

Starter Fertilizer Update

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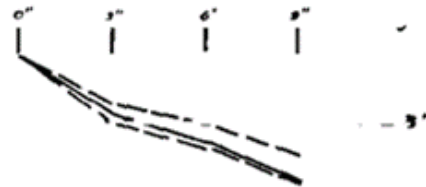
Thanks!

- Indiana Corn Marketing Council and Indiana corn growers
- Diagnostic Training Center
- Pioneer Hi Bred International Inc.
- A&L Great Lakes Laboratory
- John Deere
- AirScout
- Purdue farm managers and staff

ROOT SYSTEMS OF YOUNG CORN PLANTS IN RELATION TO FERTILIZER APPLICATIONS¹

C. E. MILLAR²

Much interest is being manifested in the location of fertilizer dropped near the seed kernel of corn in order that the young plant may derive early benefit from the nutrients supplied without danger of damage to the seedling. As a preliminary to the investigation of the problem, a knowledge of the extent and character of the root system of young corn is essential. Unfortunately, few data on the subject are found in the literature which has come to the writer's attention.

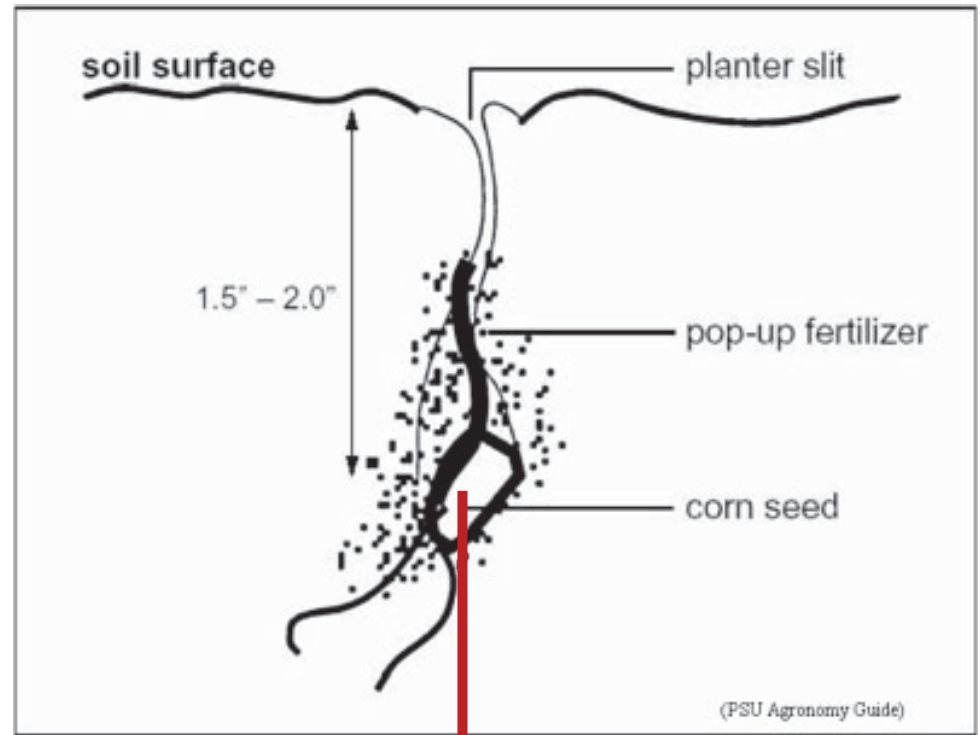


CONOVER LOAM

It is evident from these data that fertilizer placed on either side of the seed and slightly below it will be in the direct line of growth of the roots and should therefore be used by the plant earlier than fertilizer placed directly below or above the seed. The writer and Prof. E. C. Sauve of the Agricultural Engineering Department are cooperating in an endeavor to devise an attachment to the corn planter which will drop the fertilizer in this position.

Starter fertilizer

- Placement
 - In-furrow
 - A x B
- Source
 - N, P, K, micros....
- Rate



Other important factors

- Soil

- Temperature
- Nutrient levels
- Moisture content
- Soil strength
-

- Crop

- Seedling vigor
- Hybrid
- Growth conditions
- Yield potential
-

Guidelines for starter applications primarily salt related

Placement	Maximum N + K ₂ O (lbs/A)
With seed on <u>sandy</u> soils	5
With seed on other soils	8
Within 1" of seed	20
2X2 band	100

Other considerations

- Fertilizers that produce ammonia and nitrite which are toxic to plants
- Most fertilizers especially urea- and ammonium containing fertilizers (especially ATS) have potential to create unhealthy environments when placed with the seed

14 Feb 2009

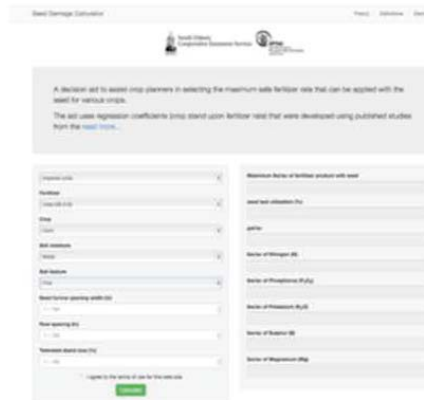


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Seed-Placed Fertilizer Decision Aid

A commonly asked question is "How much fertilizer can I safely apply with the seed?"

FertSeedDecisionAid was developed to help answer that question in a reasonably condition-specific manner. This easy-to-use decision aid is based on regression coefficients (crop stand upon fertilizer rate) that were developed in a laboratory emergence study of common fertilizers and crops and verified with published field studies when they existed. It was developed by South Dakota State University with the support of IPNI.



Additional Resources

 [Excel Version for Download](#)
Size: 0.34 MB

Related Content

 [On-line Version](#)

 [Decision Support](#)
More on this topic.

<http://www.ipni.net/article/IPNI-3268>

Starter fertilizer effects on C/C

- Cody Hornaday, M.S. project
- Determine effects of starter fertilizer on the rate of corn development and yield in continuous corn (since 2006)

Pop-up and 2x2 starter trials

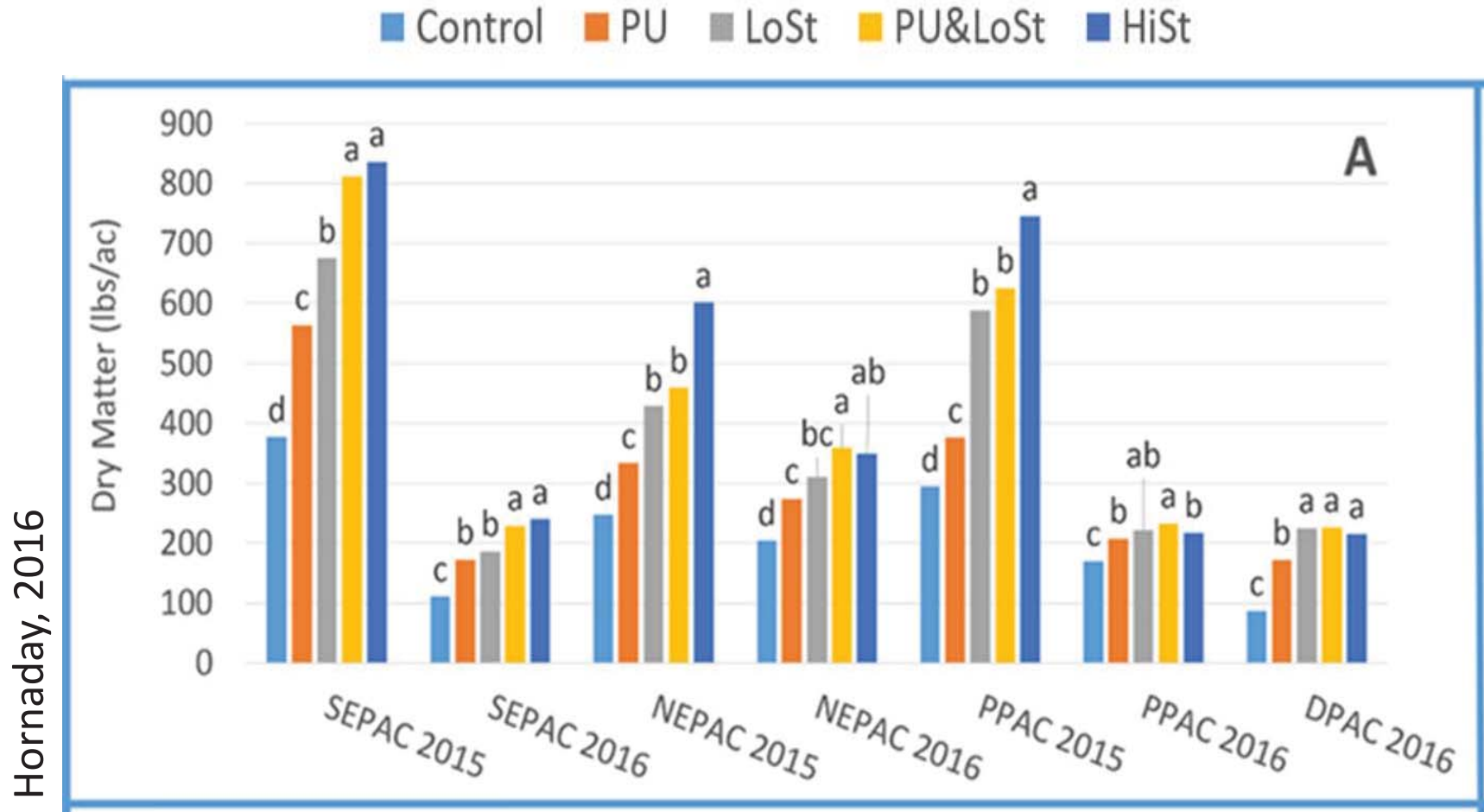
- 4 locations (2014, 2015 & 2016)
- 5 treatments
 - Control – no 2x2 or pop-up
 - Pop-Up – 3 gal 10-34-0
 - Low 2x2 – 8.3 gal 19-17-0
 - Pop-Up and Low 2x2
 - High 2x2 – 16.7 gal 19-17-0



Starter fertilizer treatments

- No starter fertilizer (Control)
- 3.4 lb N/ac with 11.6 lb P_2O_5 /ac in-furrow (PU)
- 25 lb N/ac with 22.5 lb P_2O_5 /ac 2x2 (LoSt)[†]
- 3.4 lb N/ac with 11.6 lb P_2O_5 /ac in-furrow + 21.6 lb N/ac with 19.2 lb P_2O_5 /ac 2x2 (PU&LoSt)[†]
- 50 lb N/ac with 44.7 lb P_2O_5 /ac 2x2 (HiSt)[†]
- [†] *At SEPAC, P_2O_5 rates in 2x2 were 12.5 and 25.0 lb/ac for treatments with LoSt and HiSt, respectively.*

Starter increased early-season growth at all sites



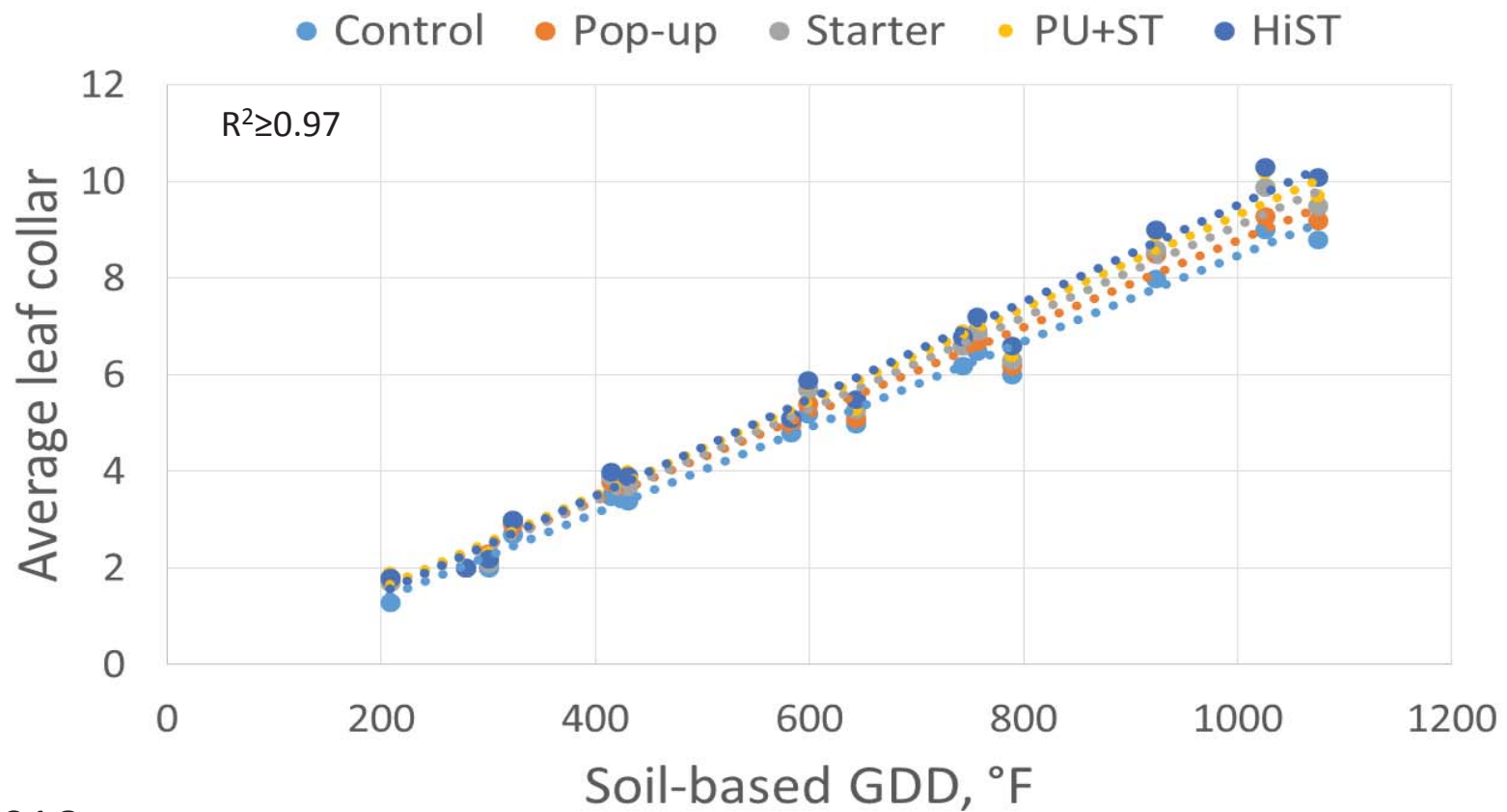
Hornaday, 2016

C/C - 2016

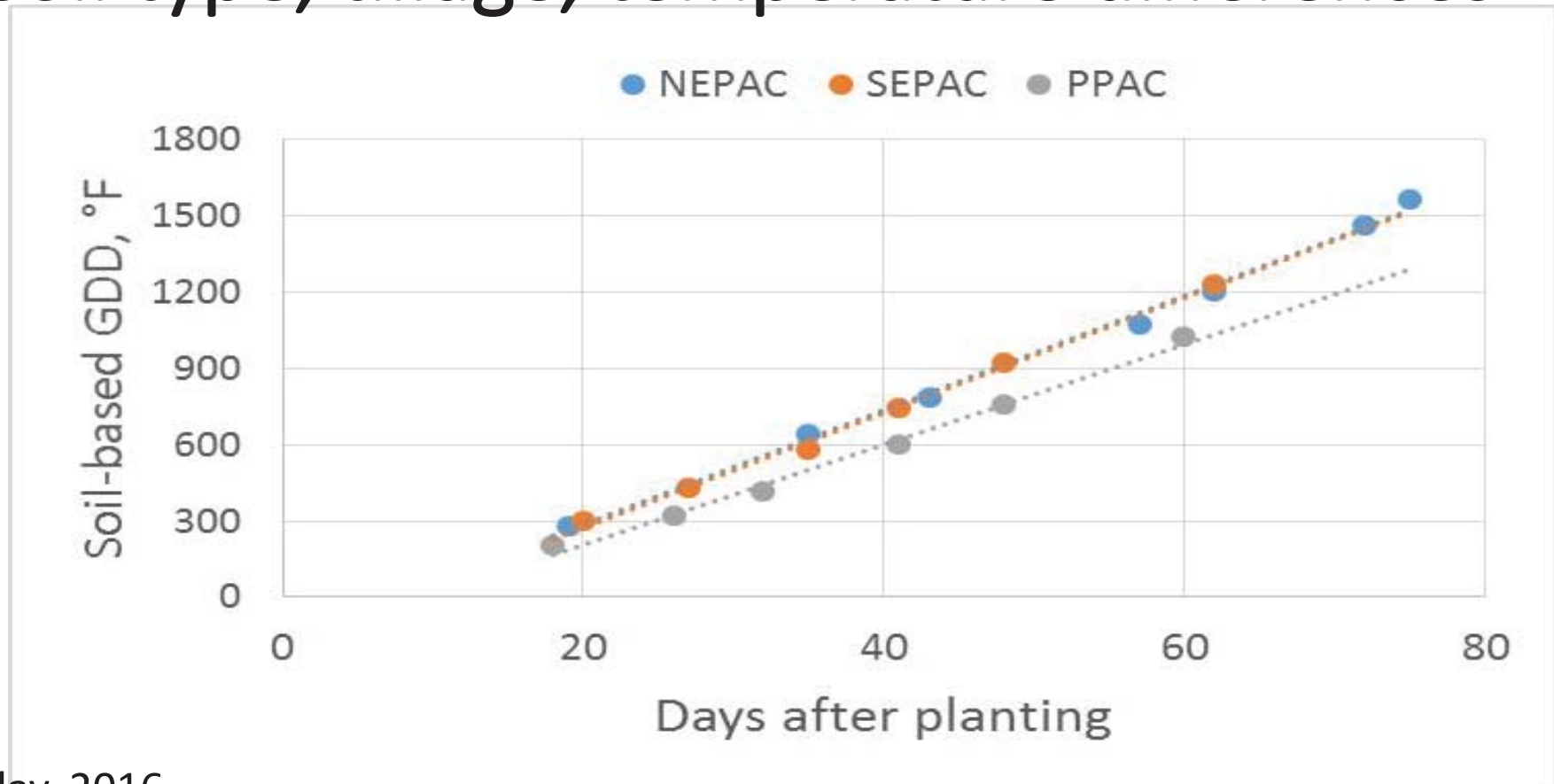
- Is greater growth due to more robust plants, taller plants, or faster development?



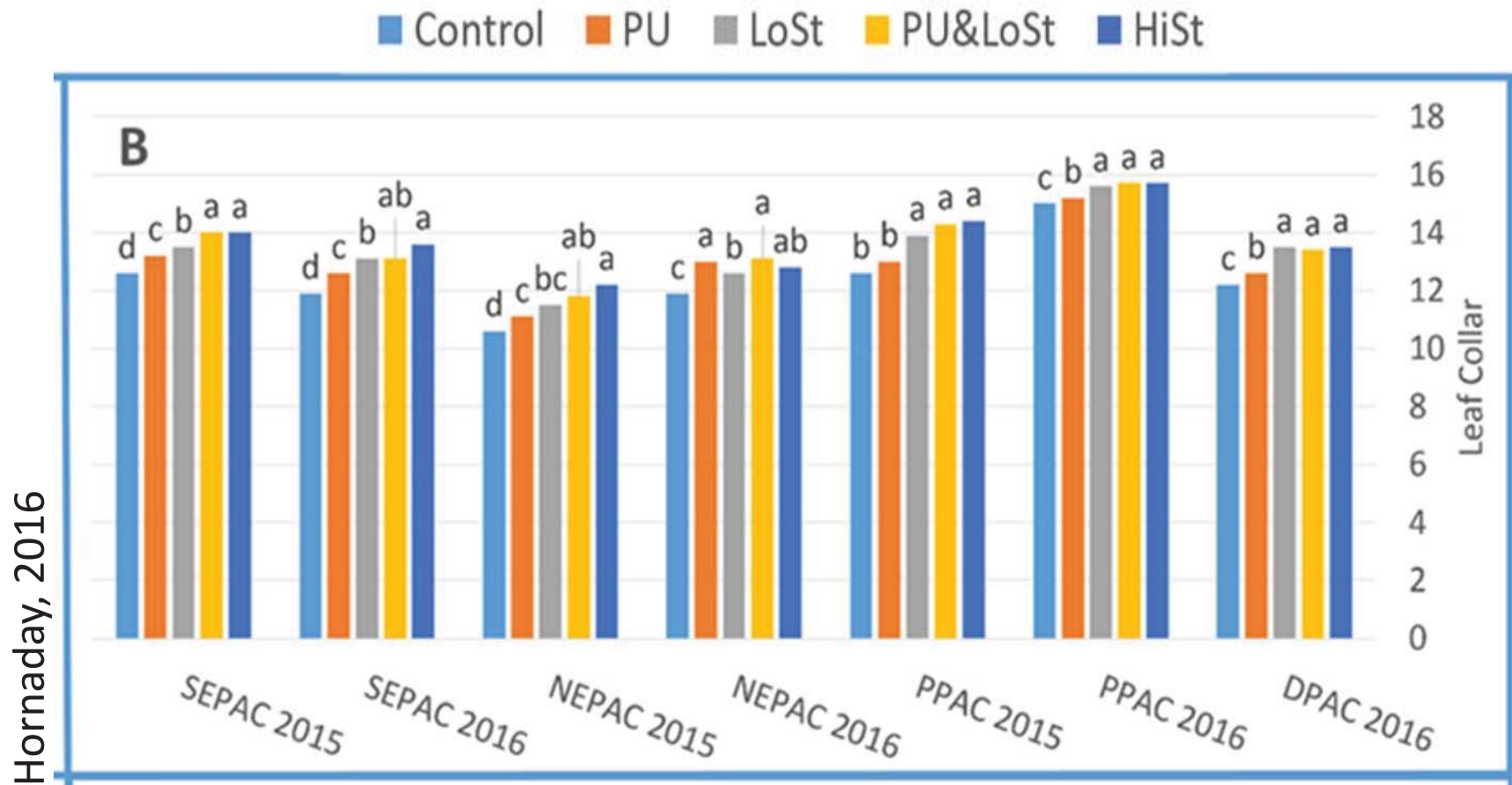
Faster leaf appearance occurred and difference in GS increased over time



Response was similar across sites despite soil type, tillage, temperature differences

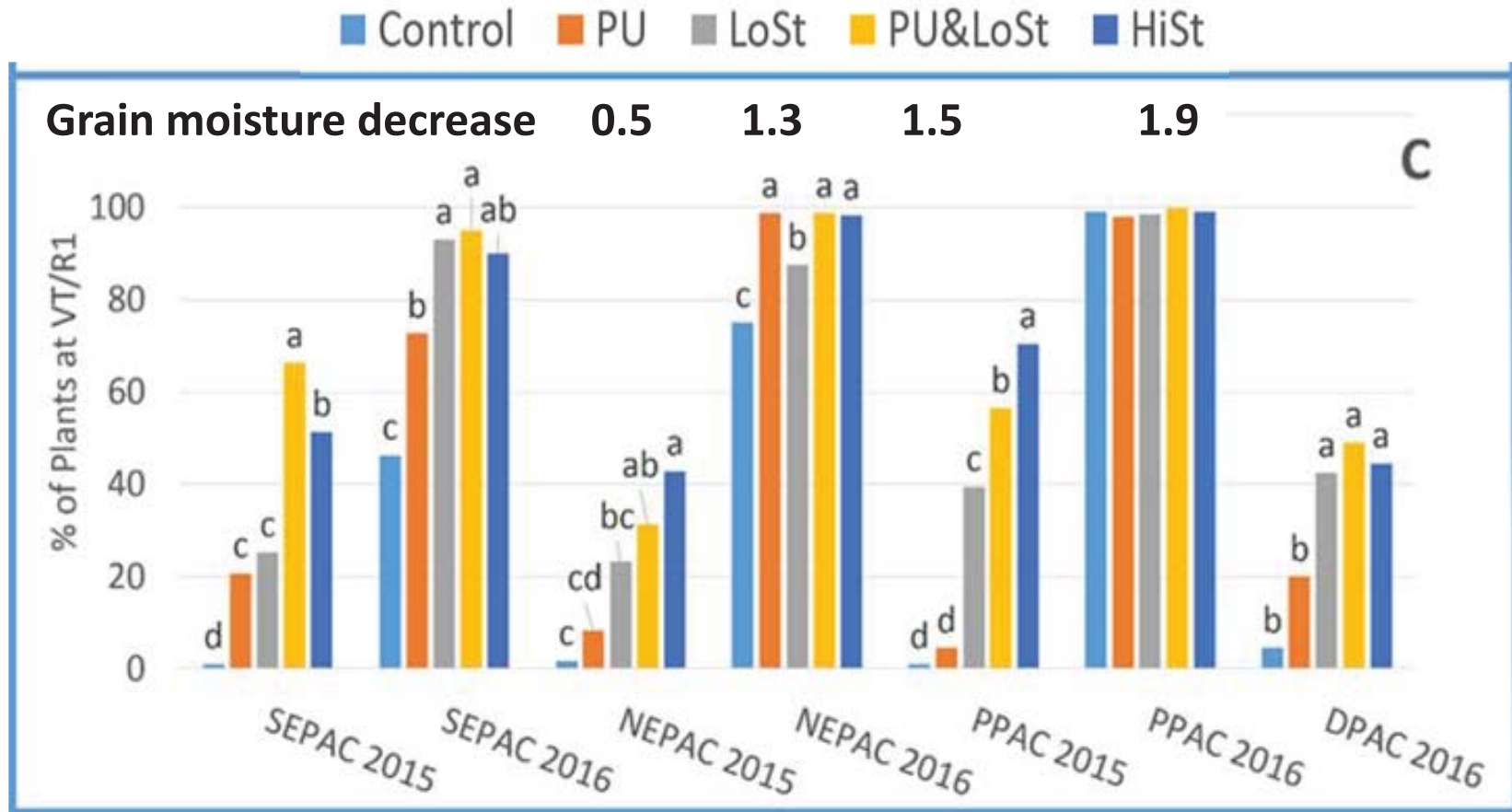


Starter increased rate of vegetative development



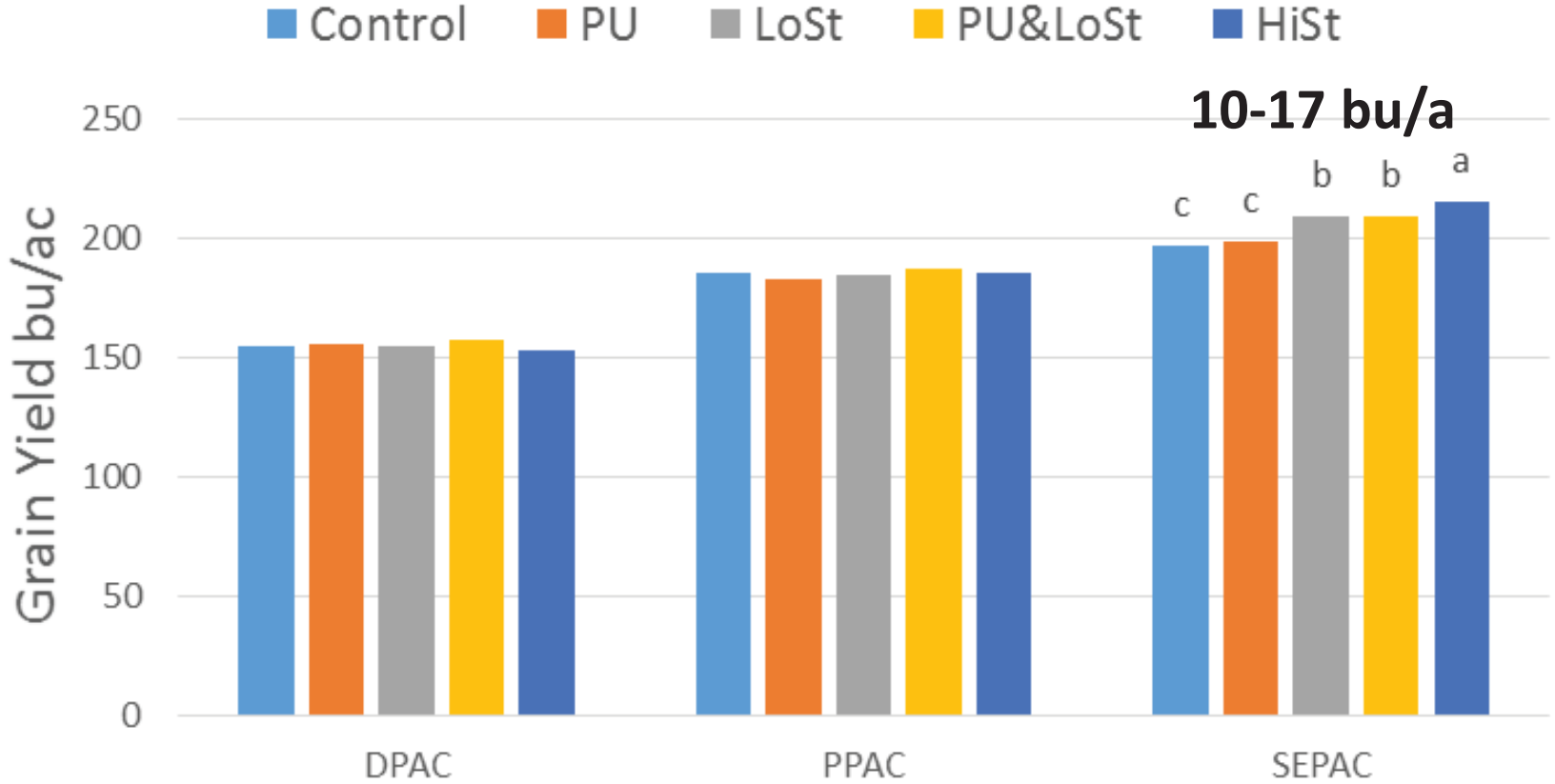
Starter resulted in earlier silking

Hornaday, 2016



C/C - 2016

2x2 starter increased yield at 1 of 3 sites-2014

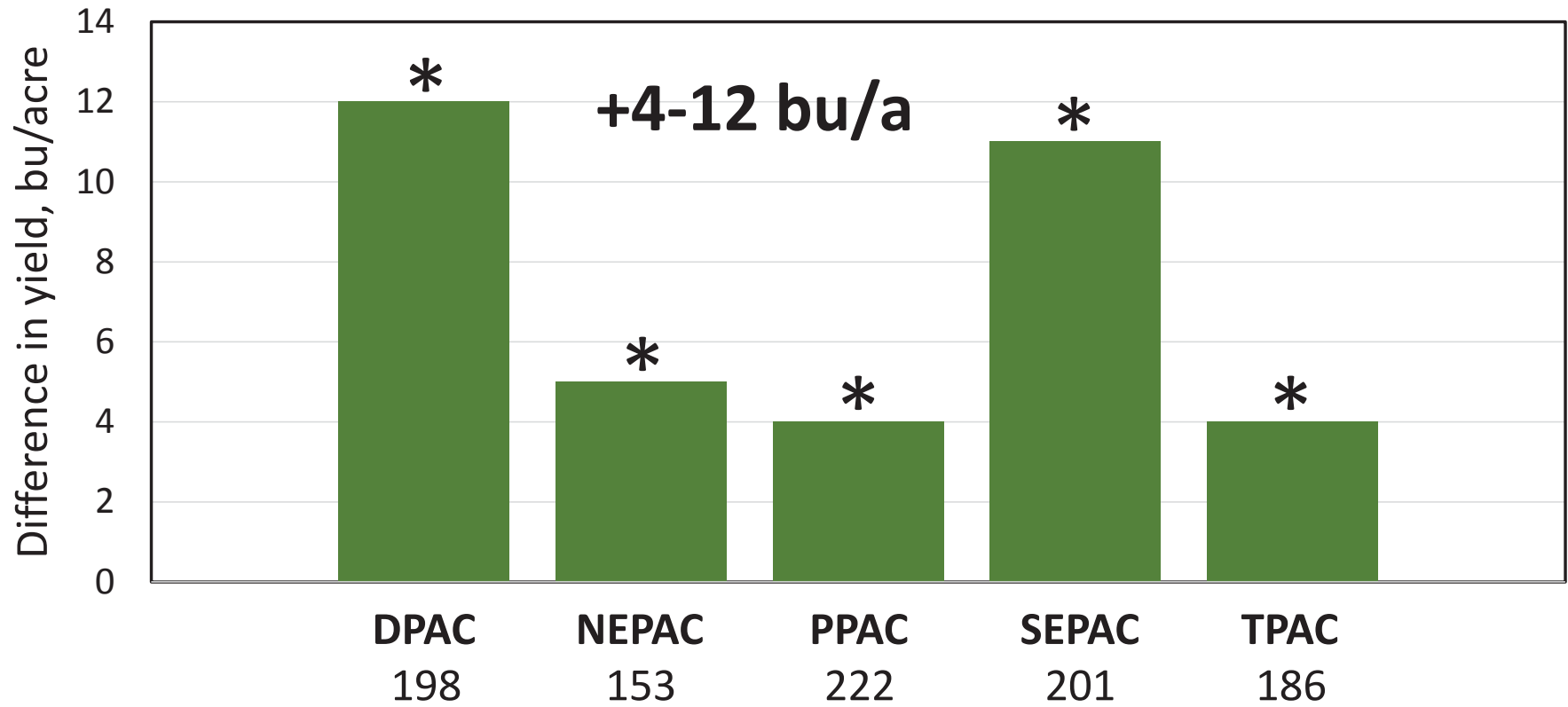


Corn after soybean starter trials – 2016, only

- 5 locations – previous 4 plus TPAC
- 2x2 starter vs no starter



2x2 starter yielded 7 bu/a more than *no starter*



DPAC
198

NEPAC
153

PPAC
222

SEPAC
201

TPAC
186

No starter yield, bu/acre

Lee, 2016

Summary

- 2x2 or pop-up fertilizer was beneficial to early plant growth, accelerated leaf appearance, and earlier silking when compared to no fertilizer at planting.
- Earlier silking with 2x2 or pop-up resulted in drier grain at harvest – PU - 0.5%, 2x2 starter treatments - 1.3-1.9%.

<https://www.agry.purdue.edu/ext/corn/research/StarterFertilizer.pdf>

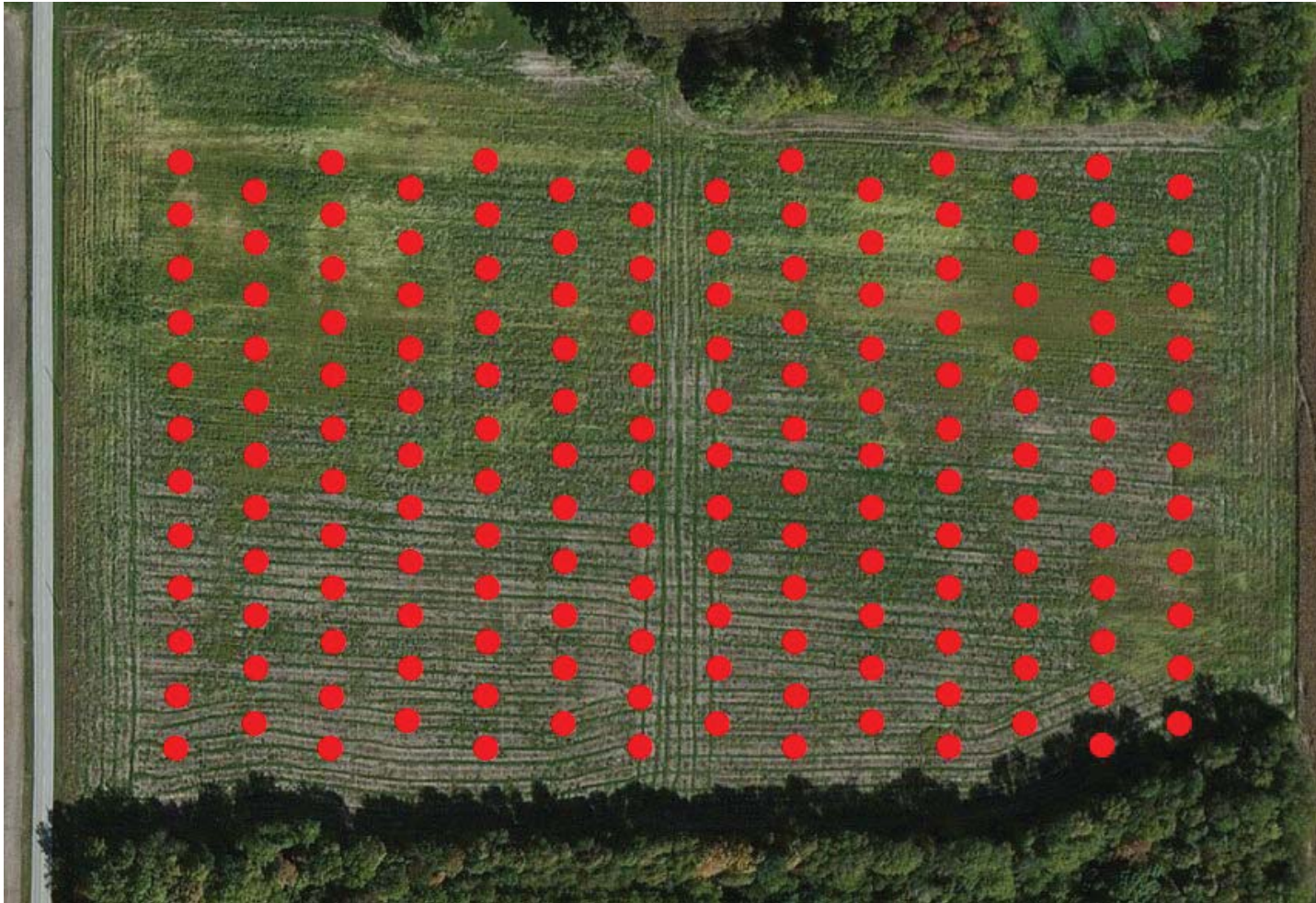
Summary

- In C/C grain yield was unaffected by pop-up in comparison to no fertilizer at planting. 2x2 starter increased yield at 1 of 3 sites in 2014 (10 to 17 bu/acre) and 3 of 7 sites in 2015 & 2016 by 6 to 9 bu/acre.
- In C/S grain yield was increased at all 5 locations in 2016 (4 to 12 bu/acre)

<https://www.agry.purdue.edu/ext/corn/research/StarterFertilizer.pdf>

Spatial response to starter fertilizer

- Jason Lee, Ph.D. project
- Does response to starter fertilizer vary by soil properties?
- How do starter fertilizers affect root development?



27 acres

**70' grid, 16
cores on 10'
radius on
each point**

Lee, 2016

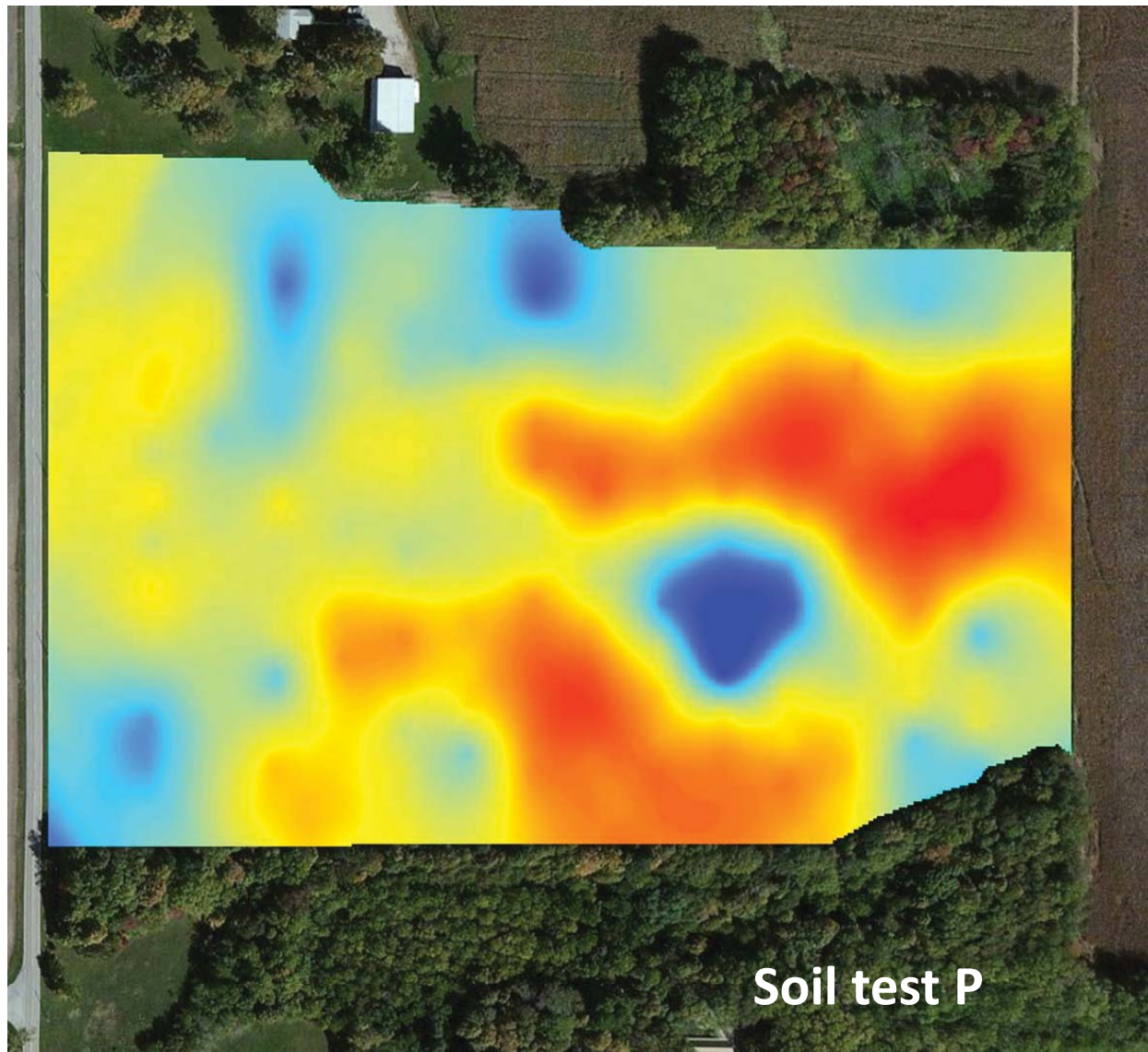
Soil test P

53

36

23

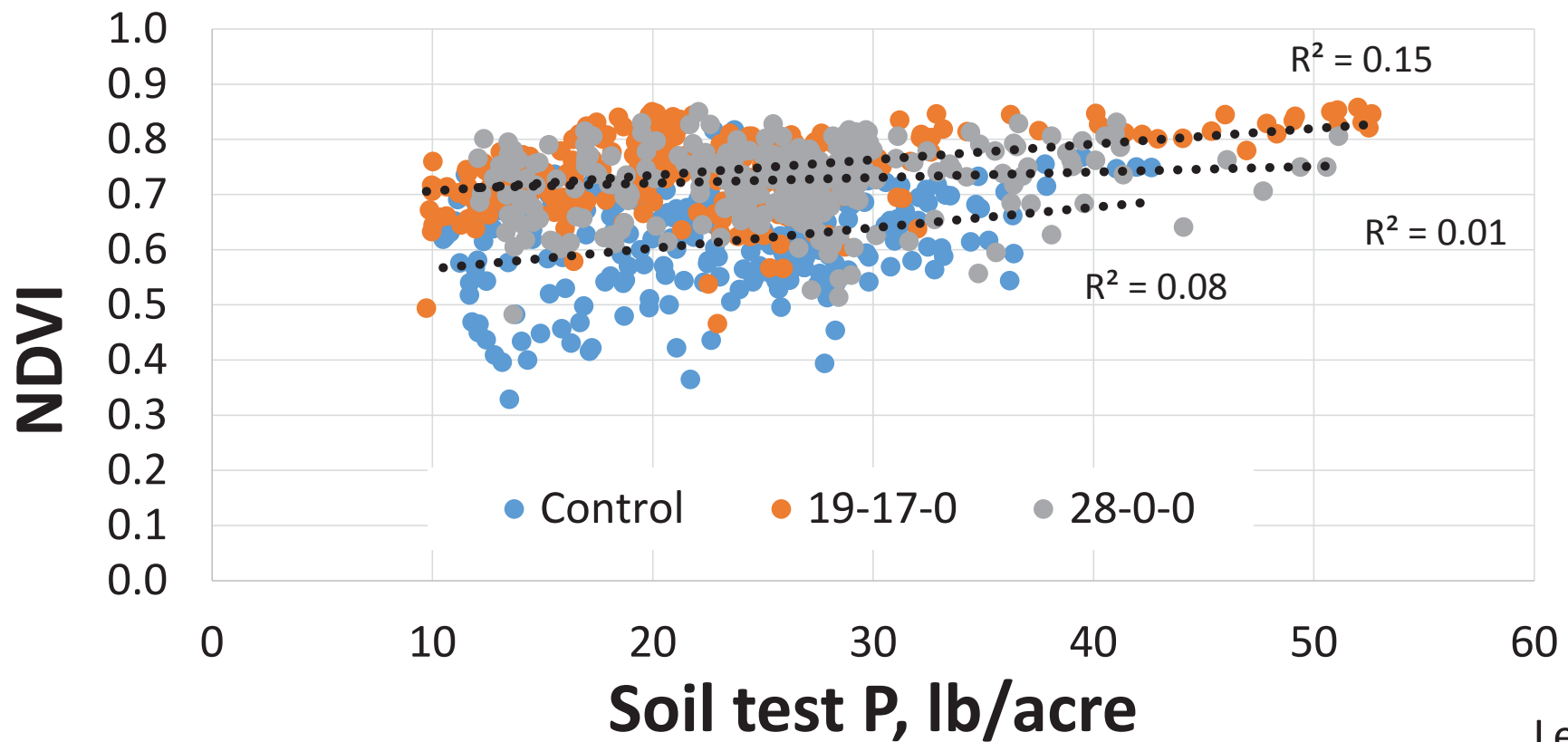
10



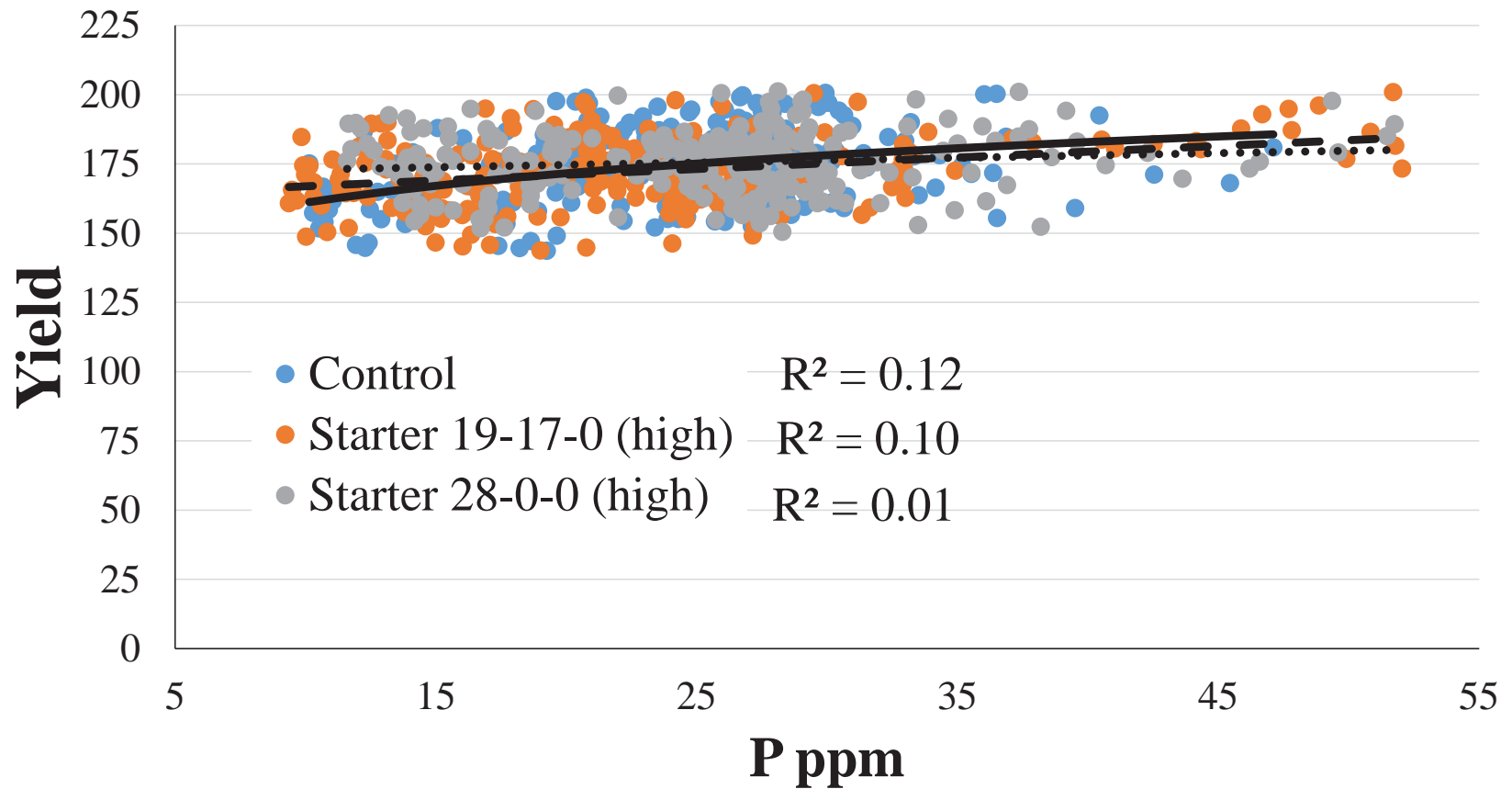
Soil test P

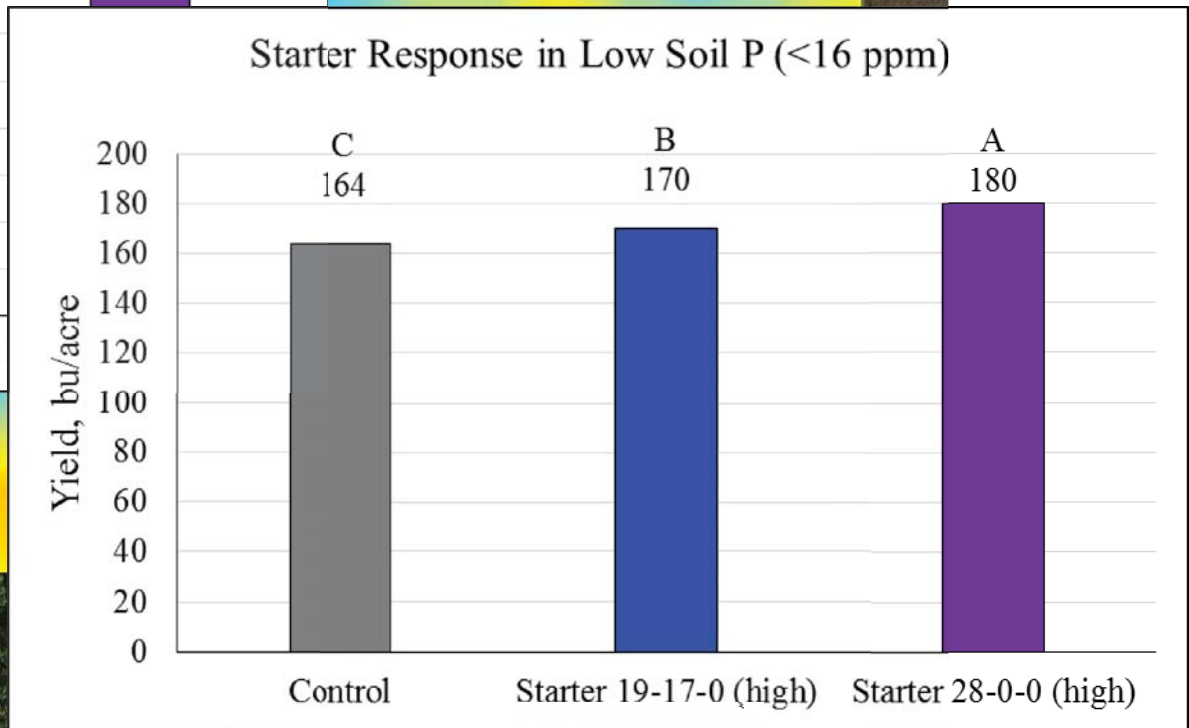
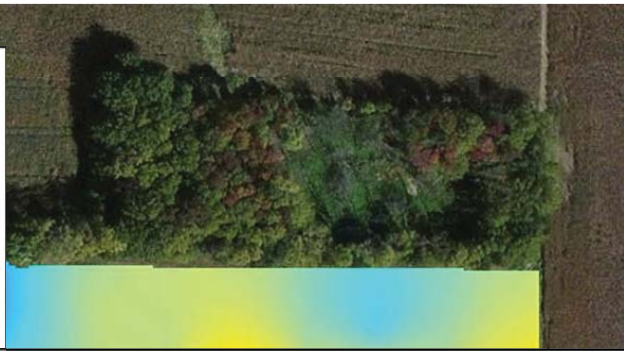
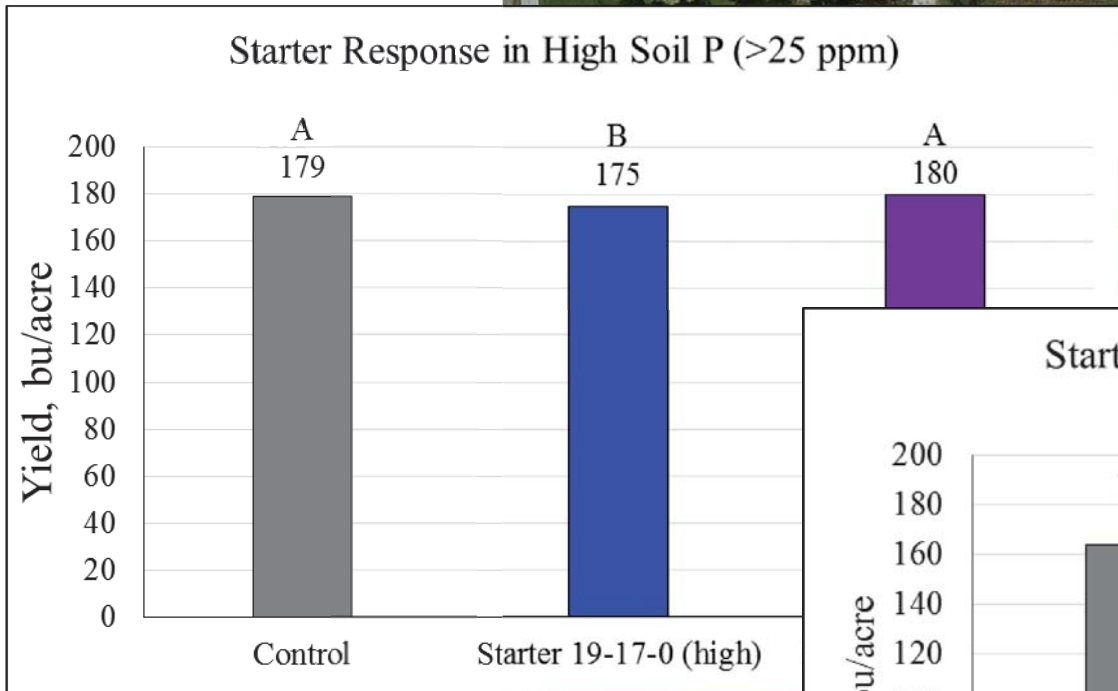
Lee, 2016

NDVI responded to starter similarly across soil test P levels



Yield response to starter by soil test P





Soil test 1

Spatial response to starter fertilizer

- Just beginning

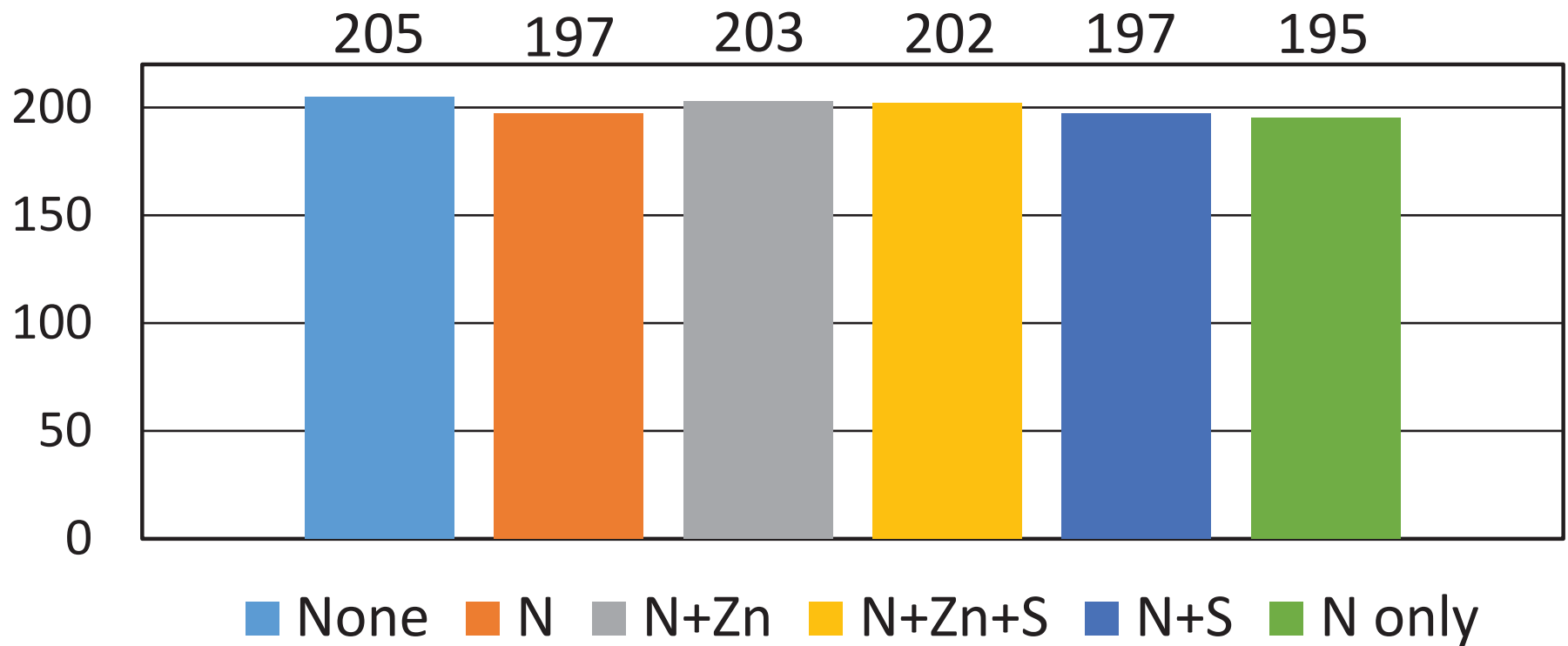
Starter treatments SWPAC – 2015&2016

1. No starter
2. N only **30 lb N/ac**
3. N+Zn **2 lb Zn/ac**
4. N+Zn+S **10 lb S/ac**
5. N+S

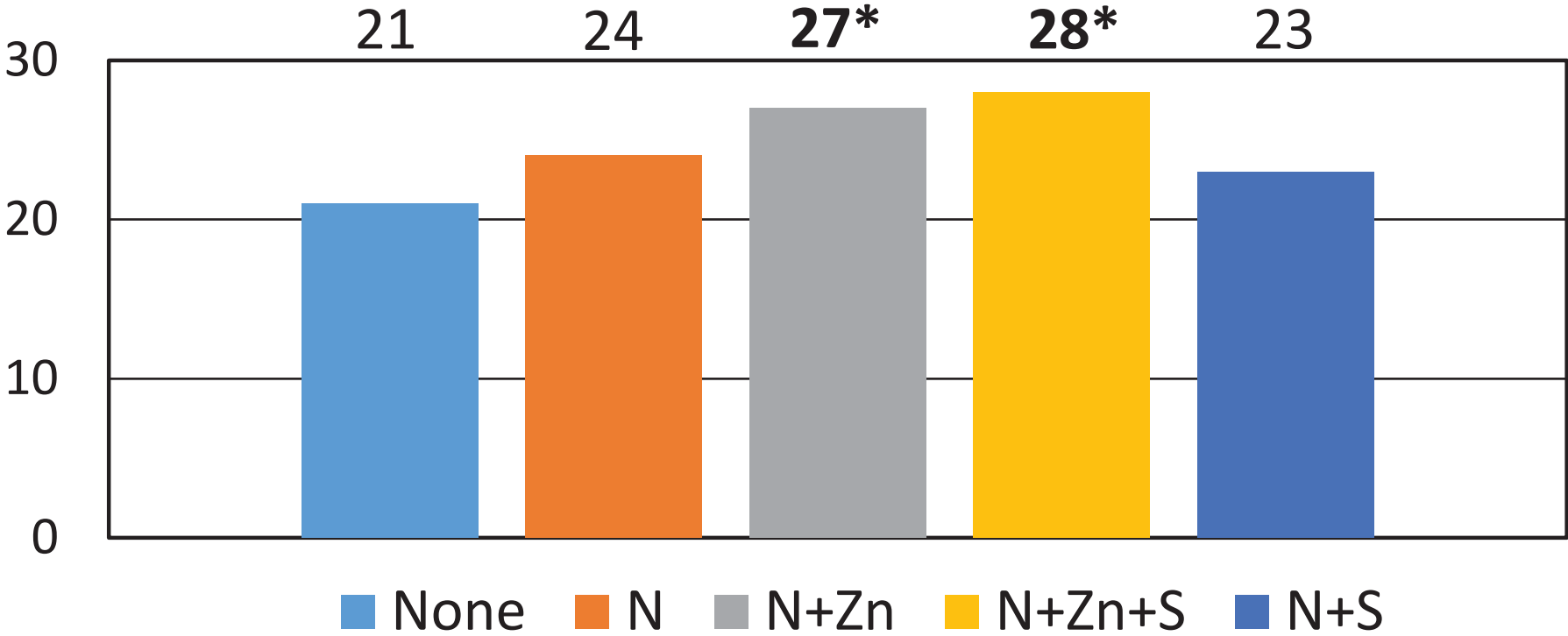
Everything equalized to 200 N, 20 S, and 0.5 B lb/acre

6. N without S (2015 only)

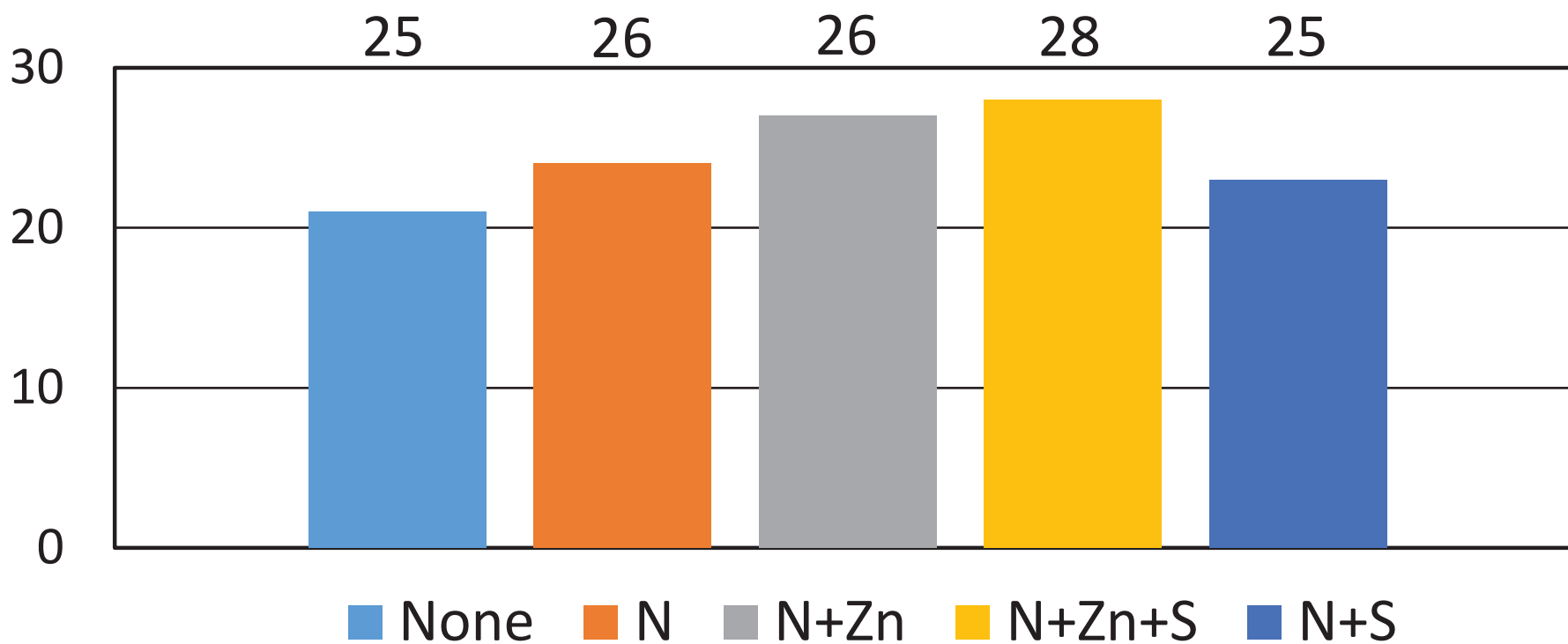
Grain yield unaffected by trt - 2015



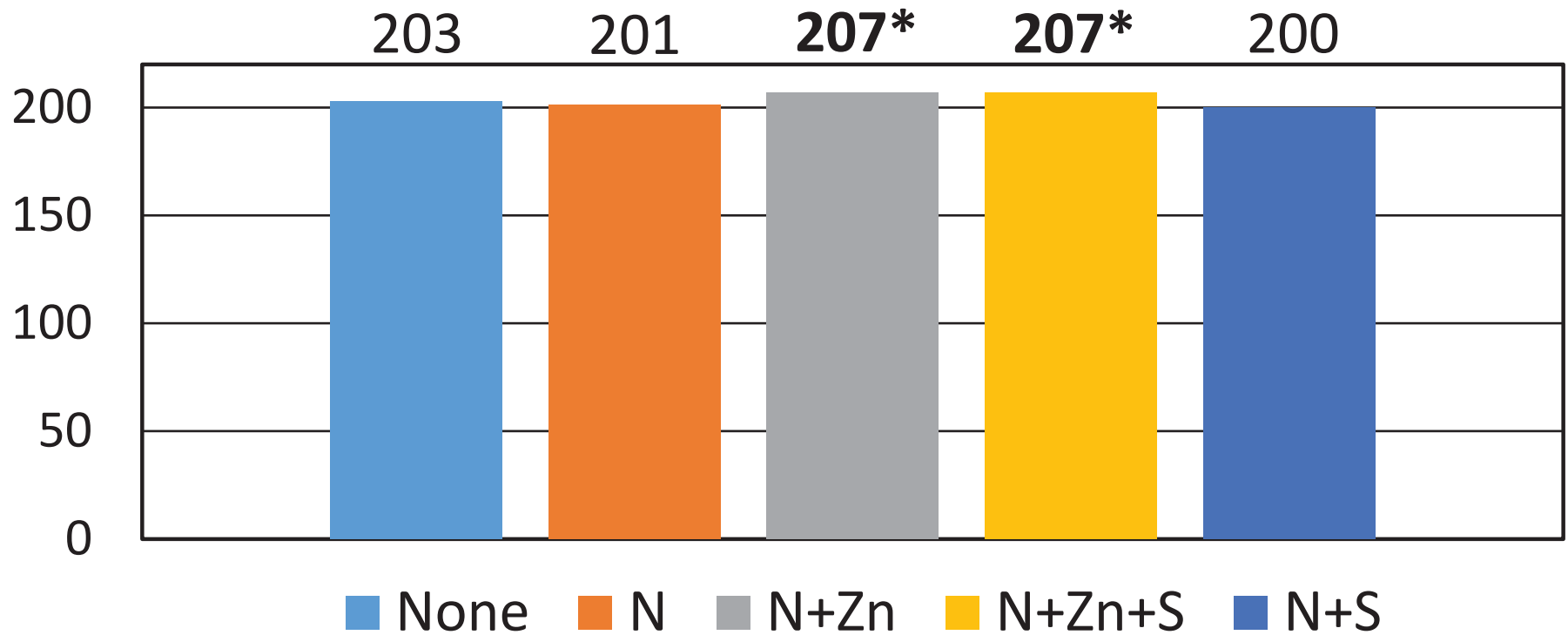
V6 tissue concentrations - 2016



Earleaf tissue concentrations - 2016



Grain yield increased by zinc - 2016



Summary – response to S and Zn

- On a sandy soil with moderate pH, S, and Zn corn responded to starter-applied Zn in 1 of 2 years but not S

Questions?

