CONSIDER THE STRIP-TILLAGE OPTION

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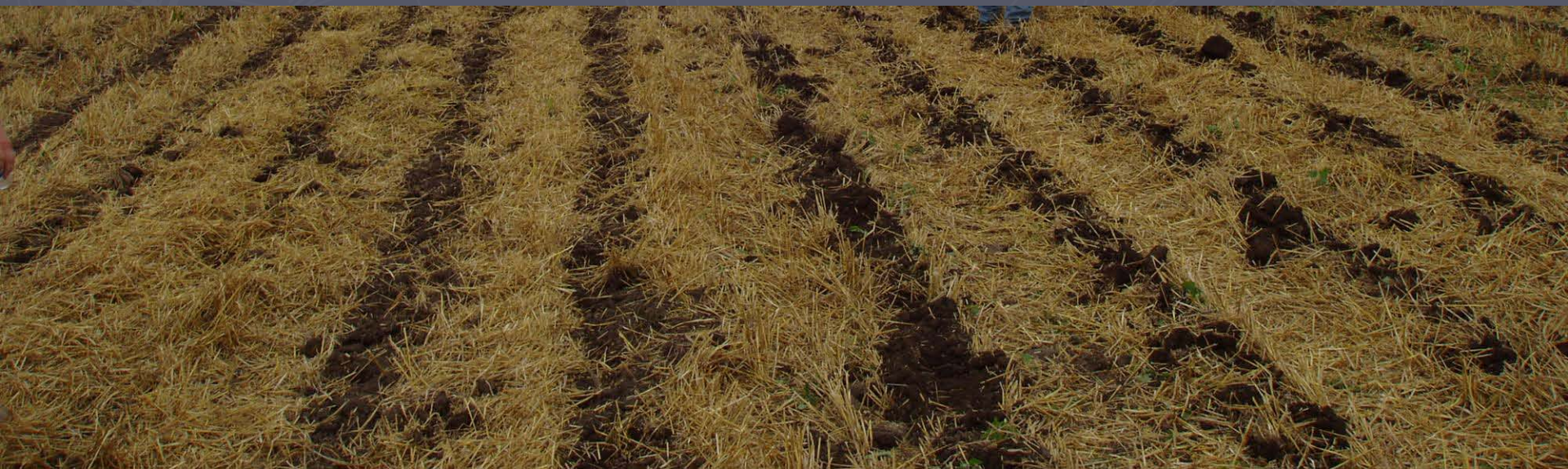
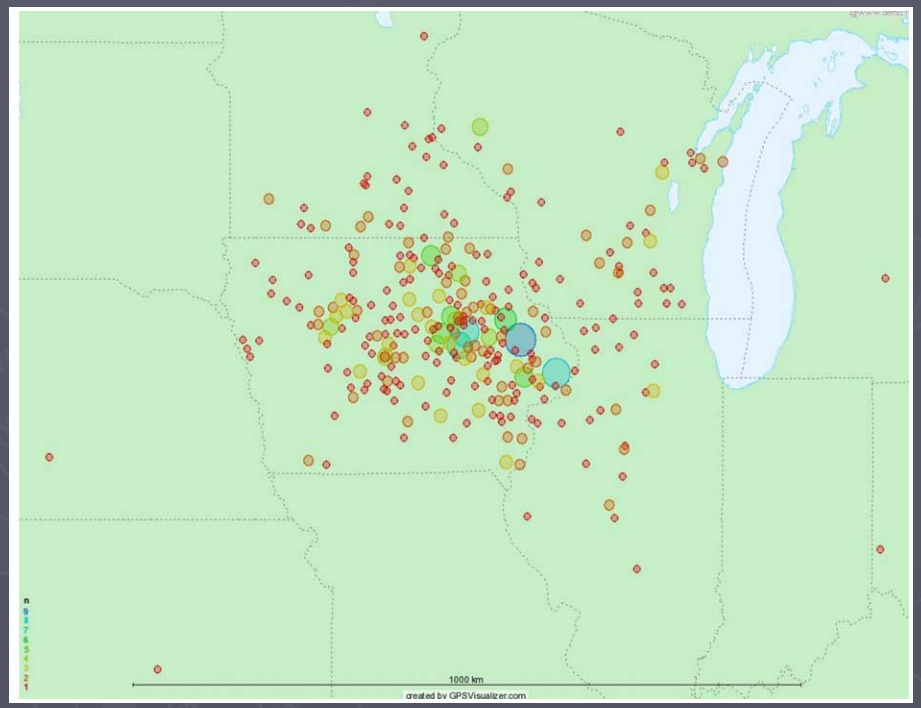
INTEREST IN STRIP-TILLAGE IS HIGH

- Soil conservation requirements
- Reduced yield with no-till
- High fuel and equipment costs
- Timeliness of operations
- Equipment/technological advances

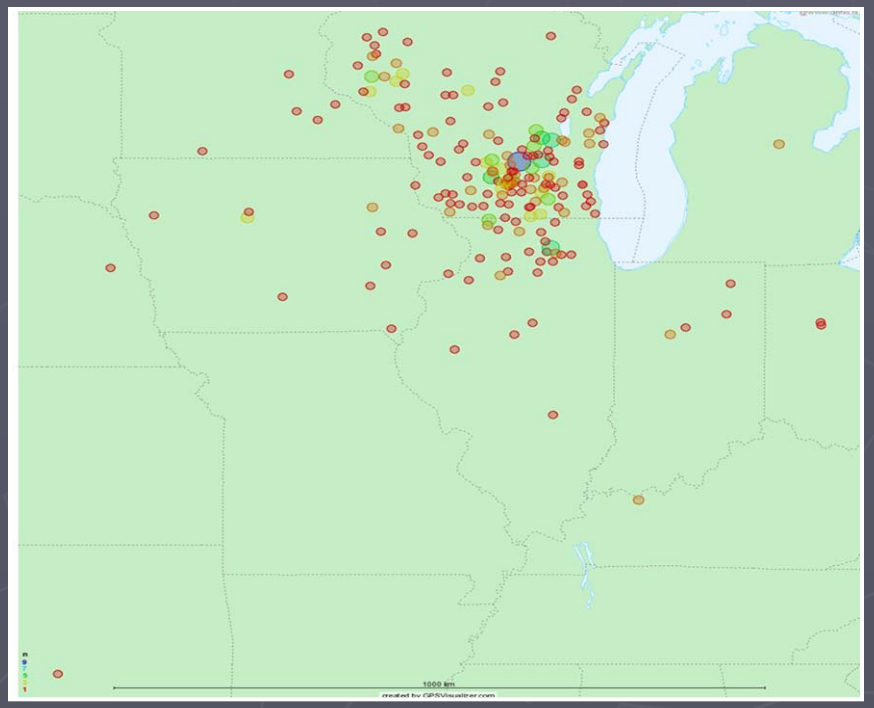


MIDWEST STRIP-TILLAGE EXPO

Zip Code Map for Midwest Strip-tillage Expo Attendees



Waterloo, IA - 2007



Arlington, WI – 2008


RTK
RTK

DEFINING STRIP-TILLAGE

LESS THAN FULL-WIDTH TILLAGE OF VARYING INTENSITY WITH THE ROW DIRECTION

- *ROW OR RESIDUE CLEARING*
  - Remove residue
  - Finger coulters, brushes, sweeps
- *STRIP-TILLAGE (SHALLOW)*
  - Move residue, seedbed prep.,
  - Row fertilizer placement
  - Fluted coulters, discs
- *STRIP-TILLAGE (MODERATE)*
  - Disrupt surface compaction, deep place fertilizer
  - Mole knives
  - Coulters move soil to create mini-ridges
- *STRIP-TILLAGE (DEEP)*
  - Remove subsoil compaction
  - Straight-shanked knife with minimal soil inversion

RESEARCH SUGGESTS BENEFITS COMPARED TO NO-TILL

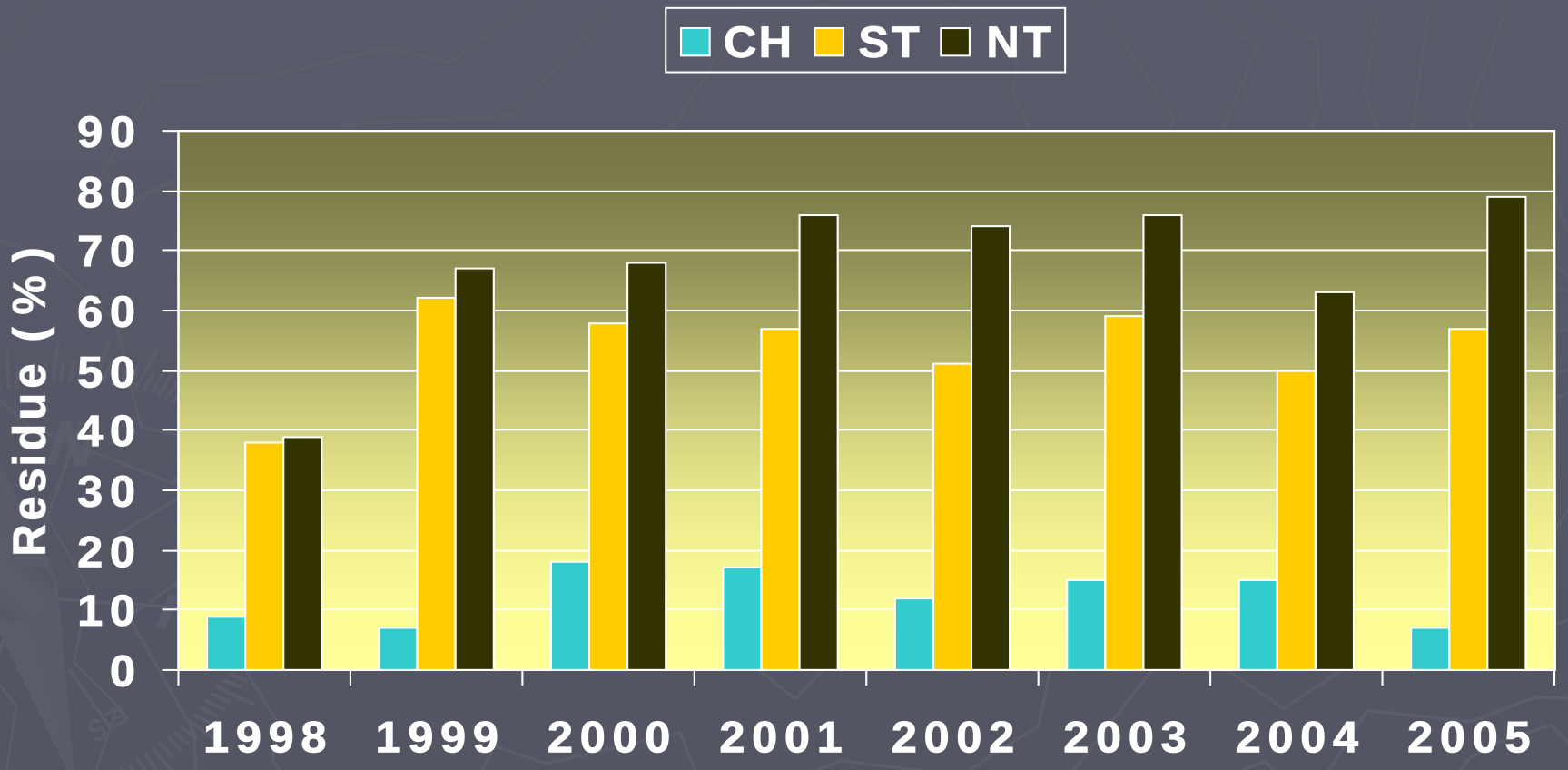
- Dryer and warmer soil (Wolkowski, Wis.)
- Earlier planting (Vyn et. al., Ontario/Ind.)
- More consistent seed depth (Swan et al., Minn.)
- Better stands (Kaspar and Erbach, Iowa)
- Faster early season growth (Wolkowski, Wis.)
- Yield response (Vetsch and Randall, Minn.)
- Net return (Yiridoe et. al., Ontario)

STRIP-TILLAGE AND SOIL CONSERVATION

CONSERVATION ALTERNATIVE TO NO-TILL

- RUSLE2 treats strip-till similar to no-till
  - Surface disturbance 30 % vs. 15 %
  - 15 – 20 % less residue
  - Actual soil loss differences are minimal
  - Variability of coulters, knives, etc.
- Strip-till on the contour whenever possible
  - May provide some additional infiltration capacity
  - Potential erosion where strips run uphill/downhill
- Best suited to fragile crop residue – soybean, alfalfa, etc.
- Equipment has been developed for corn residue

TILLAGE EFFECTS ON CROP RESIDUE



First-year corn after soybean, Arlington, Wis.

STRIP-TILLAGE AND SOIL LOSS, LANCASTER, WIS.

Runoff collector in strip-till

Rick Cruse and Hillary Owen

Sediment in chisel

Collecting sediment

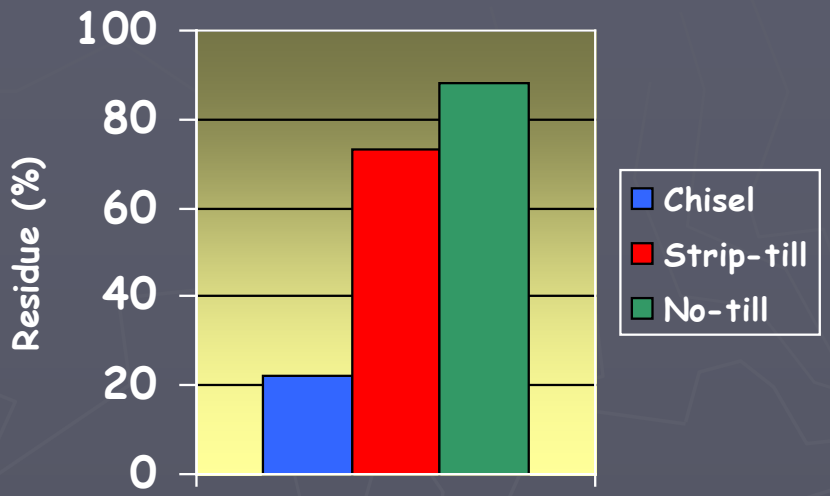
SOIL LOSS – A TALE OF TWO YEARS

2004				2005			
		Soil loss				Soil loss	
Date	Precip	Chisel	Strip	Date	Precip	Chisel	Strip
5-14	0.95	0.12	0.006	6-6	0.96	0.05	0.02
5-21	0.50	0.14	0	6-27	5.00	0.08	0.01
5-24	3.09	2.82	0.23	7-26	3.60	0.001	0
6-1	4.85	0.39	0.39	7-29	1.30	0.10	0.12
6-17	2.51	0.71	0	8-19	3.28	0.05	0.01
7-12	1.24	0.27	0.009	9-19	1.44	0.02	0
8-4	1.11	0.22	0				
Total		4.67	0.64			0.30	0.16

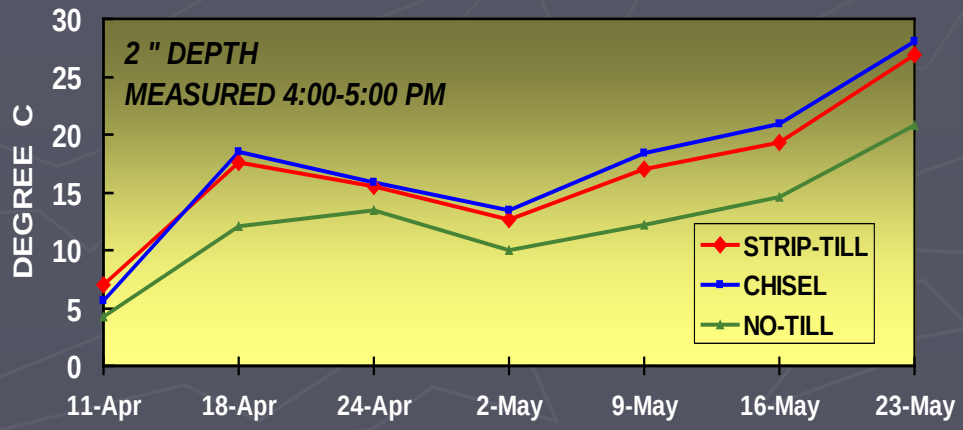

STRIP-TILLAGE AND EARLY GROWTH

SOIL TEMPERATURE AFFECTED BY TILLAGE AND CROP RESIDUE

Effect on crop residue, Arlington, Wis.

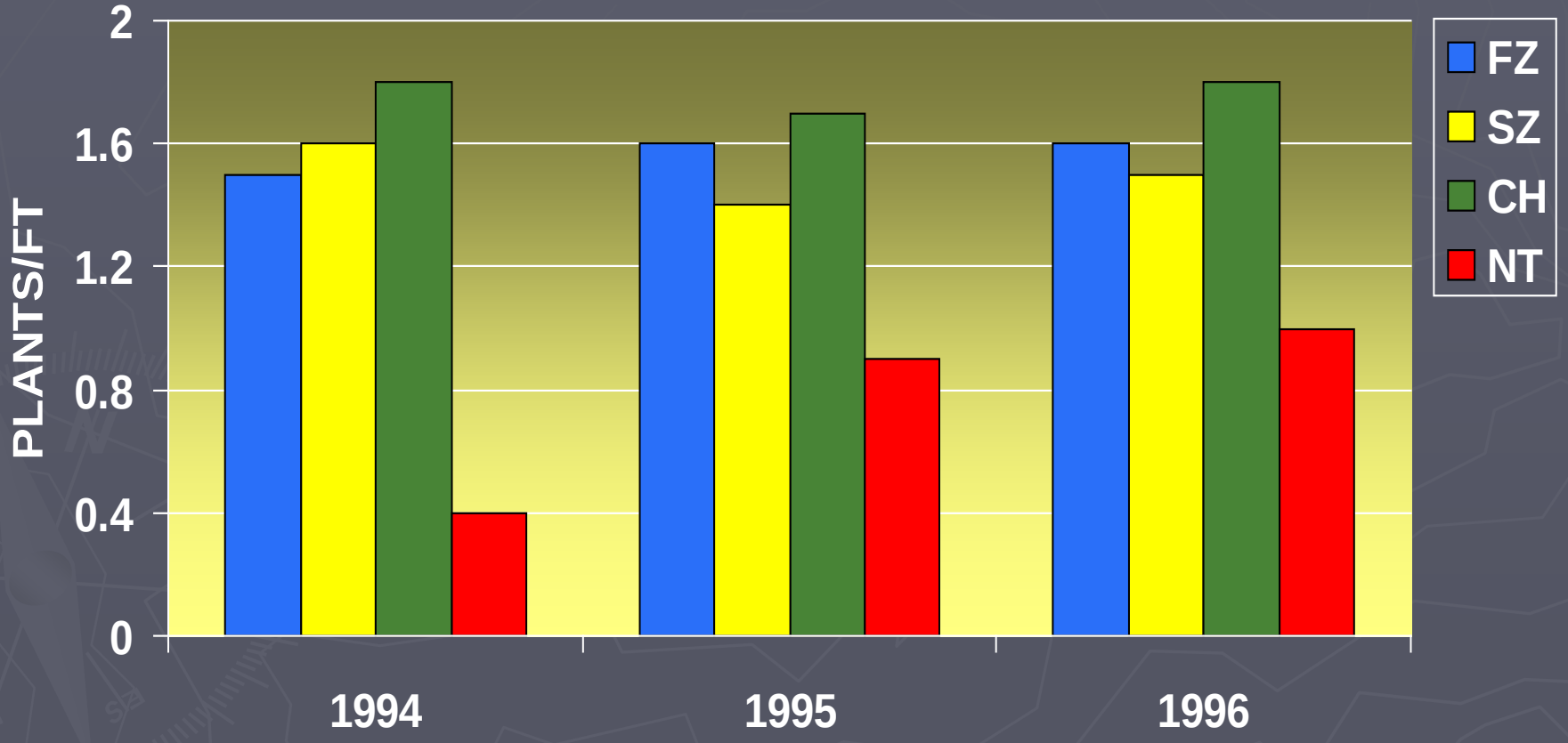


Effect on in-row soil temperature, Arlington, Wis.



Wolkowski, 2000

MAIN EFFECTS OF TILLAGE ON CORN EMERGENCE, ARLINGTON, 1994-1996



Measurements taken ~ 3 weeks after planting

EARLY GROWTH AND SILKING PROGRESS AS AFFECTED BY TILLAGE

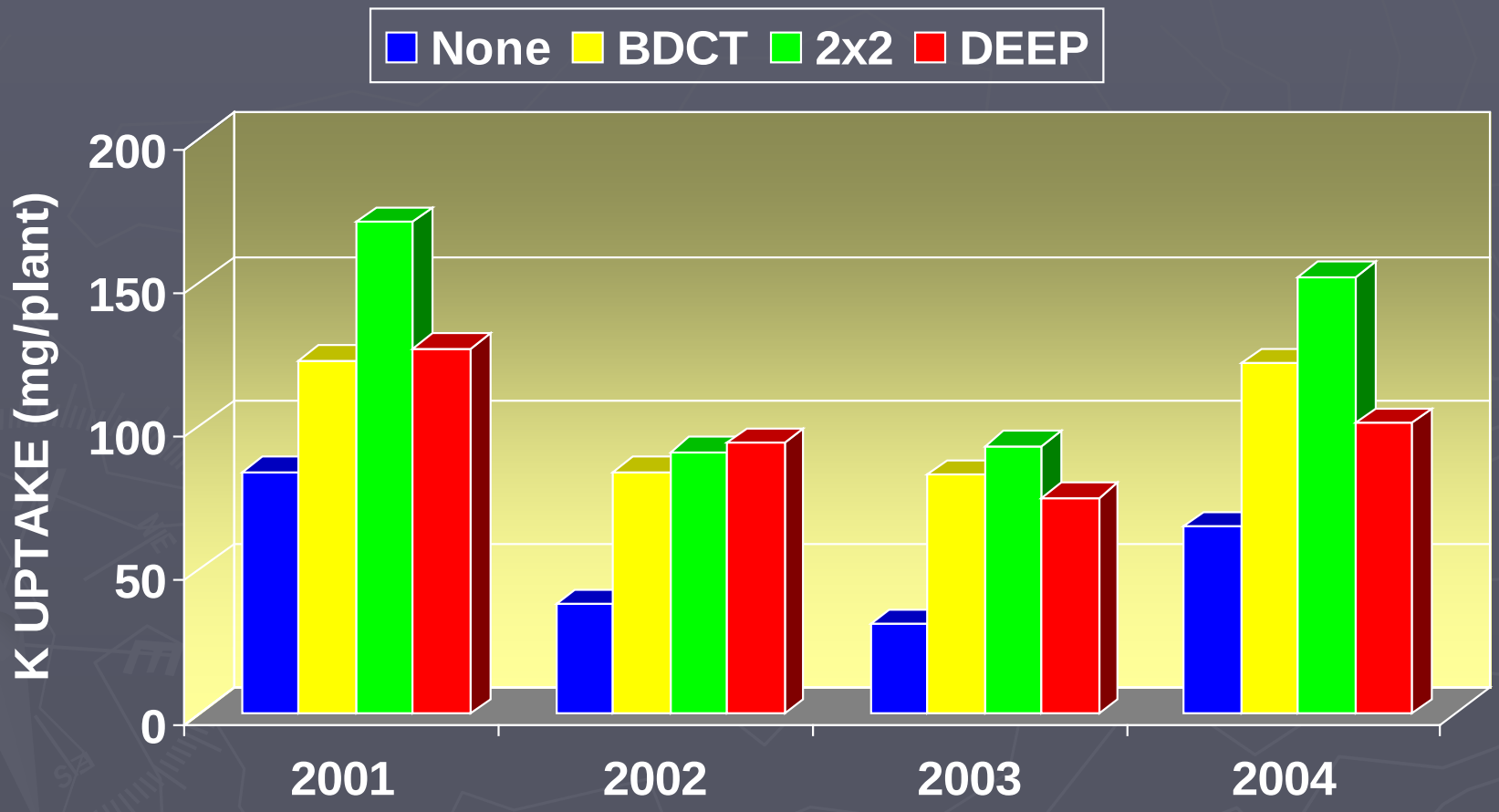
Tillage system	V6	V12	Silking
	-------- g/plant --------		%
Chisel	1.1	29	80
Strip-tillage	1.1	28	62
No-till	0.7	18	36

Arlington, avg. of 3 years

ARLINGTON TILLAGE PROJECT

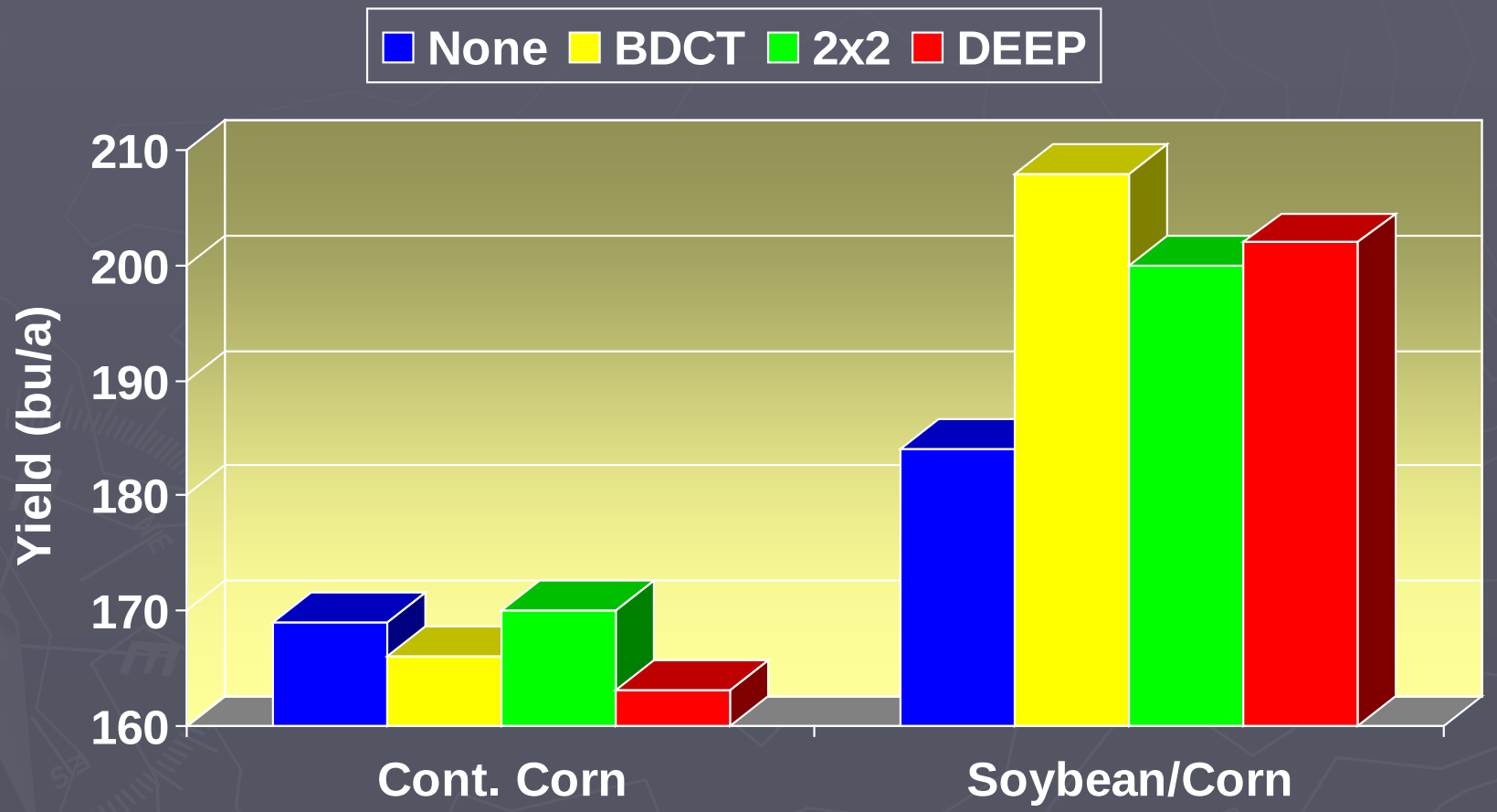
- Tillage/rotation study since 1997
  - Plano silt loam soil
  - Strip-till added in 2000
    - ’97 – ’99 row clearing
  - Continuous corn, Soybean/corn, Corn/soybean
  - PK fertilizer: None, broadcast, deep, and row-placed at crop removal rate

EARLY SEASON K UPTAKE IN STRIP-TILL



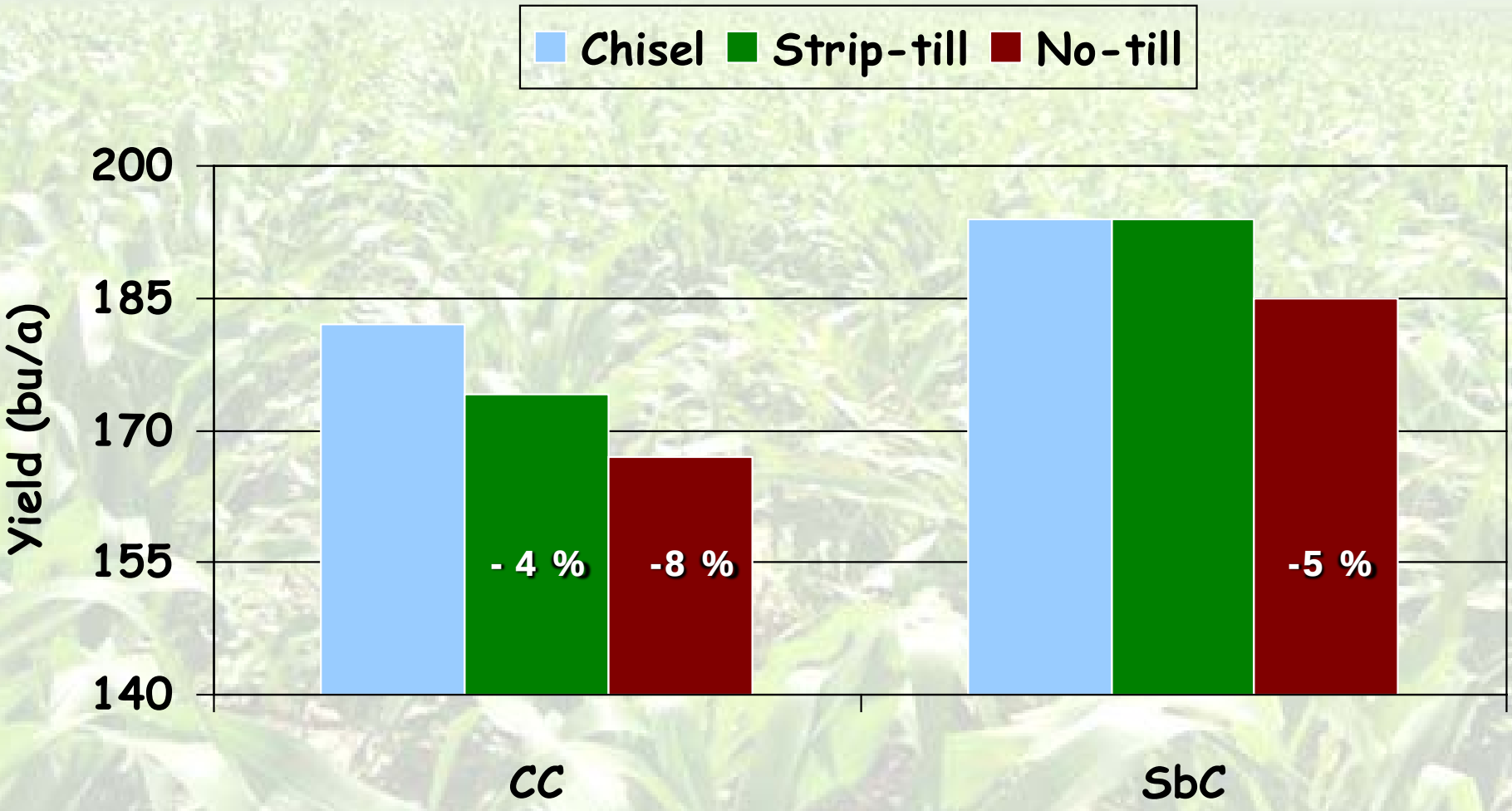
Soybean/corn rotation

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



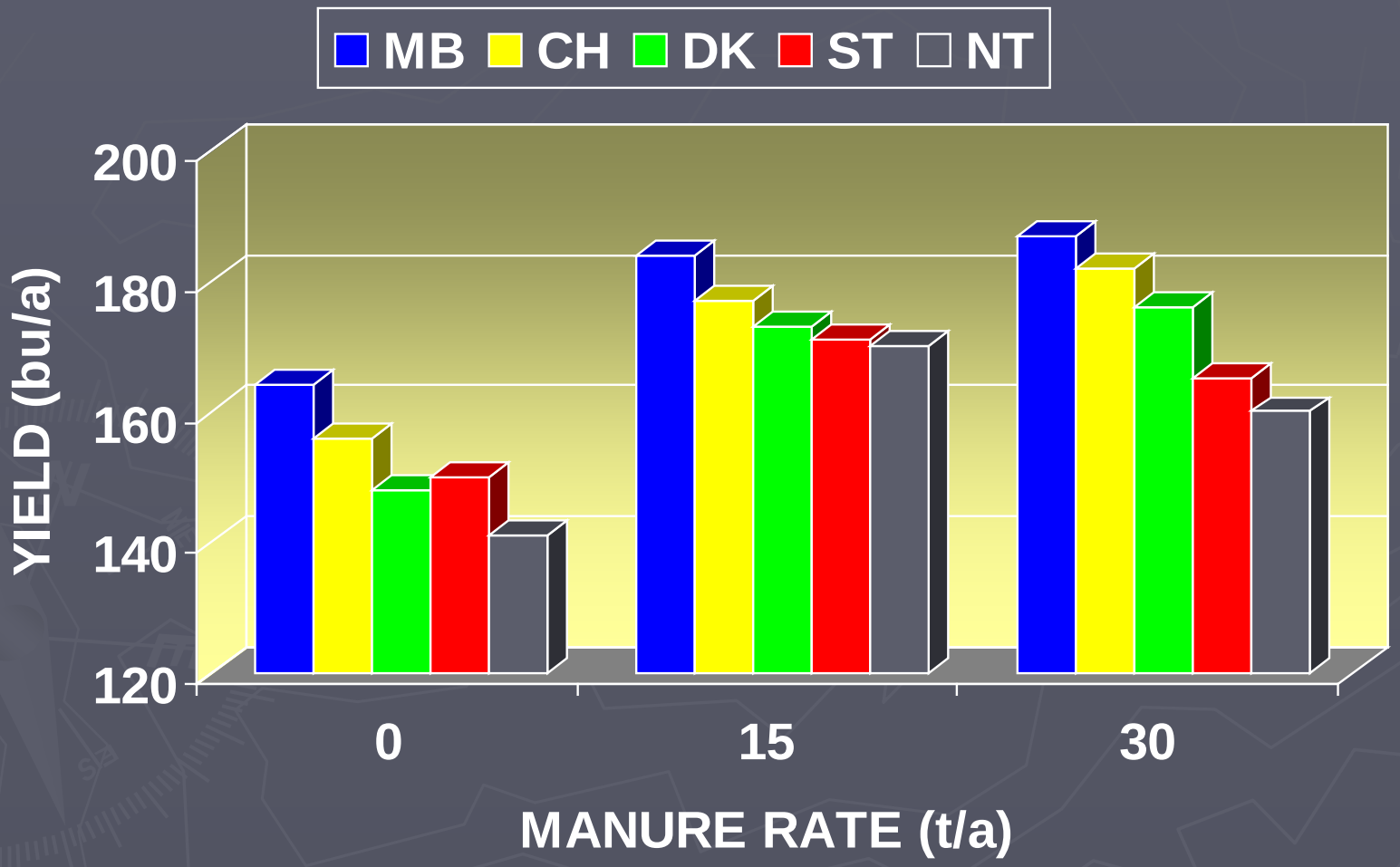
4-year avg. (2001 - 2004)

TILLAGE AND ROTATION EFFECT ON CORN YIELD, ARLINGTON, WIS. 1997 – 2007 (10 YEAR AVG.)



TILLAGE AND MANURE MANAGEMENT

MANURE AND TILLAGE RESPONSE



Arlington, Wis. (2 year avg.)

AUTO-STEER AND GUIDANCE CONSIDERATIONS

Tim Stombaugh, Univ. of KY

BENEFITS OF AUTO-STEER

- Reduce overlap and skips
- Optimizes fuel use, time, chemical and nutrient inputs, and implement wear
- Maximizes plant growth
- Controls traffic to reduce compaction
- Reduces operator fatigue

Tim Stombaugh, Univ. of KY

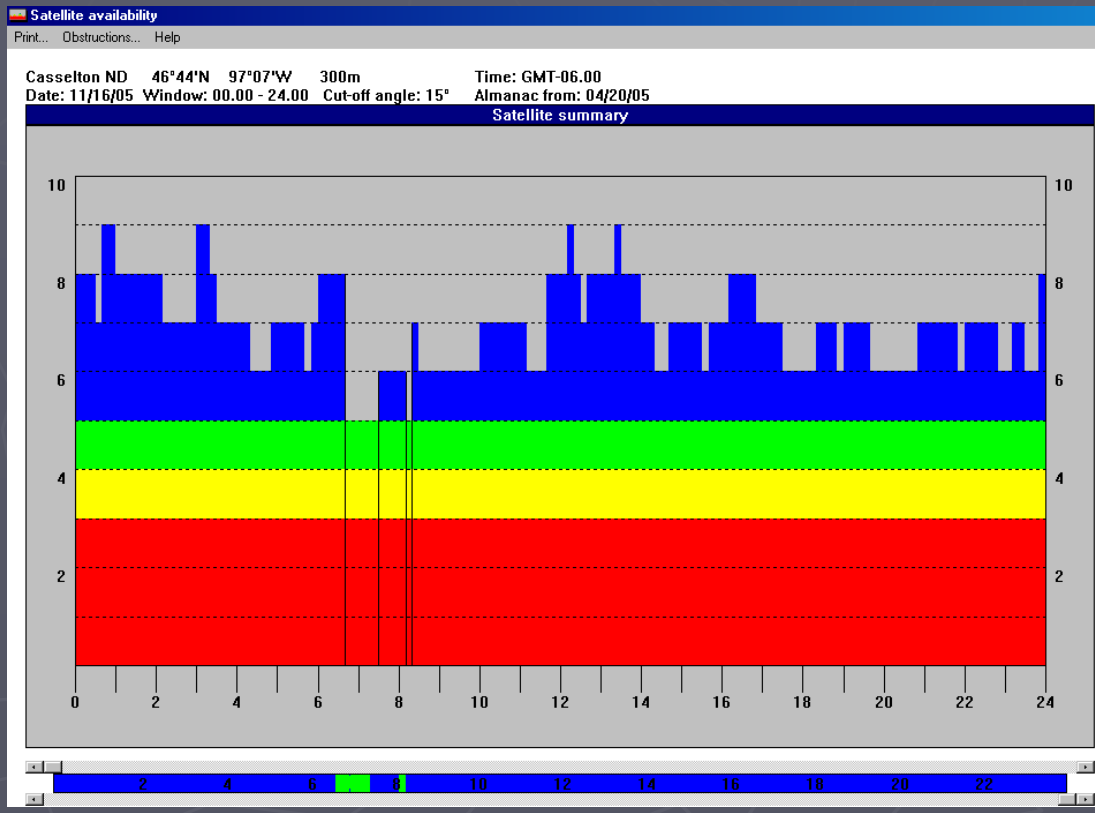
DIFFERENTIAL GPS CORRECTION

- Sub-meter (3 ft.)
  - WAAS, USCG Beacon, Omnistar VBS, Starfire I,
- Decimeter (2-6 in.)
  - Starfire II, Omnistar XP & HP
  - Requires subscription
- RTK (1 in.)
  - Real Time Kinematic
  - Survey in the base station
  - Line of sight required

Tim Stombaugh, Univ. of KY

GPS ACCURACY

- Pass-to-Pass vs. Long Term (Year-to-Year)
- Time of day
- Extended breaks during field operations
- Multiple operations
- Loss of signal near treelines, buildings, etc.



ECONOMIC CONSIDERATIONS

ROTATION/TILLAGE	AVG. YIELD (BU/A)	COP ($/BU)	COMPARED TO CH ($/BU)
Continuous Corn			
Chisel	182	2.55	--
Strip-till	174	2.53	- 0.02
No-till	167	2.63	0.08
Corn after Soybean			
Chisel	194	2.39	--
Strip-till	194	2.27	- 0.12
No-till	185	2.36	- 0.03
Soybean after Corn			
Chisel	52	6.41	--
Strip-till	52	6.23	- 0.18
No-till	50	6.15	- 0.26

Arlington, Wis. (1997 – 2007)

SUMMARY

- Strip tillage offers a residue management compromise between no-till and full-width systems
- Under conditions of intensive rainfall strip-tillage conserved soil
- The creation of a residue-free strip offers warmer and drier conditions at planting
- Response to fertilization similar to no-till
- Compared to chisel 10-year average grain yield similar in first-year corn; 4% lower in cont. corn
- Carefully evaluate upgrades to auto-steer and RTK GPS
- Production economics favor strip-tillage in first-year corn and no-till in soybean after corn