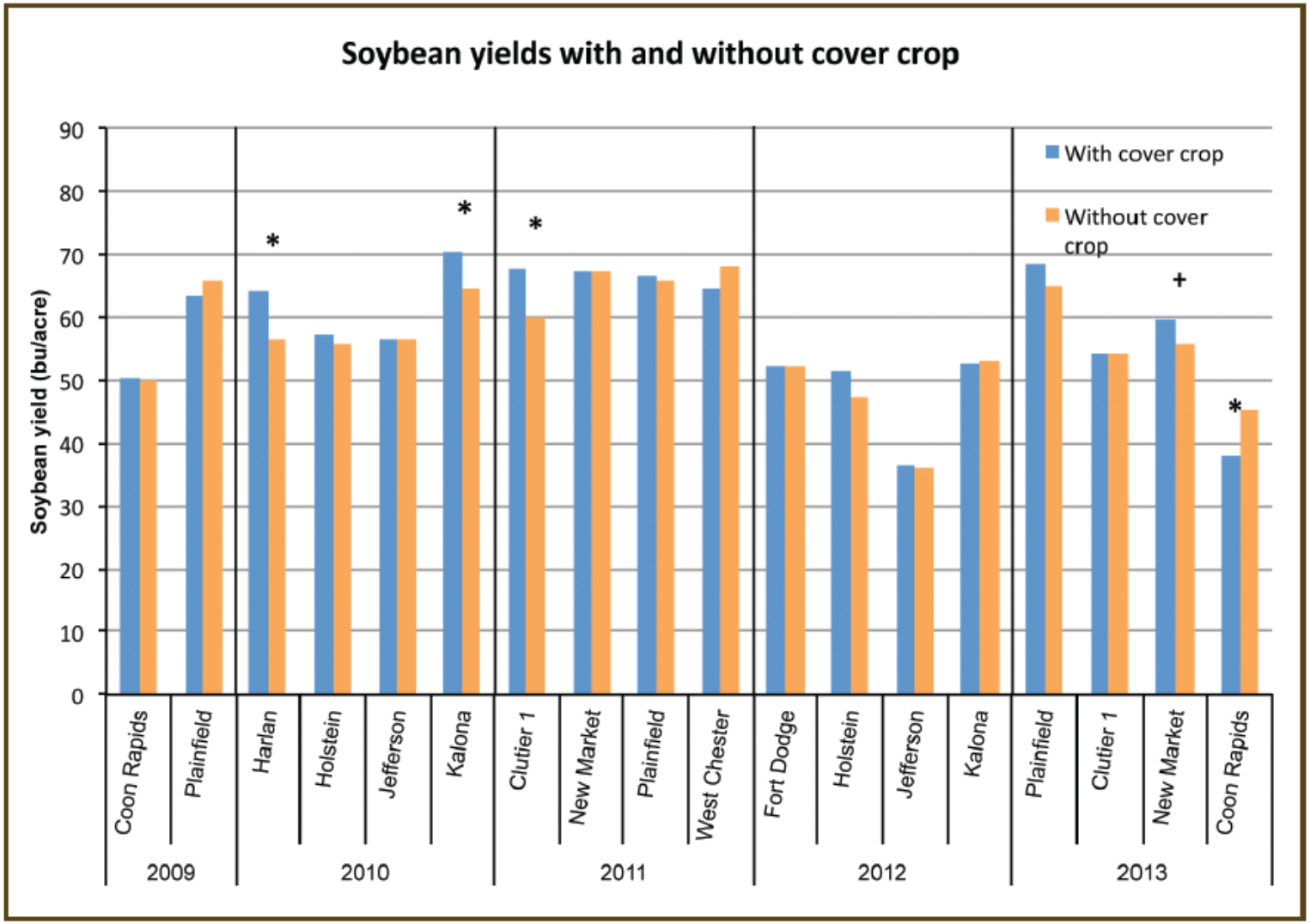


Figure 2. Soybean yields with and without a winter cereal rye cover crop from 2009-2013 (18 site-years). Columns overwritten with '*' denote significance at $P \leq 0.05$ and overwritten with '+' denote significance at $0.05 < P \leq 0.10$.

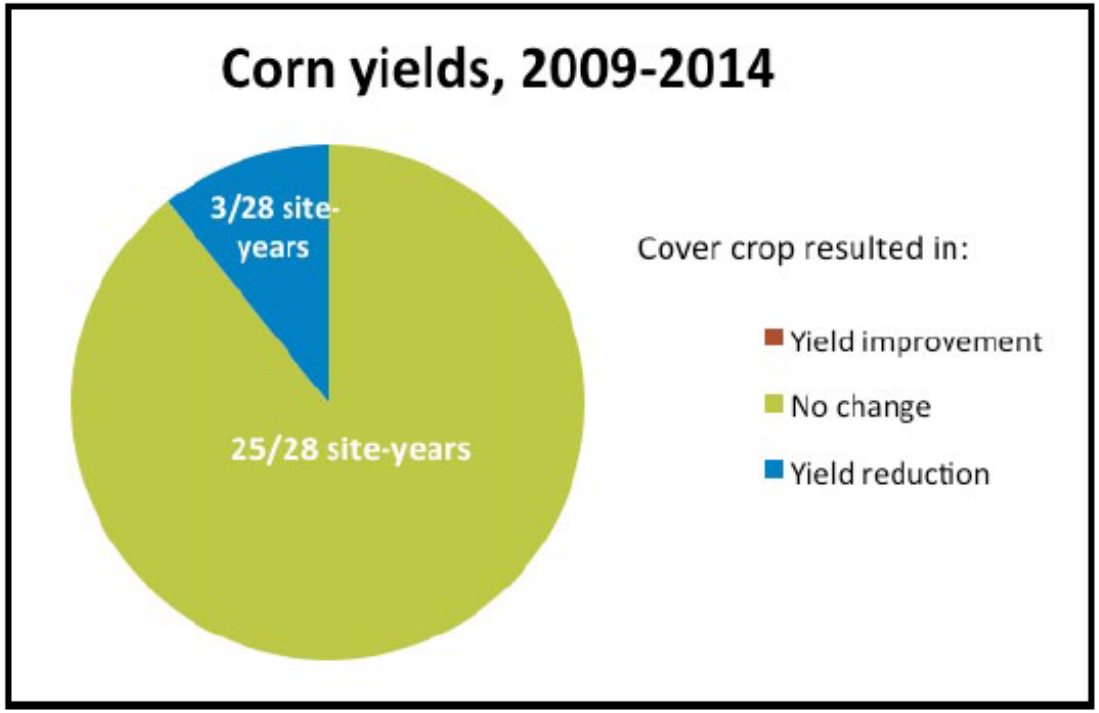


Figure 2. Trends with respect to cover crop effect on corn yields at 28 site-years from 2009 to 2014.

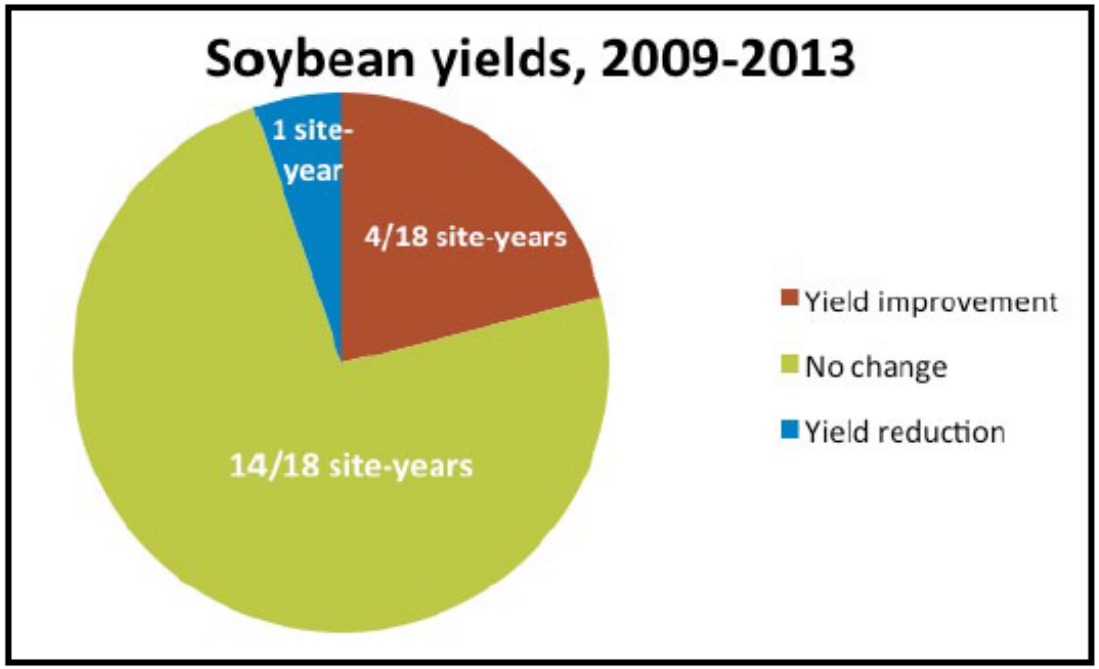
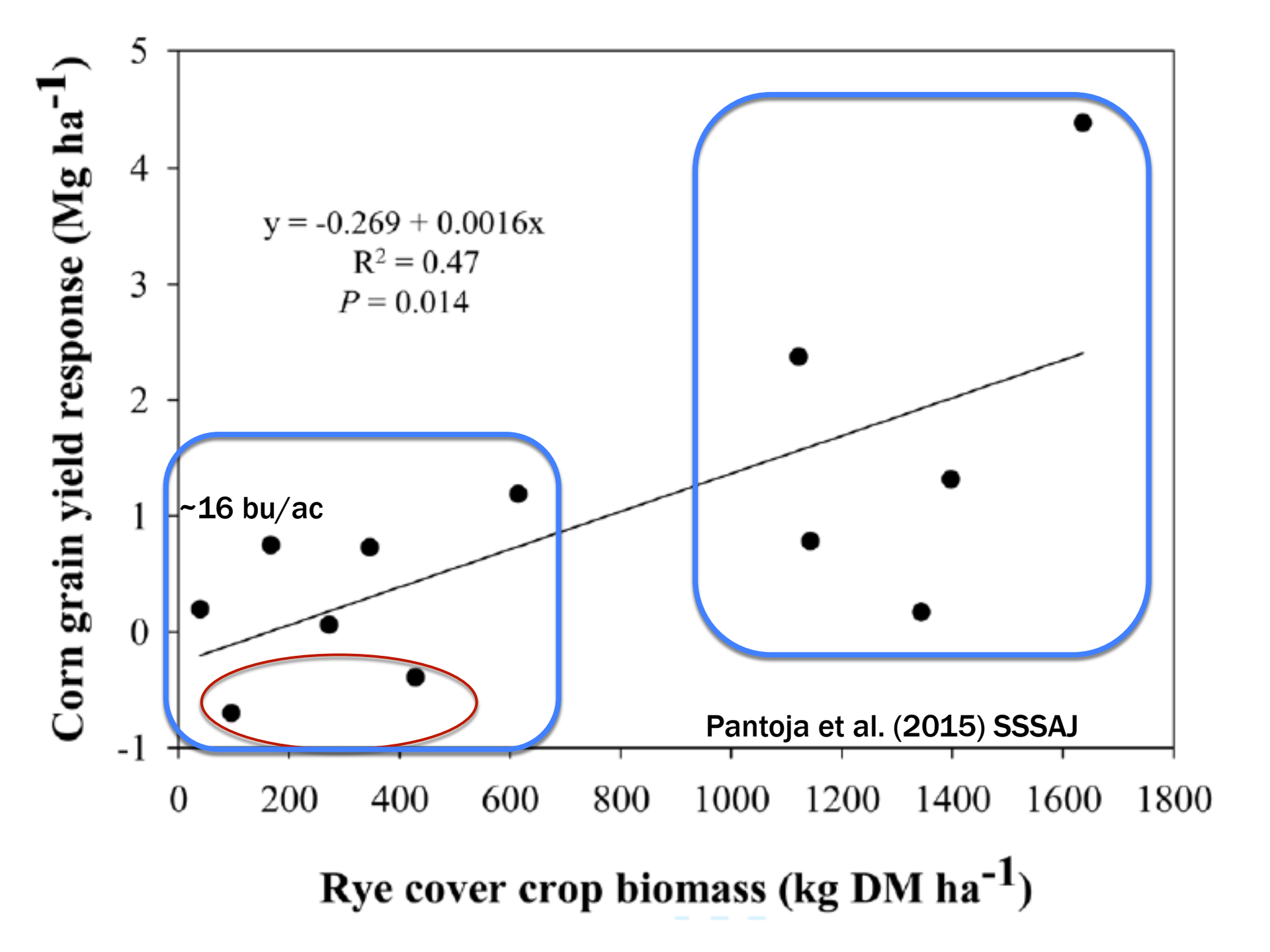
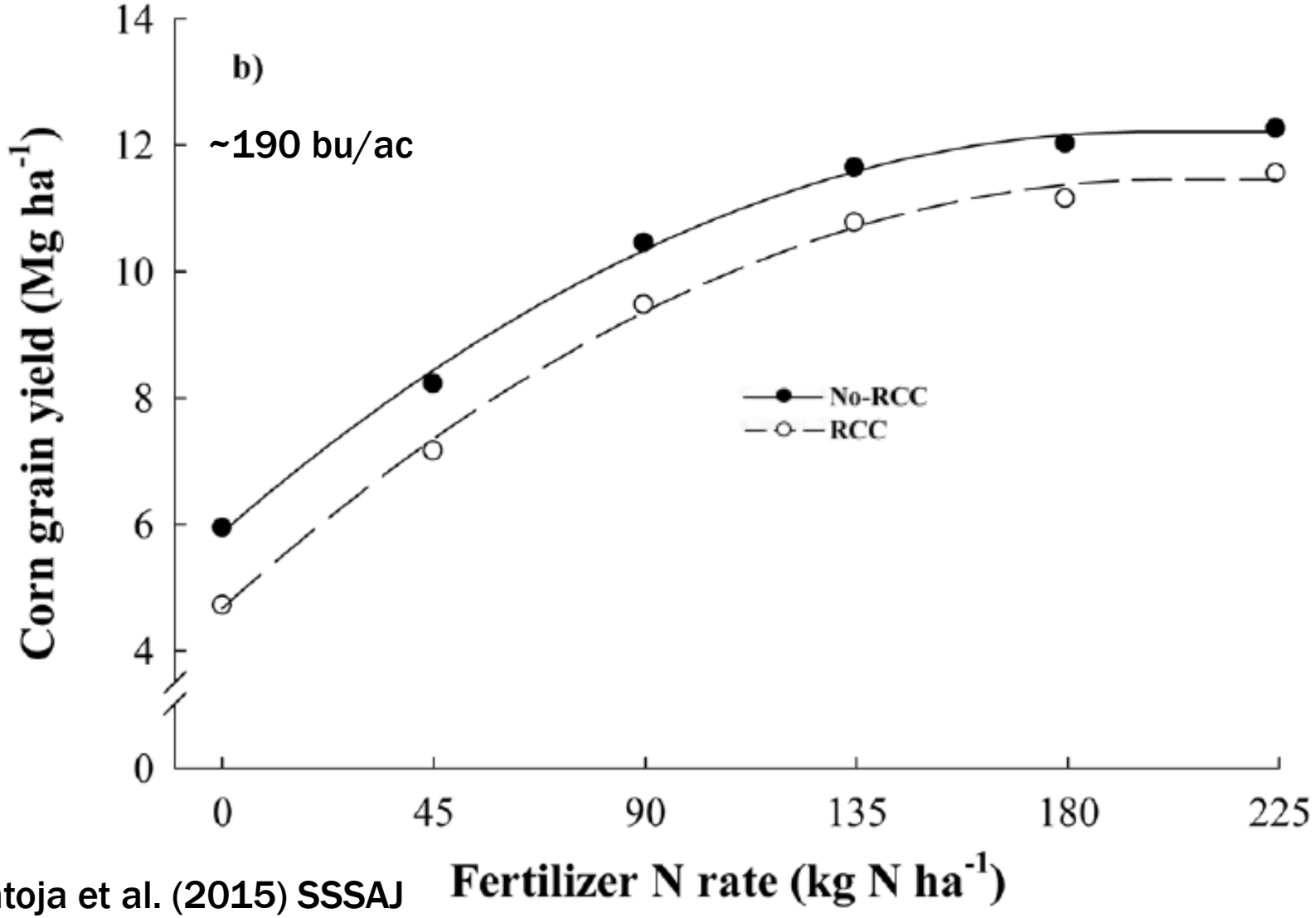


Figure 3. Trends with respect to cover crop effect on soybean yields at 18 site-years from 2009 to 2013.

WHAT IS THE CAUSE OF THE YIELD DECREASE?


Corn grain yield response (Mg ha-1)
5
4
3
2
1
0
-1
y = -0.269 + 0.0016x
R2 = 0.47
P = 0.014
~16 bu/ac
Pantoja et al. (2015) SSSAJ
0
200
400
600
800
1000
1200
1400
1600
1800
Rye cover crop biomass (kg DM ha-1)



Pantoja et al. (2015) SSSAJ

Two years, four locations = 8 site-years in Iowa
C-S rotation, always the first year effect of cover cropping

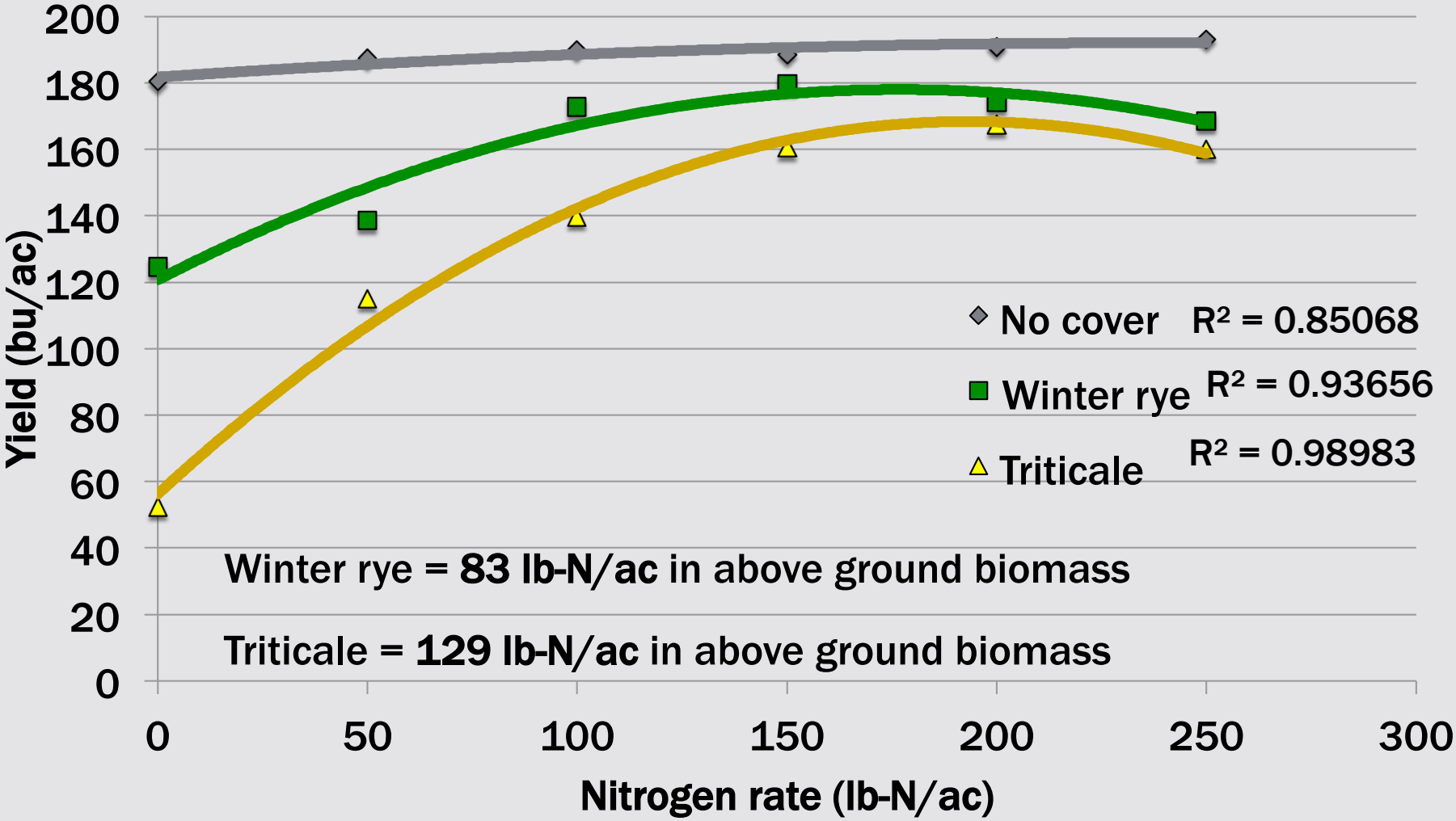
Rye Cover Crop Effects on Soil Quality in No-Till Corn Silage–Soybean Cropping Systems

Soil Sci. Soc. Am. J. 78:968–976

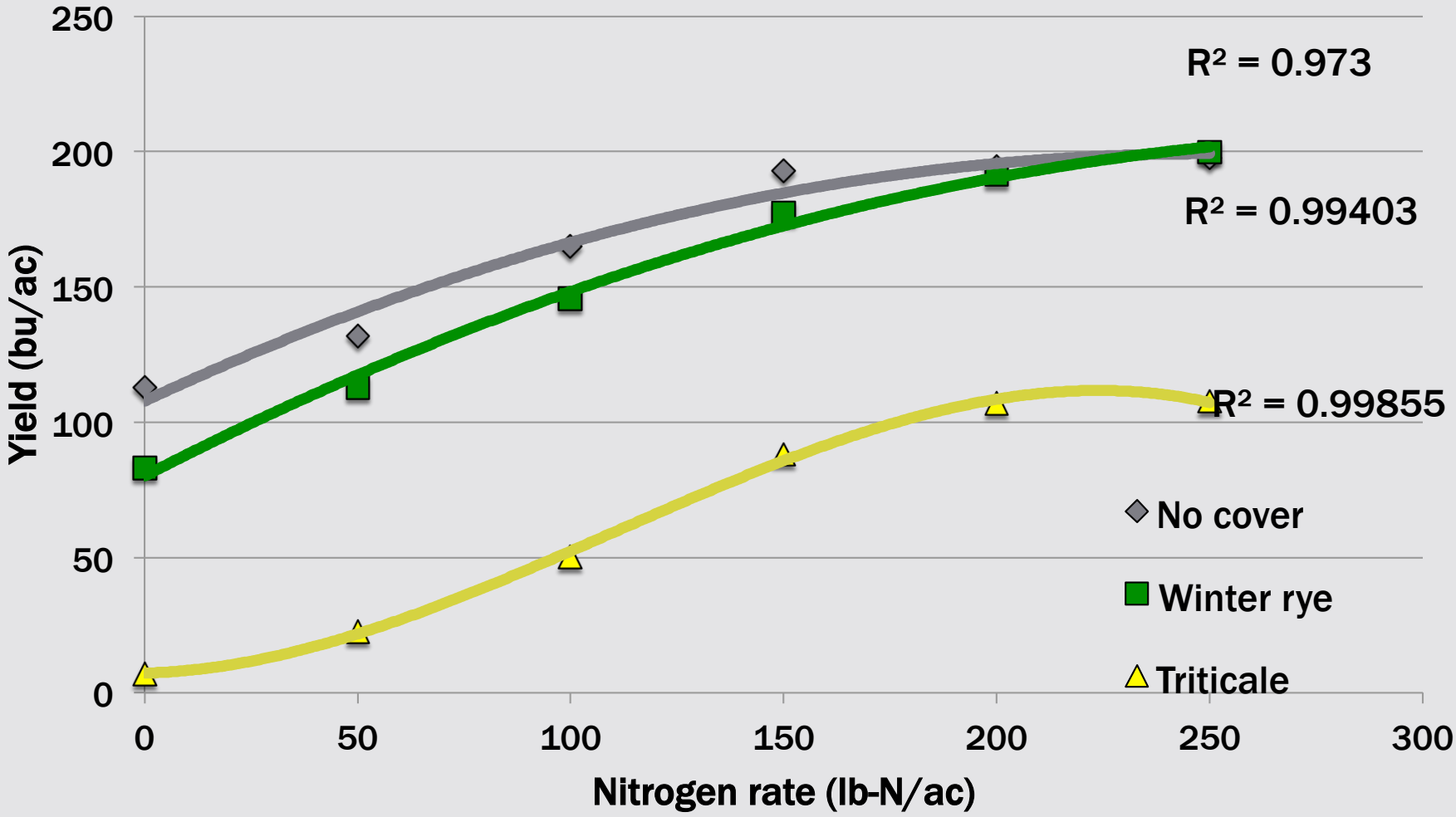
	2009 Soybean	2010 Silage	2011 Soybean	2009 Silage	2010 Soybean	2011 Silage
	bu/ac	ton/ac	bu/ac	ton/ac	bu/ac	ton/ac
Rye	59	25	52	25	44	25
No cover	58	24	51	24	40	24

- Study started in 2001
- Difference in SOM
  - No cover = 4.9%
  - Rye cover = 5.7 %
- Difference in N supply from the soil
  - Rye cover crop had 38% greater N supply compared to no cover
- No starting values…

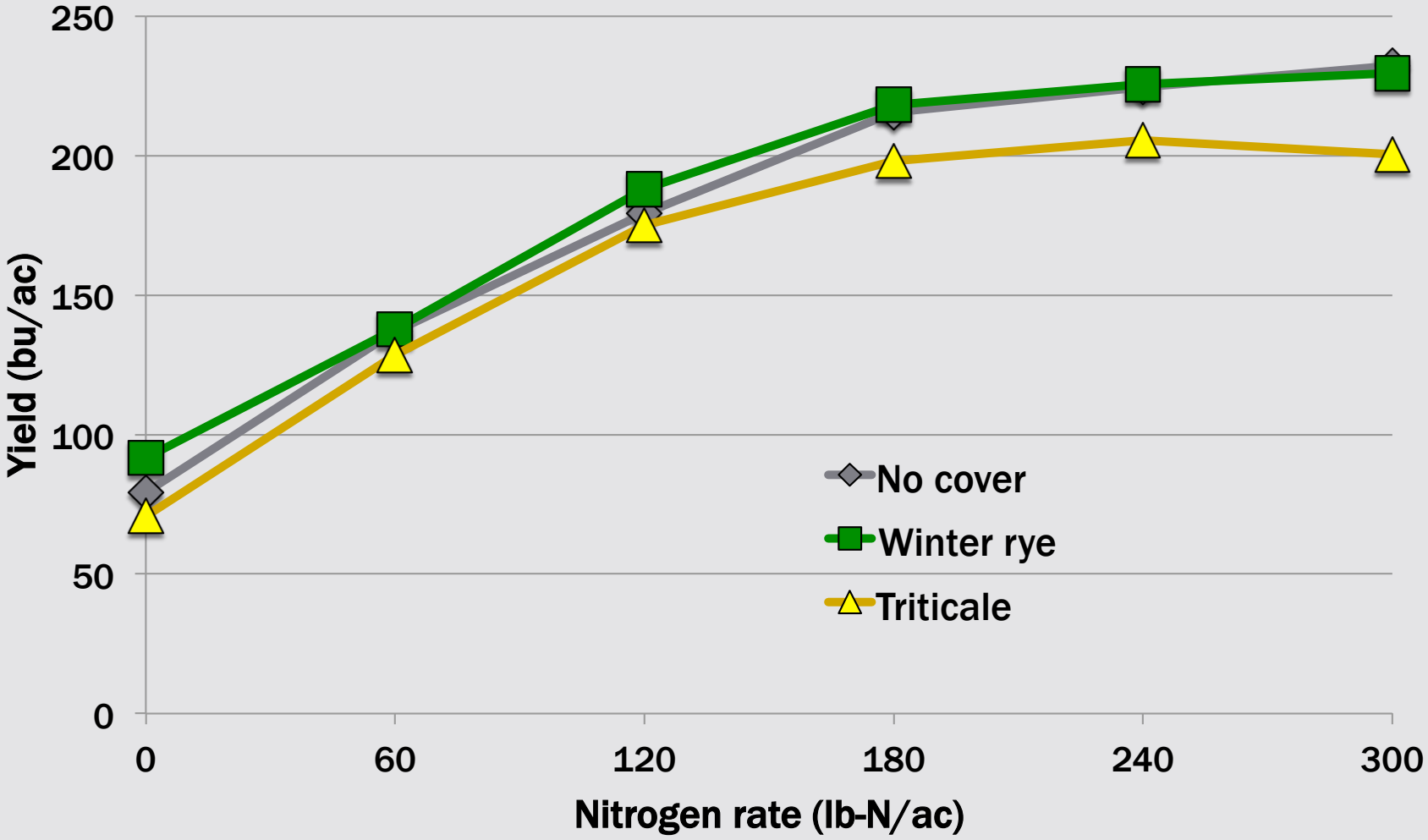
ARLINGTON: Clear difference in optimum N rate with rye or triticale, and yield drag with winter rye.



LANCASTER: No yield drag, but different optimum N rate for winter rye



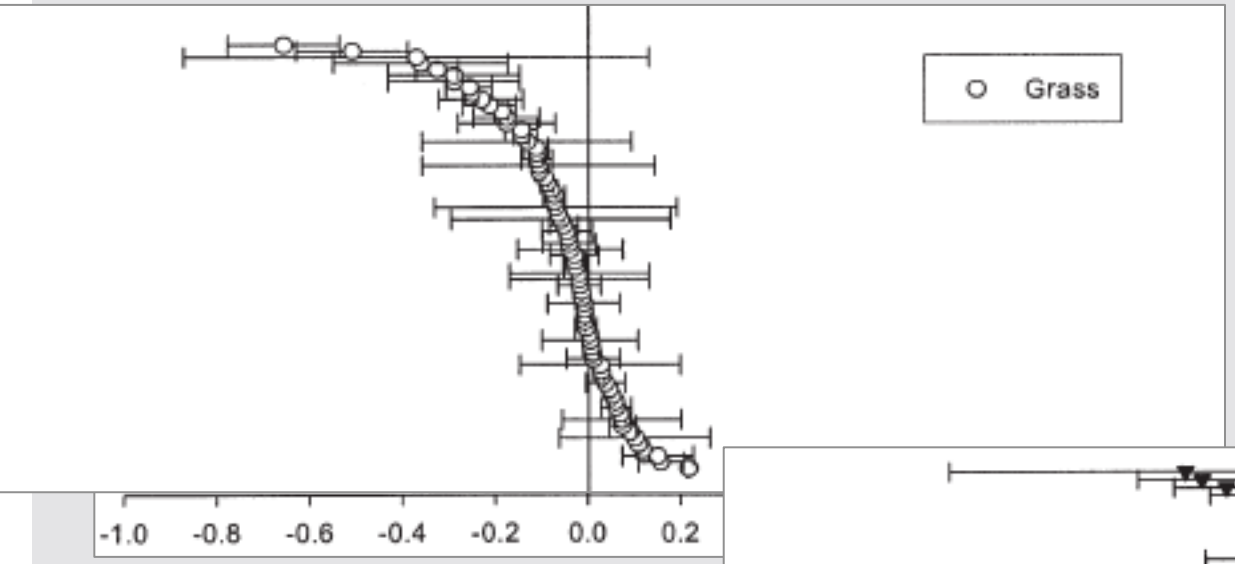
HANCOCK: Winter rye did not affect yield relative to No CC; some yield drag with triticale.



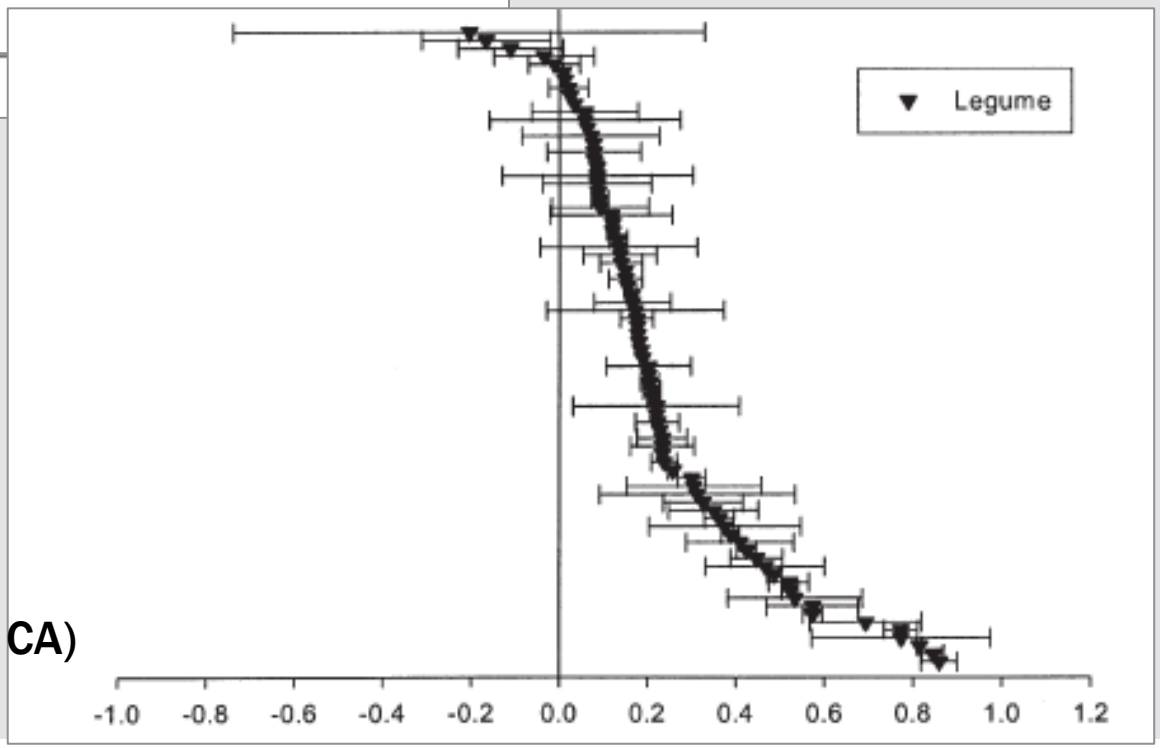
Review of Corn Yield Response under Winter Cover Cropping Systems Using Meta-Analytic Methods

Fernando E. Miguez and Germán A. Bollero*

2005 publication

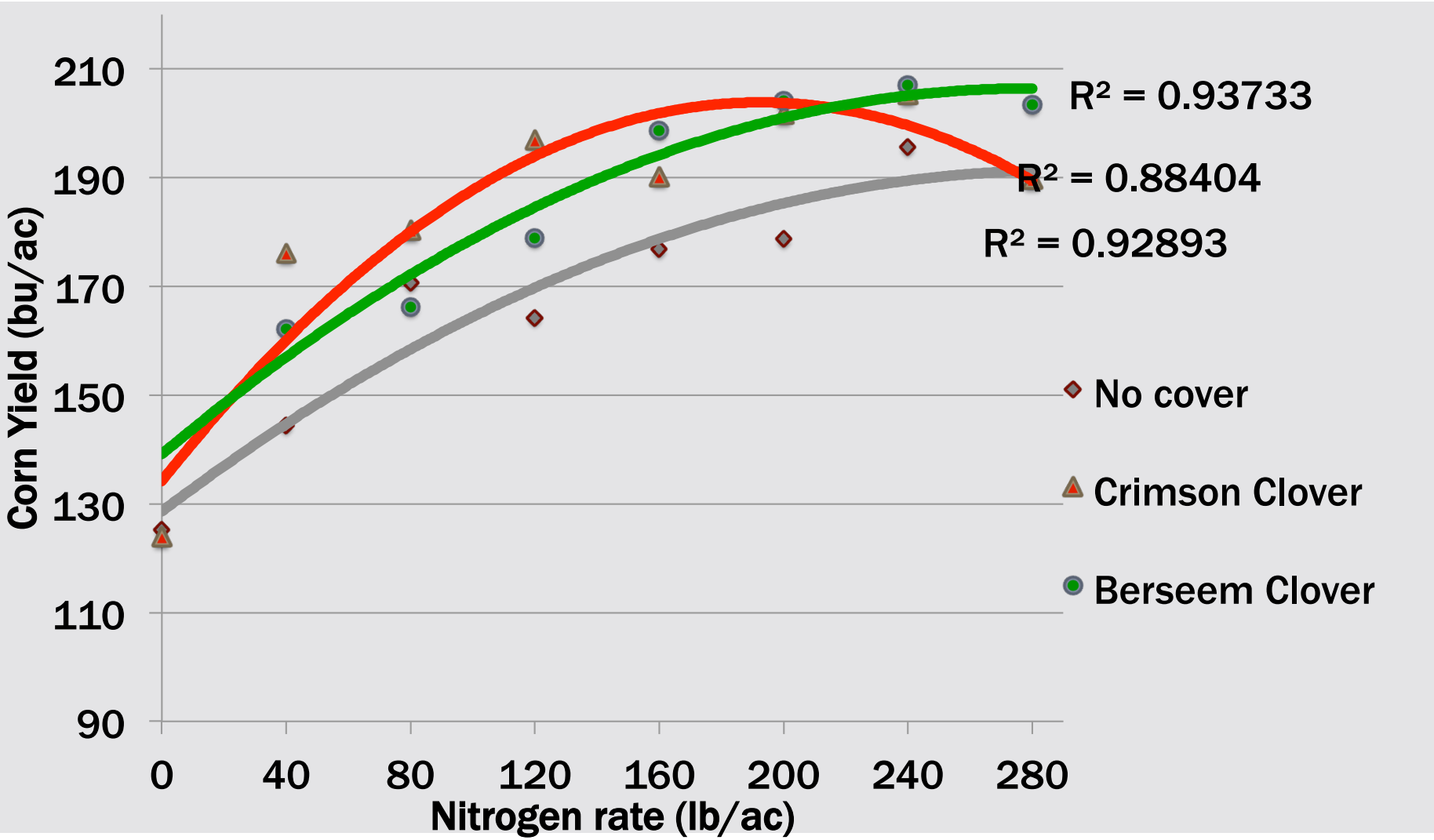


68 observations (US & CA)



82 observations (US & CA)

Clovers increase yield by up to 20 bu/ac; possible reduction in N rate.



CONCLUSIONS

- The general consensus is that grass cover crops have the potential to reduce corn yields, but more recent studies don't show as great of a probability.
- Sometimes you can make up yield with more N, sometimes you can't.
- More cover crop biomass = greater potential for yield reduction (and less likelihood more N will help).
- Soybeans yields are less impacted by grass covers.
- Legume cover crops are more likely to increase yields.

FUTURE QUESTIONS

- How does the relationship between grass cover crops and corn yield vary among soil series?
  - Or spatially within a field?
- Are reductions in yield only associated when first incorporating cover crops into rotation?
  - Do long-term benefits offset the short-term risk?
- What are the drivers of soybean yield increases caused by cover crops?
- Is radish really that great?
- How can we get legume cover crops into our corn production systems?


THOUGHTS?
COMMENTS?
CONCERNS?

No-Tillage Corn and Grain Sorghum Response to Cover Crop and Nitrogen Fertilization

Timothy M. Reinbott, Shawn P. Conley,* and Dale G. Blevins

Cover crop	Average corn yield (3 yrs)
	bu/ac
None	77.0
Oat	72.7
Hairy Vetch	80.7
Hairy Vetch + Oat	77.8
Winter Pea	82.7
Winter Pea + Oat	71.3

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journal homepage: www.elsevier.com/locate/agee

Cover crop effect on corn growth and yield as influenced by topography

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