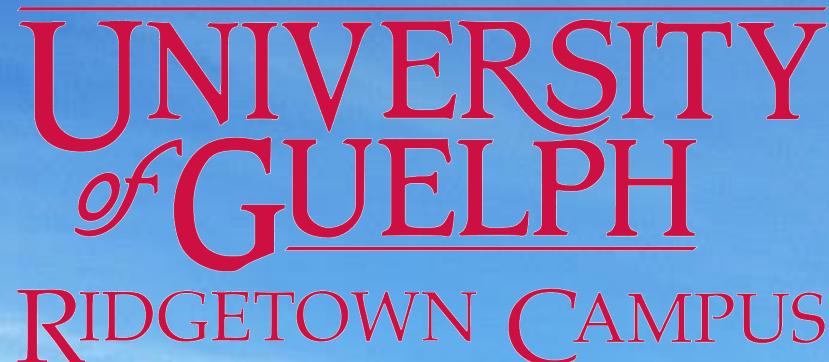


Long-term tillage-rotation-N on crop response and soil health



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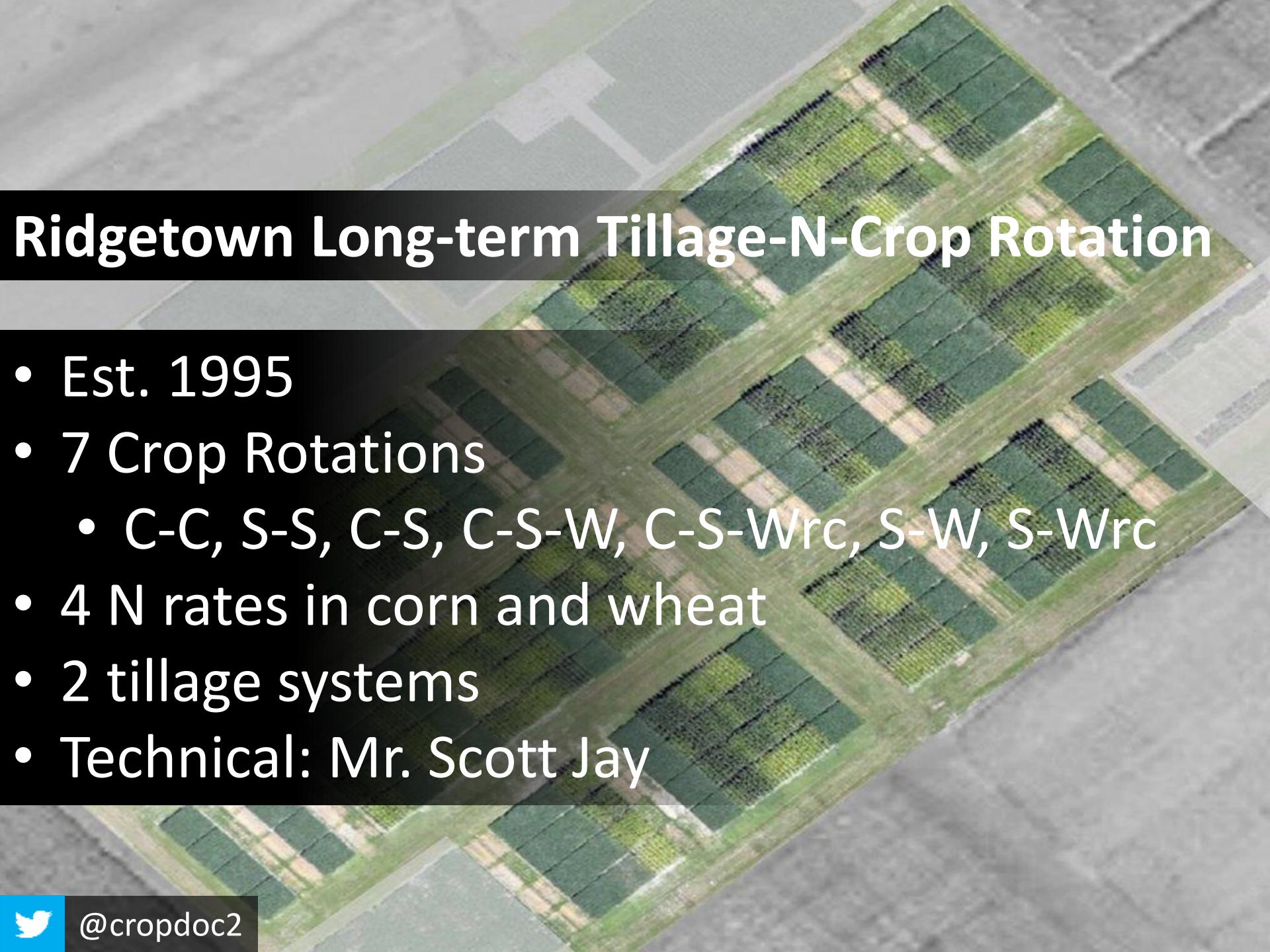
Overview

- Long-term rotation trial setup
- corn and soybean yield responses
- Soil health differences
- Red clover vs. corn yield
- Fertilizer N reqts for corn vs. soil health



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Ridgetown Long-term Tillage-N-Crop Rotation

- Est. 1995
- 7 Crop Rotations
 - C-C, S-S, C-S, C-S-W, C-S-Wrc, S-W, S-Wrc
- 4 N rates in corn and wheat
- 2 tillage systems
- Technical: Mr. Scott Jay



No-Till Corn 1995-2011

Fall Strip-Till 2012-2014

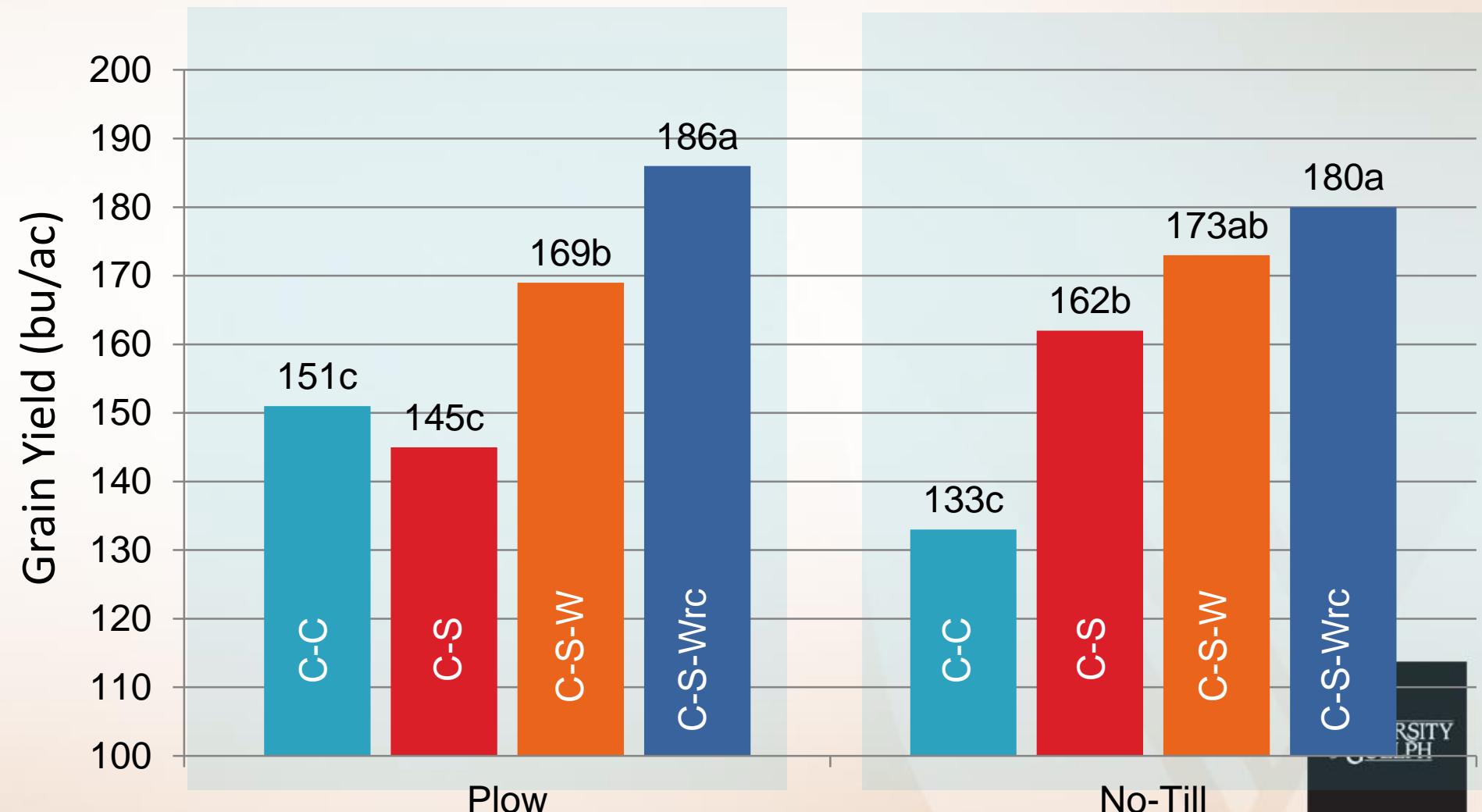


Impact of diversity on corn yield?



Tillage x Crop Rotation on Corn Yields

Ridgetown 2009-14 using 120 lbs fertilizer N/ac



Note: Mean separation within tillage system ($p=0.05$)



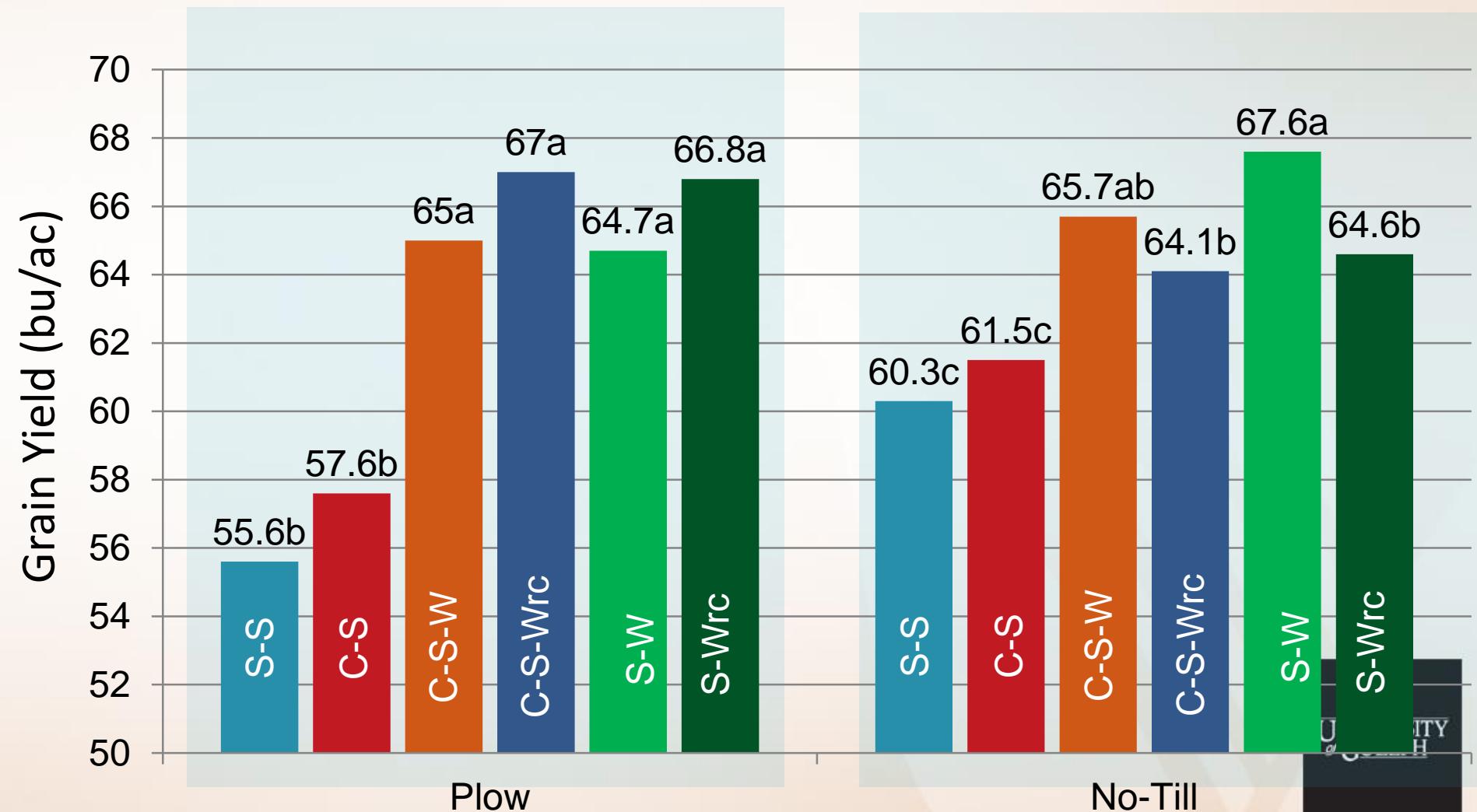
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Impact of crop rotation diversity on soybean yield?



Tillage x Crop Rotation on Soybean Yields

Ridgetown 2009-14



Note: Mean separation within tillage system ($p=0.05$)



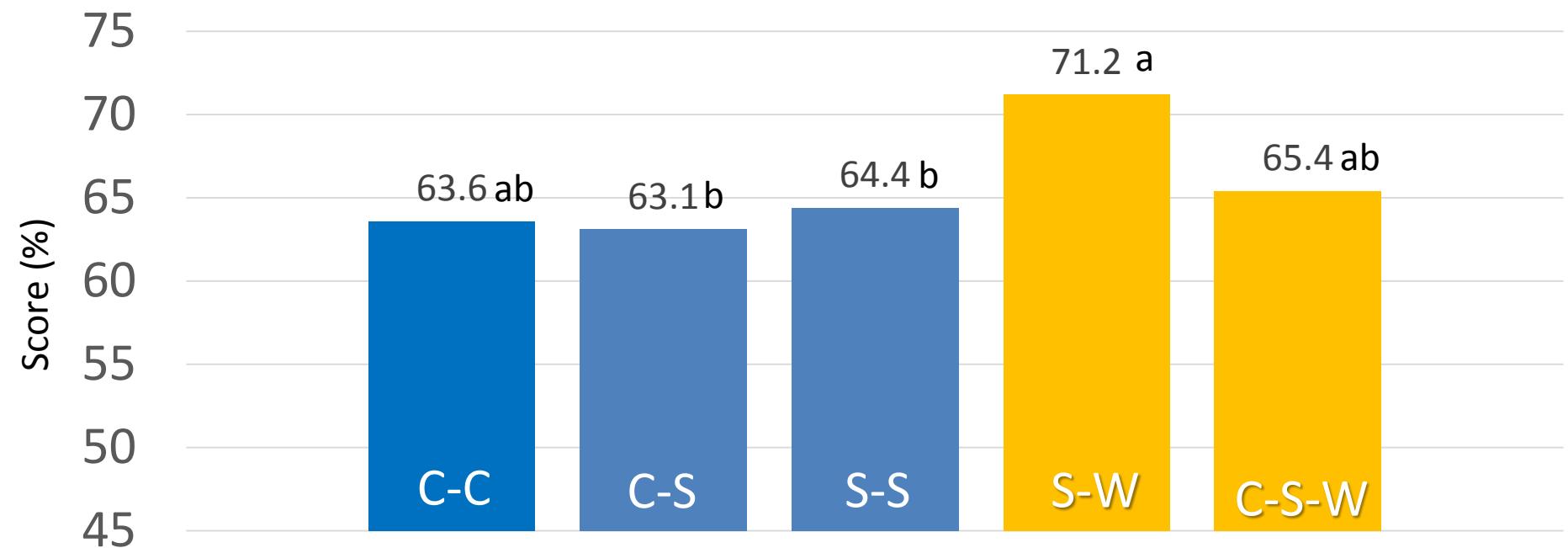
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Yield response vs soil health?



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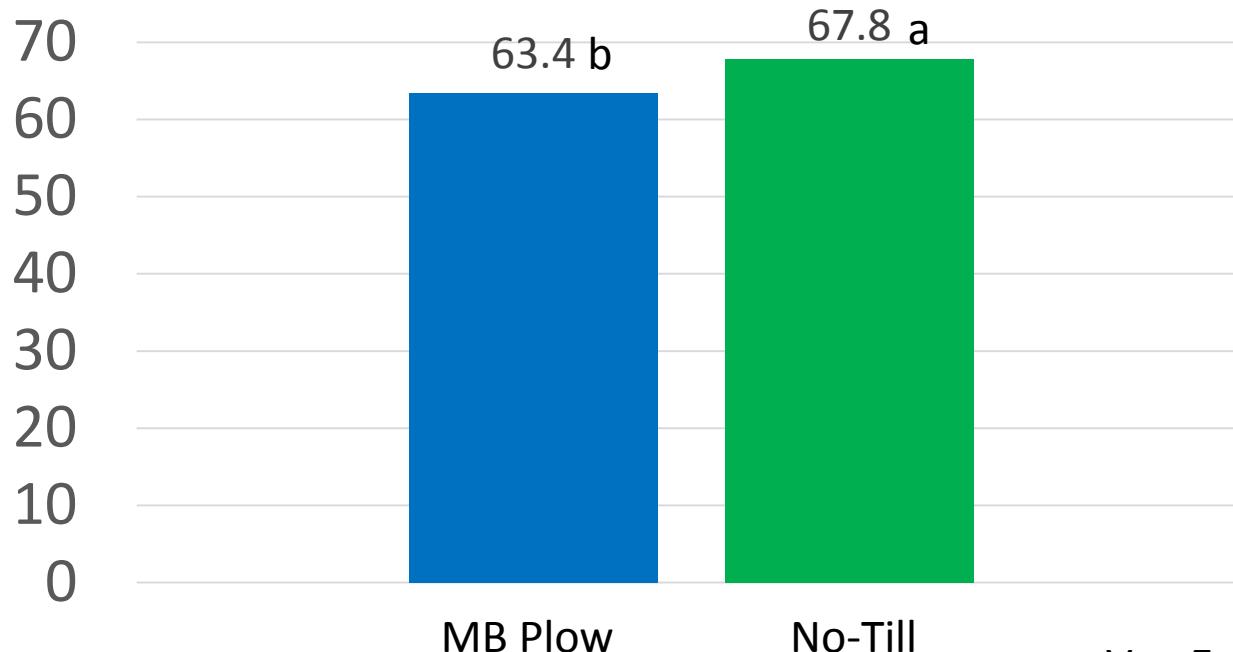
Crop rotation effects on CSHA across tillage at Ridgetown in 2009



Van Eerd et al
CJSS(2014)



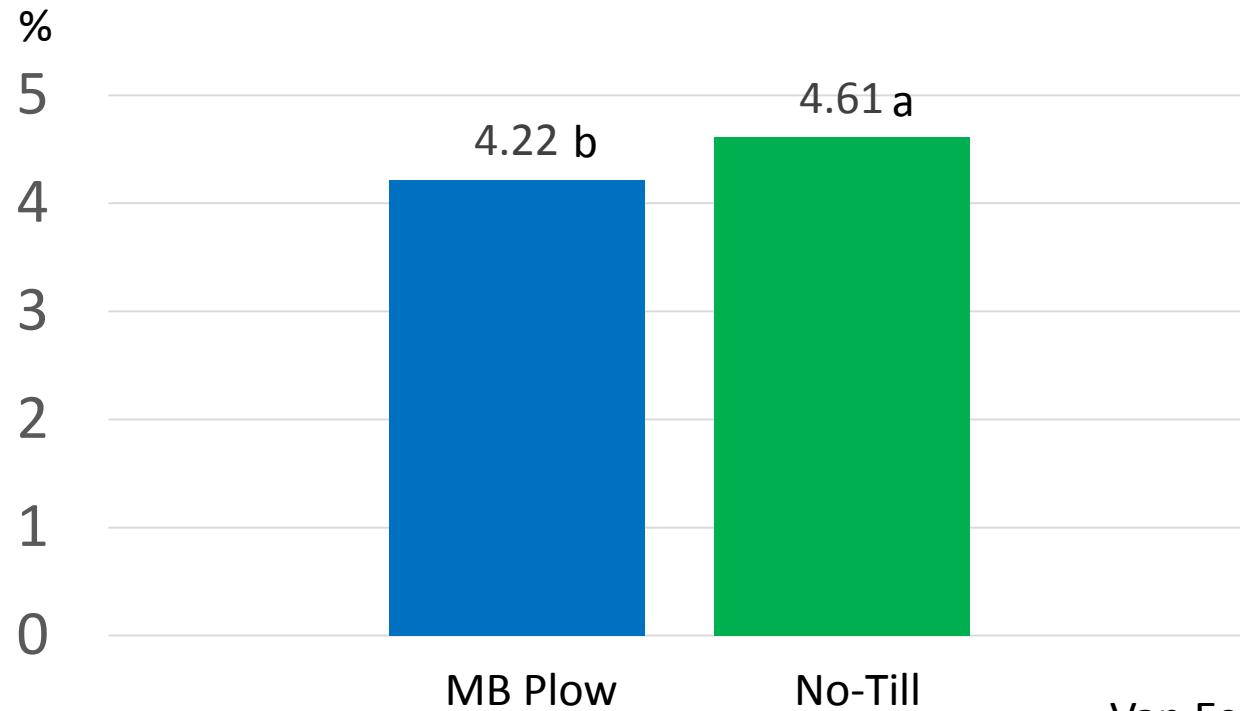
Tillage effects on CSHA across crop rotations at Ridgetown in 2009



Van Eerd et al
CJSS(2014)



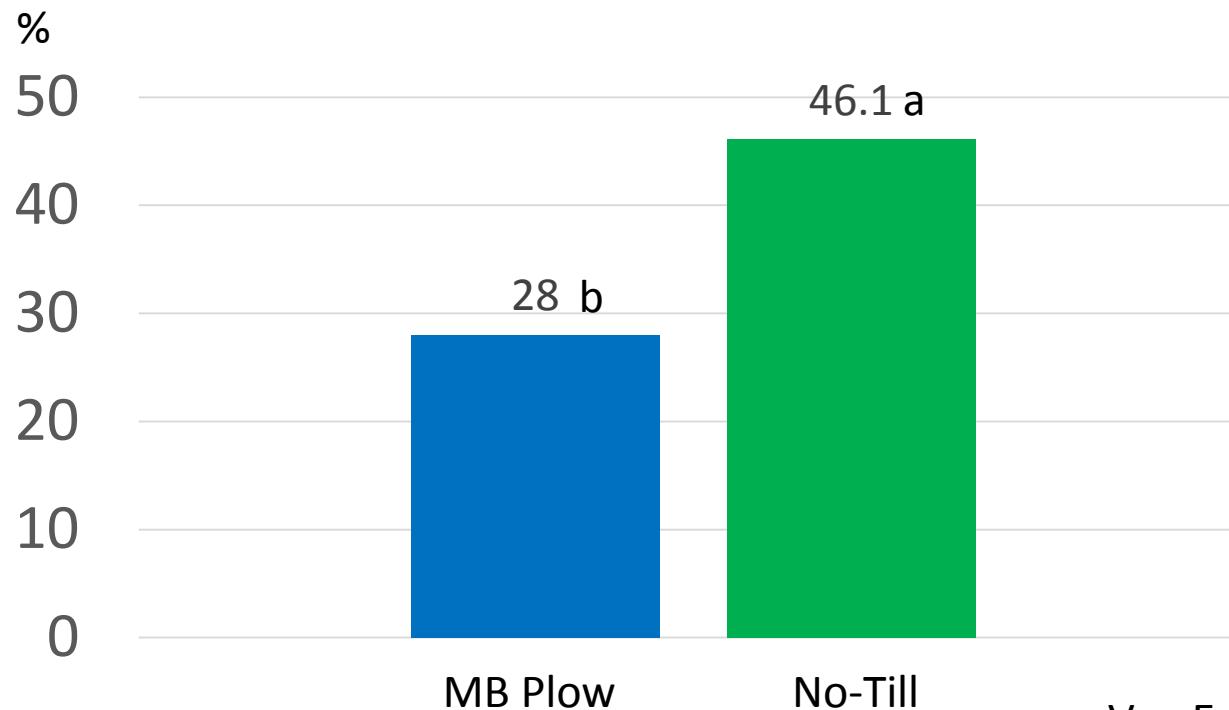
Tillage effects on soil organic matter across crop rotations at Ridgetown in 2009



Van Eerd et al
CJSS(2014)



Tillage effects on aggregate stability across crop rotations at Ridgeway in 2009



Van Eerd et al
CJSS(2014)



soil health vs. yield stability?



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Higher SOC reduces corn yield variability (2002-2006)

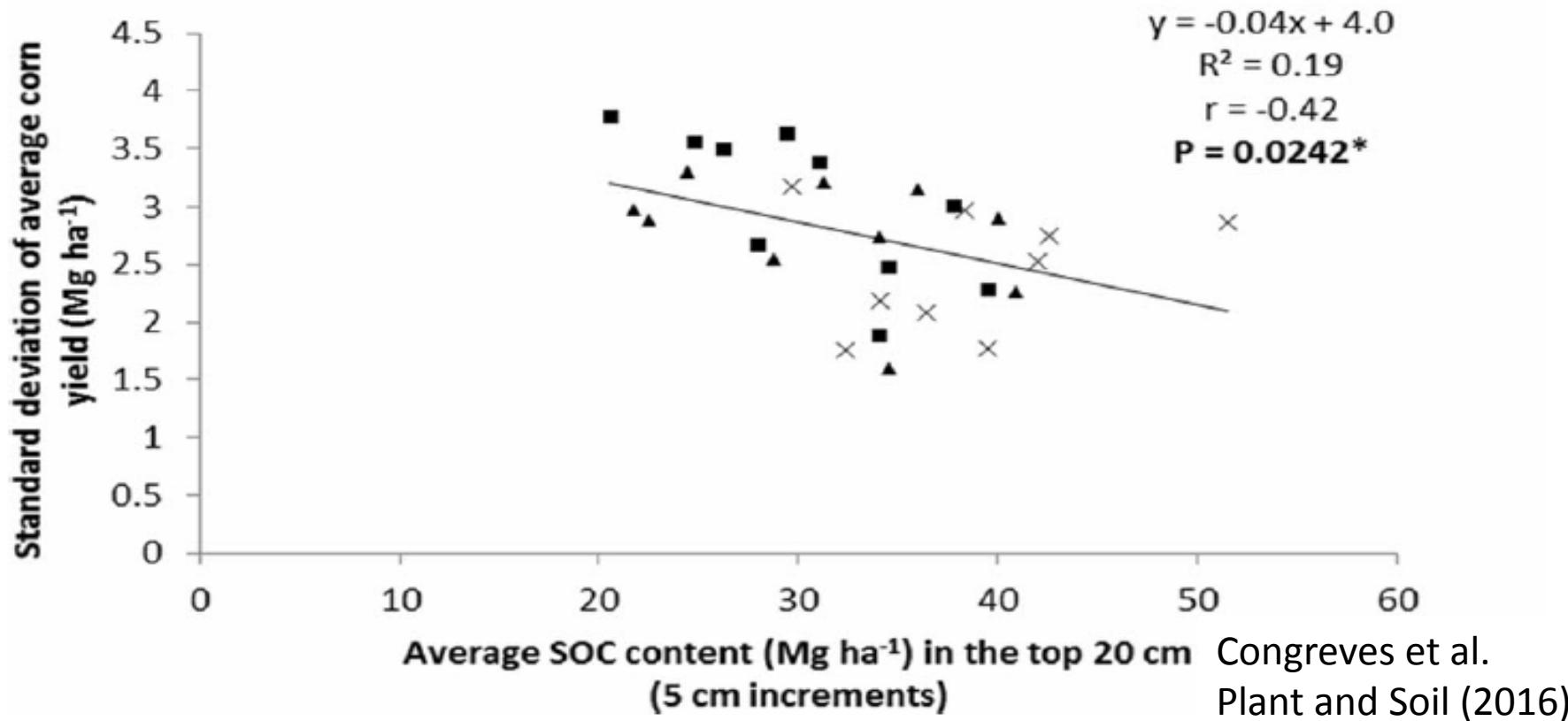


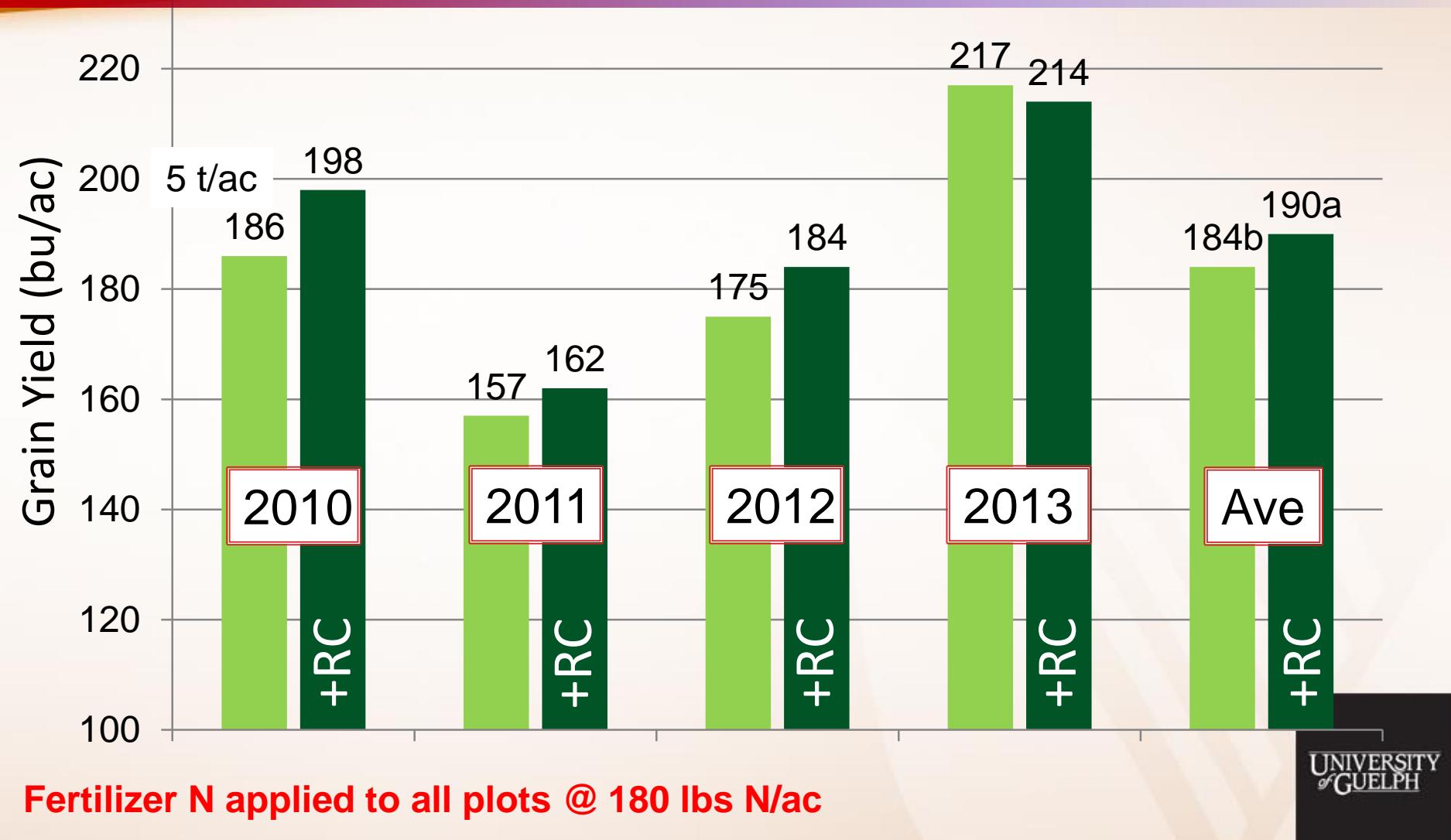
Fig. 4 Relationship between the 5-yr. (2002–2006) average corn yield or the standard deviation of corn yield and the average soil organic C (SOC) or total N content (Mg ha⁻¹) within 5 cm intervals

Impact of underseeded red clover on subsequent corn yields?



Corn Yields after Wheat +/- Red Clover

Ridgetown 2010-13

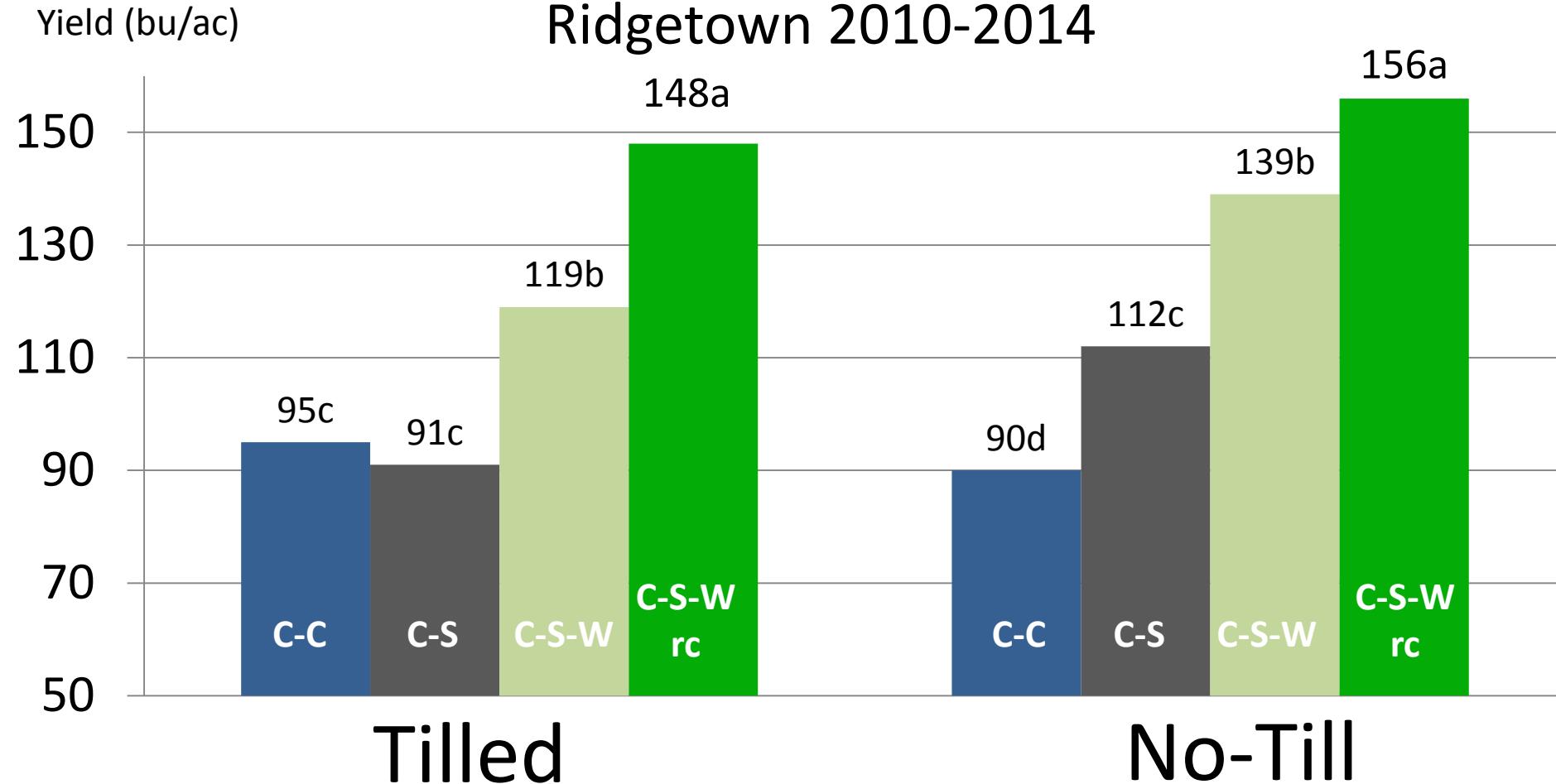


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Impact of crop rotation diversity on fertilizer N requirements for corn?



Corn yield response to soil N capacity -- zero fertilizer N – Ridgetown 2010-2014



$n=16$ observations per mean (4 reps x 4 years); MERN >173 lbs N/ac in “+173” values
Mean separation within tillage Fisher’s Protected LSD (0.05)

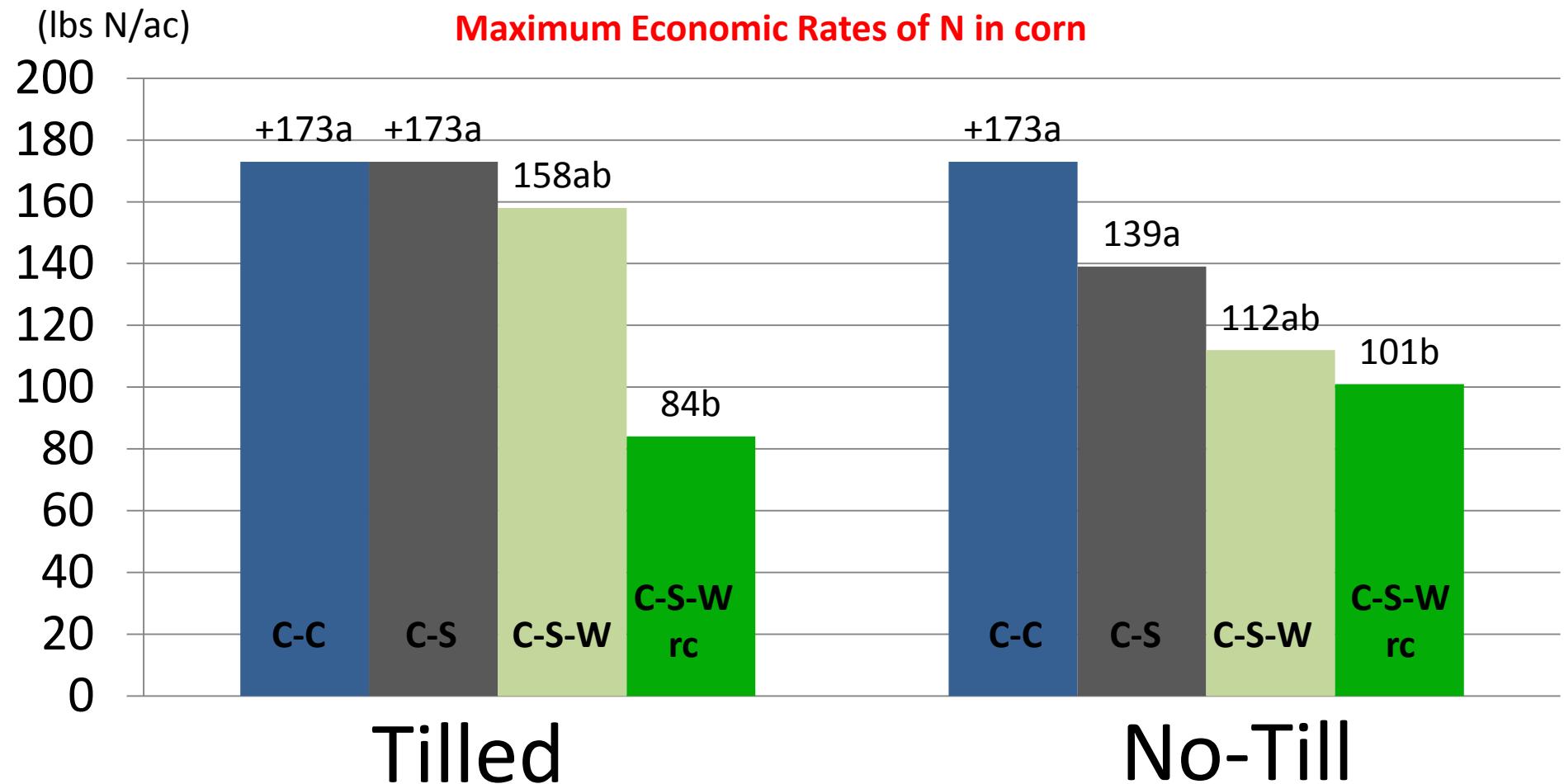


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Gaudin et al.
Agriculture Ecosystems Environment (2015)

No-till + crop rotation reduces N fertilizer requirement

Ridgetown 2010-2013



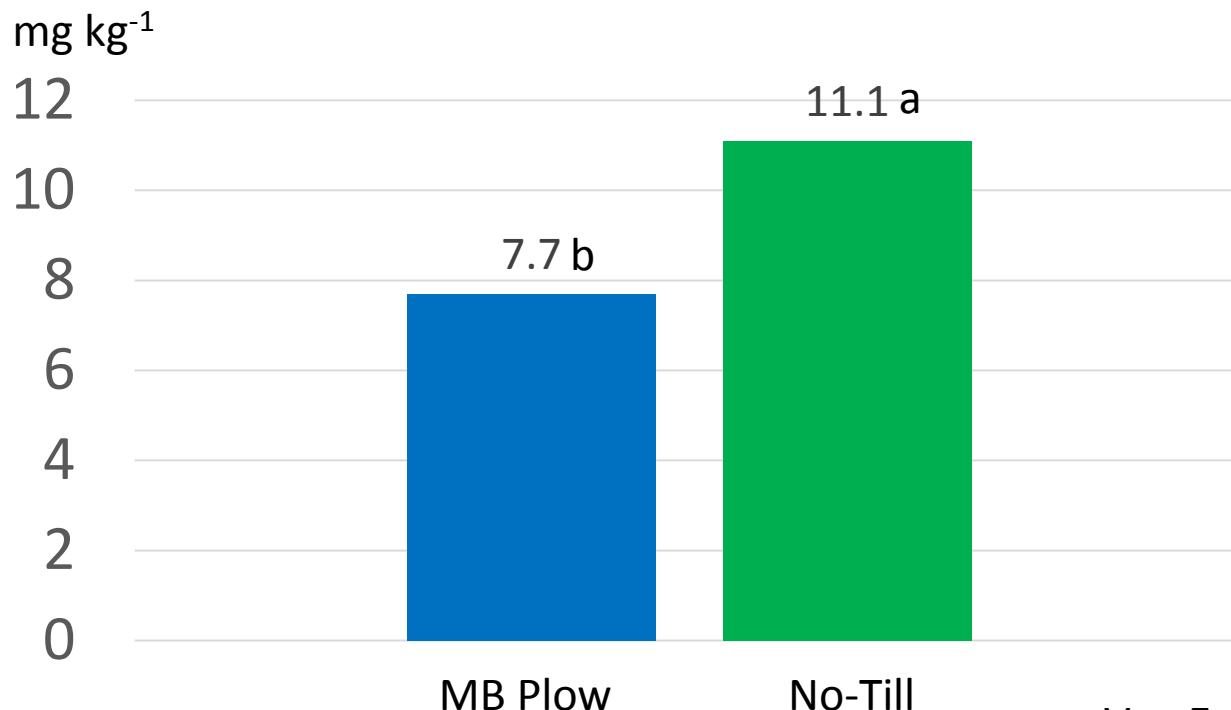
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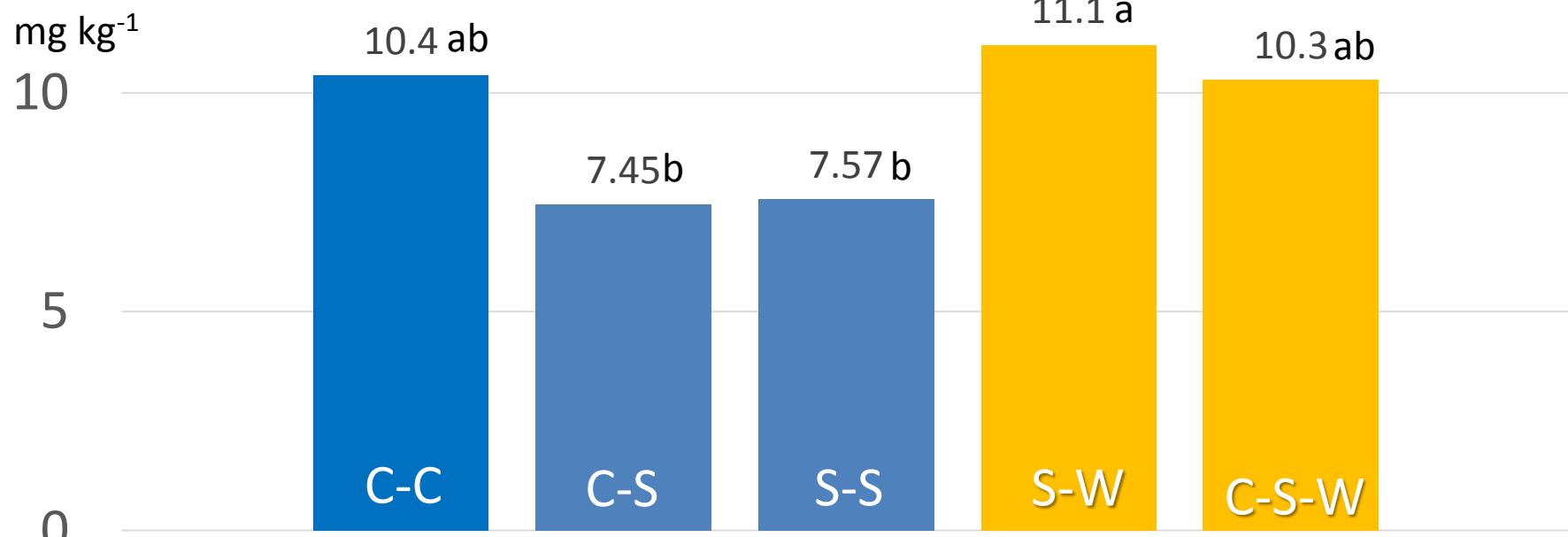
Tillage effects on potential mineralized N across crop rotations at Ridgetown in 2009



Van Eerd et al
CJSS(2014)



Crop rotation vs. PMN* across tillage at Ridgetown in 2009



*potentially mineralizable N

Van Eerd et al
CJSS(2014)

Crop rotation take-aways from Ridgetown

- Wheat ^corn yields +10 bpa
- Wheat ^soybean yields +5 bpa
- Red clover alone ^corn yield +6 bpa
- Wheat ^NUE thereby less reliance on N fert
- Crop responses reflect soil health measures
- Proposed 2018 assessment?



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QUESTIONS?

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