

Evaluation of Late Season Application of Foliar N's Impact on Grain Yield and Milling Qualities of HRWW

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Background

- ▶ Woolfolk et al 2002.
 - ▶ UAN applied at Pre and Post Anthesis significantly increased protein.
 - ▶ Rates of 10,20,30,40
 - ▶ Best was Post at 30
- ▶ Thomason et al
 - ▶ Application of 30 to 40 lb N/A between GS 45 and 54 to winter bread wheat cultivars grown in humid, high rainfall areas likely will result in consistent increases in grain protein concentration.
- ▶ Recent work with Low Salt N at flag leaf showed inconsistent results. www.npk.okstate.edu
- ▶ Plains Grains Inc. Expressed interest in more in-depth work due to low protein values of 2010 Harvest.

Objectives

- Evaluate the use of UAN and specialty product for foliar N applied at flag leaf and post-flowering to improve Great Plains hard red winter wheat grain yield, protein, and milling and baking characteristics.

Materials & Methods

- Lake Carl Blackwell (LCB)
 - (Port Silt Loam –fine-silty, mixed, superactive, thermic Cumulic Haplustoll)
- Lahoma
 - (Grant Silt Loam – fine-silty, mixed, superactive, thermic Udic Agriustoll)
- 40 lbs N ac⁻¹ preplant
- 40 lbs N ac⁻¹ topdress at hollow stem
 - UAN applied with streamer nozzles for both.

Materials and Methods

- Foliar applications– flag leaf & post-anthesis (PA)
- Foliar Sources
 - UAN (28-0-0)
 - CoRoN derived from urea, methylene diurea and methylene ureas (25-0-0)
- CO₂ backpack sprayer with offset boom
- 10 gallon ac⁻¹ flow; Water added as carrier



Treatments

Rate (lb N ac)	Source	Timing
Check		
Recommended Standard Fertility		
6	UAN	Flag Leaf
12	UAN	Flag Leaf
24	UAN	Flag Leaf
6	CoRoN	Flag Leaf
12	CoRoN	Flag Leaf
24	CoRoN	Flag Leaf
6	UAN	Post Anthesis
12	UAN	Post Anthesis
24	UAN	Post Anthesis
6	CoRoN	Post Anthesis
12	CoRoN	Post Anthesis
24	CoRoN	Post Anthesis

Summary Table, Lahoma

Variable	Rate	Source	Time	Rate*Source	Rate*Time	Source*Time	Rate*Source*Time
Grain Yield	NS	NS	NS	NS	NS	NS	NS
Protein	NS	NS	NS	NS	*	NS	NS
Mix Tolerance	NS	***	NS	NS	***	NS	NS
Loaf Volume	NS	NS	NS	NS	NS	NS	NS

*, **, *** - significant at the 0.1, 0.05, 0.01% level, respectively

2011 Lahoma Results

- No significance in grain yield, protein, and loaf volume
- 12 lb N post-anthesis – highest protein
- UAN treatments – significantly higher mixing tolerance

Summary Table, LCB

Variable	Rate	Source	Time	Rate*Source	Rate*Time	Source*Time	Rate*Source*Time
Grain Yield	NS	NS	NS	NS	NS	NS	NS
Protein	NS	NS	NS	NS	NS	NS	NS
Mix Tolerance	NS	NS	NS	NS	NS	NS	NS
Loaf Volume	NS	NS	NS	NS	NS	NS	NS

2011 LCB Results

- No main effects or interactions significant
- LCB – 3% protein increase over check
- 1% increase over standard fertility with 24 lbs UAN post-anthesis
- All mixing tolerance below quality target
- All foliar treatments larger loaf volume than standard fertility
 - Late application increased volume by 55cc

2011 Conclusions

- Both Locations – no trend in yield developed
 - Environment
- Foliar N – potential increase in Protein and loaf volume even at lower N levels.

Lahoma

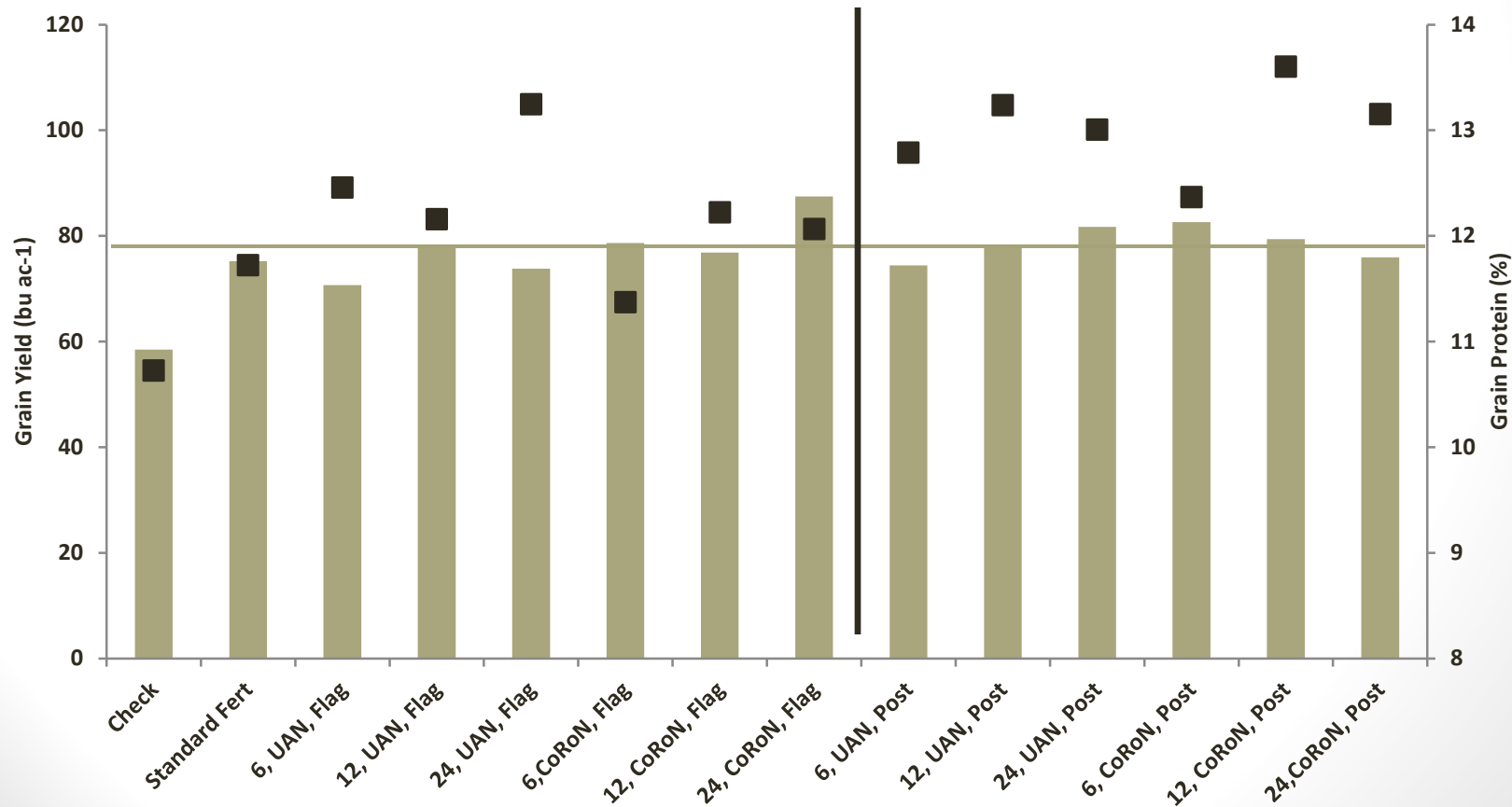
- Proc GLM
 - Pr>F

Variable	TRT	Rate	Source	Time	Rate* Source	Rate* Time	Source* Time	Rate* Source* Time
Yield	NS	NS	NS	NS	NS	NS	NS	NS
Test Wt	NS	NS	NS	NS	.06	NS	NS	NS
Protein	.05	NS	NS	.03	NS	NS	NS	NS
Flour Yld	NS	NS	NS	.02	NS	.005	NS	.02
Mix_Time	.007	NS	.01	NS	NS	NS	NS	NS
Mix_Tol	NS	NS	.04	NS	NS	NS	NS	NS

- Protein and Flour Yield
 - P Anthesis 13.02 % 72.9%
 - Flag Leaf 12.25% 72.2%

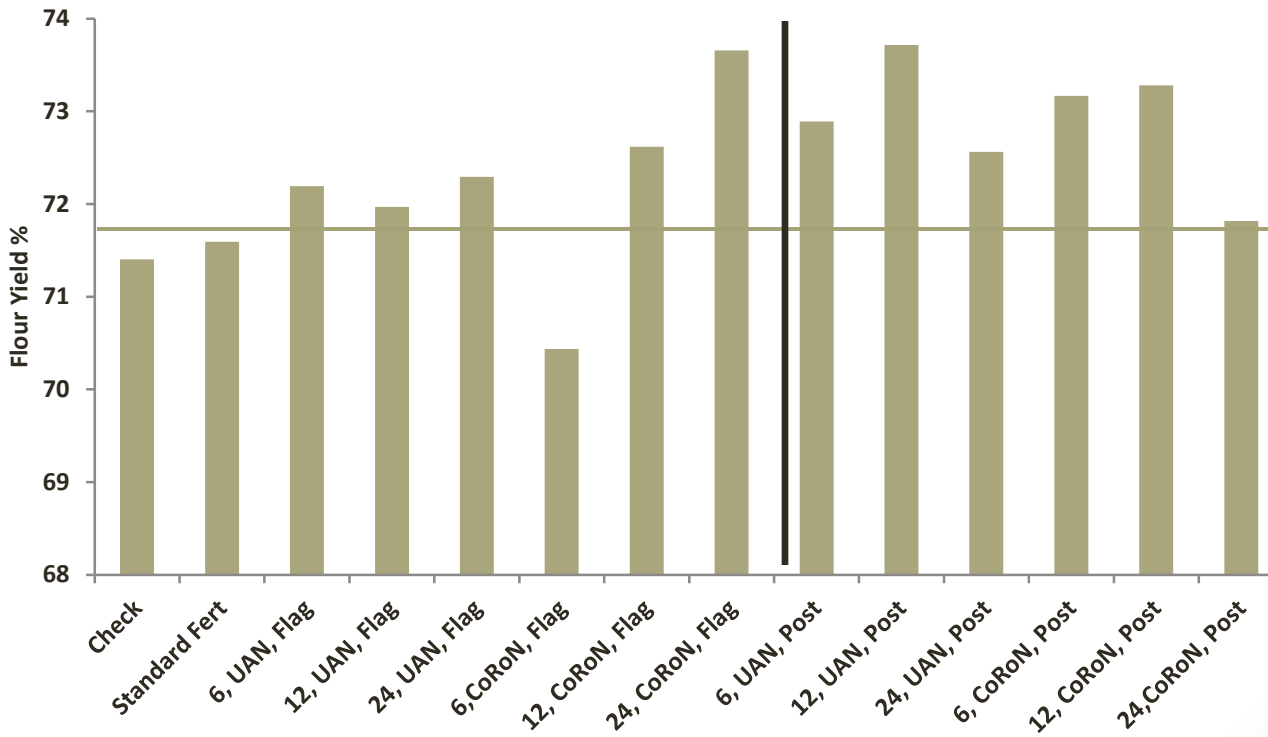
Lahoma Yield and Protein

- 12 CoRoN post
Protein Sig greater than standard.



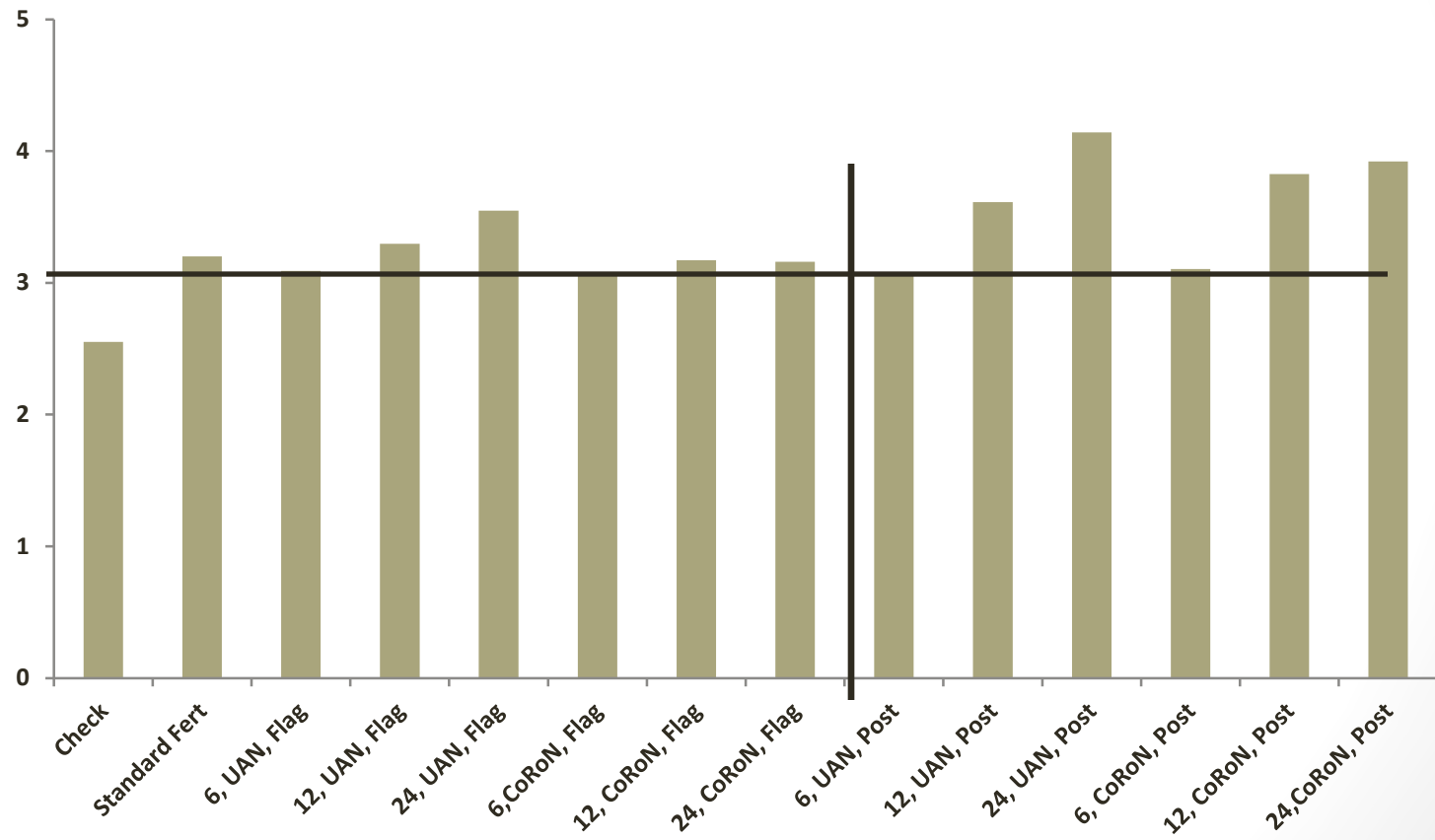
Lahoma

- Flour Yield Rate x Time
- Post at 12 lbs /ac



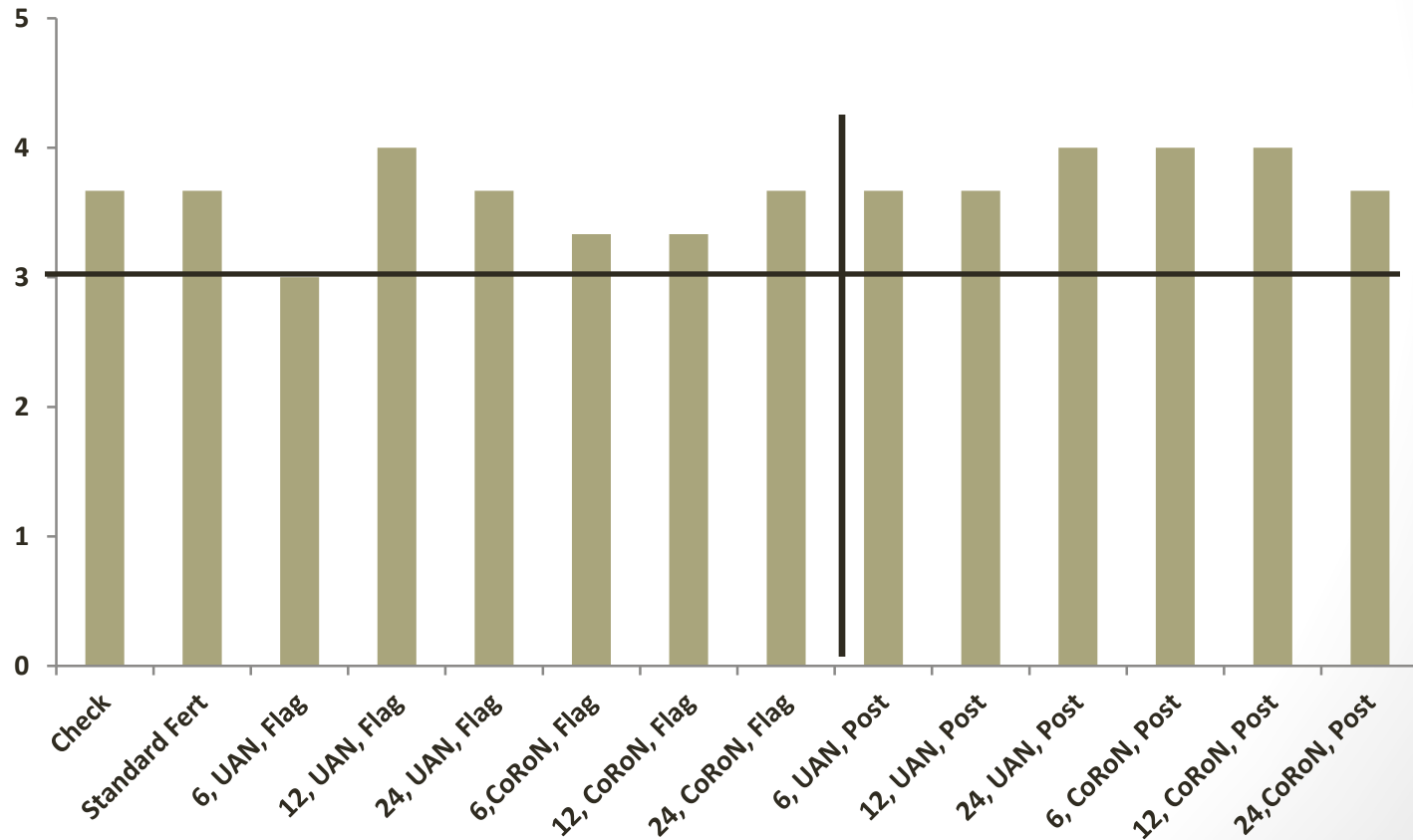
Lahoma

- Mix Time (min)



Lahoma

- Mix Tolerance (Score 0-6)



LCB

◎ Proc GLM

> Pr>F

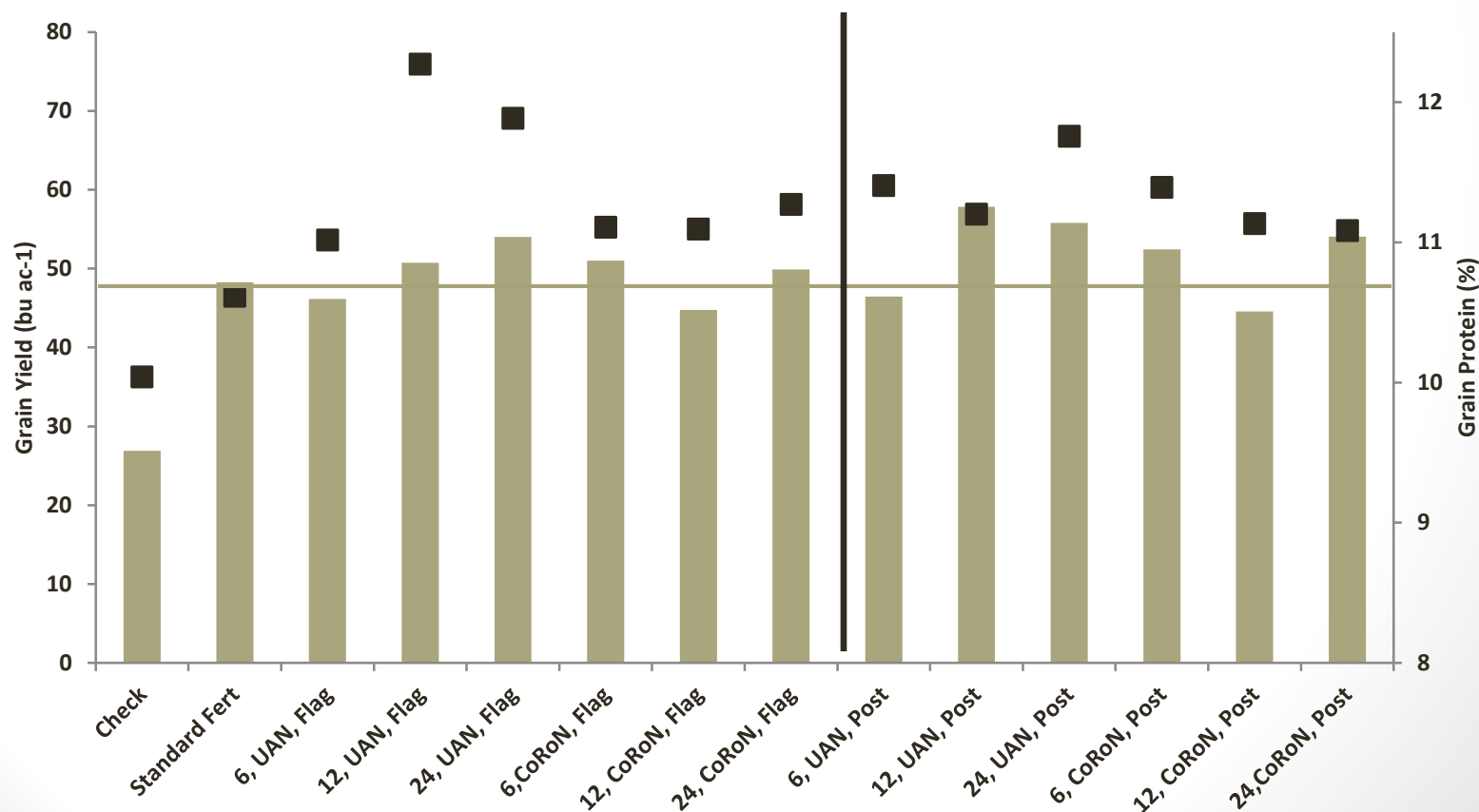
Variable	TRT	Rate	Source	Time	Rate* Source	Rate* Time	Source* Time	Rate* Source* Time
Yield	<.0001	NS	NS	NS	.009	NS	NS	NS
Test Wt	NS	NS	NS	NS	NS	NS	NS	NS
Protein	.008	NS	.03	NS	NS	NS	NS	NS
Flour Yld	NS	NS	NS	NS	NS	NS	NS	NS
Mix_Time	NS	NS	.03	NS	NS	NS	NS	NS
Mix_Tol	NS	NS	NS	NS	NS	NS	NS	NS

◎ Protein

- > UAN 11.58 %
- > CoRoN 11.18%

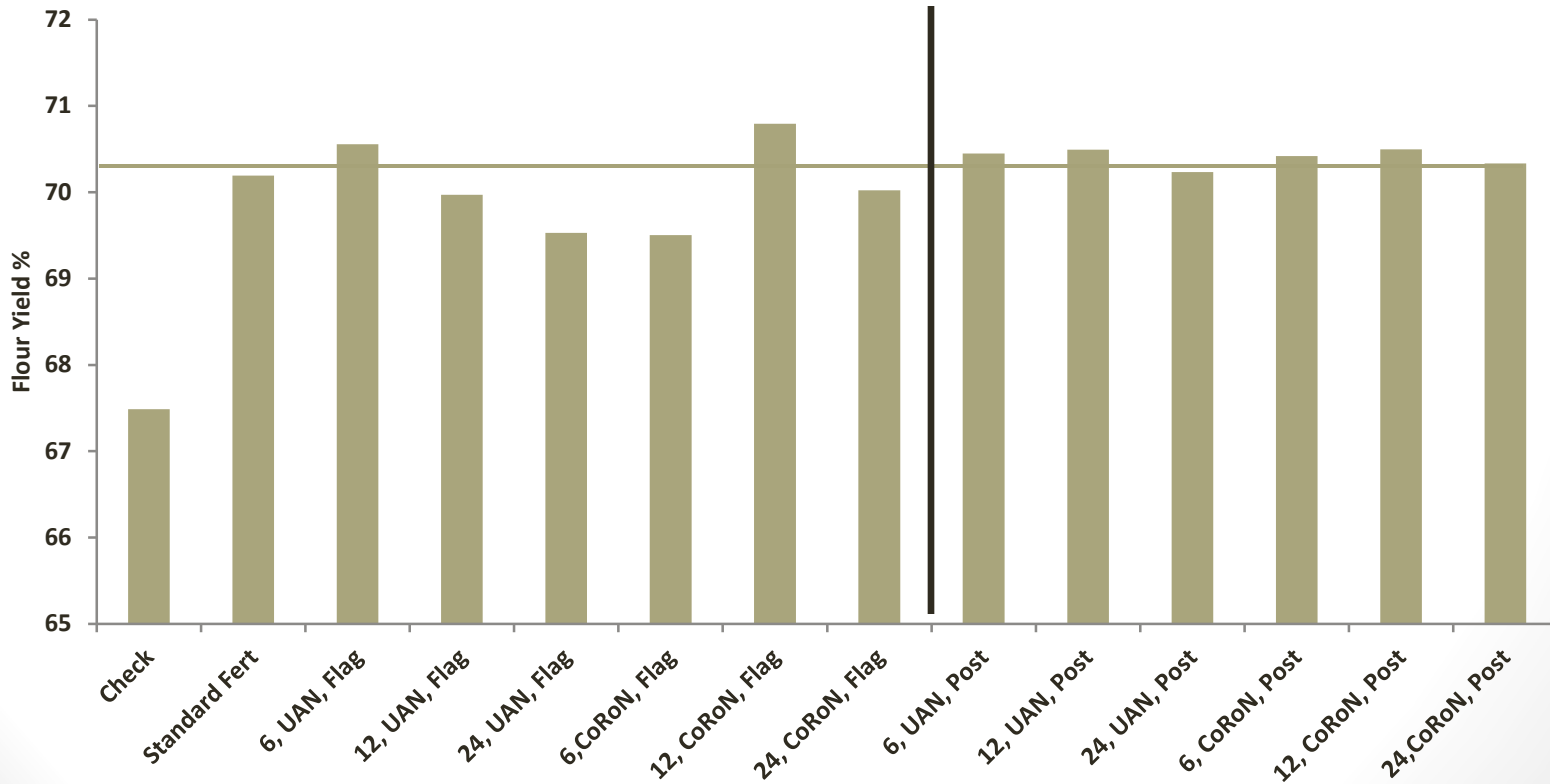
LCB Yield and Protein

- 12 UAN Flag, 24 UAN Flag, 24 UAN Post Protein Sig greater than standard.



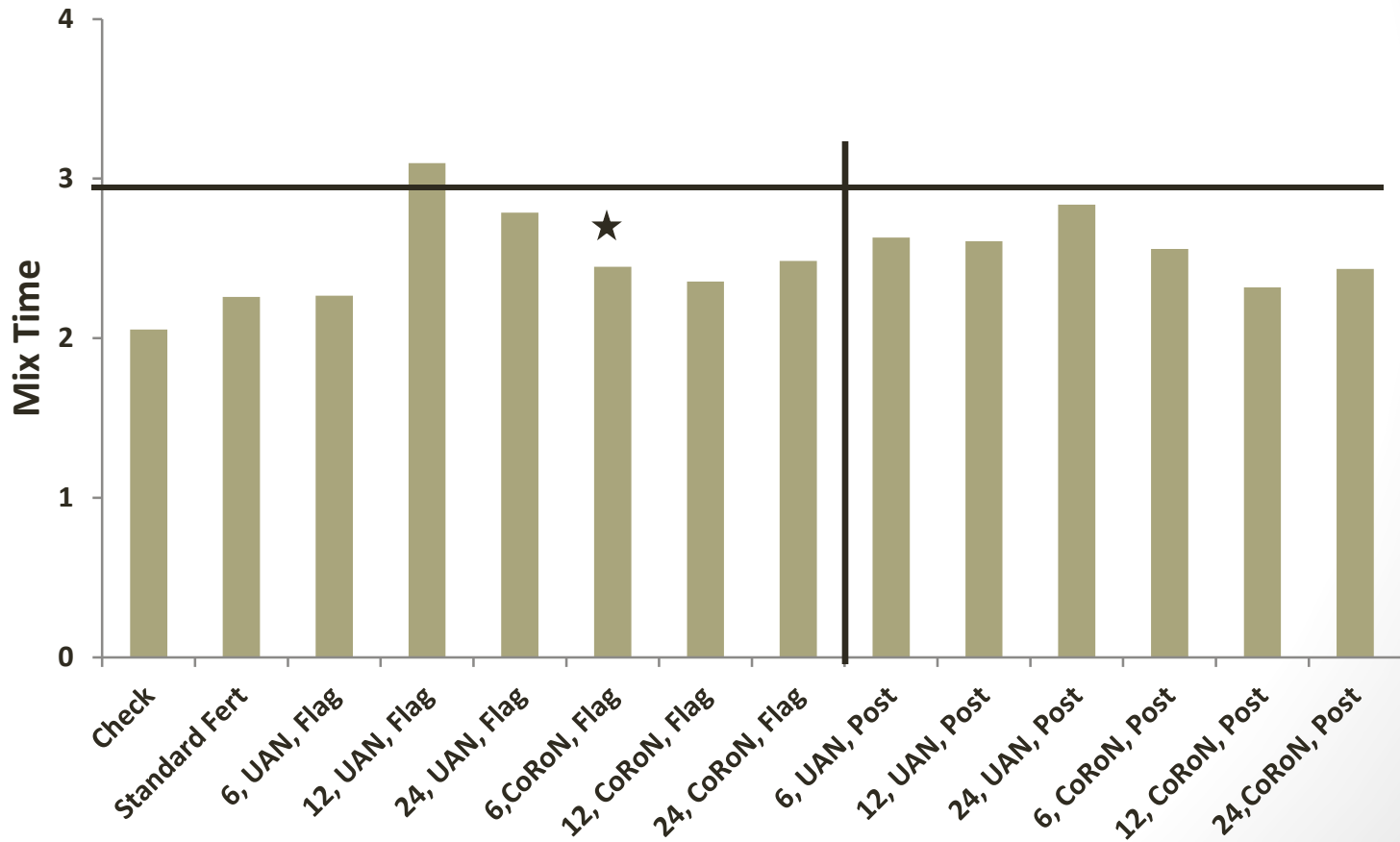
LCB

- Flour Yield



LCB

- Mix Time 12 lb N as UAN at Flag Sig > 6,14,7,13,3,2,1



2nd year Summary

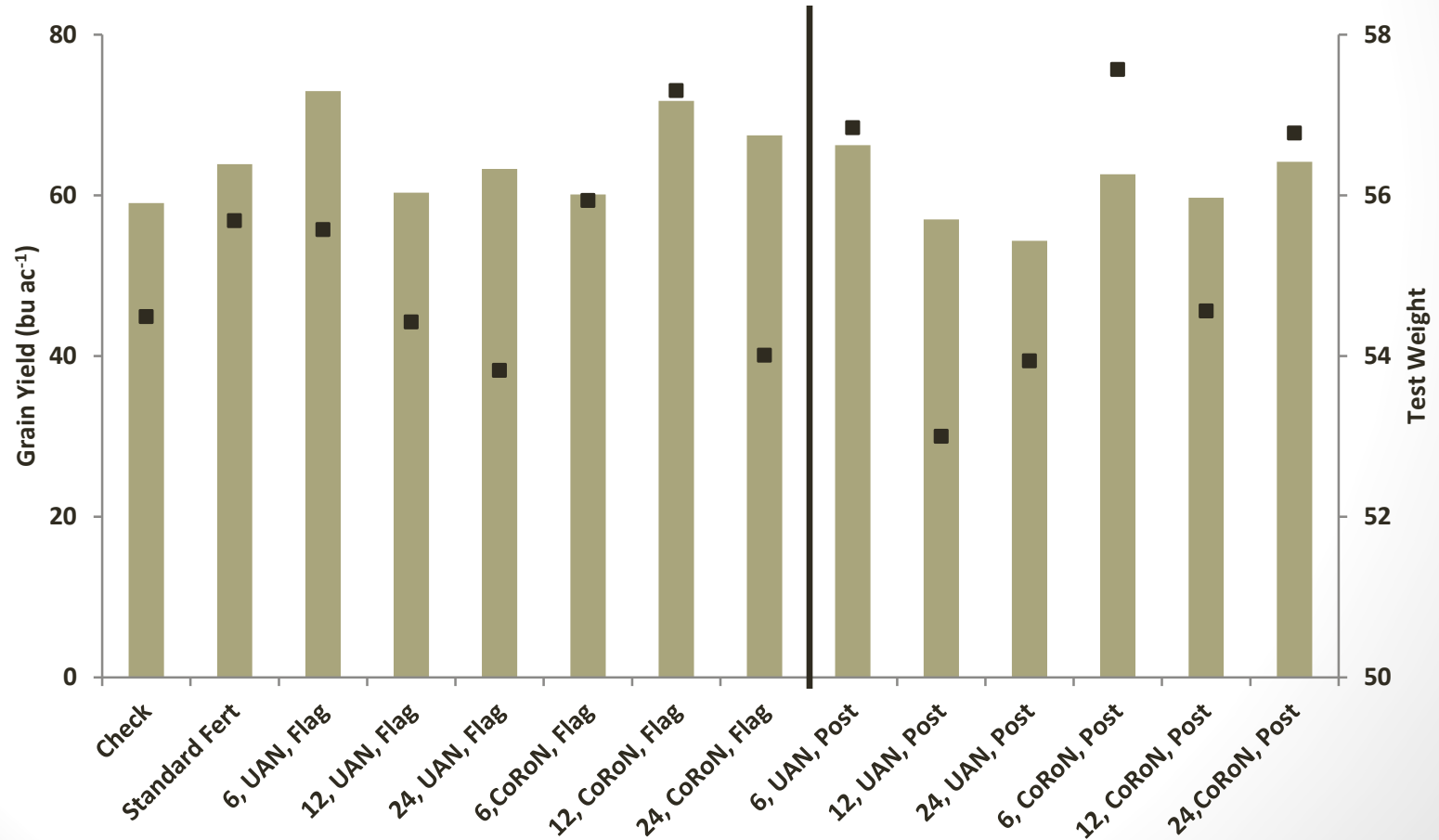
- No impact on yield with either application.
 - Standard fertility is reaching Max yield.
- Test Weight was not impacted
- Protein increased with late N, more consistently with PA apps
- Flour Yield increased at Lahoma with PA apps
- No consistent patterns.

2012-13

- Same Locations
- Coming out of two years of extreme drought A great deal of N was mineralized in the Spring of 2013
- Samples were destroyed in shipping to Manhattan
- Yield and Test weight only measured parameters.
- Lahoma No significant increase in yield above check.
- LCB Only significant difference in yield was check.
- Test weight impacted at both locations by rate.

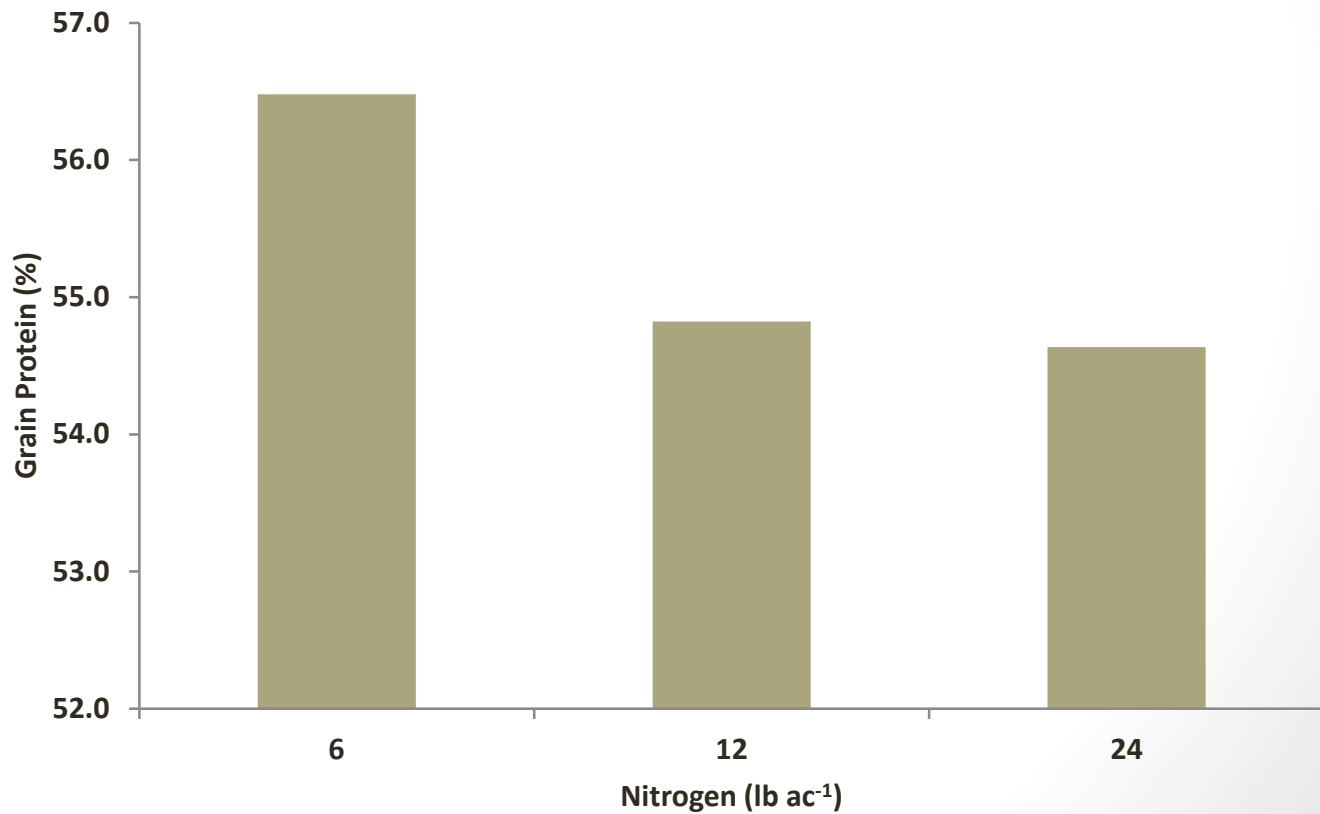
Lahoma

- Test Weight: 53-57.6 Foliar Average 55.3
- Yield Bu ac⁻¹: 54.3-73 Foliar Average 63.3



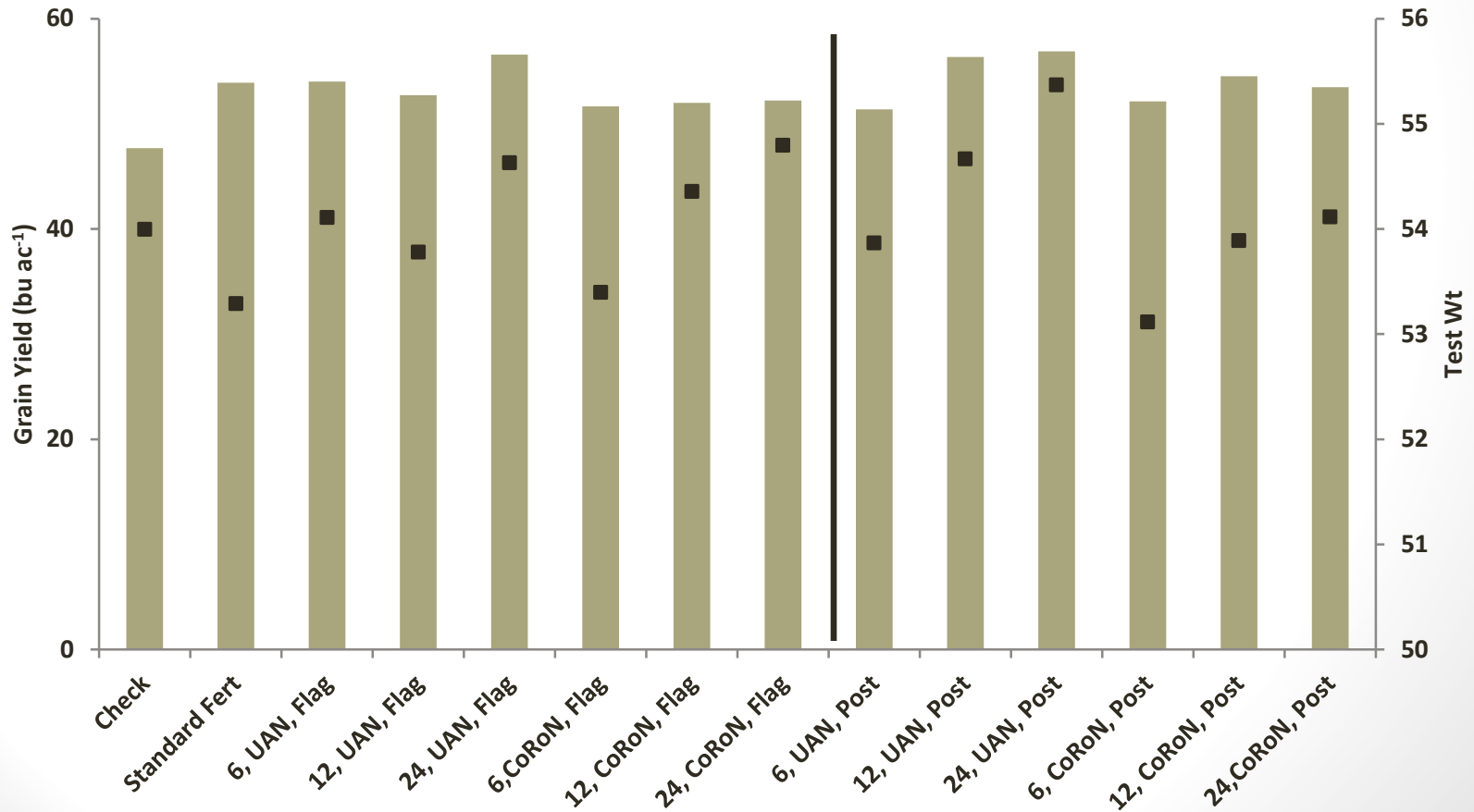
Lahoma

- Test Weight
 - N Rate 6 Sig > 24
 - CoRoN (56) > UAN (54.6)



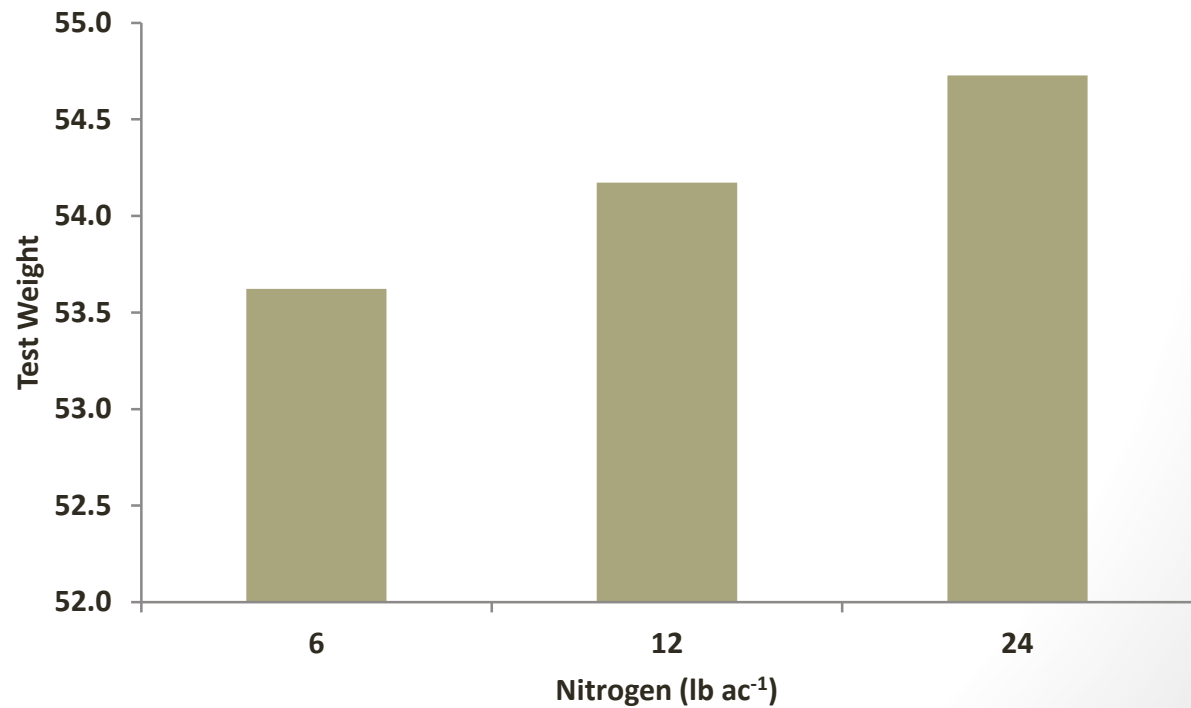
LCB

- Test Weight (53.1-55.4) Foliar average: 54.2
- Yield (47.7-56.9) Foliar average: 53.7



LCB

- Test weight
 - N: 24 lb Sig > 6
 - CoRoN (53.9) = UAN (54.4)



2012-2013 Summary

- Lahoma
 - Test Weight: Sig 12 > 3,8,13,4,5,11
 - Yield: NS

- LCB
 - Test Weight: Sig 8 > 4,6,2,1,9,12
 - Yield: Check Sig lower than all other trts

- Trt12: 24 CoRoN at Post Anthesis
- Trt 8: 24 CoRoN at Flag Leaf

Conclusions

- Yield was never impacted by foliar application above Standard Fertility
 - All other factors extremely variable and not consistent.
 - Oklahoma's environment post flag leaf may be too variable to say conclusively Foliar Application will improve
-
- Will re-establish the trial in 2014 in hopes of 3rd year of quality data.

Thank you!!!



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