Improving Corn and Soybean Yields With Starter and Foliar Fluid Fertilizers

Dorivar Ruiz Diaz

and

Nathan Mueller

Dep. of Agronomy
Kansas State University

Objectives

- Verify potential soil parameters that could be related to responses to starter and foliar applied macro and micronutrients.
- Assessment of corn and soybean grain yield and early growth response to starter fertilizer.
- Compare responses with and without additional foliar fertilizers.
- Evaluate tissue analysis as a diagnostic tool to explain responses to foliar and starter macro and micronutrient application.

Methods

- Factorial Arrangement in RBCD with Two Factors:
- Starter: None, NPK, NPK + micros.
  - Dribble placement.
- Foliar: None, NPK, NPK + micros.
  - V6 for Corn and R1 for soybean.
- Micronutrients: Fe, Zn, Mn, B, Cu.

Methods

- Soil samples 0-6” from each small plot.
- Tissue samples before foliar fertilizer application from each small plot.
- Early plant growth.
- Grain yield.

Methods

- Two irrigated locations for each soybean and corn.
- “Optimum” N,P,K fertility, hybrids, irrigation, and population.
- Zn, Cu, Mn : EDTA. Fe-HEDTA.
- Boron (Derived from boric acid).
- N, P, K: 4-10-10 and 10-10-10.

Methods

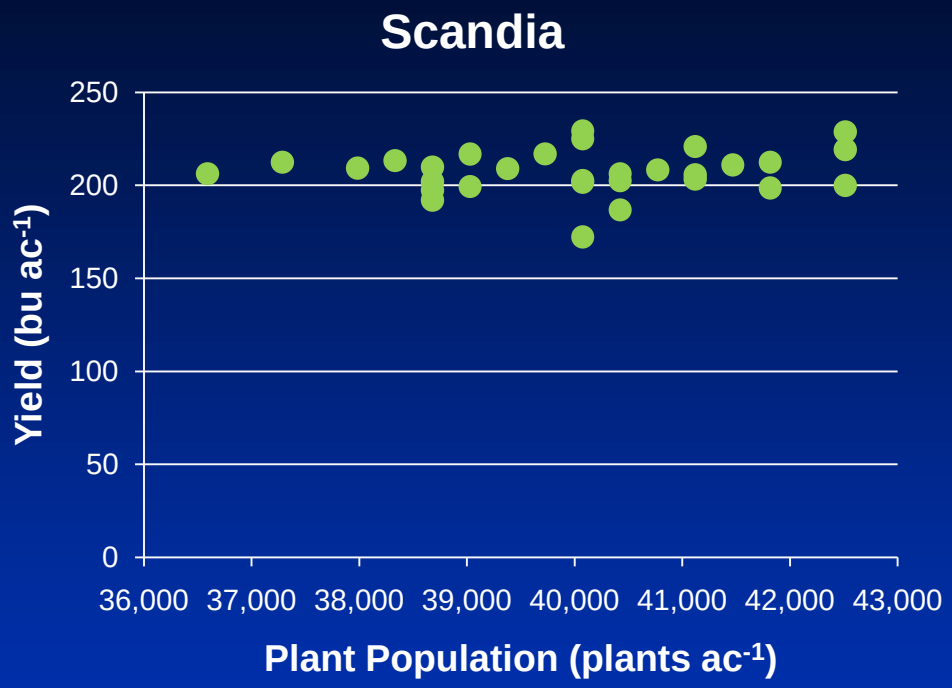
Nutrient application rates

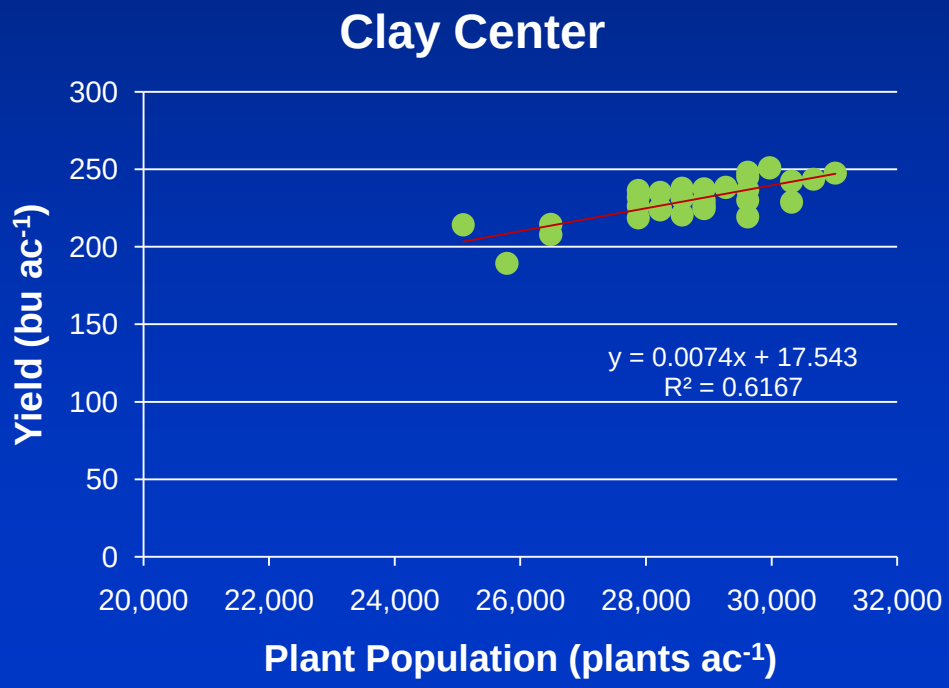
		N	P2O5	K2O	Fe	Zn	Cu	Mn	B
Starter		- - - - - - - - - - - - - - - - lbs/acre - - - - - - - - - - - - - - - -							
	NPK	4	10	10	-	-	-	-	-
	NPK + micros	4	10	10	0.5	0.5	0.5	0.5	0.5
Foliar									
	NPK	2	2	2	-	-	-	-	-
	NPK + micros	2	2	2	0.2	0.2	0.2	0.2	0.2

Average soil test levels

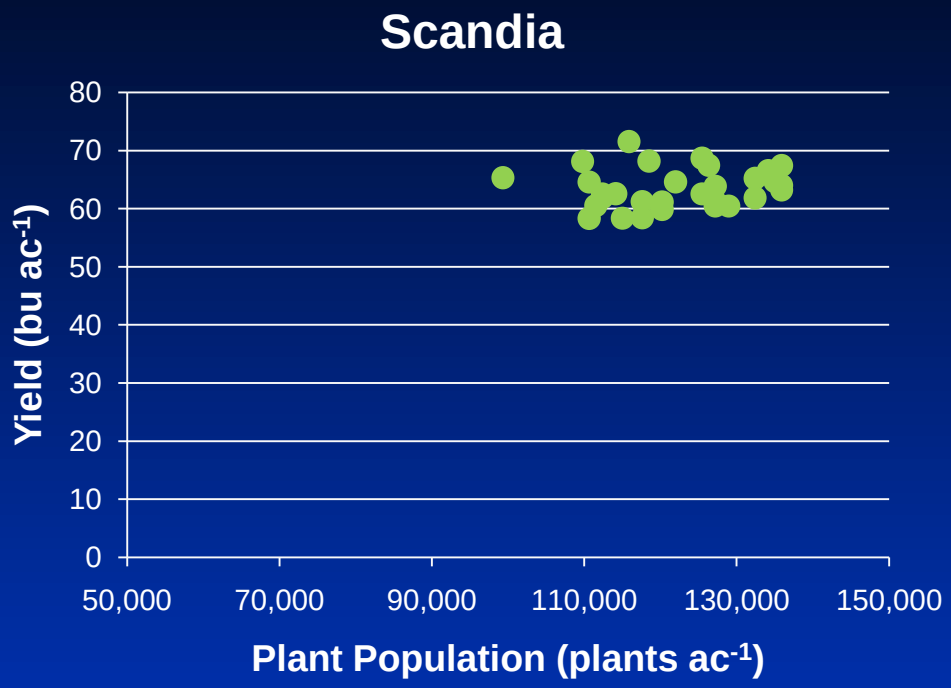
Soil test (ppm)	Corn		Soybean	
	Scandia	Clay Center	Scandia	Clay Center
pH	6.7	7.4	7.0	7.1
P	21	114	22	34
K	460	388	480	255
Zn	1.4	2.5	1.2	4.0
Fe	31	21	26	16
Mn	23	5.9	17	9
Cu	0.88	0.36	0.86	0.33
B	0.54	0.31	0.67	0.33

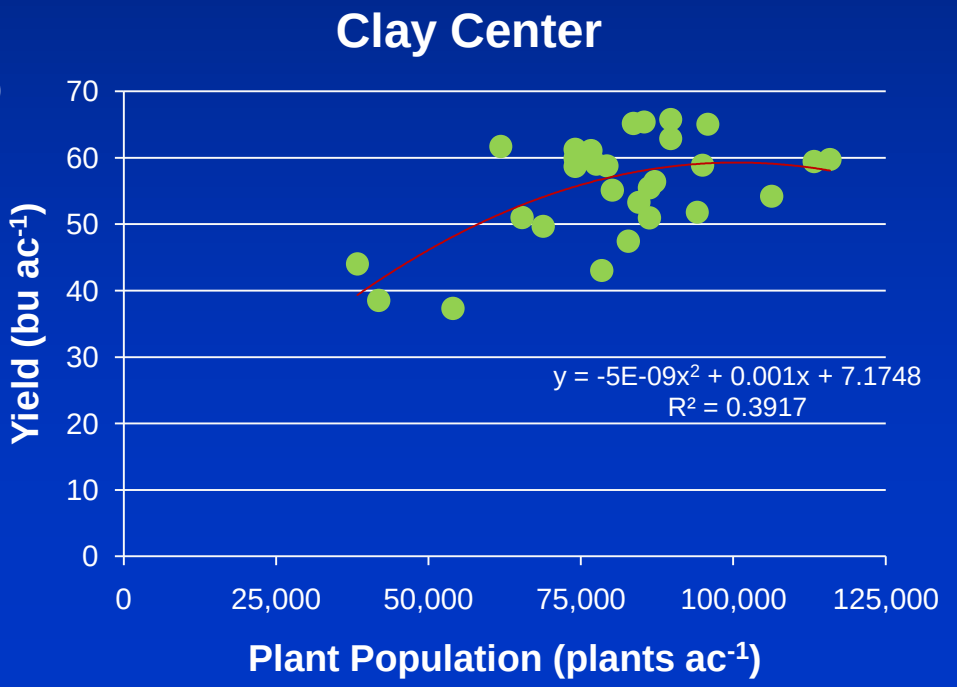
Corn: Optimum Population?





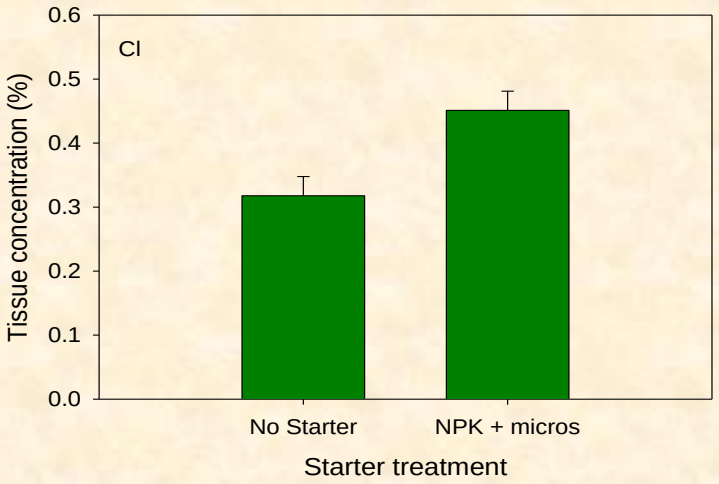
Soybean: Optimum Population?

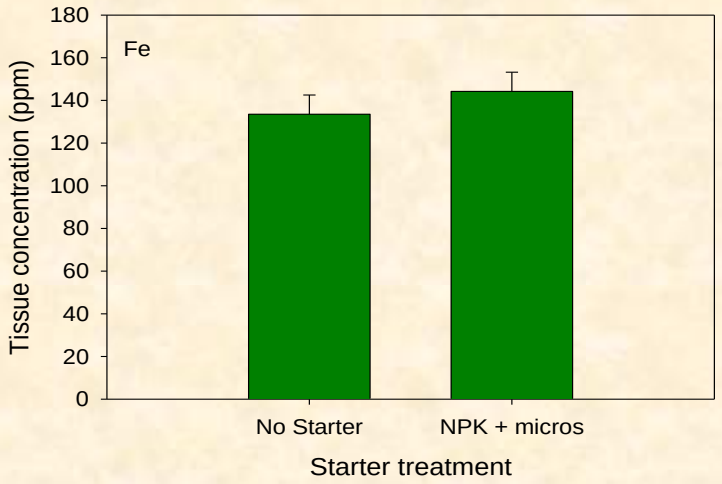


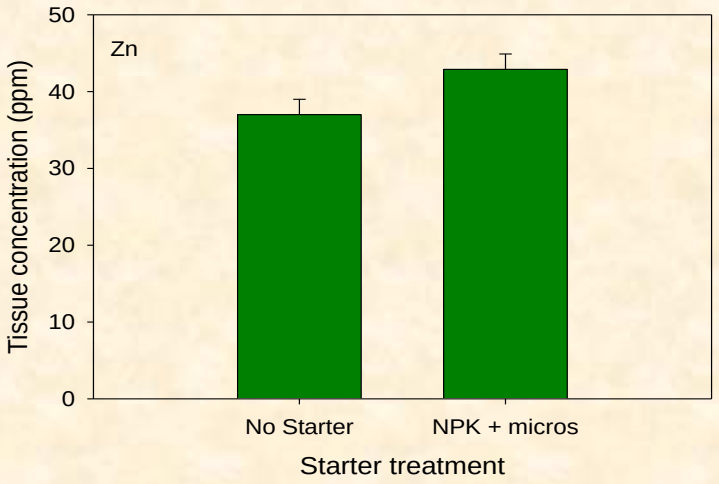


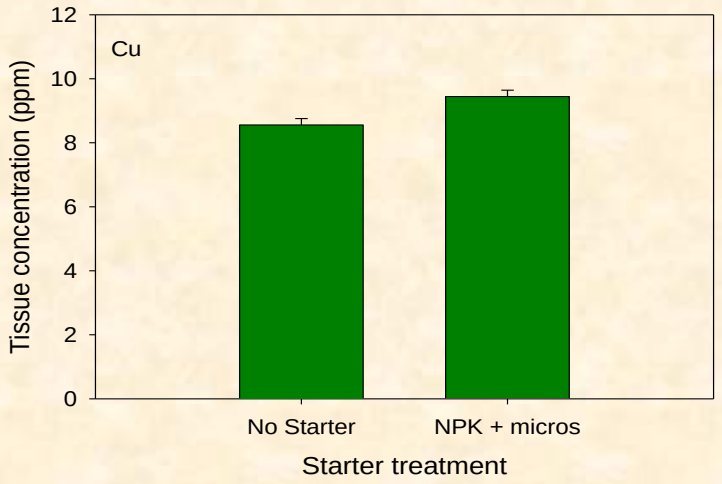
Corn tissue nutrient increase

Scandia



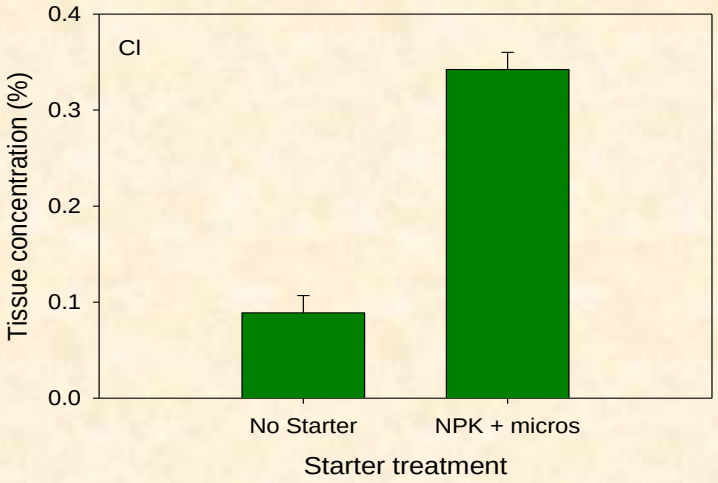


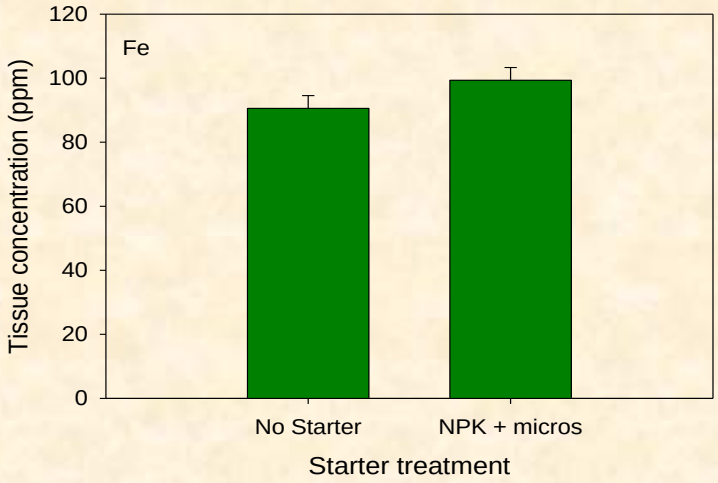


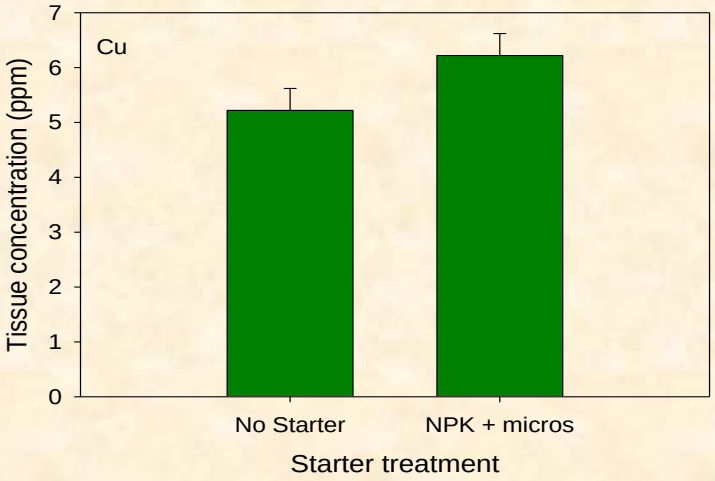


Corn tissue nutrient increase

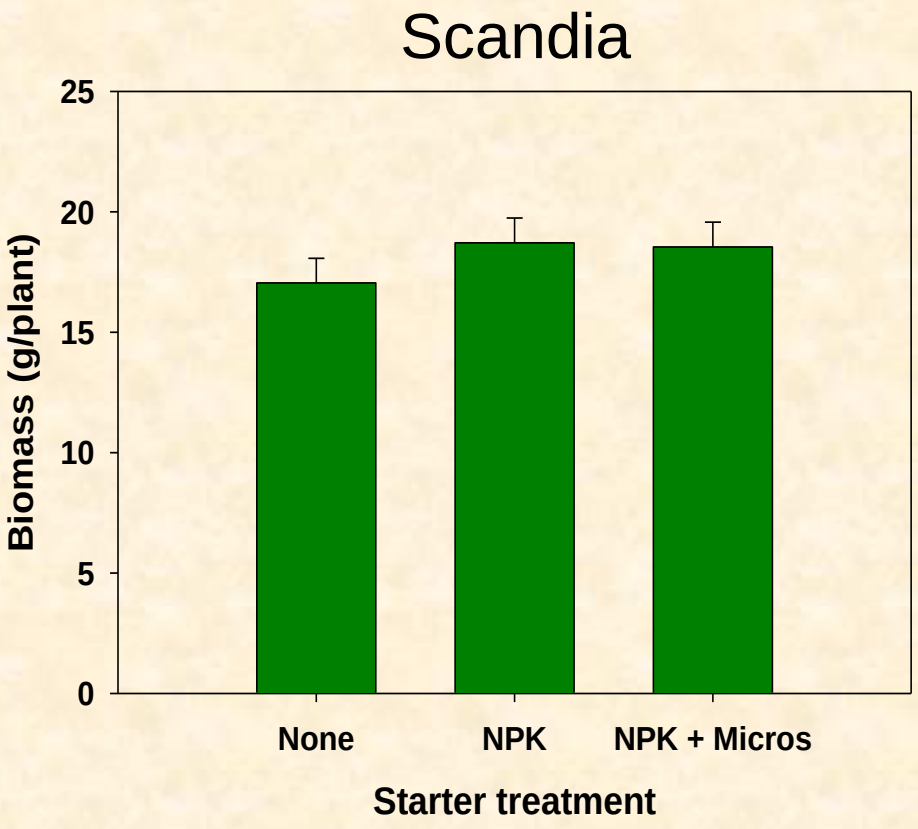
Clay center

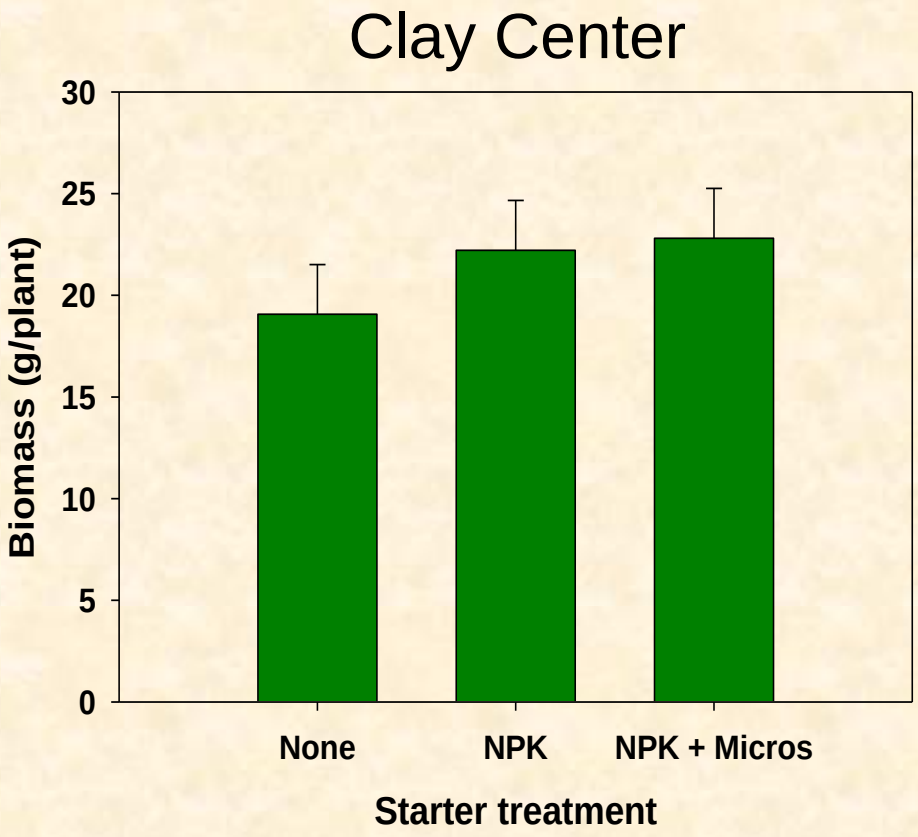






Starter Effect on Corn Early Biomass





Starter Corn Yield - 2010

Scandia

Starter treatment	Yield (bu/a)
None	204 b
NPK	207 a
NPK + micros	209 a

Clay Center

Starter treatment	Yield (bu/a)
None	228 b
NPK	231 a
NPK + micros	231 a

Starter Soybean Yield - 2010

Scandia

Starter treatment	Yield (bu/a)
None	63 a
NPK	63 a
NPK + micros	65 a

Clay Center

Starter treatment	Yield (bu/a)
None	56 b
NPK	58 b
NPK + micros	63 a

Summary

- Scandia Corn
  - Starter increased P content in tissue.
  - Starter increase grain yield.

- Clay Center Corn
  - Yield limited by low plant population.
  - Copper-limited based on tissue analysis.
  - Micro-starter increased copper tissue concentration.

Summary

- Clay Center Soybean
  - Yield limited by plant population.
  - S and Cu-limited based on tissue analysis.
- Copper in micronutrient starter did not increase in tissue concentration.
- Zn, B, Mn and Fe significantly affected by micronutrient starter at both locations.

Current and Future Direction

- Tissue nutrient sufficiency range assessment.
- Multivariate and regression analysis of data.
- Sulfur requirement for corn and soybeans.
- Diagnosis and recommendation integrated system (DRIS).
- More years of data collection needed.

Acknowledgement

- Fluid Fertilizer Foundation
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- Nutra-Flo
- Kansas Corn Commission

Questions?