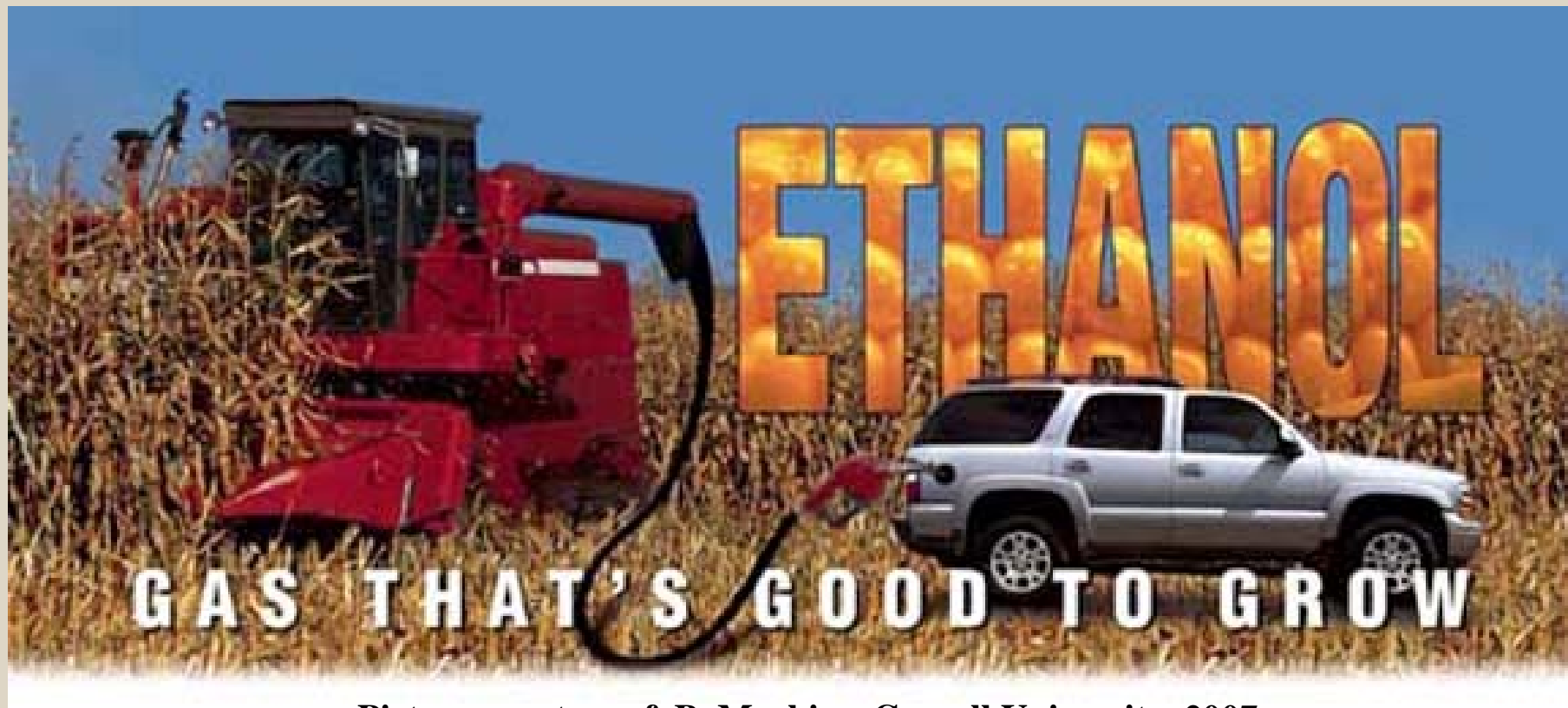


Tillage Systems to Sustain Soil and Yield in “Continuous” Corn

**Tony J. Vyn & Graduate Students,
T.D. West, Colleagues, & Farmers**



Does ethanol really change the conservation tillage decisions for corn production?



Picture courtesy of B. Moebius, Cornell University, 2007

Tillage Choices for Corn after Soybean versus Corn after Corn?



Photo credit: Greg Stewart



10.23.2002

Answer: Depends on Soil Type, Erosion Risk, Technology Adoption and Crop Management



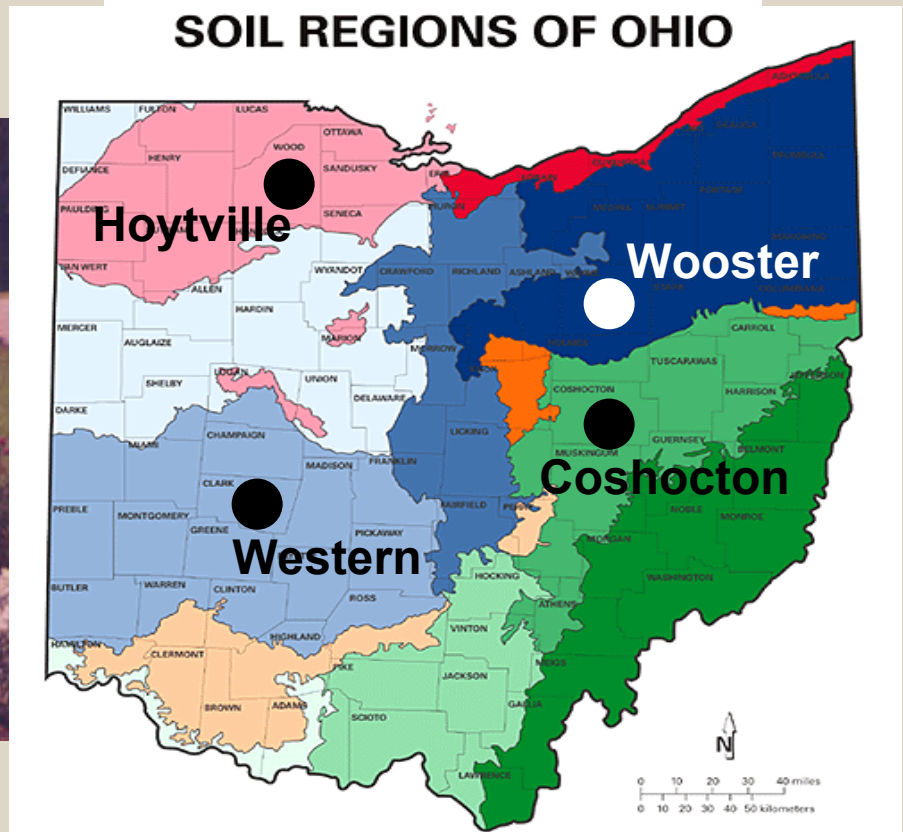
Picture courtesy of Jeff Vetsch, Univ. of Minnesota

What Kind of Corn-Dominant Rotation?

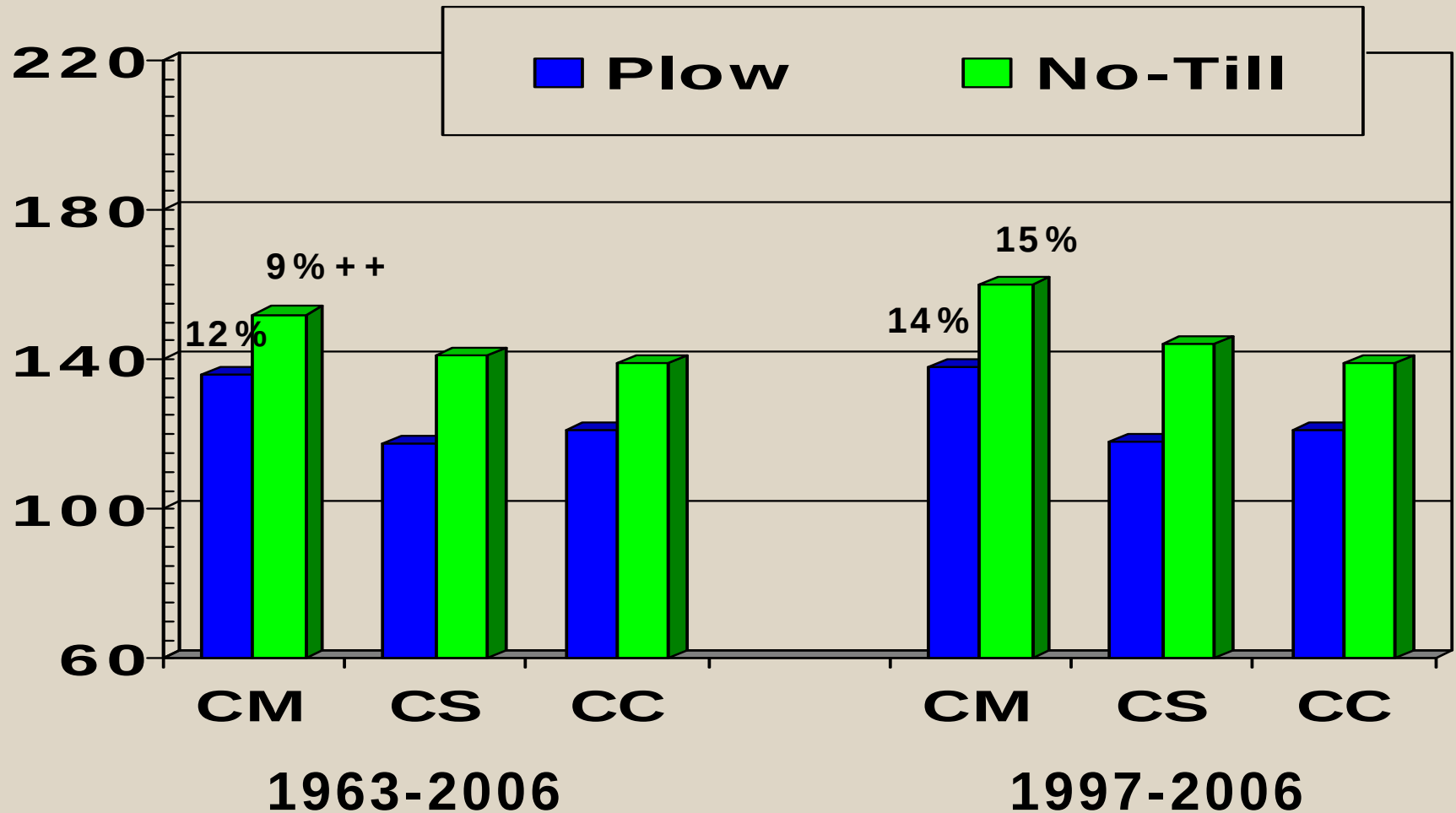
- **Continuous Corn**
- **Soybean-Corn-Corn**
- **Soybean-Corn-Corn-Corn**
- **Soybean-Corn-Corn-Soybean-Corn**
- **Soybean-Wheat-Corn-Corn-Corn**
- **Alfalfa-Alfalfa-Alfalfa-Corn-Corn-Corn**



Triplett - Van Doren Tillage and Rotation Plots in Ohio

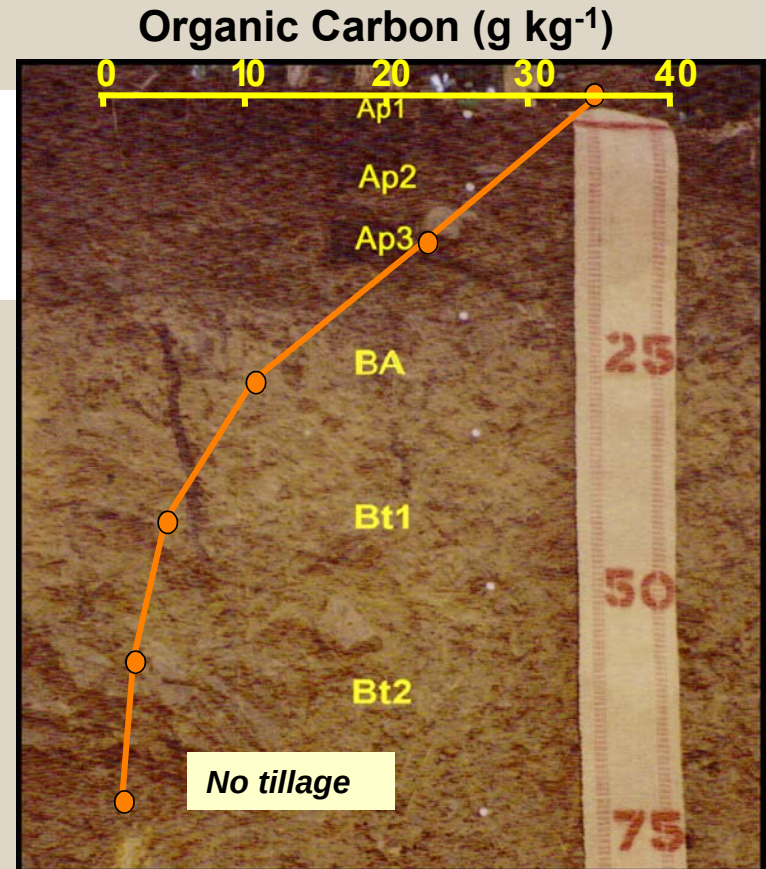
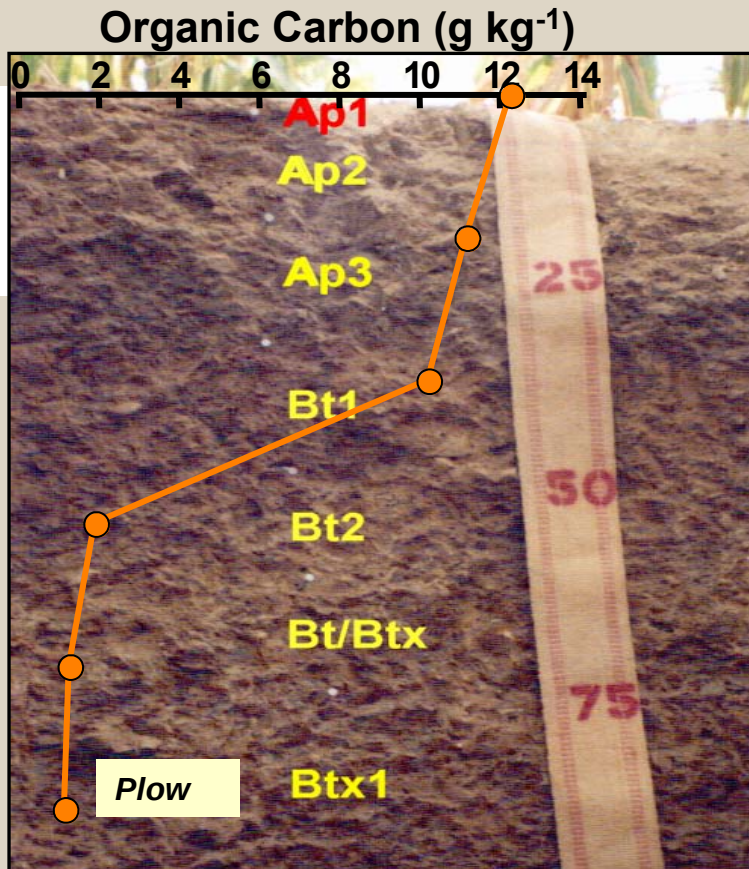


Corn Yield Response to Rotation/Tillage (Wooster, OH; 1963-2006)



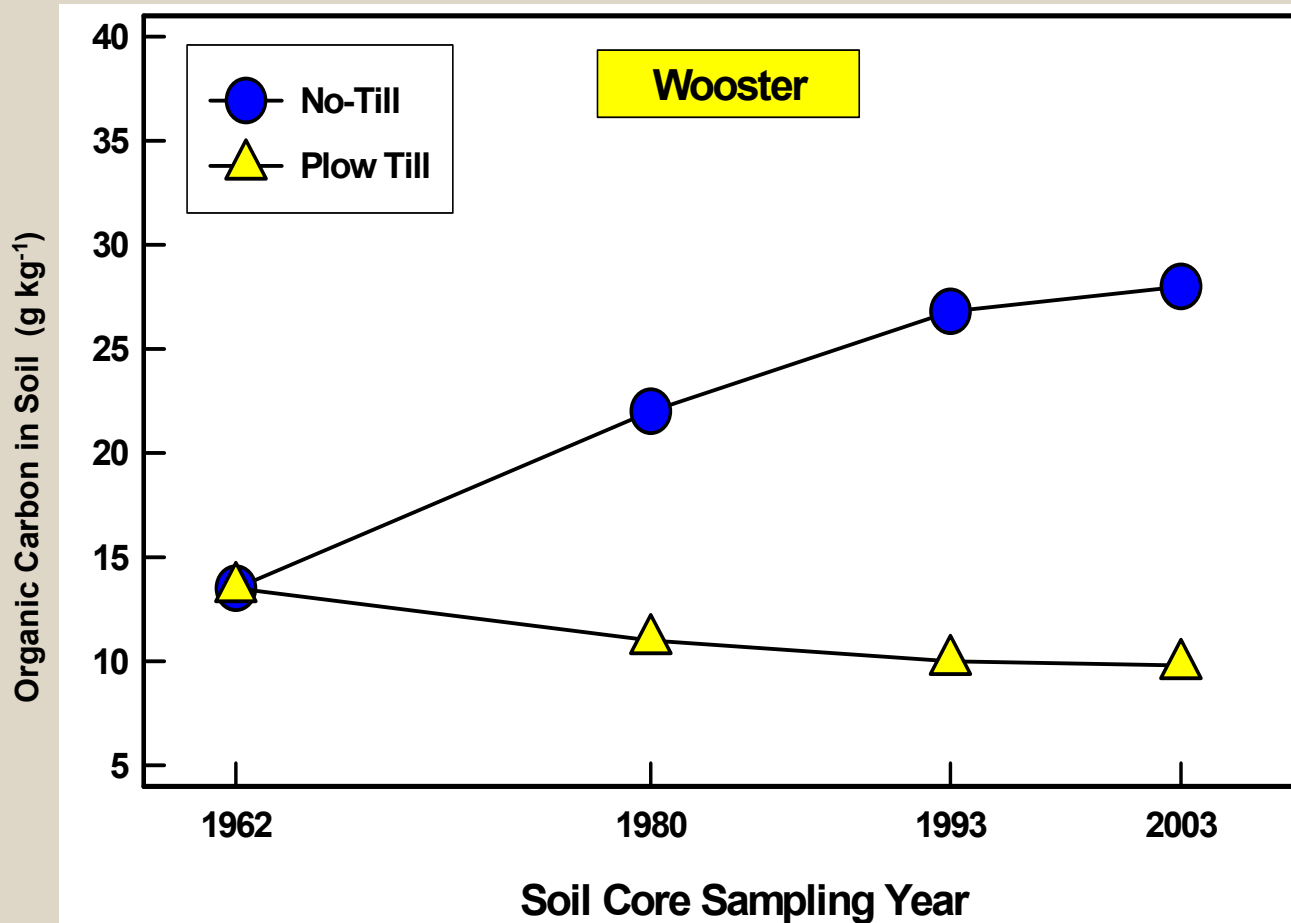
Source: Dr. Warren Dick, OSU

Wooster Site



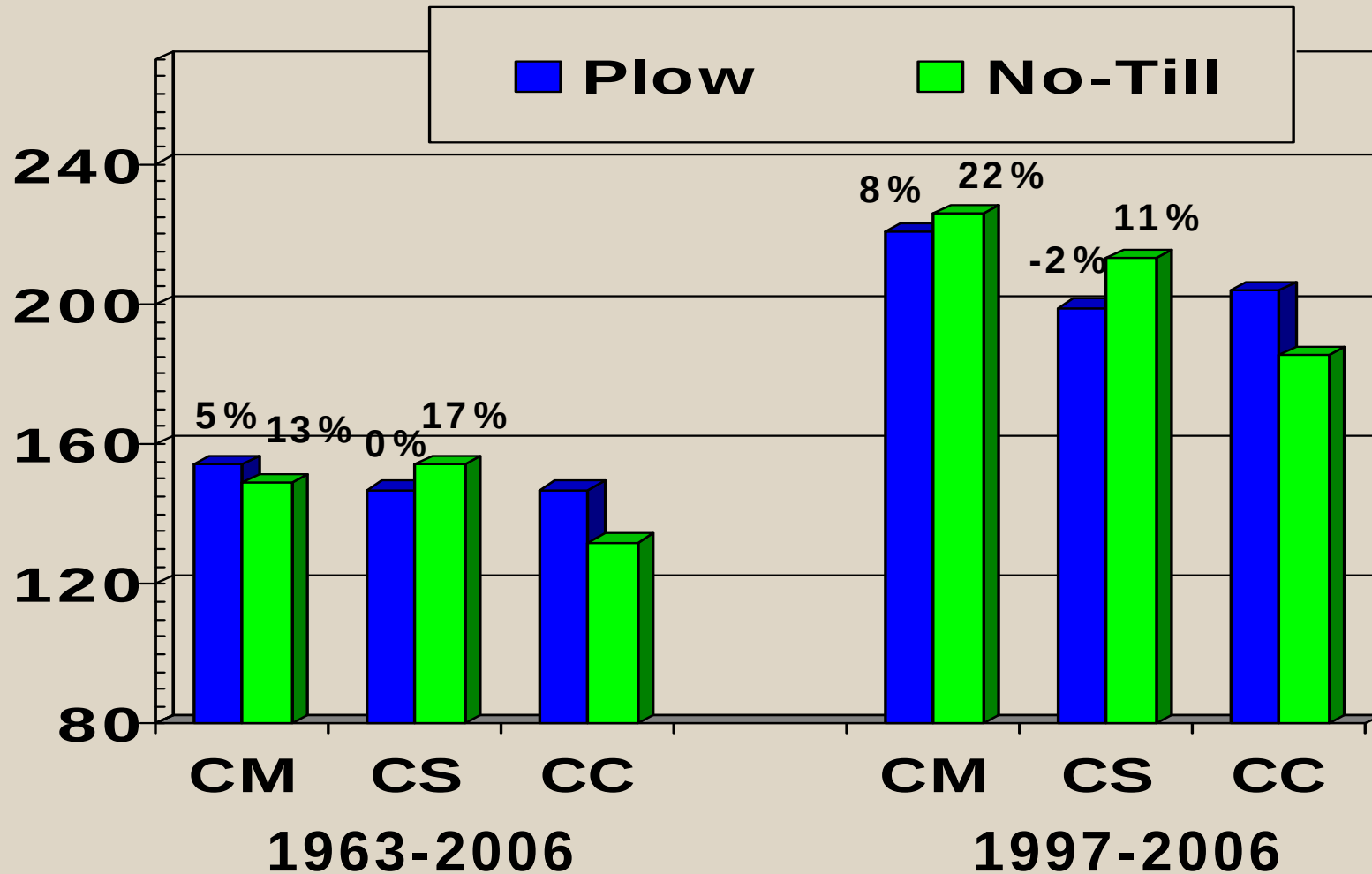
Source: Dr. Warren Dick, OSU

Tillage Effects on Organic C (Wooster) from 1962 to 2003

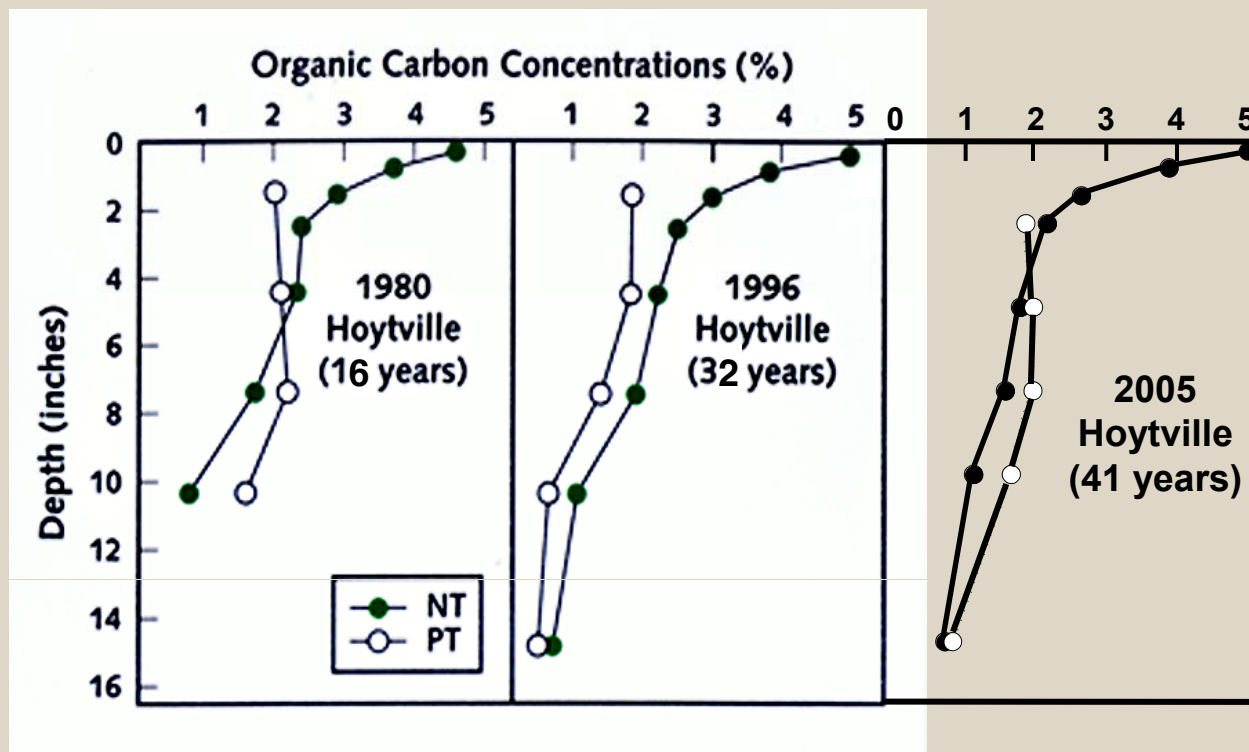


Source: Dr. Warren Dick, OSU

Corn Yield Response to Rotation/Tillage (Hoytville, OH; 1963-2006)



Tillage Effects on Organic C (Hoytville) (1980 to 2005)



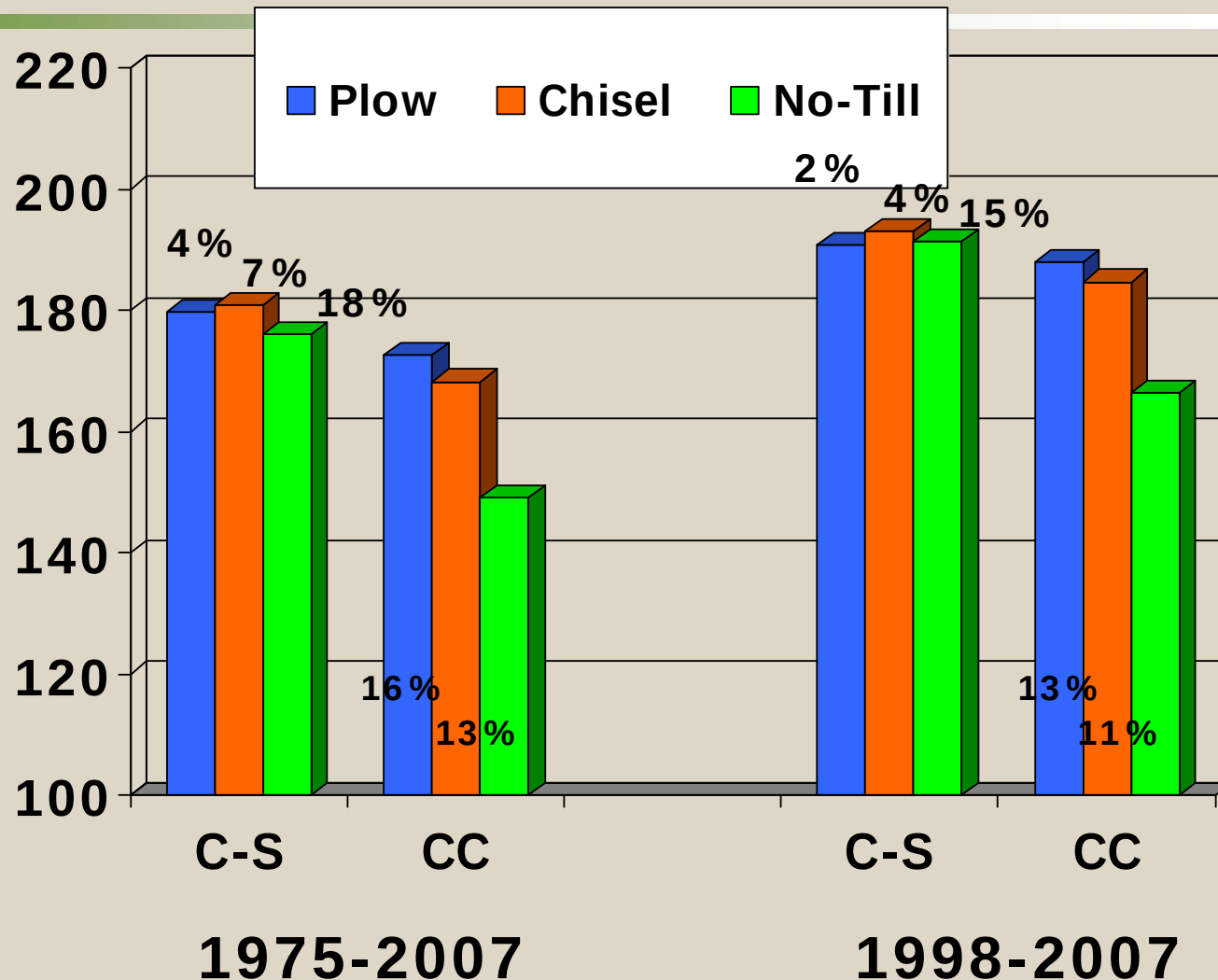
Source: Dr. Warren Dick, OSU

Long-term Rotation and Tillage Plots

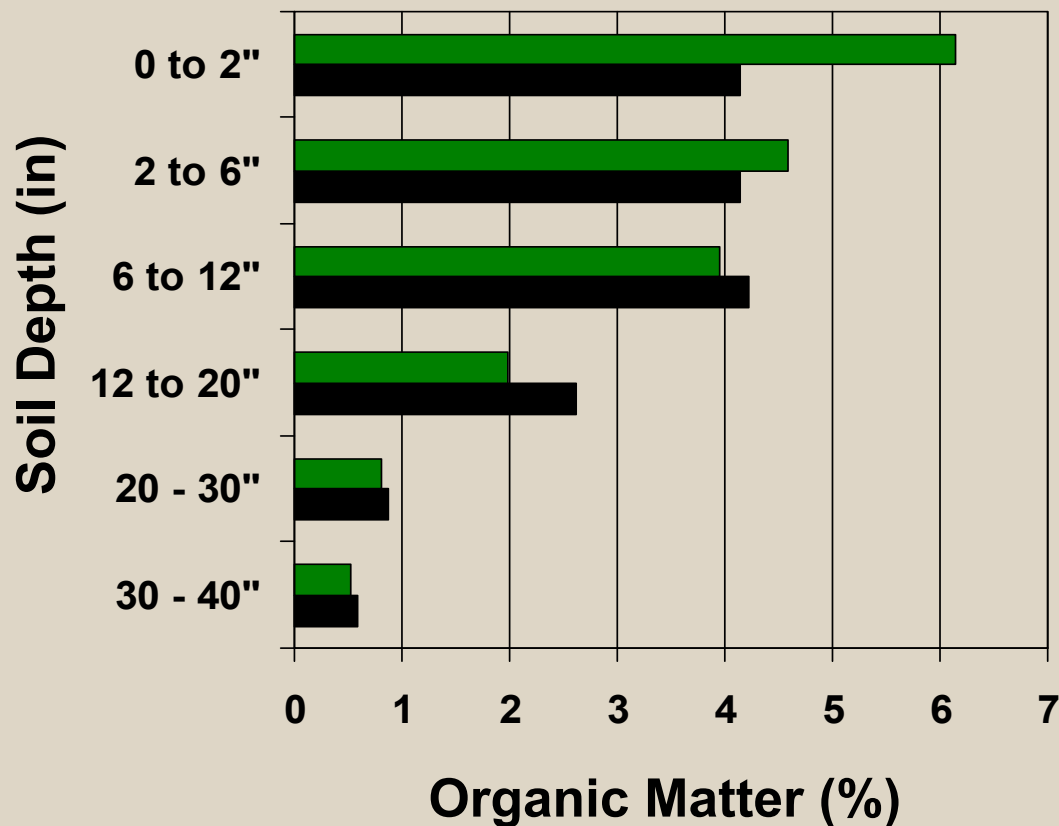
Silty clay loam, W. Lafayette, IN 1975-2006



Corn Yield Response to Tillage and Rotation, Silty Clay Loam, W. Lafayette, IN, 1975-2007.



Long-term Tillage Effects on Soil Organic Matter (1975-2003, West Lafayette, IN)

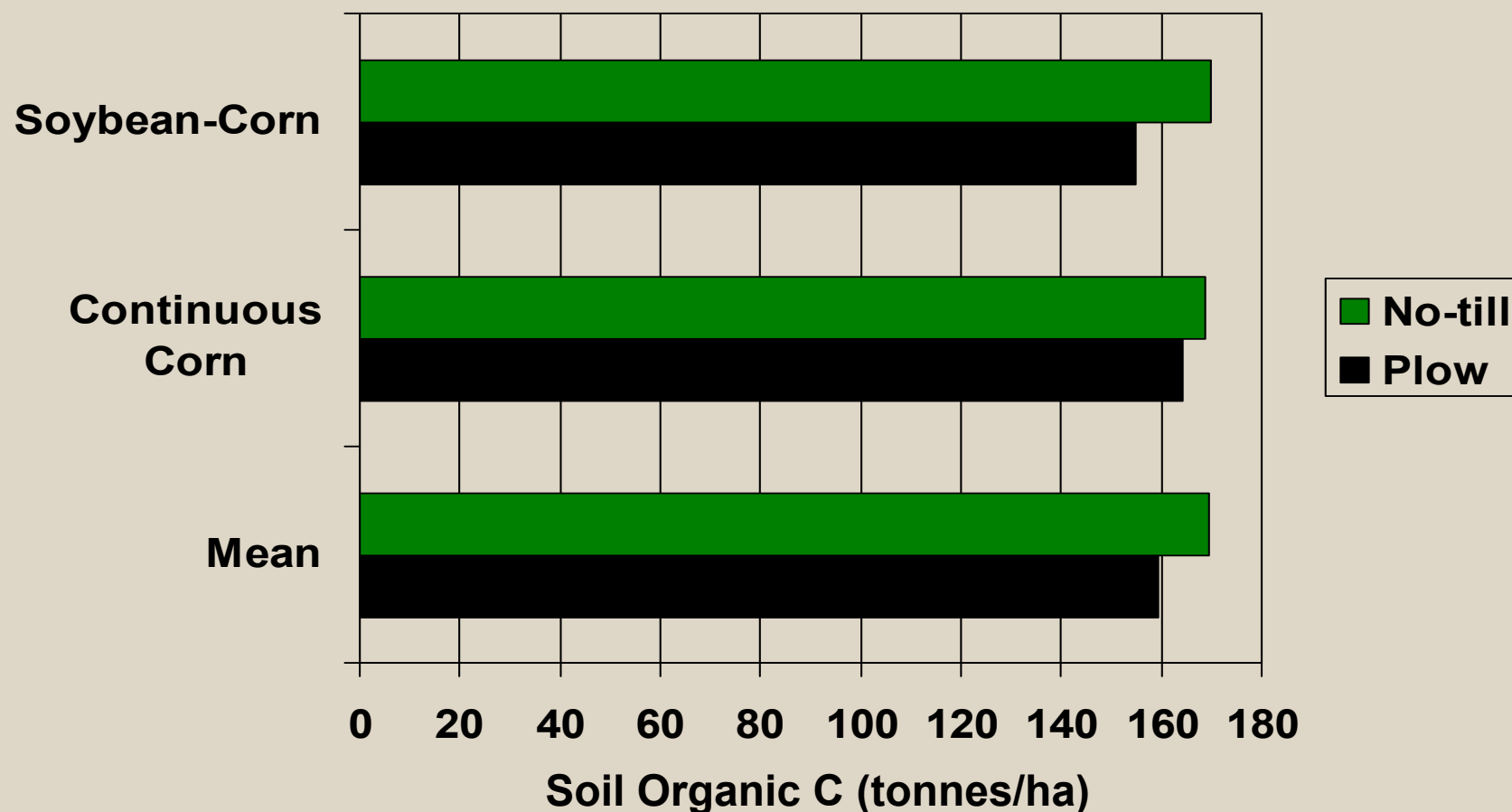


■ No-till
■ Plow



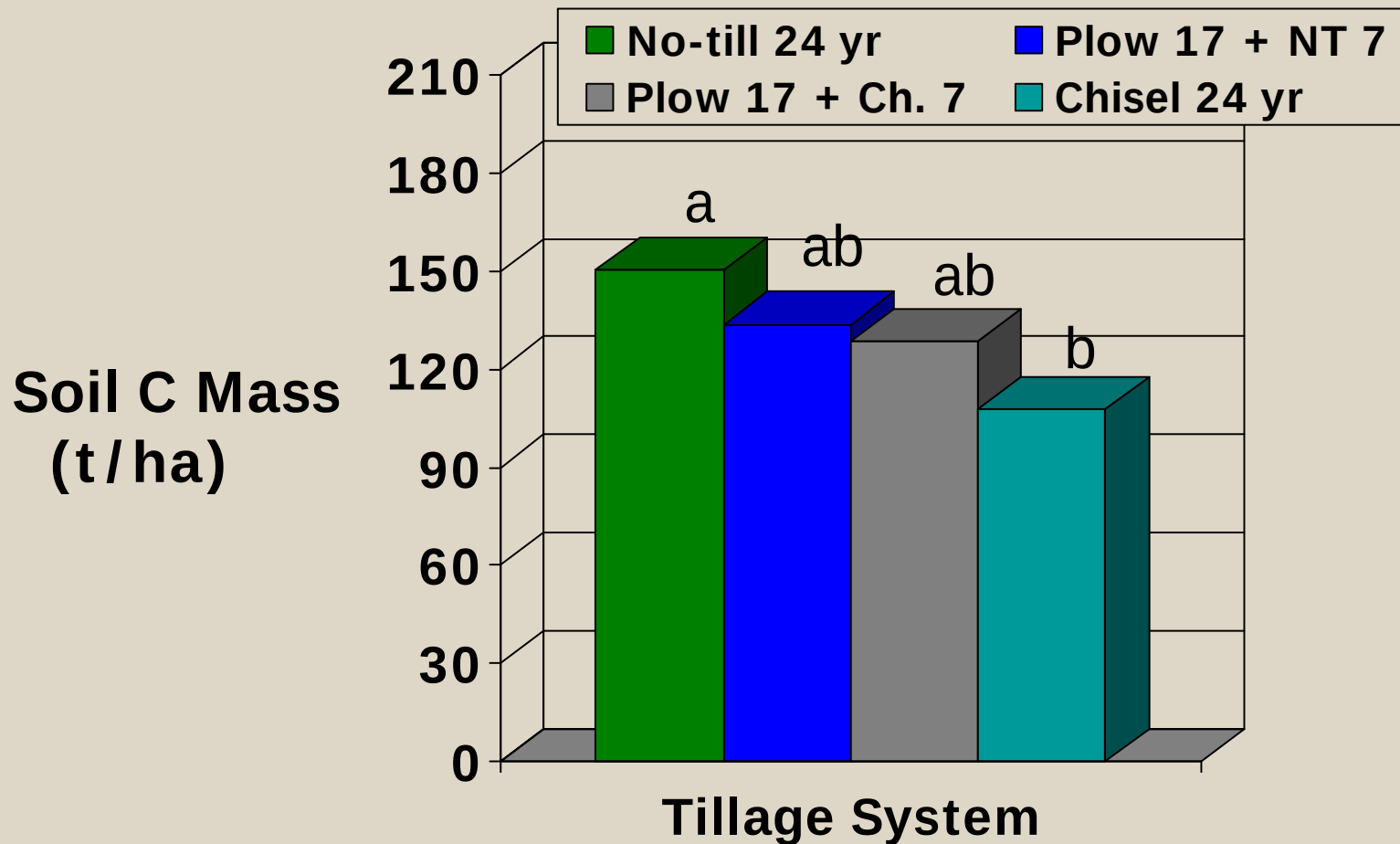
Source: Gál, Vyn et al., 2007, Soil Tillage Research

Long-term Tillage and Rotation Effects on Total Soil Carbon to 40" depth (1975-2003)



Source: Gál, Vyn et al., 2007, Soil Tillage Research

Continuous versus Short-term No-till Influence on Soil Carbon Weight



Source: Omonode, Gál, Stott, Abney & Vyn* 2006, SSSAJ 70:419-425

Strip Tillage for Corn after Corn?



Strip-Till Corn after Corn



**Split the
middle w/o
guidance**

Source: Norm Larson, Elburn Co-op, IL

Questions about Corn Stover Removal



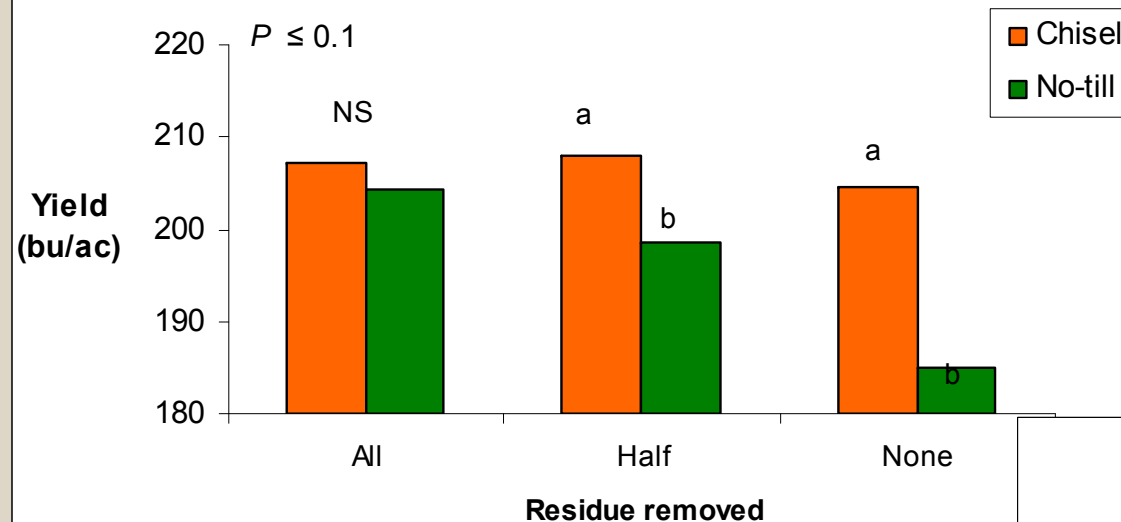
Feasibility for ethanol production?
Effects on soil properties?

Pictures from Dr. Stuart Birrell, Ag and Biological Engineering, Iowa State

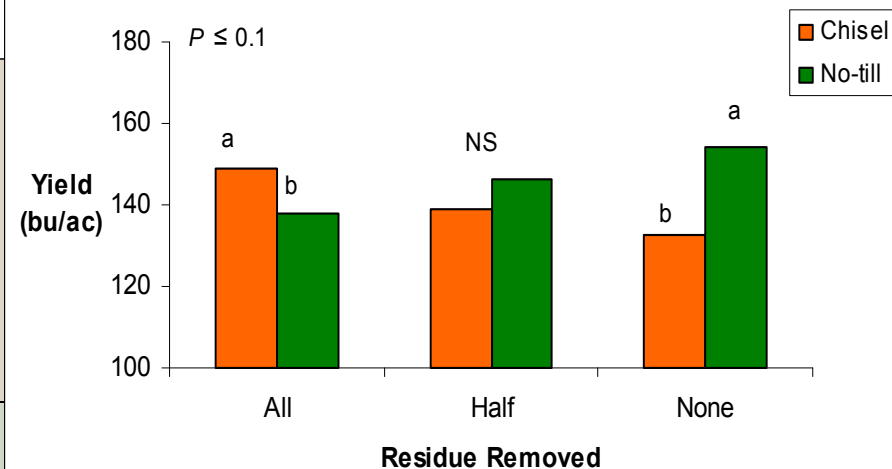
Corn Yield Response to Residue Removal in Corn after Corn

J. Coulter and E. Nafziger, Univ. of Illinois, (2006-2007)

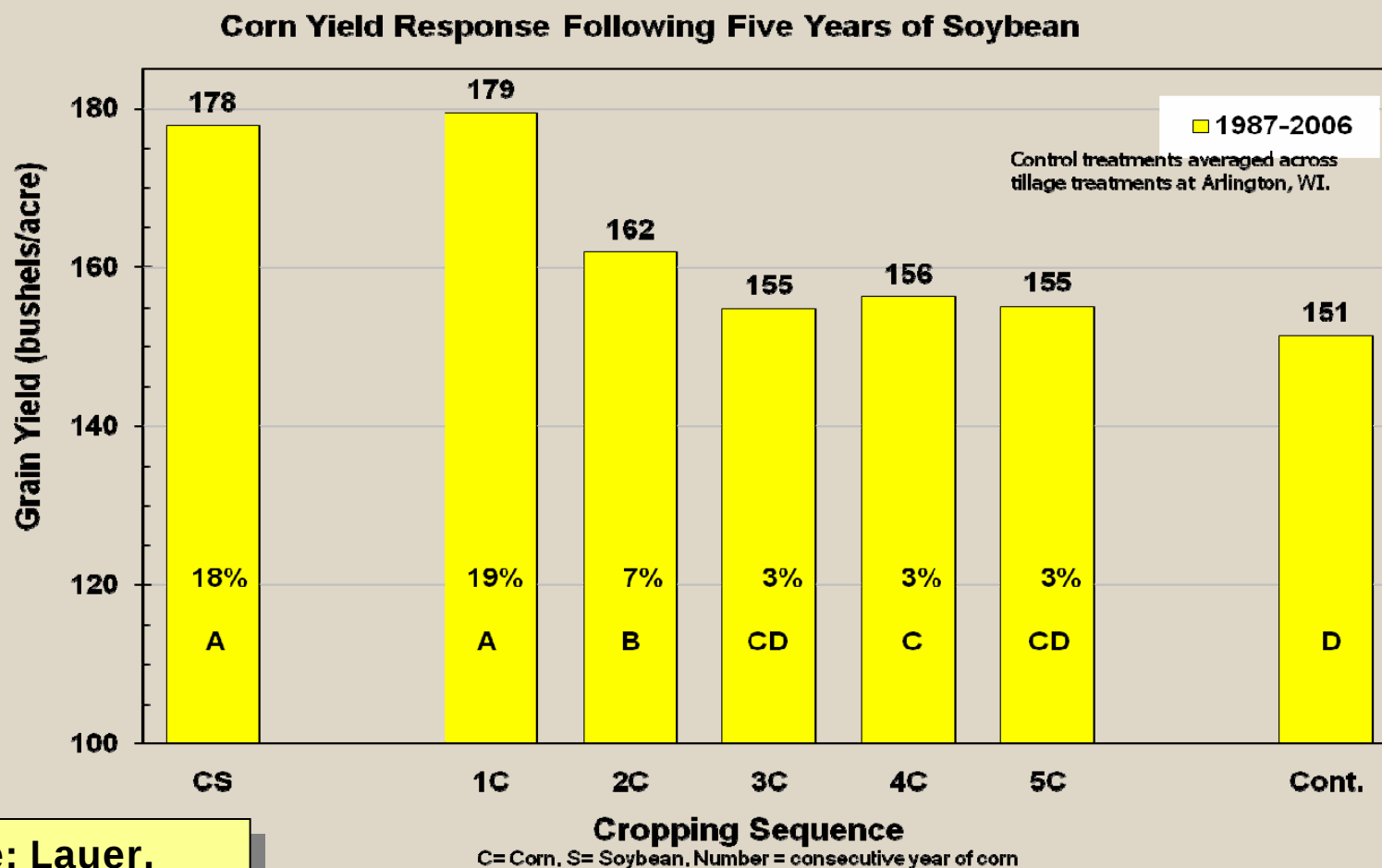
Across 5 Mollisol environments in Illinois



Across 2 Alfisol environments in Illinois

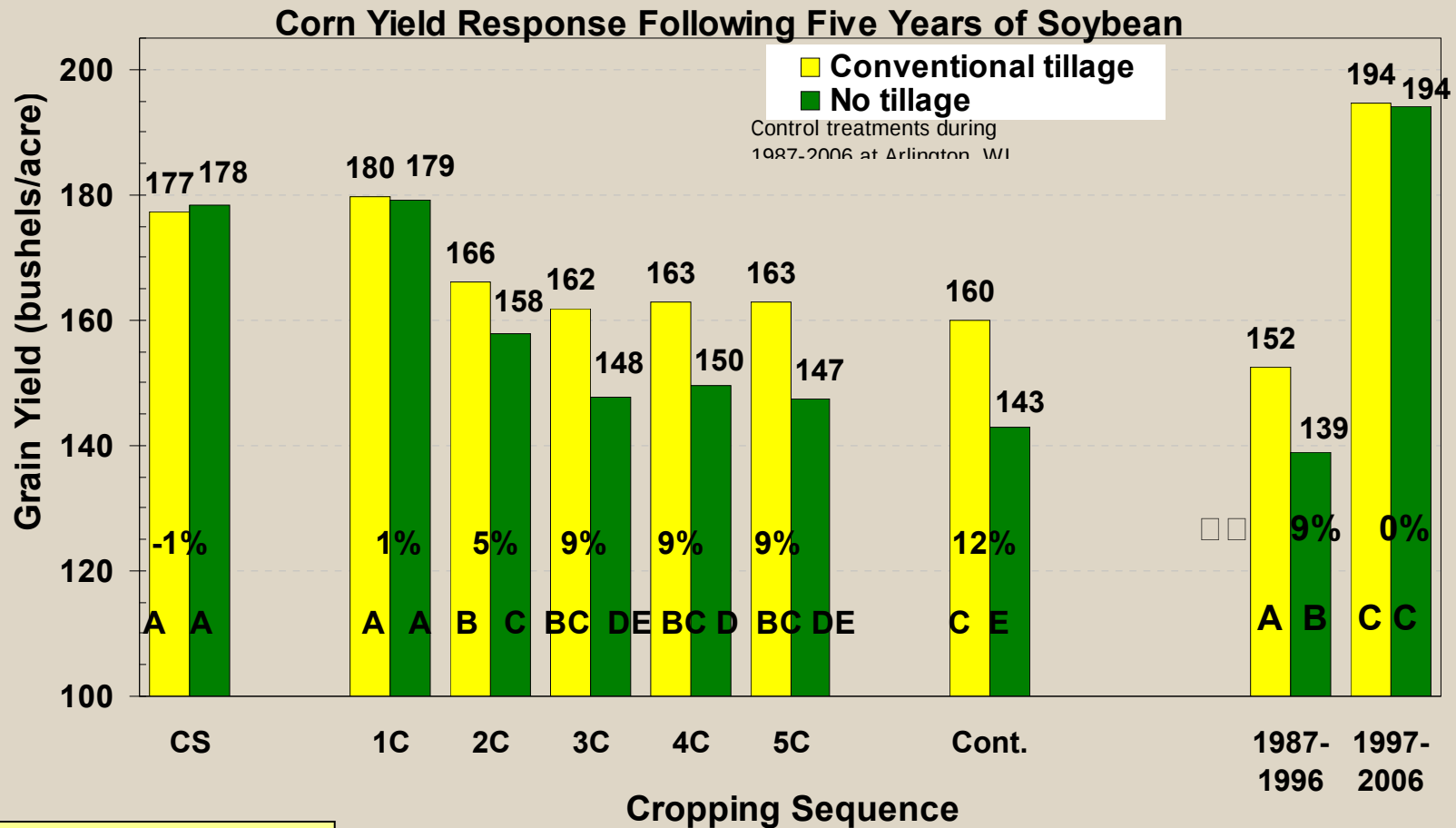


The rotation effect lasts two years increasing corn grain yield 19% for 1C and 7% for 2C ...



Source: Lauer,
unpublished

Corn Yield Response to Tillage After 5 Years of Soybean (Arlington, WI; 1987 to 2006; Control Treatments)



Source: Lauer, unpublished

C= Corn, S= Soybean, Number = consecutive year of corn

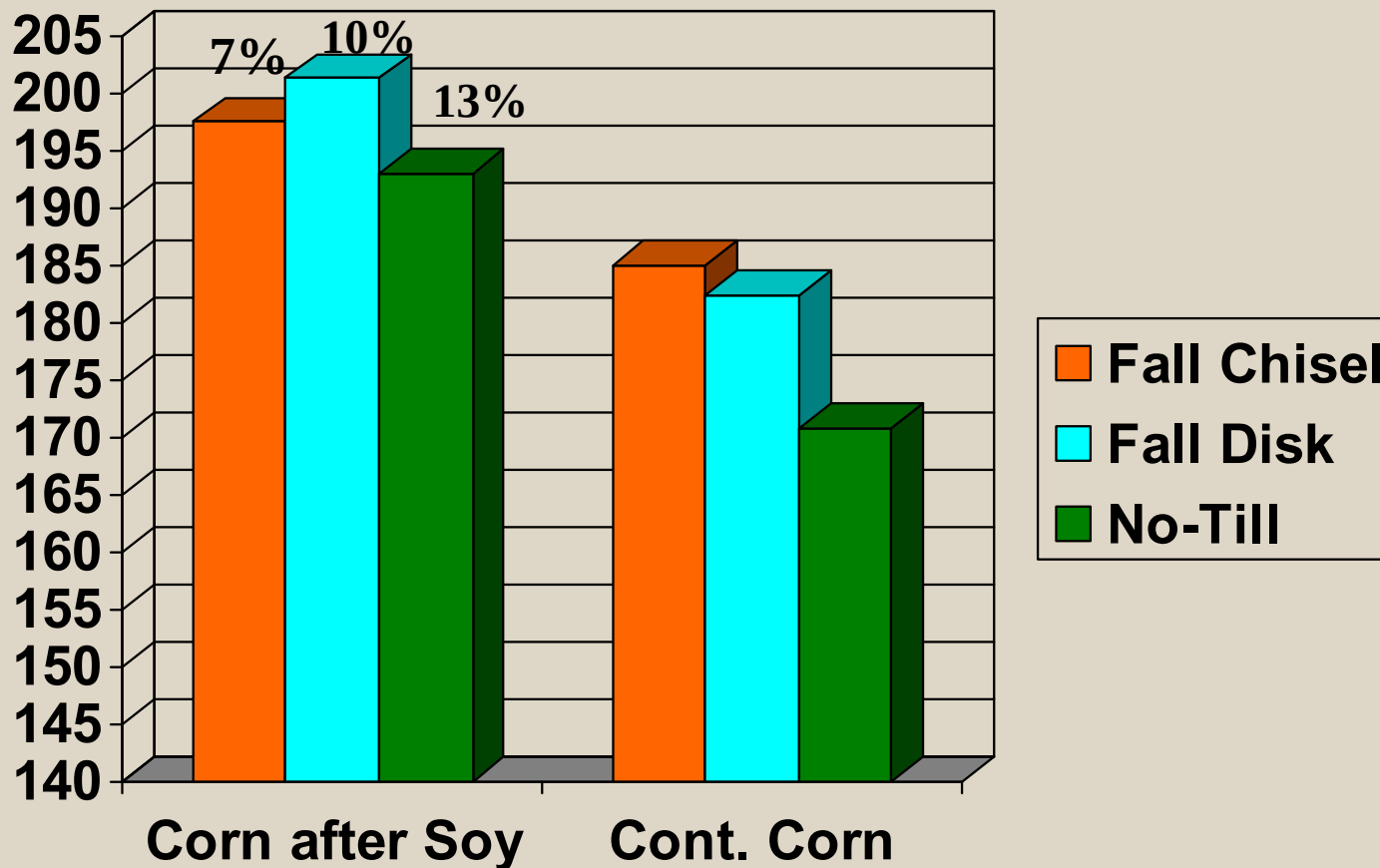
Management Issues Include Automatic Guidance, Fertility, Prior Compaction, and Seed Row Uniformity



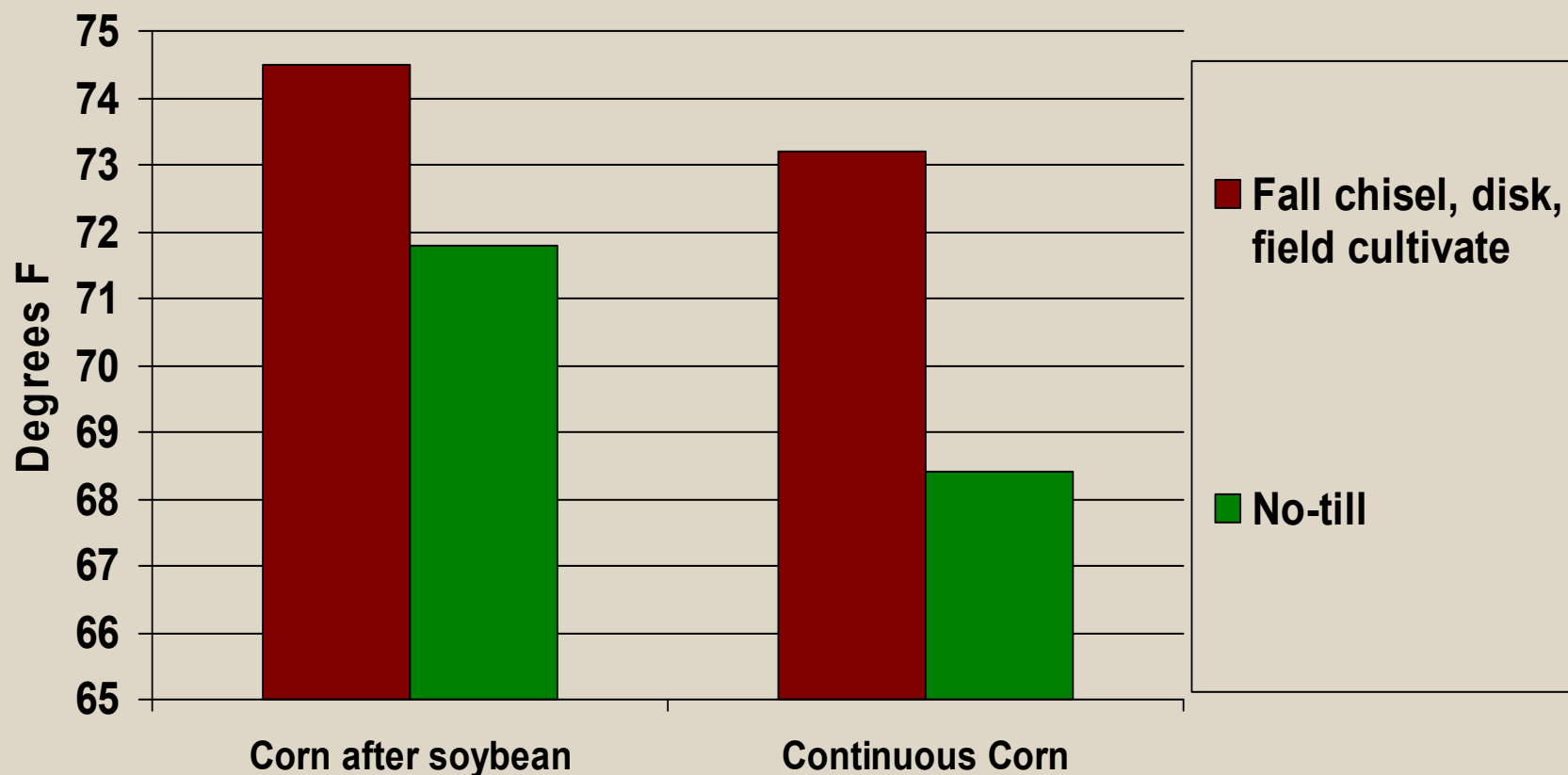
Row Position in No-Till Continuous Corn



Corn Yield Response to Tillage and Rotation, Sebewa Loam soil, Wanatah, IN (1997-2007)



Average Maximum Soil Temperatures in First 4 Weeks after Planting (1997-2002) Wanatah, IN on Loam Soil



What do Average Heights Tell us?



Uniformity More Difficult to Achieve in Corn after Corn



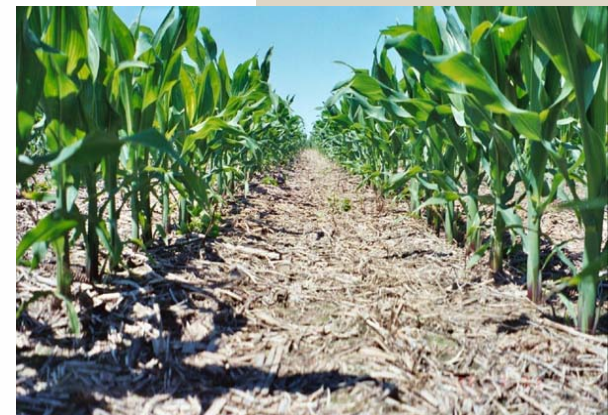
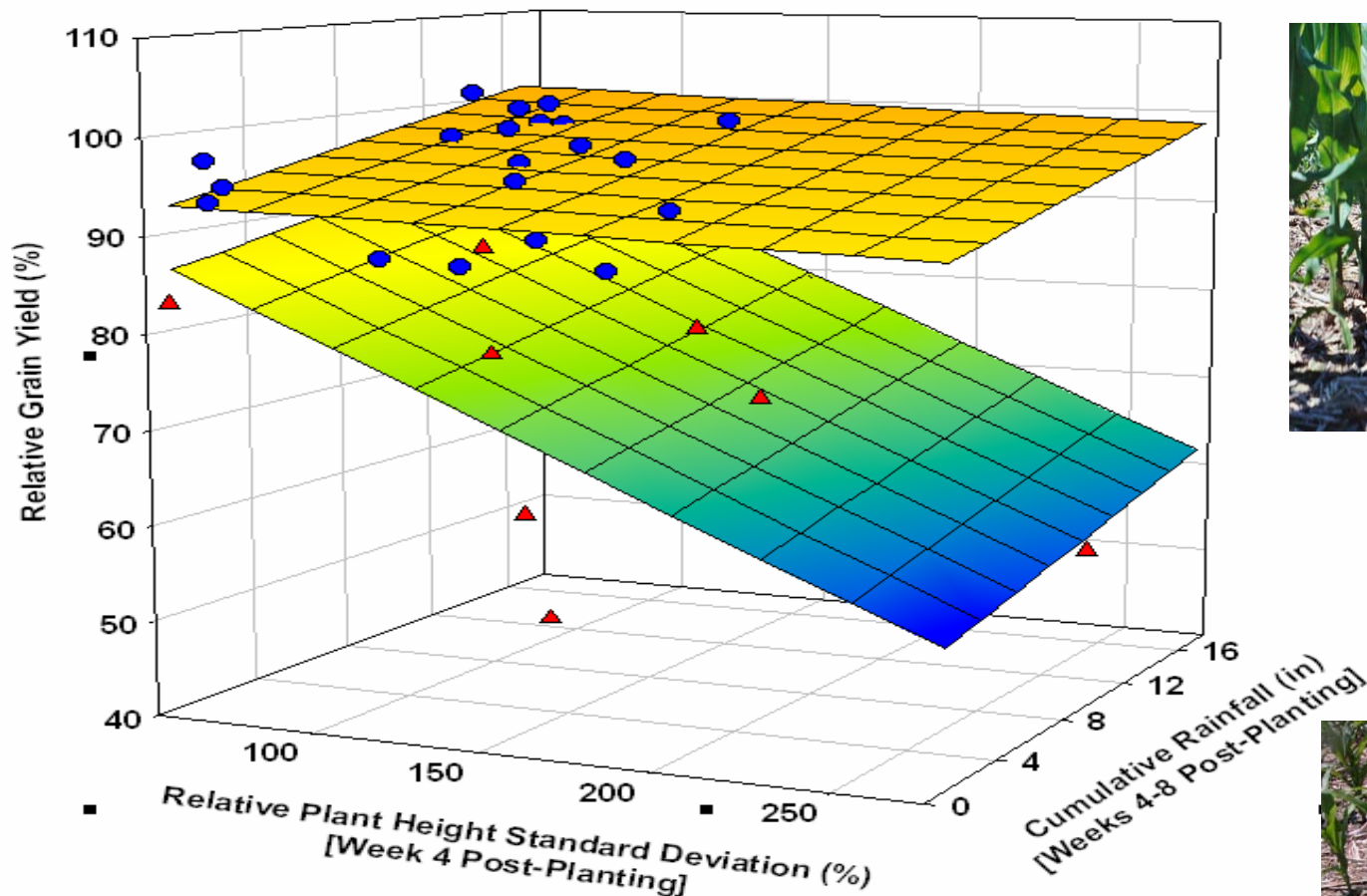
Chisel Plow



No-Till



Grain Yield Response of No-till Continuous Corn vs. Plow + No-till Rotation Corn (1980-1994)



Boomsma and Vyn, 2007 (Purdue AY 329-W)

Tony's Top Five for Conservation-till Corn after Corn

- 1. Be realistic about costs before switching to 2nd - year Corn or Continuous Corn. Rotation advantage very tillage & soil dependent, and may decline with time in corn-soybean rotations.**
- 2. Pick your best drained and most productive fields.**
- 3. Consider strip tillage as an alternative to no-till or conventional tillage.**
- 4. Optimize conservation-till corn performance with superior management (e.g. hybrids, fertilizer rate and placement, pest control).**
- 5. Aim for plant-to-plant uniformity in the row.**

Acknowledgments

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John Deere Cropping Systems Unit

Case-DMI (Goodfield, IL)

Remlinger (Kalida, OH)

Seed:

Pioneer Hi-Bred, Int.

Beck's Hybrids

Thanks!

tvyn@purdue.edu

home page:

[//www.agry.purdue.edu/staffbio/vyn](http://www.agry.purdue.edu/staffbio/vyn)

