Corn Stalks Add Value for Nebraska

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NebGuide

University of Nebraska–Lincoln Extension, Institute of Agriculture and Natural Resources

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G1846
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Harvesting Crop Residues

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residue. For wheat, suggested values are 11 lb N, 3 lb P_2O_5, 15 lb K_2O, and 2 lb S. Harvesting crop residues also removes cations (positively charged ions) such as calcium, magnesium, and potassium, which help neutralize soil acidity. This suggests that more lime will be needed eventually. Harvesting 1 ton of corn resi
lb of lime
value of

Table I.

Recent UNL and ARS studies

Considerations

- Value of nutrients removed
- Effects on
  - Erosion: water and wind
  - Soil water
  - Crop yield
  - SOM
  - Soil compaction
- Cover crops, double cropping for forage production, and manure application

Value of nutrients

How much crop residue is produced?
Estimate 1 t per
- 40 bu corn
- 30 bu soybean
- 20 bu wheat

r value of nutrients in one ton of corn residue.
urrent fertilizer nutrient values as appropriate in
d calculate the $ values in column e.

Element	tion ue %	Pounds Per ton lb/ton	Fertilizer* Nutrient Price $/lb	Value of Nutrient In residue $/ton
a	*b*	*c = b/100 x 200*	*d*	*e = c x d*
N	0.85	17	$0.60	$10.20
P_2O_5	0.2	4	$0.90	$3.60
K_2O	1.7	34	$0.40	$13.60
S	0.15	3	$0.50	$1.50
Total value				$28.90

*Prices May 2012

Nutrient contents (lb/t residue)

	Corn/milo	Soybean	Wheat
N	17	17	11
P_2O_5	4	3	3
K_2O	34	13	15
S	3	2	2

Water erosion: cont. corn

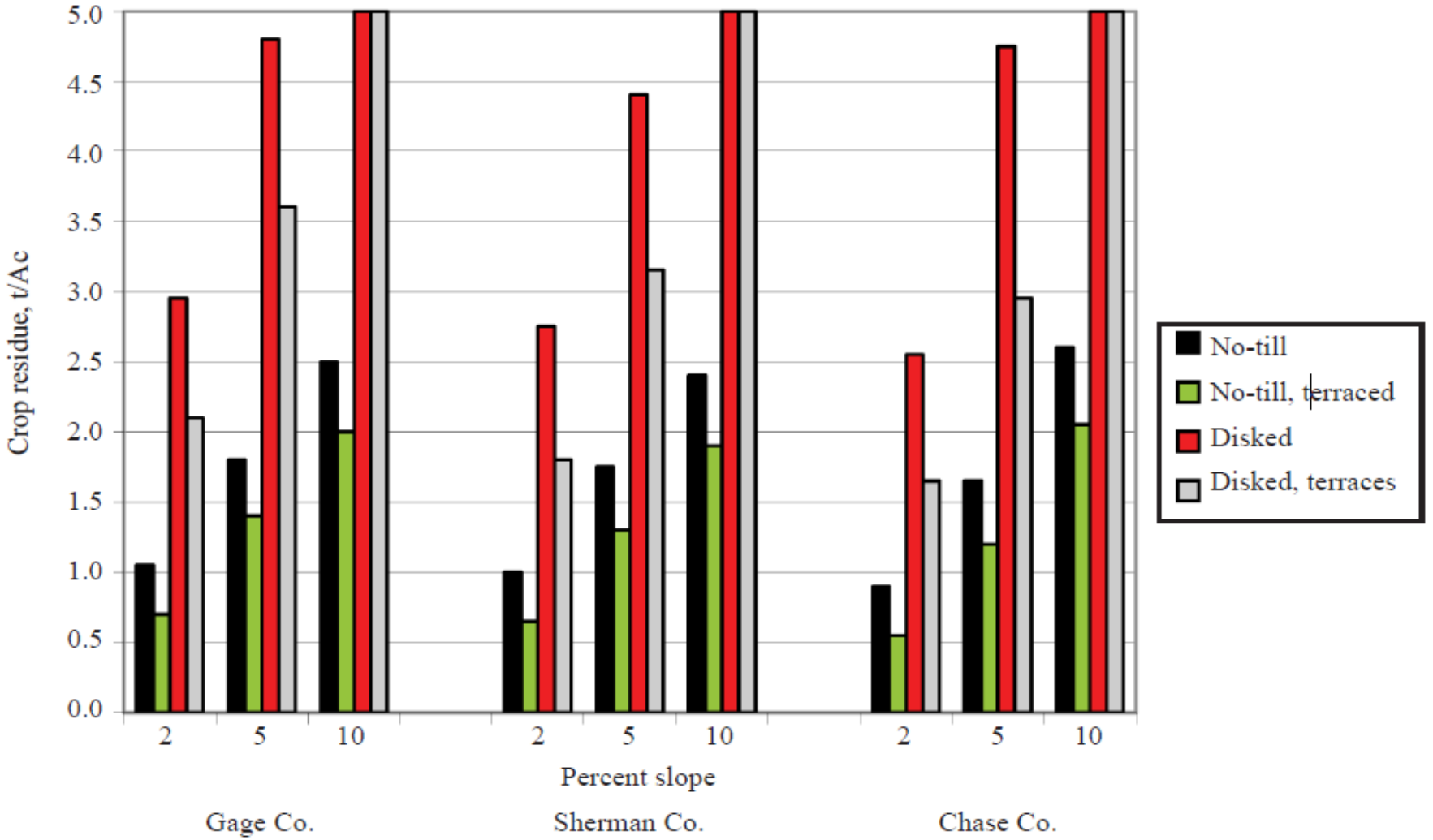
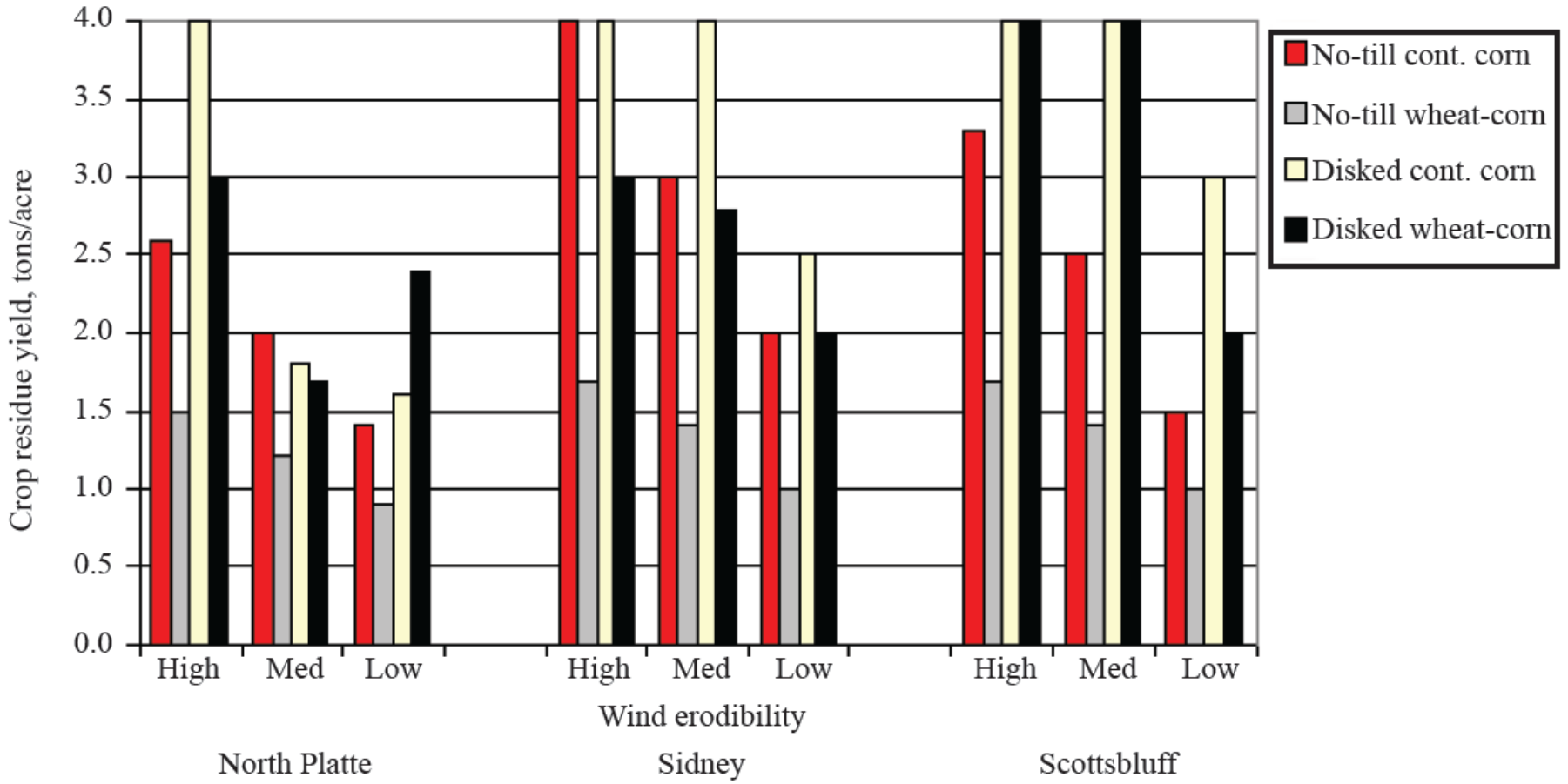


Figure 1. Crop residue needed to keep water erosion to below 5 ton/acre/year for silt loam and silty clay loam soil on three slopes in three counties of Nebraska. Bars reaching the upper limit of the chart indicate that more than 5 ton/acre of crop residue needs to remain as ground cover in the field.

Wind erosion

Residue needed for <5t/ac/yr erosion by wind



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Soil water

- Crop residue benefits
  - Reduced evaporation
  - Trapped snow
  - Reduced runoff and increased infiltration
- How much reduction in crop available water with residue removal?
  - 0-5”

Soil organic matter

- Below ground biomass is especially important to maintaining SOM
- Results of two USDA-ARS studies at ARDC
  - Rainfed, marginal soil
  - Irrigated, good soil

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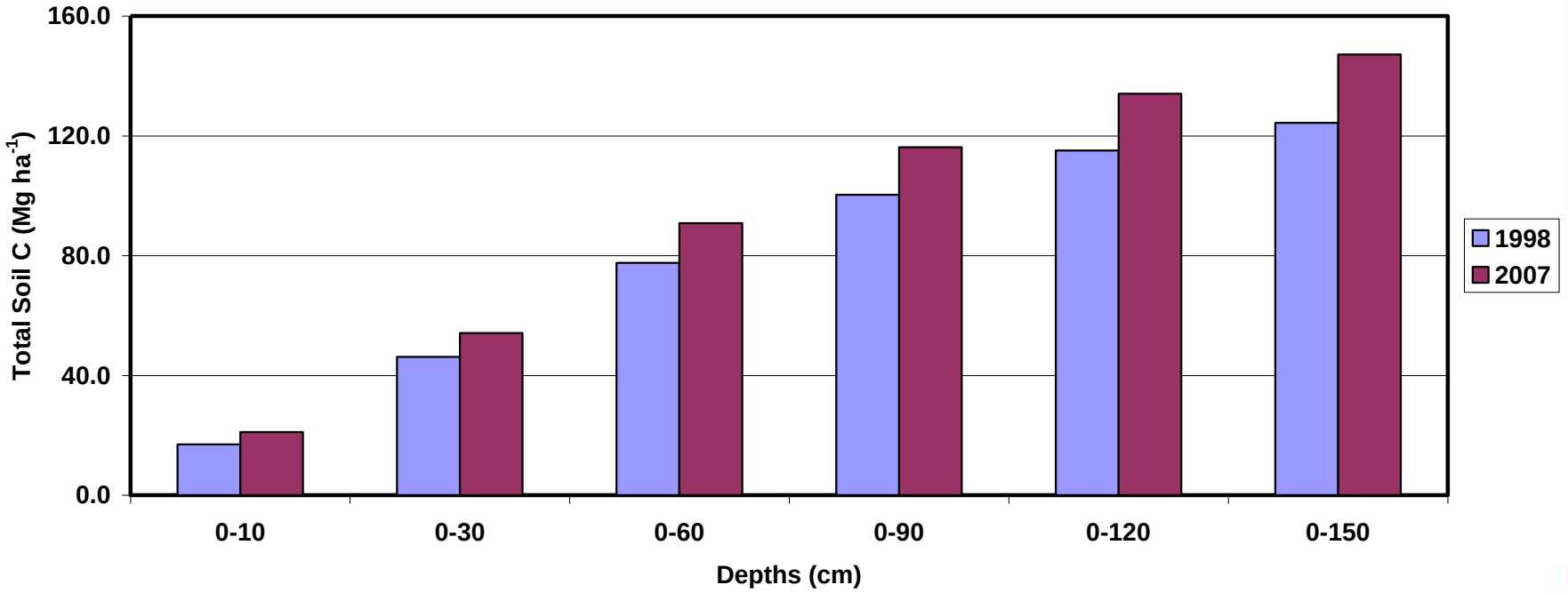
Rainfed corn on 2% SOM soil: an increase in soil organic C with and without removal on 12 years!



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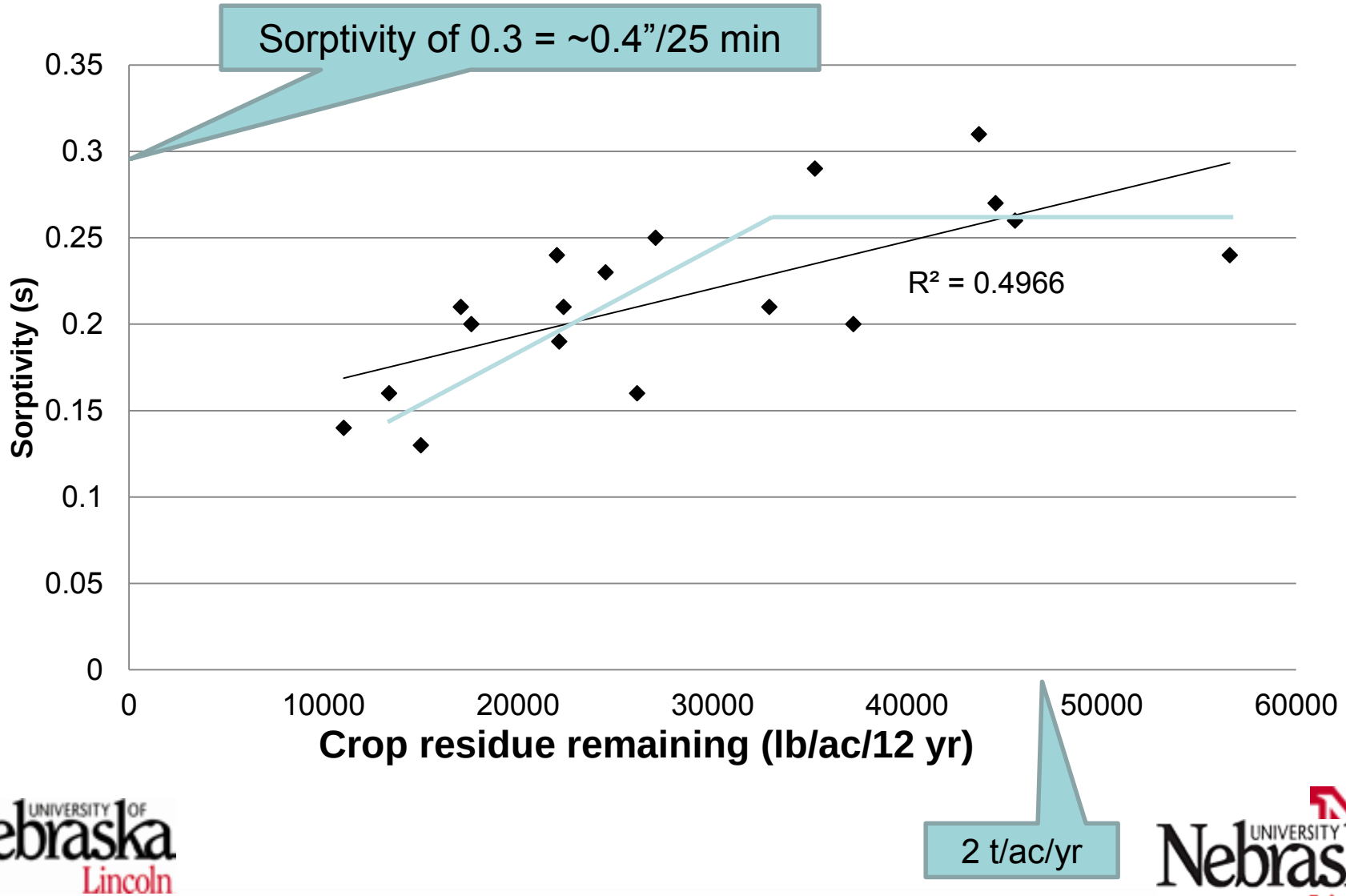
Irrigated with >3% SOM:

- Disk compared to no-till
- Removal at 0, 40, 80%
- A small **decrease** in soil C over 10 yrs for all treatments **except no-till with no removal**

Residue removal and soil organic matter

- Concern for soil chemical, physical and microbial properties
- Suggested: leave an average of >2 t/yr

Water infiltration: dryland farming in CO



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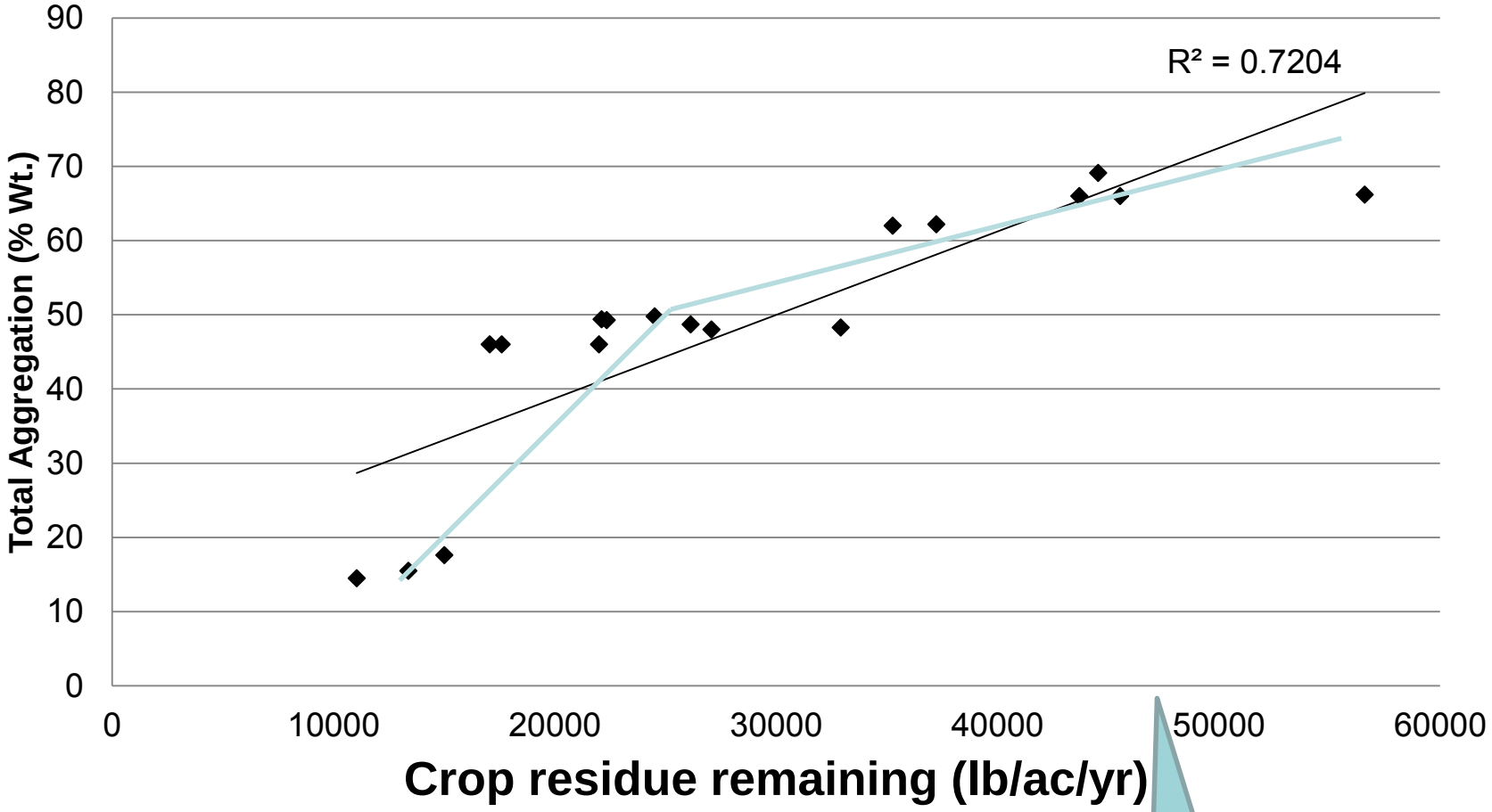
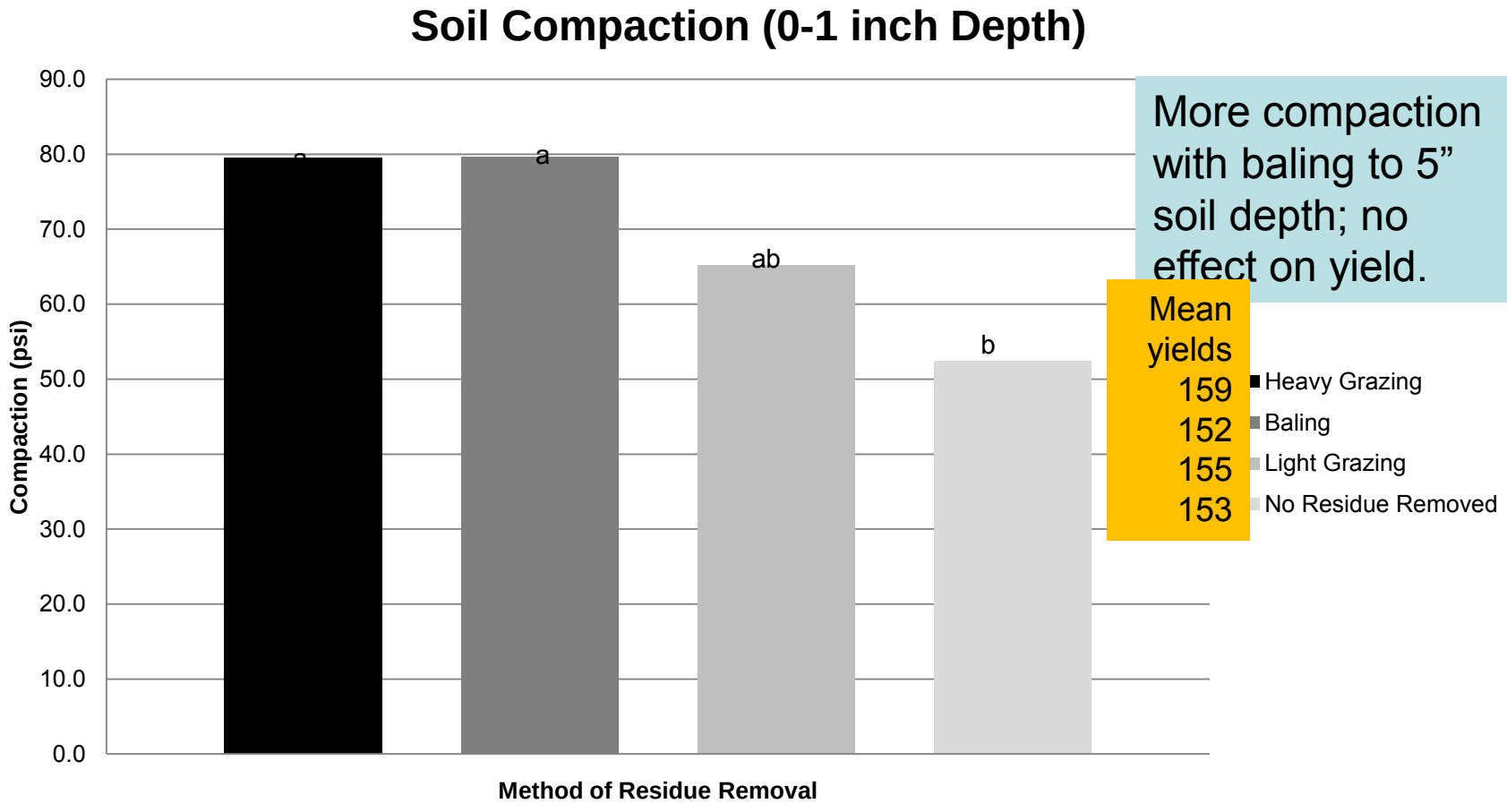
Aggregates (water stable); 0-1” depth



2 t/ac/yr

Soil Compaction (Brule NE)



More compaction with baling to 5" soil depth; no effect on yield.

Mean yields
159
152
155
153

Effects on crop yields

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No-till corn grain yield in the rainfed study at Mead, NE (2001-2010).

N rate lb/ac	% stover removal	Grain yield bu/ac
60	0	88
60	54%	82
120	0	116
120	53%	115
180	0	114
180	53%	116

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Grain yield: irrigated continuous corn at ARDC (2009-2010; after 9-10 yrs).

Tillage	Stover removed	Grain yield
	%	
Disk	0	202
	36	207
	76	212
	Mean	**207**
No-till	0	181
	39	206
	81	202
	Mean	**196**

Yields with grazing of stalks: no-till corn-soybean rotation; 17 years

Study years	Following crop	Spring grazed	Fall grazed	Ungrazed
1996-2011	Soybean	61.7	62.4	60.4
	Corn*	207	209	206

*The corn yield was for the second crop after grazing.

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Manure and cover or forage crops

- Manure application supplies nutrients and organic material
- Cover crops and double cropping with forages can be valuable in reducing water and wind erosion and may contribute to SOM

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Stover removal and N rates

- Can we reduce N rates because of less N immobilization?
- Research at 3 sites in 2013 and 2014:
  - 0 and ~75% stover removal
  - 6 N rates
  - Will the N response curves differ?

Double-cropping for forage production: on-farm trials

- Brassica B/C sown into seed corn
  - when male rows are taken out
  - Corn harvested by early September
  - Brassica and stover grazed by steers Nov-Feb
- Drill-sown winter rye after corn silage
  - Spring grazing by cows/cow-calf pairs
- Effects on animal performance, yield of following crop, potential for nitrate leaching, depletion of soil water

Recap:

- Crop residue cover is important to erosion control
- Rainfed Site – Marginal Soil
  - Increase SOM to 5’ with and without stover removal for 10 yr
- Irrigated Site – Productive Soil
  - Reduced SOM for all treatments except for no-till with no residue removed
- 2 t/ac/yr generally adequate to maintain soil productivity if erosion is controlled

N

Recap

- In Corn Belt, an average corn yield increase with residue harvest; small soybean yield increase with grazing
- In semi-arid western Nebraska, a 30 bu yield loss occurred in **one rainfed** case
- No yield loss after 4 years with irrigation at Brule NE

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EC711

Baling Corn Residue

A Decision Support Tool to Evaluate the Economics

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Robert N. Klein, Extension Western Nebraska Crops Specialist
Bo Liu, Extension Cropping Systems Disease Management Specialist
Tim M. Shaver, Extension Nutrient Management Specialist
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EC711

Removing corn residue by baling is widely practiced

Removing residue affects many processes and can lead to greater evaporation and runoff of water, and reduced soil aggregation (*Figure 1*). Removing residue also may increase erosion and weed pressure, and will remove nutrients from the field, resulting in increased fertilization cost. Conversely, removing residue may decrease disease pressure and, if abundant amounts of residue are present, make planting the next crop easier.

Considering all the relevant factors can make decisions about harvesting corn residue challenging. That's why a decision support tool (Microsoft Excel® spreadsheet) was developed to help producers estimate the costs and returns associated with removing corn residue. This user-friendly tool requires data that producers can easily obtain and provides information to help producers decide whether to bale corn residue. This publication includes a step-by-step guide to completing each work-

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Grazing Cornstalks

A Decision Support Tool to Evaluate the Economics

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EC290

This tool was designed to be helpful to producers across the state. Because conditions vary widely, not all features of the tool will be applicable in every instance. If a particular feature does not apply to your situation, just leave that segment blank.

This tool is similar to one designed to evaluate the economics of baling cornstalks called *Baling Corn Residue — A Decision Support Tool to Evaluate the*

Thank you!

Questions or comments??

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