UNIVERSITY OF MINNESOTA EXTENSION

Reducing Tillage in Challenging Soils

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Points and Shanks:

- Lifts and separates the soil
- Less destruction of soil structure

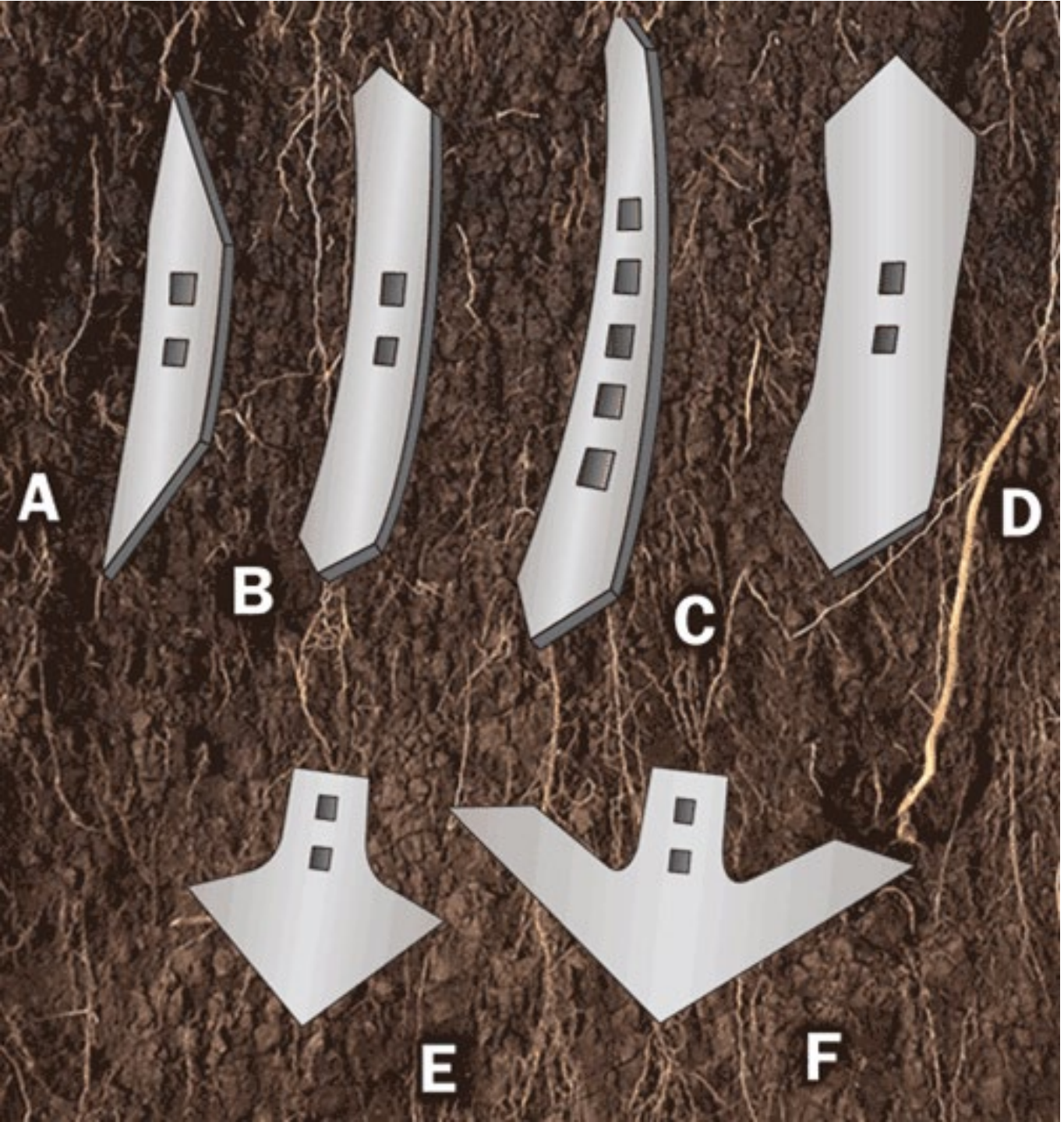
Disks

- Shear and cut the soil
- Destroys more structure than shanks

Chisel Plow

- 6-9” deep
- Full field tillage
- Conventional tillage
- Varies in aggressiveness
- Slower speeds than shallow tillage

Photo courtesy of Dick Wolkowski, UW

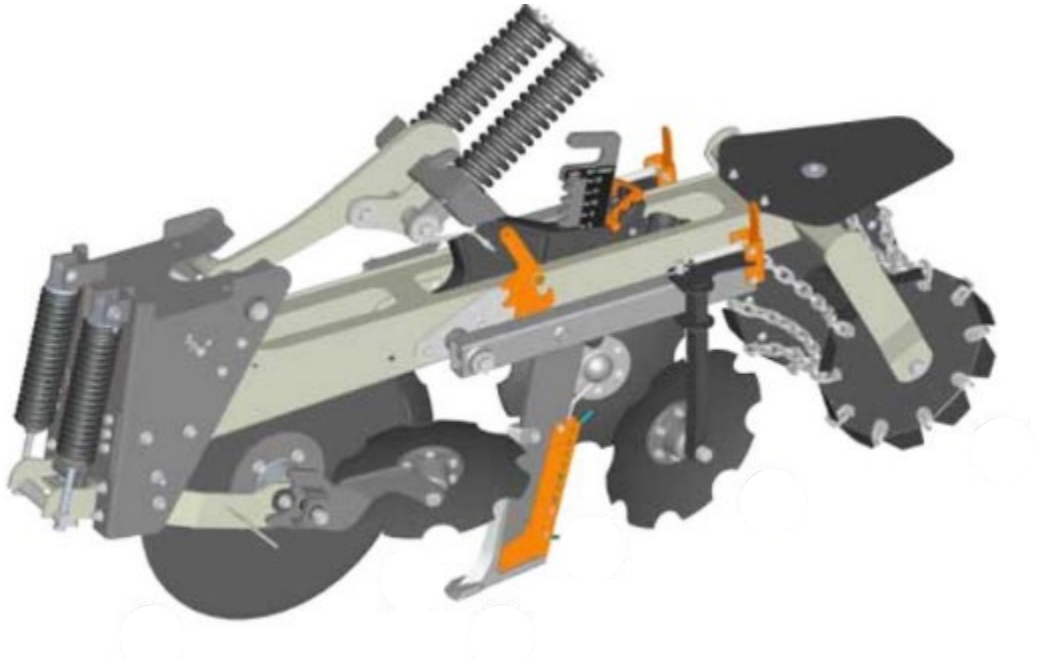


Chisel Plow Points

- Soil disturbance
- Depth
- Smeared soil potential

Twisted Shovel vs. Sweep

Provided by Dick Wolkowski, UW)



Shanked Strip Till Units

Best for fall use

Banded nutrients

More tillage

Residue moved out of berm

Deeper tilled zone (6-8”)

Don’t forget to purchase rock trippers

Coulter Strip Till Units

Fall and Spring usage

Fertilizer mixed in 5” x 5”

Residue chopped and mixed

Less aggressive tillage

Shank to Coulter option

Reduced Till Starts with the Combine

Even distribution of chaff and straw =

- Even temp and moisture
- Better planter performance
- Even germination

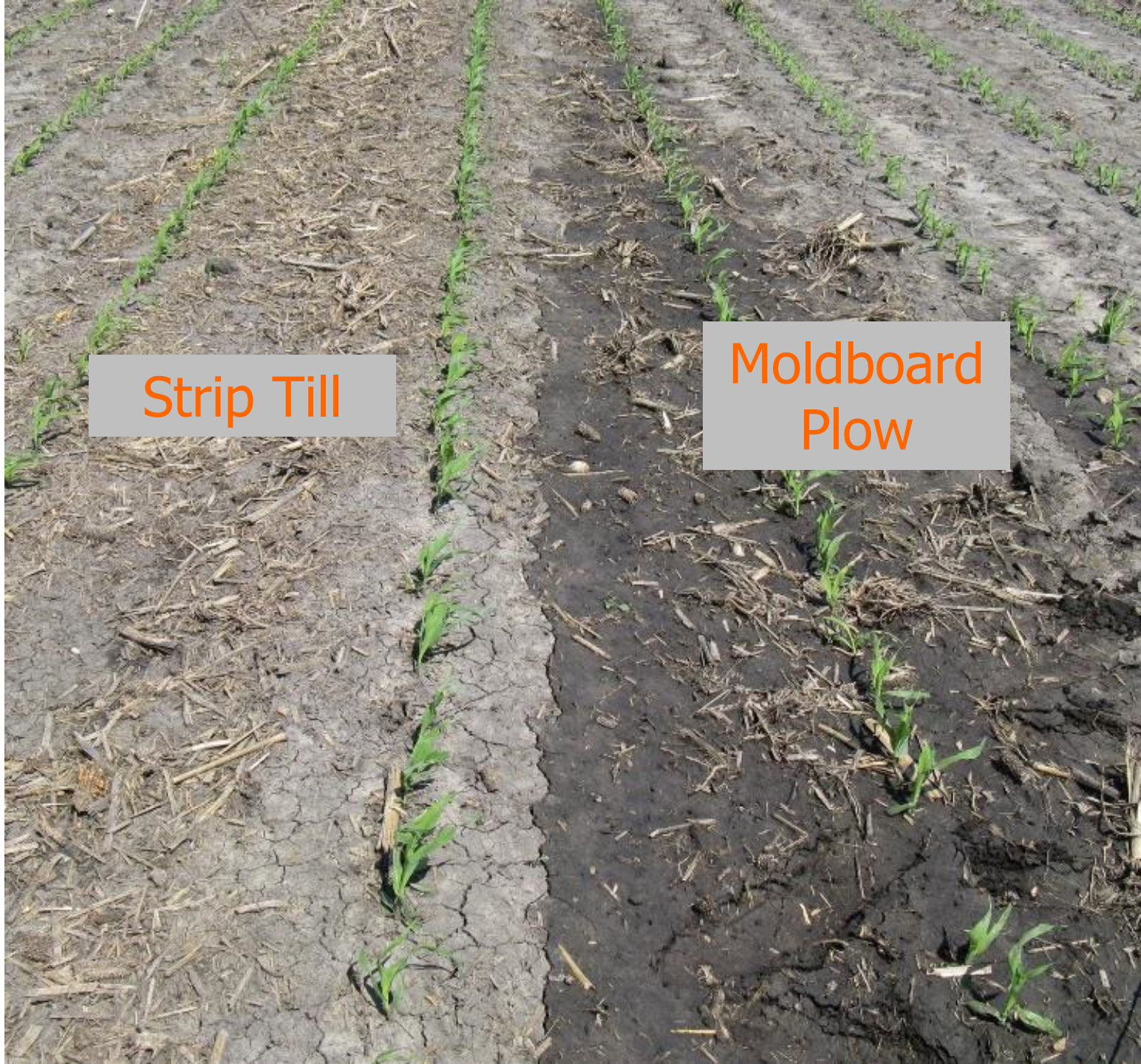
Photo: Dorian Gatchell, MN Ag Services

Planter Settings

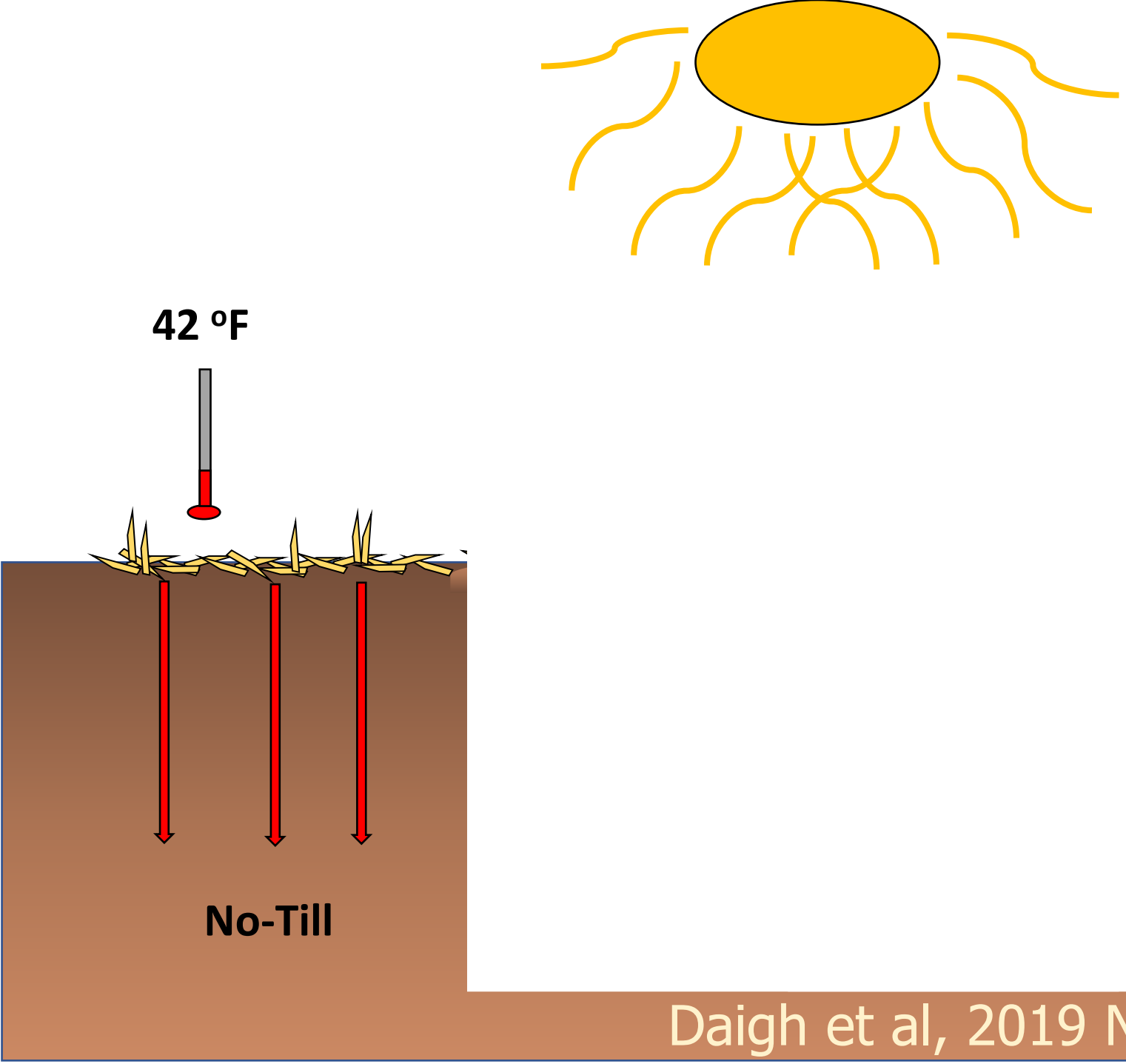
- Residue managers
- Sharp coulters/disk
- Everything in new and working order

Reduced Tillage Concern #1

Reduced tilled fields won’t warm-up or dry in time for early planting

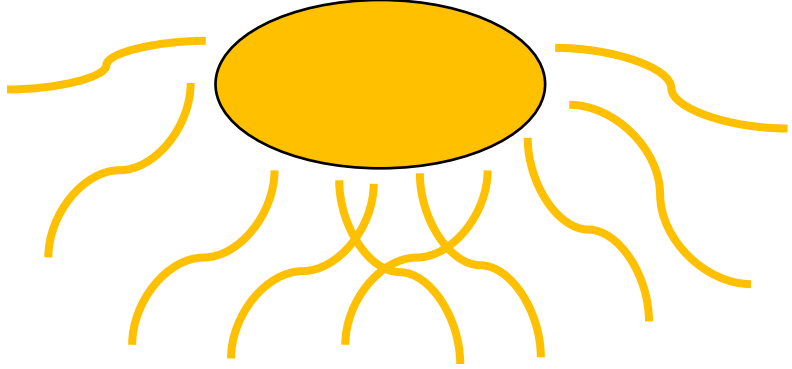


Average temperatures of the three farms



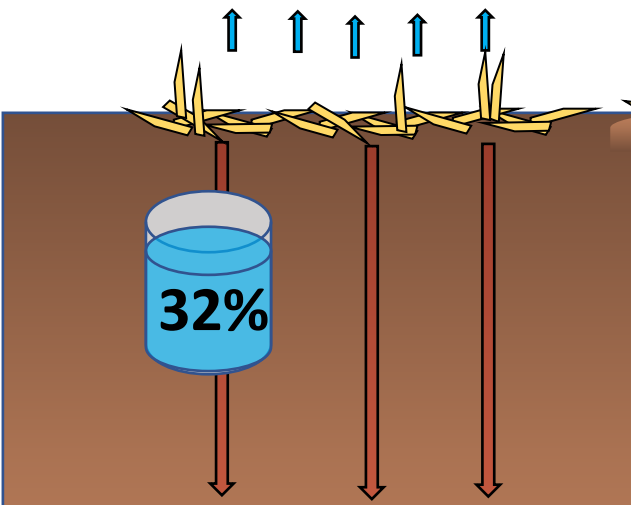
Daigh et al, 2019 NDSU

Saturated Soil



Average water content of the three farms

Water



Daigh et al, 2019 NDSU

Nitrogen Loss

Denitrification in a Saturated Soil

Can Lose **2-4** lbs of Nitrogen/ac/day

Photo Courtesy of Dave Franzen, NDSU

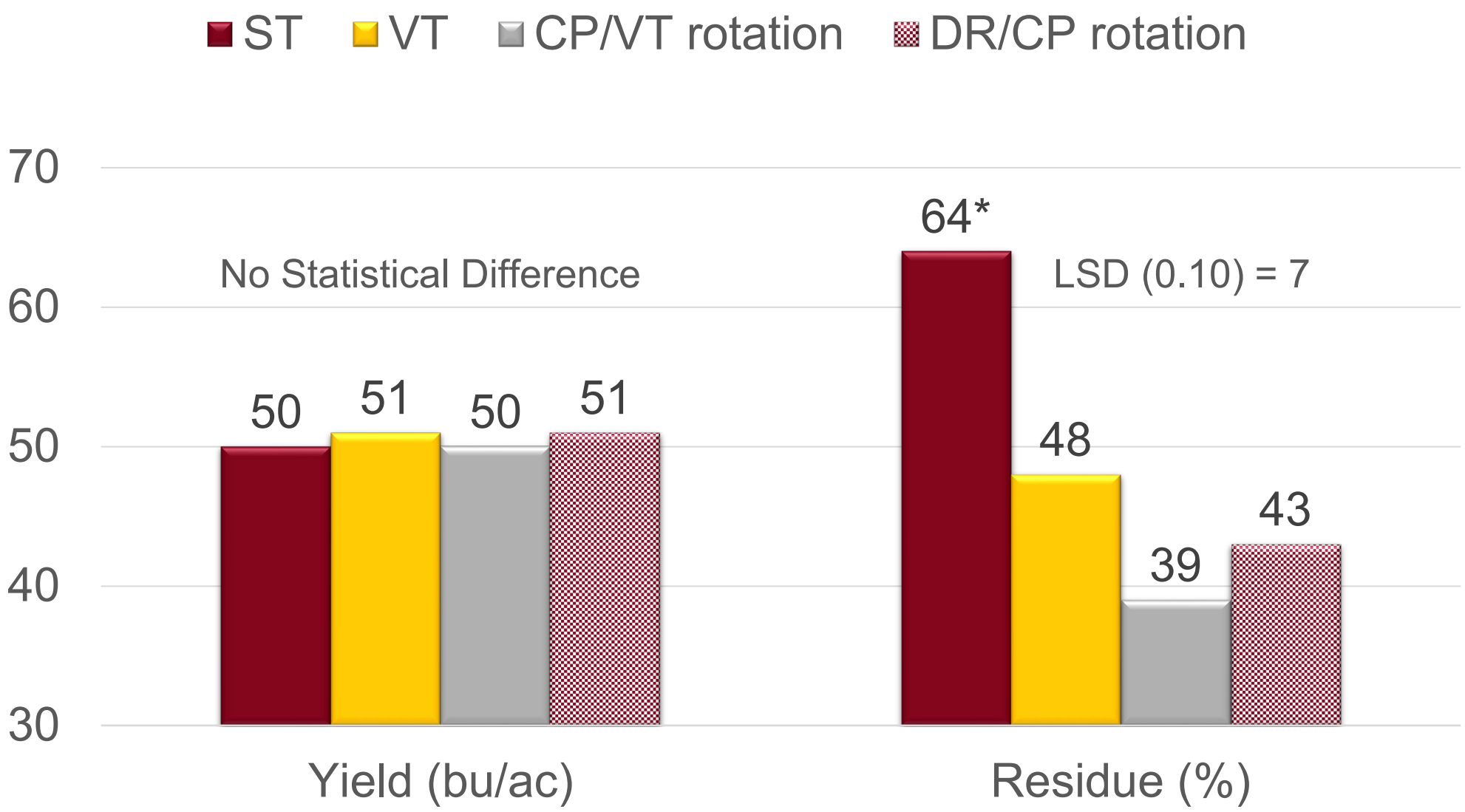
Reduced Tillage Concern #2

Yield Will Suffer

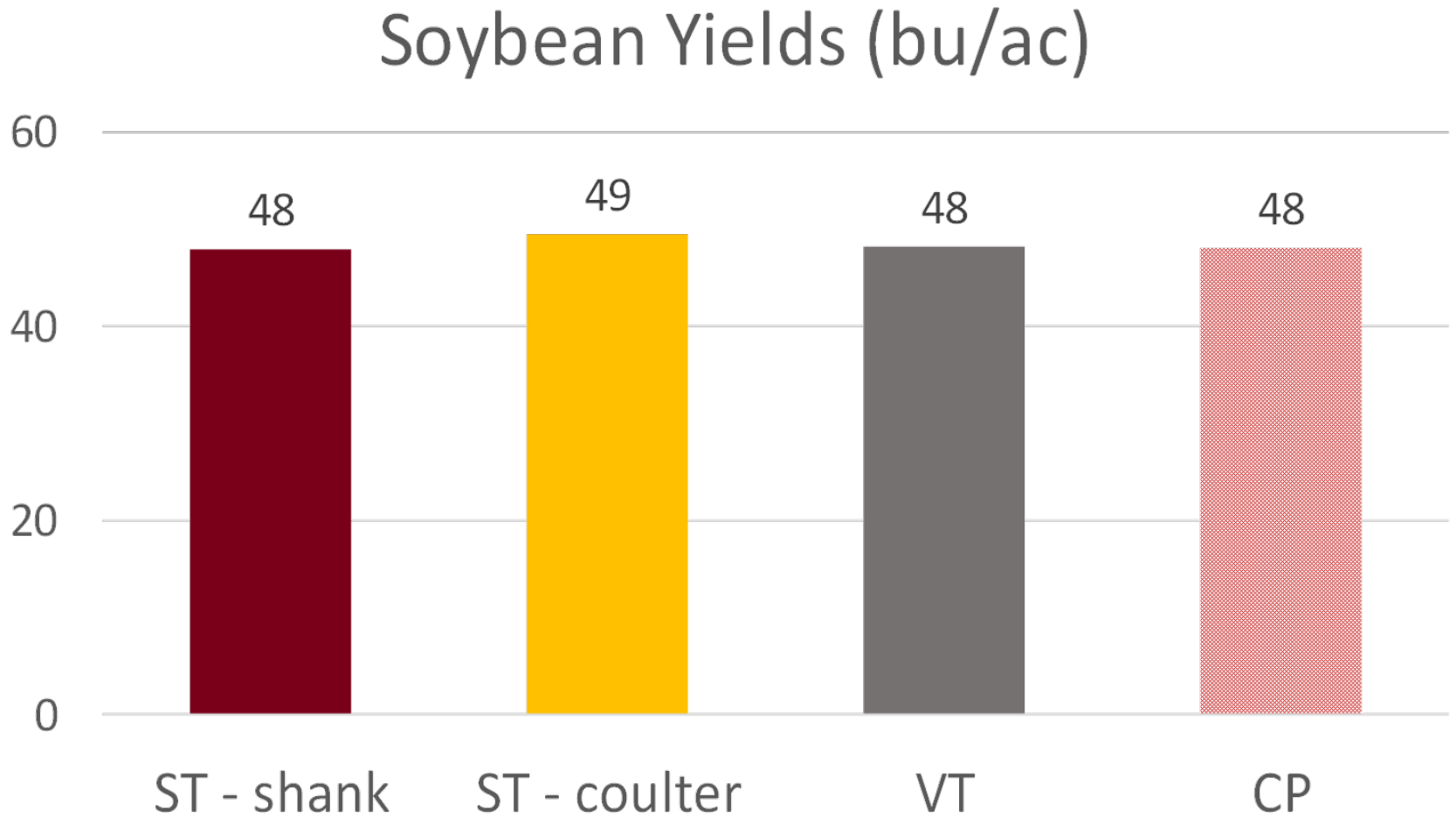
Photo courtesy of MN Ag Services

90% of Research Conducted in Farmer's Fields

3-Year Yield and Residue Averages in WC MN (2010-12)



4 Site Years of Soybean Yields
Fergus Falls and Barney (2015-18)



No statistical difference

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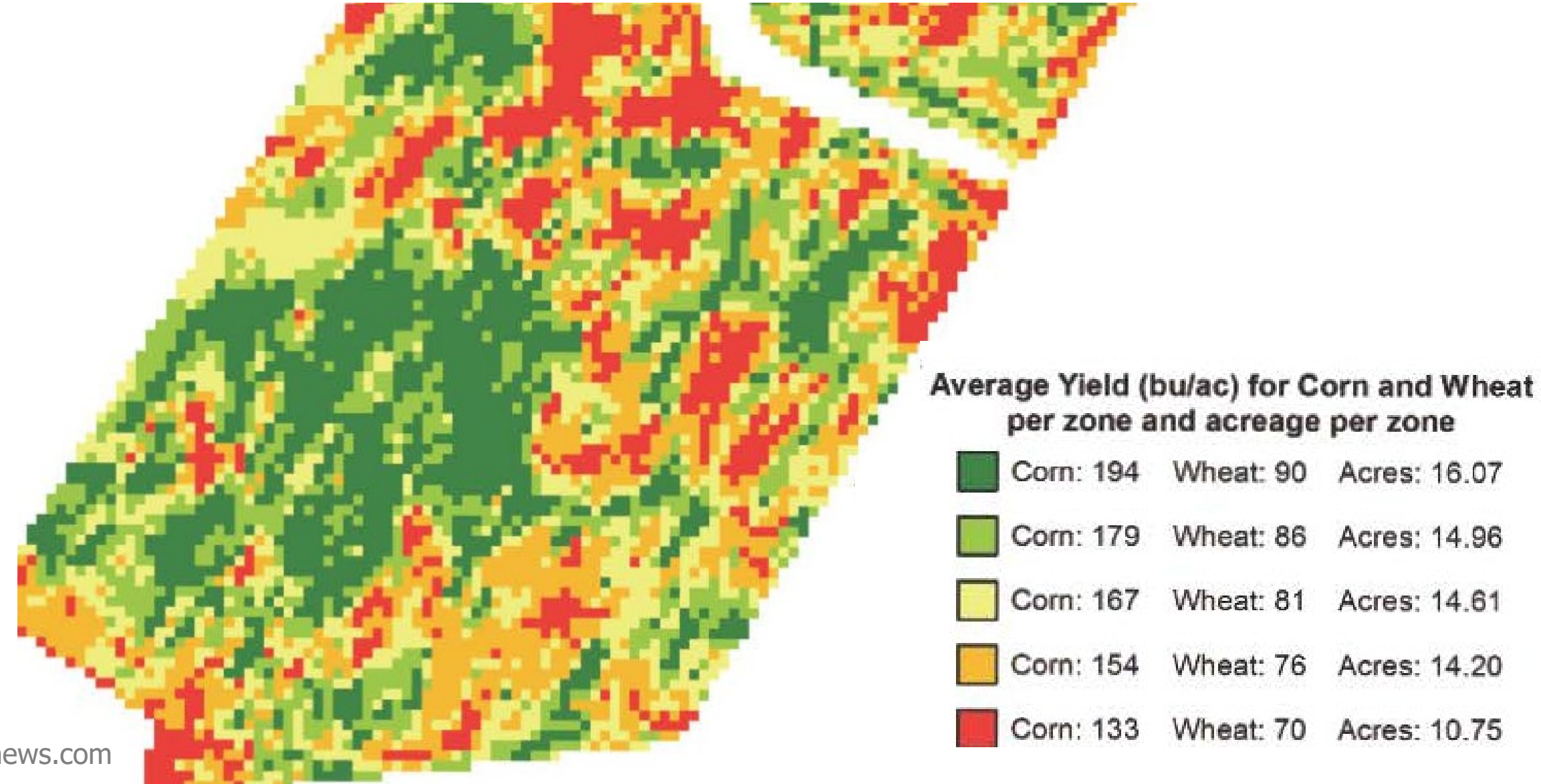
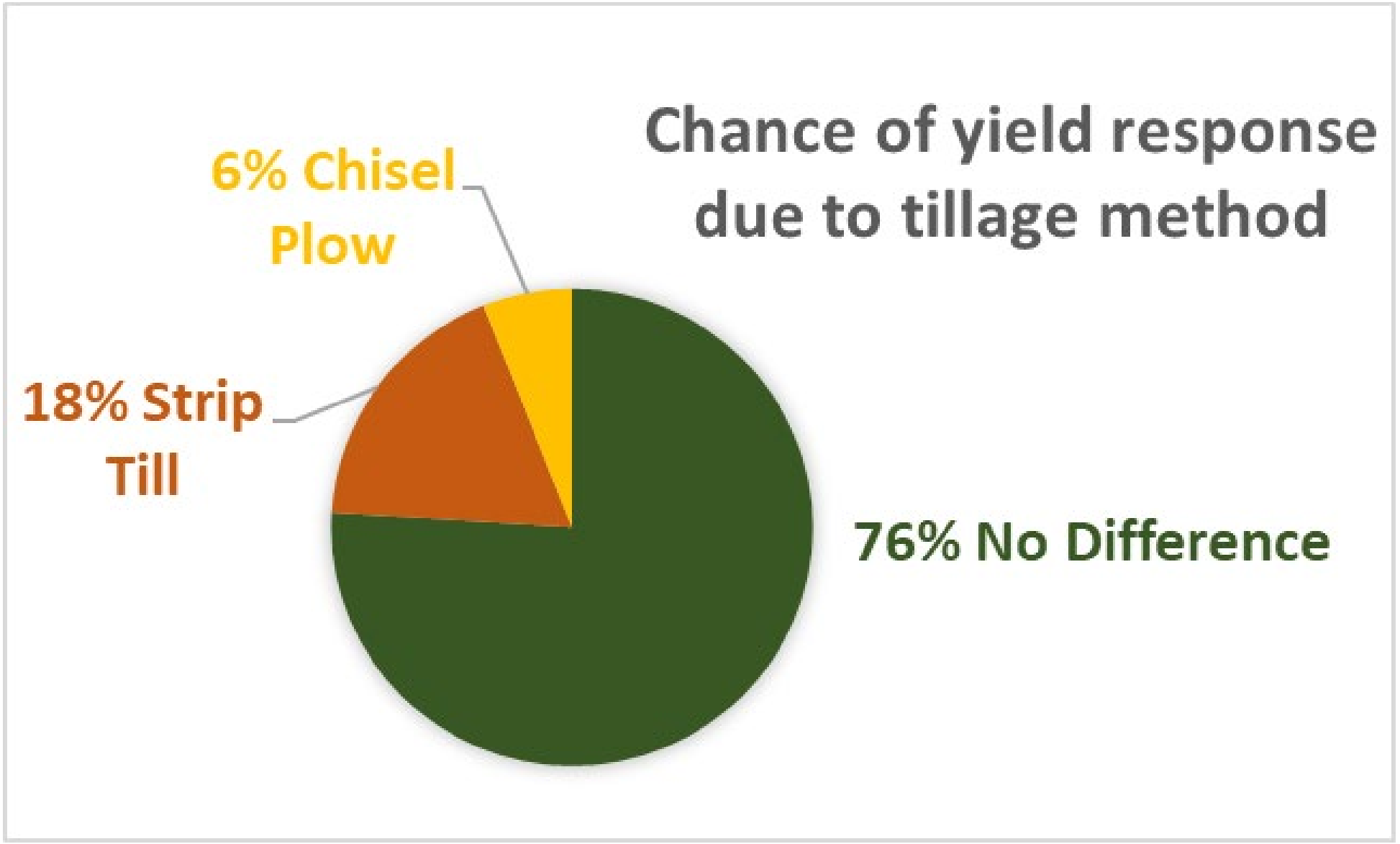
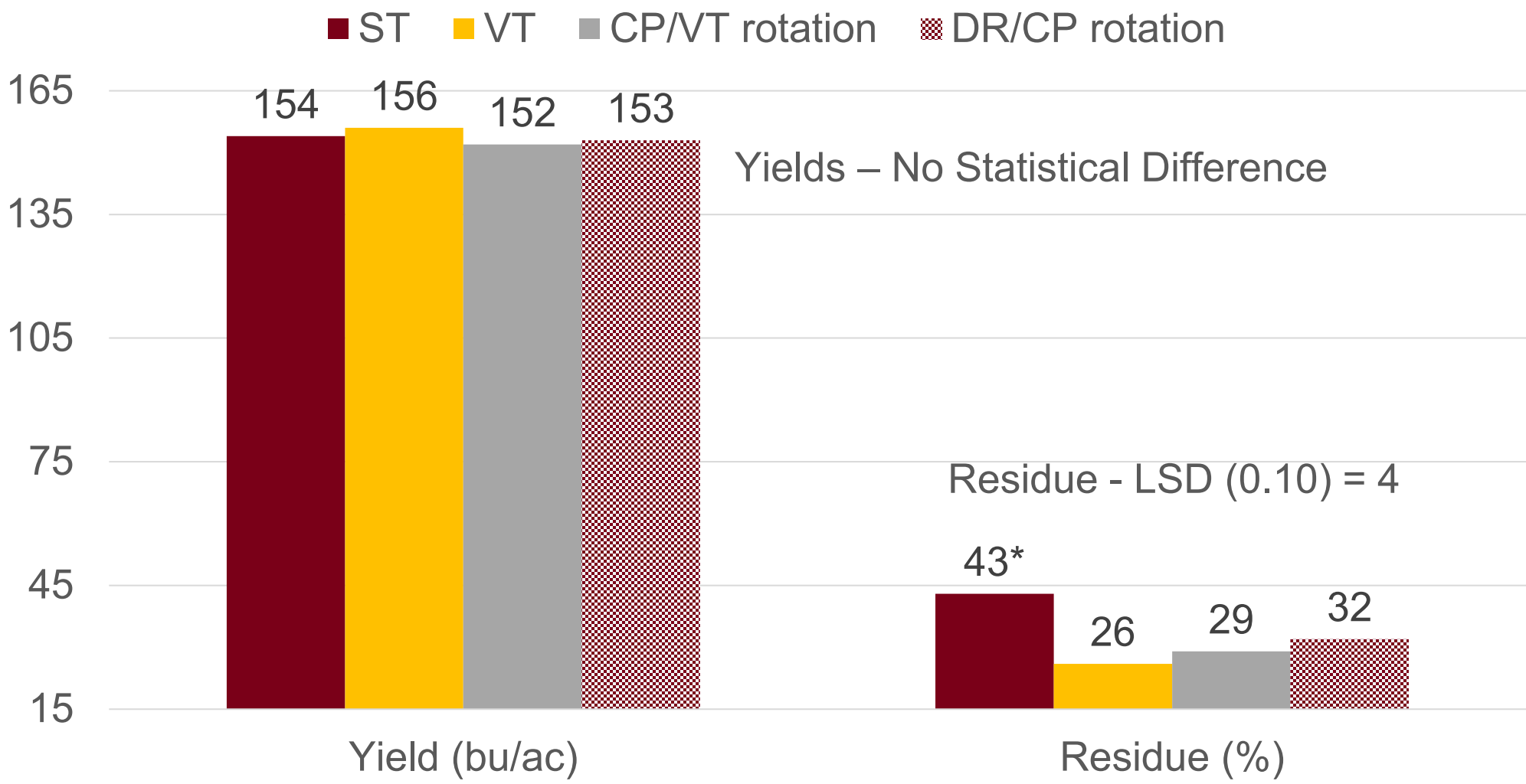
Yield Variability and Statistics



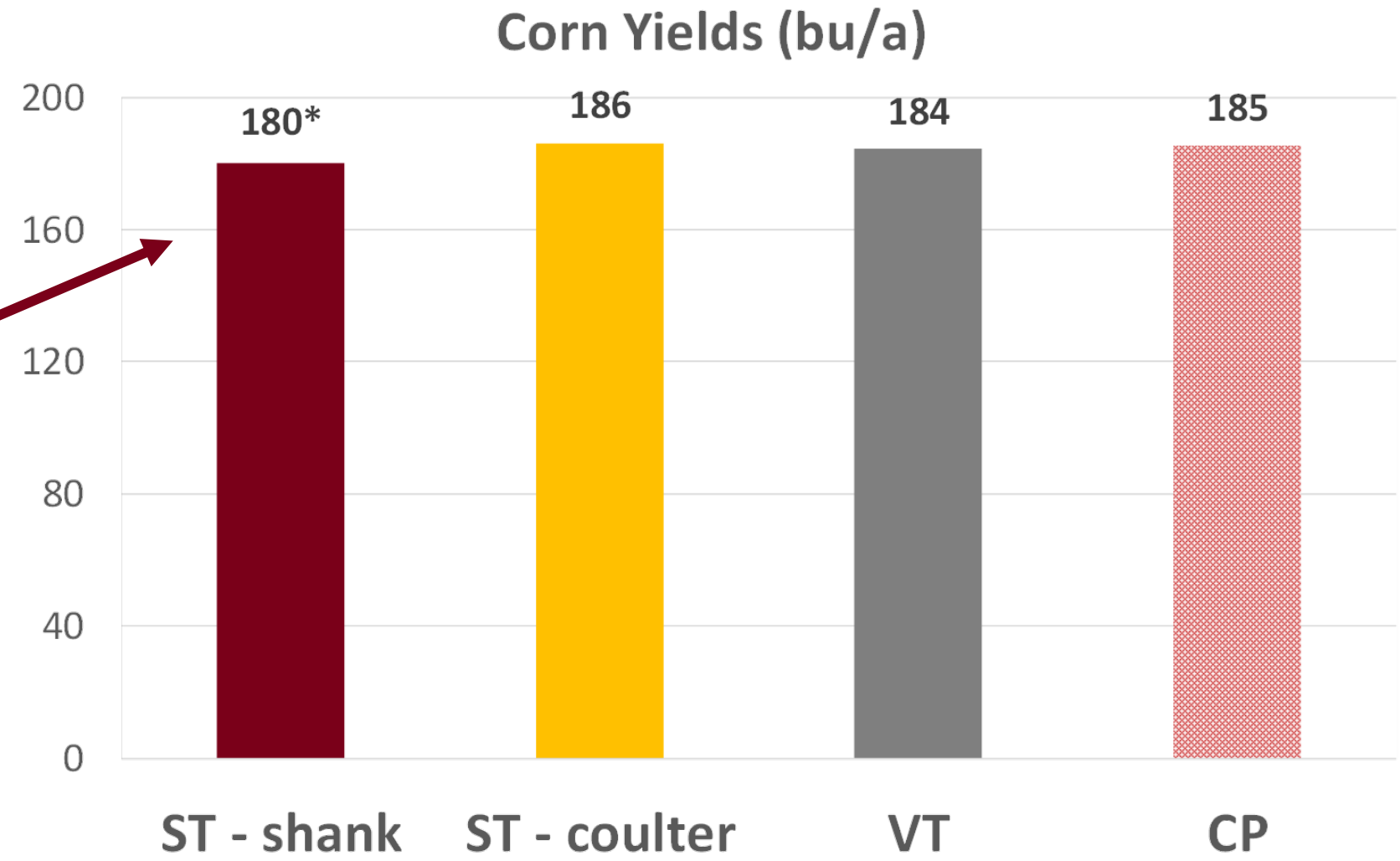


Soybean yield response to tillage for 17 site years in E. North Dakota and NW Minnesota (2005 – 2012)

3-Year Yield and Residue Averages in WC MN (2010-12)



Ave of 4 Site Years of Corn Yields Fergus Falls and Barney (2015-18)



*1 site – planted after rain and smeared soil

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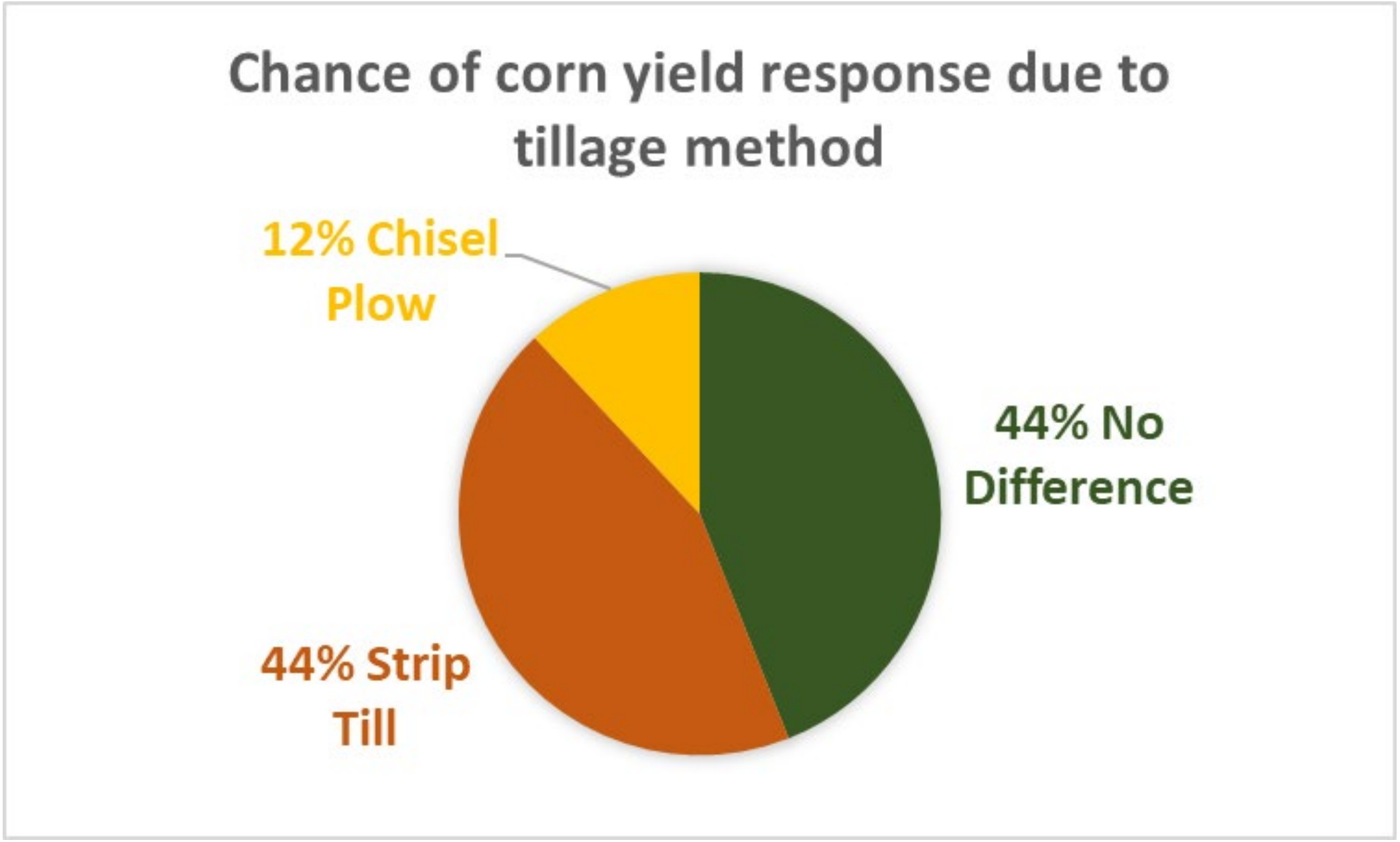
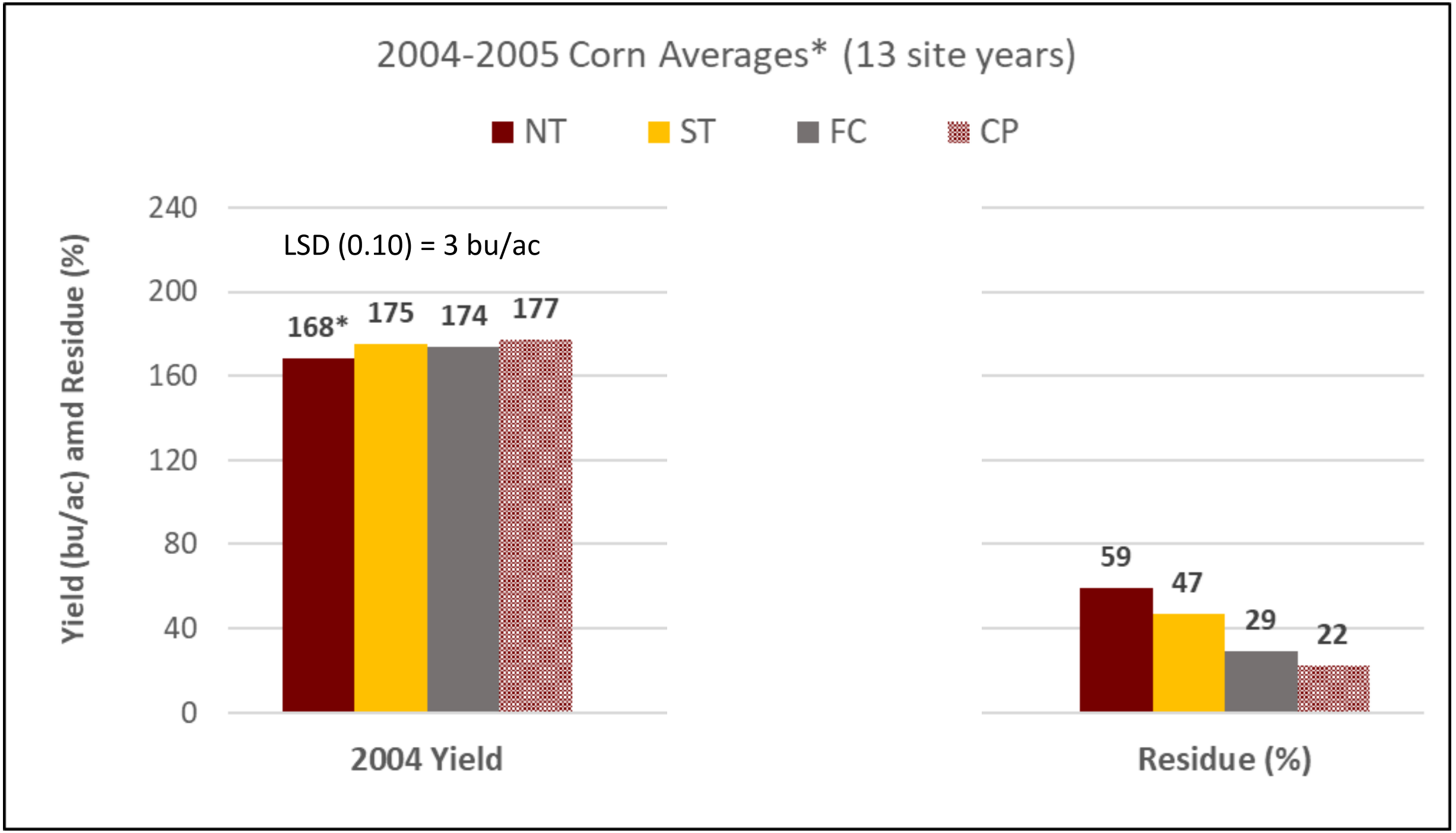


Corn yield response to tillage for 18 site years across E. North Dakota and NW Minnesota through 2005 - 2012.

Weather Has More Effect on Yield Then Tillage


2004-2005 Corn Averages* (13 site years)
NT
ST
FC
CP
Yield (bu/ac) amd Residue (%)
240
200
160
120
80
40
0
LSD (0.10) = 3 bu/ac
168*
175
174
177
59
47
29
22
2004 Yield
Residue (%)

Tillage Costs per Acre

Assumptions:

- $2.75 diesel
- $20.00 labor
- 1,400-acre grain farm
- New tractor and implement overhead
- Not adding additional cost of chopping head
- Costs include overhead (depreciation, interest, insurance, housing and repairs), fuel and labor charges.

Source: July 2022, Farm Business Management, University of Illinois Extension

Soybean Tillage Costs

	No-till	1 pass ST	1 pass SpD	1 pass FC
First Implement	0	$17.30	$14.30	$11.10
No-till or Conventional Planter	$19.00	$19.00	$17.20	$17.20
Total cost/ac	$19.00	$36.30	$31.50	$28.30

Corn Tillage Costs

	Strip till	CP + FC	DR + FC
First Implement	$17.30	$13.60	$27.70
Liquid fert applicator (40’)	0	$ 7.70	$ 7.70
Second Implement	0	$11.10	$11.10
No-till or Conventional Planter	$19.00	$17.20	$17.20
Total cost/ac	$36.30	$49.60	$63.70

Remember in dry years, there is “natural tillage”

Challenges

- Learning curve
- Not everyone can do it
- Resources
- Perennial weed shifts
- Skepticism from neighbors

Summary

- We’ve overestimated the importance of tillage effect on yield
- Each tillage pass costs money ($11-30/ac)
- Increases soil erosion (3 - 20 T/ac)
- Lost soil costs money ($25 per ton)

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