

Micronutrients and Foliar Fertilizers

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Acknowledgments

- **MSSPB**
- **MSRPB**
- **MSCPb**
- **Agrium**
- **Agexplore**
- **BASF**
- **Bayer Cropscience**
- **CPS/Dyna Grow**
- **Dow Agrosiences**
- **Helena Chemical**
- **Horizon Ag**
- **Monsanto**
- **Monsanto Bioag**
- **Mosaic**
- **Pioneer**
- **Pinnacle Ag**
- **Syngenta**
- **Terral Seed**
- **Timac Agro**
- **Valent**



What's in a Bushel?

- 1 bu soybean contains
 - 3.3 lb N
 - 0.73 lb P₂O₅
 - 1.2 lb K₂O
 - 0.21 lb Mg
 - 0.18 lb S



Yield Level	N	P ₂ O ₅	K ₂ O	Mg	S
40	132	29	48	8	7
50	165	37	60	11	9
60	198	44	72	13	11
80	264	58	96	17	14

Adapted from: <http://www.ipni.net/article/IPNI-3296>



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Potassium Use Trends in LA

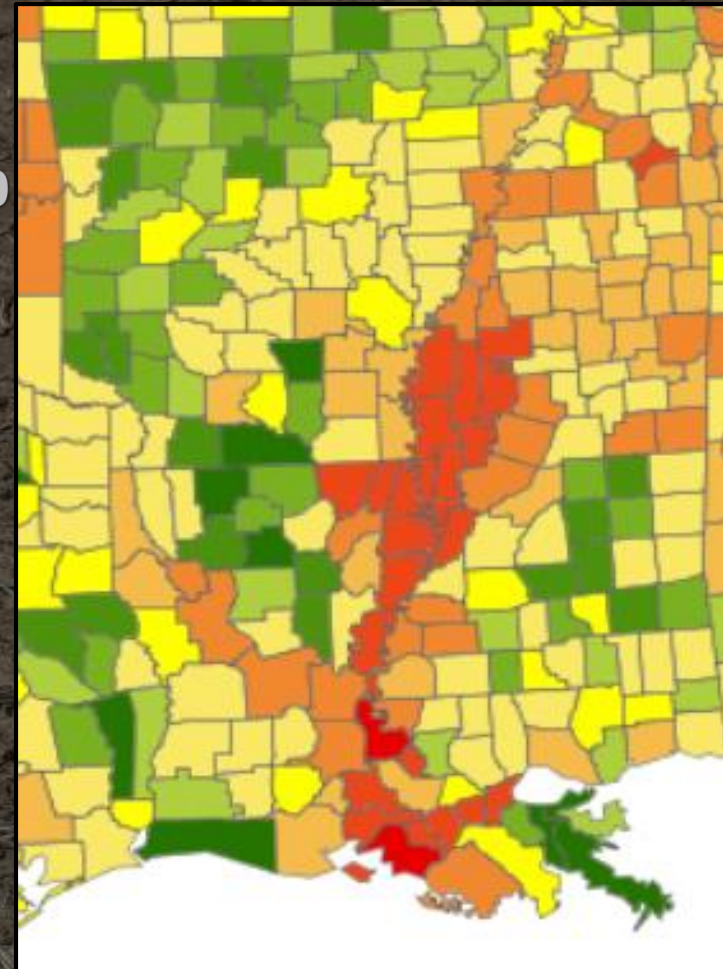
K₂O use Ratios:

Green = < 0.9, Yellow = 0.9-1.09

Light Orange = 1.1-3.0, Dark Orange = 3.0-6.0

RED = > 6.0

Year	Removal to Use Balance (Mean Tons)	Average K ₂ O per harvested acre
1987	-66,178	45.3
1992	-36,250	41.3
1997	-31,164	45.2
2002	-41,401	42.9
2007	-52,039	50.0
2010	-75,959	59.5
2011	-45,026	53.5
2012	-88,169	66.6



Adapted from: [IPNI NUGIS Data www.ipni.net/nugis](http://www.ipni.net/nugis)



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Phosphorus Use Trends in LA

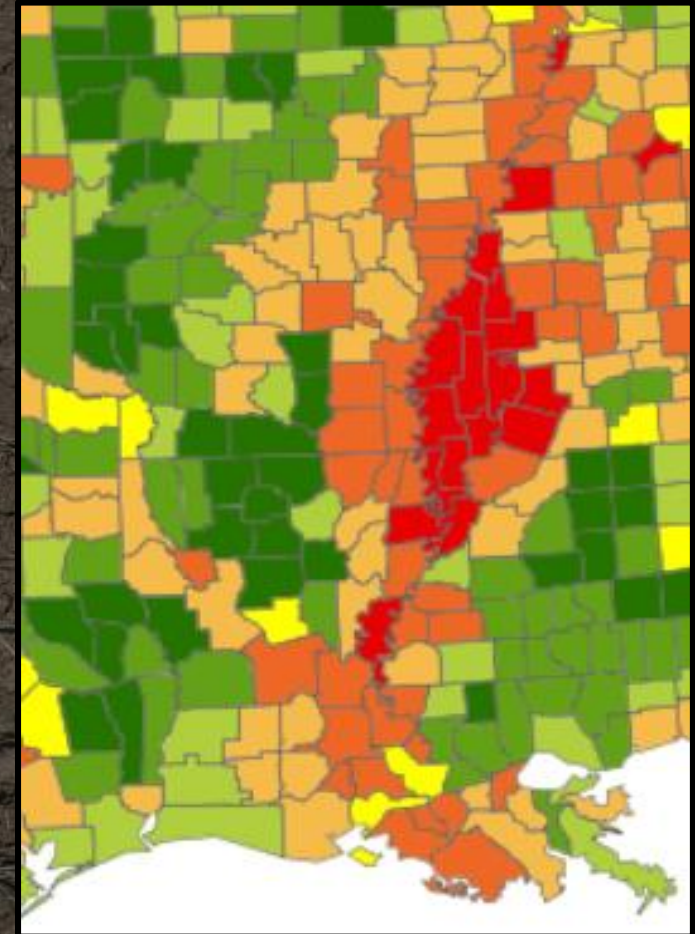
P₂O₅ use Ratios:

Green = <0.9, Yellow = 0.9-1.09

Light Orange=1.1-2.0, Dark Orange = 2.0-5.0

RED = >5.0

Year	Removal to Use Balance (Mean Tons)	Average P2O5 per harvested acre
1987	-16,099	22.6
1992	-3,028	21.2
1997	-3,520	23.7
2002	-10,388	23.8
2007	-18,517	27.5
2010	-28,287	31.5
2011	-17,353	30.5
2012	-27,573	36.8



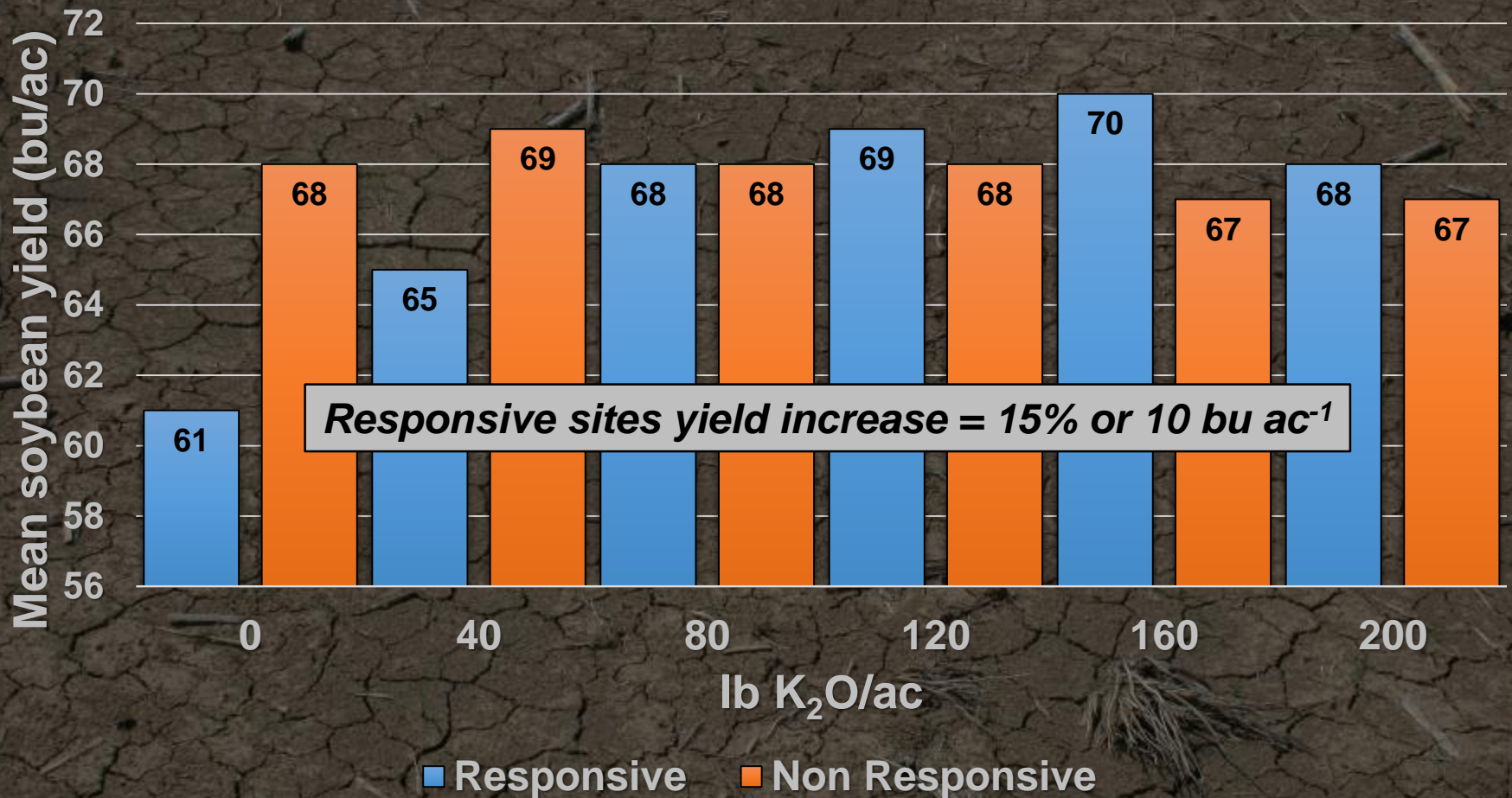
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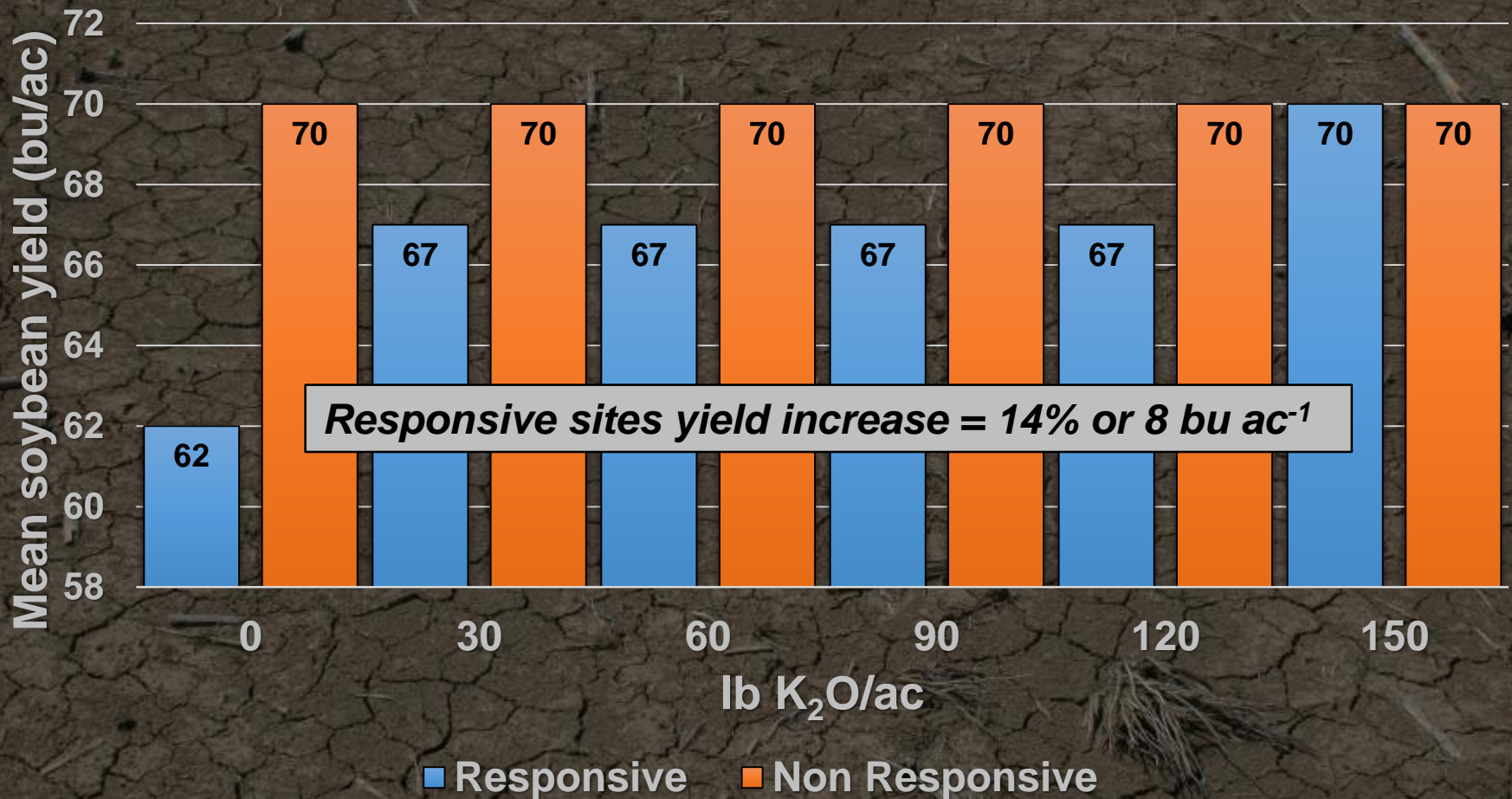
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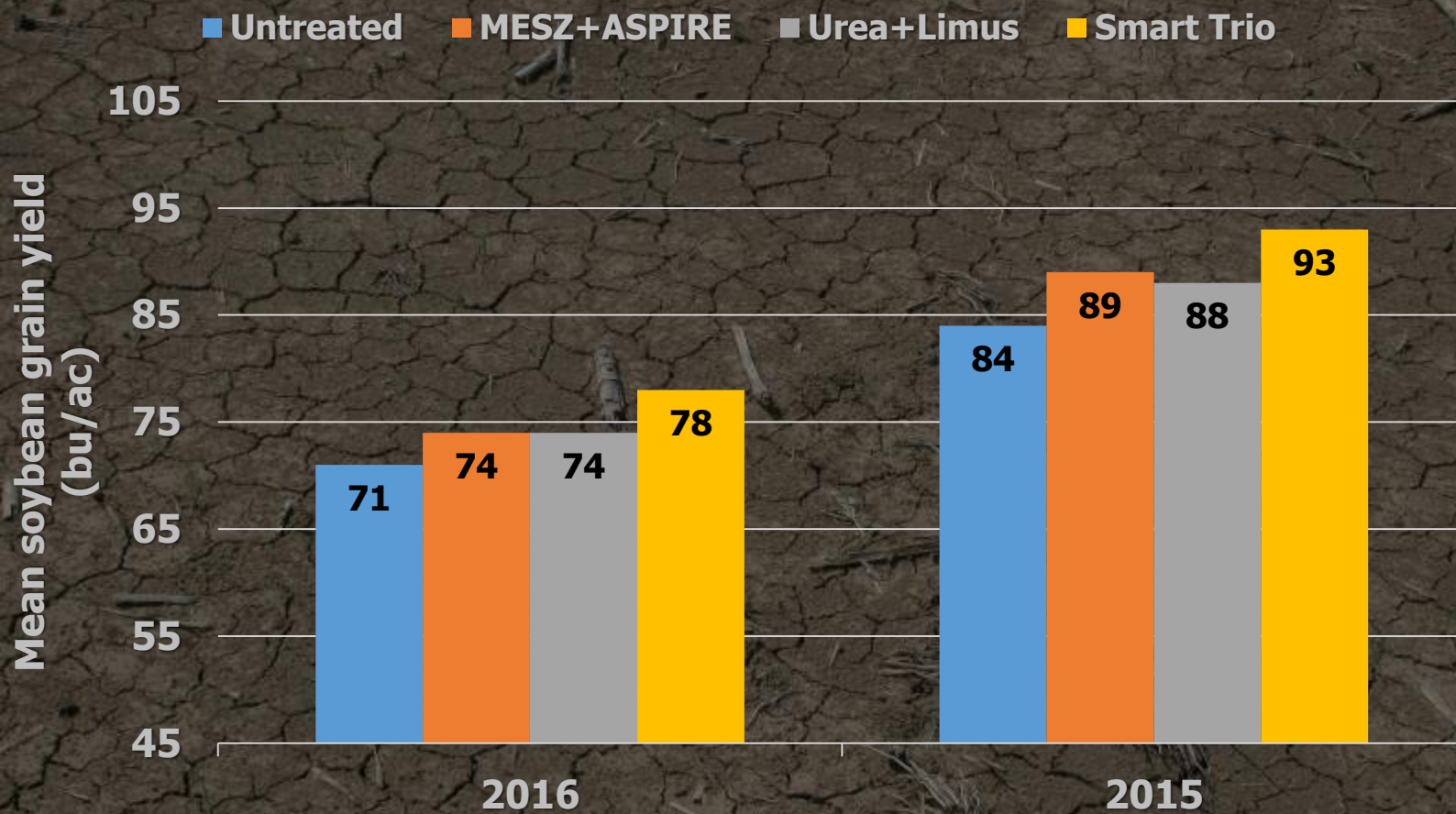
Soybean Response to Potassium Application



Soybean Response to Phosphorus Application



High Yield Omission Trials



When and Where to Use Foliar Products

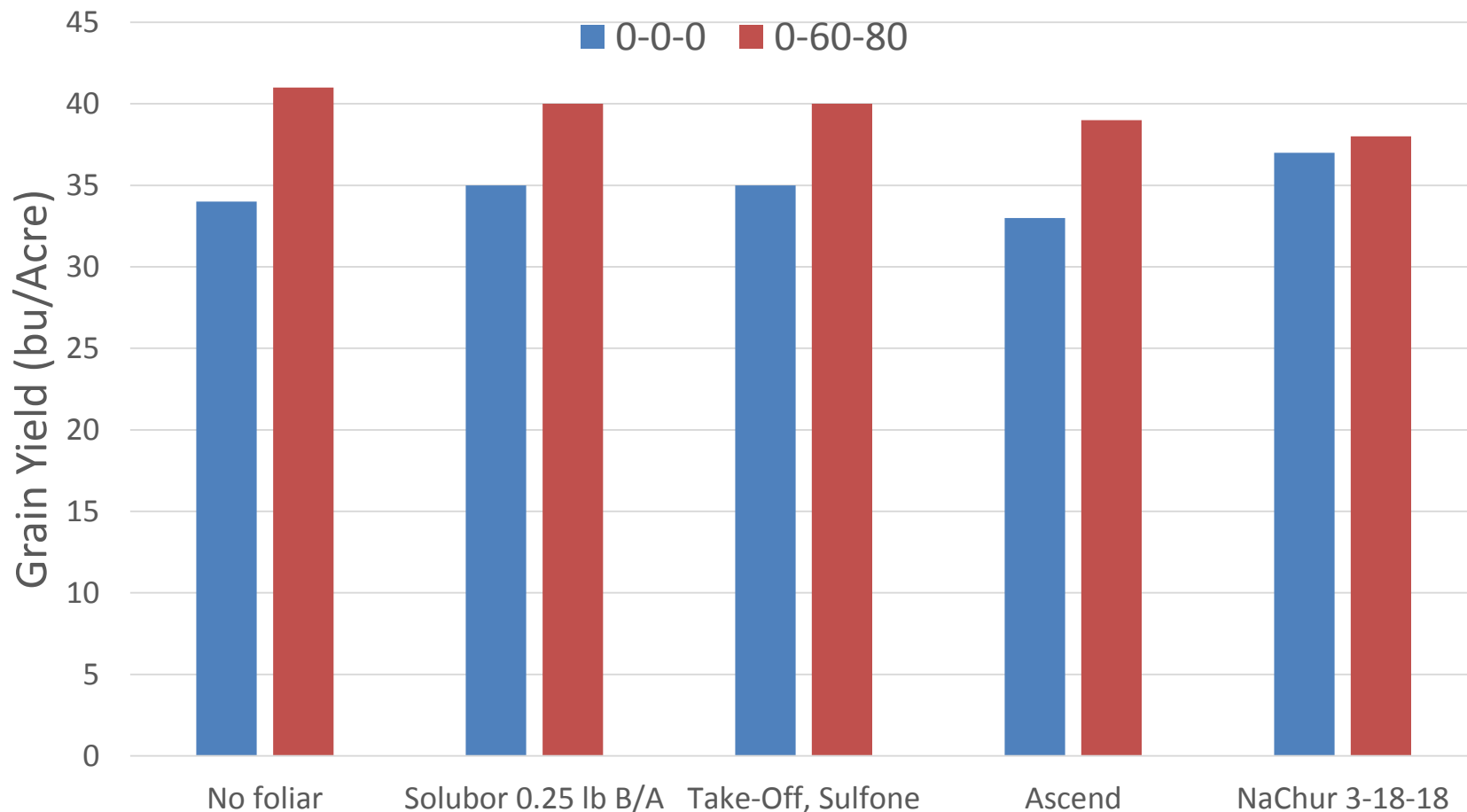
- **When Base Fertility Levels are adequate**
- **When a visual deficiency symptom is observed and can be corrected with a small amount of fertilizer (i.e. Micronutrient)**
- **When tissue sampling verifies a symptom or suggest a possible hidden hunger situation that can be addressed**
- **Foliar Fertilizers DO NOT REPLACE A SOUND FERTILITY PROGRAM**



Foliar Feeding Soybean

Foliar Treatment	Rate	0-0-0	0-60-80
		Bu/Acre	
Boron Only	0.25 lb B/A @ V6	50	63
Over-The-Top Legume	24 oz/A @ R2	53	64
Foliar Blend	32 oz/A @ V6 & R2	53	63
NaChurs 0-0-24	2 gal/A @ R2	51	59
NaChurs 3-18-18	1.5 gal/A @ R2	52	63
		52 b	63 a
LSD0.10		Interaction was NS (P=0.4010)	
Main effect of Foliar Product (P=0.14) and Interaction (P=0.40) were NS			

Soybean Response to Foliar Products: 2015

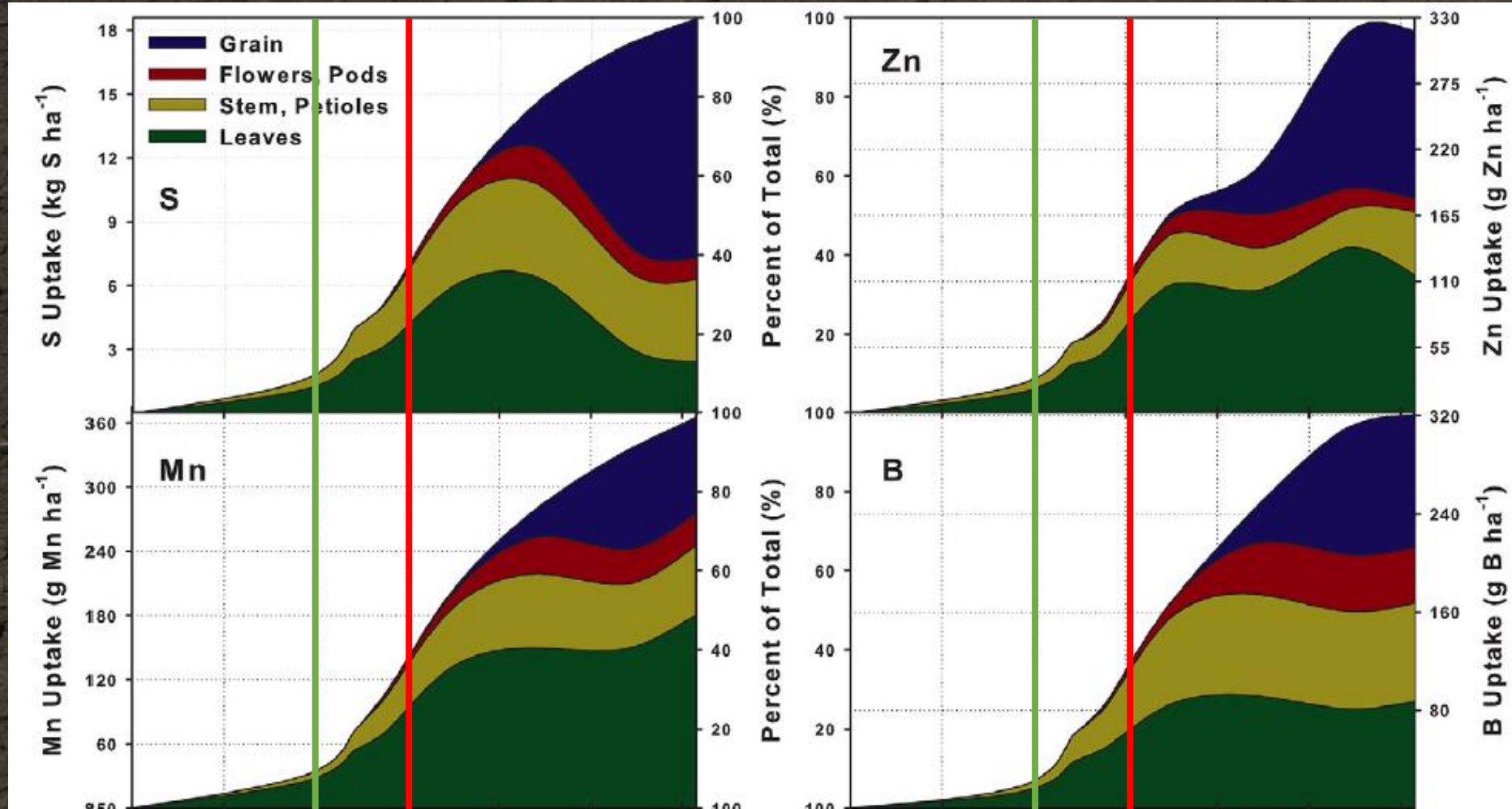


2015 PTRS I12 Field

Armor 47-R13 planted June 23

Soil-test K, 34 ppm (dry) & 34 ppm (moist)

Micronutrient Uptake in Soybeans



Bender et. al, 2015



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Nutrient Partitioning in MS Soy

Nutrient	Soybean Growth Stage					
	V4	R2	-----R5.5-----		-----R6.5-----	
	Leaves/Stem		Pods		Leaves/Stem Pods	
N	24	62	157	32	75	32
P	2.1	7.2	19	3	10	3
K	17.5	67	171	15	101	31
S	1.5	4	9	2	4	2
B	0.02	0.07	0.24	0.07	0.16	0.09
Mn	0.03	0.06	0.20	0.16	0.16	0.11
Zn	0.04	0.10	0.30	0.16	0.15	0.13
Fe	0.15	0.32	0.67	1.50	0.42	0.76



Tissue Samples – Why?

- **Two primary reasons**
 - In season routine check up
 - Diagnostic when needed to confirm a visual diagnosis
- **Can give you a idea of Plant Temperature**



Tissue Sufficiency Ranges

SOYBEAN									
Time	N	P	K	S	Fe	Mn	B	Zn	
	-----%-----				-----ppm-----				
Prior to Pod Set	4.0-5.5	0.25-0.5	1.7-2.5	0.2-0.4	50-350	20-100	20-55	12-30	

FIELD CORN									
Time	N	P	K	S	Fe	Mn	B	Zn	
	-----%-----				-----ppm-----				
< 12 Tall	3.5-5.0	0.3-0.5	2.5-4	0.2-0.5	50-250	20-300	5-25	20-60	



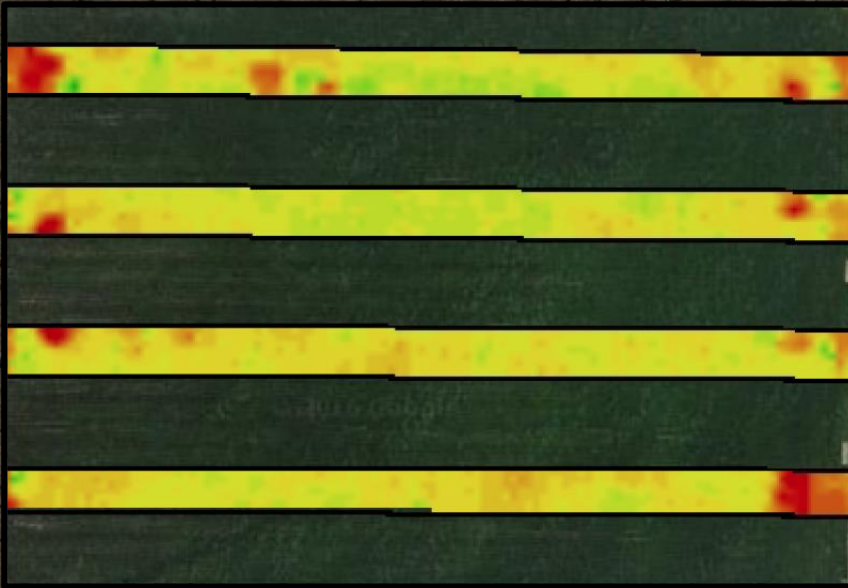
Manganese and Soybean



- **Manganese deficient Soybean**
 - **Interveinal chlorosis**
 - **Newly developed leaves (Immobile)**
 - **Stunted growth**
- **Causes high pH**
- **Sandy soils and/or Droughty Clay soils**



Manganese and Soybean



IDC – Iron Chlorosis



- Not that Prevalent in Delta
- Extreme Issue in Blackbelt Soils
 - High Levels of Carbonate in Soil
 - Variety Selection First Defense
 - Seed treatment option best
 - Foliar applications, mixed results
 - EDDHA appears to be the best chelation form



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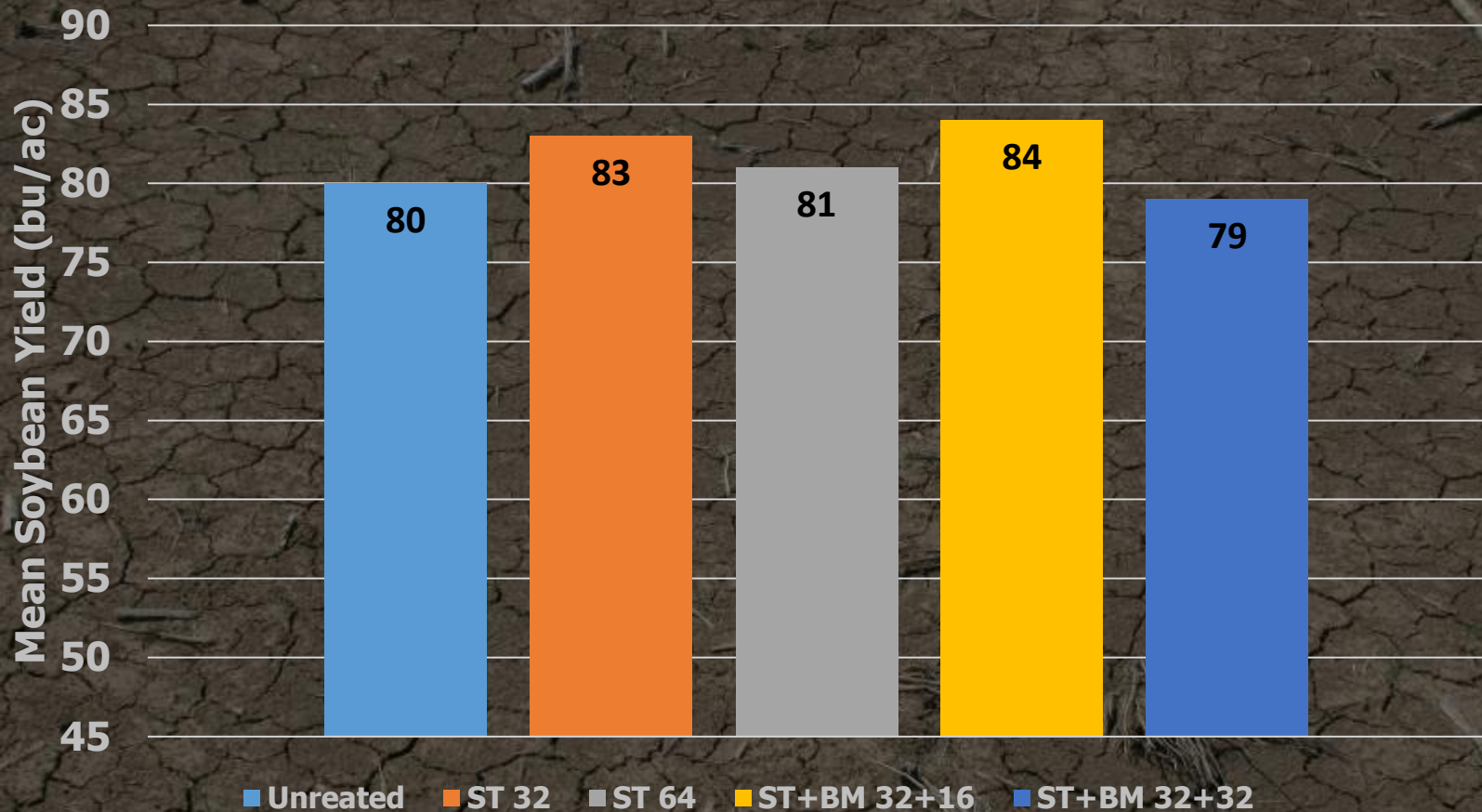
Soybean Iron Chlorosis



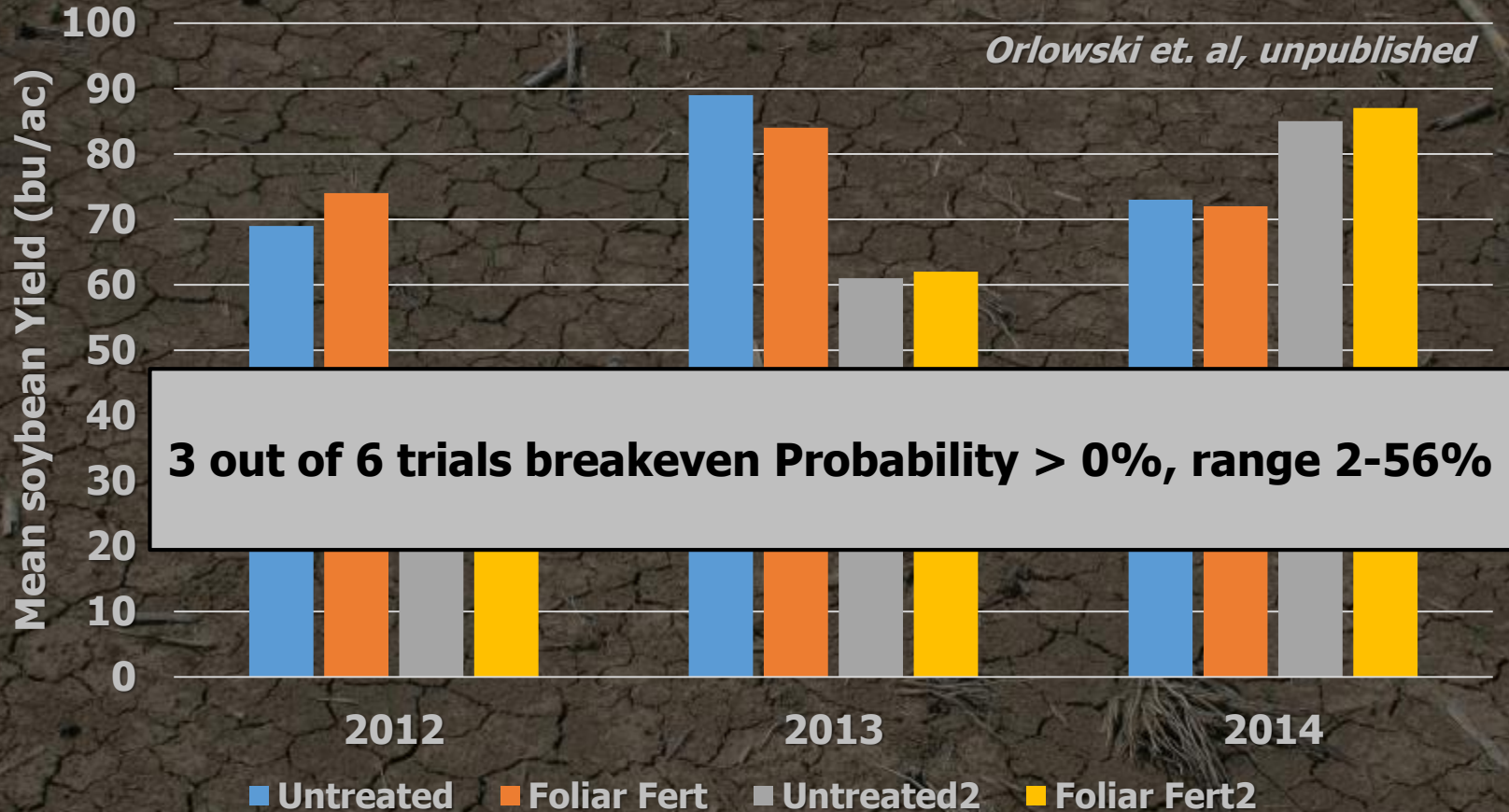
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Foliar Fertility Mixed Nutrient



USB High Yield Trials 12-14



Foliar Fertilizer Study



No herbicide



Glyphosate



Glyphosate + Dual Magnum



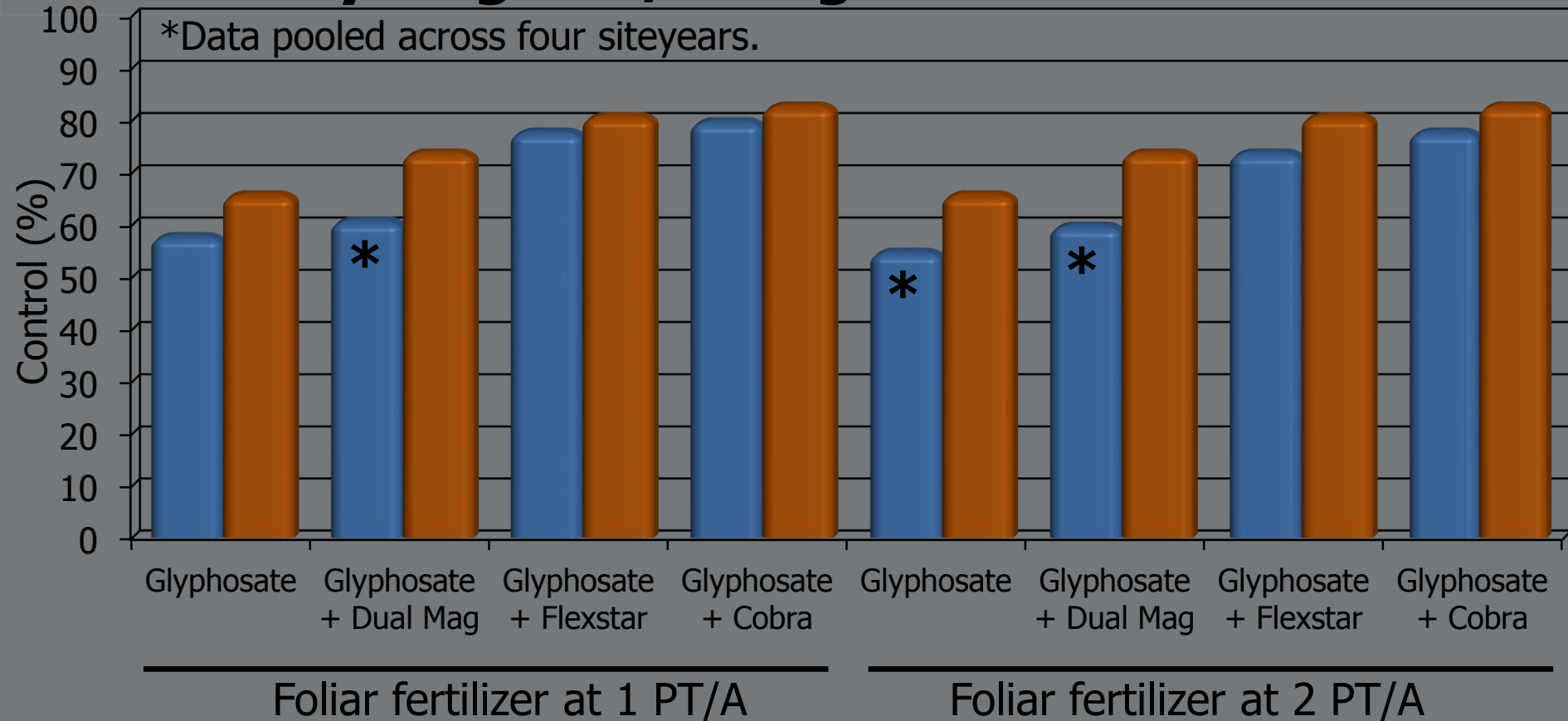
Glyphosate + Flexstar



Glyphosate + Cobra

Foliar Fertilizer Study

Palmer amaranth control 14 DAT—Test of synergistic/antagonistic effects



■ Observed ■ Expected

Data: Tyler Hydrick



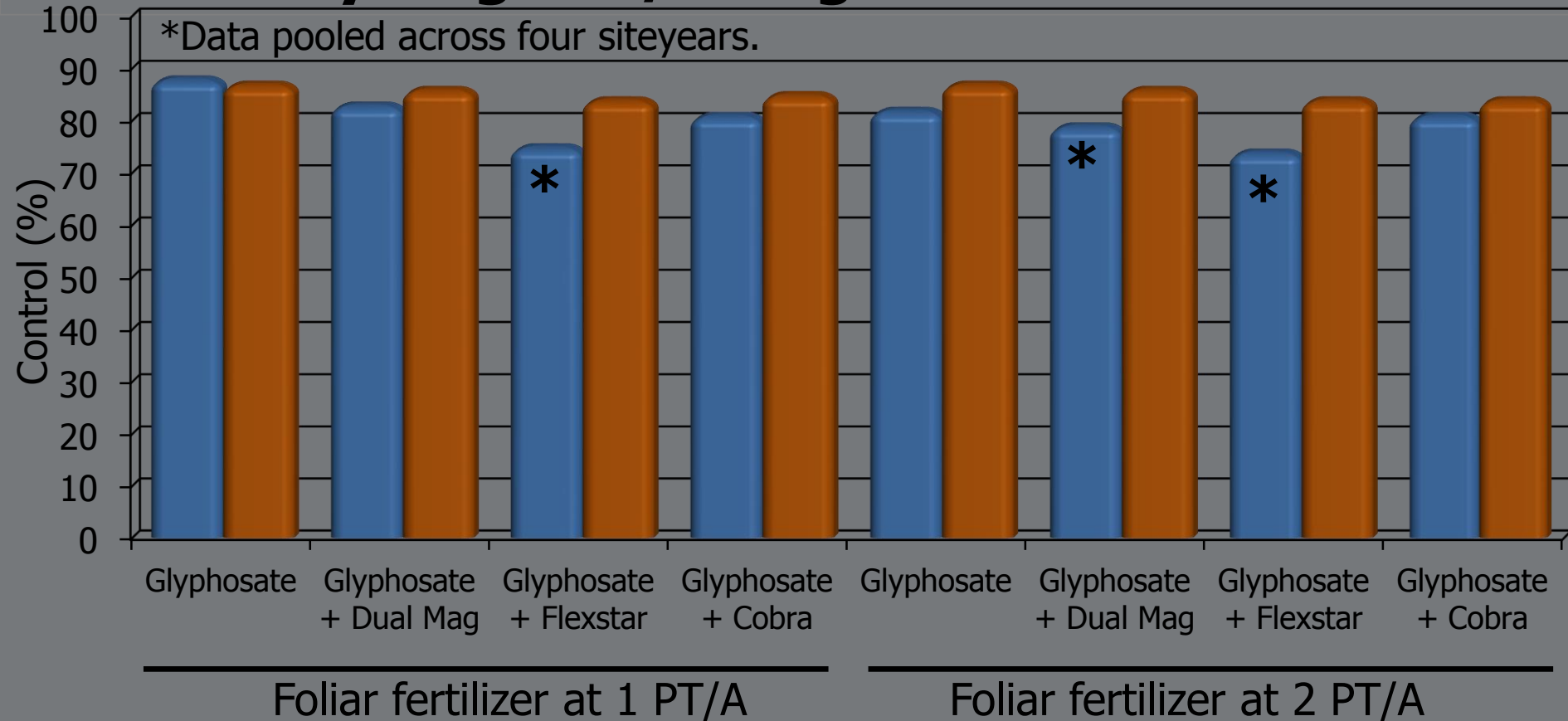
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Foliar Fertilizer Study

Barnyardgrass control 14 DAT—Test of synergistic/antagonistic effects



■ Observed ■ Expected

Data: Tyler Hydrick



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Questions ?



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