

# **Is it a Practice for Wisconsin Soils**

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# Vertical tillage

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- ❑ As the name implies vertical tillage is designed to create loose zones up and down in the soil
- ❑ A continuum between strict no-till and moldboard plowing
- ❑ Avoids horizontal smearing and the creation of tillage pans
- ❑ Various implements can be used and effective depth will be dependent on implement
- ❑ Many producers unknowingly practice vertical tillage (and I was unknowingly doing vertical tillage research)
- ❑ All systems must incorporate wise tillage management

# Typical advertising

**VERTICAL TILLAGE**

Conventional Tillage  
Vertical Tillage

Field Cultivator  
Disk  
Plow

**NEW Turbo-Chopper™**

See it in action at [www.greatplainsmfg.com](http://www.greatplainsmfg.com)

**Breaking Down Yield Barriers**

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Specific product names are for educational purposes only and do not represent the endorsement of the author or UWEX

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TRACTORS | PLANTING & SEEDING | APPLICATION EQUIPMENT | HARVESTING | **TILLAGE** | HAY & FORAGE | UTV | SKID STEERS | ATTACHMENTS | PRECISION FARMING

## TILLAGE

**Disk Harrows**

- ▶ Offset
- ▶ Tandem

**Primary Tillage**

- ▶ Chisel Plow
- ▶ Disk Rippers
- ▶ In-line Rippers

**Vertical Tillage**

- ▶ True-Tandem™ 330 Turbo

**Seedbed Preparation**

- ▶ Field Cultivators
- ▶ Seedbed Conditioners

**Strip-Till**

- ▶ Nutri-Tiller 5310

**Vertical tillage with the capability to level**

- Ideal for spring and fall tillage
- Faster than other tillage operations
- Blades move soil and residue laterally and up and down

**SHOPPING TOOLS**

- ▶ BUILD & PRICE
- ▶ COMPARE SPECS
- ▶ FINANCING SOLUTIONS

**NEW FOR 2010**

- ▶ Case IH Scout utility vehicle
- ▶ Farmall A utility tractors
- ▶ Magnum tractors with CVT
- ▶ 3400 Series corn heads

**SPECIAL OFFERS**

- ▶ Free AFS AccuGuide™ AutoGuidance Offer
- ▶ Jump Start 2010 with Great Financing Offers

**SPECIAL EVENTS & PROMOTIONS**

- ▶ Case IH sponsors first-ever red tractor quilt contest

# Earthworms: Nature's vertical tillage machine

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(Images courtesy of Dr. Randall Reeder, Ohio State Univ.)



# Vertical tillage claims

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- Break up compaction (shallow or deep)
  - Improved rooting, drainage, aeration
- Move, but maintain surface residue
- Promote soil drying and warming
- Incorporate manure and fertilizer
- Manage cover crop material
- Address some pest and weed issues
- Smooth soil surface to create seedbed



# Vertical tillage (Patent description)

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- Tillage tool having a number of gangs of fluted-concave disc blades, rolling baskets, and wheels connected to a main frame.
- The fluted-concave disc blades move the soil in a direction lateral to the side of the blades as well as up.
- The rolling bars aid in leveling the seedbed and crushing the remaining large pieces of soil.
- The vertical tilling implement reduces the amount of subsoil compaction and cuts through heavy residue making it ideal for use in the fall or in the spring.

# Horizontal vs. vertical tillage tools

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## Horizontal tillage

- ❑ Moldboard plow
- ❑ Field cultivator
- ❑ Tandem disk



## Vertical Tillage

- ❑ Chisel plow
- ❑ Strip-tillage
- ❑ Zone-builder type subsoilers
- ❑ Aerway
- ❑ Phoenix harrow
- ❑ Coulter disk tools

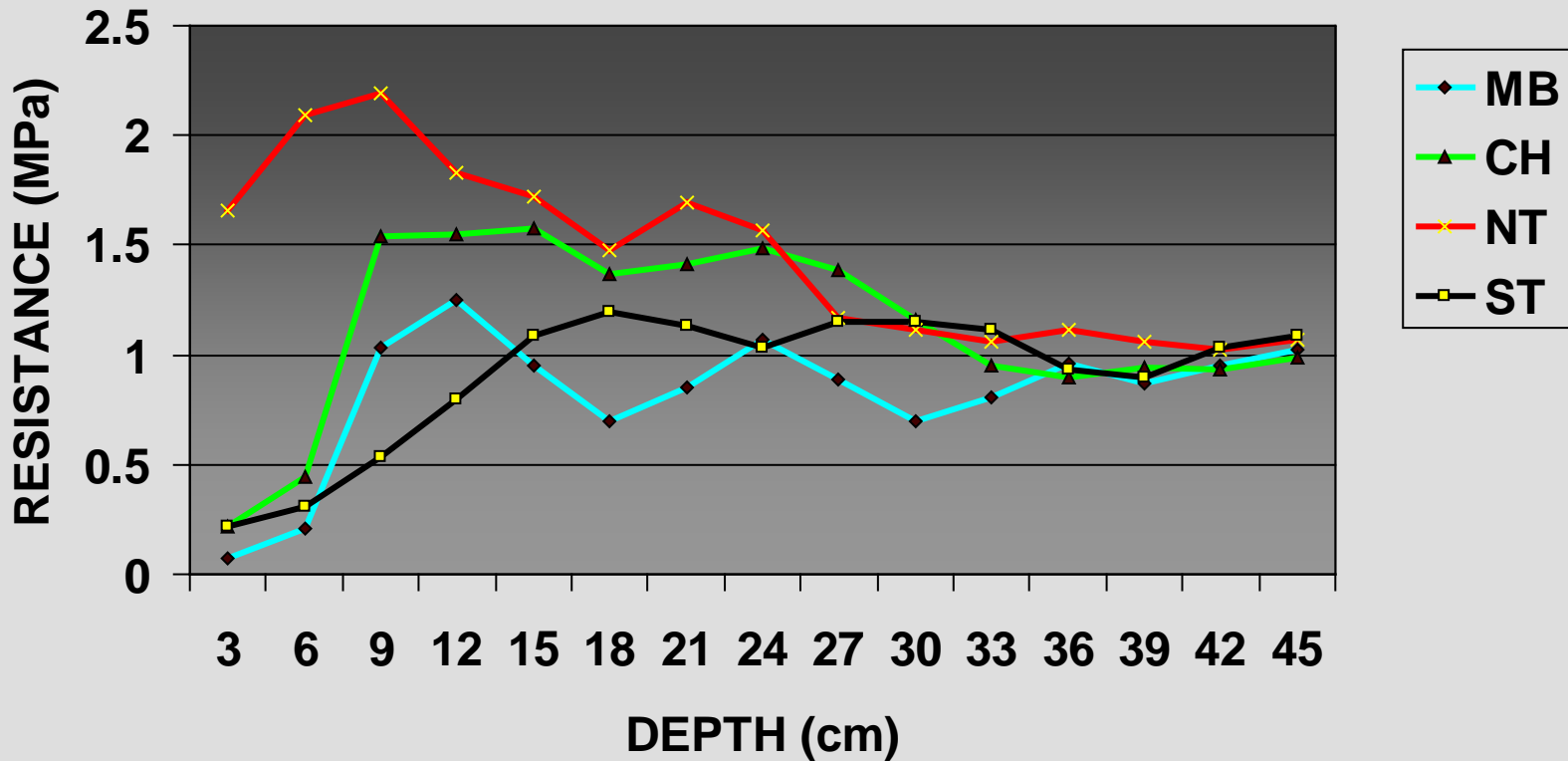
# Producers should set “tillage goals” based on conservation, soil and residue condition, and crop rotation

- ❑ Quantity and type of residue, and soil condition prior to tillage
- ❑ Desired final residue cover, distribution, surface roughness, and seedbed
- ❑ Presence of compaction and rutting
- ❑ Power and time requirement
- ❑ Planter capability
- ❑ Other management issues



(Ron Schuler, UW BSE, 2007)

# Tillage does remove surface compaction (Wolkowski, unpublished)



**Arlington, Wis., 2002 (6 t vehicle)**

# Many existing tools perform vertical tillage



Combination chisel plows



AerWay



Strip-tillage



Straight-shanked subsoilers

# “Newer” vertical tillage tools

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- Fluted concave disk gangs
- Spike harrow
- Rolling basket



# One pass with Turbo-till, Arlington 2005

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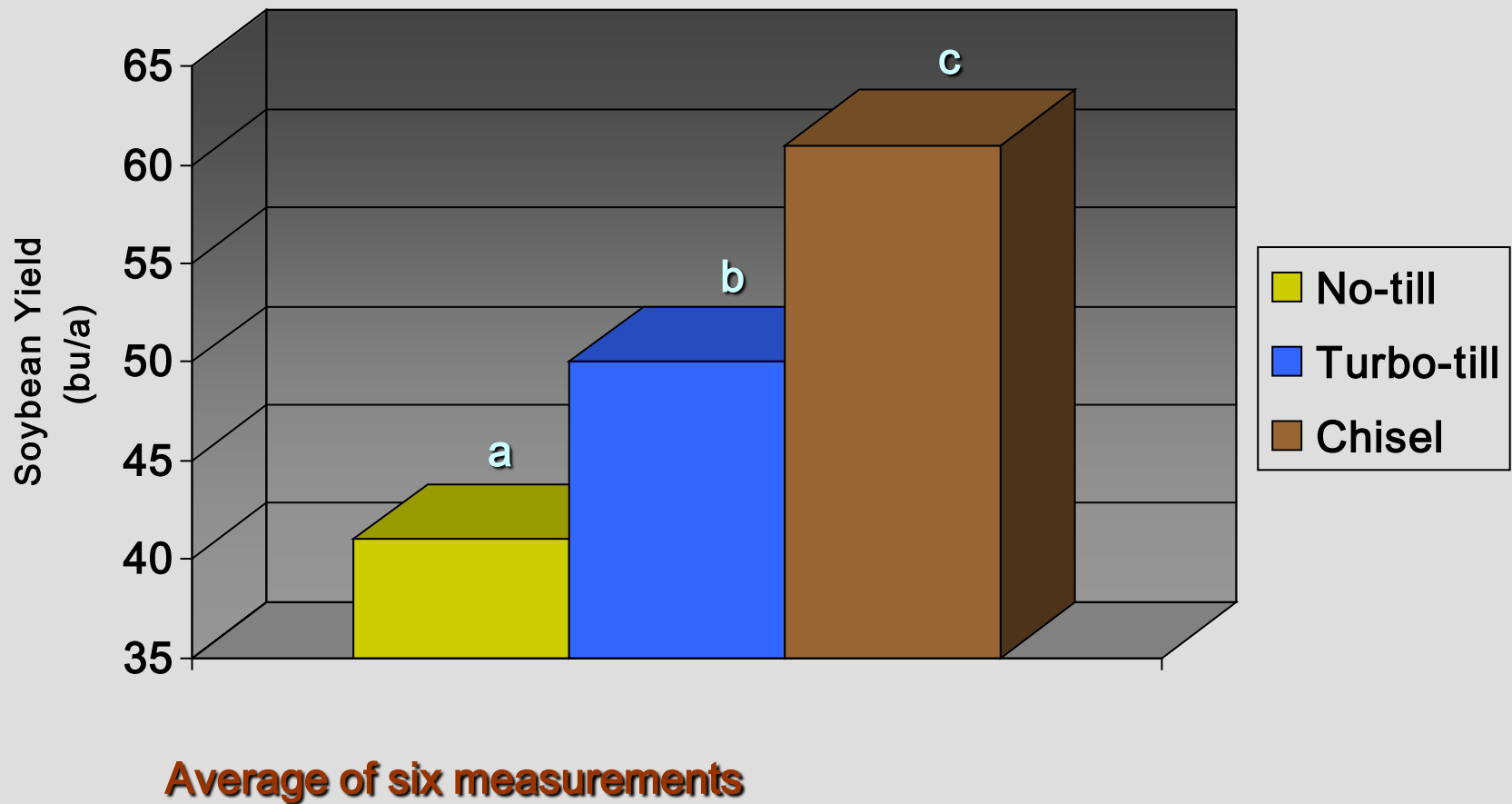


**Corn Stubble**

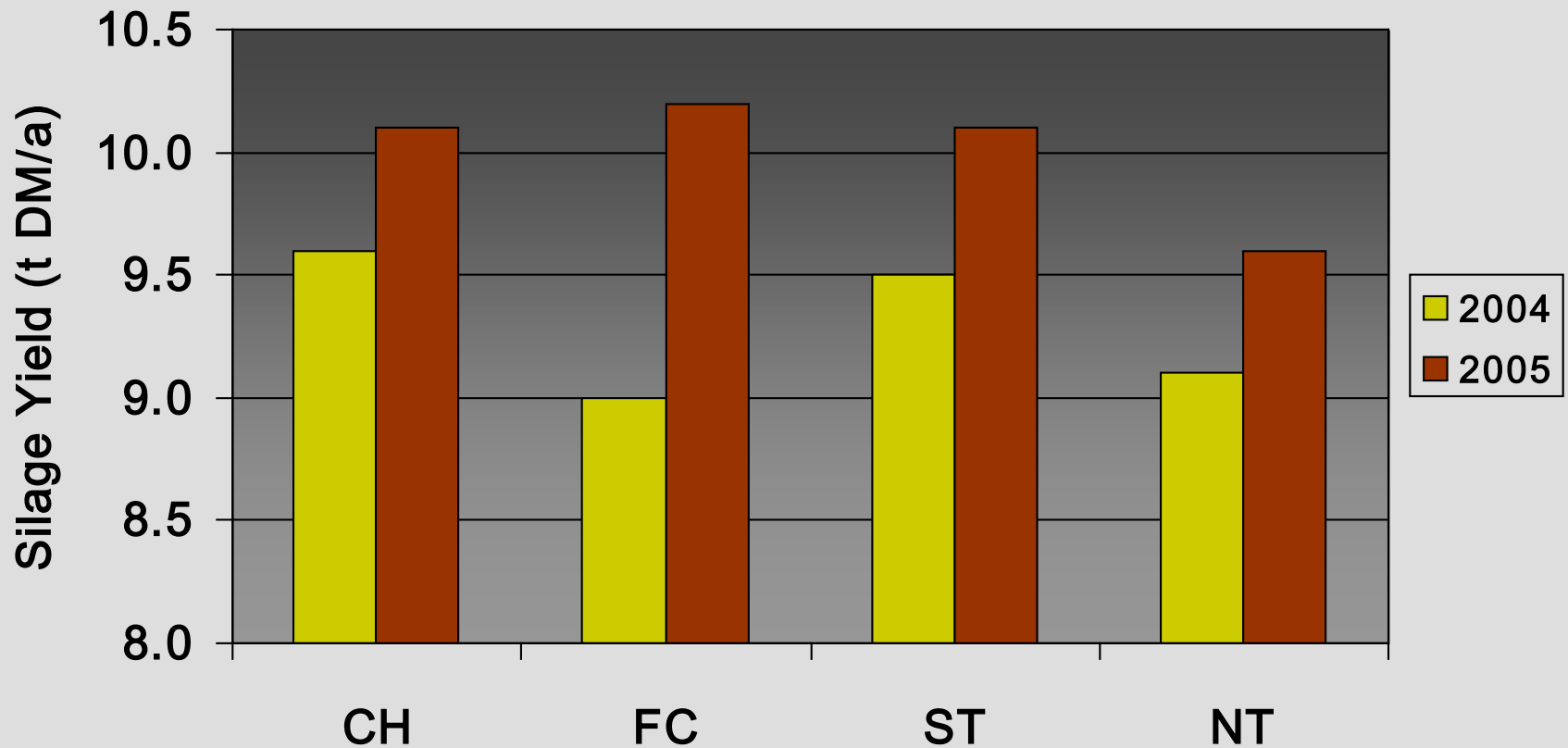


**Heavy Manure**

# Response of soybean to tillage, Arlington, WI, 2005 (Wolkowski, unpublished)

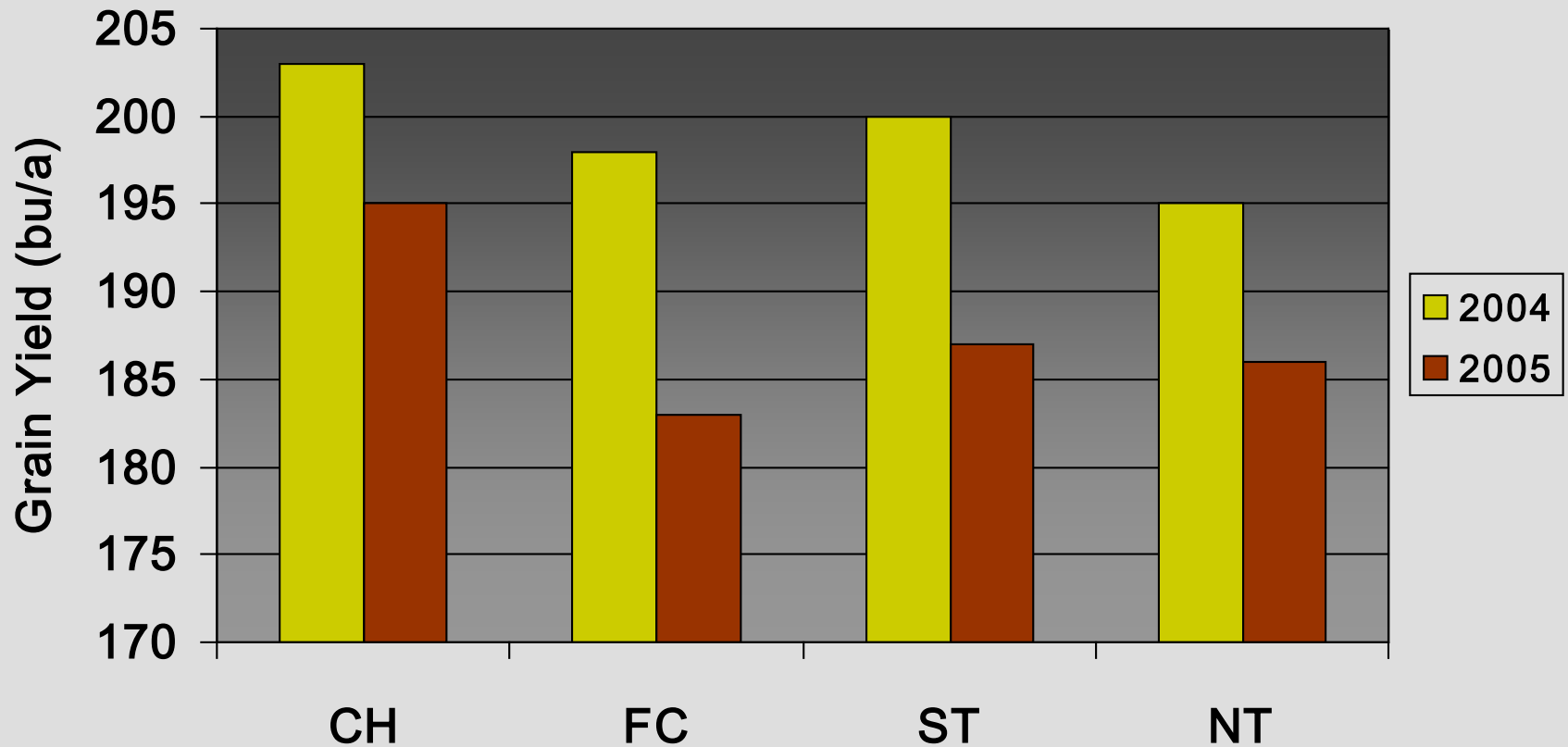


# Effect of tillage practice in first-year corn, Lancaster, WI 2004 and 2005 (Wolkowski, 2006)



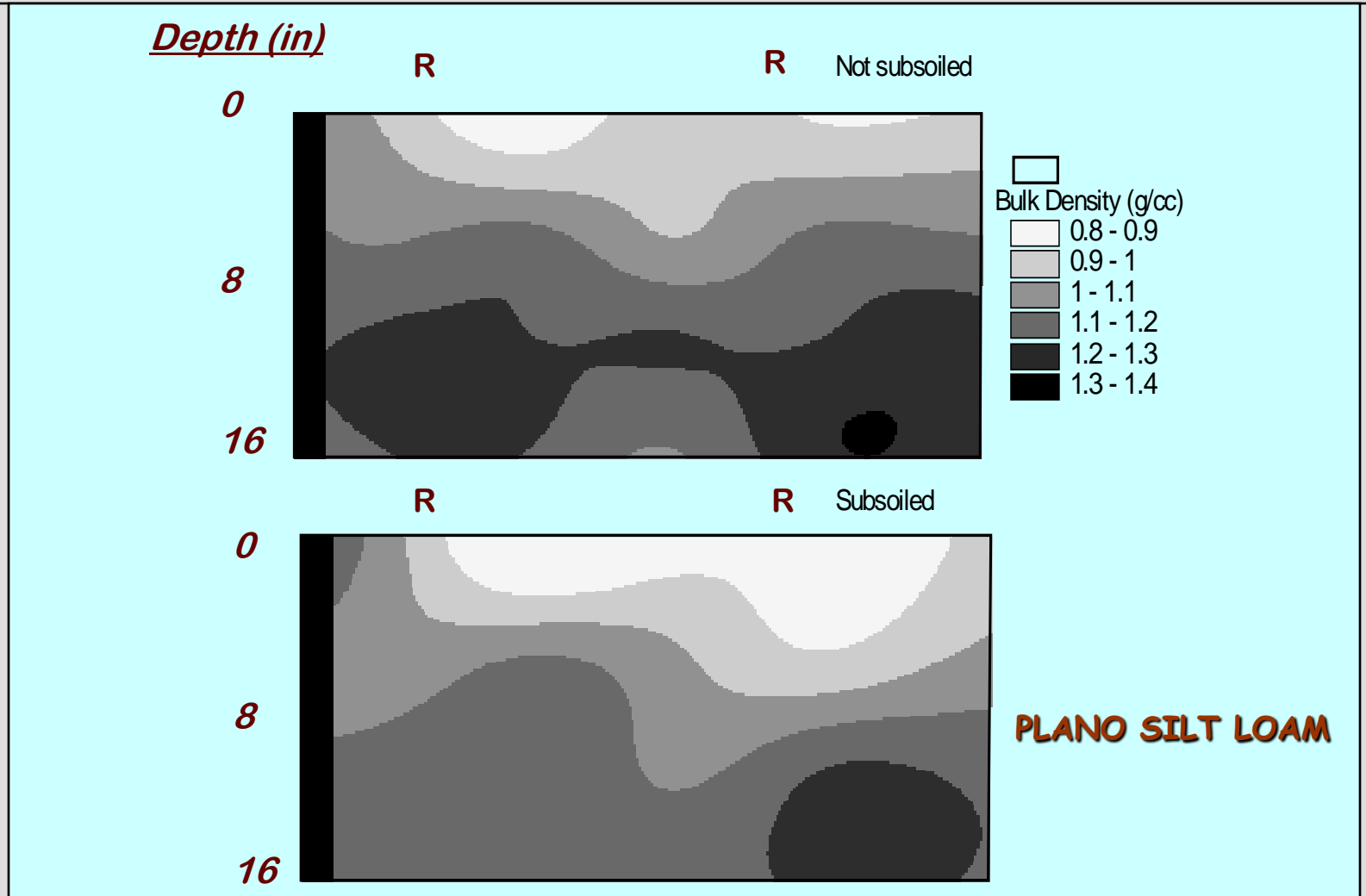
**Pr>F = 0.25 and 0.55 in 2004 and 2005, respectively**

# Effect of tillage practice in first-year corn, Lancaster, WI 2004 and 2005 (Wolkowski, 2006)



**Pr>F = 0.52 and 0.62 in 2004 and 2005, respectively**

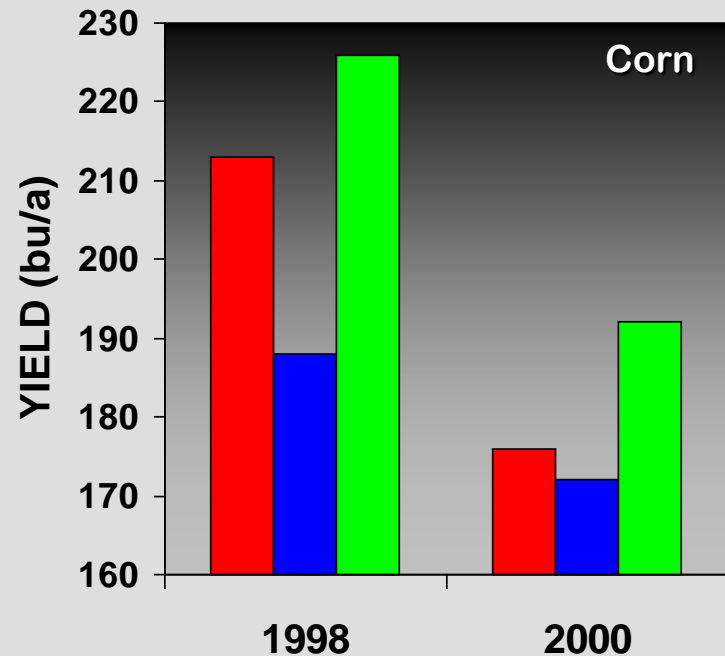
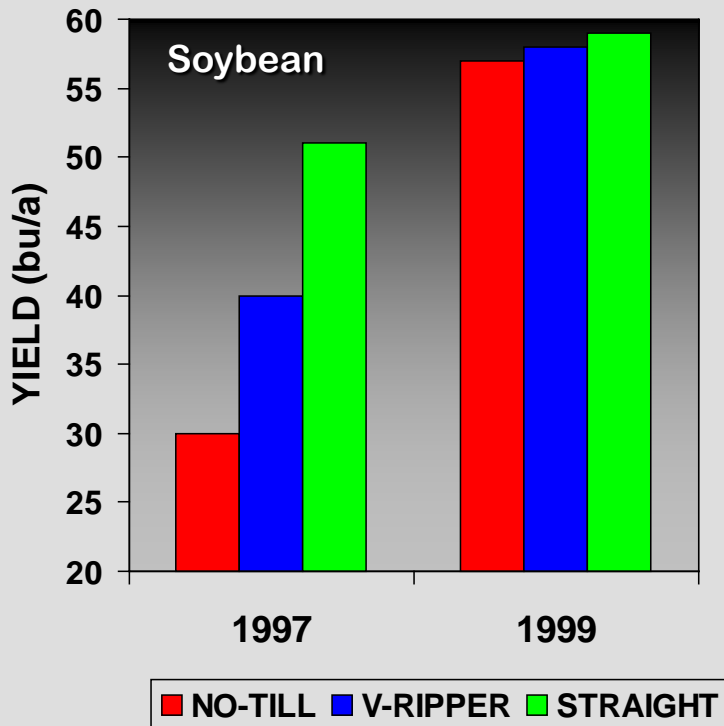
# Soil bulk density profile, Arlington, WI 1998 (Wolkowski, unpublished)



# Effect of tillage on corn and soybean yield, Arlington, WI (Wolkowski, 2000)

Tillage	Corn Yield (bu/a)		Soybean Yield (bu/a)	
	1998	1999	1998	1999
Fall Chisel	223	206	57	47
Fall Subsoil	218	201	54	51
Spring Field Cult.	223	204	53	45
Pr>F	0.15	0.44	0.38	0.31

# Effect of subsoiler type on soybean and corn yield on a silty clay loam soil (Wolkowski, unpublished)



**Manitowoc, Co.**

# Effect of tillage and field location on corn and soybean yield, Elrosa, MN (DeJong-Hughes, UMEX)

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Tillage	2003 Corn Yield (bu/a)		2004 Soybean Yield (bu/a)	
	Upland	Depression	Upland	Depression
Ridge-till	183	156	32	14
Ridge-till w/ Subsoil	185	155	33	17
Pr>F	NS	NS	NS	NS



# Summary

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- Set reasonable goals for tillage management
  - Conservation requirements
  - Crop residue and soil condition
  - Power requirements
  - Time and cost limitations
  - Planter capability
- Control traffic and avoid compaction
- Producers are encouraged to compare tillage systems and select tools that fit their specific crop and soil needs