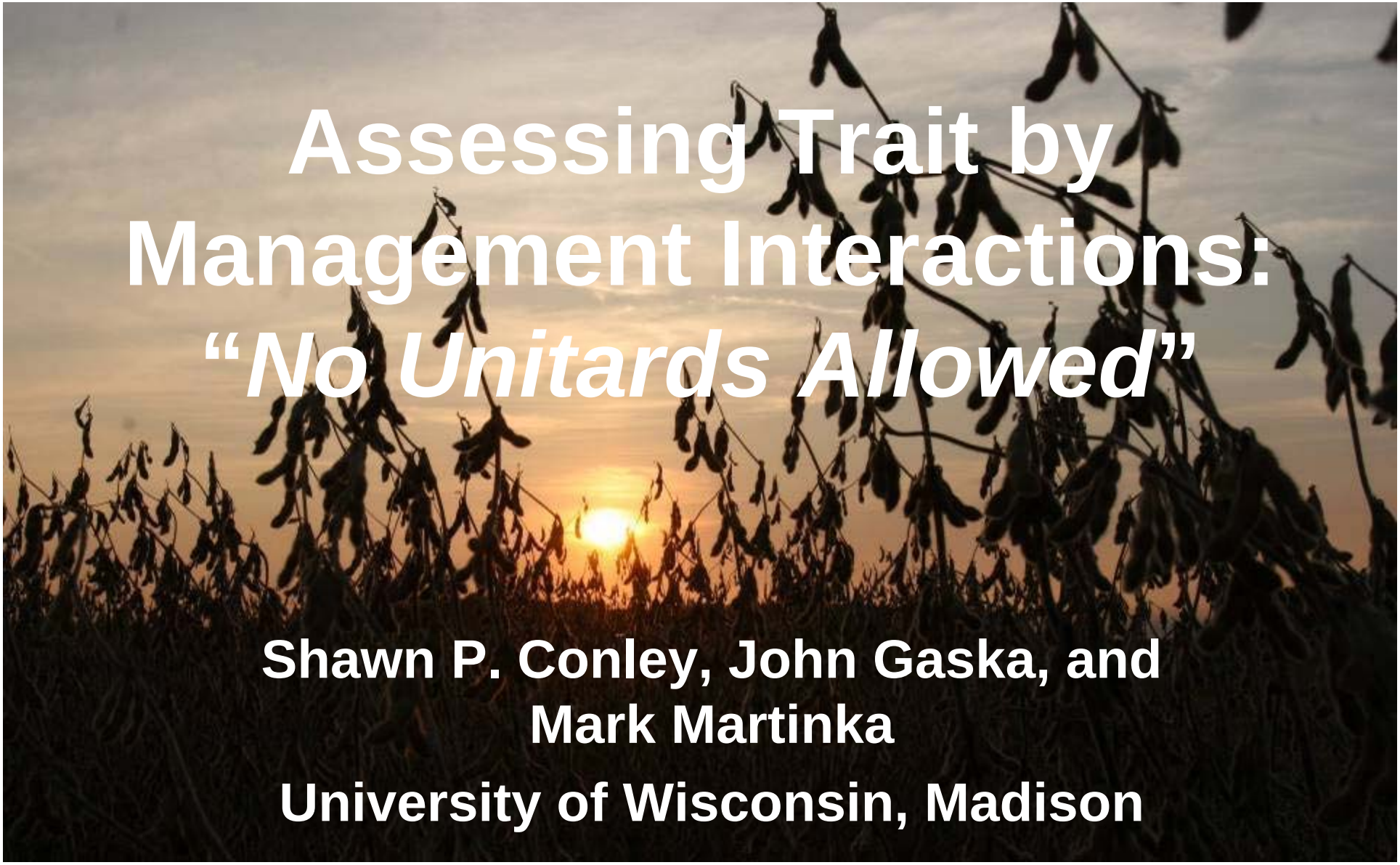


Assessing Trait by Management Interactions: "*No Unitards Allowed*"

Shawn P. Conley, John Gaska, and Mark Martinka

University of Wisconsin, Madison

THE UNIVERSITY of WISCONSIN MADISON

WISCONSIN SOYBEAN MARKETING BOARD

UW Extension

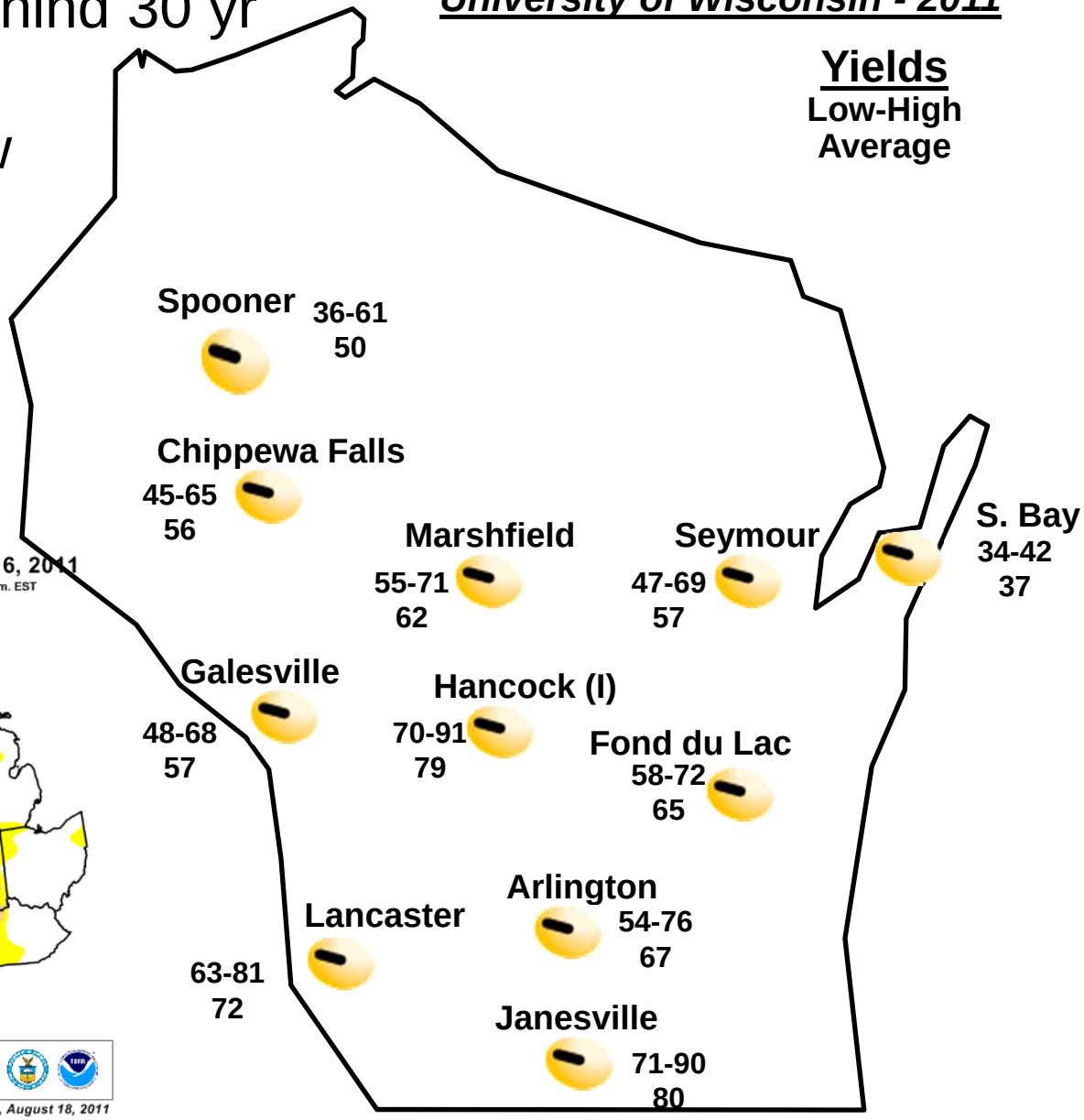
2011

- **3rd highest state (47.0 bu a^{-1})**
- < 100-200 GDU's behind 30 yr
- Variable rainfall
- Harvest moisture low
- $10.80 bu^{-1} ave. WI

Soybean Variety Test Locations

University of Wisconsin - 2011

Yields
Low-High
Average



U.S. Drought Monitor

Midwest

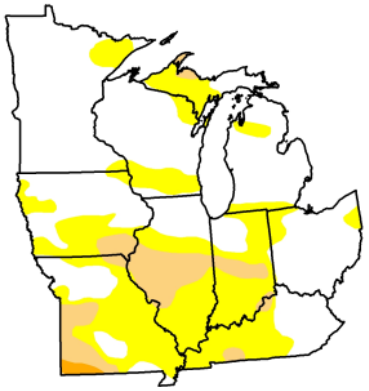
August 16, 2011
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	57.85	42.15	9.54	0.51	0.00	0.00
Last Week (08/09/2011 map)	62.00	38.00	10.05	0.52	0.00	0.00
3 Months Ago (05/17/2011 map)	98.83	1.17	0.00	0.00	0.00	0.00
Start of Calendar Year (12/28/2010 map)	79.27	20.73	4.91	1.31	0.29	0.00
Start of Water Year (09/28/2010 map)	74.54	25.46	9.61	2.68	0.00	0.00
One Year Ago (08/10/2010 map)	85.97	14.03	6.81	1.67	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://drought.unl.edu/dm

Released Thursday, August 18, 2011
Laura Edwards, Western Regional Climate Center

What is the Question you are Trying to Answer?

Lets clarify some simple stats

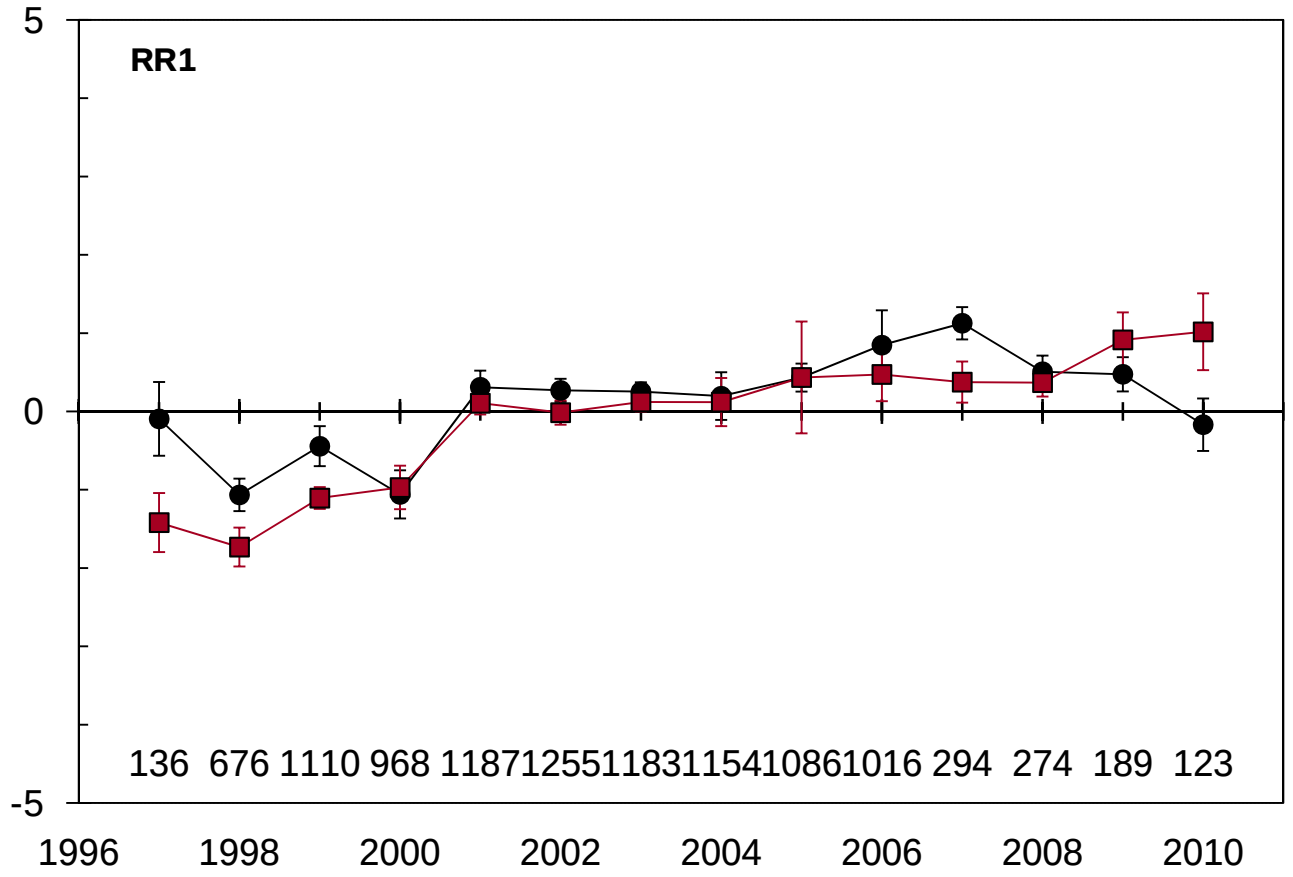
- Hypothesis: proposed explanation for a phenomenon of interest

- P-value : the probability of obtaining/observing a test statistic at least as extreme or more extreme than the observed outcome

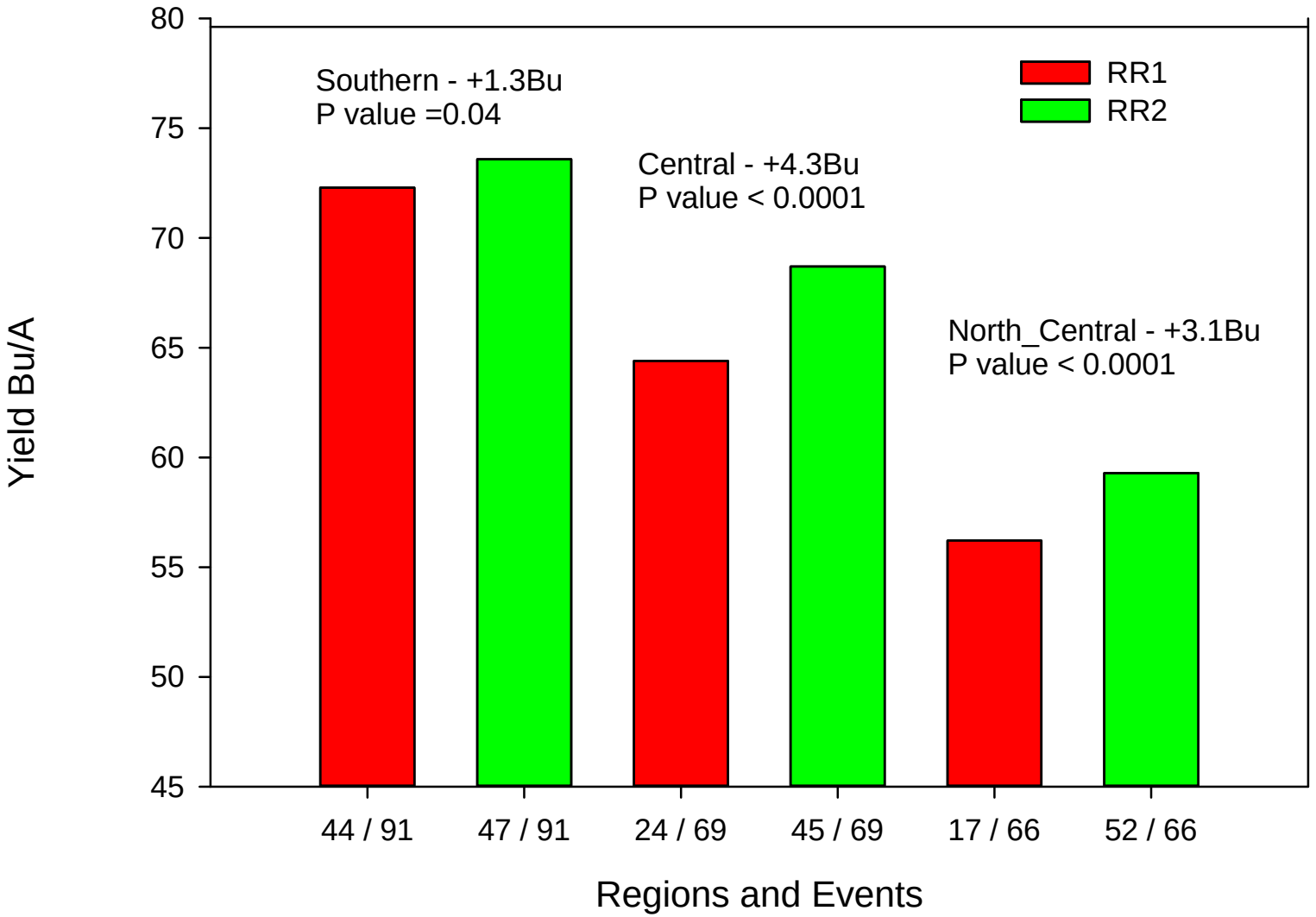
- Level of significance: amount of evidence necessary to accept that an event is unlikely to have occurred by chance (links with the P-value)

Why do we care…Straight up Yield

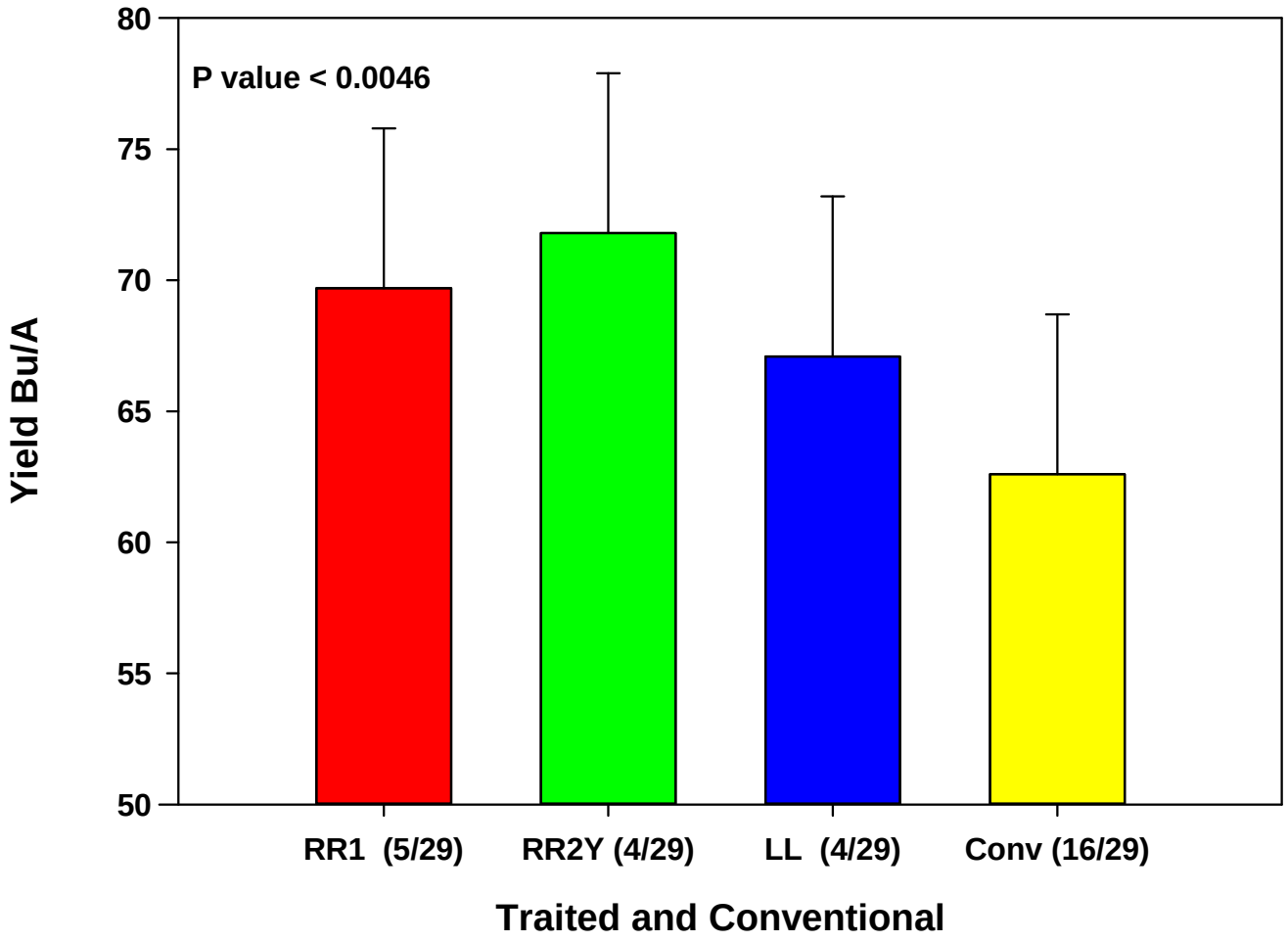
- New traits and novel product pipeline



2011 Regional Event Average Yields

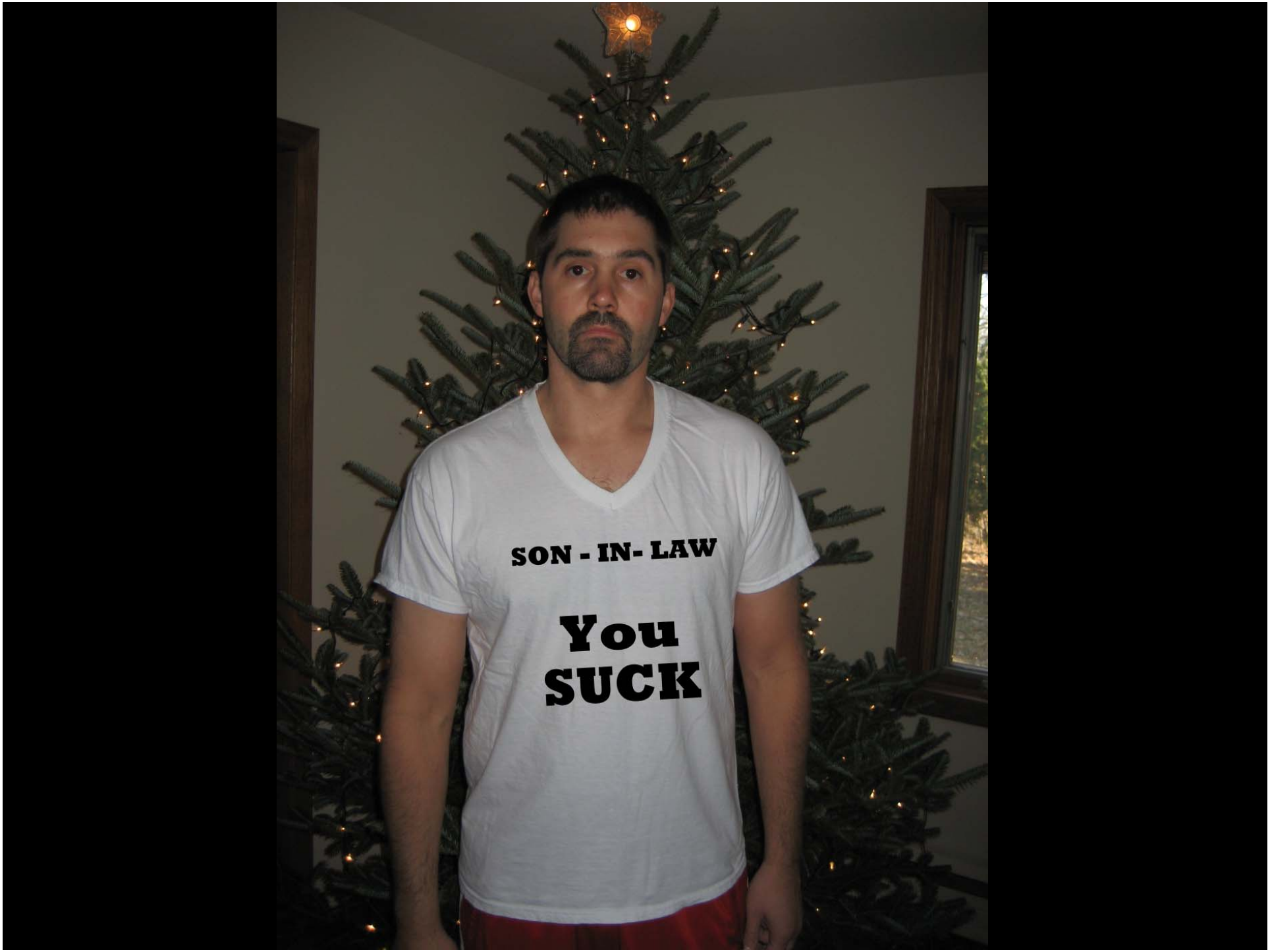


2011 Southern Region Traited and Conventional Herbicide Average Yields




I heard what you said about me!!!
Disclaimer: Not an actual picture of my mother-in-law.


SON - IN - LAW
1


SON - IN- LAW
You
SUCK

Why else do we care……

- Input interactions and “Synergies”

- Agronomy update 2011 (N=274)
  - Will “New” Soybean Traits be More Responsive to High Input Management?

Objectives

- Characterize the effect of multiple input interactions on soybean yield and grower profitability

- Quantify soybean trait response to intensive management

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Objective 1 Materials and Methods

- The experimental design was a factorial (2^5) design with site serving as the replication (Cochran and Cox, 1957). This design, with its manageable number of plots, will allow for expansion to multiple locations and allow for more intensive data collection.

- In Year One (2011), these experiments were located at our Arlington, Janesville, and Fond du Lac Variety Trial locations.

- The main factors of interest were trait [var] (RR1 vs. RR2Y), seed treatment (ApronMaxx plus Optimize 400) (yes or no), foliar fertilization (3 gallons of 3-18-18) @ V6 (yes or no), foliar insecticide @ R2/3 (yes or no), and foliar fungicide @ R2/3 (yes or no).

Data collected and analysis

- Stand counts at V3 and R8
- Leaf tissue analysis for (N, P, K) @ V6 and R3 (objective 1)
- Disease incidence and severity at R3 and R5
- Soybean aphid counts at R3 and R5
- Reflectance measurements using a crop canopy sensor @ V6, R3
- Grain yield and quality

- Data analysis: Initial analyses focused on comparing the effect of different treatments using standard methods of ANOVA and LSD values.

Main effect and interactions for soybean seed yield from objective one.

Main effect	Grain yield	P-value
Trait (variety)		0.0043
Pioneer 92Y30 (RR1)	70.0	
Dairyland DSR-2375/R2Y (RR2Y)	66.7	
Seed treatment		0.57
UTC	68.1	
ApronMaxx (1.5 fl oz/cwt) + Optimize 400 (2.4 fl oz/cwt)	68.6	
Foliar fertilizer		0.54
UTC	68.0	
3-18-18 (3 gal per acre @ V6)	68.7	
Foliar insecticide		0.86
UTC	68.5	
Warrior w/Zenon (3.0 fl oz. @ R2/3)	68.3	
Foliar fungicide		0.03
UTC	67.1	
Quilt Xcel (14 fl oz @ R2/3)	69.6	

No interactions were significant at the 0.05 probability level

Objective 2 Materials and Methods

- Due to our design limitation on the number of traits/varieties we can compare in Objective 1, as well as the difficulty in testing the influence of multiple inputs on soybean yield, we also conducted a second set of experiments.
- The experimental design was a randomized complete block split-split-plot design with 4 replications (Cochran and Cox, 1957). The main plot effect was intensive management (+ or -), the sub-plot was trait, and the sub-sub-plot was variety.
- The intensive management treatment combined all the inputs used in Objective 1: no treatment (-) vs. (seed treatment + foliar fertilization @ V6 + foliar insecticide @ R2/3 + foliar fungicide @ R2/3.
- The trait treatment tested was RR1 vs. RR2Y. The variety treatment consisted of 5 varieties of each trait. One each of the RR1 and RR2Y varieties tested was the same as those in Objective 1 to allow for comparisons among experiments and to increase our level of inference.

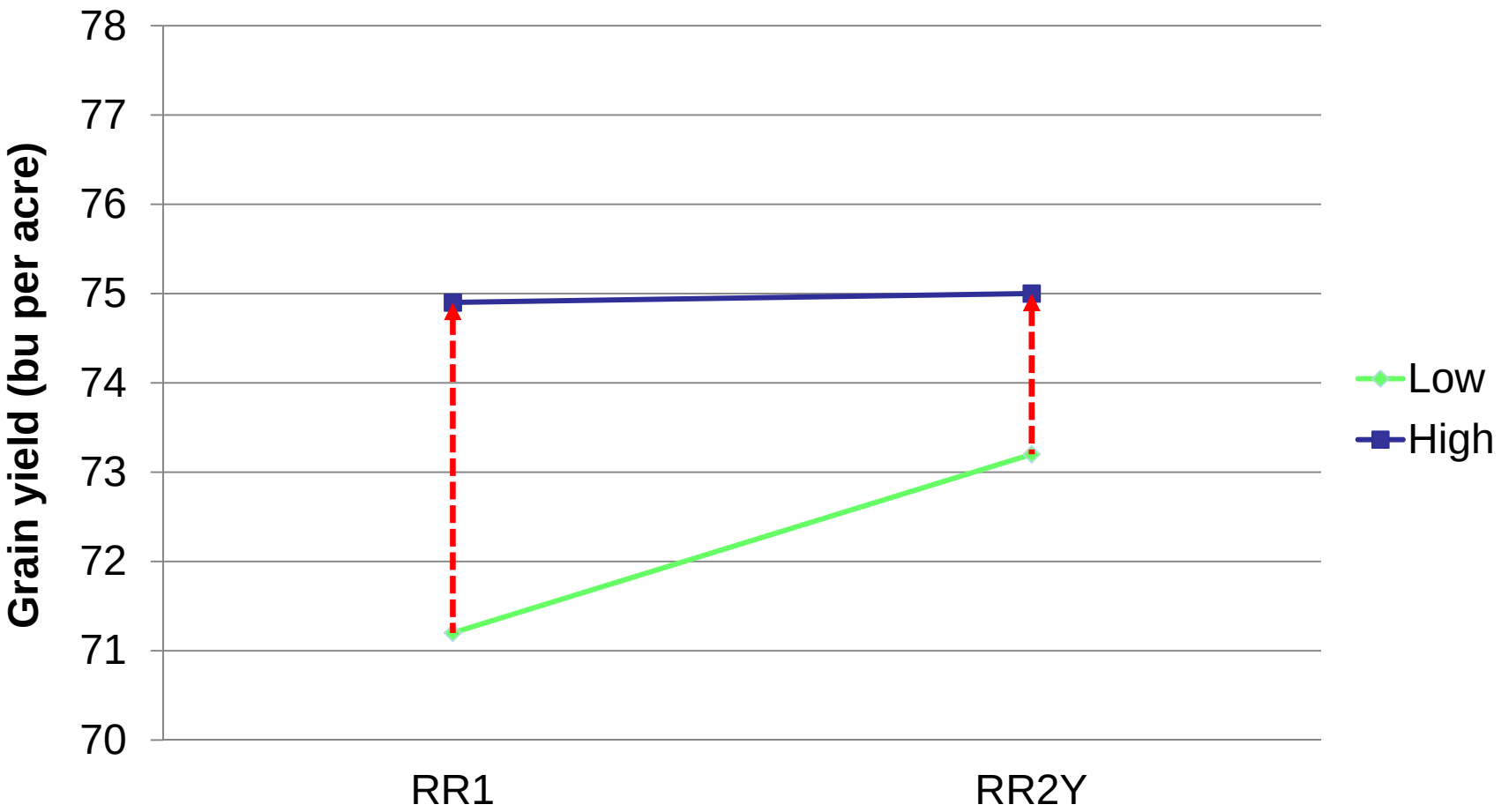
Main effect and interactions for soybean seed yield from objective two.

Main effect	Grain yield	P-value
Trait†		0.56
RR1	73.0	
RR2Y	74.1	
Management§		0.01
UTC	72.2	
Intensive	75.0	
Trait by management		0.12

† (RR1 varieties: Pioneer 92Y30 and 92Y51, NK Brand S21-N6 and S19-A6, Dairyland DSR-2011; RR2Y varieties: FS HiSoy HS24A01, Dairyland DSR-2375/R2Y, Renk RS241R2, Asgrow AG2631 and AG2431)

§ Intensive management = ApronMaxx (1.5 fl oz/cwt) + Optimize 400 (2.4 fl oz/cwt) + 3-18-18 (3 gal/a @ V6) + Warrior w/Zenon (3.0 fl oz./a @ R2/3) + Quilt Xcel (14 fl oz/a @ R2/3)

Characterizing the Trait x Management Interaction



Summary and Conclusions

- Preliminary results from 2011 of this multi-year experiment suggested that variety selection and foliar fungicide were the primary contributors to yield in 2011 ($P < 0.05$)
- No yield differences were observed between RR1 and RR2Y traits in Obj. 2
- We did not observe any trait or genetic by input interactions
- These preliminary results suggest that no “synergies” were attained by adding or deleting inputs in these experiments.
- These results further emphasize our recommendations that variety selection is the most valuable tool in increasing soybean yield followed by scouting and timely application of a pesticide when needed to control soybean pests.

Genetics by Management

- The experimental design was a randomized complete block split-split-plot design with 4 replications (Cochran and Cox, 1957). The main plot effect was intensive management (+ or -)and the sub-plot was variety.

- The intensive management treatment combined all the inputs used in Objective 1 plus Cobra: no treatment (-) vs. (seed treatment + Cobra @ V4 + foliar fertilization @ V6 + foliar insecticide @ R2/3 + foliar fungicide @ R2/3.

- Varieties: 92Y53, 92Y31, 92Y70, 92Y51, 92Y11, 92Y30

1 day after application (6/30/11)

8 days after application (6/30/11)

Main effect and interactions for soybean seed yield.

Main effect	Grain yield	P-value
Genetics		0.04
92Y11	68.3	
92Y30	75.2	
92Y31	68.7	
92Y51	72.5	
92Y53	70.4	
92Y70	71.6	
Management§		0.20
UTC	69.5	
Intensive	72.7	
Genetics by management		0.53

§ Intensive management = ApronMaxx (1.5 fl oz/cwt) + Optimize 400 (2.4 fl oz/cwt) + Cobra (12.5 fl oz + 1% v/v COC @ V4) + 3-18-18 (3 gal/a @ V6) + Warrior w/Zenon (3.0 fl oz./a @ R2/3) + Quilt Xcel (14 fl oz/a @ R2/3)

AGRONOMIC MAXIMIZATION OF SOYBEAN YIELD AND QUALITY

- Determine the best yield-protecting or yield-enhancing product or combination of the newest products to increase soybean yields using the maximum yield concept or ***"SOYA" = S****ystematic* ***O****ptimization of* ***Y****ield-enhancing* ***A****pplications*. Products and systems will be evaluated for utility both on a large-scale regional basis as well as within specific production environments.

- Evaluate the interaction of these yield-enhancing products with next generation high-yielding varieties and current varieties, under both aggressive and standard soybean management practices to better understand how management interacts with variety choice.

- Evaluate the interaction of the "SOYA" treatments with plant population to better understand the impact of aggressive management on minimum required seeding rates and to broaden and verify minimum seeding rate recommendations determined in the project "Agronomic Limitations of Soybean Yield and Seed Quality in the US".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