

Soil testing lab and fertility research update

Dorivar Ruiz Diaz

Soil Fertility and Nutrient Management

Overview

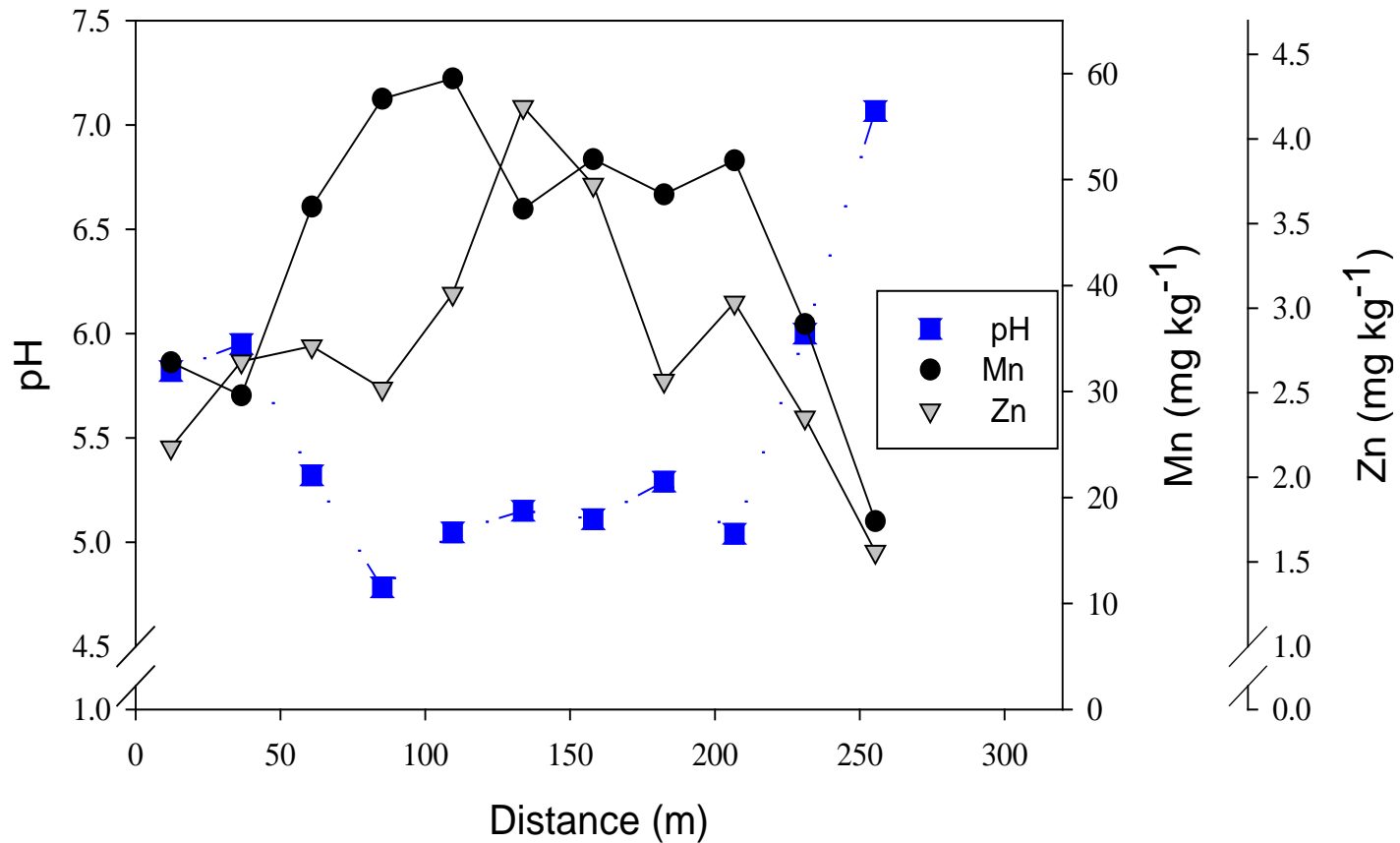
- Soybean micronutrient study.
- Phosphorus placement – corn and soybean.
- Making decisions on fertilizer rates when crop prices are low.
- Update on the soil testing lab.

Soybean response to micronutrients

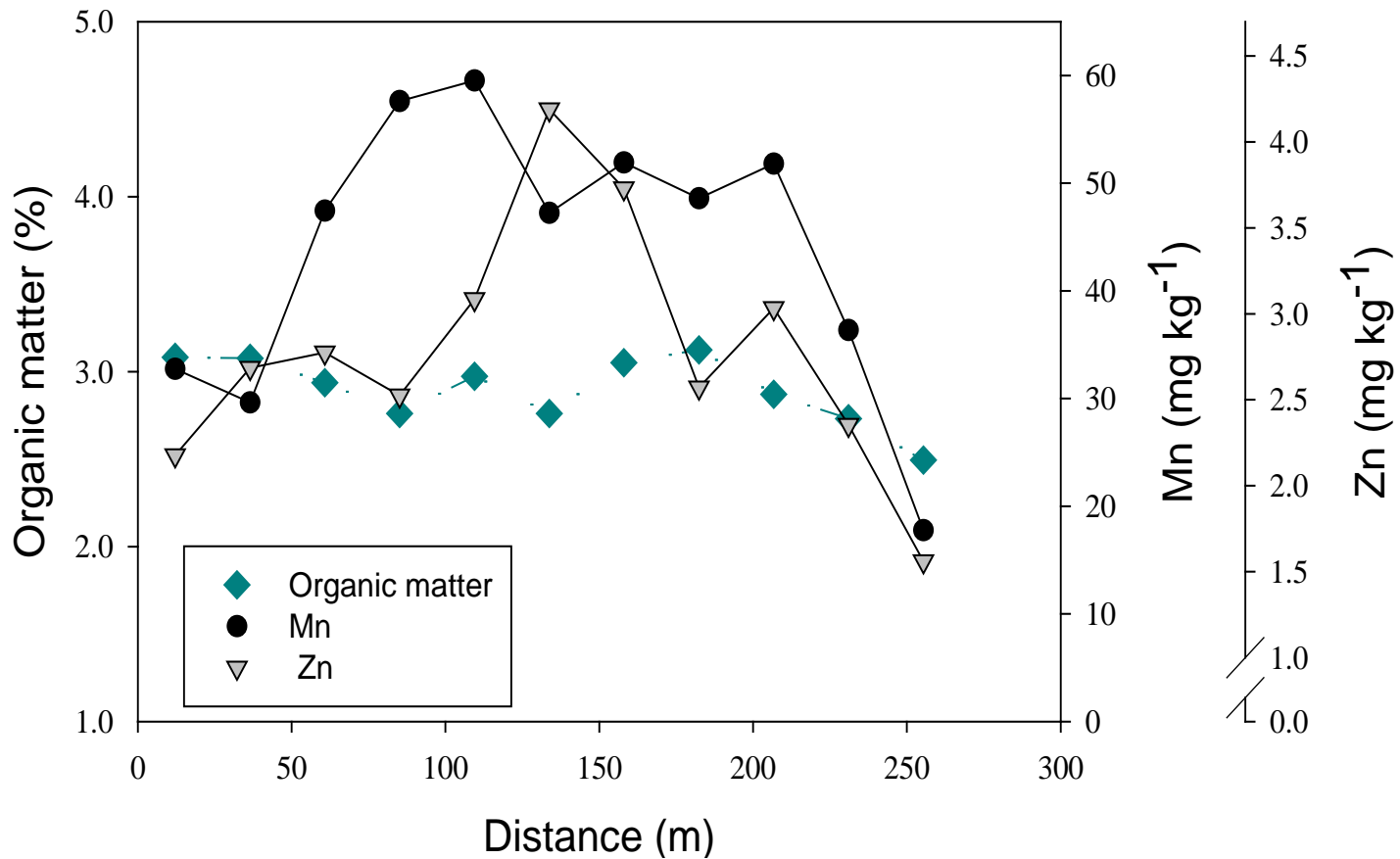
- Fertilizer treatments for small plots:
 - Five individual nutrients. Broadcast, pre-plant.
 - S= 15 lbs/acre
 - Mn, Zn, Cu= 10 lbs/acre
 - B= 5 lbs/acre
 - Blend
- Strip trial with two treatments: control and blend.
- Intensive soil and tissue analysis.



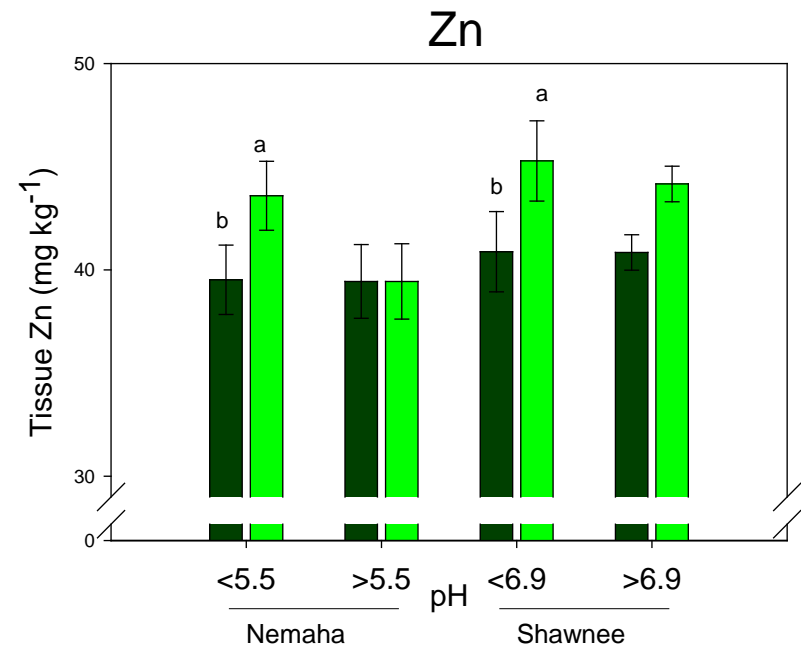
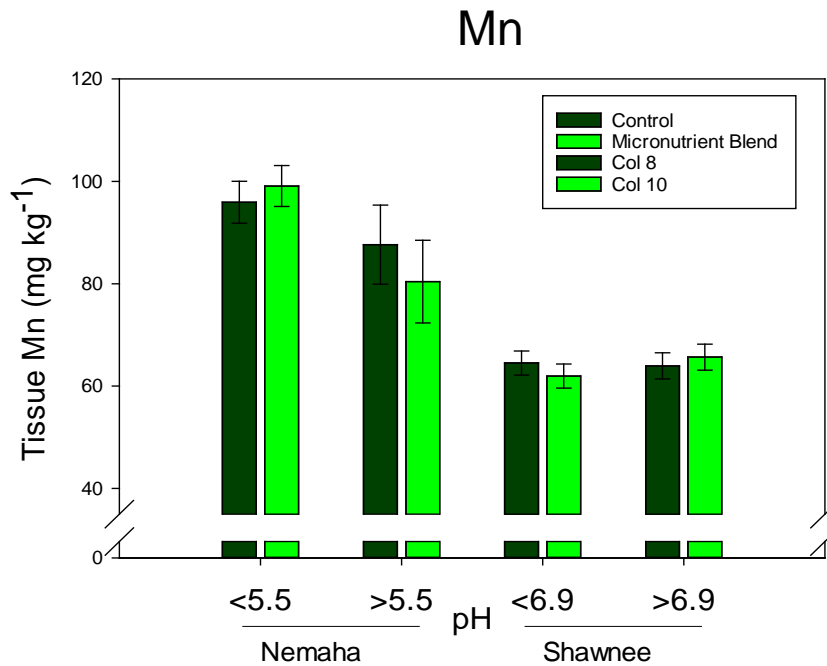
Soil test – field strips



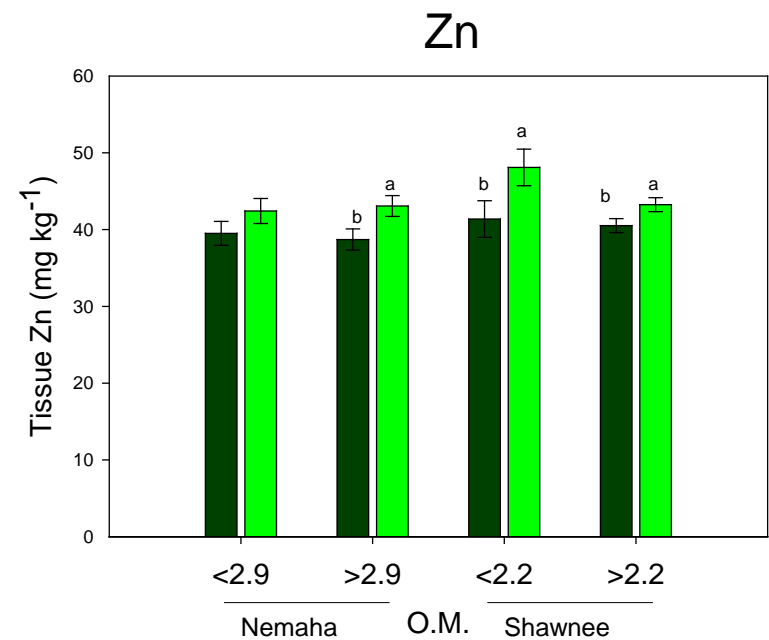
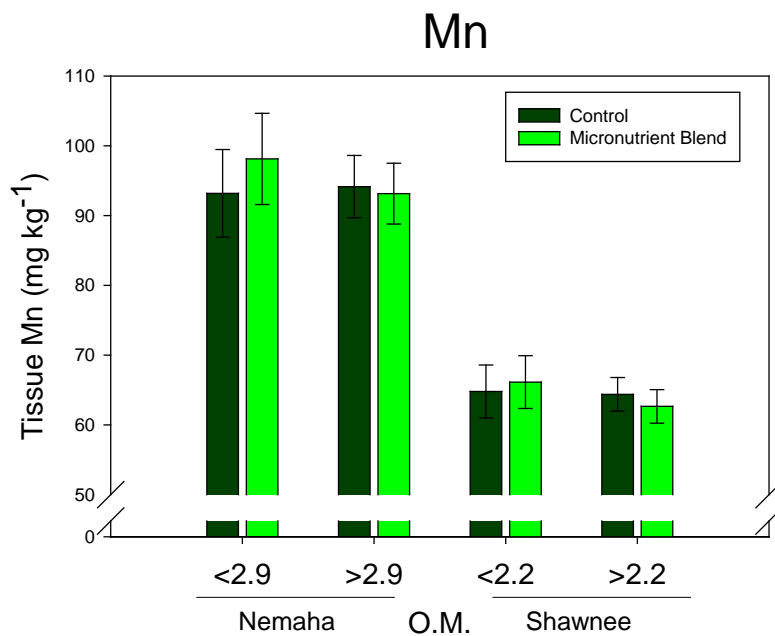
Soil test – field strips



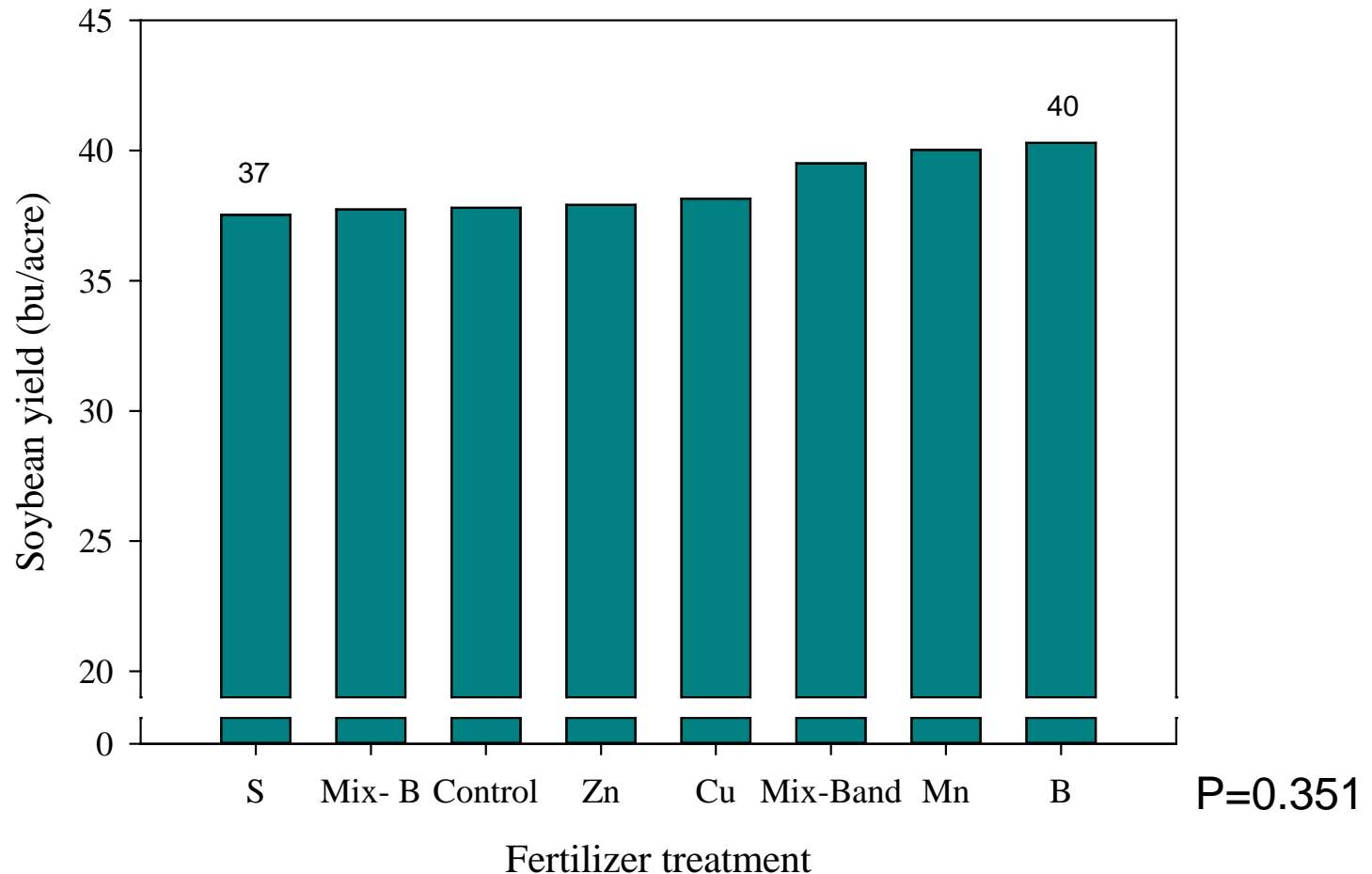
Tissue test vs pH – field strips



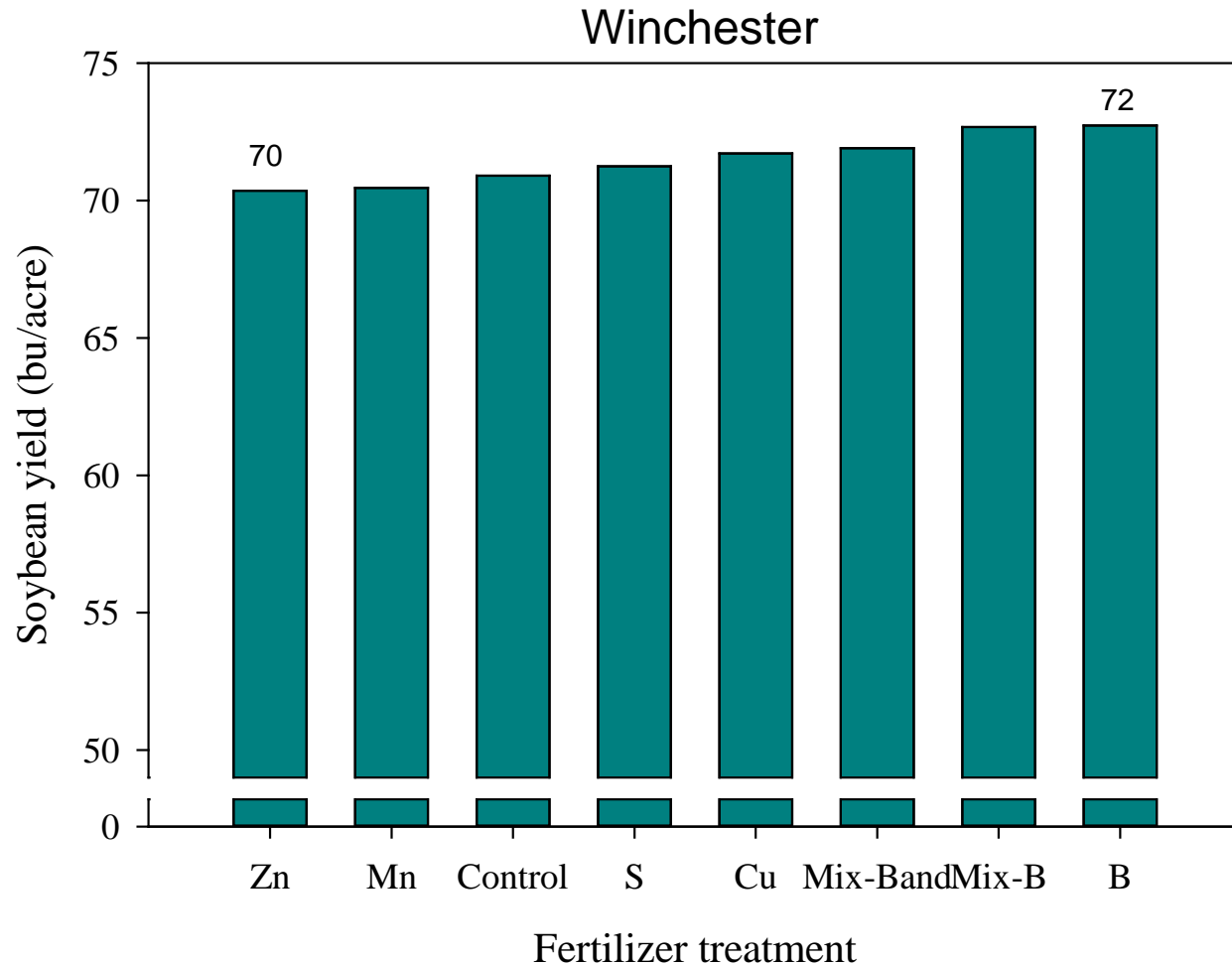
Tissue test vs OM – field strips



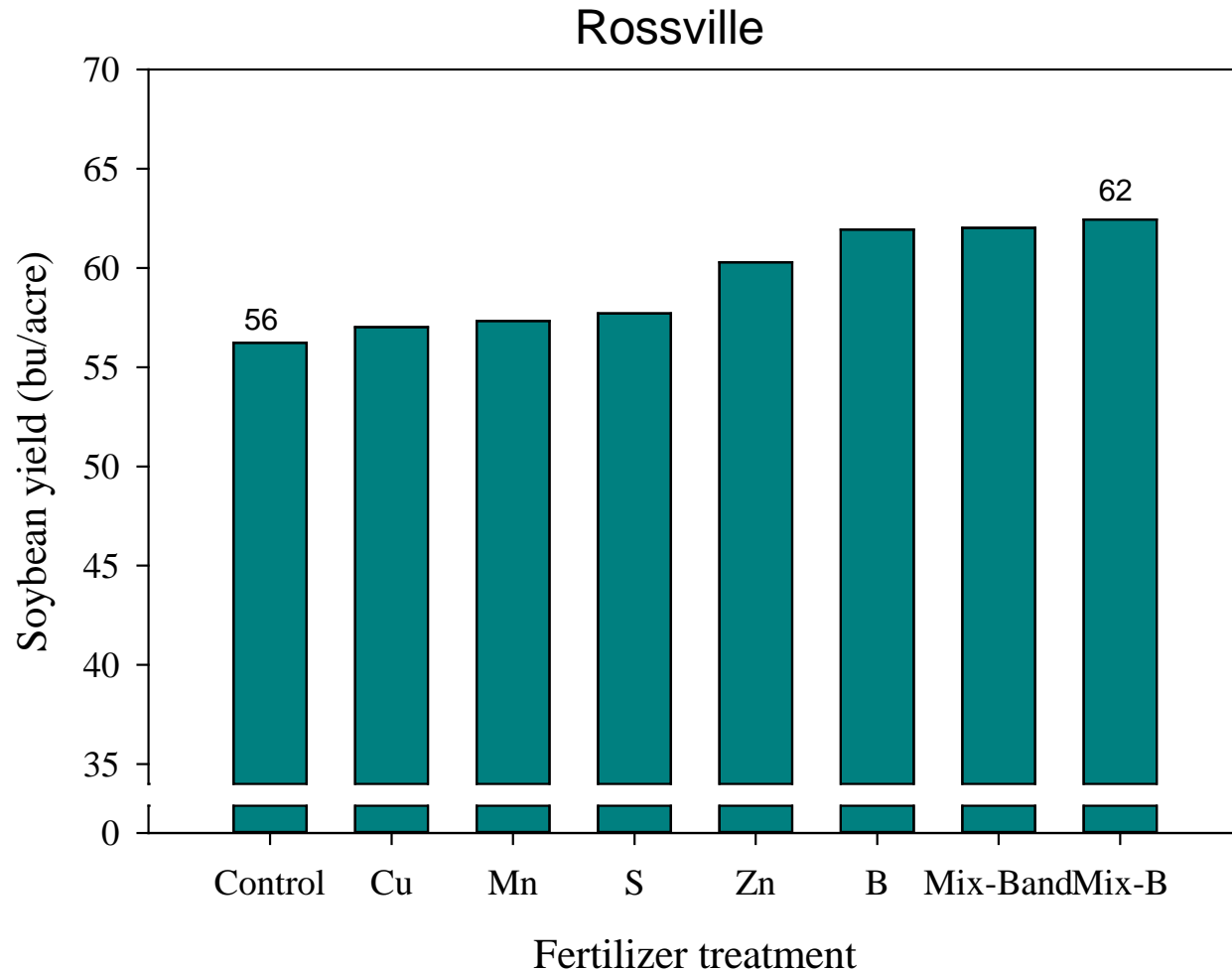
Micronutrients soybean – Small plots- average yield across all sites



Micronutrients soybean – Small plots - High yield site



Micronutrients soybean – small plot- Responsive site



P=0.084

Sandy soils, low CEC

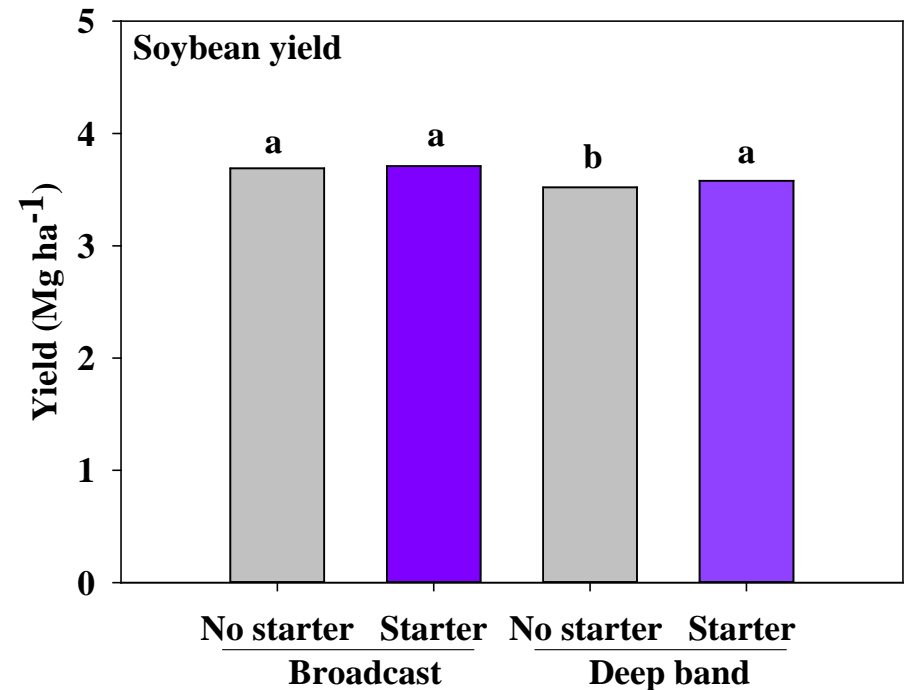
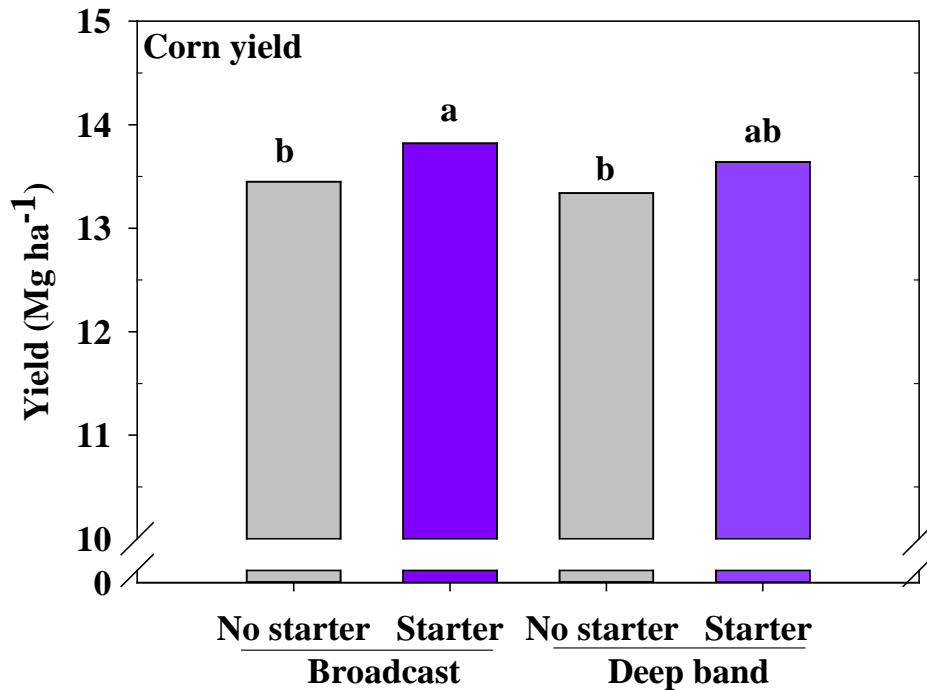
Micronutrients soybean - Rossville

Soil parameter	
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

Summary – micronutrients

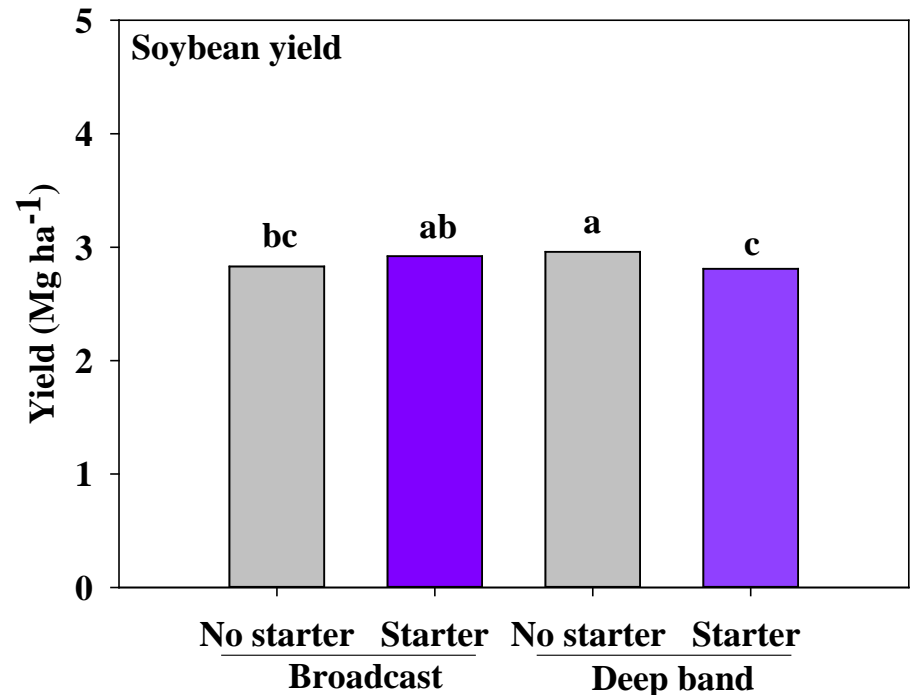
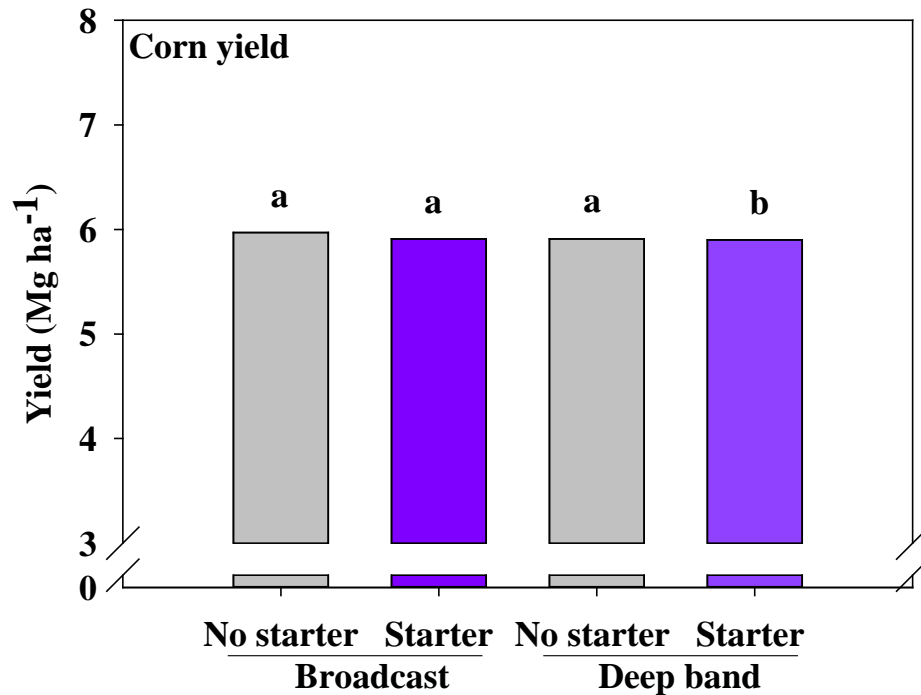
- Fertility requirements are best determined by soil testing and other considerations such as field history.
- Response to S and micros are usually small and affected by soil conditions (texture and OM).
- Tissue test in this study confirm micronutrient uptake by soybean.

Corn and soybean response to P placement - Scandia



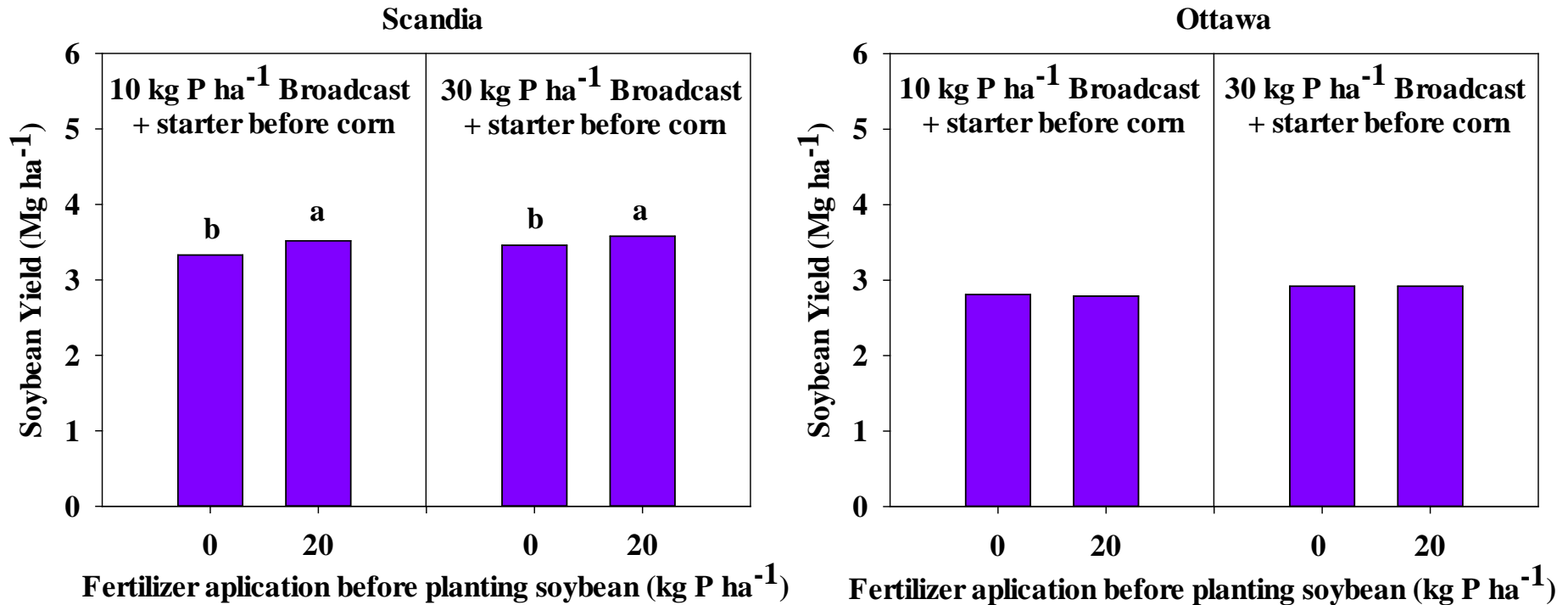
Average of 9 years: 80 lbs/acre P₂O₅ total, (20 lbs/acre starter)

Corn and soybean response to P placement - Ottawa



Average of 9 years: 80 lbs/acre P₂O₅ total, (20 lbs/acre starter)

Additional P application to soybean

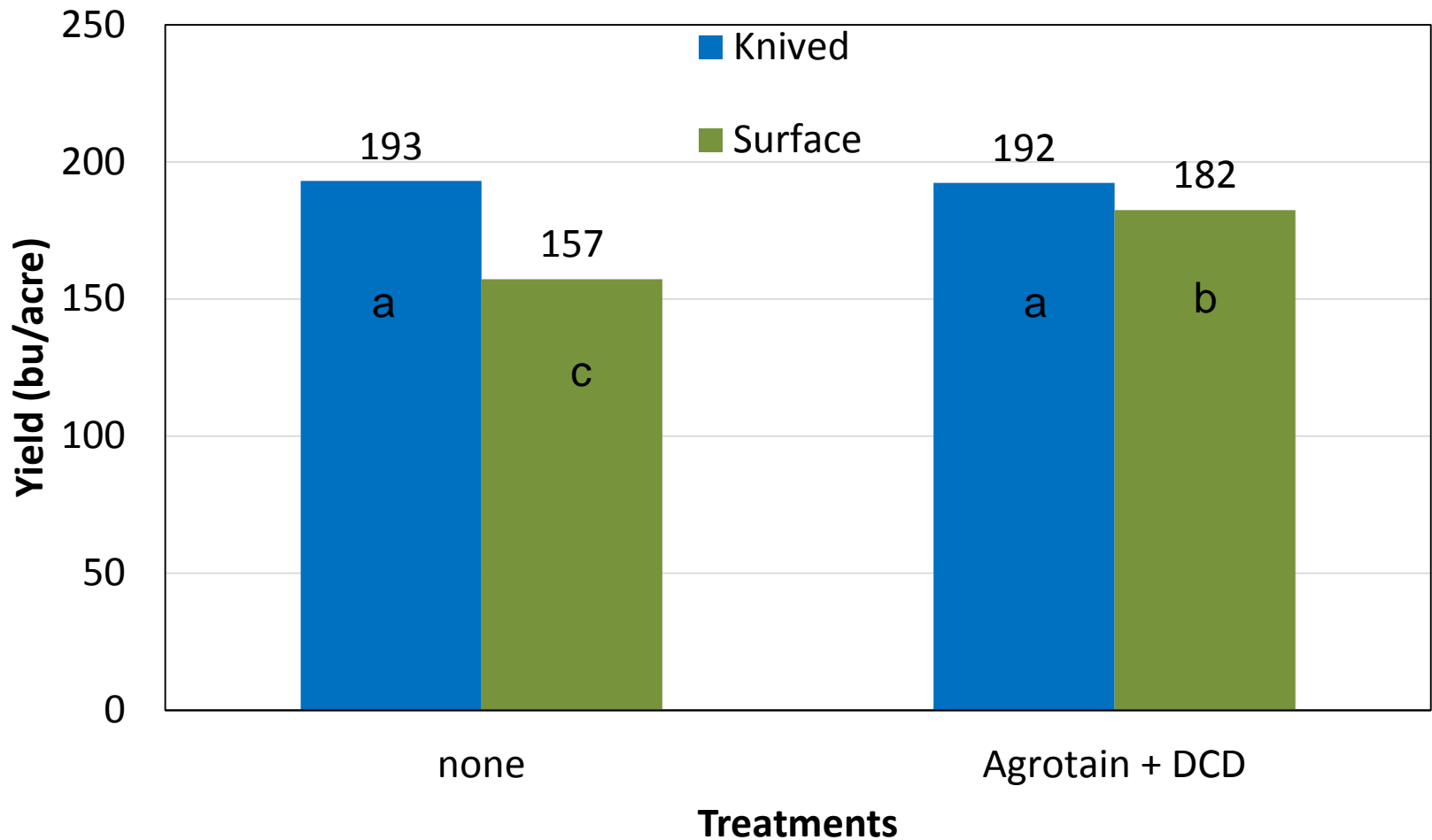


Average of 9 years: 40 lbs/acre P₂O₅

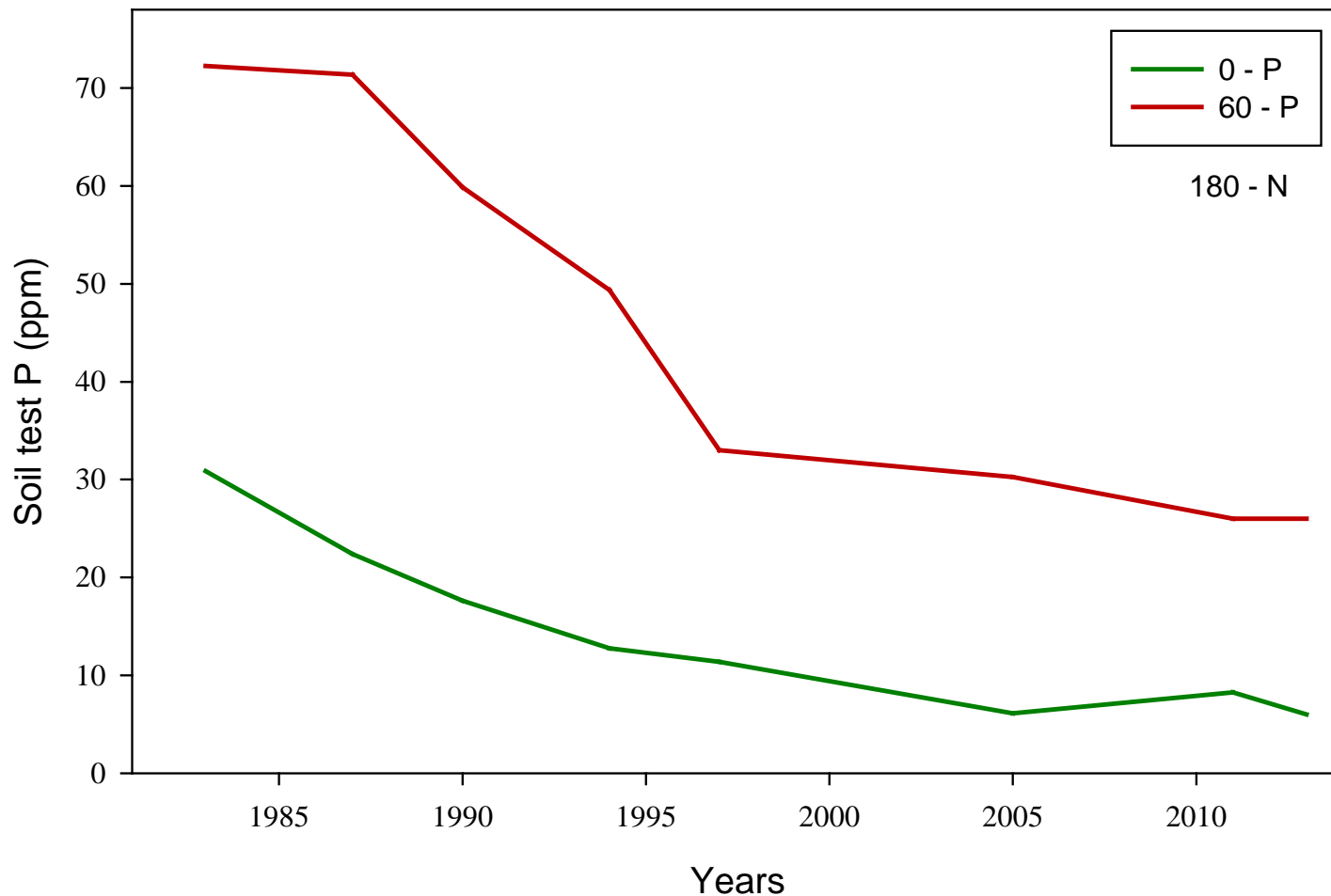
Summary - P placement

- Yield response become more significant over time
 - Decreases in soil test with high removal
 - Inadequate fertilizer input for the rotation
- Phosphorus placement seldom affect corn and soybean yield
 - May show a clear benefit at locations with potential for P runoff.

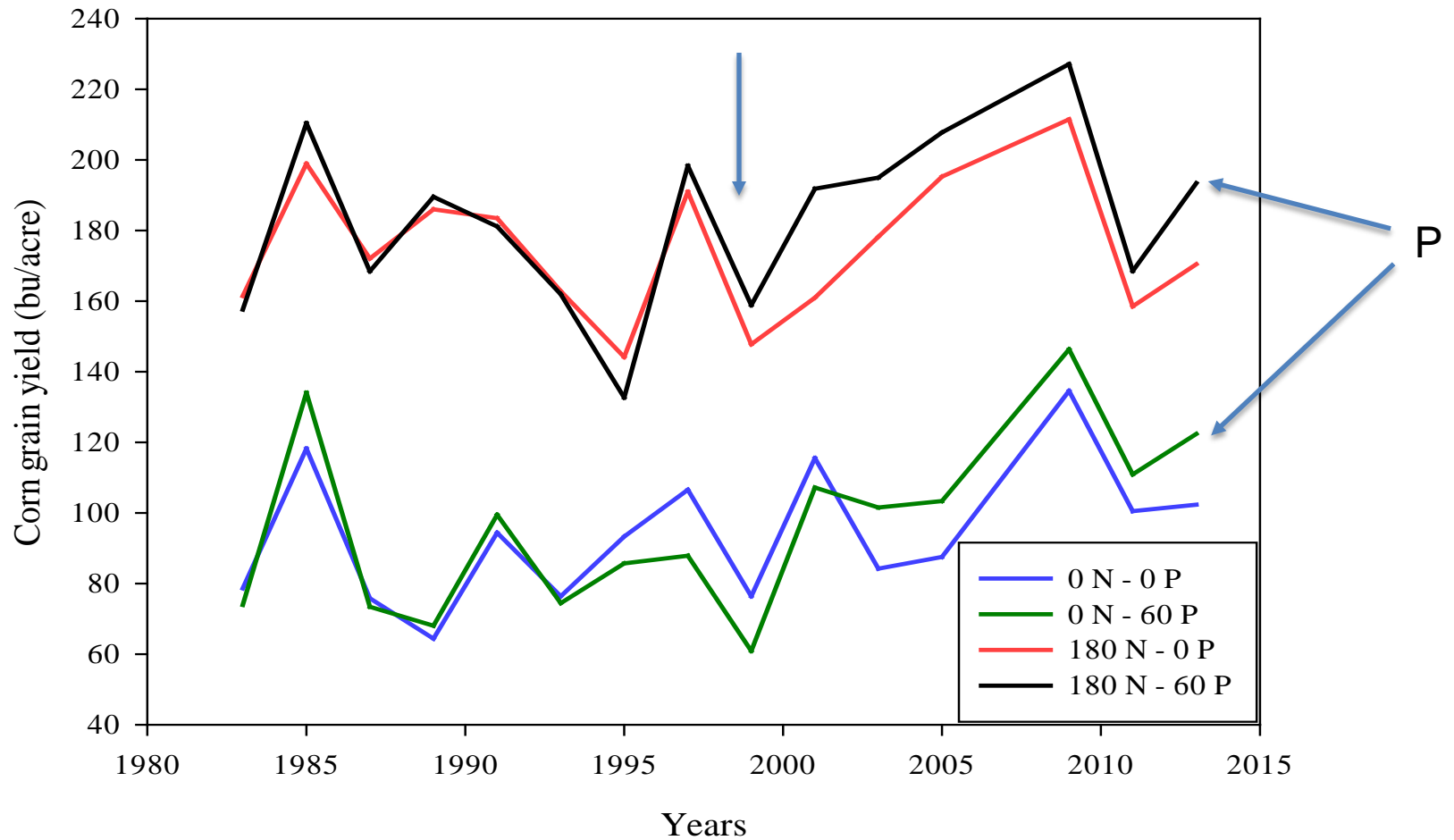
N placement + Additive 2015



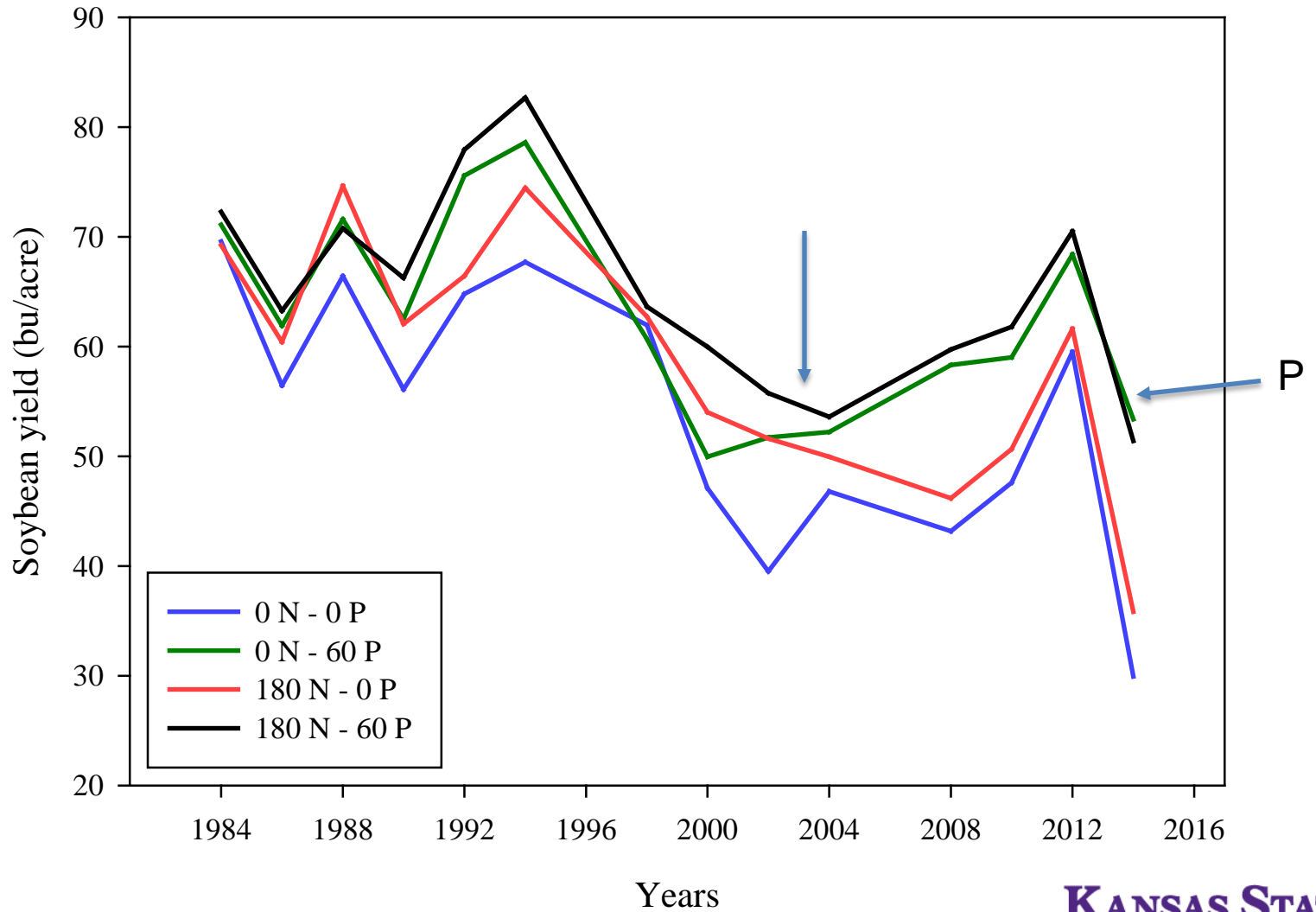
Soil test P change in 30 years corn and soybean



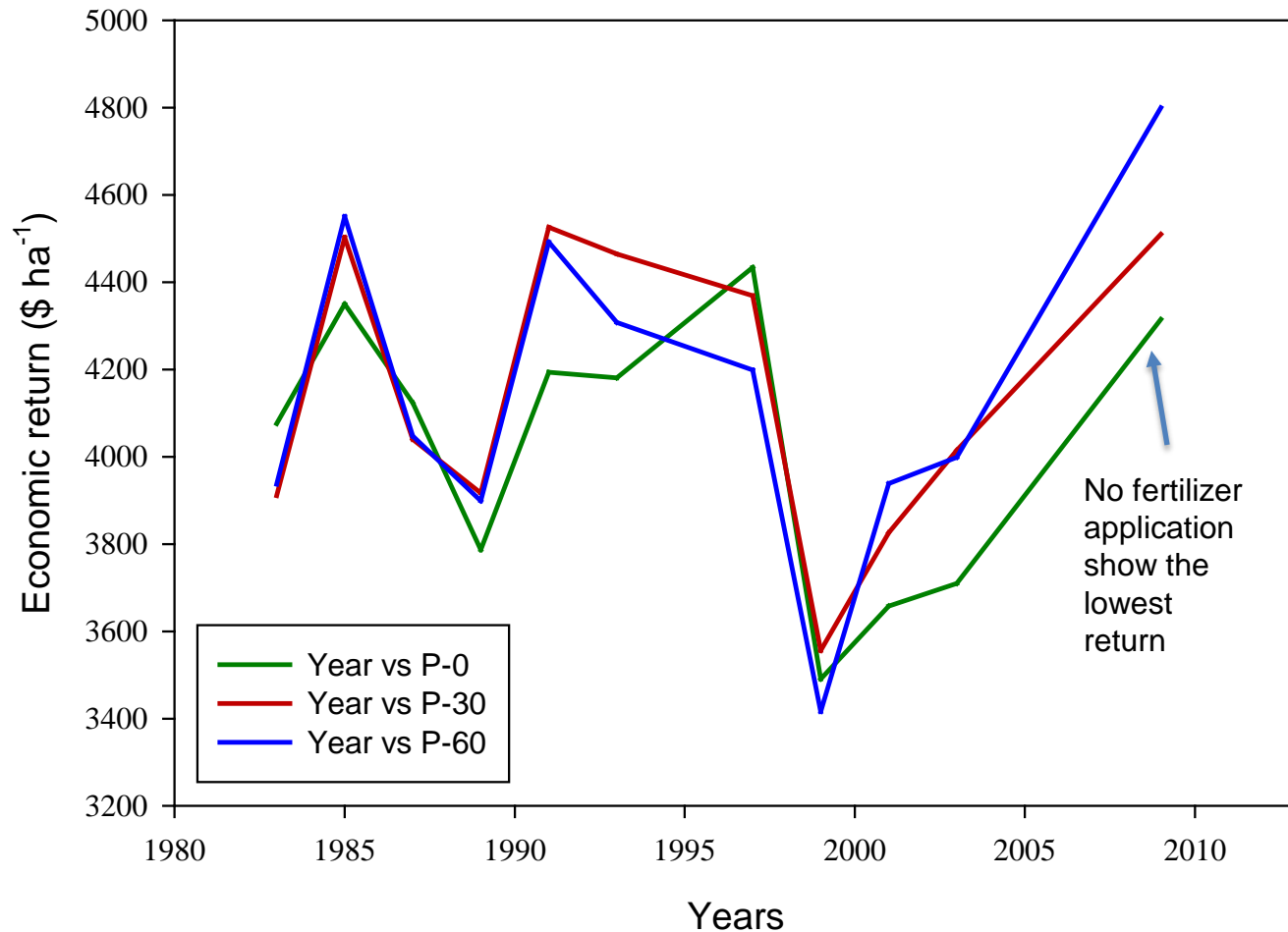
Corn yield – 30 years



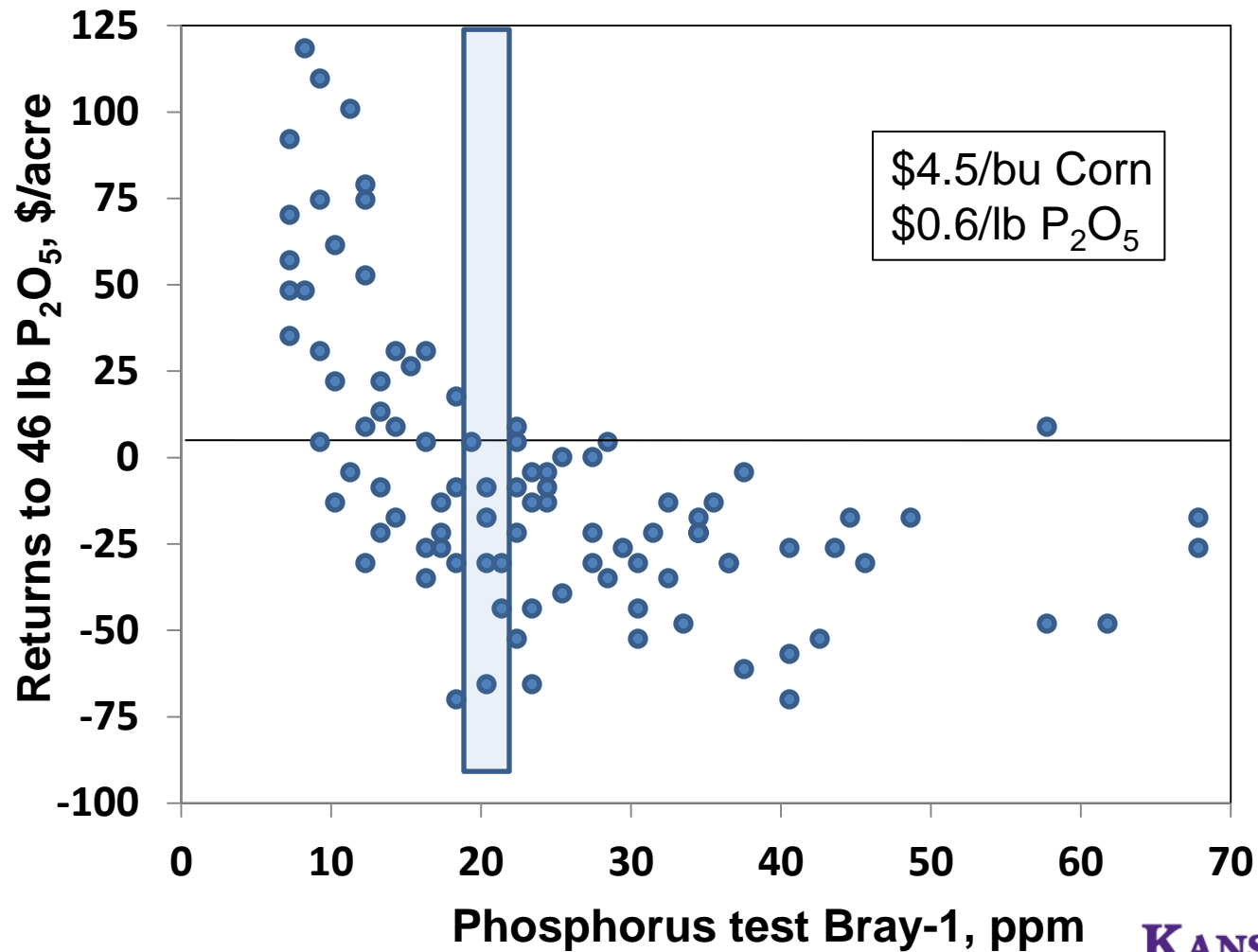
Soybean yield



Economic return to P fertilization (using values of 2015)

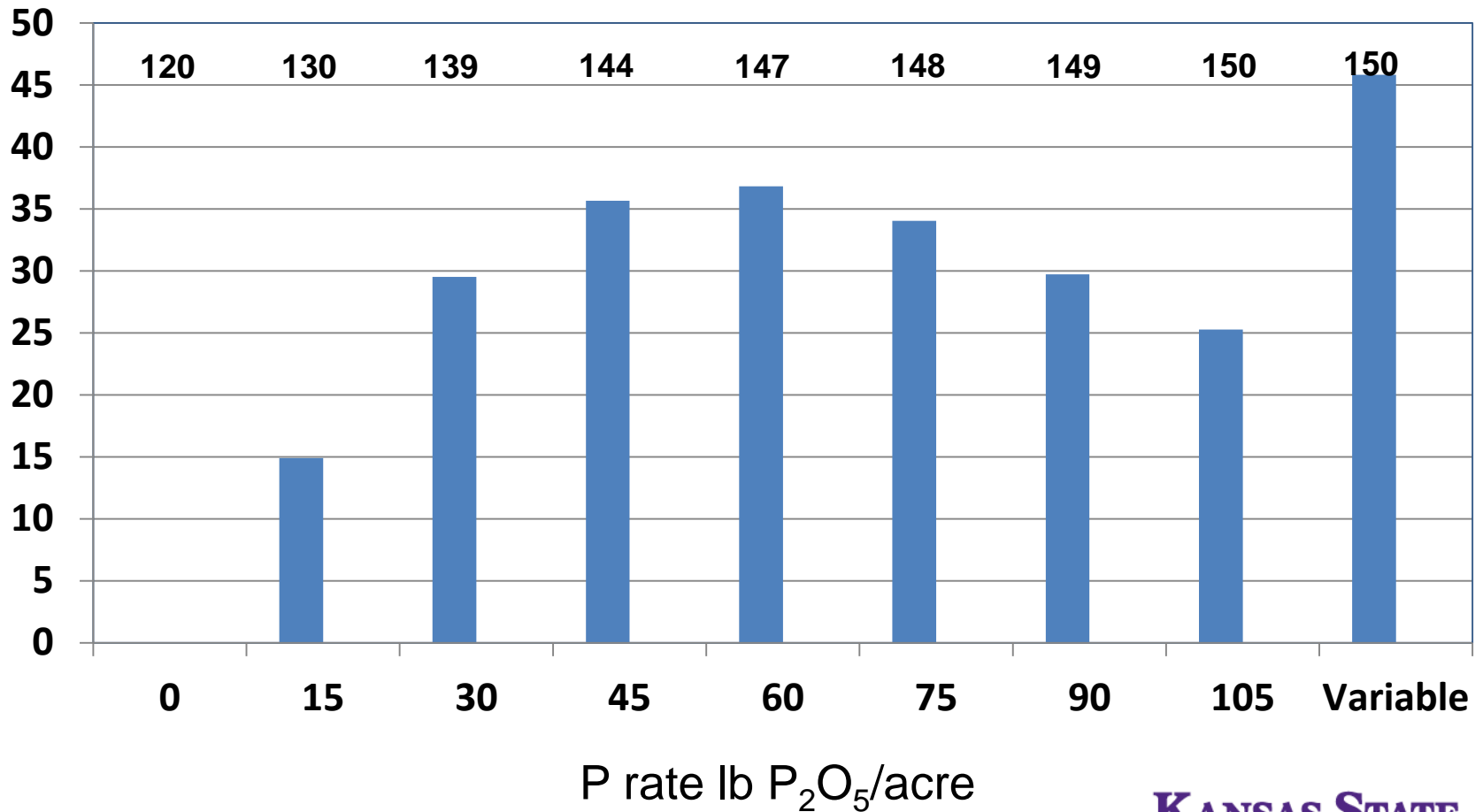


Net return to 46 lb of P_2O_5

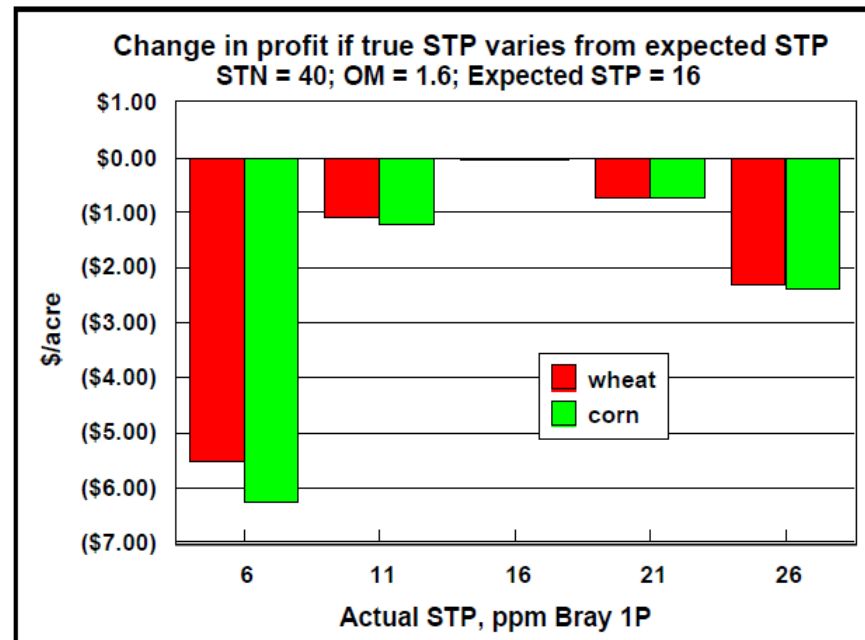
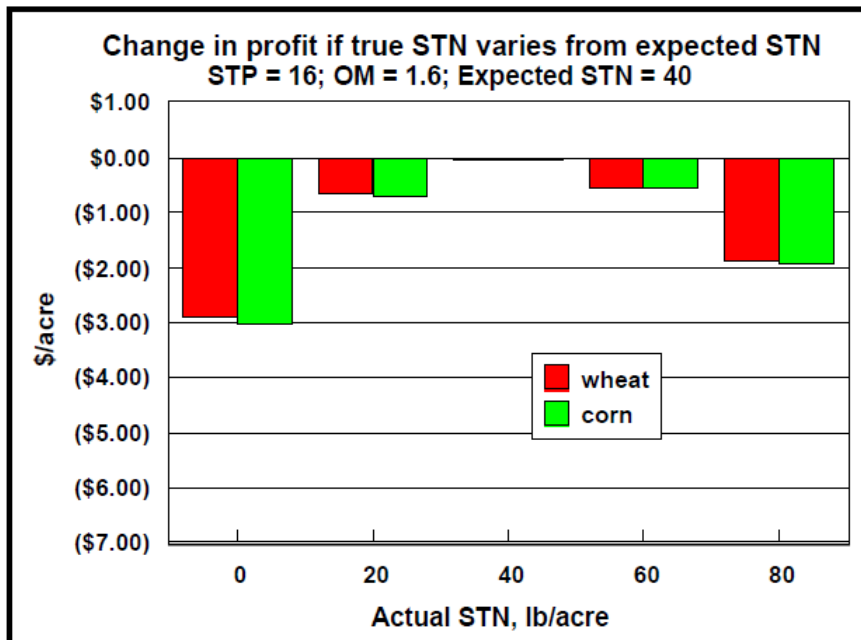


Simulated corn net return to uniform and variable application

Net returns \$/acre



Soil test N and P effect on profits



45 bu wheat
and 75 bu corn

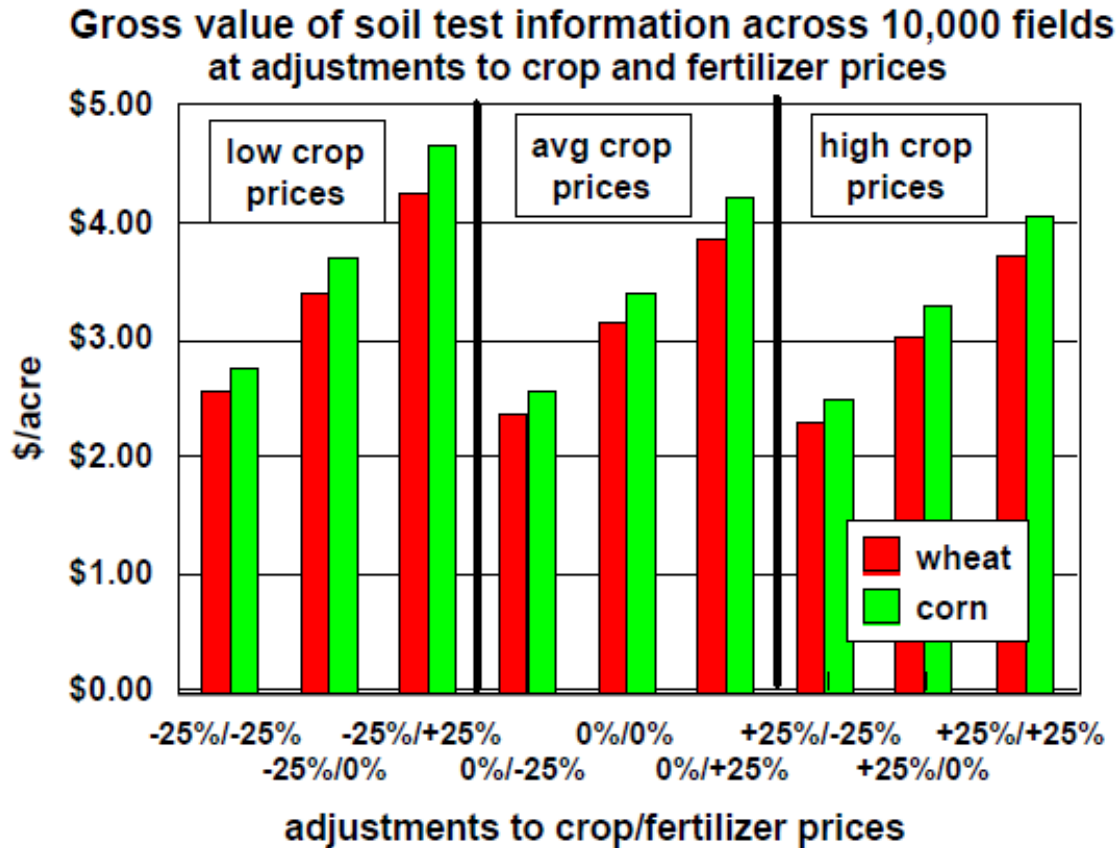
Wheat= 2.31 \$/bu

Corn= 3.2 \$/bu

N= 0.23 \$/lb N

P= 0.25 \$/LB P₂O₅

Returns to soil sampling are greater when crop prices are lower



Only fields with a greater potential yield increase per unit of N or P would be fertilized when crop prices are low.

Variable rate application?

- Identify parts of a field that could respond to higher rates of fertilizer.
- Savings from reduced fertilizer application: only if non-responsive areas of a field are identified.
- Benefits can only be determined on a field-by-field basis.
- The challenge is to identify opportunities for increased net income with sufficient precision without excessive cost.

Some factors to consider

- Expectation for economical response to P in the year of application is small in the Optimum category.
- Crop yields in many fields are high this year, so crop removal will be influencing soil test levels.
- Reducing P and K fertilization or liming application rates across all conditions is not a rational or good management decision.

Focus on limiting nutrients in Kansas

- Typically N, P, K, and some micros depending on the region (i.e. Fe). Sulfur becoming an issue for some crops.
- Optimum soil pH is essential.
- Use soil test to make the right decision; little value of tissue testing (except diagnostic).
- Fertilizer placement can improve efficiency significantly.
- Some additives can help – use the ones that are proven and under the “right” conditions.

Grain as a form of currency keeps prices in perspective

Source	A bu buys:			Cost of 100 lbs:		
	2012	2013	2014	2012	2013	2014
	----- lbs -----			----- -Bu-----		
N	12	9	7	8	12	15
P2O5	17	11	9	6	9	11
K2O	15	11	9	7	9	11

Grain as a form of currency keeps prices in perspective

- It now takes more bushels to buy fertilizer than in the previous years.
- But not much more relative to the full value of today's high yielding crops.
- Assessment of yield response and nutrient need prediction through use of up-to-date soil testing.
- The goal is to maximize return to the fertilizer inputs.

Soil testing lab



New report format

K-STATE Research and Extension

Kansas State University
2308 Throckmorton Plant Sciences Center
Manhattan, KS 66506-5503

Tel: 785-532-7897 Fax: 785-532-7412
www.agronomy.ksu.edu/soiltesting

Knowledge
forLife

Soil Test Report

Sample Information:

Prepared For:
Brandon Yeakley
Yeakley Farms
846 NW 10th Ave
Hoisington, KS 67544

Send Copy To:
Brandon Yeakley
Yeakley Farms
846 NW 10th Ave
Hoisington, KS 67544

yeakley716@gmail.com
6205620032

yeakley716@gmail.com
6205620032

Sample ID: BLE

Order Number: 259
Lab Number: 002420

Received: 9/25/2015
Reported: 11/21/2015
County: Barton
(where sample was taken)

Results

Analysis	Value Found	Analysis	Value Found
Nitrate (NO3) surface or 1st sample	10 ppm	Soil pH (1:1, soil:water)	6.6
Potassium (K)	351 ppm	Phosphorus (P) Mehlich-3	38 ppm

Wheat (Target pH of 6.0)

Nutrient Graph

Nutrient	Very Low	Low	Medium	Optimum	Above Opt	Excessive
pH	6.6					
P	37.8					
K	351.0					

Lime ECC	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O	Zinc Zn	Sulfur S	Boron B	Chloride Cl
All Nutrient Units in lbs / acre		Suff	Suff				
0	58	0	0	0	0	0	0

Comments:

Do not apply Sulfur!

References (Crop Related):

Wheat Production Handbook

<http://www.bookstore.ksre.ksu.edu/pubs/c529.pdf>

General References:

Soil Test Interpretation and Fertilizer Recommendations
For current information and order forms, please visit

<http://www.bookstore.ksre.ksu.edu/pubs/MF2586.pdf>

<http://www.agronomy.k-state.edu/services/soiltesting/Prices%20and%20Analysis%20Request%20Forms.html>

Soil testing lab

- Andrew Stammer –BS and MS from Iowa State, experience as CCA working in Iowa.
- Credit card payment available now at the lab.
- Can request free soil sample bags.

Soil testing lab

- Request shipment label:
 - UPS
 - One day delivery within Kansas
 - Bill to the county or the producer directly
- New website:
 - Customer account with access to results, payment options, recommendations.

Questions?

Dorivar Ruiz Diaz

ruizdiaz@ksu.edu

785-532-6183

Extension Agronomy

Kansas State University



KANSAS STATE UNIVERSITY
**Soil Fertility &
Nutrient Management**

www.agronomy.ksu.edu/extension/SoilFertility

KANSAS STATE
UNIVERSITY