

Improving corn and soybean yields with starter and foliar fluid fertilizers

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Starter and foliar including micronutrients

- Fields with high corn and soybean yields may benefit from micronutrients.
- Typically low micronutrient requirements can be combined with a starter program
- The use of foliar micronutrient application in combination with soil-applied program.
- Evaluate nutrient sufficient or potential *“hidden hunger”*



Objectives

- Assessment of corn and soybean grain yield and early growth response to starter fertilizer with micronutrients.
- Evaluate responses with and without additional foliar fertilizers.
- Evaluate foliar nitrogen in corn (derived from methylene ureas and triazone).



Methods

- Factorial Arrangement in RBCD with Two Factors:
- Starter: None, NPK, NPK + micronutrients.
- Foliar: None, NPK, NPK + micronutrients.
 - V6 for Corn and R1 for soybean.
- Micronutrient mix:
 - Mn, Zn, Cu as EDTA
 - Fe as HEDTA, and B.



Methods

- Measurements
 - 0- to 6-inch soil samples
 - Whole corn plants at V6
 - Soybean trifoliolates at R1
 - Tissue sampling after foliar fertilizer application
 - Grain yield
- Statistics
 - ANOVA using the GLIMMIX procedure of SAS



Methods

- Six irrigated locations for corn during 2010, 2011 and 2012.
- Six irrigated locations for soybean during 2010, 2011 and 2012.
- Optimum N,P,K fertility, hybrids, irrigation, and population.
- N, P, K: 4-10-10 and 10-10-10.



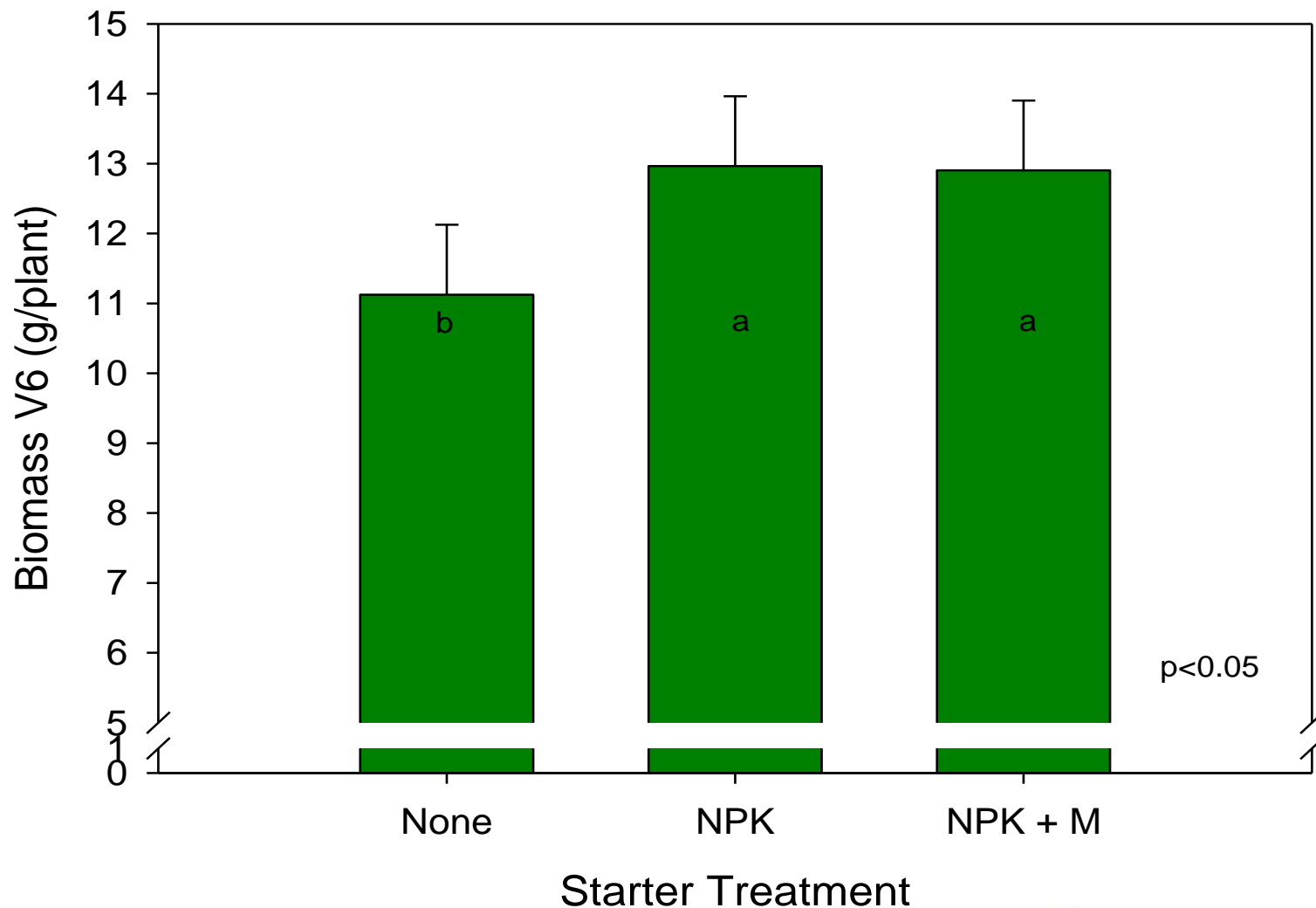
Methods

Nutrient application rates

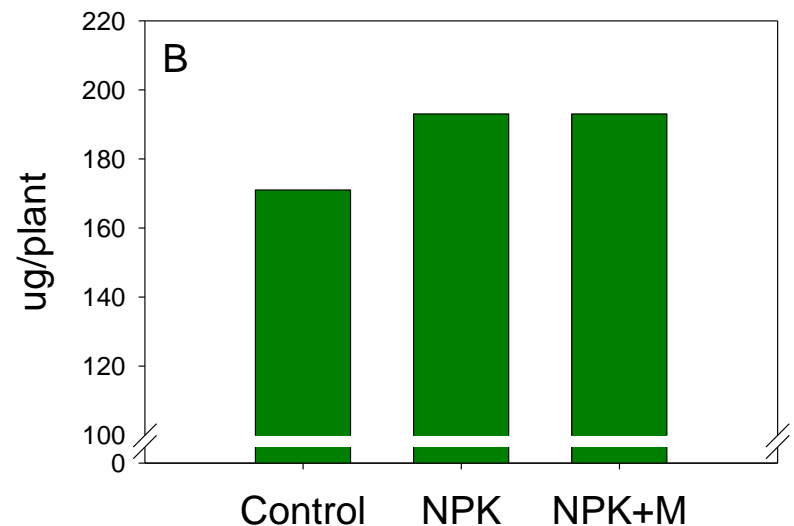
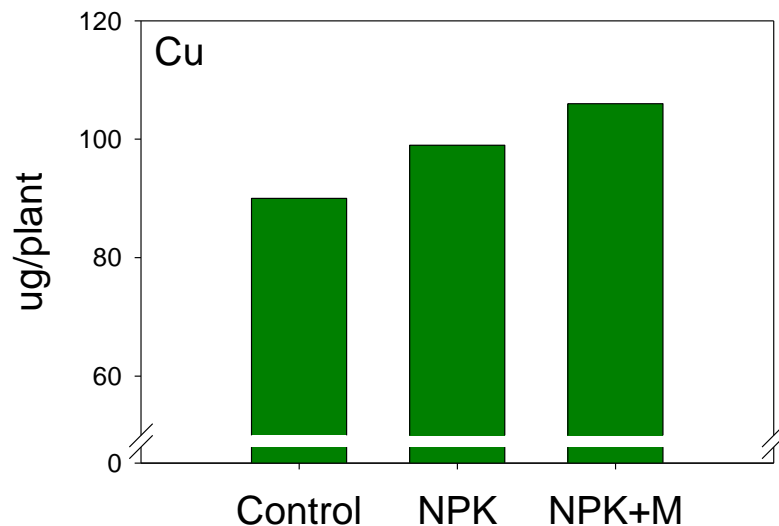
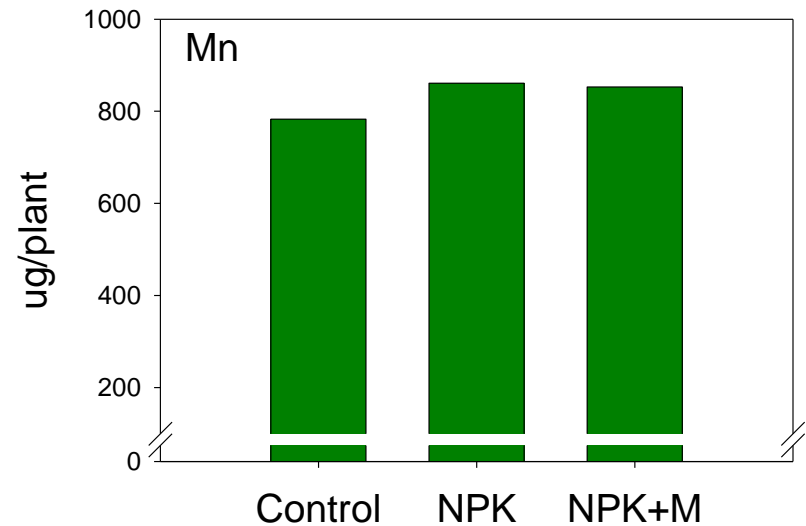
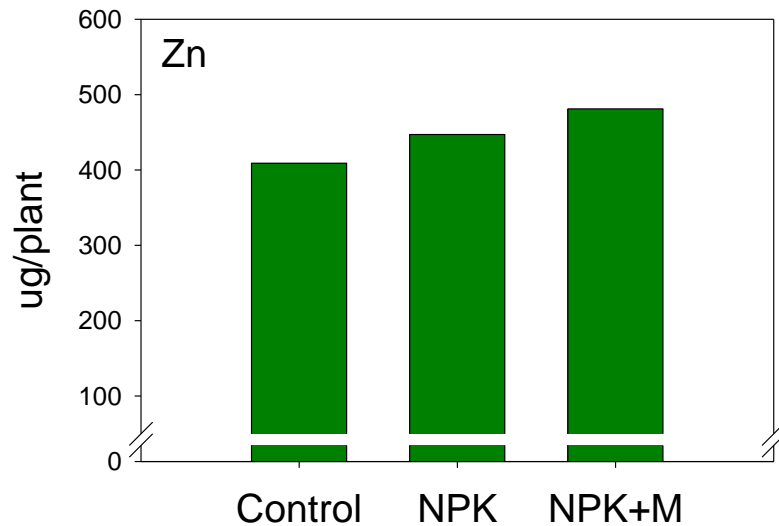
		N	P2O5	K2O	Fe	Zn	Cu	Mn	B
<u>Starter</u>		----- lbs/acre -----							
	NPK	4	10	10	-	-	-	-	-
	NPK + micros	4	10	10	0.5	0.5	0.5	0.5	0.5
<u>Foliar</u>									
	NPK	2	2	2	-	-	-	-	-
	NPK + micros	2	2	2	0.2	0.2	0.2	0.2	0.2



Corn biomass V6 - across locations



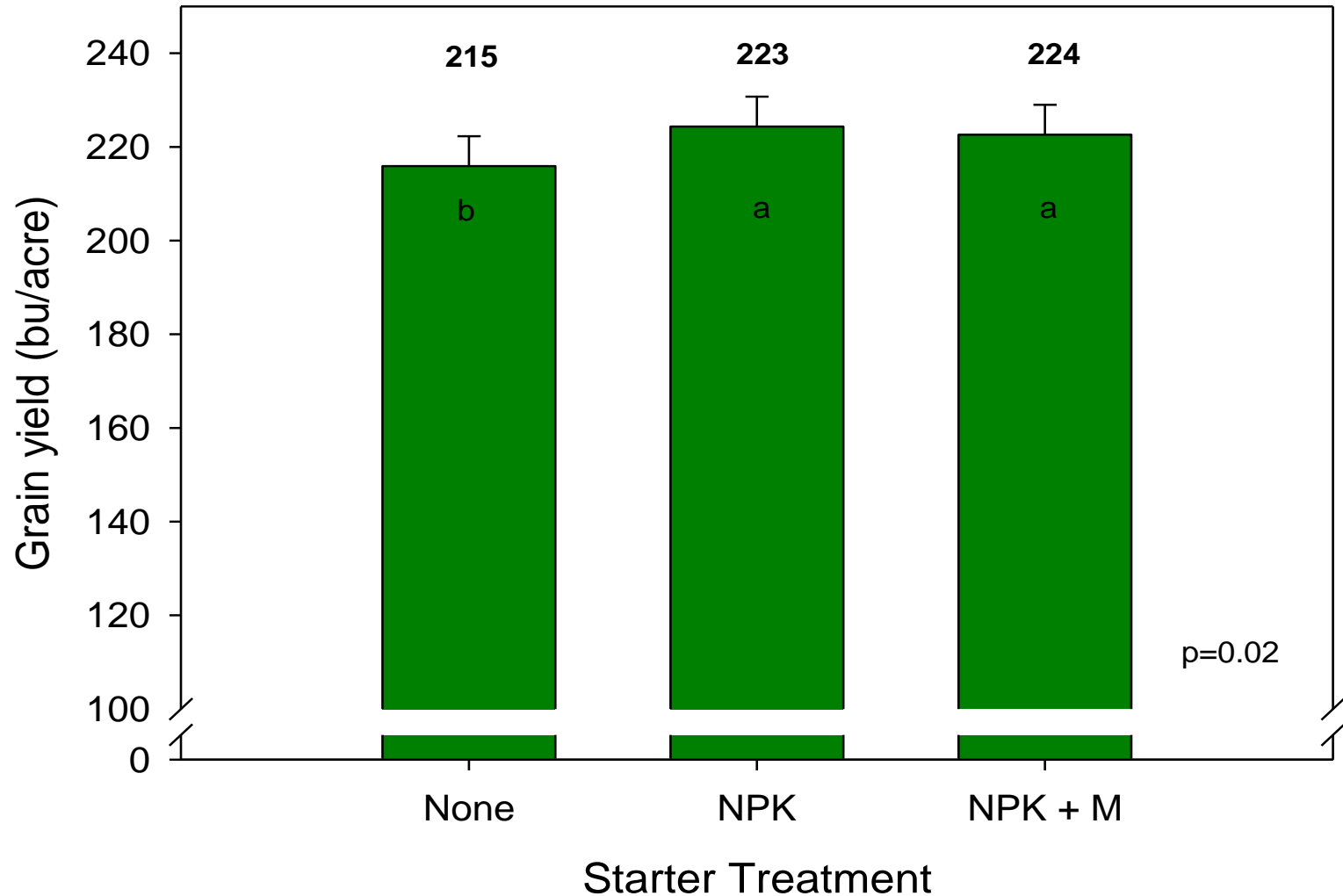
Corn nutrient uptake - V6



Across locations



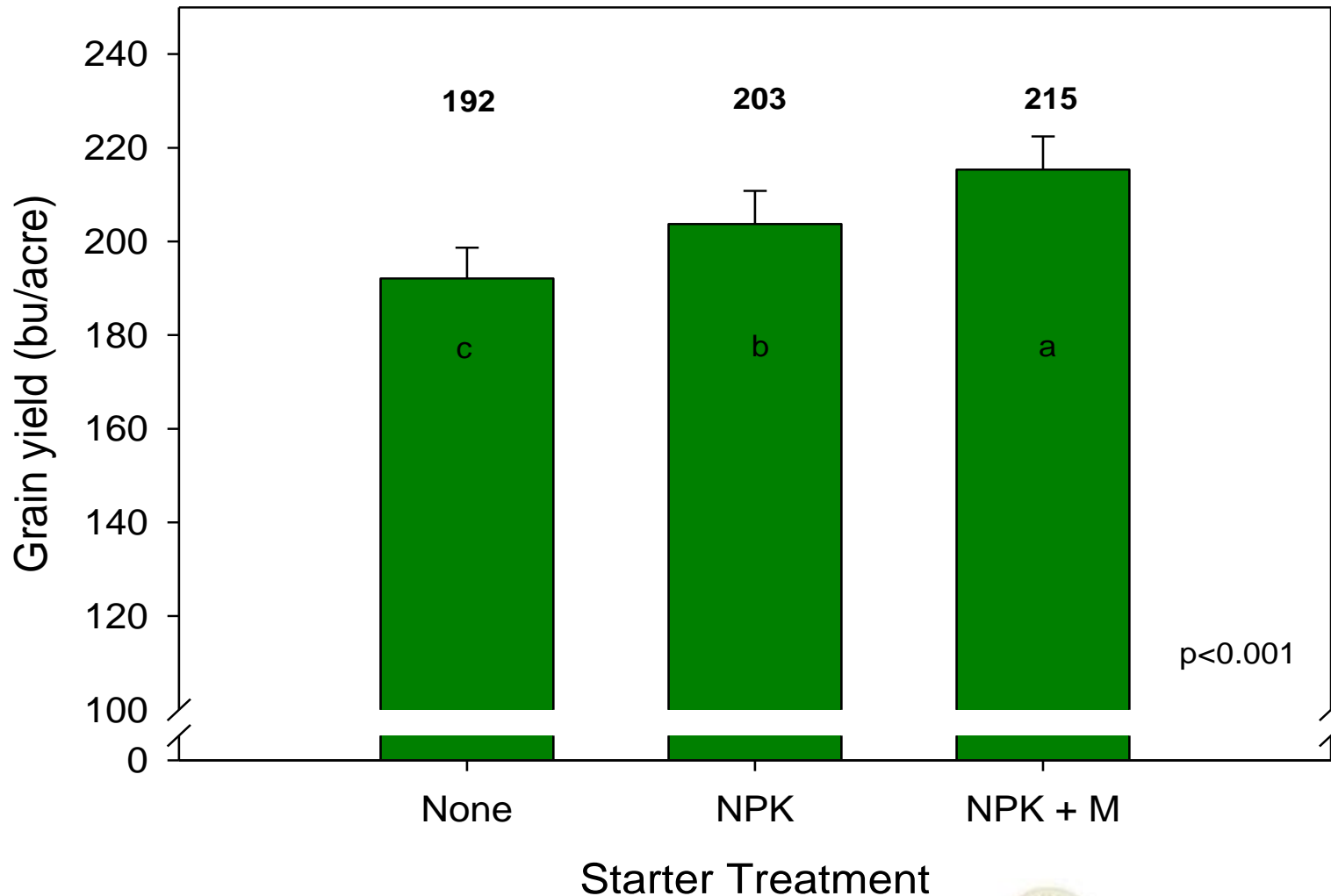
Corn grain yield - across locations



Across locations



Responsive location - Rossville 2012

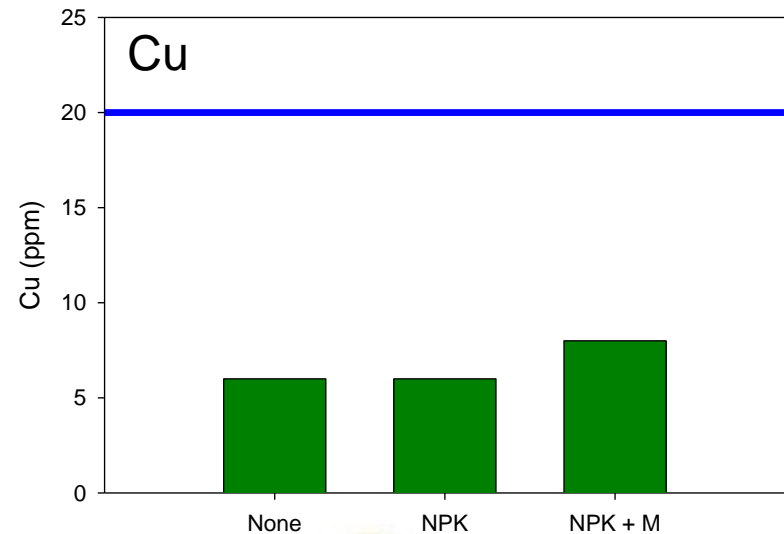
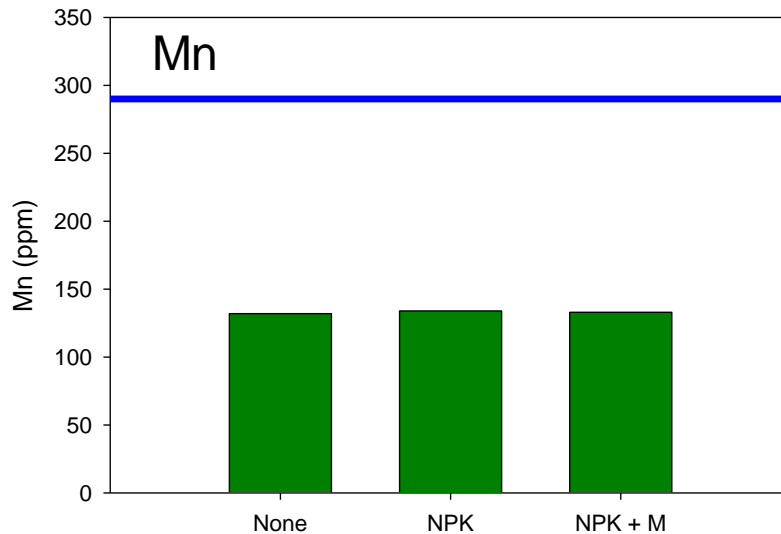
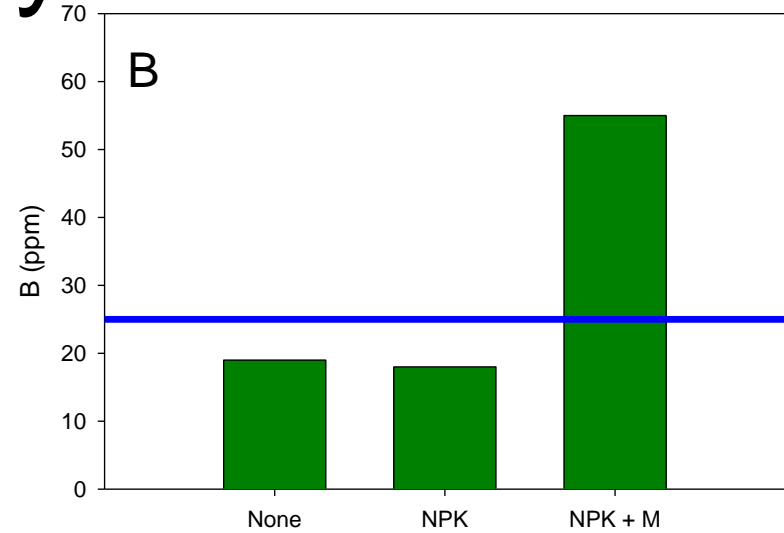
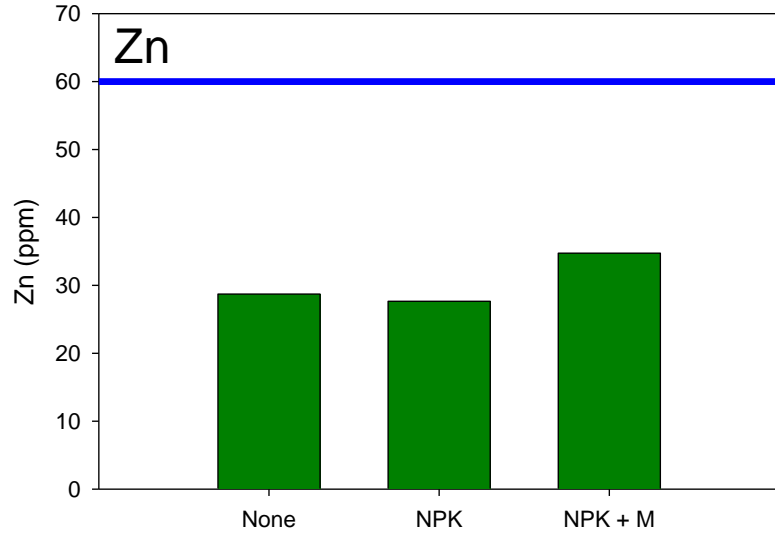


Responsive location - Rossville 2012

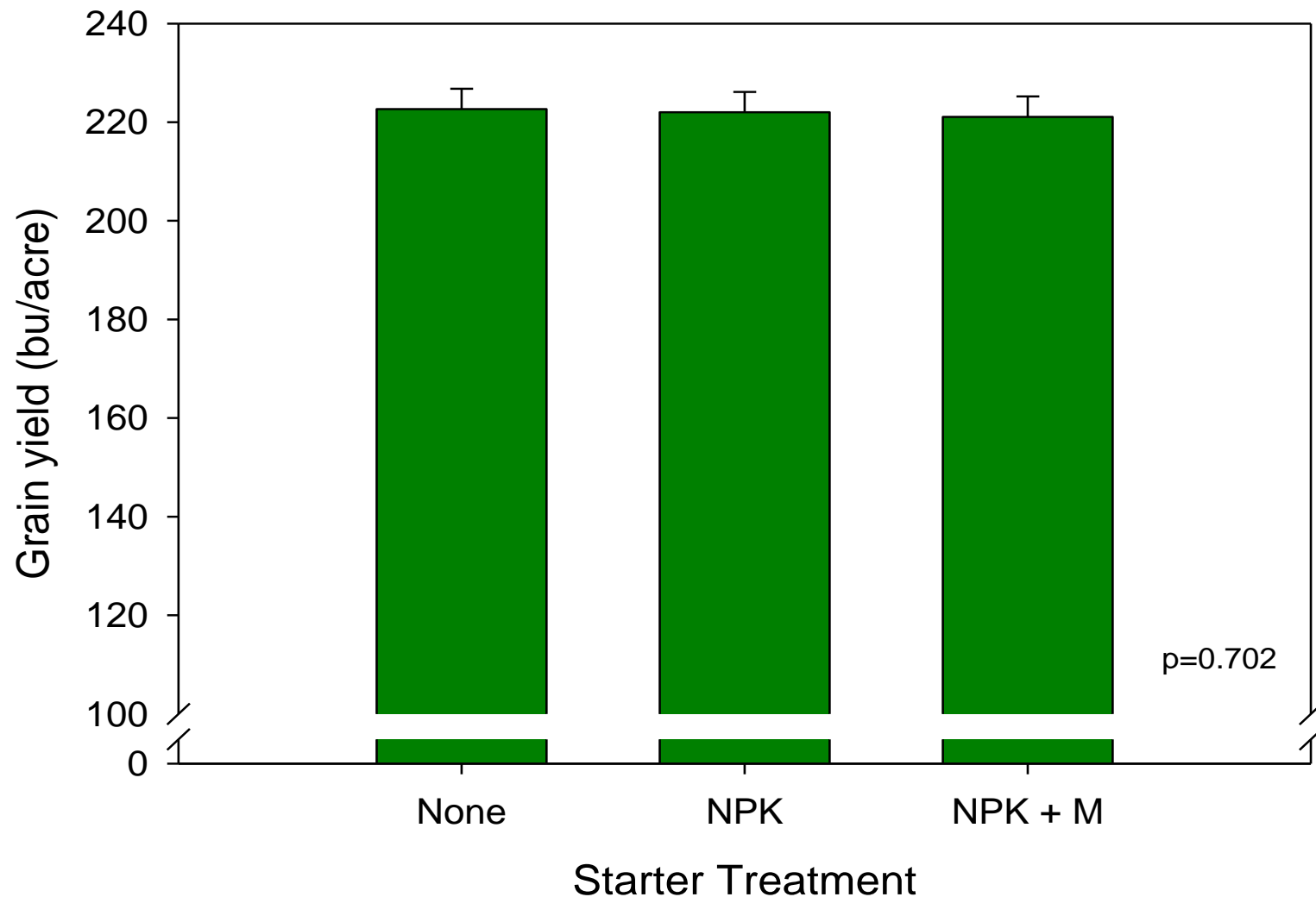
Soil parameter	Rossville
pH	6.8
Soil test P (ppm)	24
Soil test K (ppm)	114
CEC (meq/100g)	4.5
OM (%)	0.9
Sand (%)	80
Clay (%)	5



Responsive location - Tissue analysis



Corn grain yield - foliar

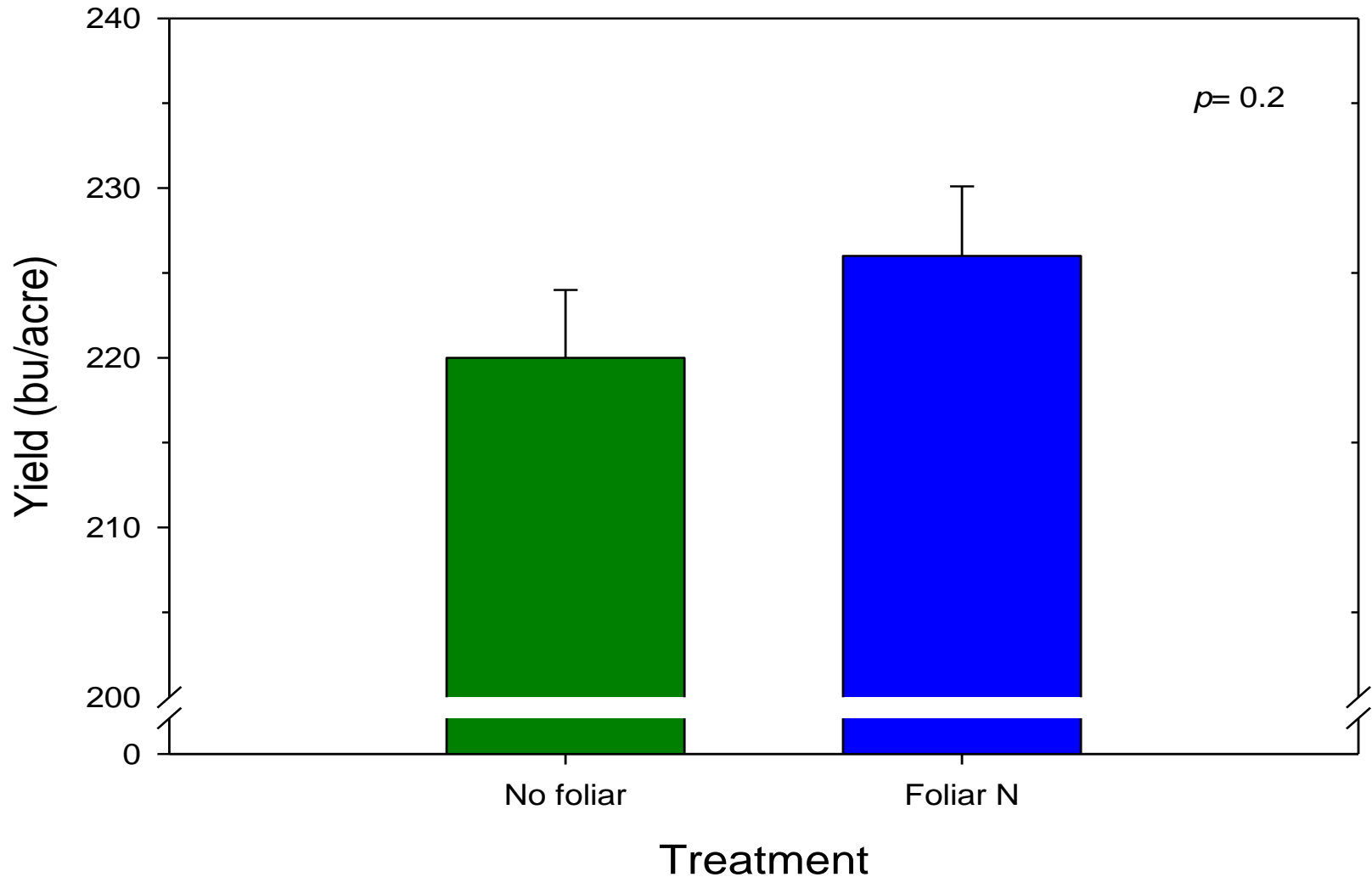


Foliar nitrogen - corn

- Derived from methylene ureas and triazone
- Slower drying on the leaves?



Foliar nitrogen corn



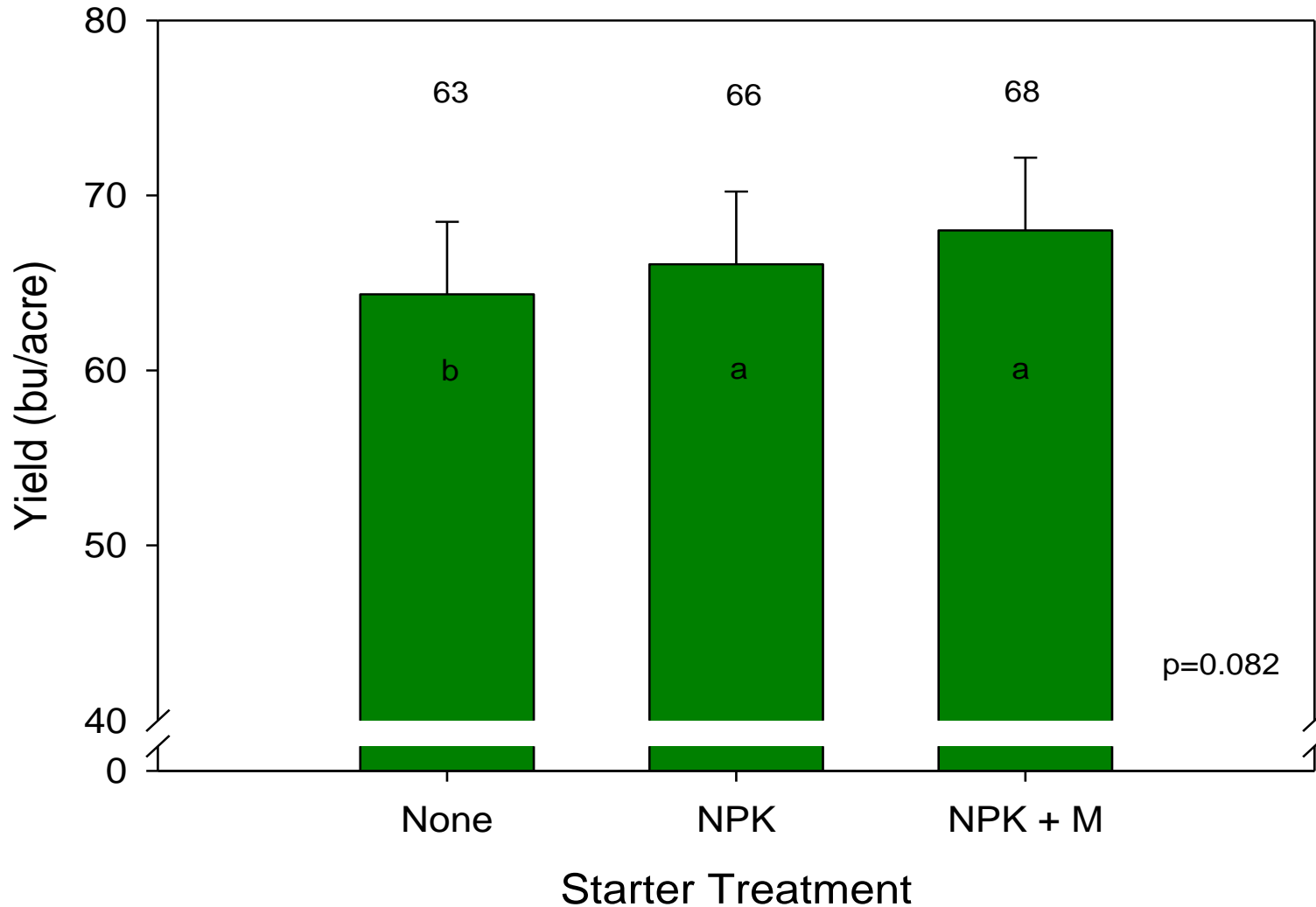
Across locations



Soybean



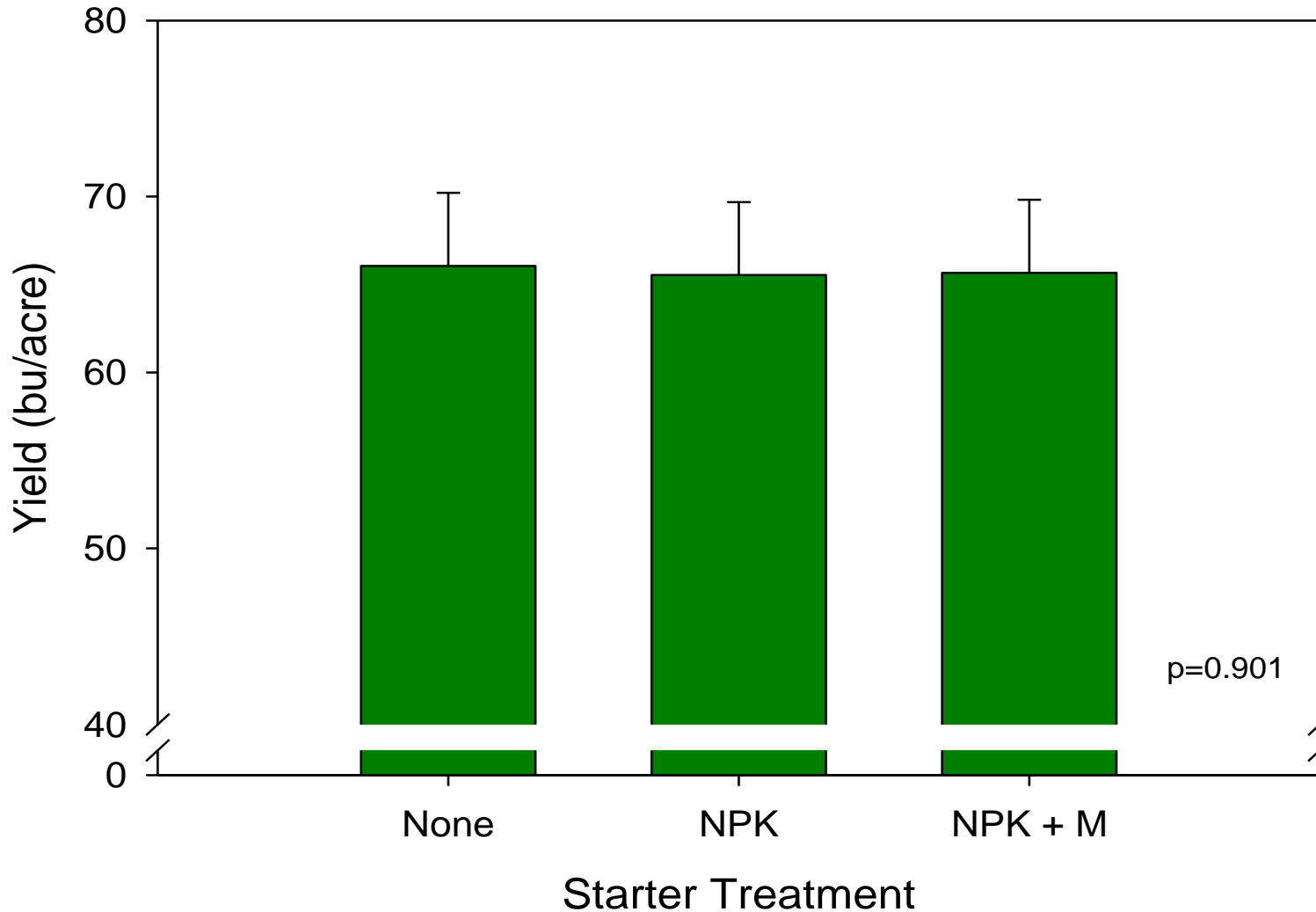
Soybean yield - starter



Across locations



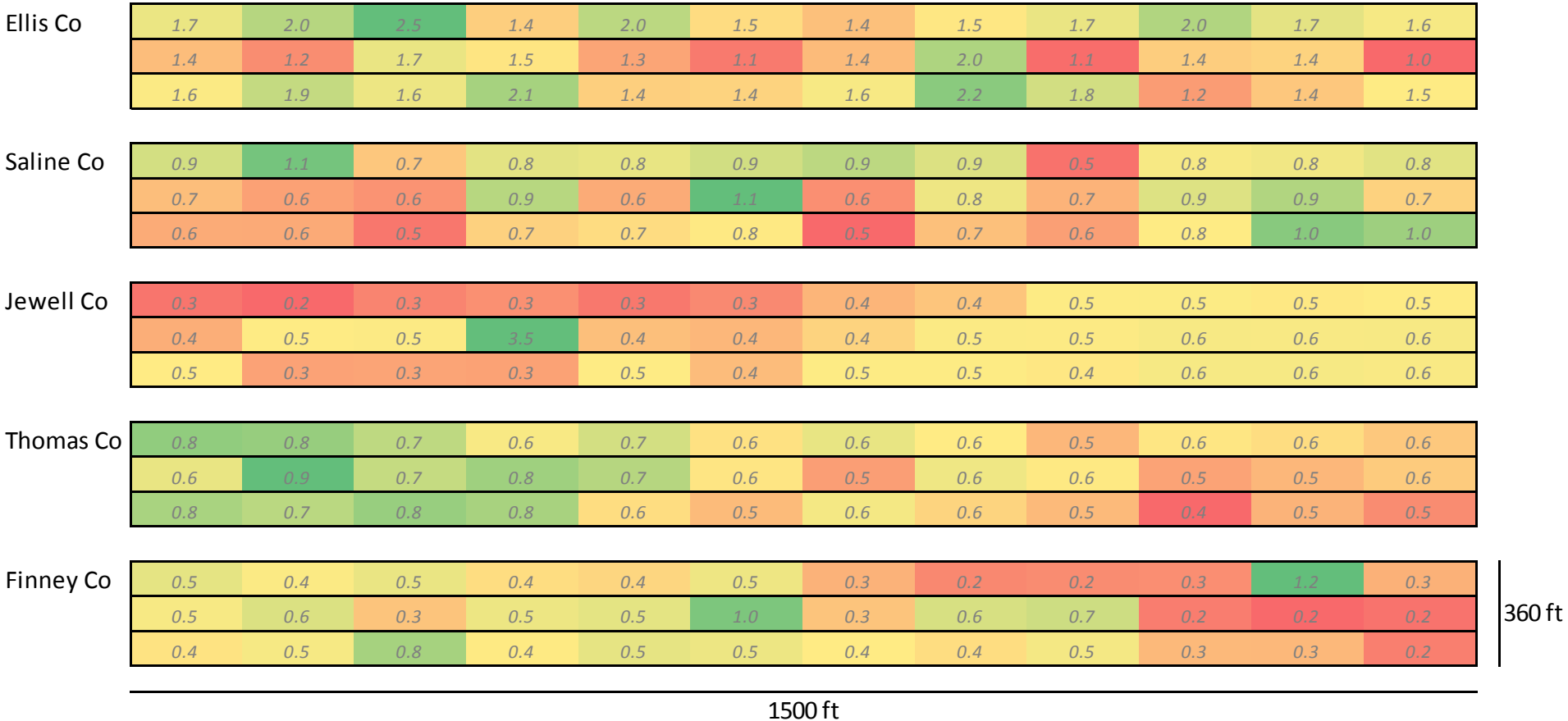
Soybean yield - foliar



Across locations

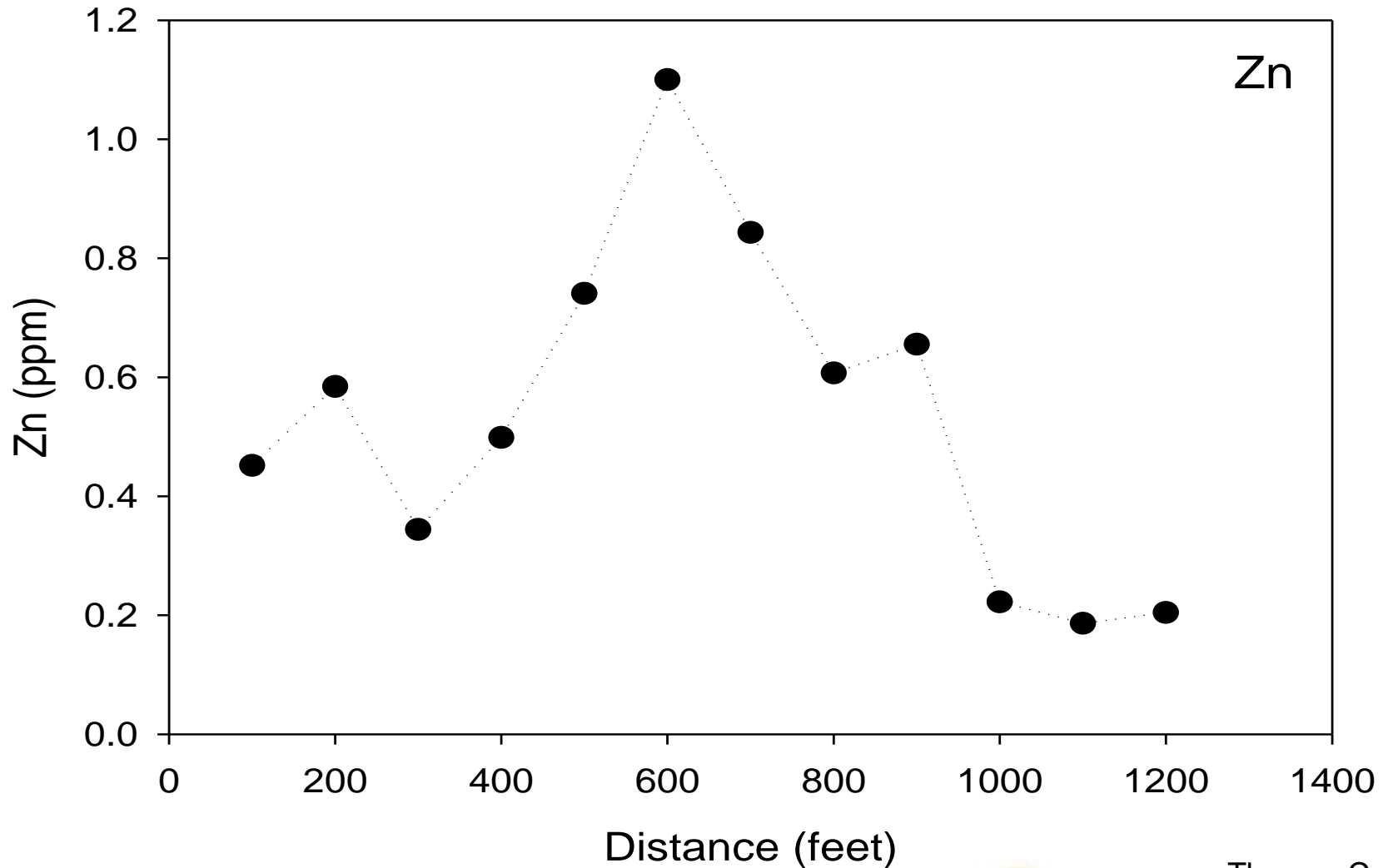


Field variability soil Zn



Zn (DTPA)

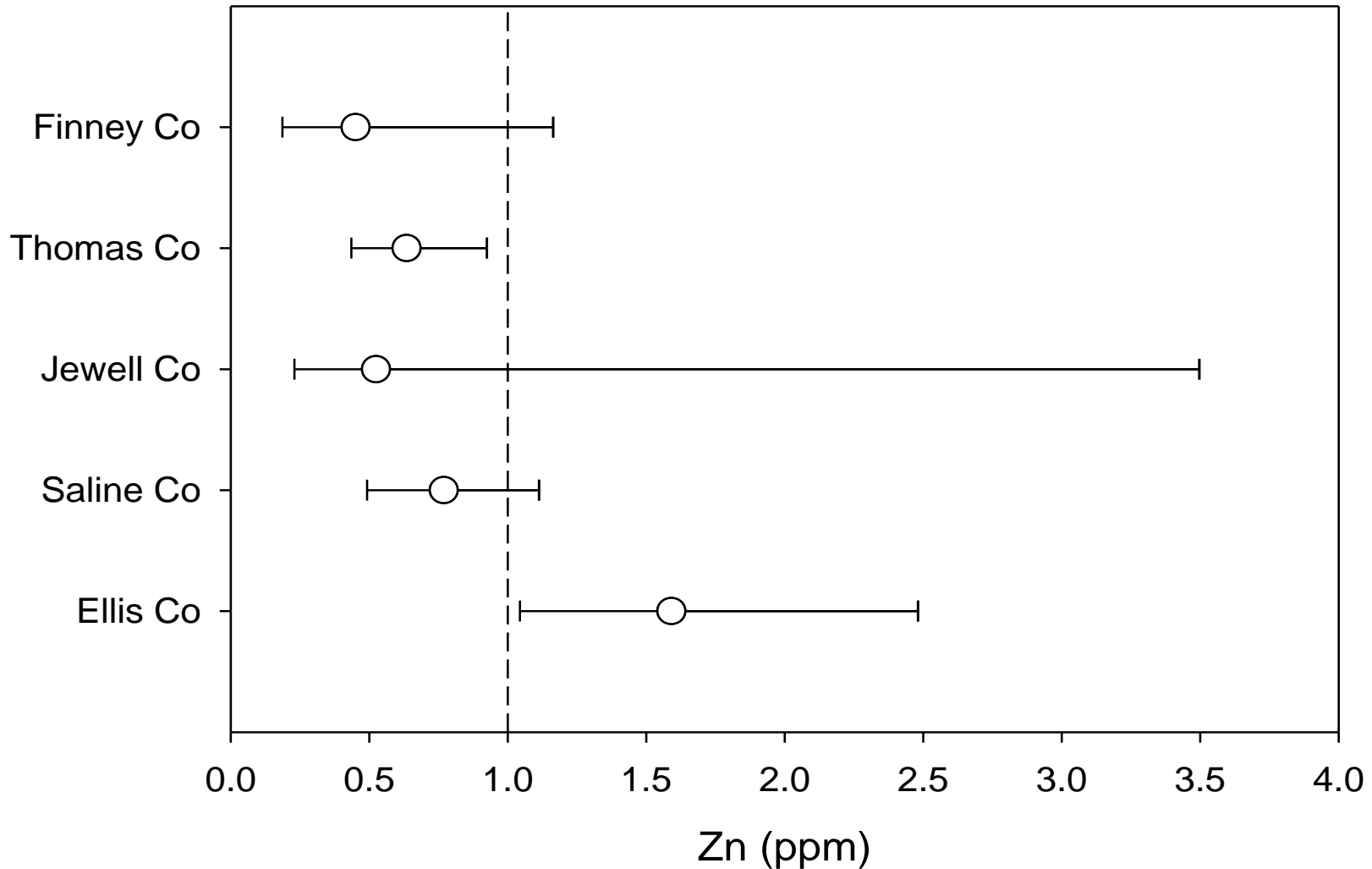
Field variability soil Zn



Thomas Co, 2012



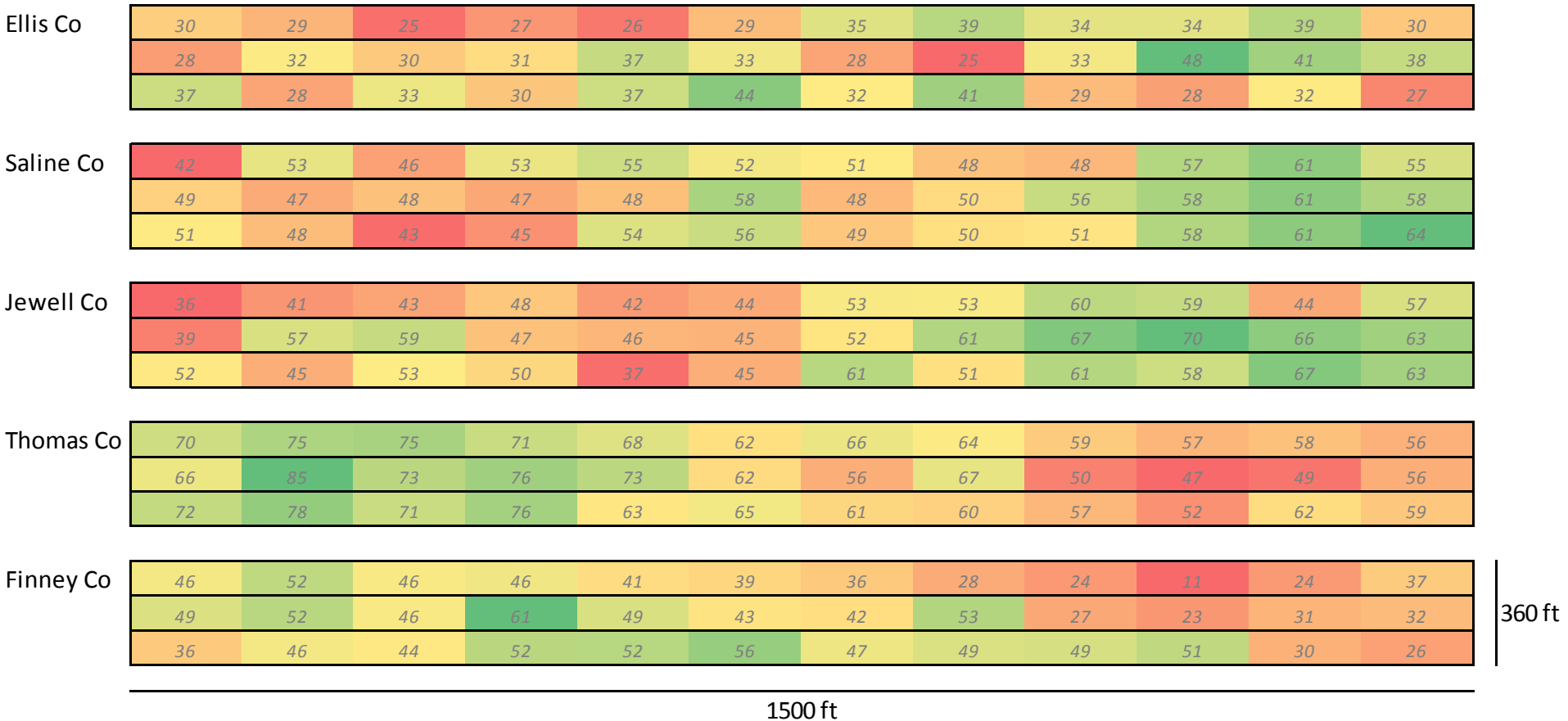
Field variability soil Zn



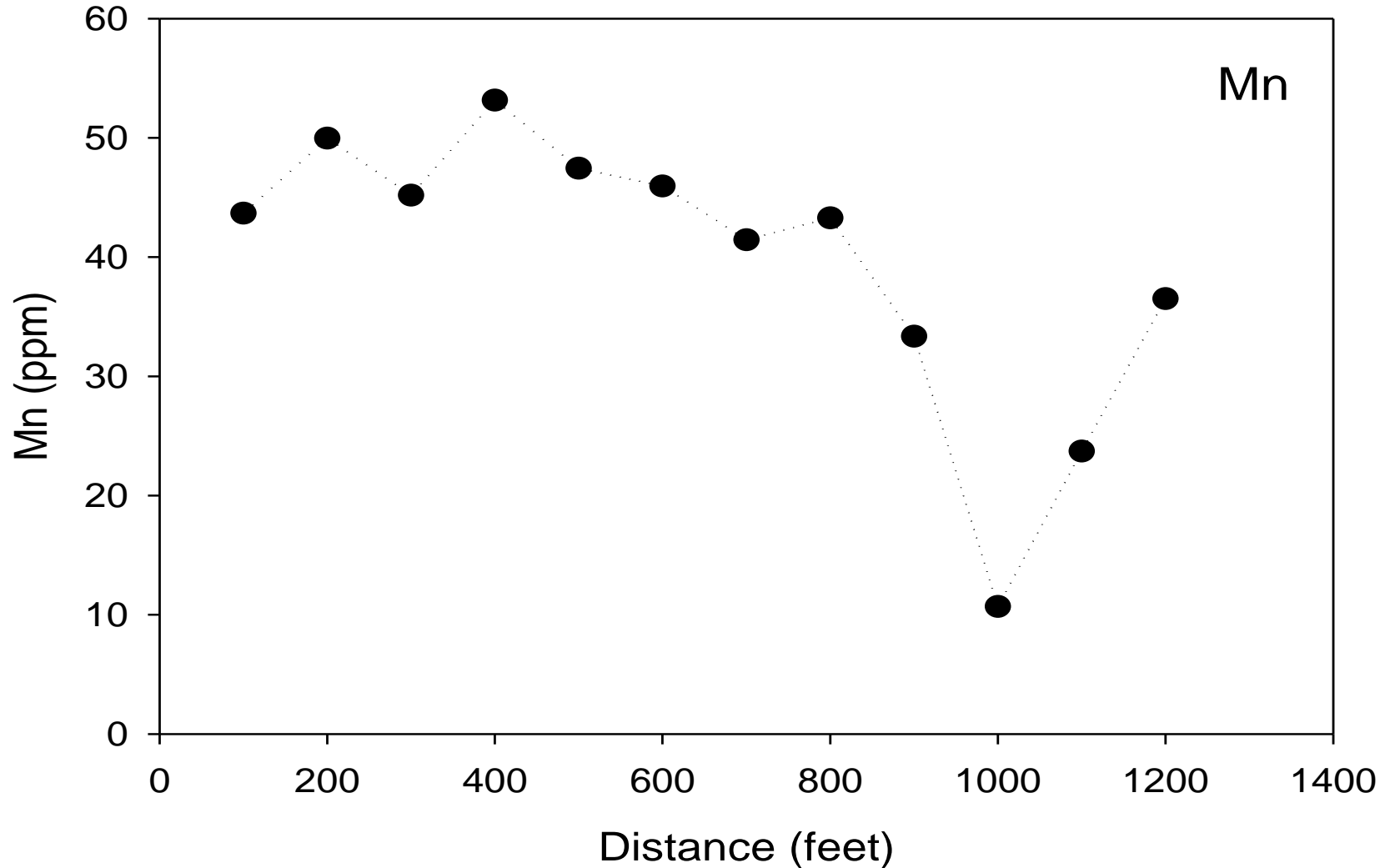
Zn (DTPA)



Field variability soil Mn



Field variability soil Mn



Summary

- *Micronutrients seems to have no “starter effect” on corn biomass in addition to N and P.*
- Response to starter w/ micros vary by soil type.
 - Location with sandy soil and low OM show significant response.
- Foliar application show no yield response in our study.



Summary

- Micronutrients with starter fertilizers may help with small scale soil nutrient variation.
- Within-field soil test variability for micronutrients should be considered.
- Starter with micronutrients may be an *effective “insurance”* to avoid potential yield loss in some conditions.



Acknowledgement

- Fluid Fertilizer Foundation
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- Nutra-Flo
- Waters Agricultural Laboratories
- Olsen's Agricultural Laboratory



Questions?



Field variability soil Mn

