Available Soil Water at Planting and Related Management

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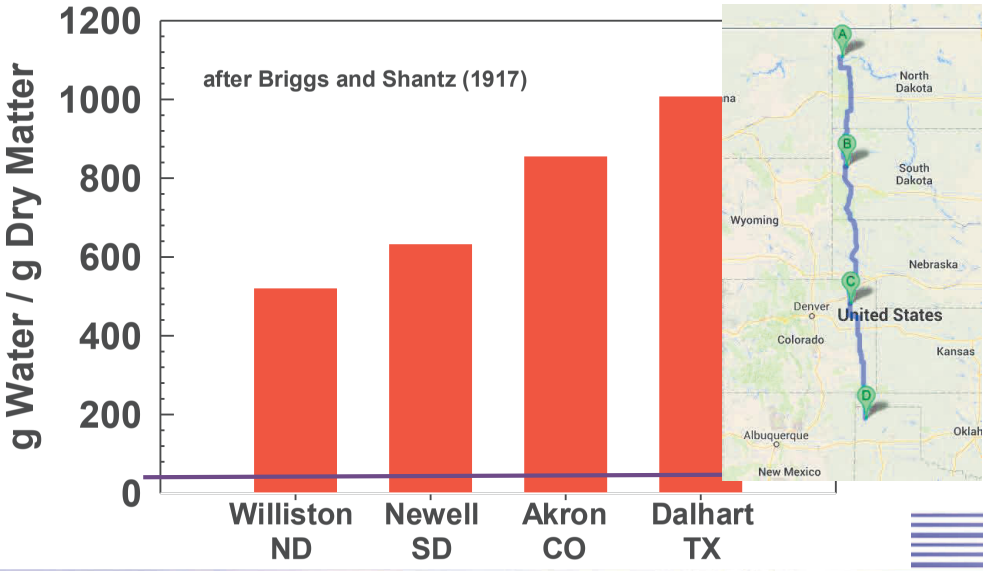
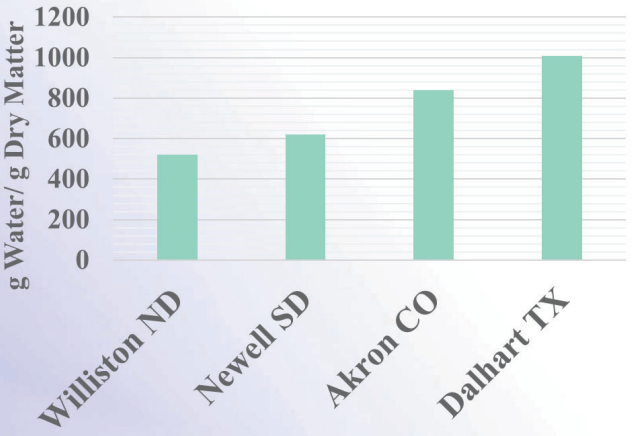
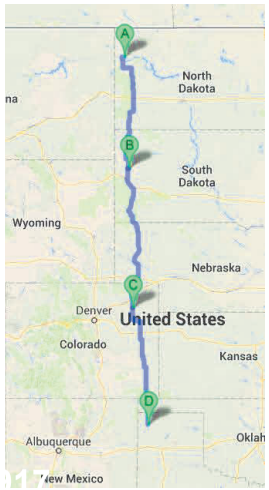
Water Requirement of Second Crop of Grimm Alfalfa, 1912



Water Requirement of Second Crop Grimm Alfalfa





Briggs and Shantz (1917)

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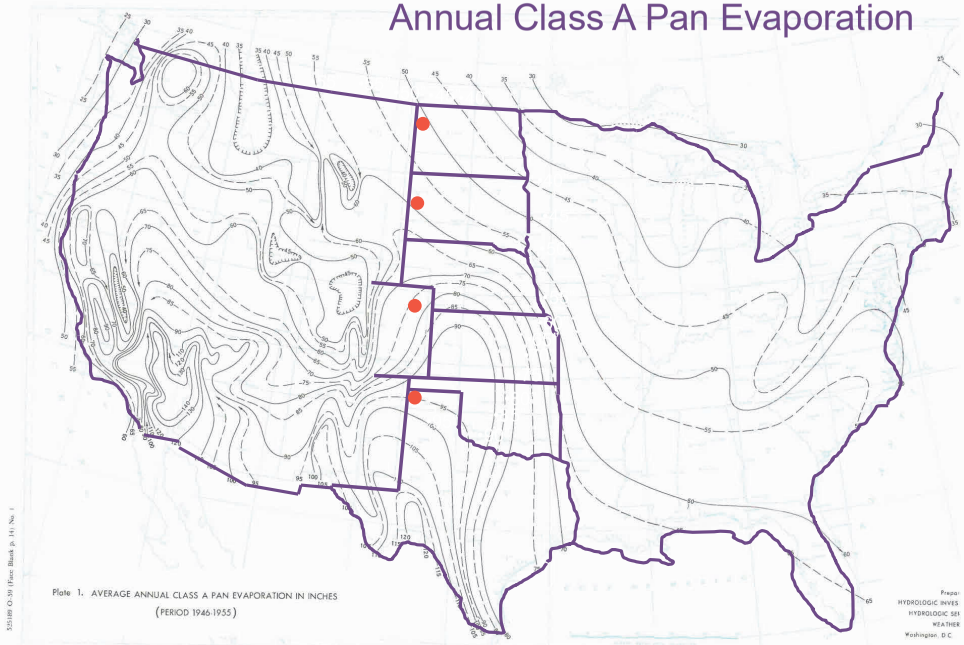
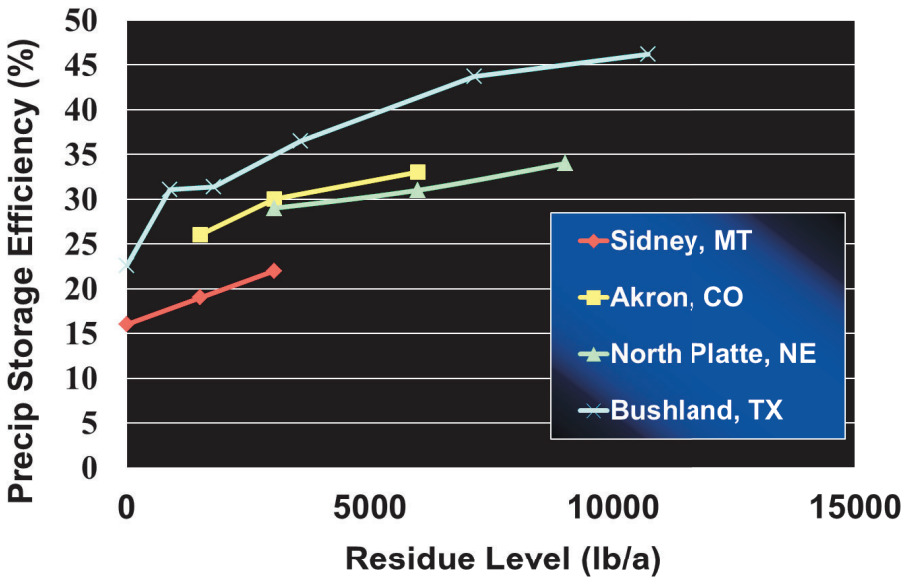
Annual Class A Pan Evaporation



Precipitation Storage Efficiency



Adapted from Nielsen et al., 2005.

Effect of Tillage – W-F 1993-1998 (Tribune, KS)

	Fallow	
Fallow Method	Accumulation	Efficiency
	cm (in)	Percent
No-Till	16.0 (6.30) a	23.8 a
Reducted Till	14.0 (5.51) b	20.9 a
Conventional Till	8.2 (3.23) c	12.1 b

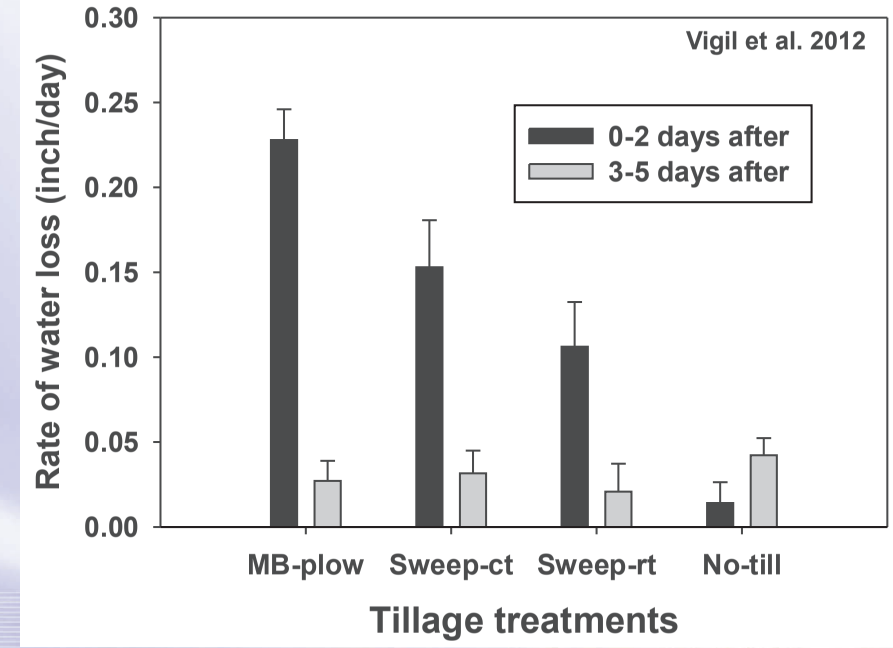
ANOVA P>F

Source of Variation		
Fallow Method	0.011	0.0114
LSD 0.05	1.6 1.7	0.07

†Letters within a column represent differences at LSD (0.05)

Schlegel et al.

Rate of water evap. first 2 days, & during the next 3 to 5 days



Crop Choice Effect on Surface Residues and Fallow Efficiency 1998-2008

	Fallow	
Fallow Method	Accumulation	Efficiency
	cm (in)	Percent
W-S-F	8.3 (3.25) a	20.1 a
W-SF-F	5.3 (2.08) b	12.5 b

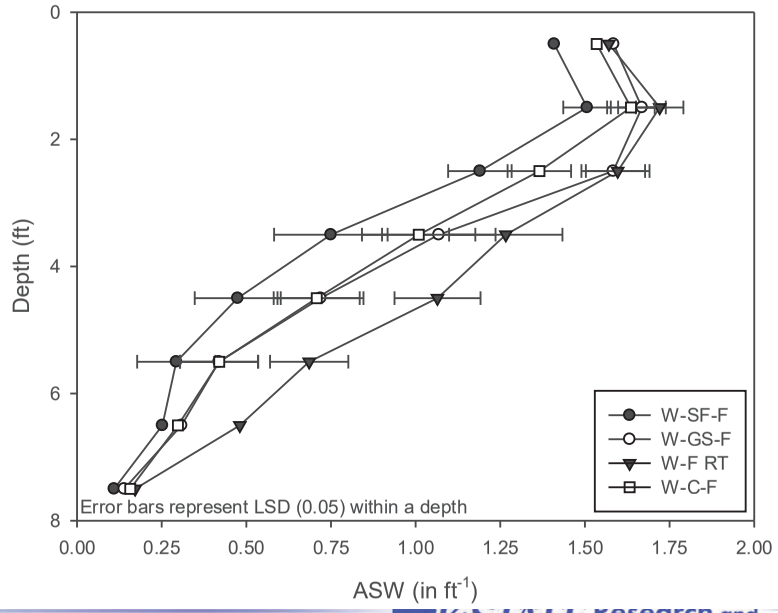
ANOVA P>F

Source of Variation		
Fallow Method	0.0452	0.0346
LSD 0.05	1.6 (1.14)	6.94

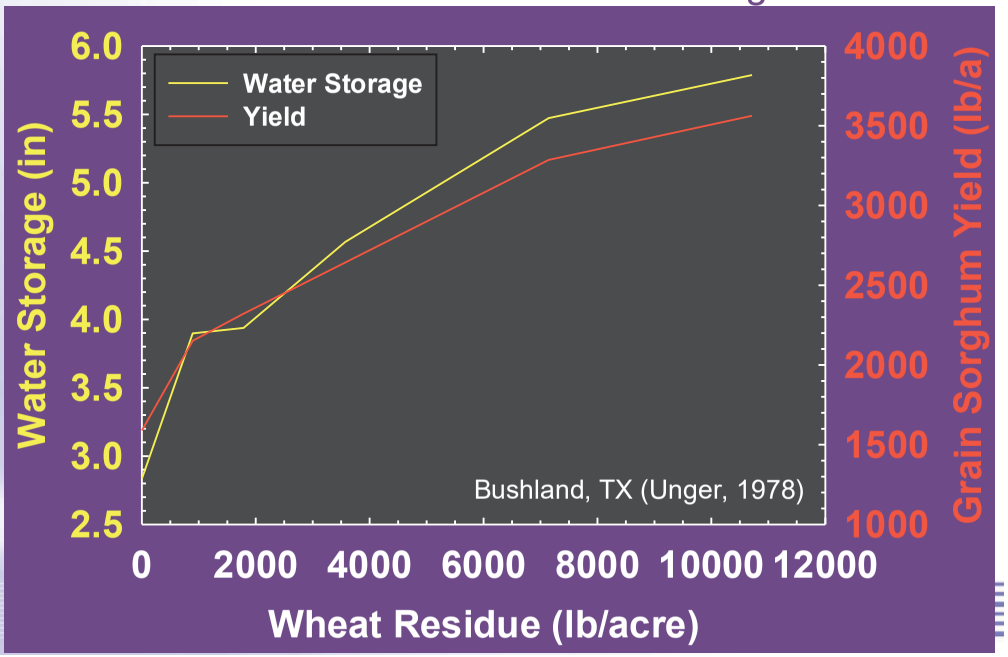
†Letters within a column represent differences at LSD (0.05)

Schlegel et al.

Available Soil Water at Wheat Planting in W-F and W-(C/S/SF)-F Rotations
Tribune, Kansas 1995-1998



Wheat Residue: Soil water storage & Grain Sorghum Yield



Time of Year: Efficiency from Row-Crop Harvest to Wheat Seeding (W-S-F)

SWREC-Tribune 2001-2007

Time Period	Efficiency
	Percent
Row-Crop Harvest to July Fallow	28.8
July Fallow to Wheat Planting	-4.6
Row-Crop Harvest to Wheat Planting	21.2

Schlegel et al.

Where do we go from here?

- We know when fallow is inefficient
  - W-F, no moisture storage during the second summer fallow period
    - W-S-F rotation works great when we have rain!
  - W-S-F, no moisture storage from July to wheat planting
    - Can we grow a short-season spring crop in fallow?
  - W-S-Flex fallow
    - Plant a spring crop when conditions are favorable
- Can we strike a balance?

Plant Available Water at Wheat Planting: Standing Cover Crop vs Hay

Cover Crop Method	Plant Available Water (0-3 in)		Plant Available Water (0-6 ft)	
	(in)		(in)	
Cover	0.09	a†	5.76	a
Hay	0.06	b	4.96	b
		ANOVA P>F		
Source of Variation				
	<0.001		<0.0001	
LSD 0.05	0.03		0.45	

†Letters within a column represent differences at LSD 0.05

- Cover >0.8 inches than hay (0-6 ft)

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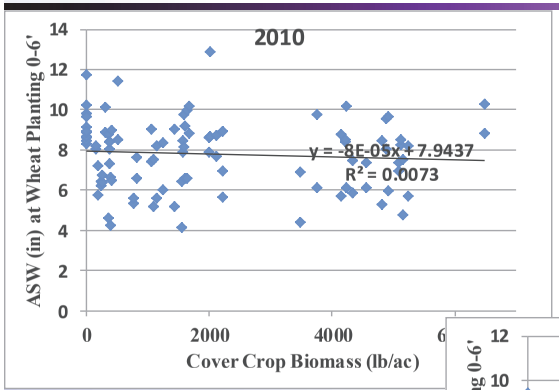
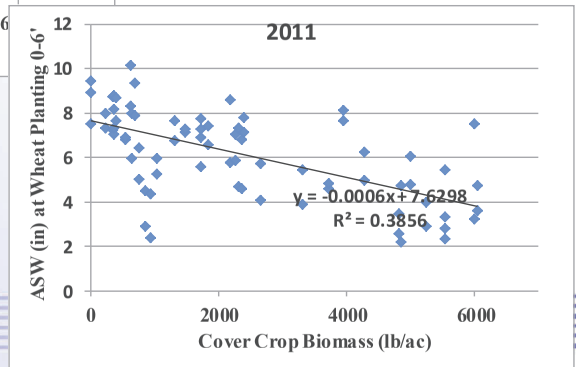
PAW at Wheat Planting-Fallow Method (2008-12)

Fallow Method	Plant Available Water (0-6 ft)		Difference from Fallow
	(in)		(in)
Fallow	7.91	a	0.00
Hairy Vetch	6.24	b	-1.68
S Pea	6.16	b	-1.75
W Lentil	6.06	bc	-1.85
S Lentil	5.68	bcd	-2.24
S Triticale	5.49	bcd	-2.43
W Pea	5.40	bcd	-2.51
S Pea/S Triticale	5.24	cde	-2.68
S Lentil/S Triticale	5.17	cdef	-2.75
Hairy Vetch/W Triticale	5.15	def	-2.76
W Pea/W Triticale	4.95	defg	-2.97
W Lentil/W Triticale	4.49	efg	-3.42
W Triticale	4.29	fg	-3.62
Pea (grain)	4.09	gh	-3.82
W Wheat	3.28	h	-4.64
LSD 0.05	0.90		

ASW at Wheat Planting: 0-6' Soil Depth



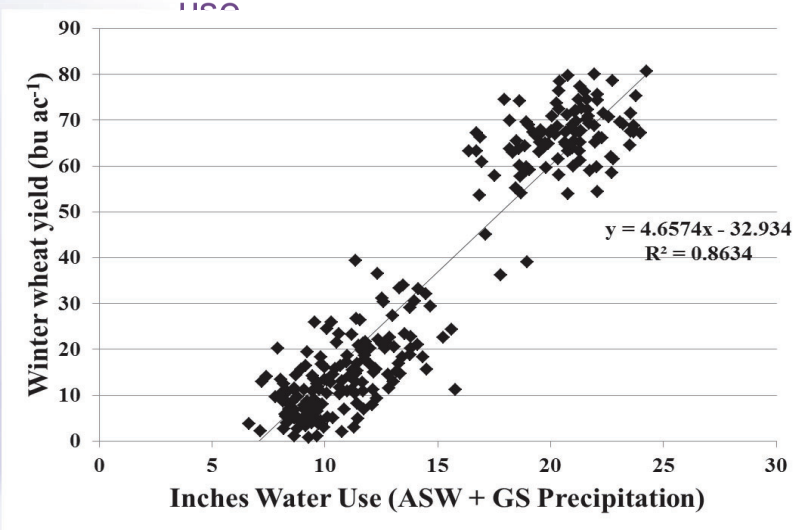
- ASW decreased with CC biomass
- Wet years NS
- Dry years reduced ASW & crop yield
- 5 bu/inch



- PSE (after CC termination) increased with CC biomass

Water Makes Grain

- 4.7 bu ac^{-1} 1 inch^{-1} water use



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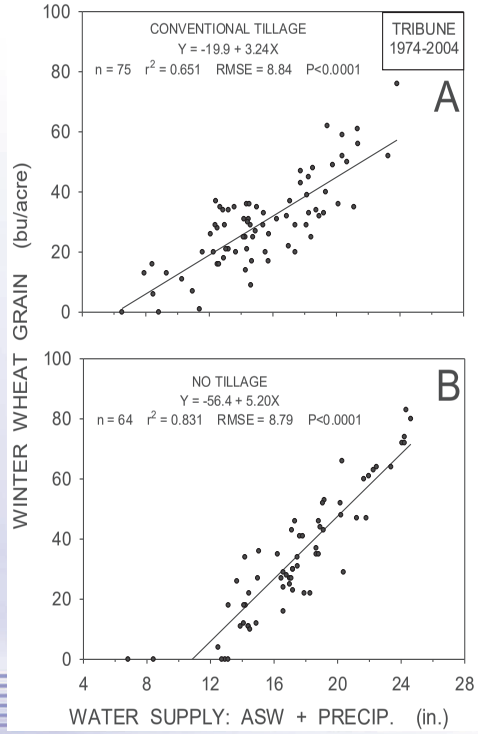
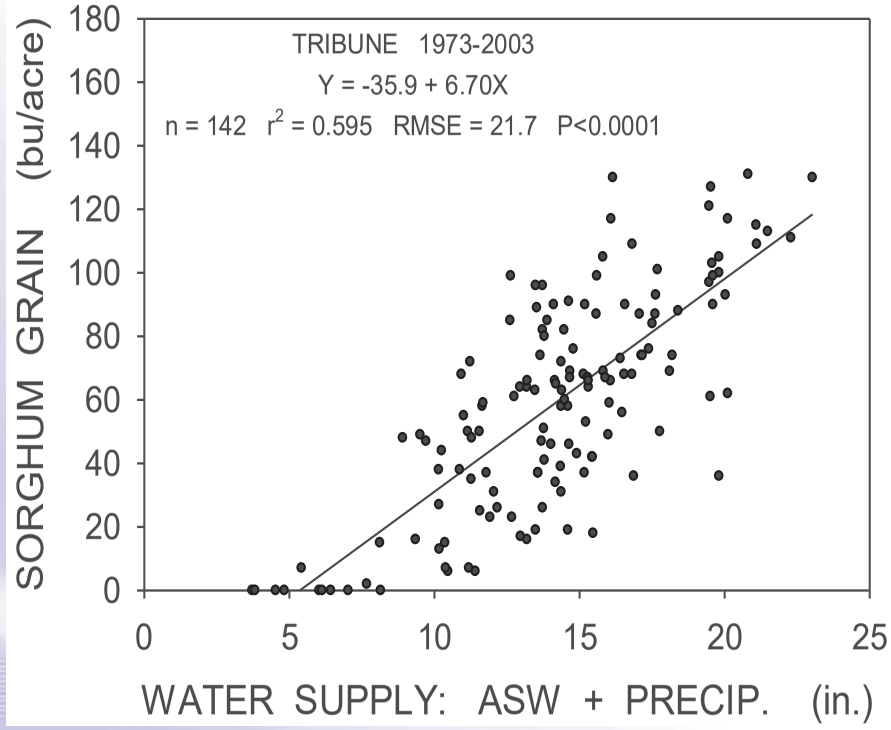
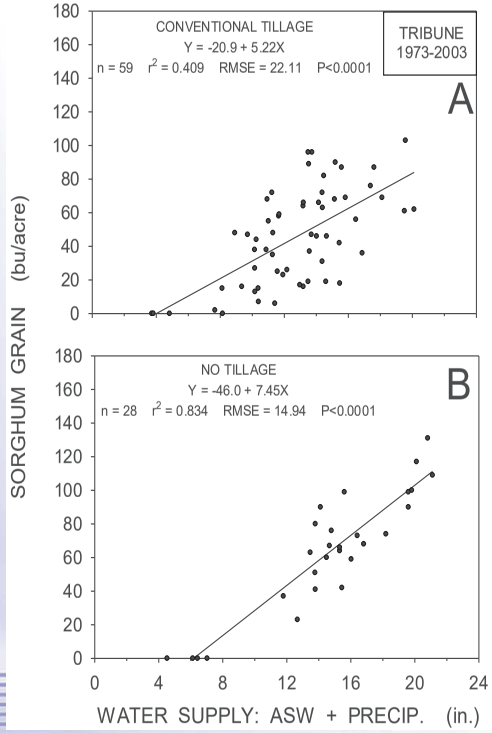
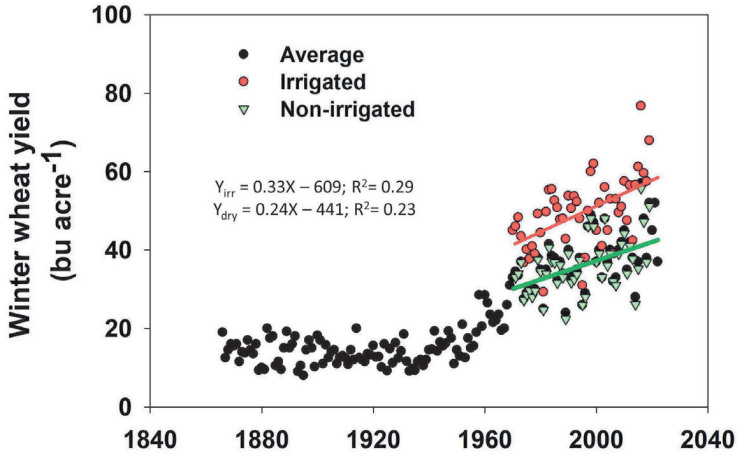


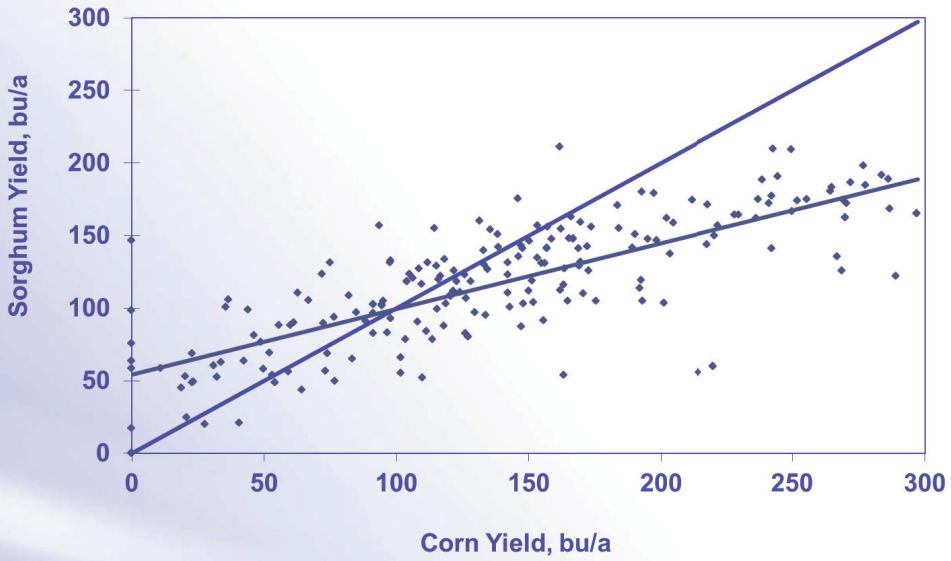






Year	0.2 (<.05)	
October precipitation	3.4 (<.01)	
February precipitation	7.0 (<.01)	
April precipitation	2.3 (.05)	
April temperature	-1.4 (<.001)	R^2 0.43

Sorghum-Corn Yield Comparison



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Concluding Thoughts

- Make decisions that will improve precipitation use efficiency:
  - Good fallow management
    - No-till, residue, and weed control
  - System Intensification
    - More consistent with grazing/forage crops
    - Flex-cropping: take advantage of opportunities
    - But efforts need to keep in mind "do no harm"
      - Hits on subsequent crops reduce surface residues, etc.

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Ogallala Aquifer Program

Funding and Contact Info

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