Strip-Till Corn Production Systems: The Known and the Unknown

Tony J. Vyn & Graduate Students, Colleagues & Farmers

Successful Strip Tillage after Soybean and Reasonable Soil Moisture Conditions

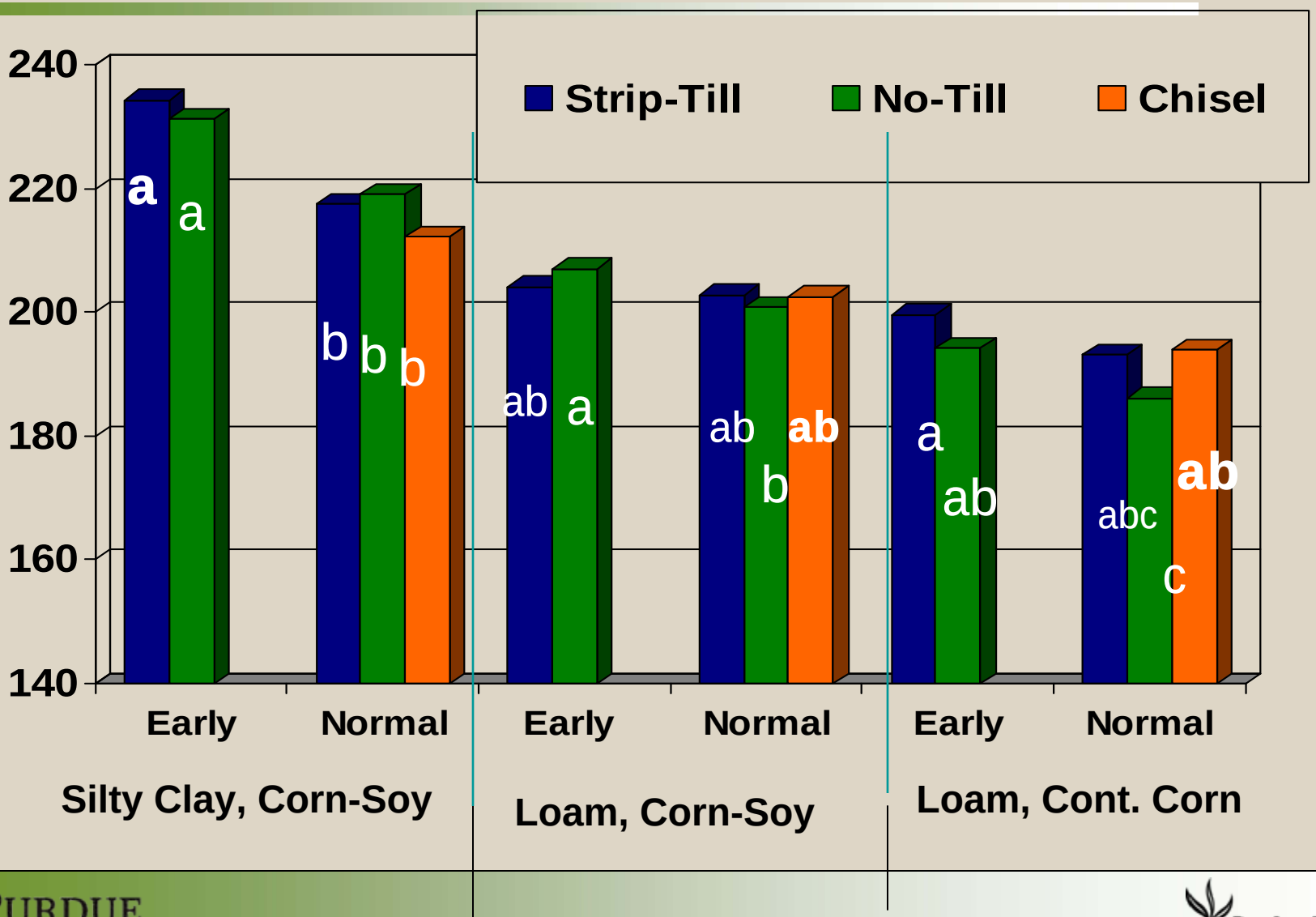
Source: Norm Larson, Elburn Co-op, IL

Fall Strip Tillage

Berms after Soybean Harvest

Berm Heights in Spring after Successful Strip Tillage

Corn Yield Response to Tillage and Planting Date in Indiana, 2003-04

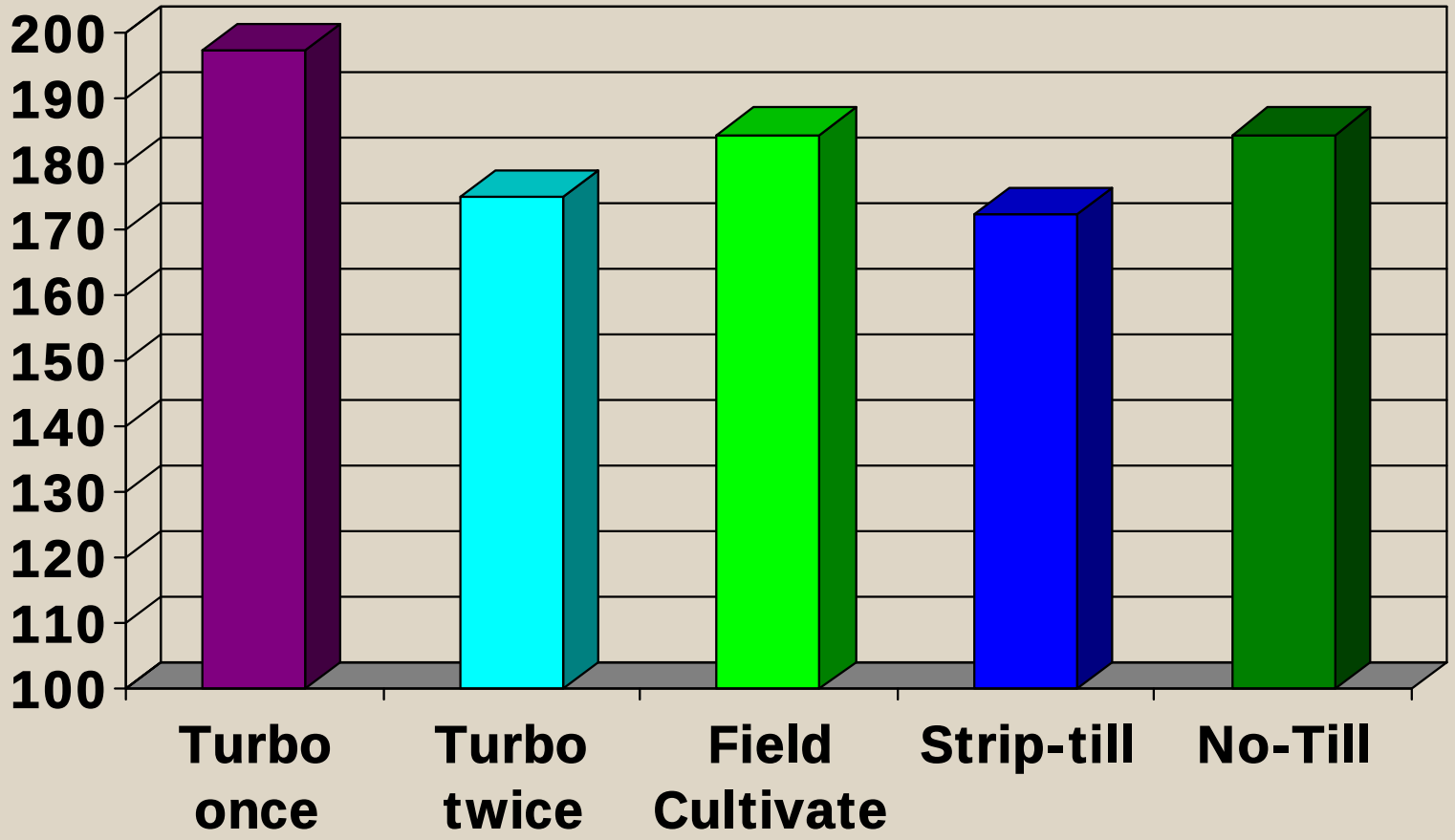


Spring Strip-till Berms

Other Spring Tillage Options?

Spring Strip-Till vs. Turbo-Till® or FC

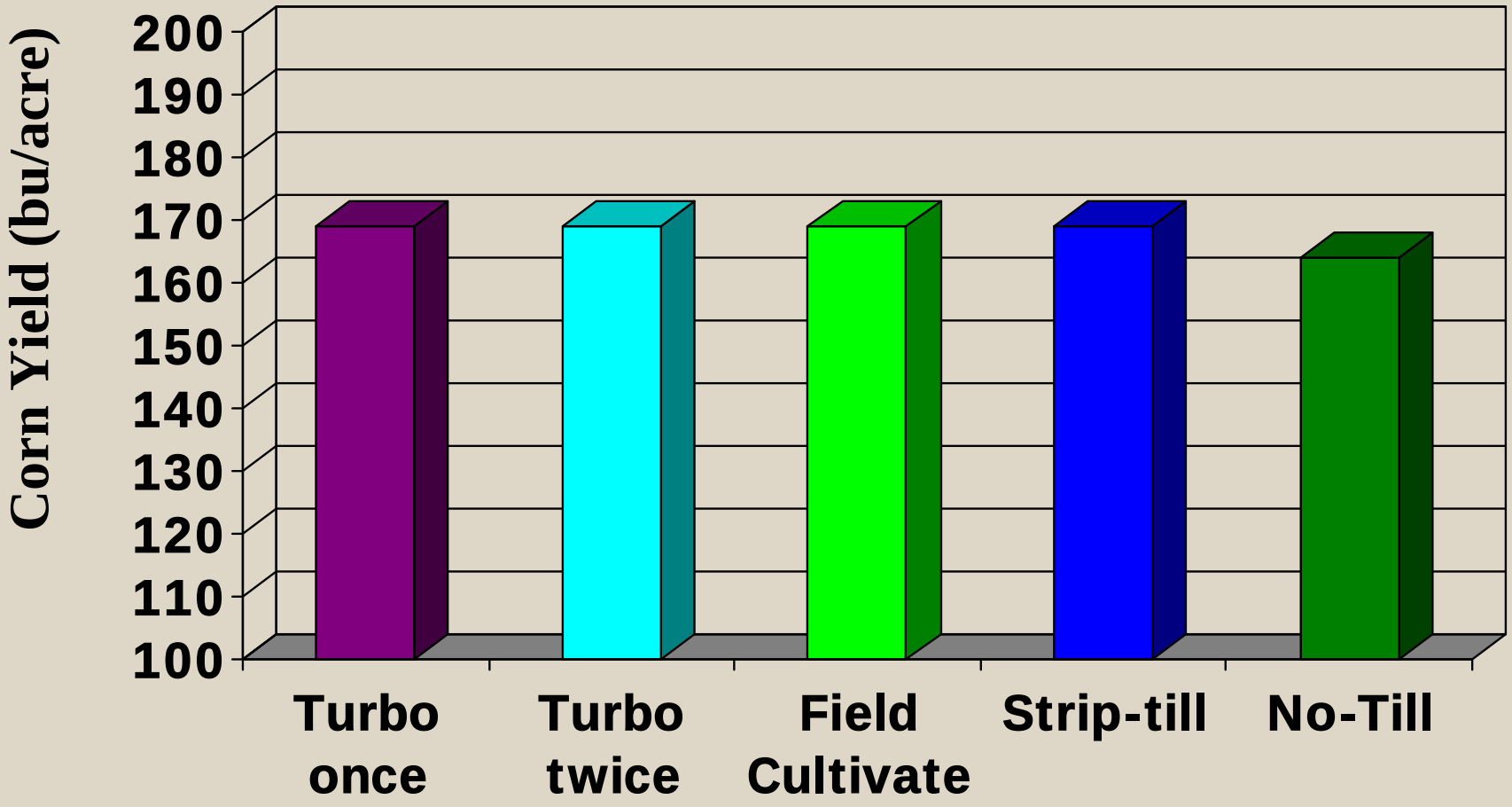
North-East Purdue Ag Center, Columbia City (2004)



Courtesy: Phil Walker and Allen County SWCD

Fall Strip-Till vs. Turbo-Till® or FC

North-East Purdue Ag Center, Columbia City (2005-2006)



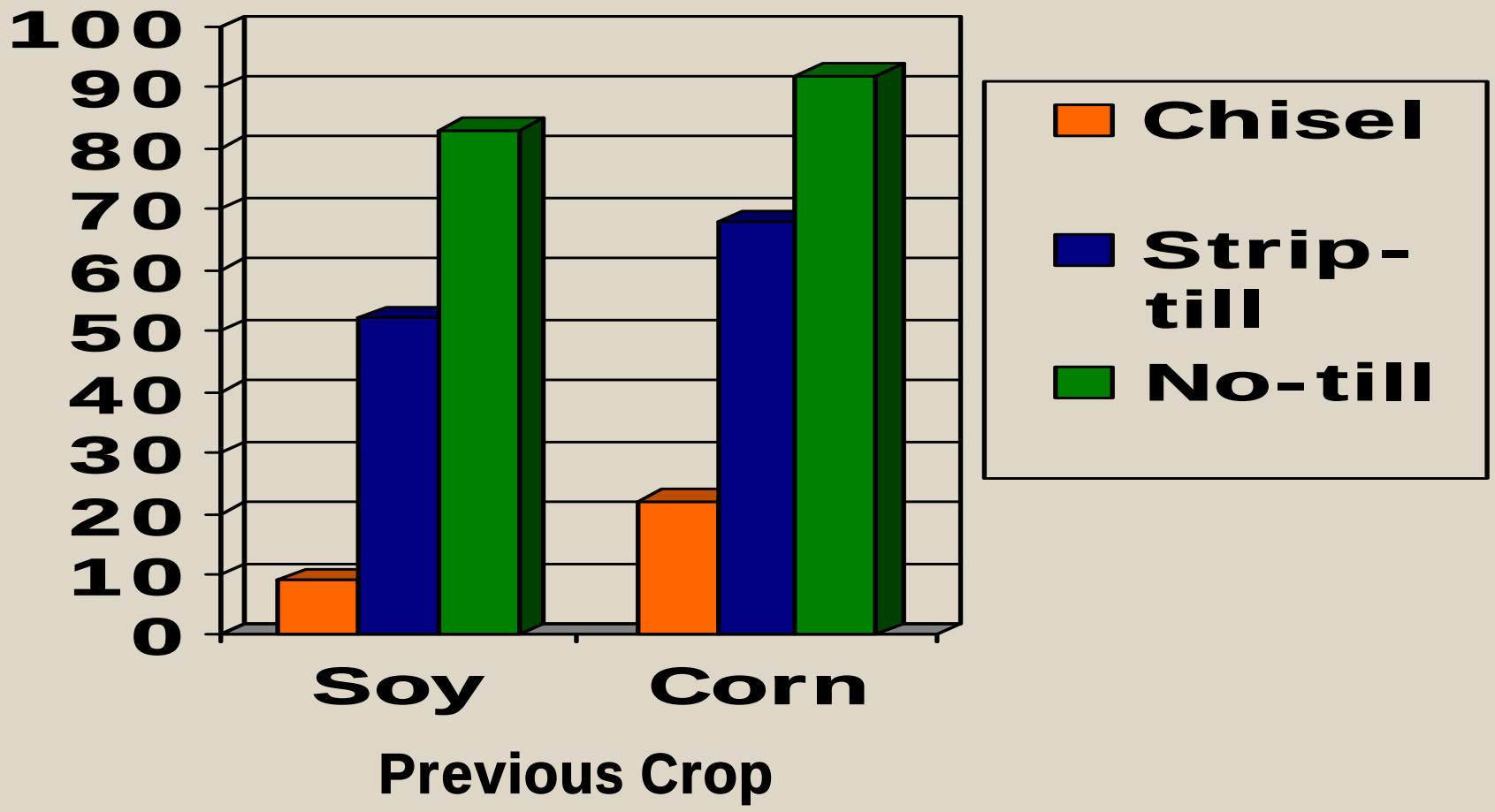
Strip Tillage for Corn after Corn?

Strip-Till Corn after Corn

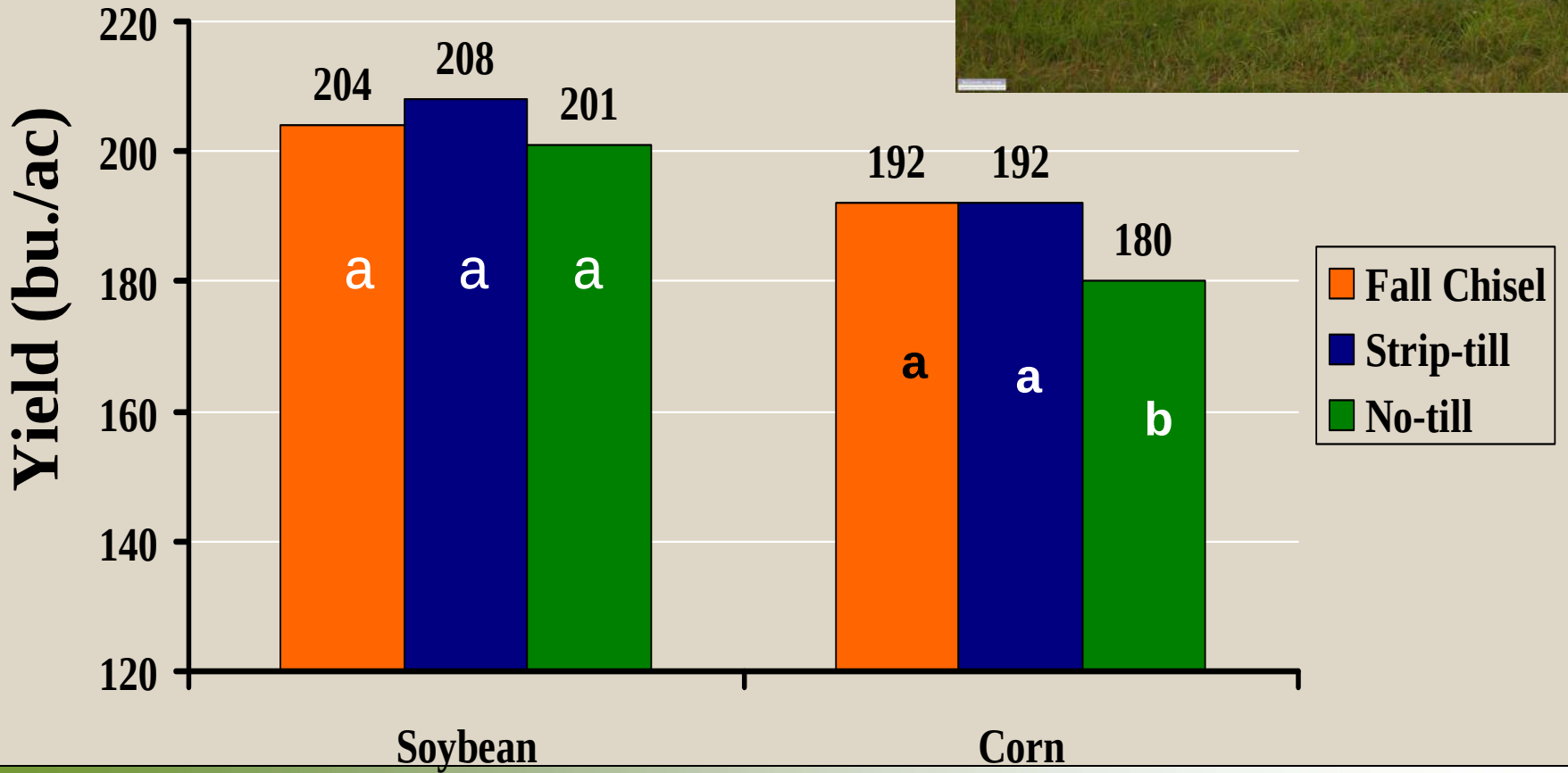
Split the middle w/o guidance

Source: Norm Larson, Elburn Co-op, IL

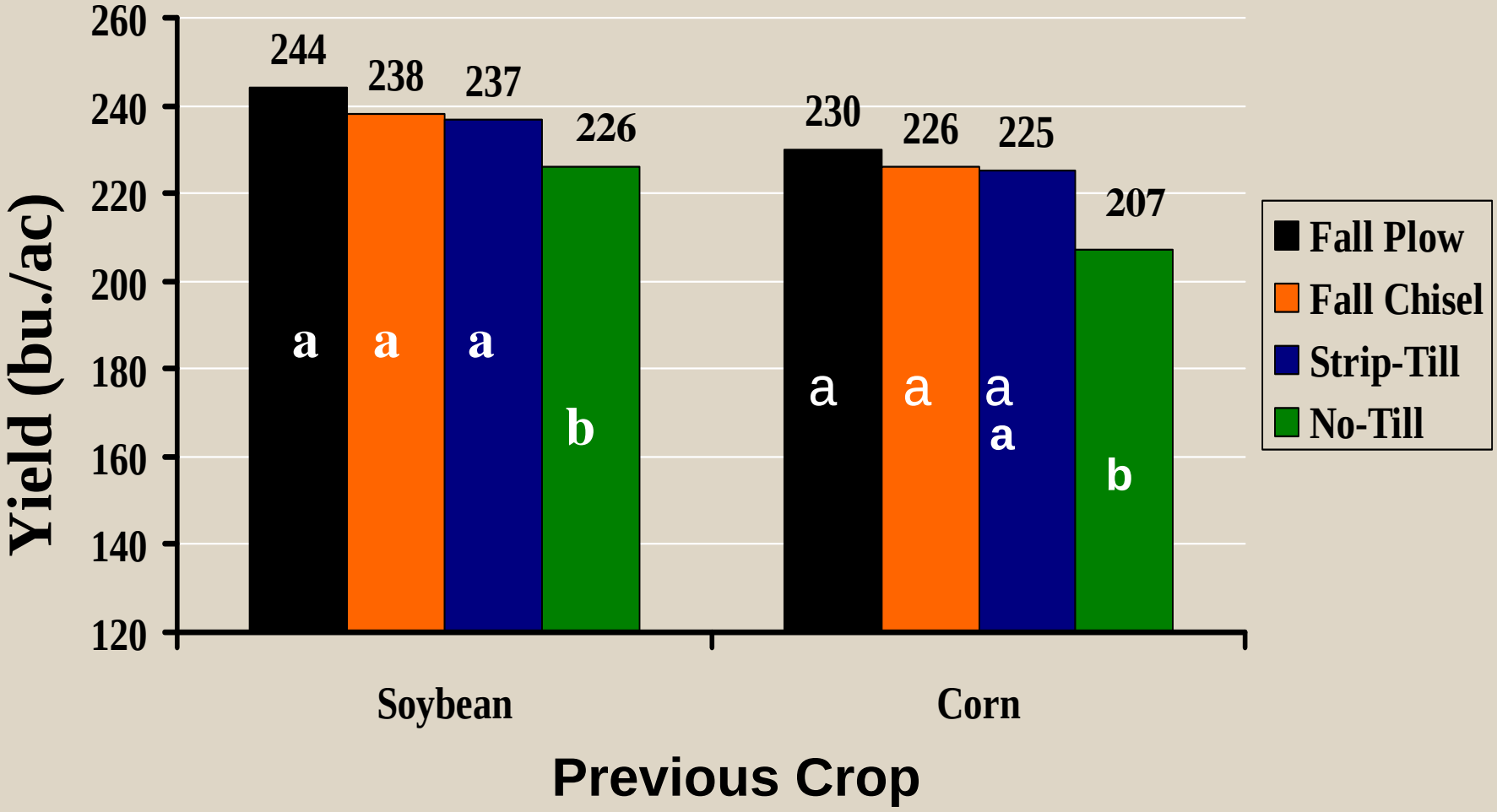
Surface Residue Cover (%) after Planting
Loam Soil, Wanatah, IN, 2001-2005



Strip Tillage for Corn after Soybean and Corn in N. Indiana, Loam Soil (2001-07)



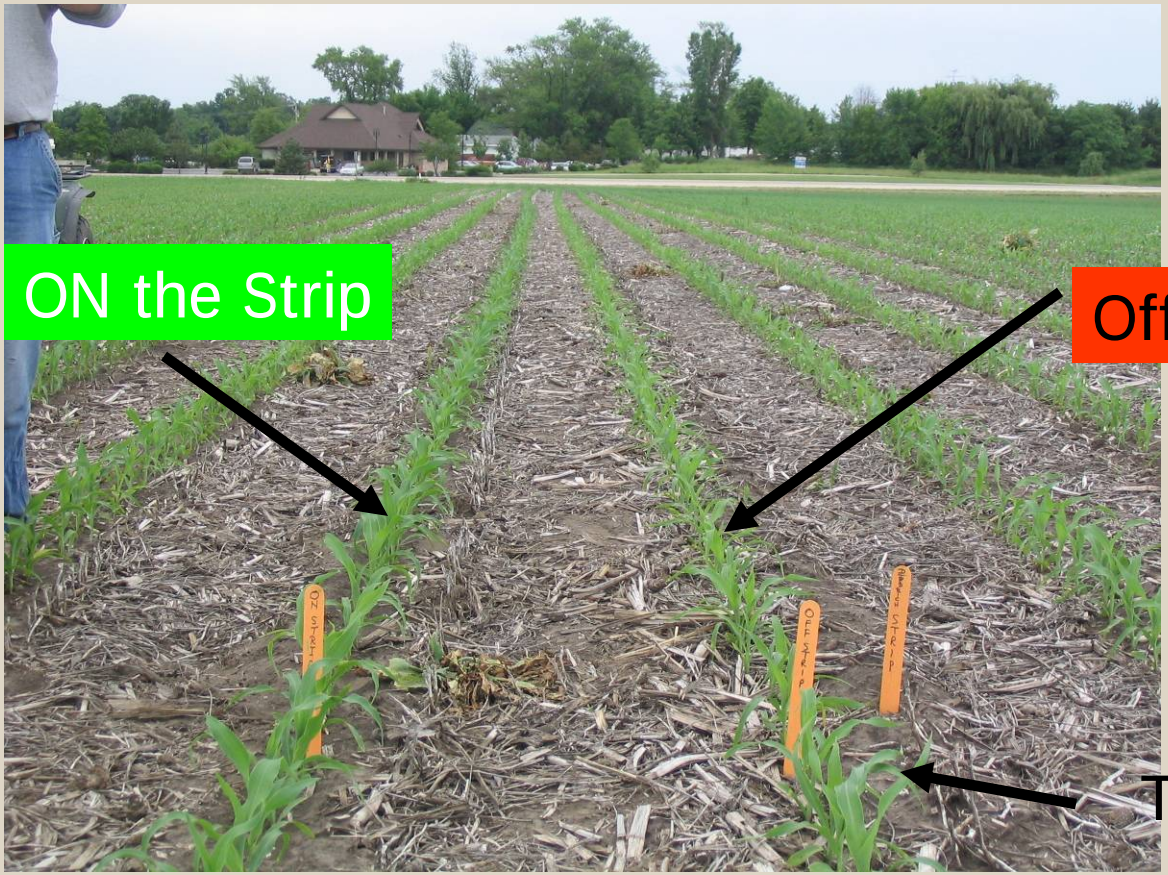
Tillage Effects on Corn Yields after Soybean and Corn in N. Indiana, Loam Soil (2007)



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

Precision of Planting Following Strip Tillage ?

Row Position is Critical



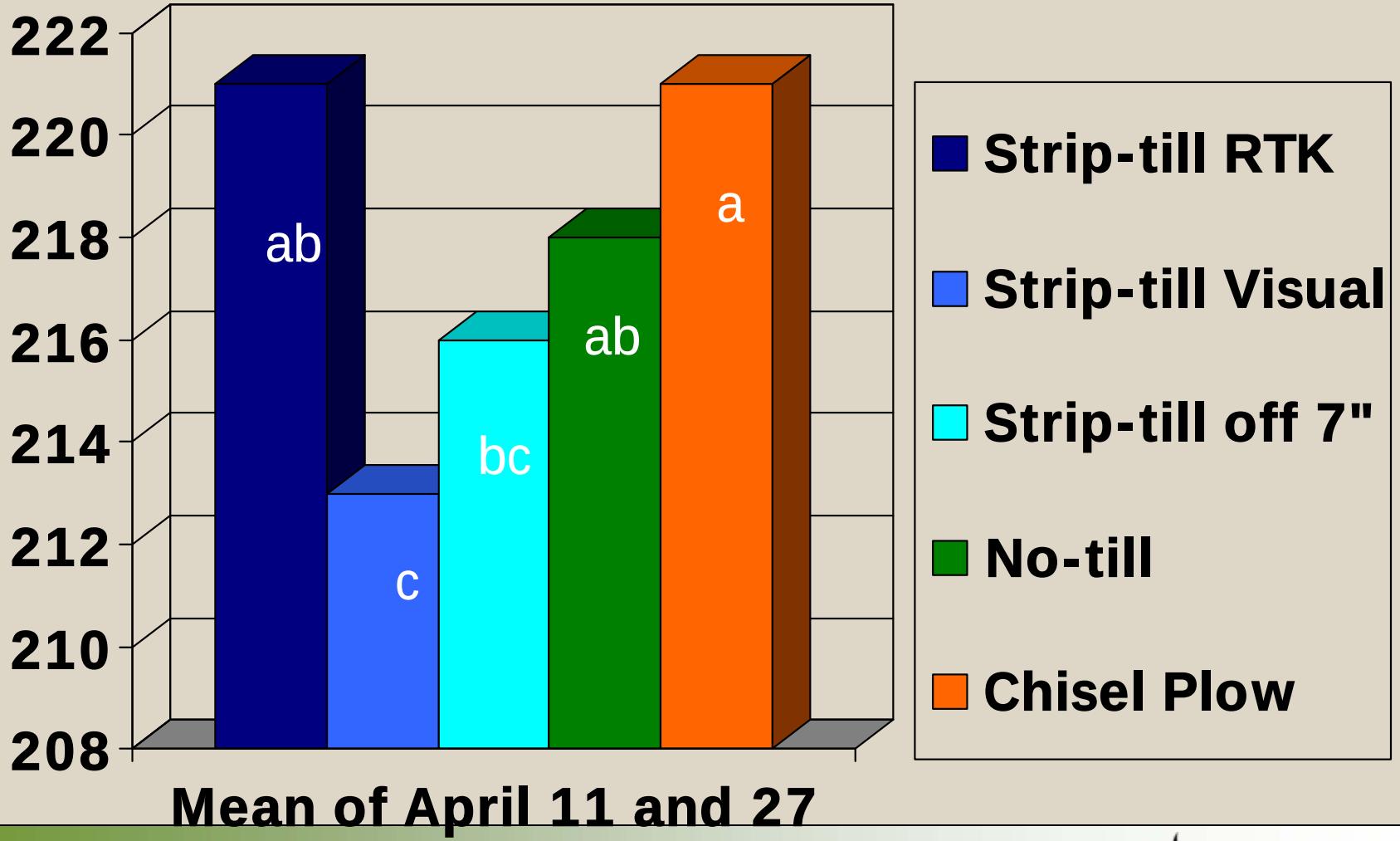
Source: Norm Larson, Elburn Co-op, IL

RTK Planting after Strip-Till

(West Lafayette, 2006)

RTK Plot Harvest 2006

Average Corn Yield Response to RTK Precision at West Lafayette, IN, 2006



Strip Tillage with Fertilizer Banding

ARLINGTON, WI STRIP-TILLAGE PROJECT

- **Tillage/rotation study since 1997**
  - **Plano silt loam soil**
  - **Strip-till added in 2000**
  - **Cont. corn, Soybean/corn, Corn/soybean**
  - **PK fertilizer: None, broadcast, deep, and row-placed at crop removal rate**
  - **Summarize 2001 – 2004, strip-till only**

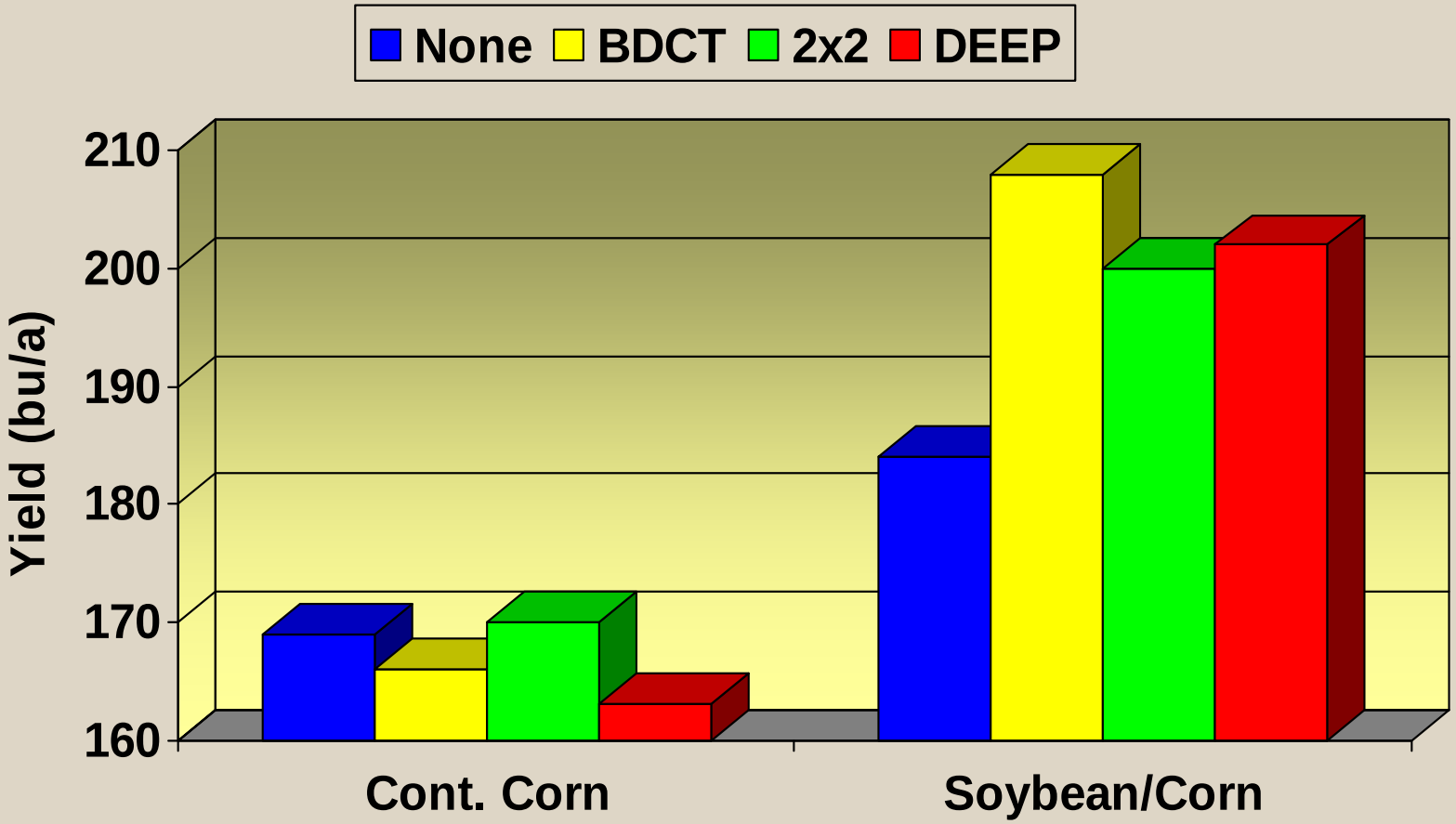
ARLINGTON SOIL TEST

Year	pH		Soil test P (ppm)		Soil test K (ppm)	
	None	Bdct.	None	Bdct.	None	Bdct.
2001	6.7	6.7	41	51	99	110
2005	6.7	6.6	38	56	91	120

Source: D. Wolkowski, University of Wisconsin, 2007

CORN GRAIN YIELD AS AFFECTED BY FERTILIZER PLACEMENT IN STRIP-TILL

Four Year Avg. (2001 - 2004)



Source: D. Wolkowski, University of Wisconsin, 2007

Strip Tillage with Nutrient Banding in Small-plot Research (West Lafayette, IN)

Note: P_2O_5 rate = 88 pounds/acre, and K_2O rate = 115 pounds/acre

All plots received a uniform 2 x 2” starter of 14 – 28 – 14 (N,P,K), plus a total N rate of 250 pounds/acre.

High Yield Corn Response to Placement

Sponsor: PPI-FAR 2001-2003

Hybrids: 1. Pioneer 34B24
2. Pioneer 34M95

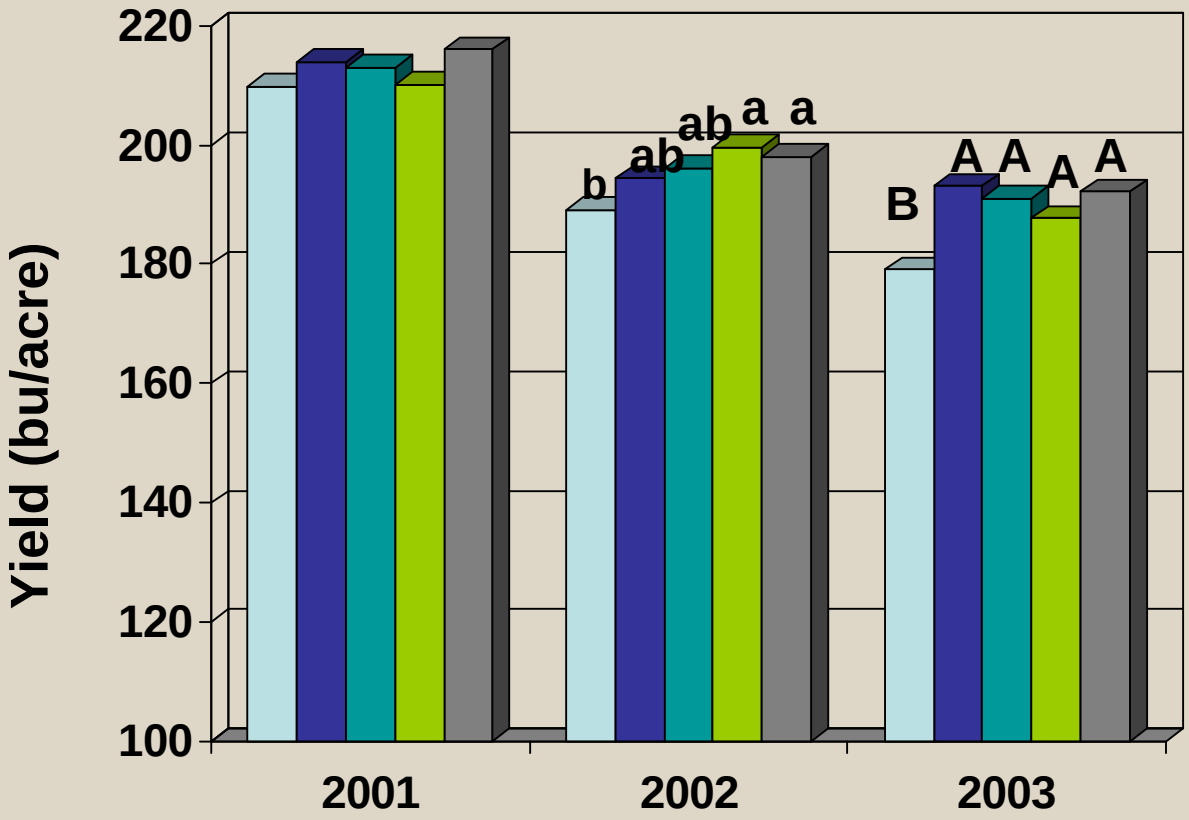
Population/ Acre: 1. 32,000
2. 42,000

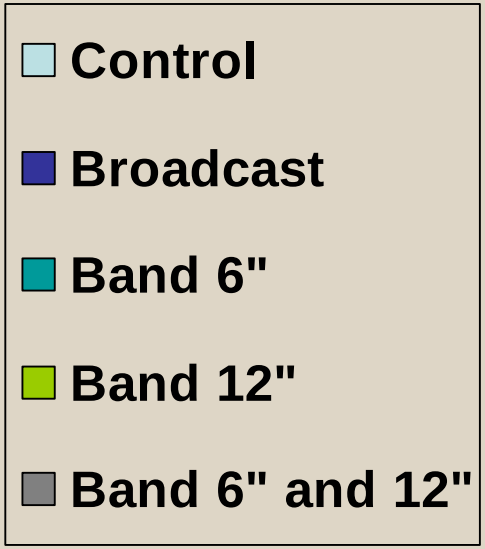
P&K Fertilizer Placements:

1. Control
2. Broadcast
3. Shallow Band (6”)
4. Deep Band (12”)
5. Shallow + Deep (6” and 12”)

Note: P_2O_5 rate was 88 pounds/acre, and K_2O rate was 115 pounds/acre
All plots received a uniform 2 x 2” starter of 14 – 28 – 14 (N,P,K).

Corn Yield Response to Fertility Placement, West Lafayette, IN, (2001-2003).





"CONTROL"			
Soil-test P (0-4"):	15	25	30
(4-8"):	15	15	21
Soil-test K (0-4"):	94	143	161
(4-8"):	107	101	110

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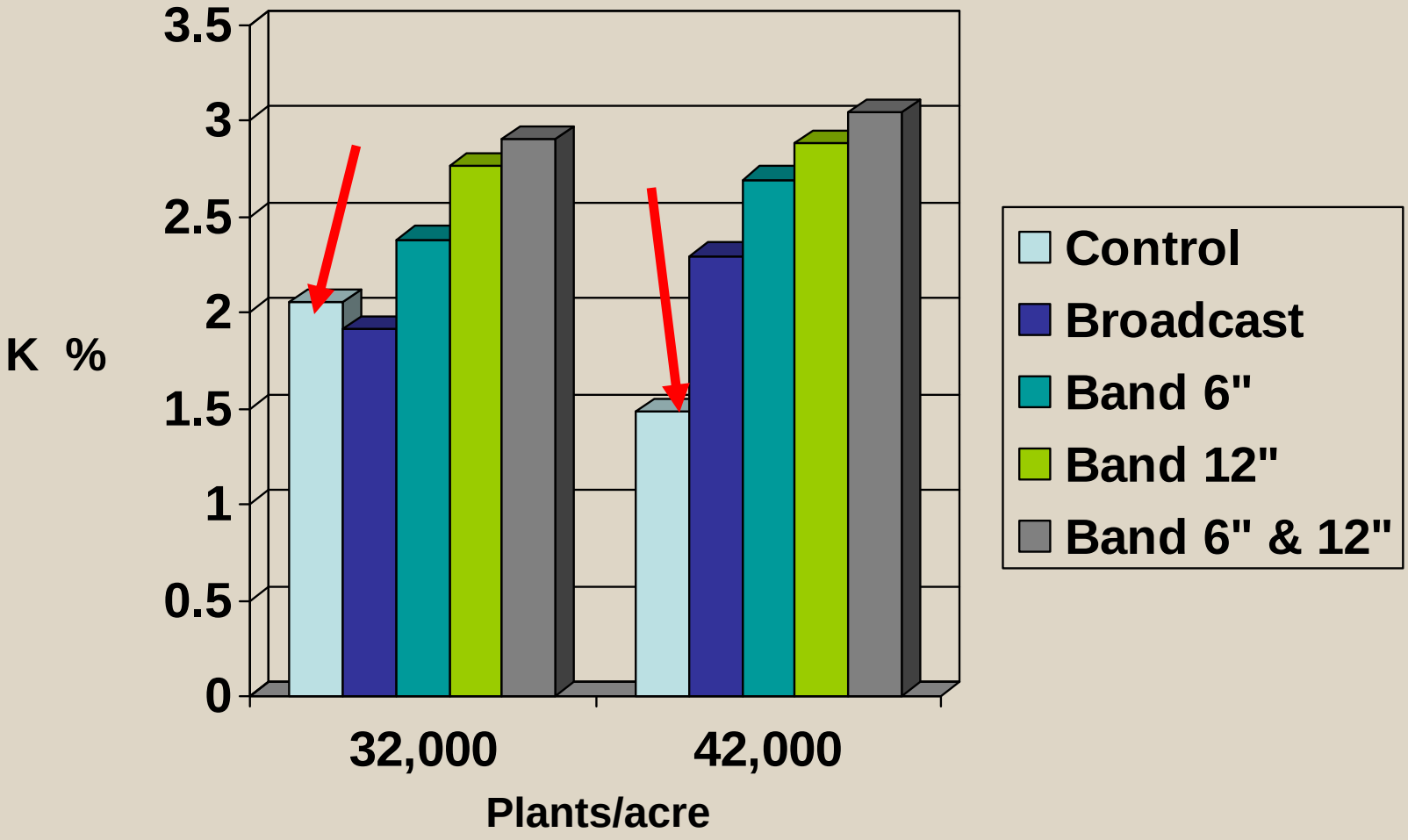
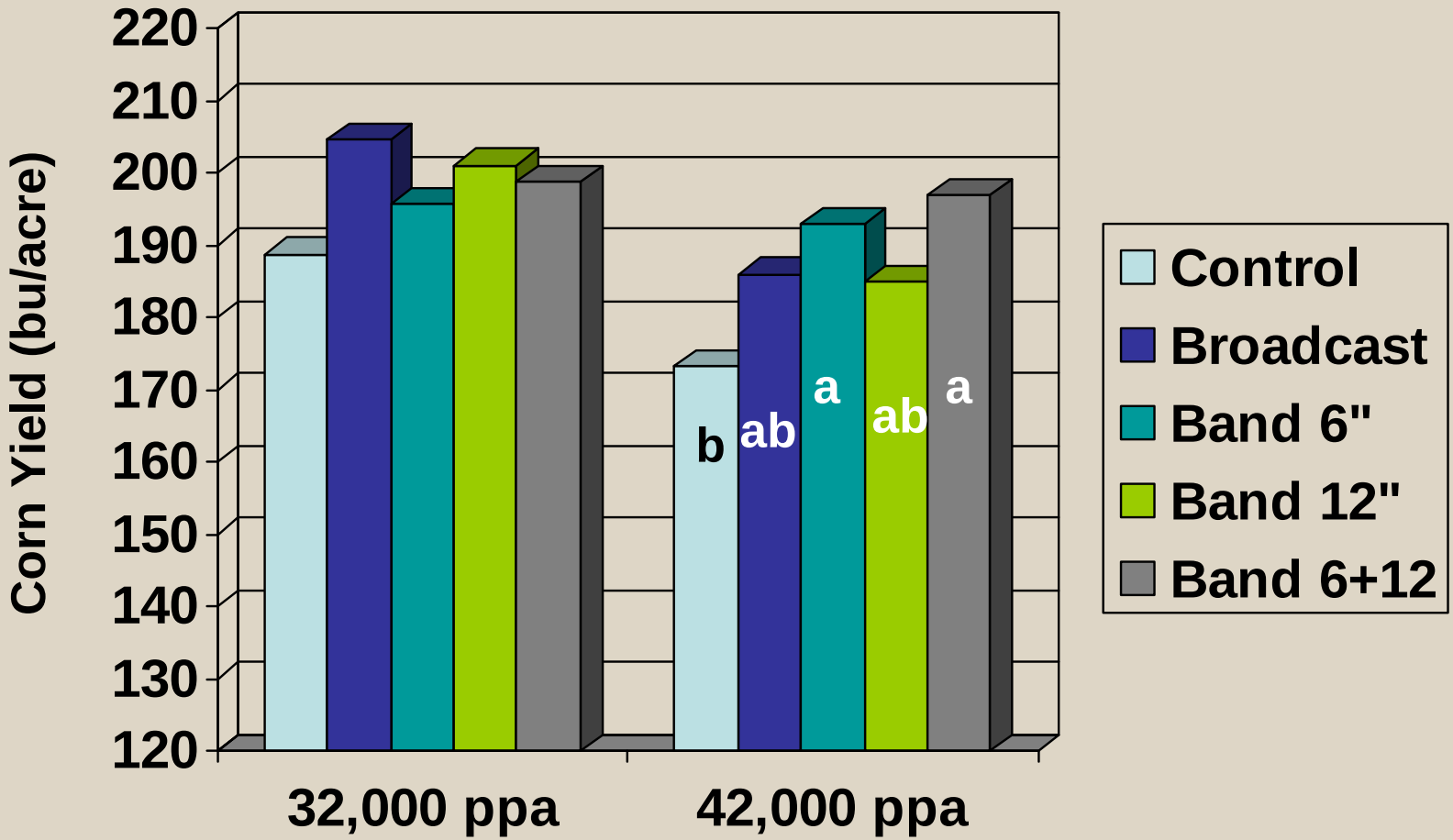
Placement Effects of P plus K on Leaf K % for Pion. 34M95 in 2003



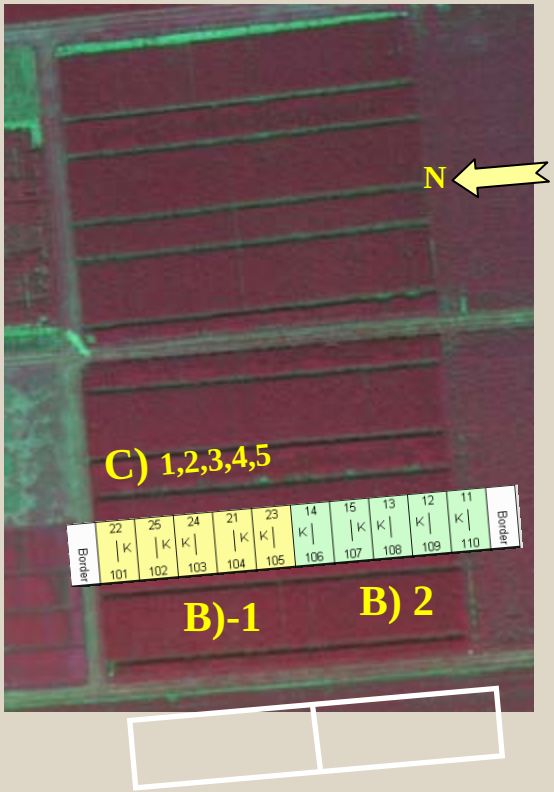
Corn Yield Response of Pion. 34M95 to Alternate P plus K Placements in 2003



Corn Response to Deep Banding at 6” Depth

2005 – 2006 Experimental design

Field 54-55 July 7, 2006



Split-split Plot Design

A) Block -2005: 5 - 2006: 6

B) Hybrid
1_ Pioneer 31N28 (119 CRM)
2_ Pioneer 31G68 (118 CRM)

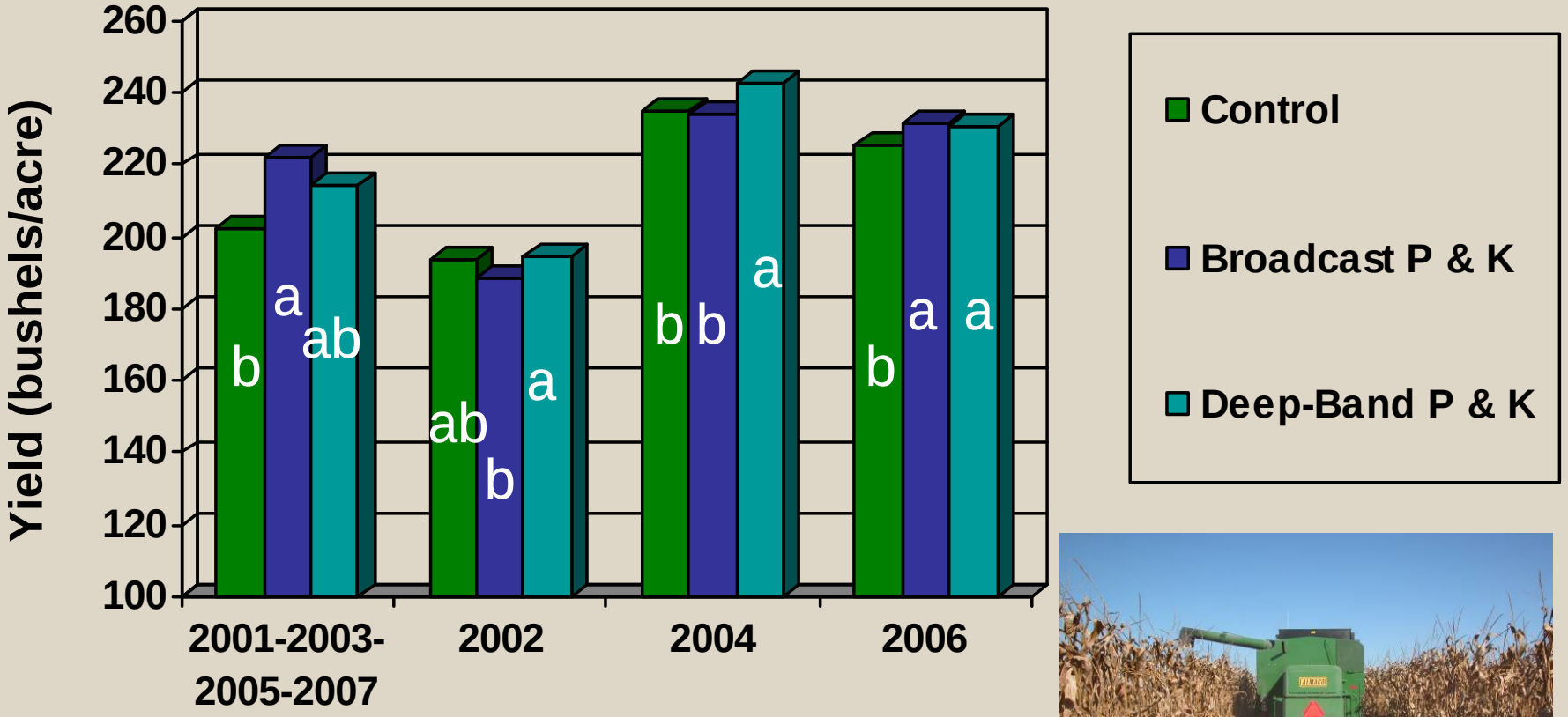
C) Fertility Placement
1_ Check
2_ Broadcast P+K
3_ Banded P+K
4_ Banded P
5_ Banded K
(applied in the previous fall)

Residual Effects of Fertilizer P and K Placement in Corn on Subsequent No-till Soybean (2002-2006)

Planting 5/10/04

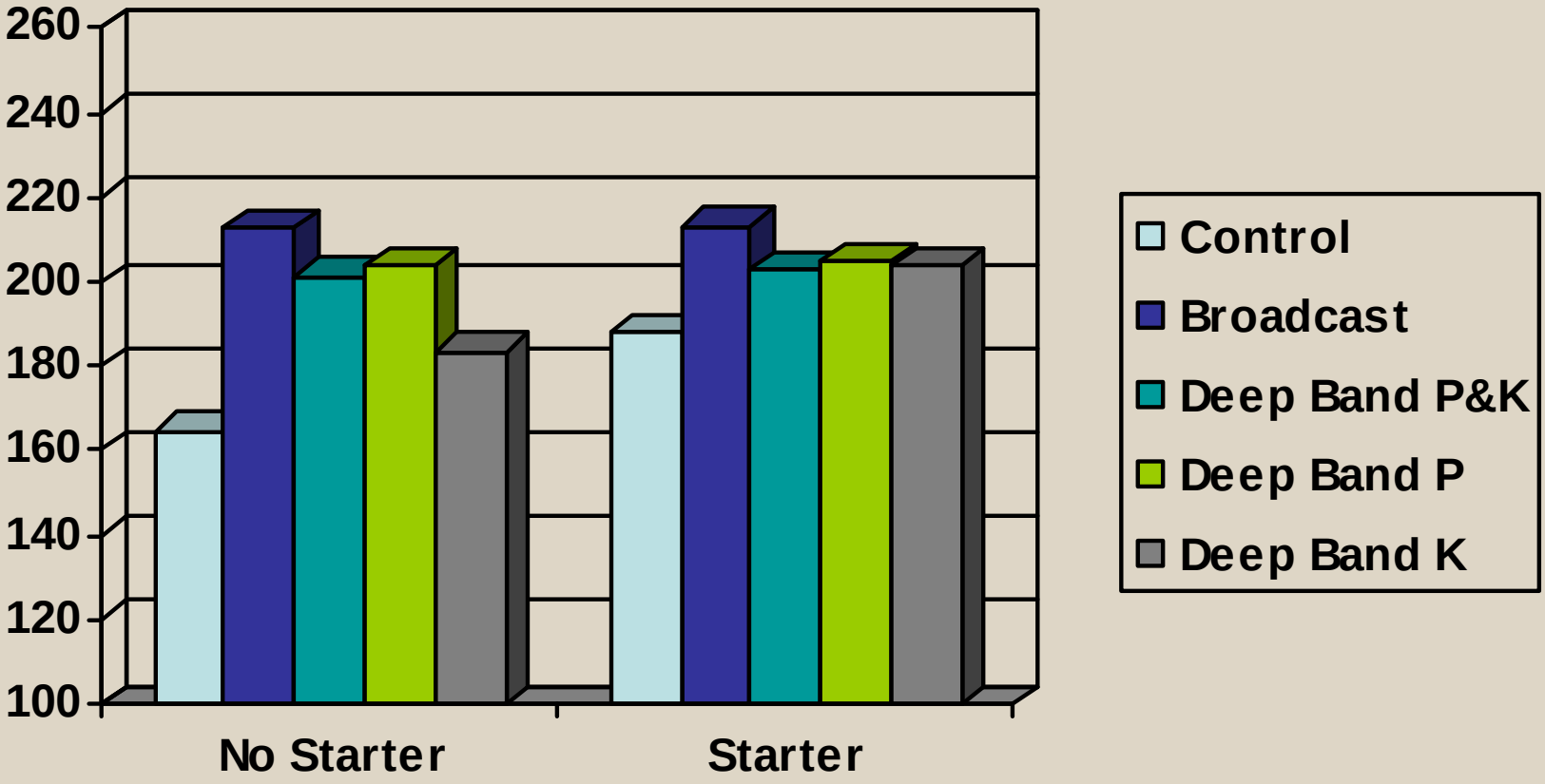
Soil sampling (June/04)

Six inch Band P and K Placement Effects on Strip-till Corn Yield (mean of 2 hybrids, 2001-2006)



		2001-2003-2005-2007	2002	2004	2006
Soil-test P	(0-4”):	22		104	
	(4-8”):	21		94	
Soil-test K	(0-4”):	186		164	
	(4-8”):	94		125	

Starter Fertilizer* Influence on Corn Response to Deep Banding (2007)

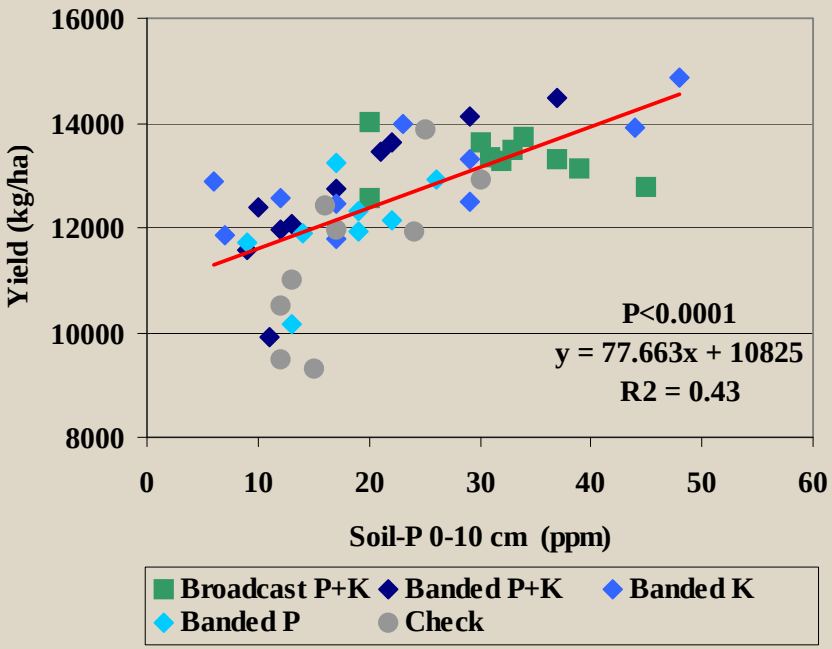


* Starter was 10-34-0

Corn grain yield relationships, within fertility treatments, to soil-test P or K at the plot level.

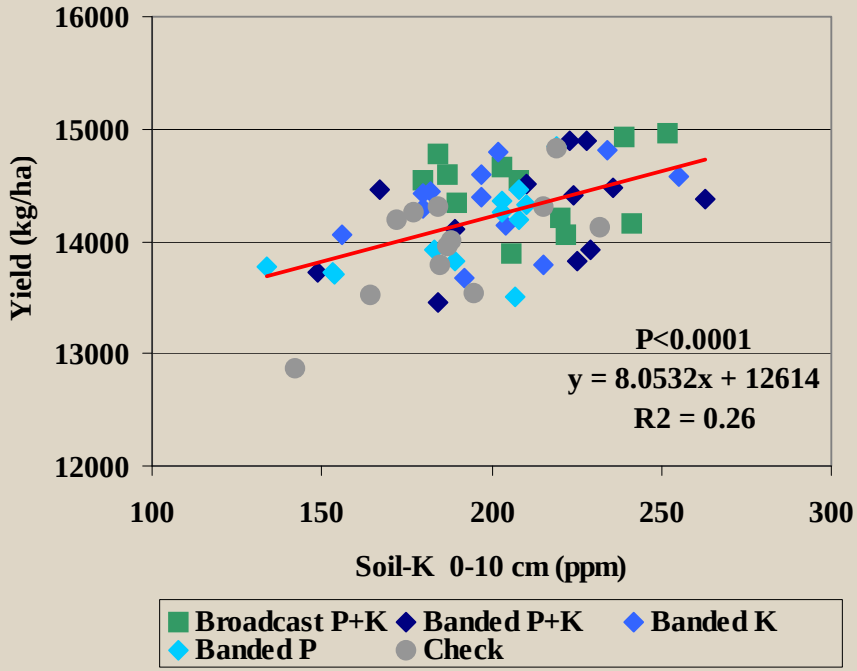
Medium P

*** Grain yields (2005)**



Very high P

*** Grain yields (2006)**

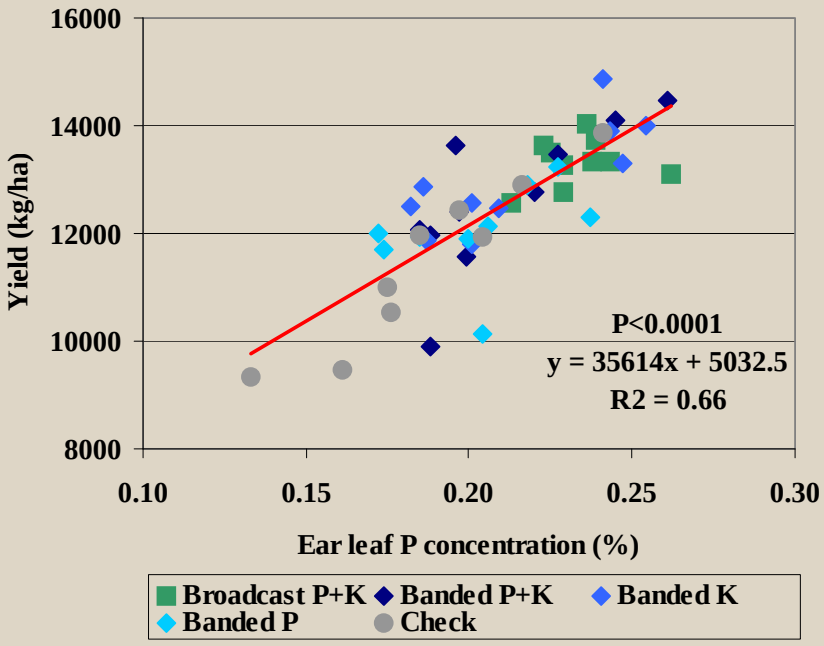


ACRE 2001-2006 Experiment

- **Corn grain yield relationships, within fertility treatments, to ear leaf-P or K at the plot level.**

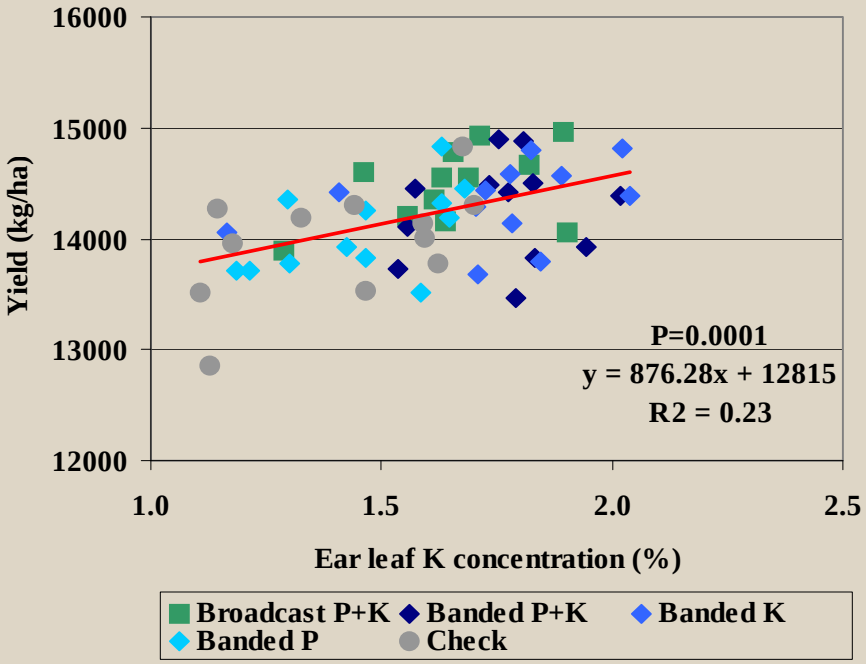
Medium P Soil

*** Grain yields (2005)**



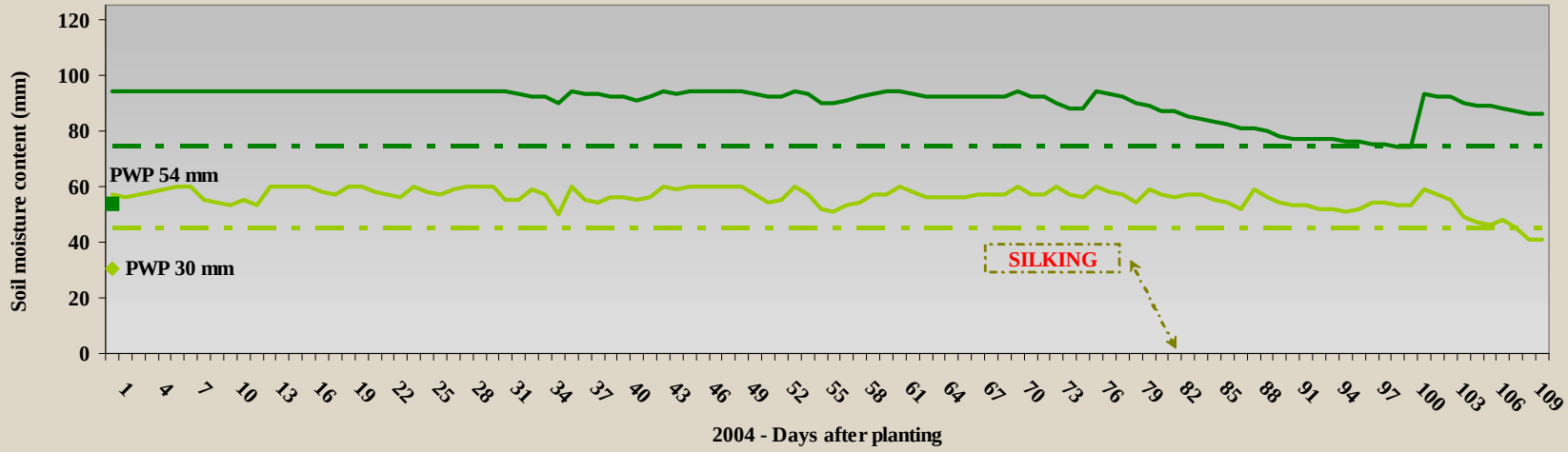
Very high P

*** Grain yields (2006)**

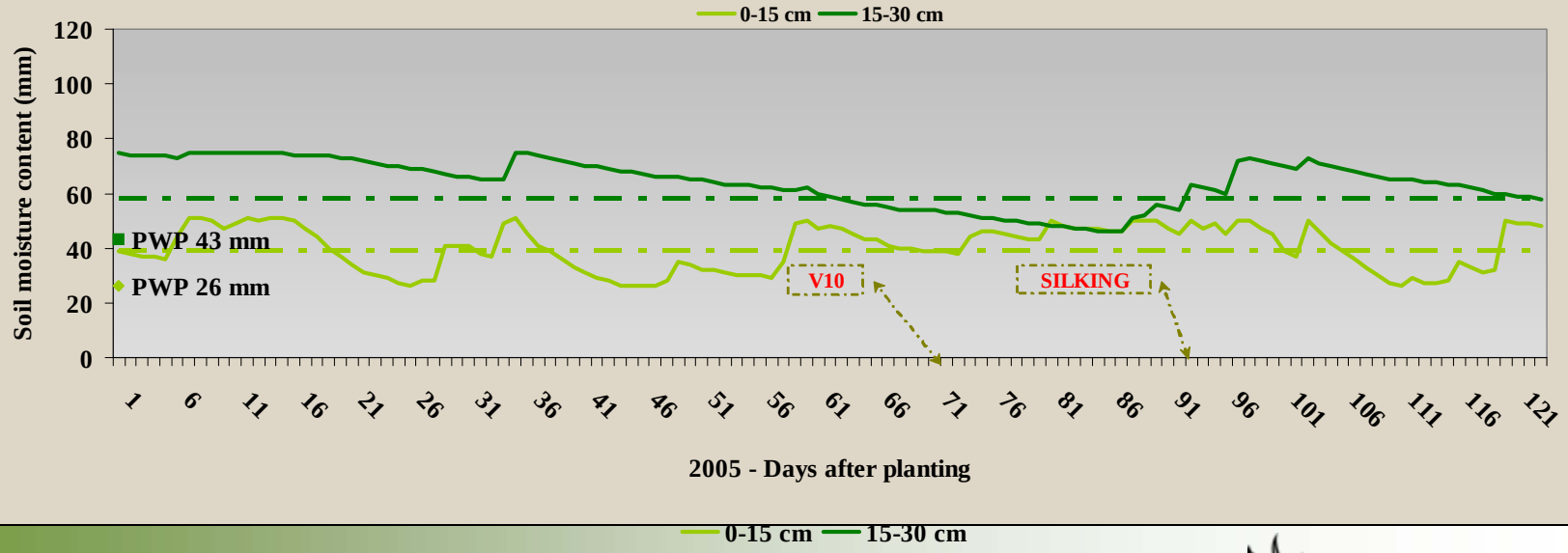


- **SIMBAL model for soil moisture availability related to corn grain yield differences in 2004 versus 2005.**

2004



2005



Strip-till Corn: The Known

1. Strip-till corn yields are no better than no-till corn yields when corn follows soybean.
2. The biggest advantages for strip-till over no-till are increased planting date flexibility, early soil warmth, and the opportunity for fertilizer banding.
3. Strip tillage is clearly superior to no-till on medium to fine-textured soils (with poor drainage) when corn follows corn.

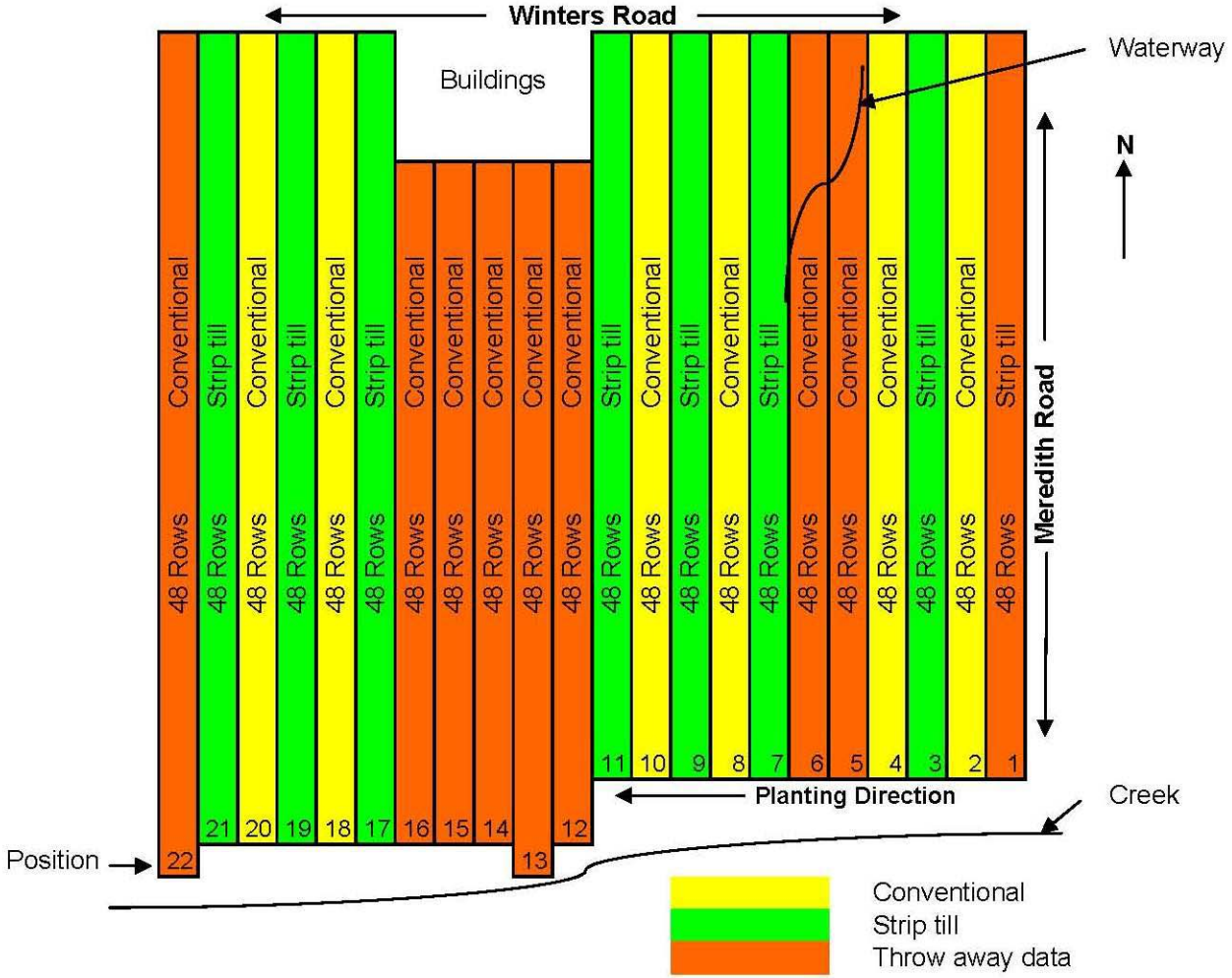
Strip-till Corn: The Unknown

1. P and K fertilizer placement: Should deep-band always be in the same position? Can deep-band replace starter? Can deep-band replace broadcast altogether? Can P and K rates be lowered? Soil sampling position?
2. What are the best options in spring when wet falls prevent completion of fall strip-till?
3. Can strip-till equal the erosion control of no-till on steep slopes?

Strip-till Corn: The Unknown (Continued)

4. Relative importance of the shank design versus the berm configurations in achieving higher yields on different soils.
5. Optimum row position when strip-till corn follows corn?
6. The additional yield and profitability gains with automatic guidance & controlled traffic systems in future.

7. Who is going to do the Research!



Strip till Date: 11/22/06

Purdue Agronomy
crop, soil, and environmental sciences

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John Deere & Co.

Equipment:

John Deere Cropping Systems Unit
Case-DMI (Goodfield, IL)
Remlinger (Kalida, OH)

Seed:

Pioneer Hi-Bred, Int.

Thanks!

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