CROP RESIDUE MANAGEMENT AND SOILS

Humberto Blanco

DeAnn Pressley

CELLULOSIC ETHANOL PRODUCTION

- Several cellulosic ethanol plants will start operations between 2012 and 2014.
- Feedstocks: Corn stover and wheat straw

MANY QUESTIONS

- What are the effects of crop residue removal on soil quality?
- It is possible to remove a fraction of crop residues without affecting soil and water quality, soil C sequestration, and crop yields for different soils and crops.?

POSITIVE IMPACTS OF RESIDUE REMOVAL

Improve farm economy (Marketing excess residue produced).

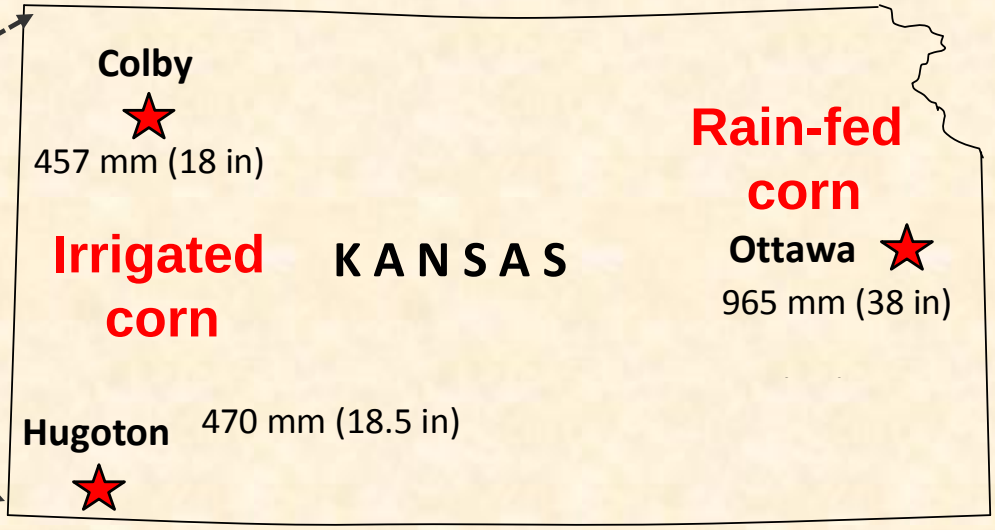
In some soils, residue removal may:

- **promote soil warming.**
- **increase seed germination.**
- **reduce pests.**
- **increase crop yields.**

HOW ABOUT NEGATIVE IMPACTS OF RESIDUE REMOVAL?

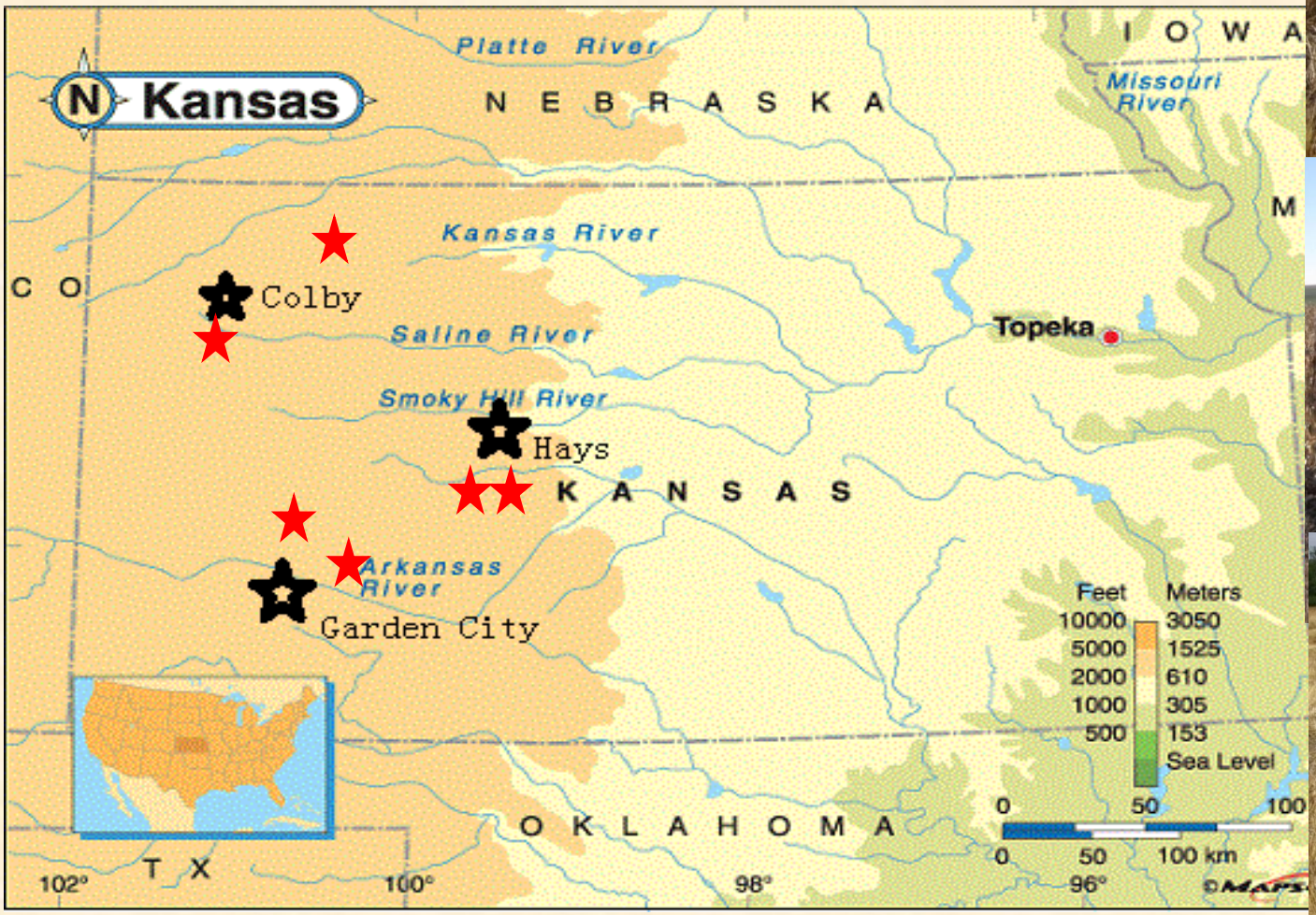
CORN STOVER REMOVAL FROM IRRIGATED AND RAINFED NO-TILL SOILS IN KS: Experiment established in spring 2009

(Ian Kenney, DeAnn Presley, Humberto Blanco, Brian Olson, and Keith Janssen)



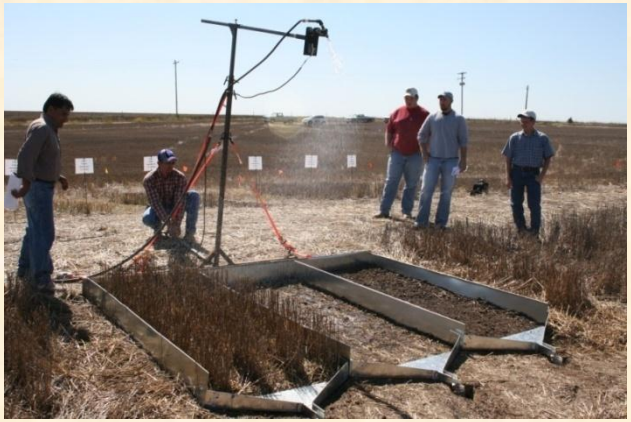
WHEAT AND SORGHUM RESIDUE REMOVAL IMPACTS ON SOIL AND CROP YIELDS IN KANSAS: ON-FARM AND PLOT RESEARCH

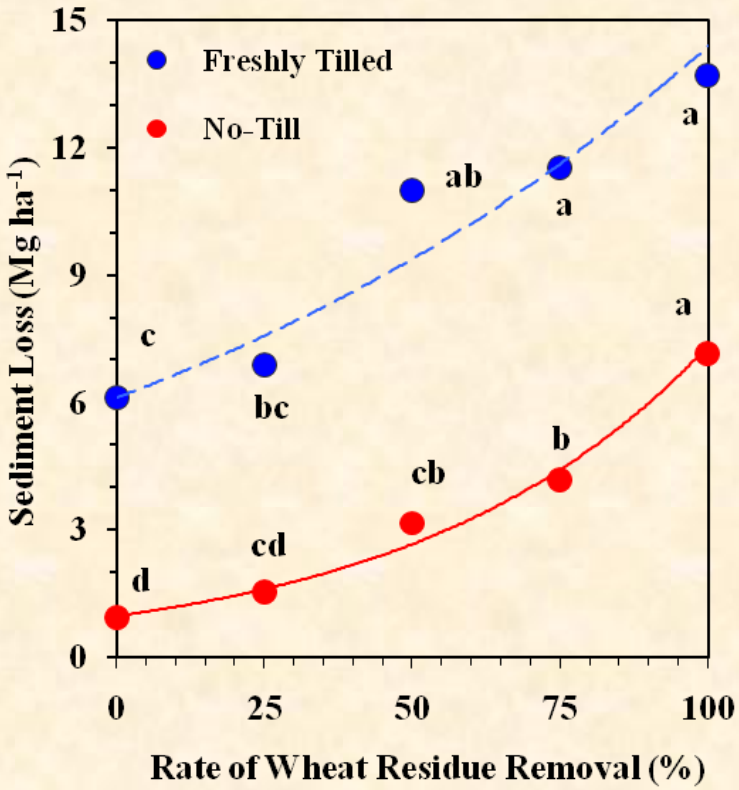
(Yuxin He, Humberto Blanco, John Tatarko, DeAnn Presley, Scott Sttagenborg, and Gerard Kluitenberg)

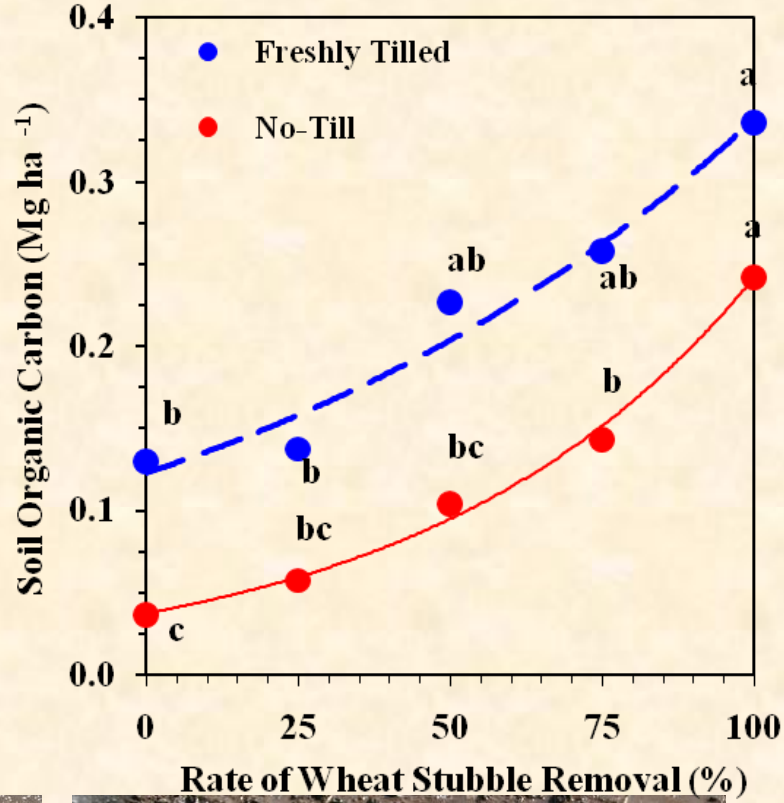


WHEAT STRAW REMOVAL ON WATER EROSION: HAYS

Soil slope
6%



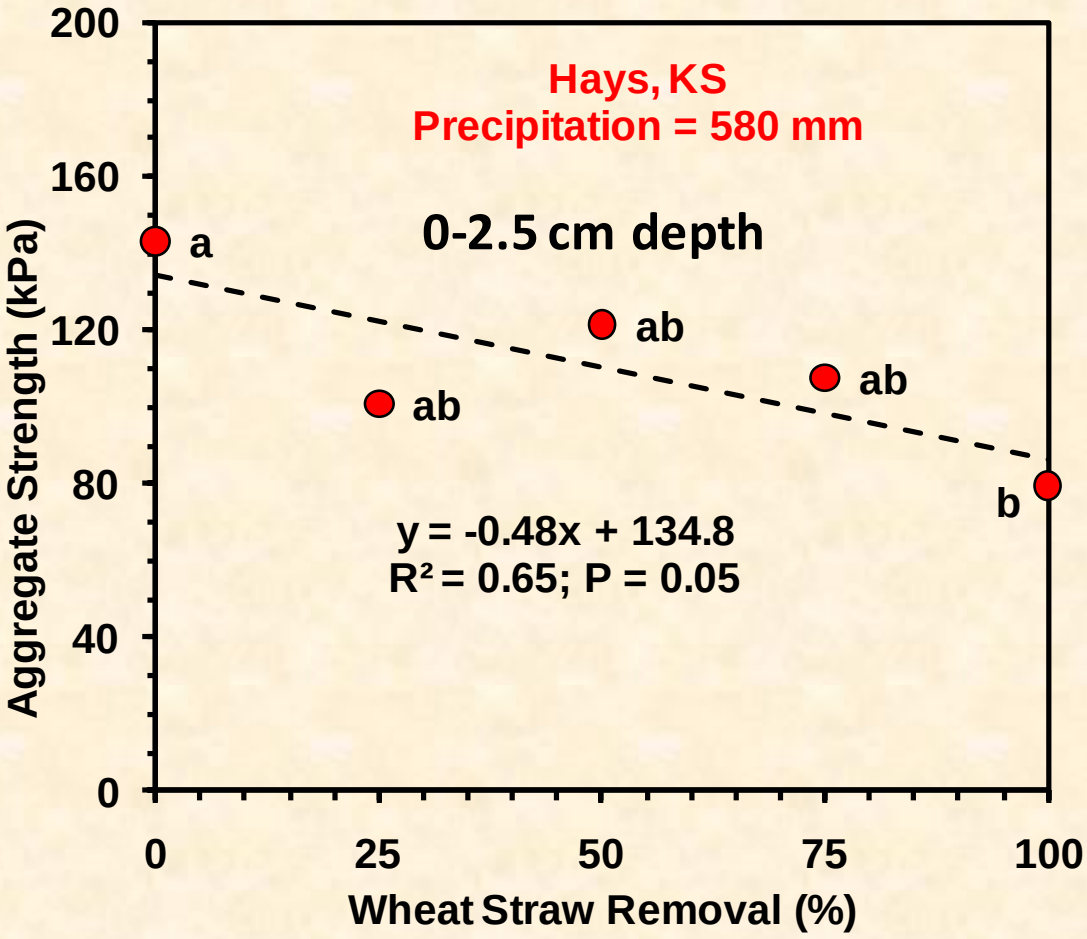


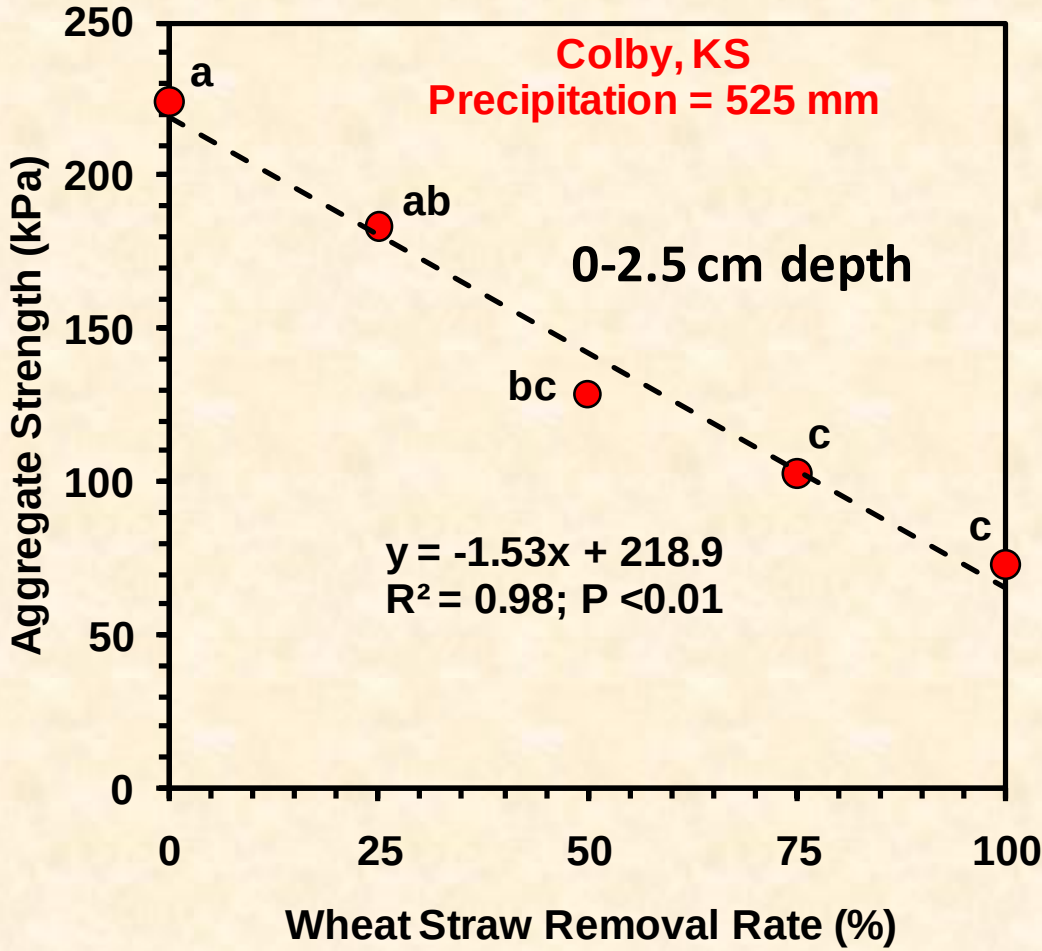


RESIDUE REMOVAL VERSUS SOIL WATER USE

- **Biofuels vs. the Great Plains.**
- **About 100 L irrigation water needed for 1 L corn ethanol.**

WHEAT STRAW REMOVAL INCREASES SOIL'S SUSCEPTIBILITY TO WIND EROSION: Experiments in Hays and Colby: 2 years after removal

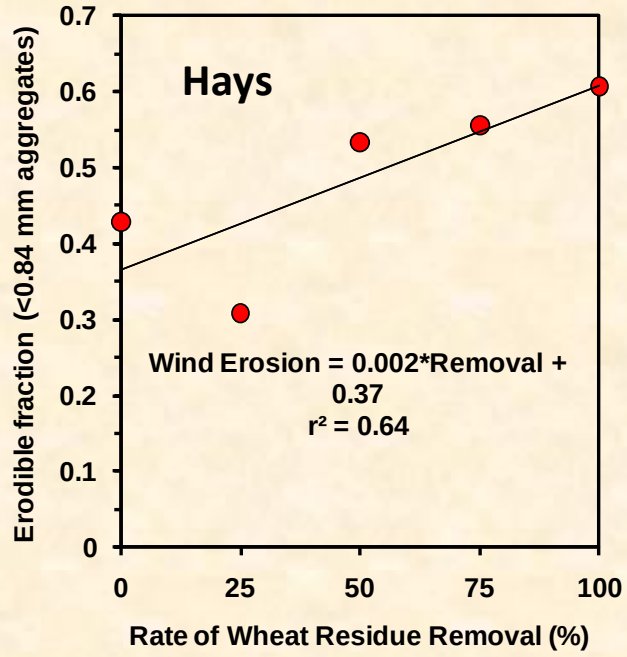


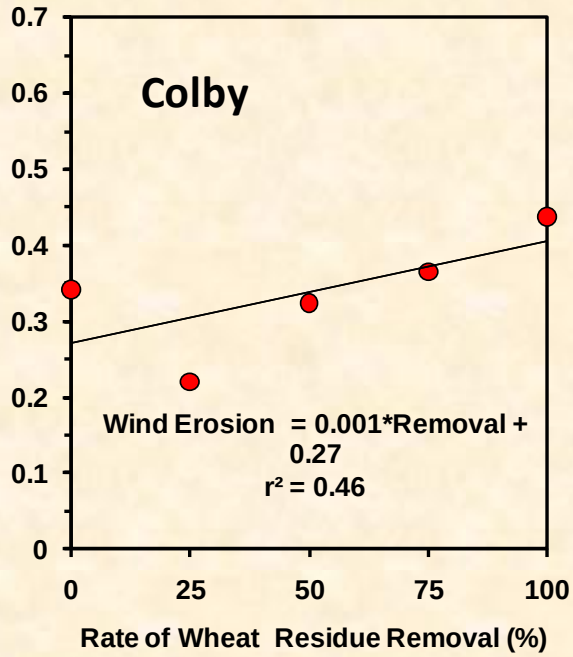


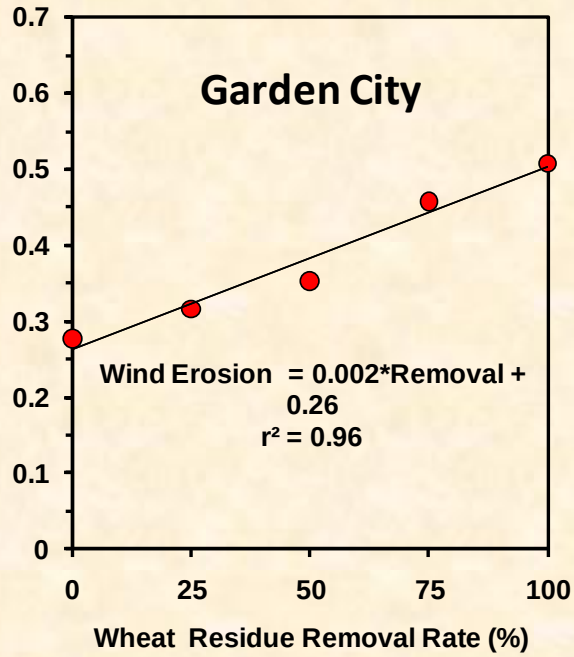
Wheat straw removal reduces the strength of soil aggregates and thus increases the soil's susceptibility to wind erosion.

RESIDUE REMOVAL EFFECTS ON SOIL ERODIBLE FRACTION

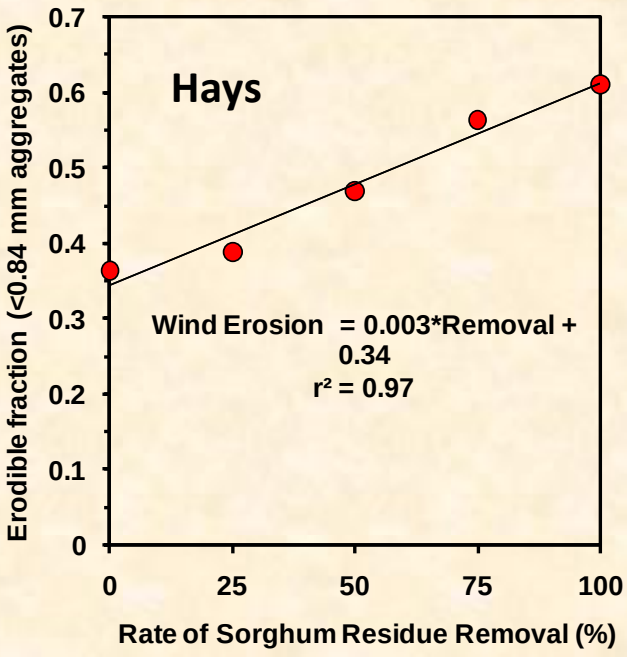
WINTER WHEAT

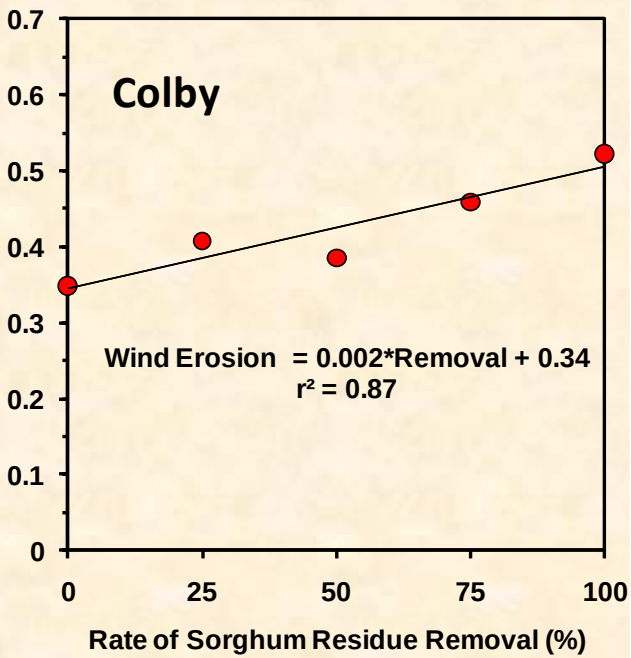


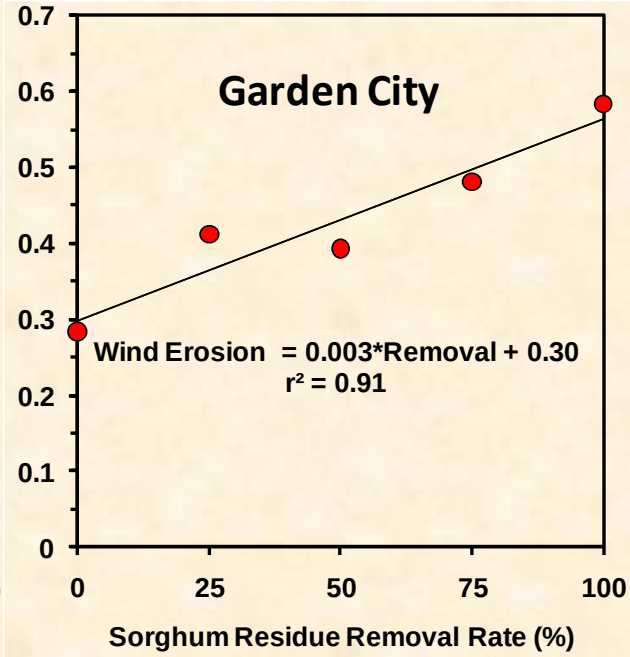




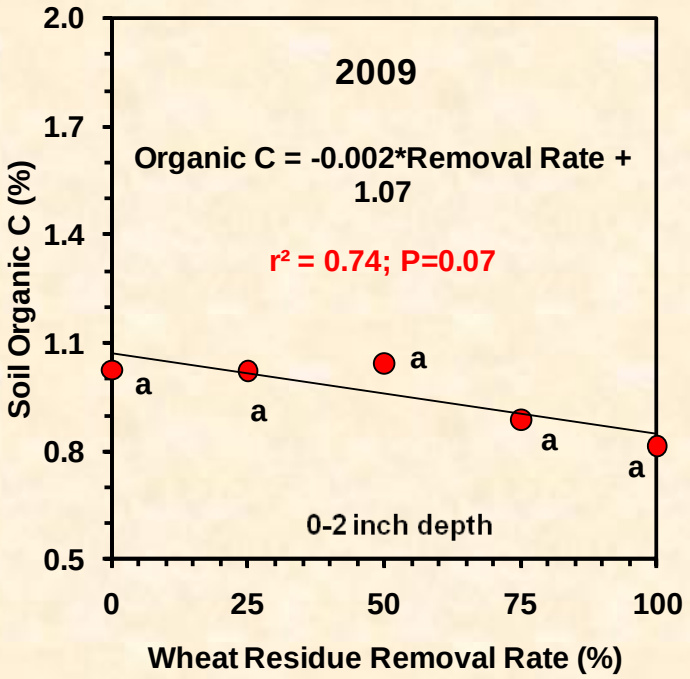
GRAIN SORGHUM

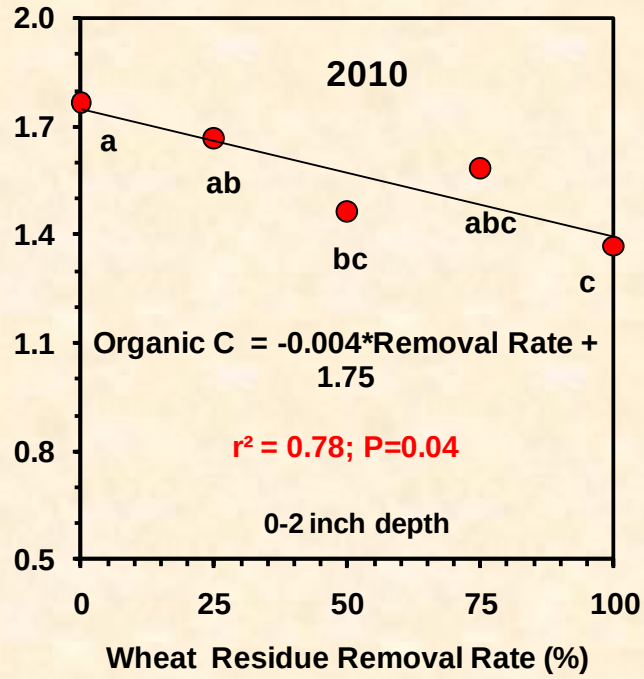


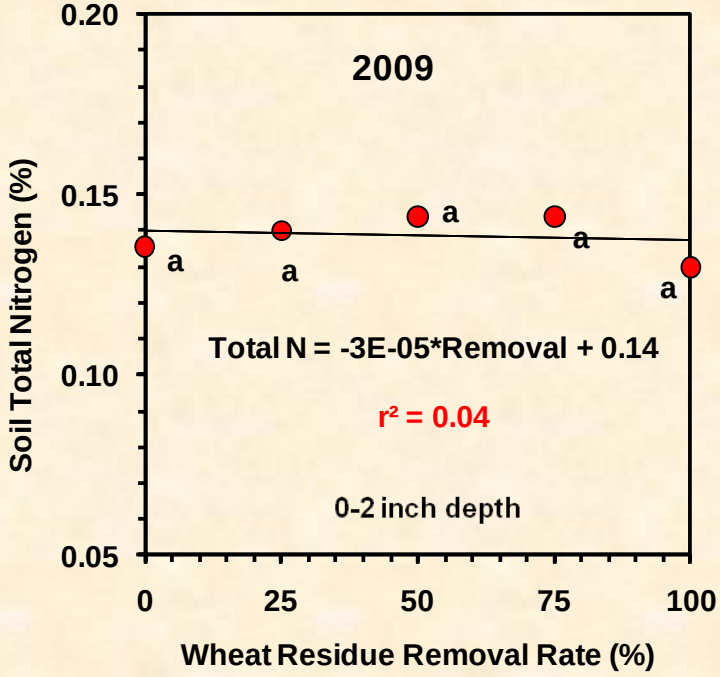


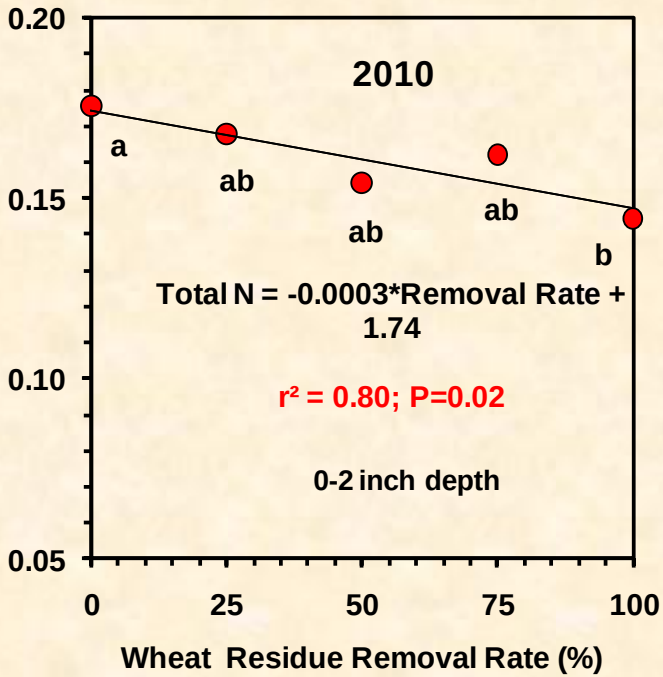


Wheat straw removal effects on soil organic C: Hays

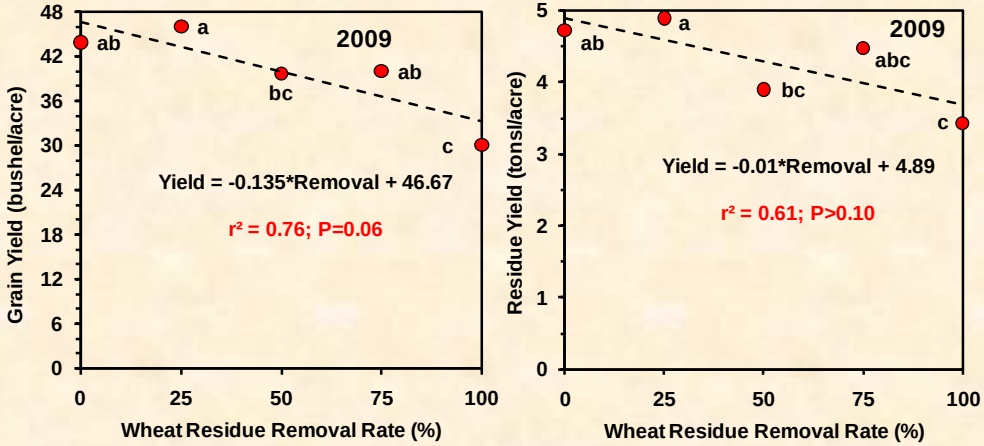


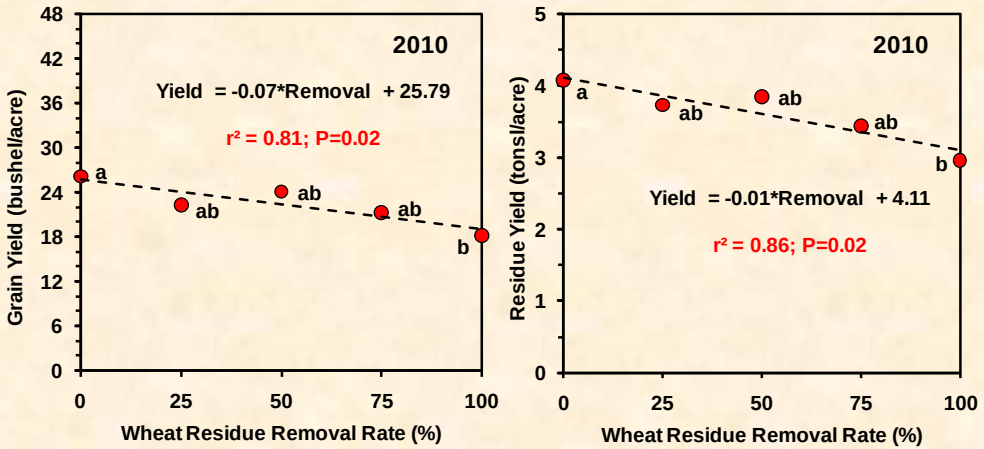


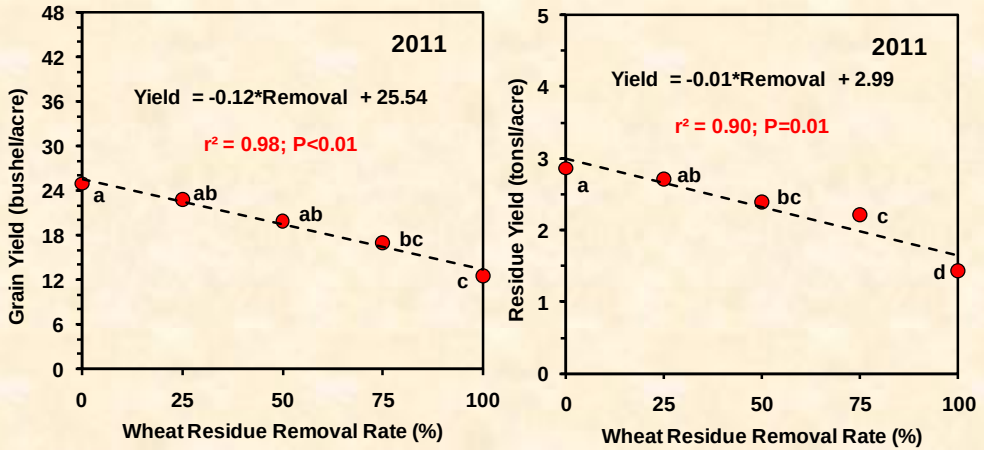


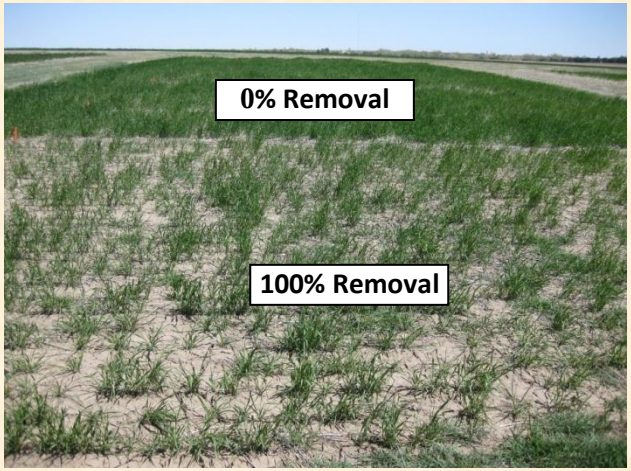


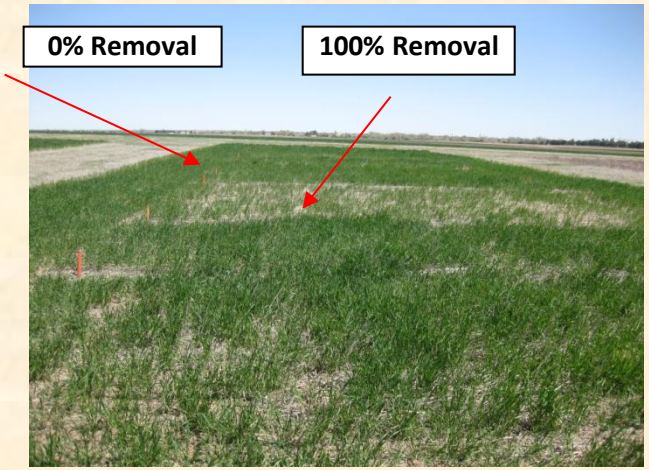
Wheat straw removal effects on grain and straw yield: Hays



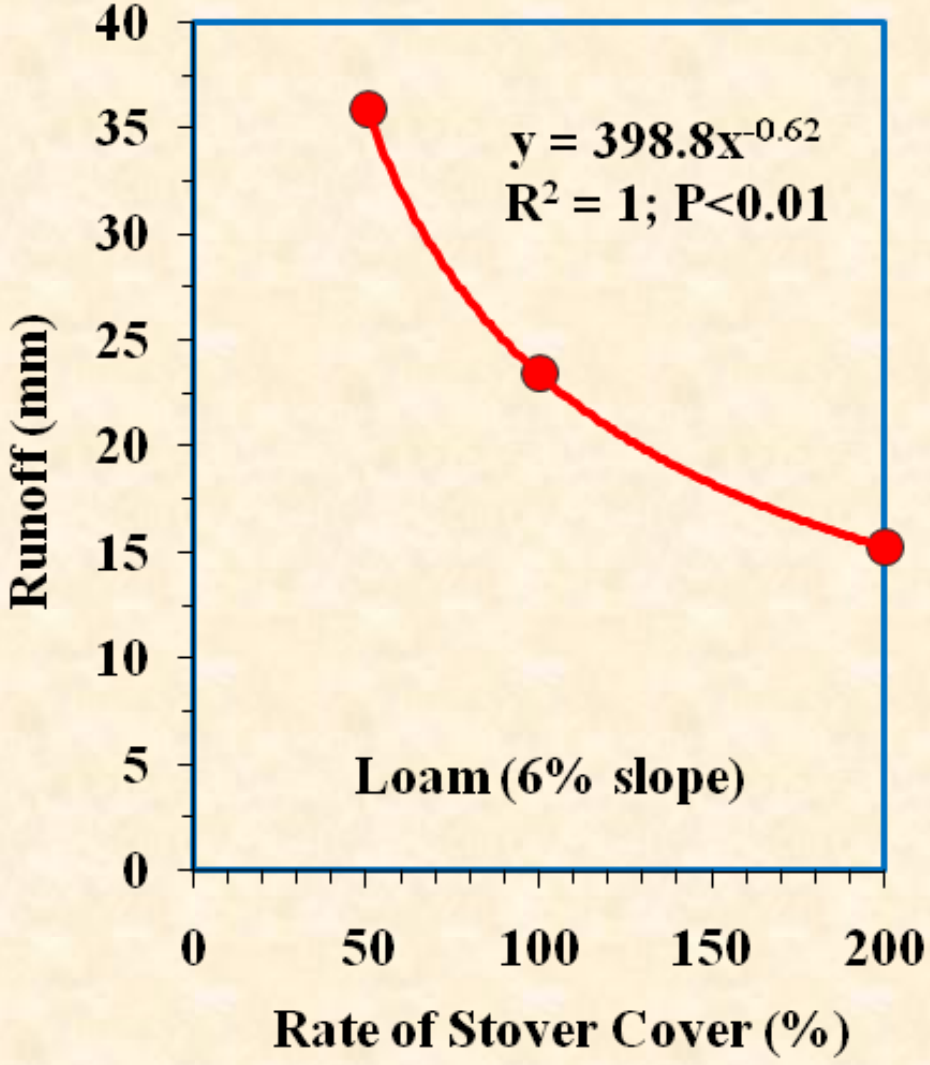


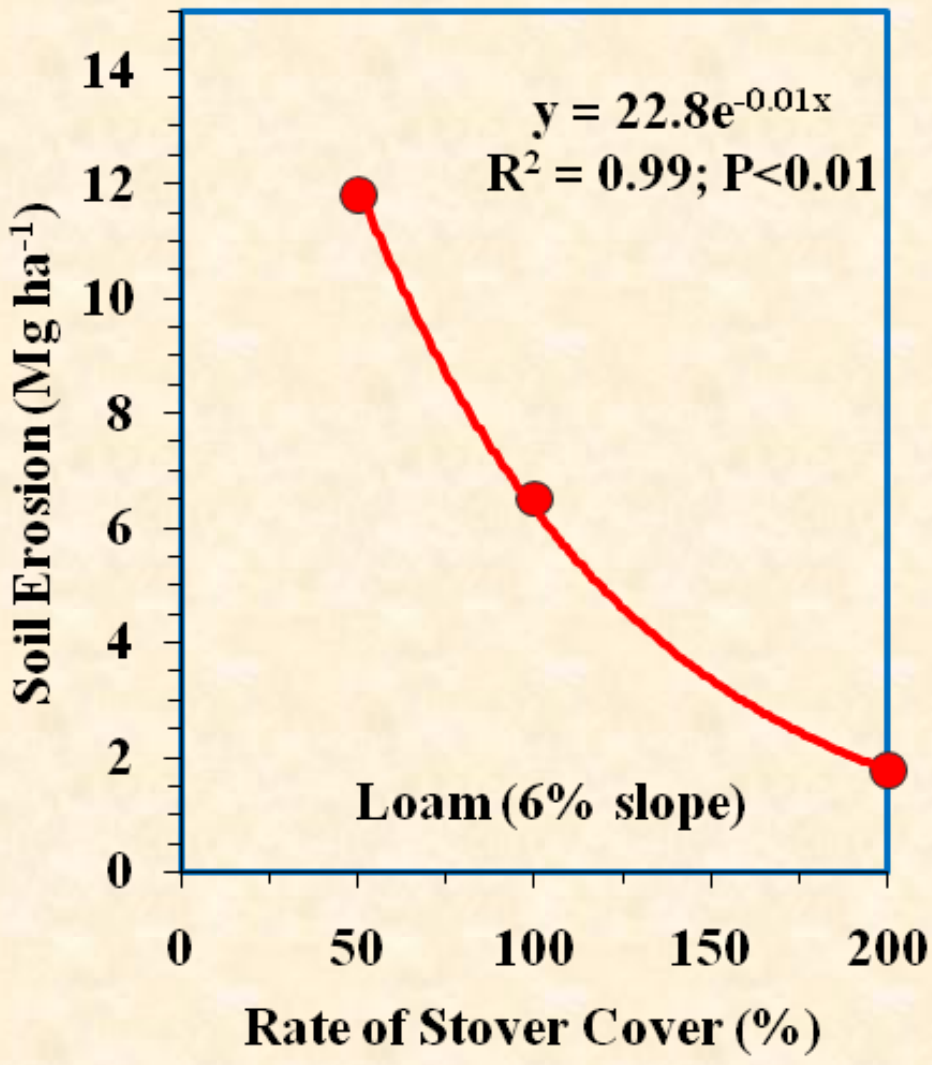




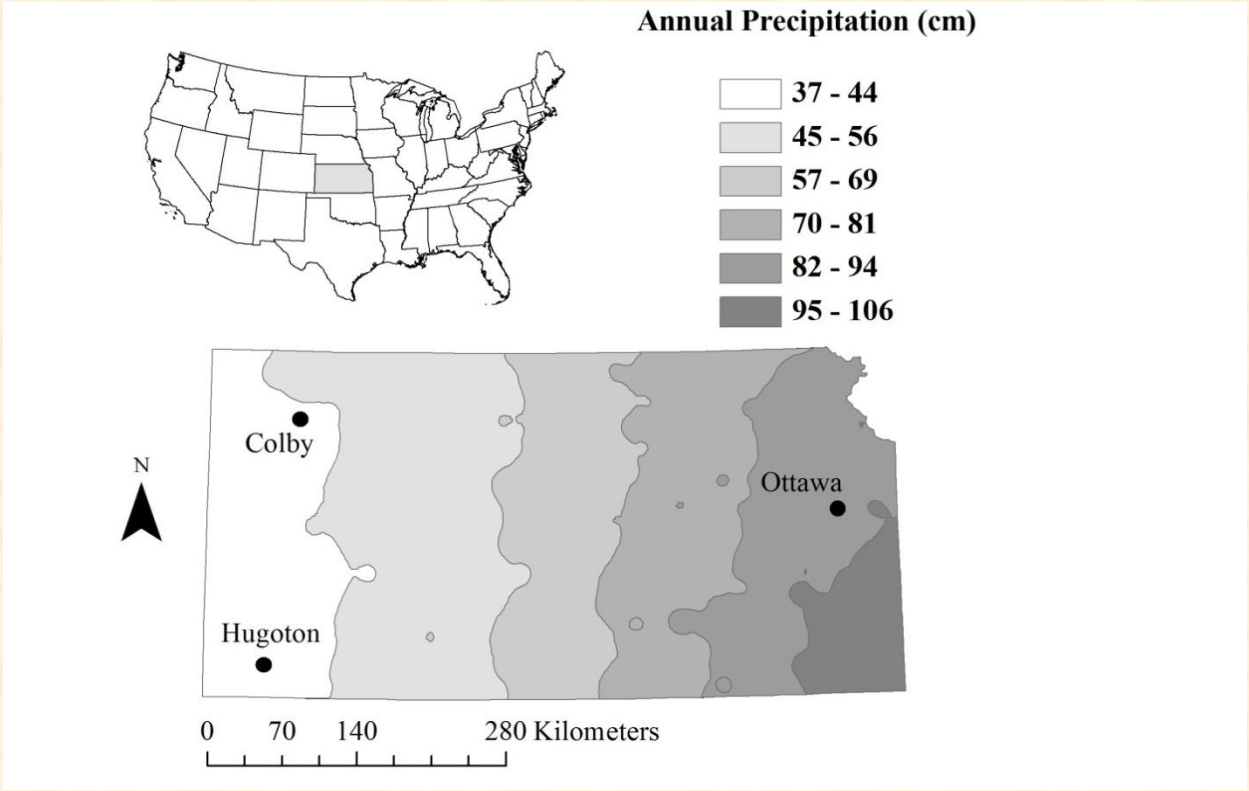


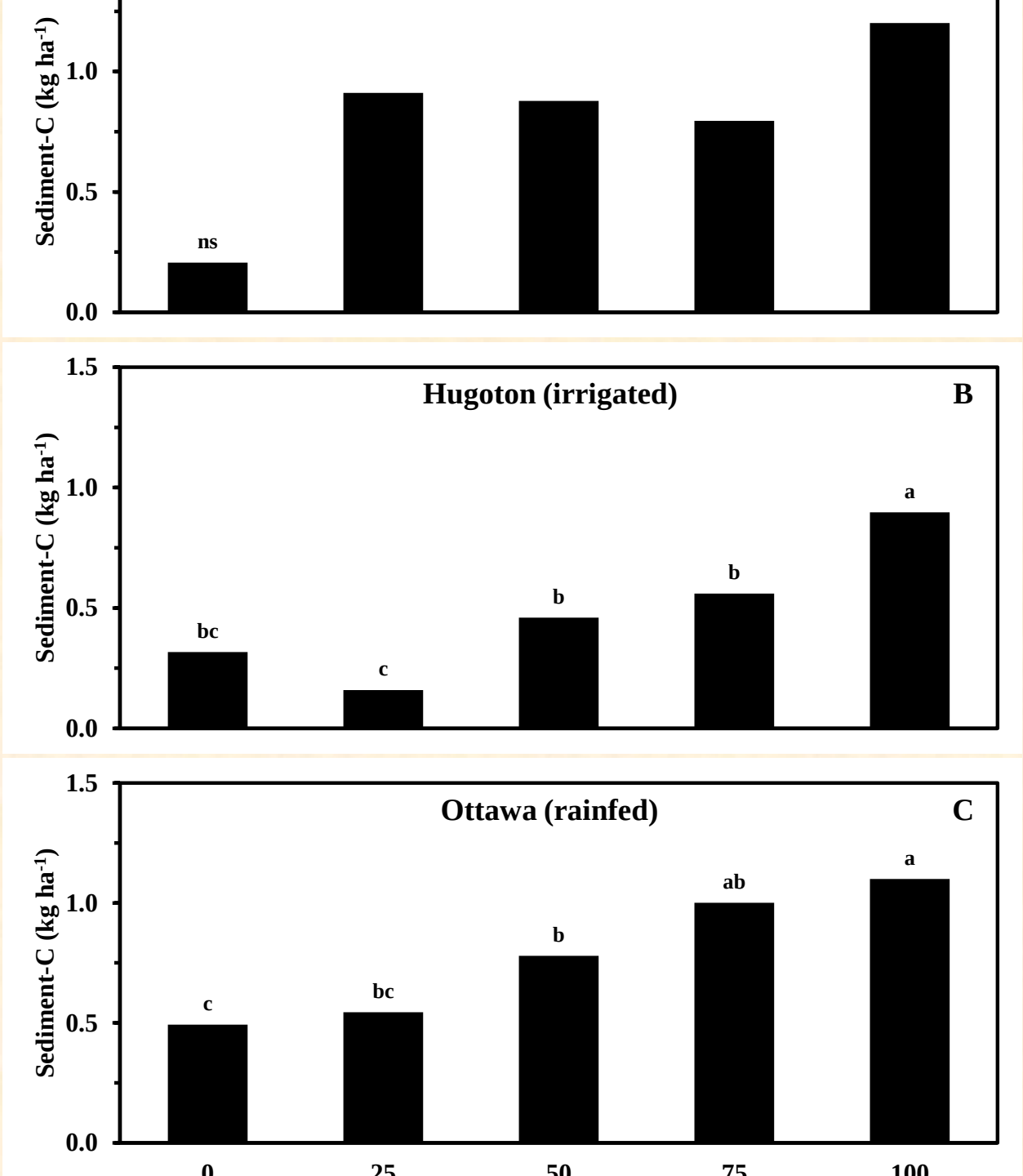
Runoff and Sediment Losses from No-Till Corn on a Barnes loam (Morris, MN; Lindstrom, 1986) Residue Treatments: 0.5Y, Y, 2Y





THANKS FOR YOUR ATTENTION


Annual Precipitation (cm)
37 - 44
45 - 56
57 - 69
70 - 81
82 - 94
95 - 106
Colby
Ottawa
Hugoton
N
0 70 140 280 Kilometers


Sediment-C (kg ha-1)
0.0
0.5
1.0
ns
Hugoton (irrigated)
B
1.5
bc
c
b
b
a
Ottawa (rainfed)
C
c
bc
b
ab
a
0
25
50
75
100

•Table 1. List of crop residue index values. Multiply index by
•bushels of grain produced per acre for an estimate of
•available residue.
•Residue
•Crop Index*
•Wheat 100
•Corn 60
•Grain Sorghum 60
•Oats 55
•Soybeans 45
•Sunflower 1.5
•* Residue index = pounds of residue produced/bushel
•of grain produced

•An easy way to estimate pounds of residue is to
•make a template from pliable rod or material that is 132
•inches long and can be bent to form a circle. The circular
•template will have a diameter of 42 inches. The area
•within the circle is a unique size because the weight of
•the dry matter residue within this circle, weighed in
•grams and multiplied by 10, will equal pounds per
•acre. For example, if 800 grams of residue dry matter
•are collected from within the circle, there are approximately
•8,000 pounds of residue dry matter per acre
•available for grazing.

•**ESTIMATING CROP RESIDUE AVAILABLE FOR GRAZING: KSRE Forage Facts Handbook**