Knowledge for Life

Water, Wind and Sun: Choices for Future of Western Kansas

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Manhattan, KS

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Novmber 8-9, 2017

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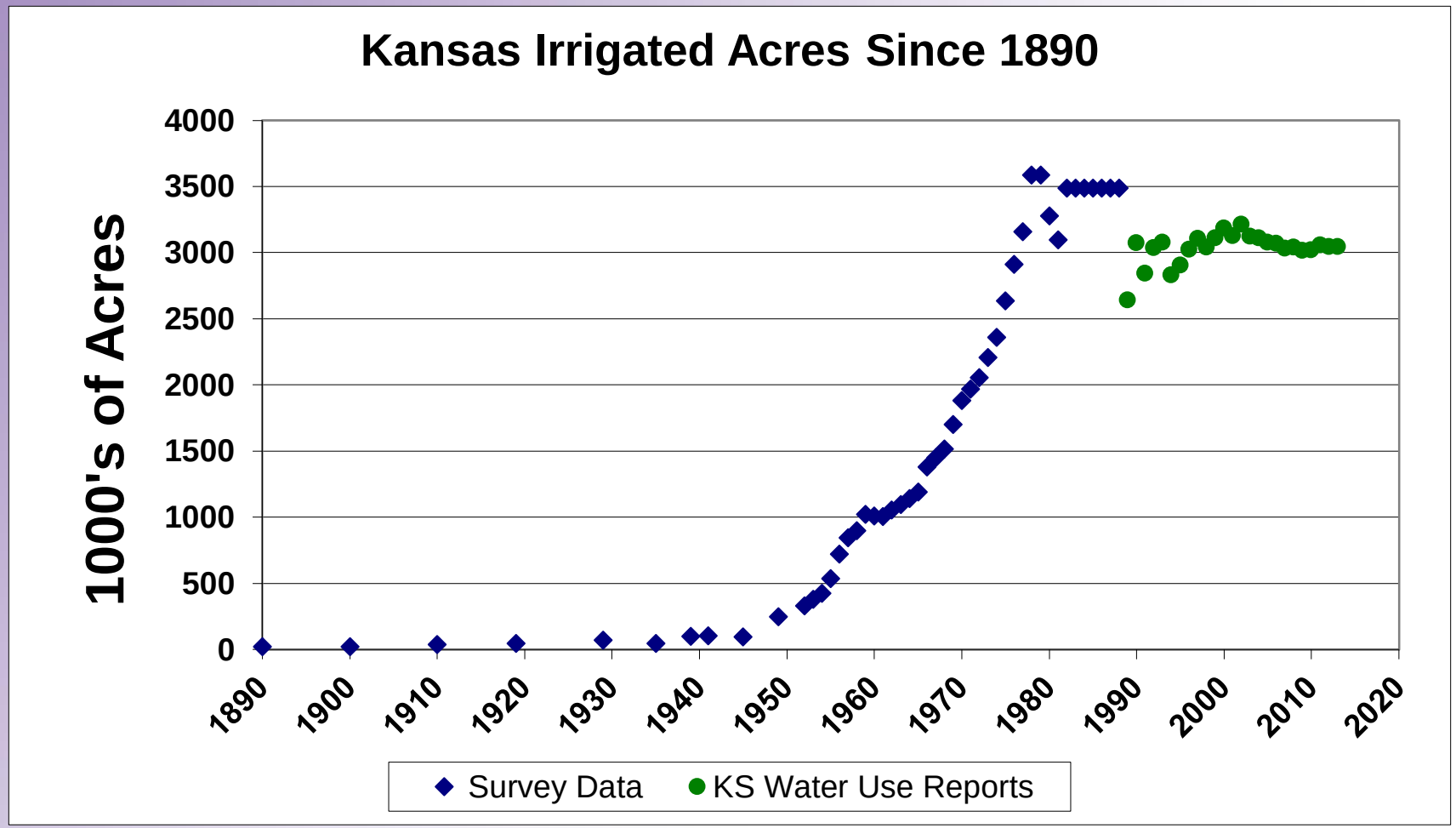
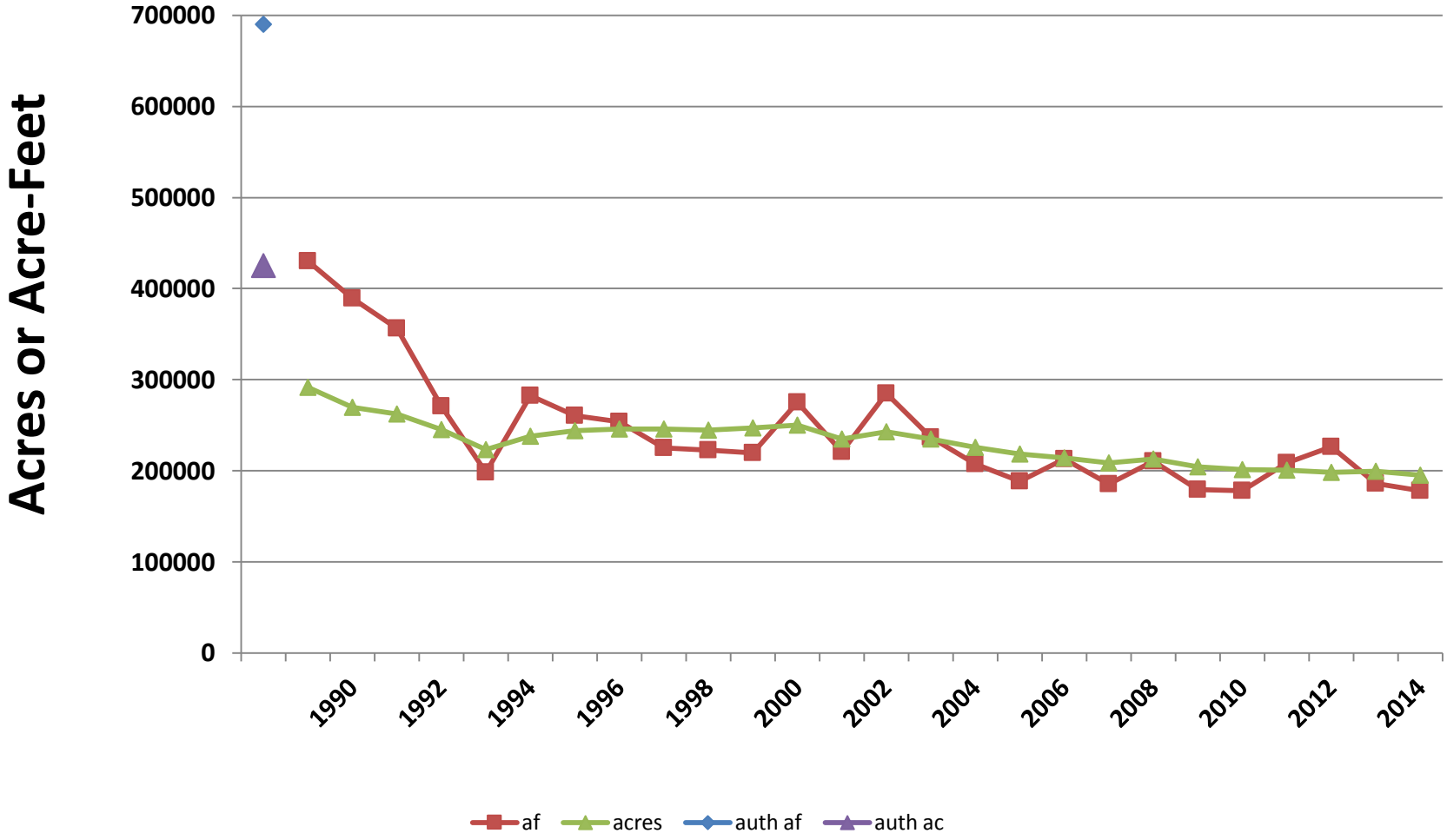
Kansas Irrigated Acres



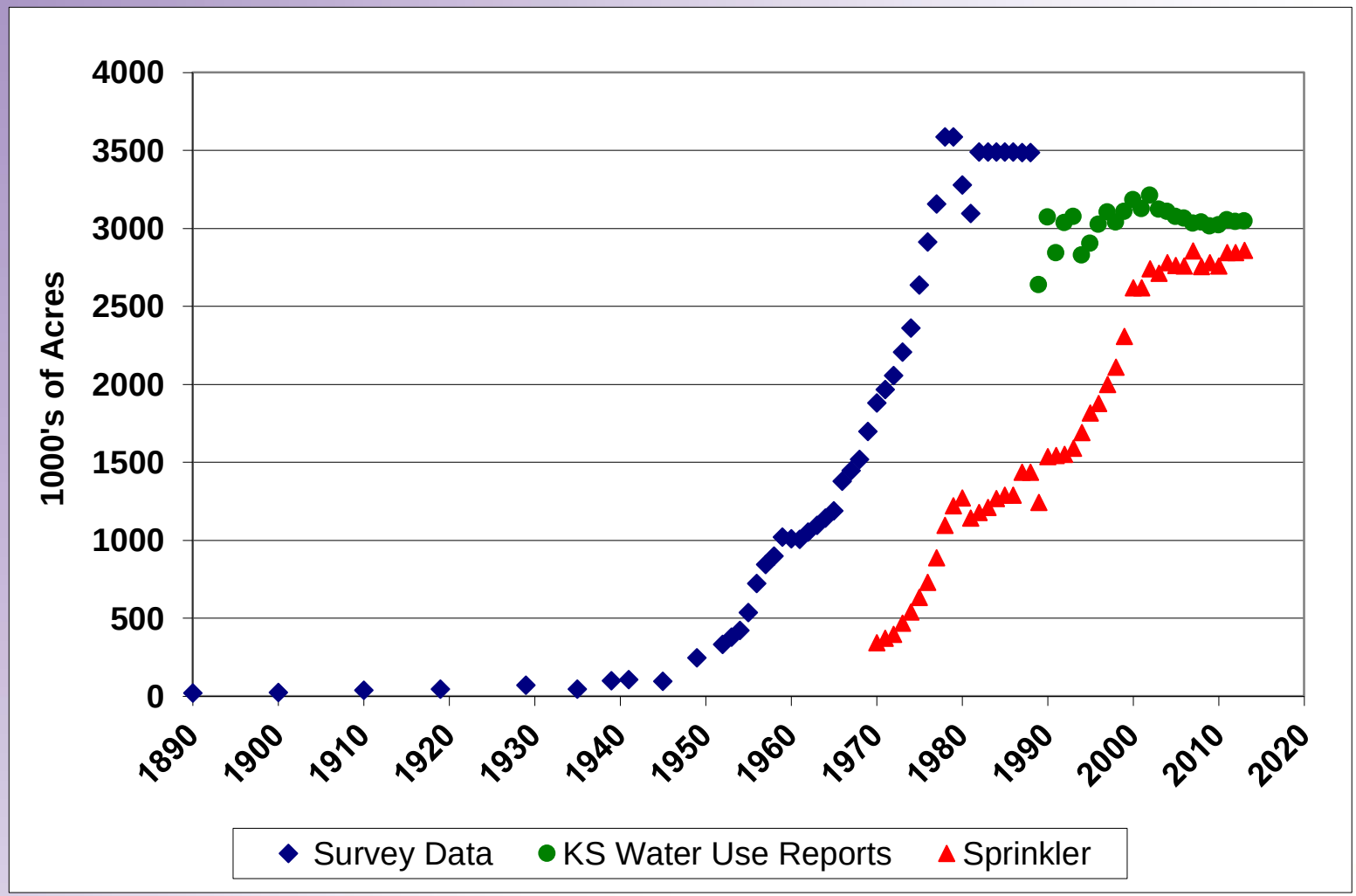
GMD1 Irrigation Water Use and Acres



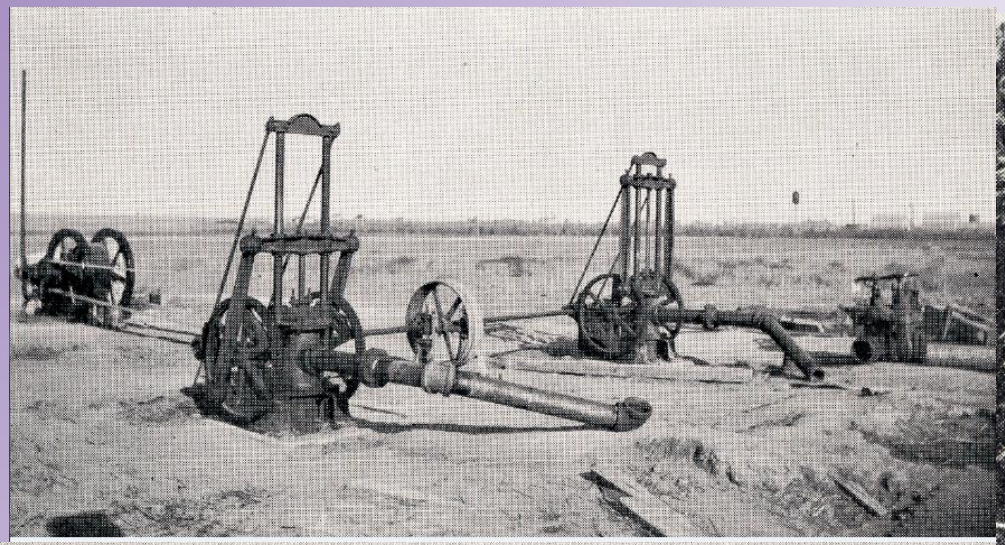
Kansas: 1989 – 2012 Change in Irrigated Acres

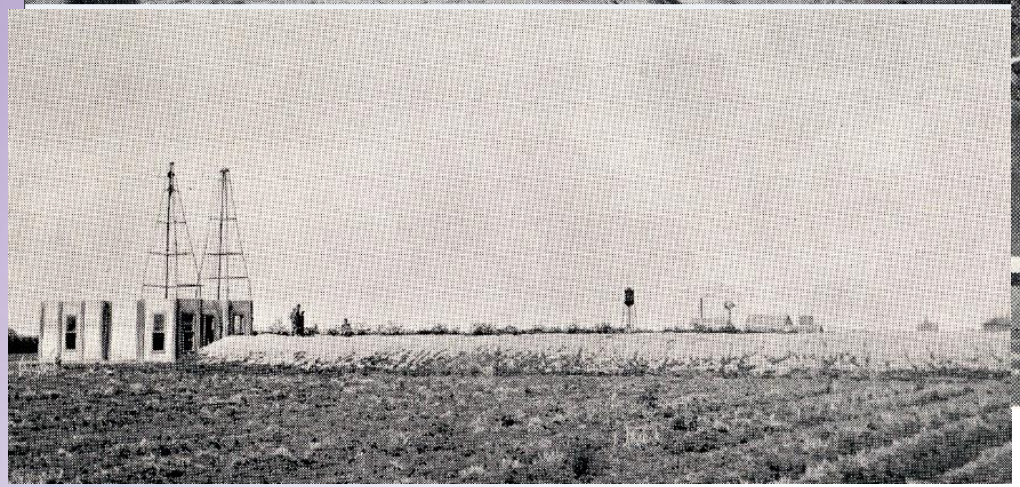
Reporting Unit	1989 acres	2012 acres	Change in acres	% Change since 1989
GMD 1	291574	198377	-93197	-32.0
GMD 3	1572470	1424923	-147547	-9.4
GMD 4	359016	387286	28270	7.9
Rest of Region 1 (West)	106915	109220	2305	-2.2
Total of Region 1 (West)	2329975	2119806	-210169	-9.0
GMD 2	94683	136543	41860	44.2
GMD 5	429133	456746	27613	6.4
Rest of Region 2 (Central)	192664	248916	125712	29.2
Total of Region 2 (Central)	716480	842205	125725	17.5
Total of Region 3 (East)	52375	80070	27695	52.9
State	3098830	3042081	-56749	-1.8

Kansas Irrigated and Sprinkler Irrigated Acres



Colby Irrigation Project

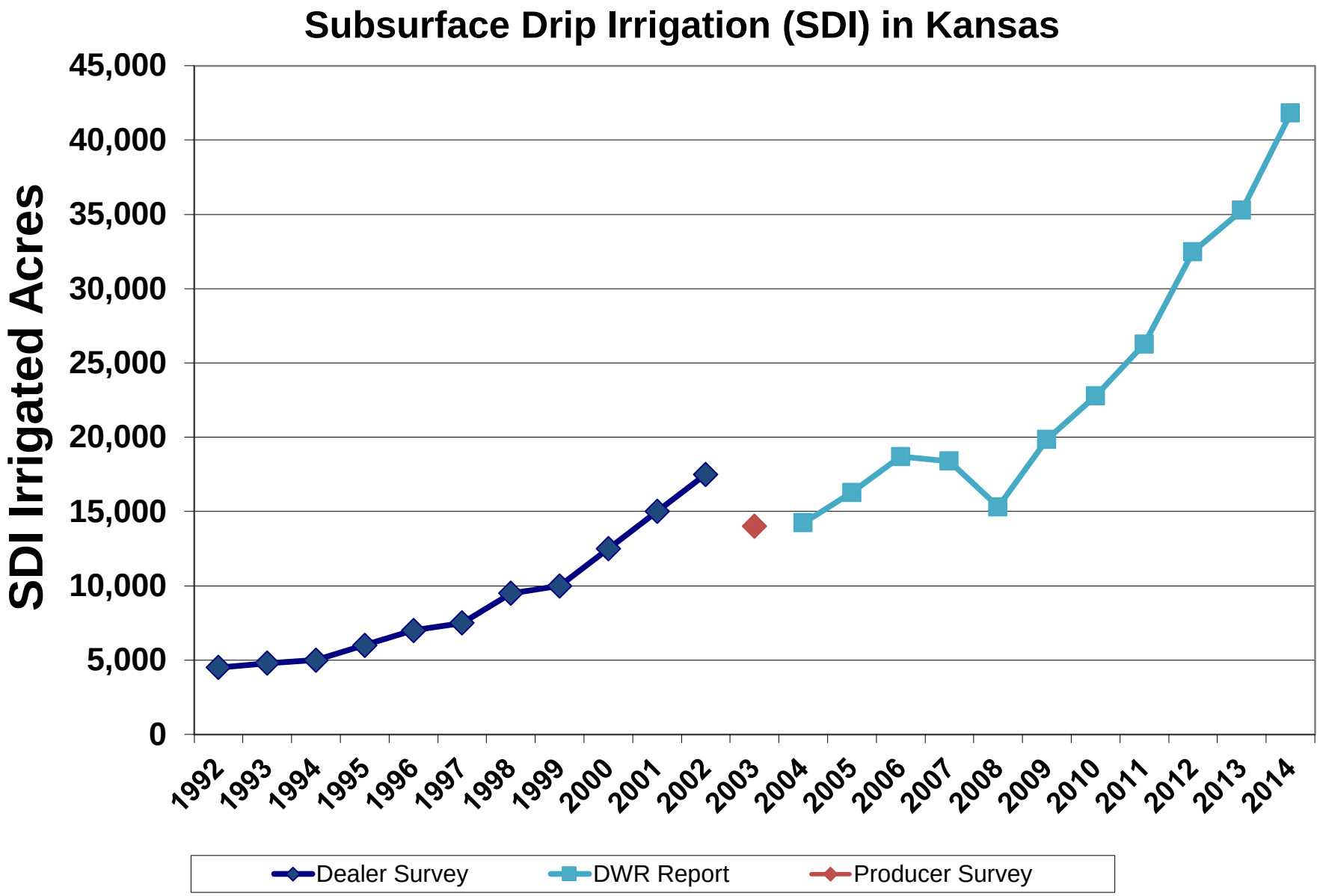




Gated Pipe

Lay-flat plastic pipe

Center Pivot Sprinkler Irrigation Systems



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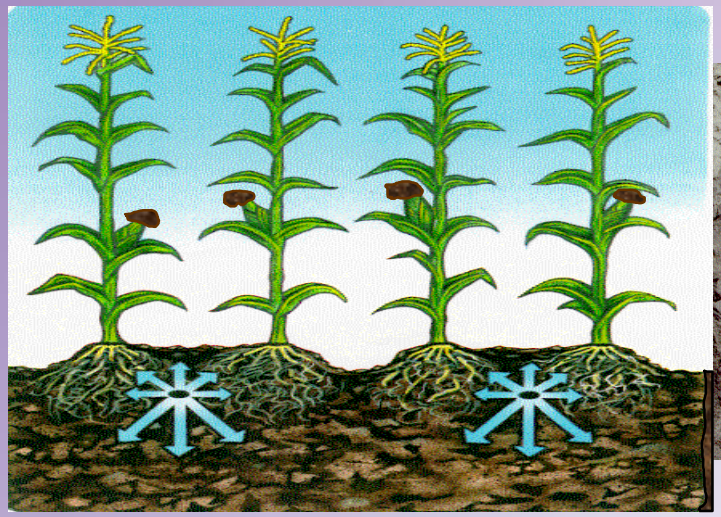
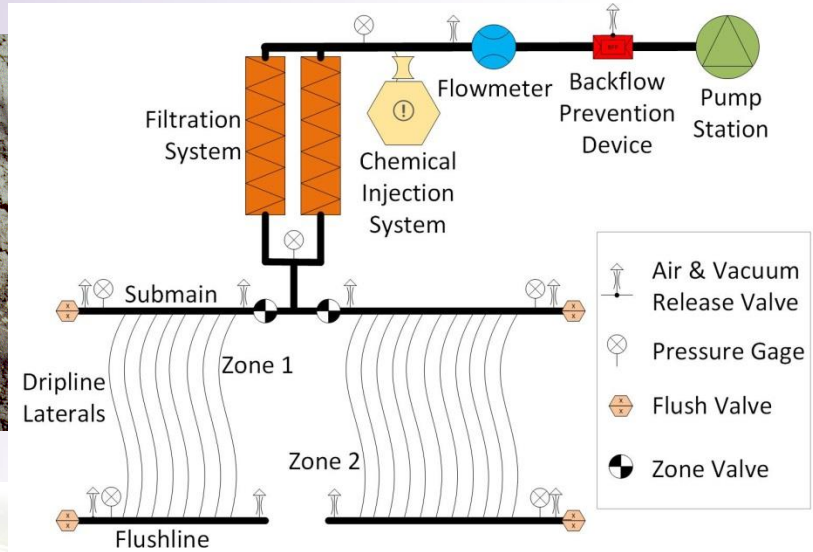
Subsurface Drip Irrigation - SDI





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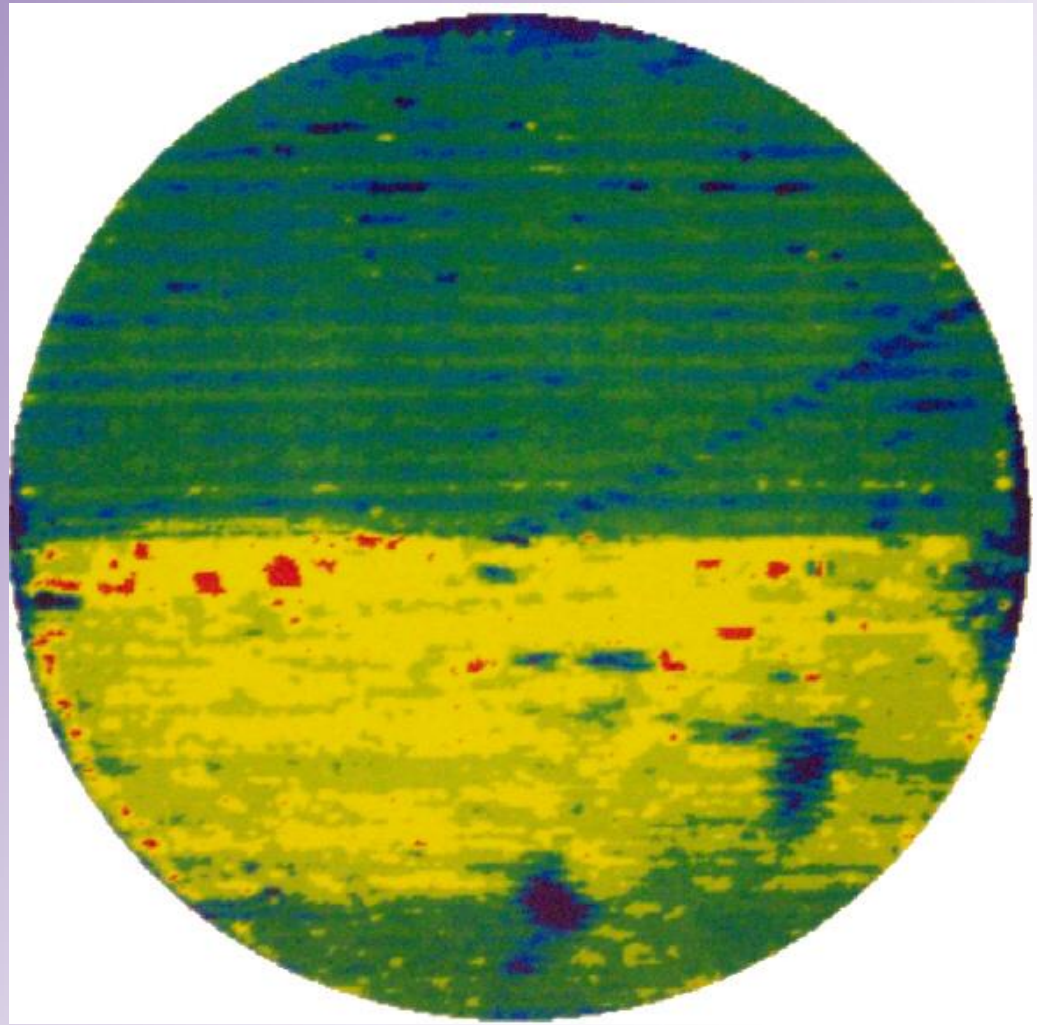
Example from a yield map to illustrate the importance of understanding all aspects of crop production



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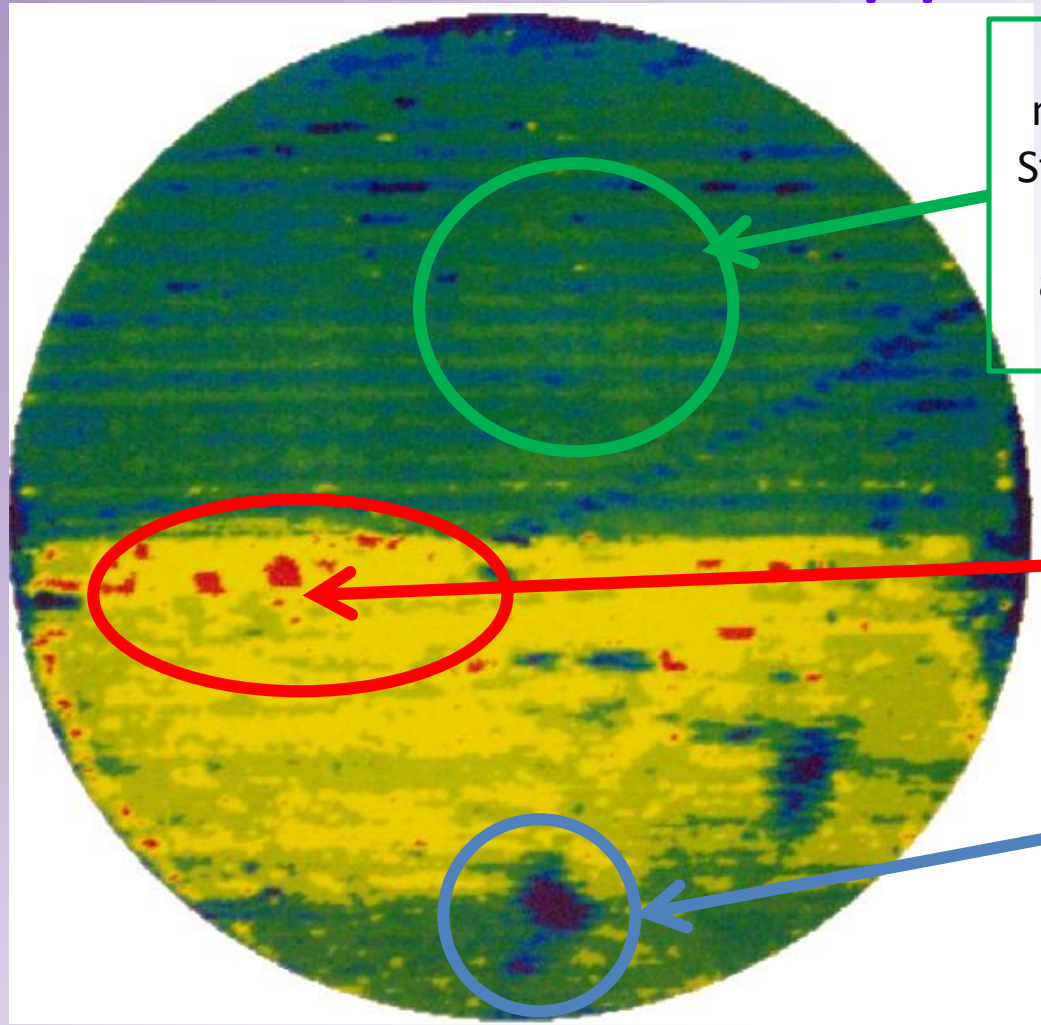

Area planted late due to multiple days of rain delay. Striping effect due to change of corn in one planter to adjust for late planting but not changed in other.

Red and yellow area of high production, this area was planted at targeted time

Blue area areas of no production

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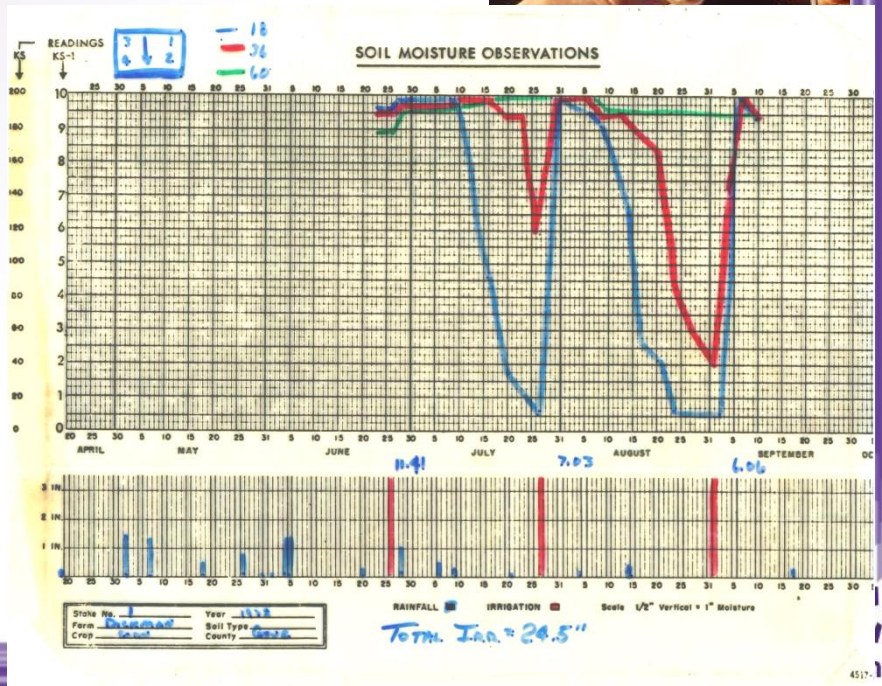
Roth/Garden City Co. Farm Field Day

Water CUP highlighted water meters as a management tool and soil based irrigation scheduling

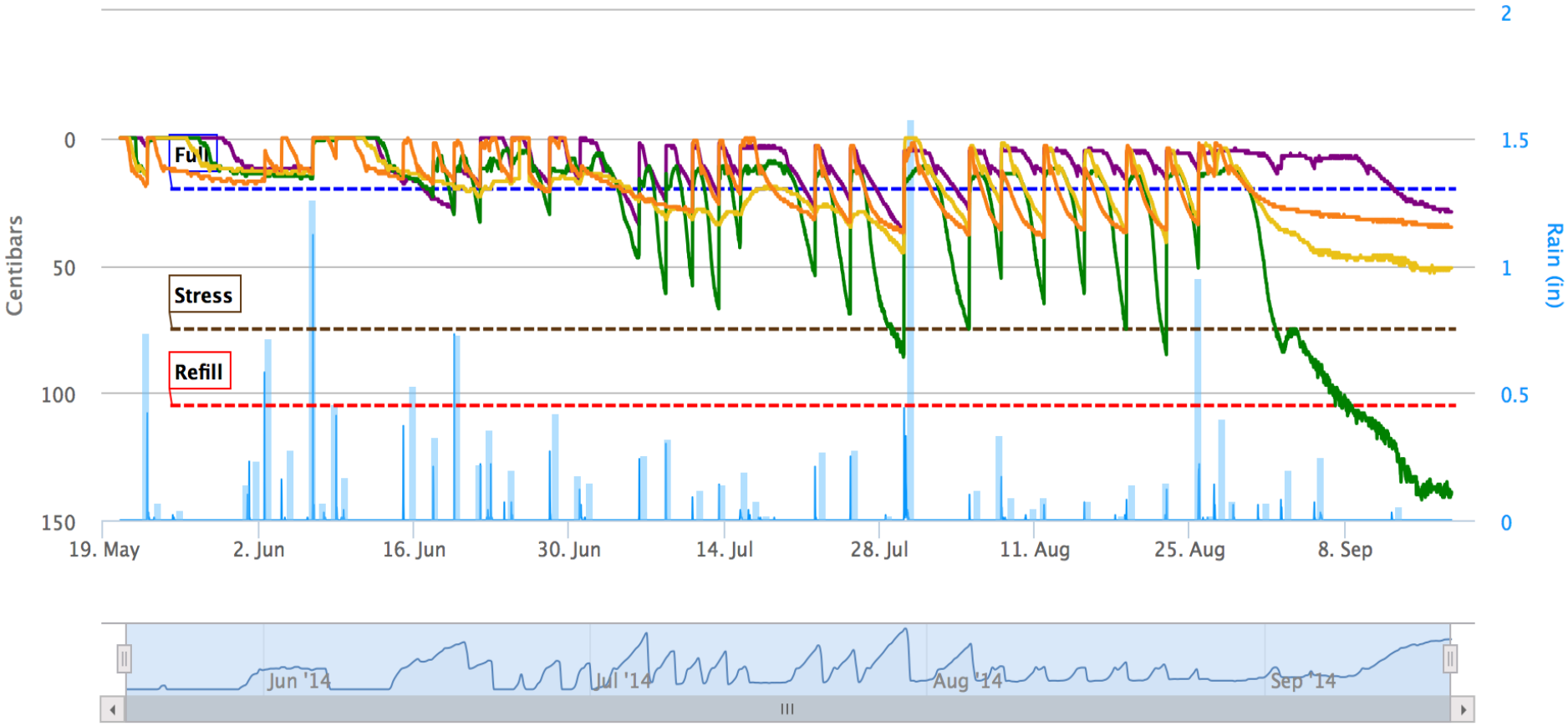


53577 12-32-29 #2 S

Crop: Corn, Device Soil Type: Clay Loam

Zoom 1dy 1wk 2wk 1m 3m All

From May 18, 2014 To Sep 19, 2014



8" 16" 24" 32" cur_rain day_rain Temp Notes

Highcharts.com

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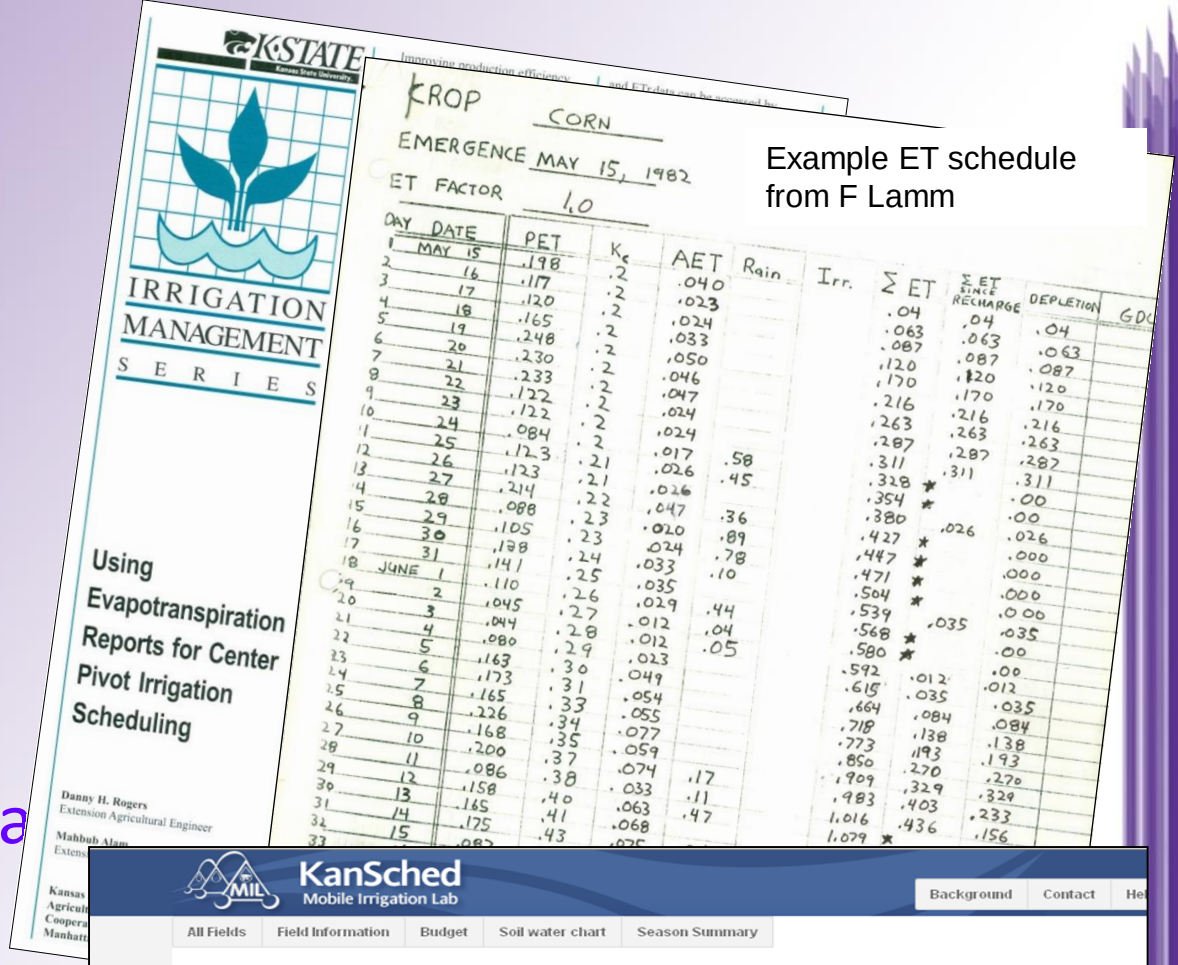
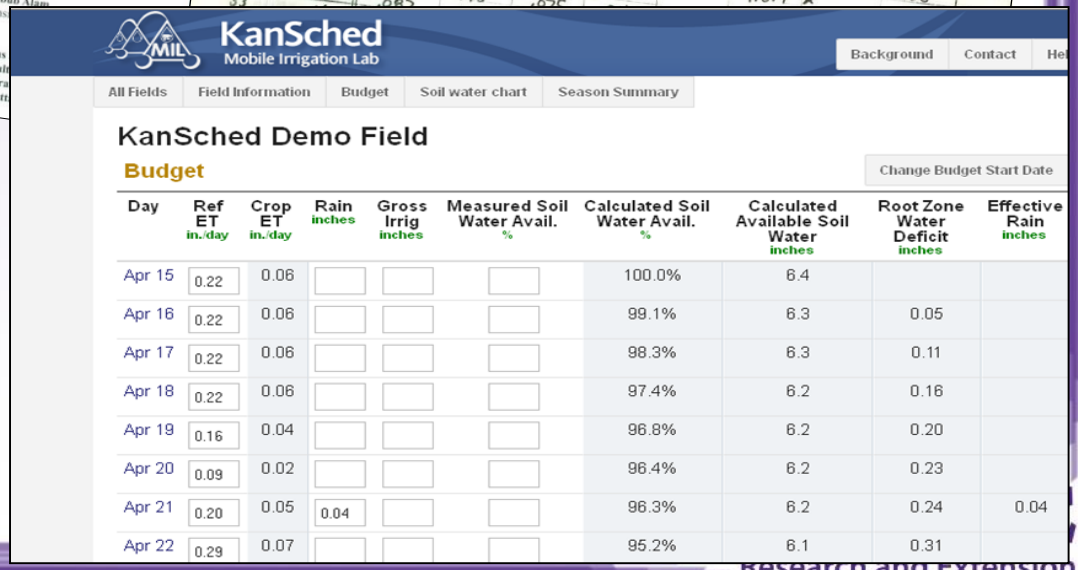


Example ET schedule from F Lamm



Day	Ref ET in./day	Crop ET in./day	Rain inches	Gross Irrig inches	Measured Soil Water Avail. %	Calculated Soil Water Avail. %	Calculated Available Soil Water inches	Root Zone Water Deficit inches	Effective Rain inches
Apr 15	0.22	0.06				100.0%	6.4		
Apr 16	0.22	0.06				99.1%	6.3	0.05	
Apr 17	0.22	0.06				98.3%	6.3	0.11	
Apr 18	0.22	0.06				97.4%	6.2	0.16	
Apr 19	0.16	0.04				96.8%	6.2	0.20	
Apr 20	0.09	0.02				96.4%	6.2	0.23	
Apr 21	0.20	0.05	0.04			96.3%	6.2	0.24	0.04
Apr 22	0.29	0.07				95.2%	6.1	0.31	

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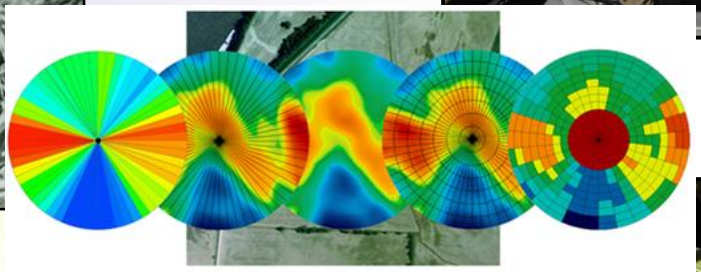
How far can we go?



Adapted from http://cropmetrics.com/features/ [illegible]

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K-State Research and Extension Website:

www.ksre.ksu.edu

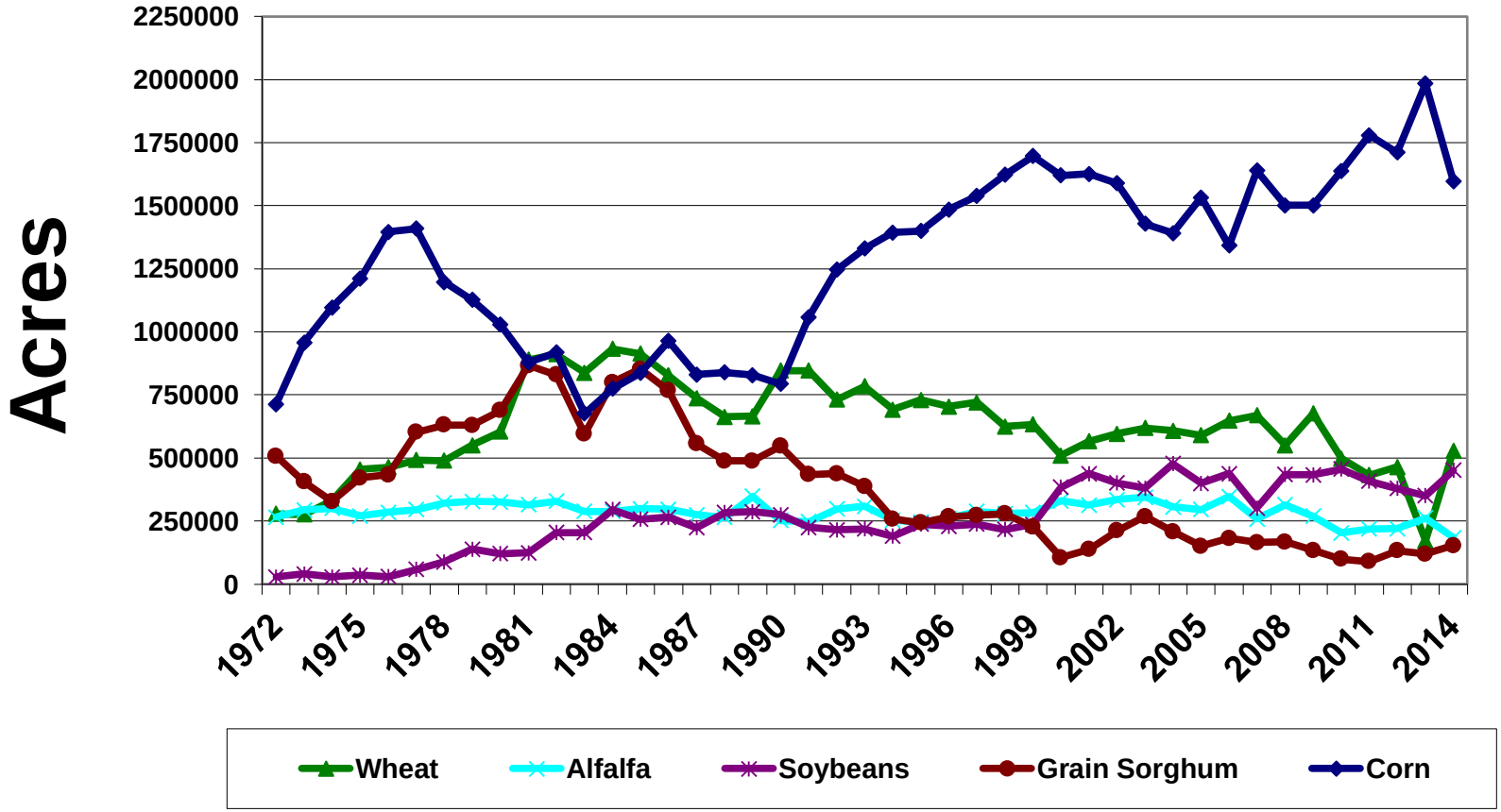
General Irrigation: www.ksre.ksu.edu/irrigate

Subsurface Drip Irrigation: www.ksre.ksu.edu/sdi

Mobile Irrigation Lab:

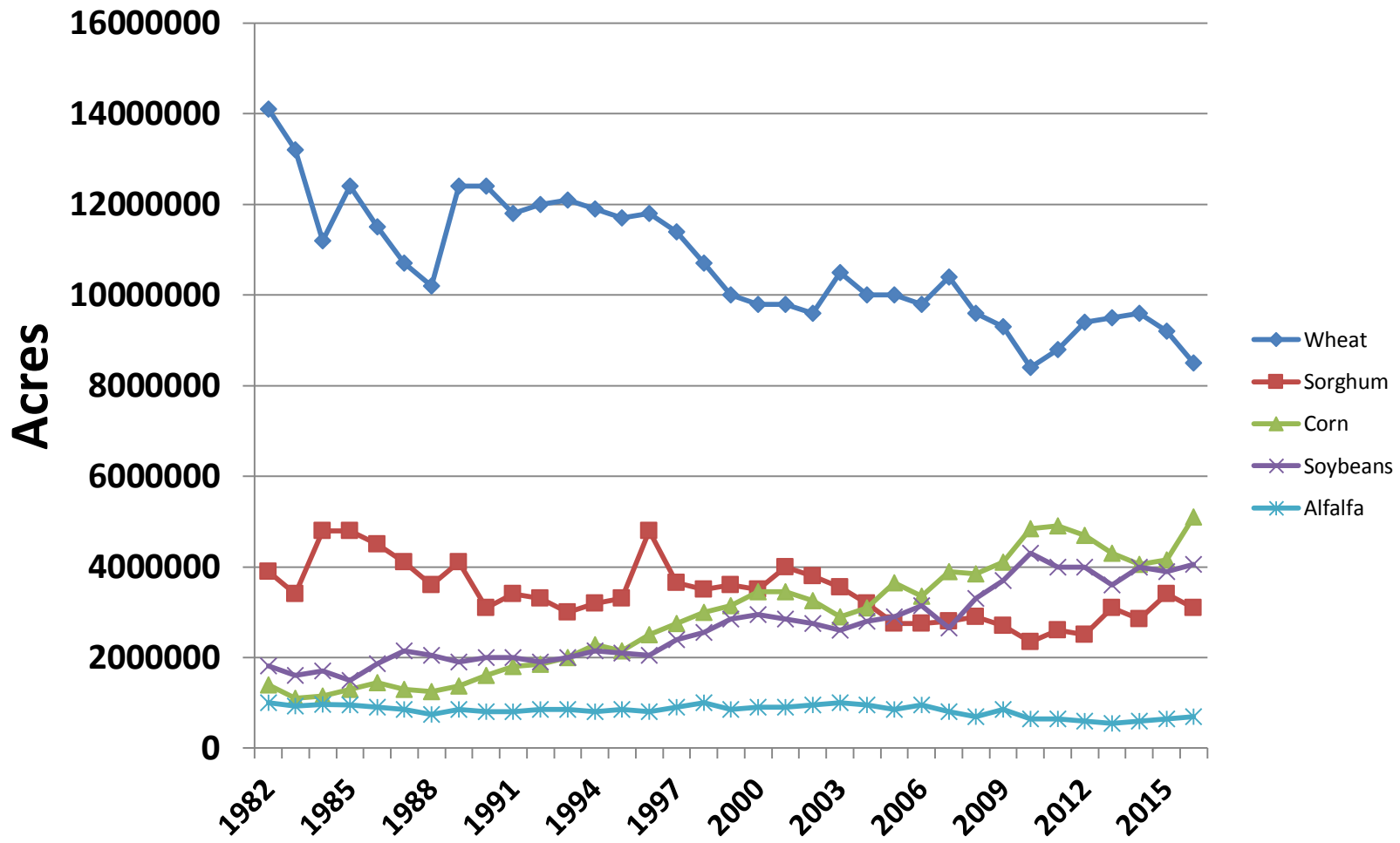
www.bae.ksu.edu/mobileirrigationlab

Major Kansas Irrigated Crop Acreage



Selected Crops Acreage Trends in Kansas

(Irr + Dry)



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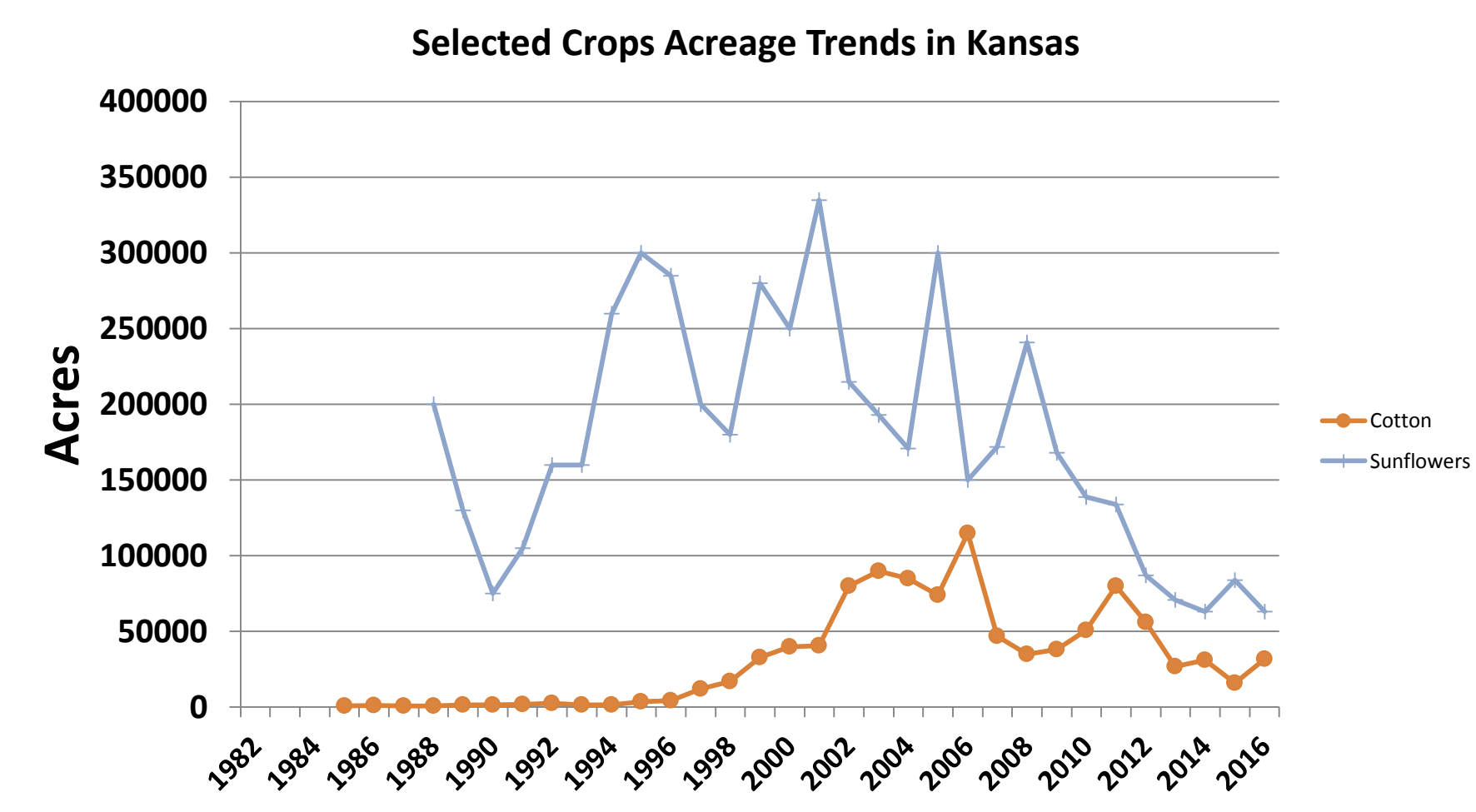
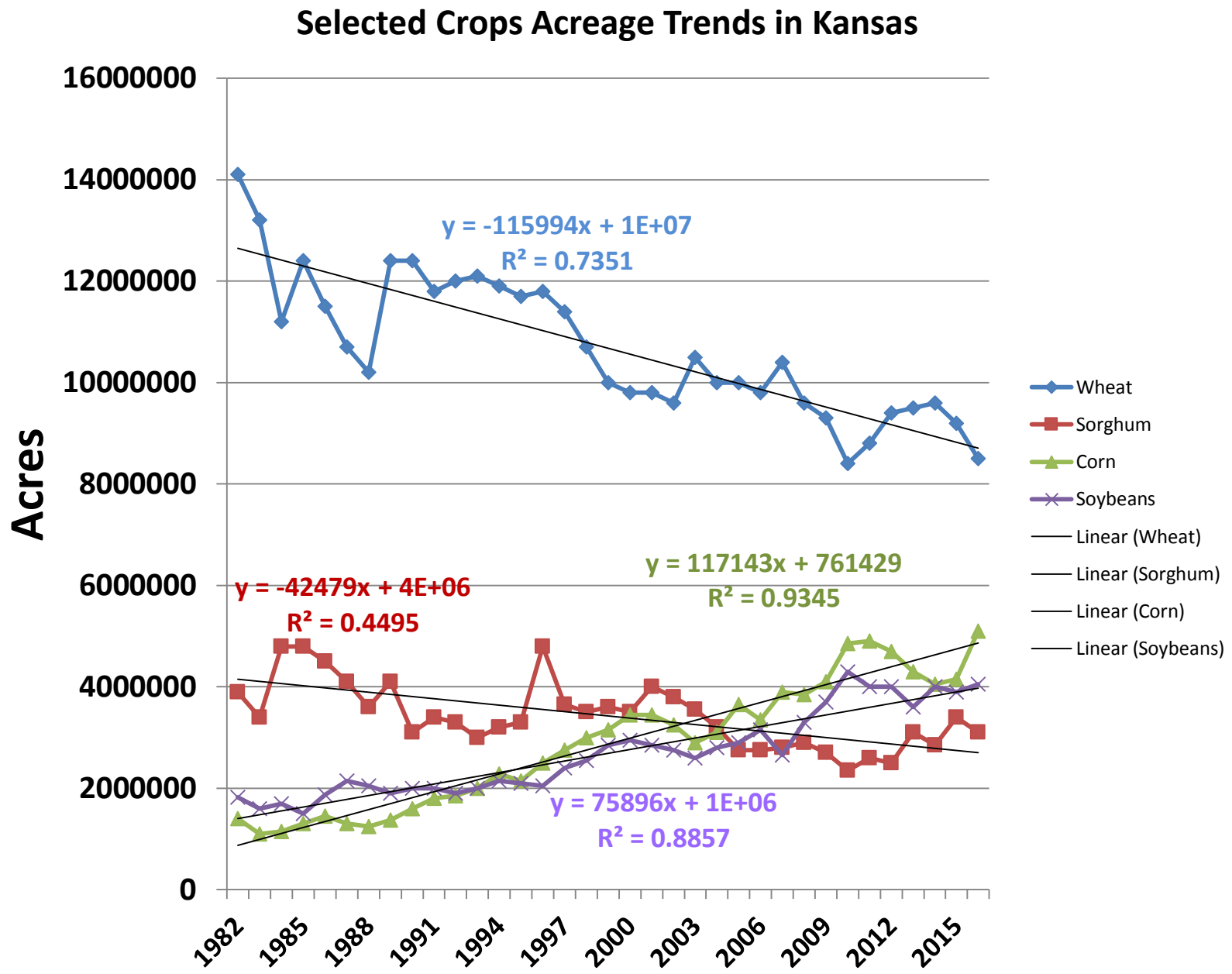

Selected Crops Acreage Trends in Kansas
Acres
400000
350000
300000
250000
200000
150000
100000
50000
0
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Cotton
Sunflowers



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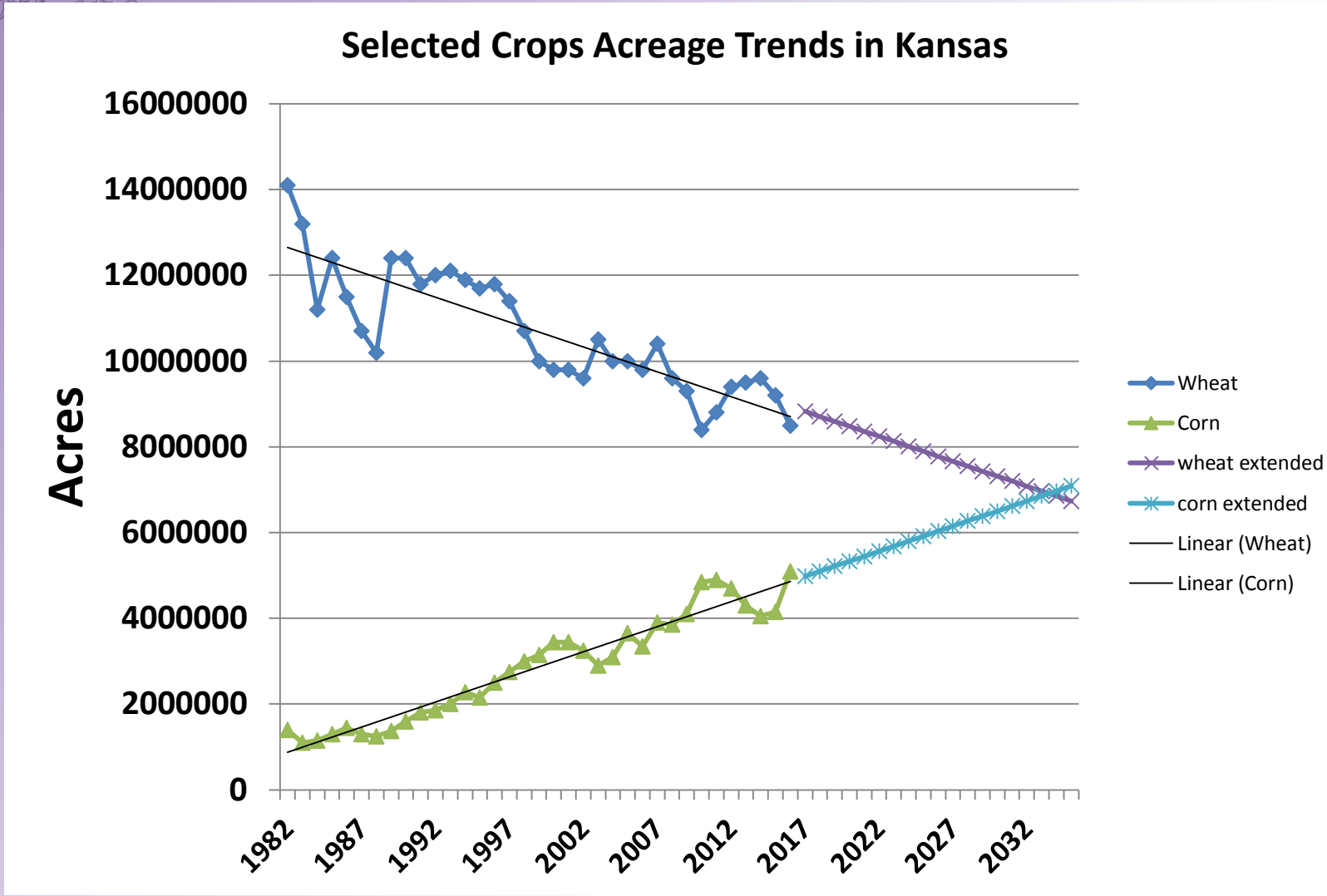
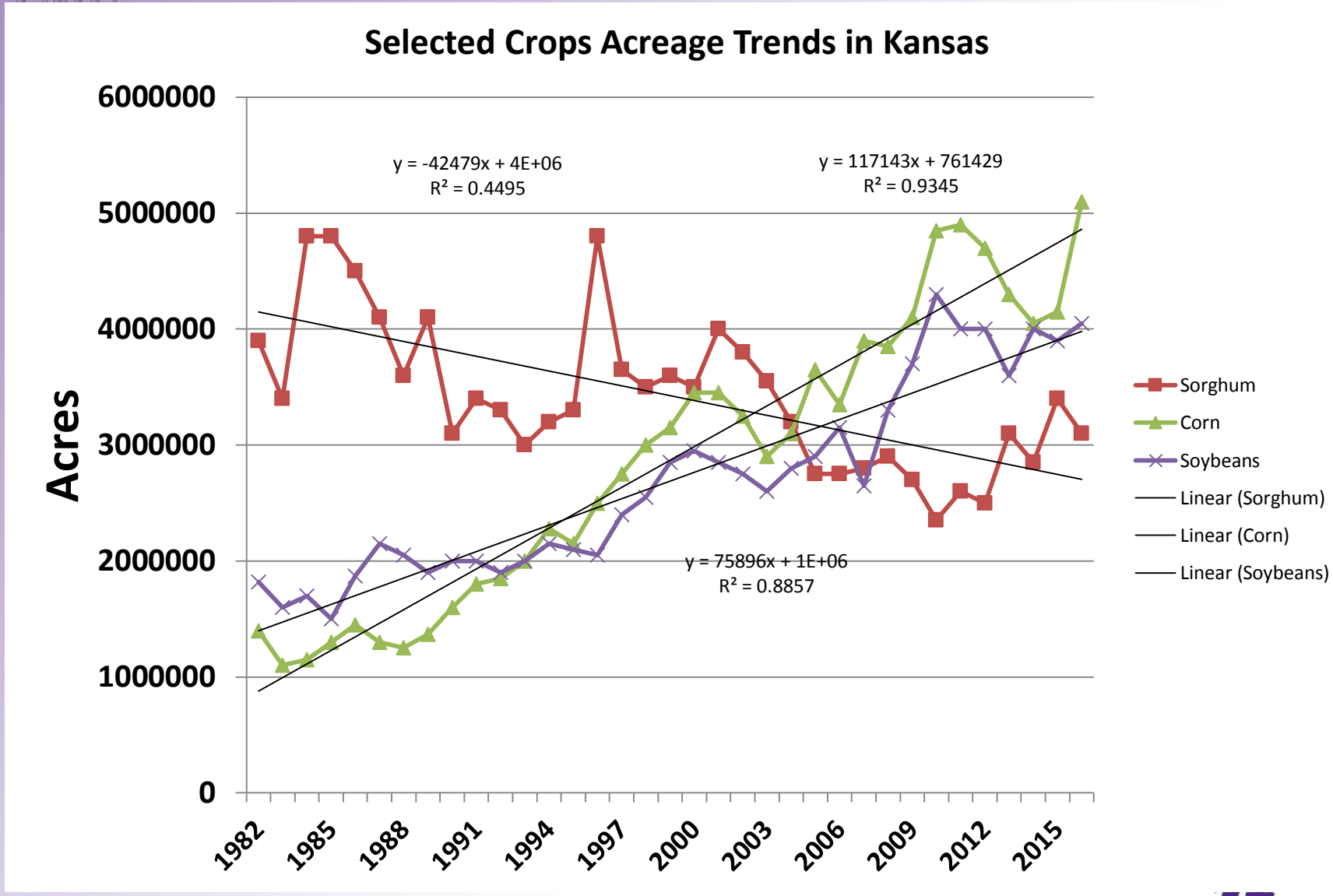
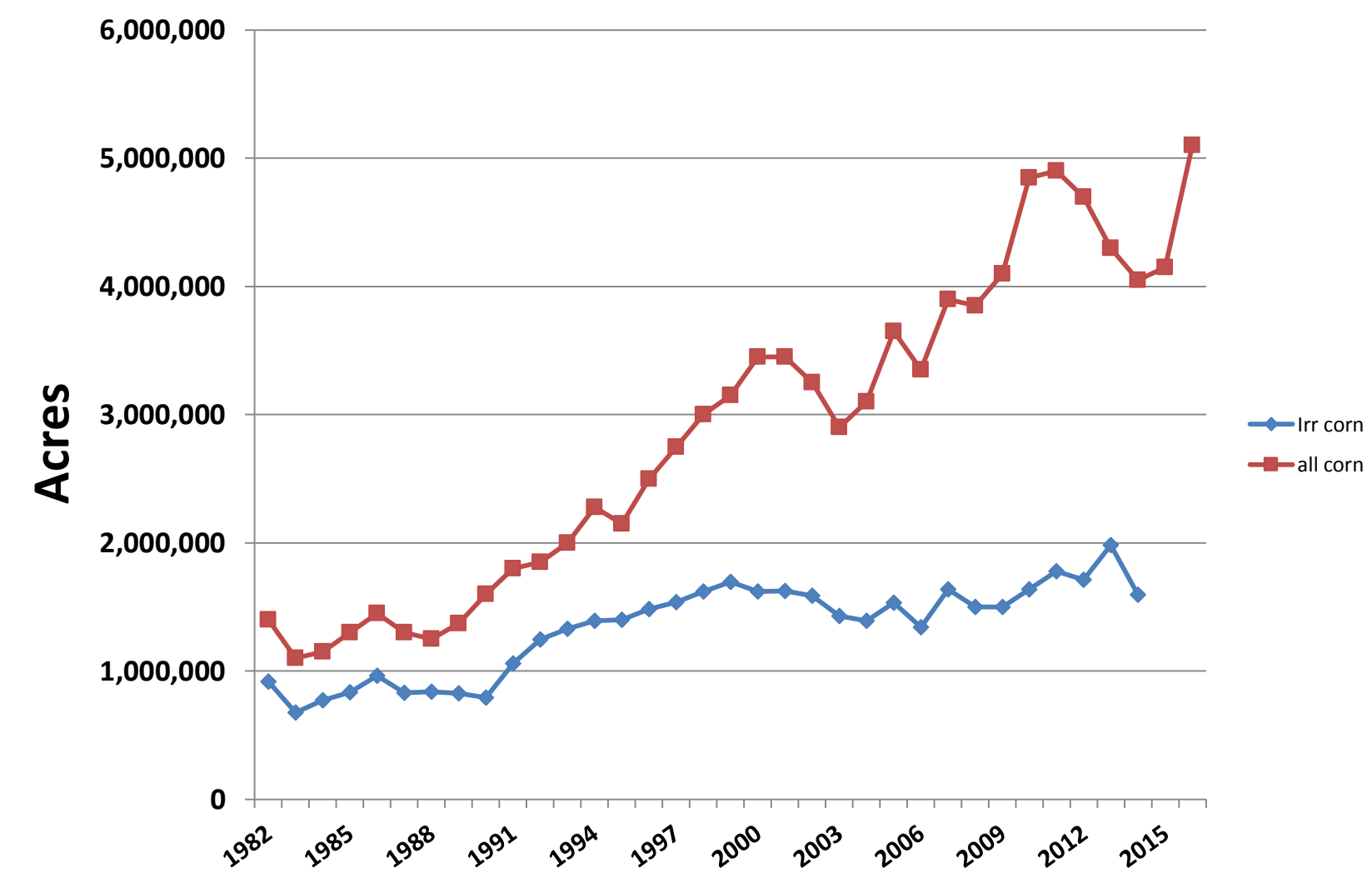
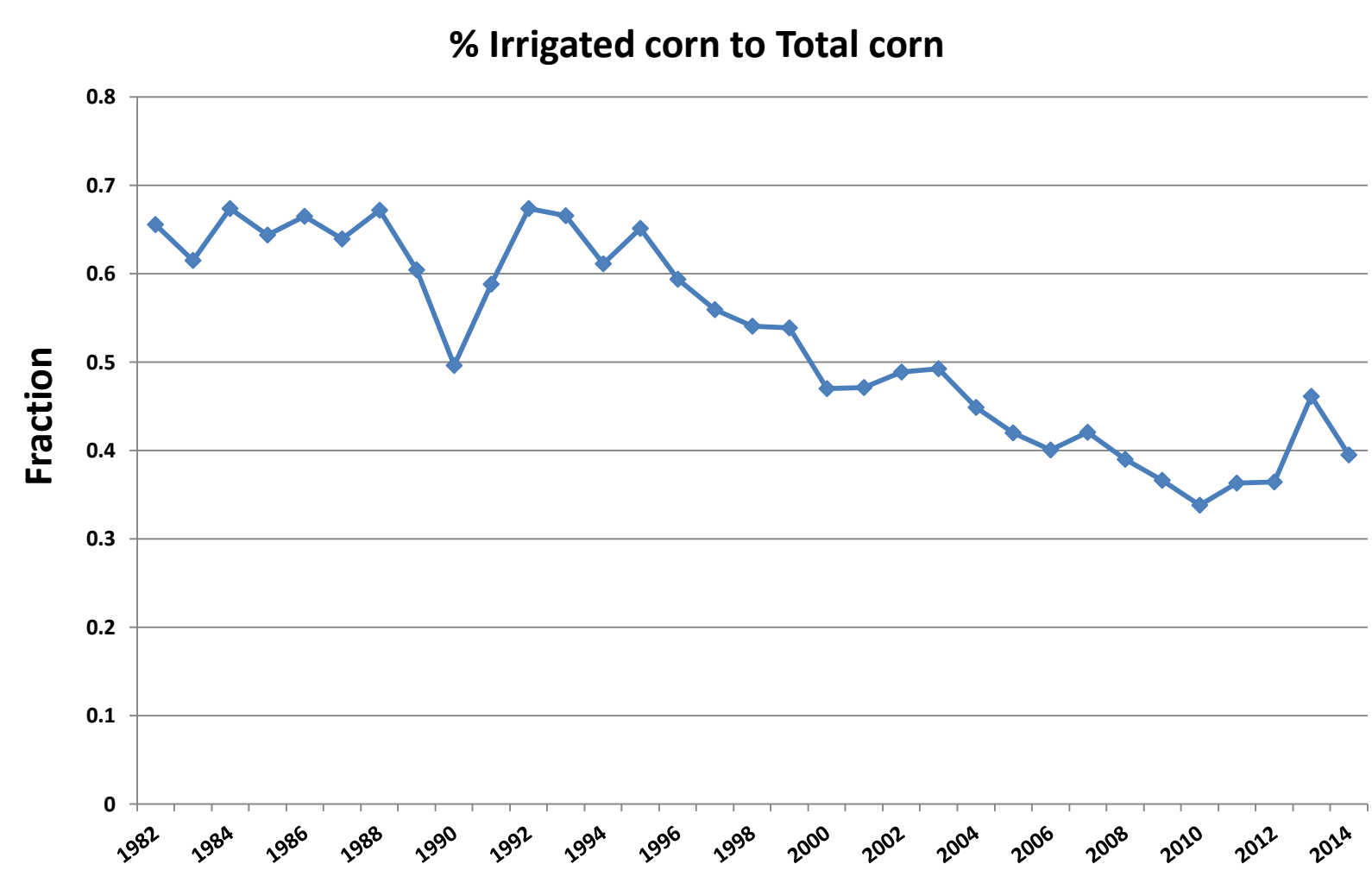

Selected Crops Acreage Trends in Kansas
Acres
16000000
14000000
12000000
10000000
8000000
6000000
4000000
2000000
0
1982
1987
1992
1997
2002
2007
2012
2017
2022
2027
2032
Wheat
Corn
wheat extended
corn extended
Linear (Wheat)
Linear (Corn)

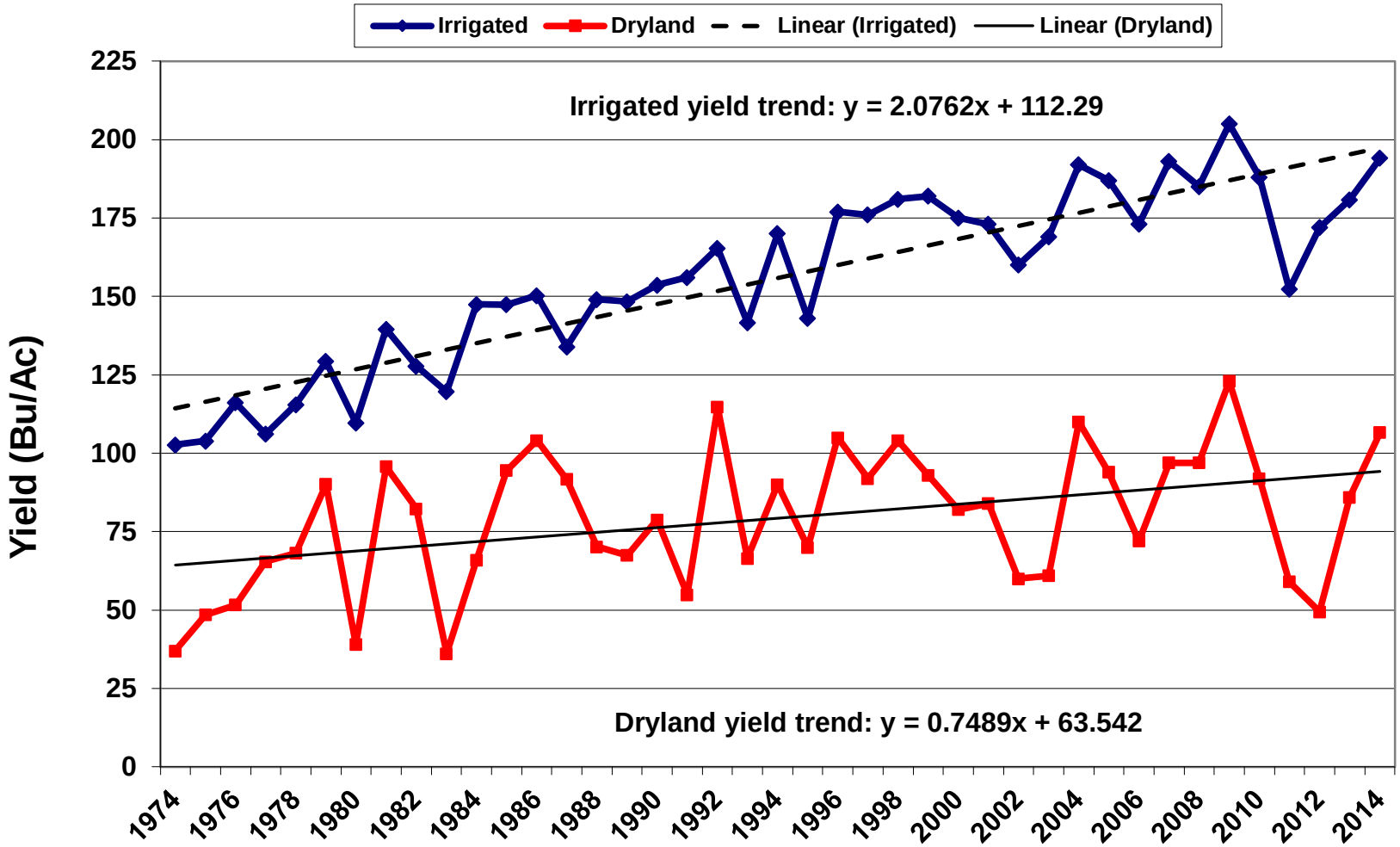

Selected Crops Acreage Trends in Kansas
Acres
6000000
5000000
4000000
3000000
2000000
1000000
0
1982
1985
1988
1991
1994
1997
2000
2003
2006
2009
2012
2015
y = -42479x + 4E+06
R² = 0.4495
y = 117143x + 761429
R² = 0.9345
y = 75896x + 1E+06
R² = 0.8857
Sorghum
Corn
Soybeans
Linear (Sorghum)
Linear (Corn)
Linear (Soybeans)

Irrigated and Dryland Corn Acres




% Irrigated corn to Total corn
Fraction
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014

Kansas Corn Yield Trend



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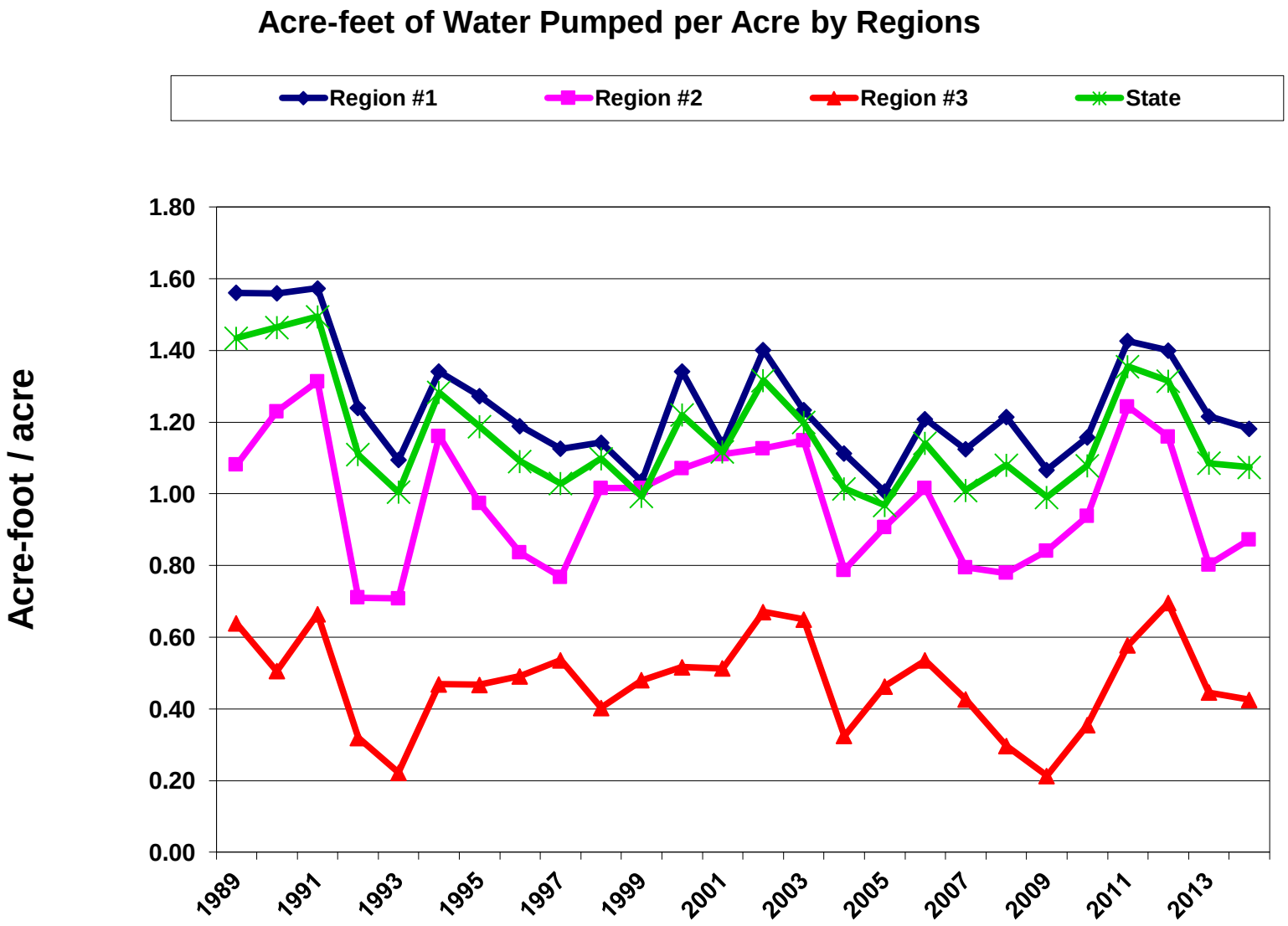
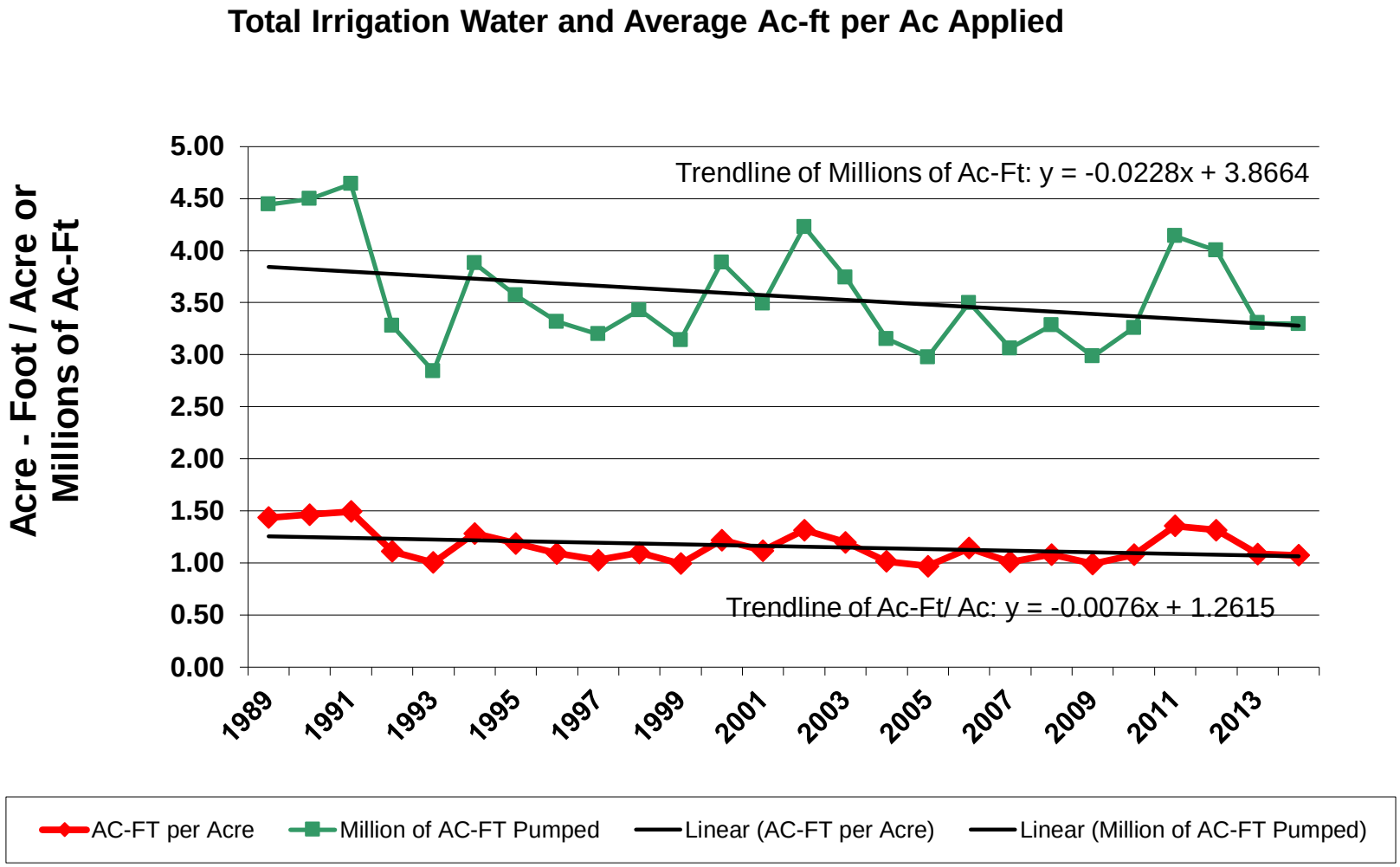
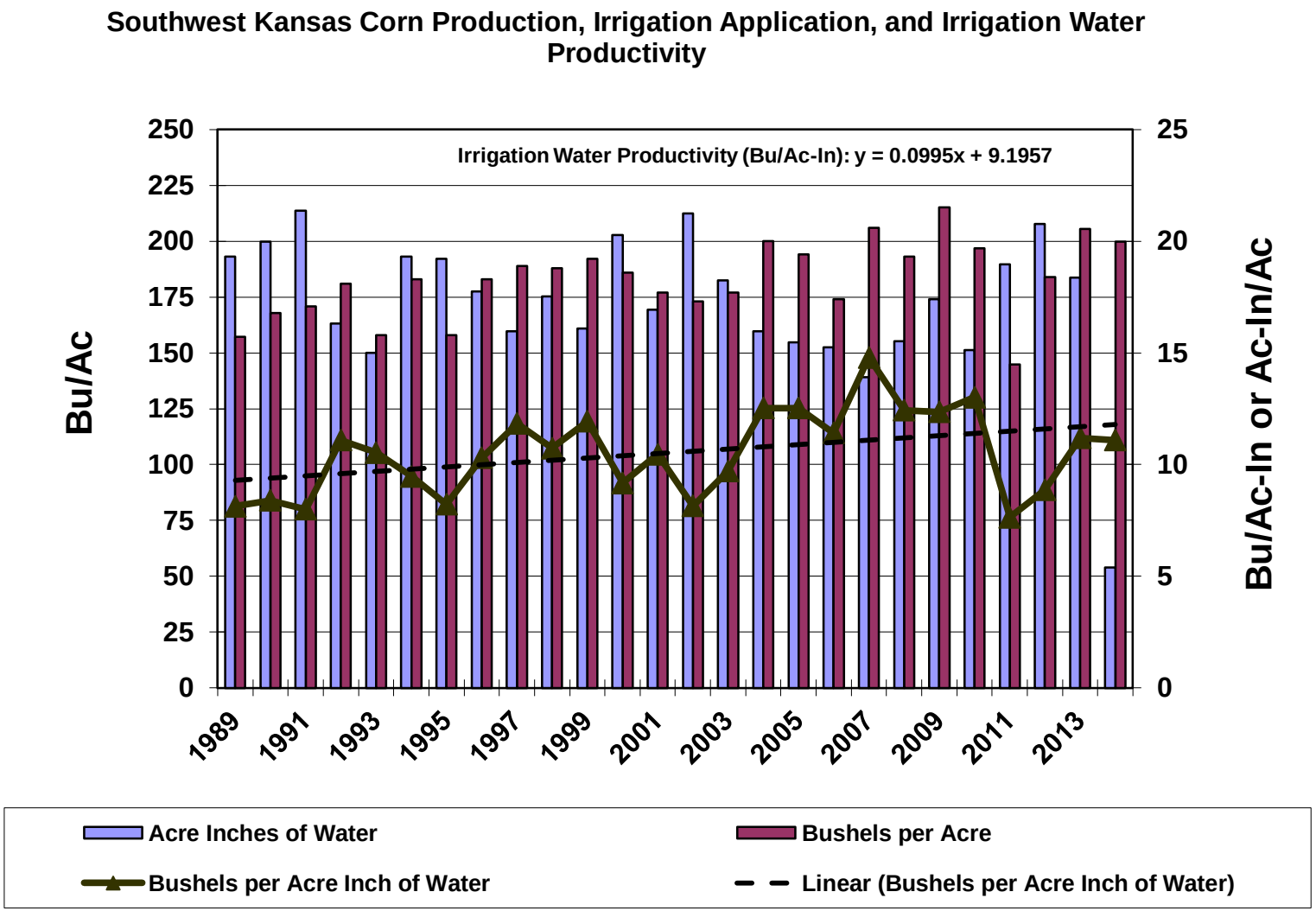
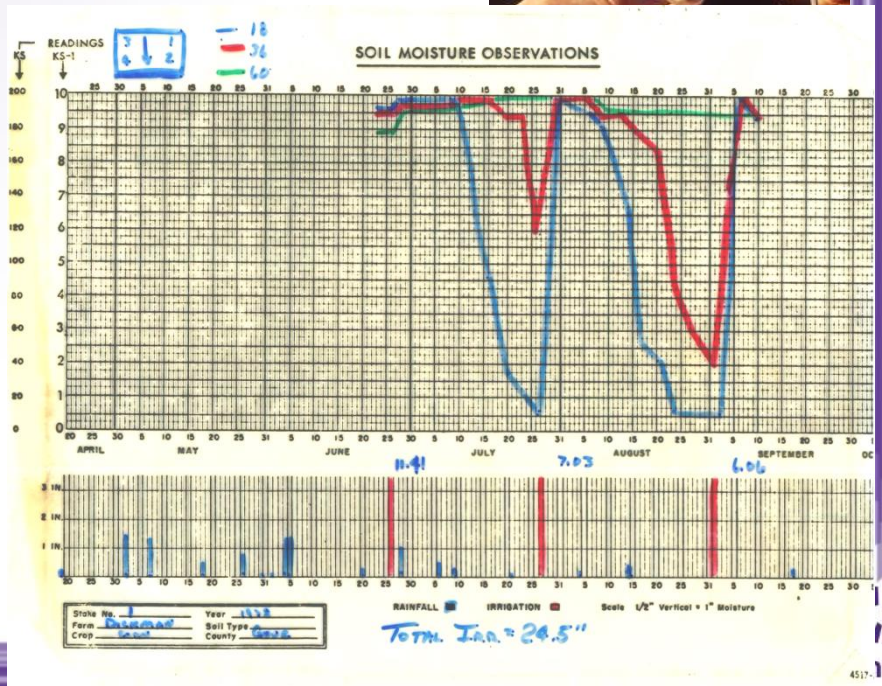

Acre-feet of Water Pumped per Acre by Regions
Region #1
Region #2
Region #3
State
Acre-foot / acre
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013


Total Irrigation Water and Average Ac-ft per Ac Applied
Acre - Foot / Acre or Millions of Ac-Ft
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Trendline of Millions of Ac-Ft: y = -0.0228x + 3.8664
Trendline of Ac-Ft/ Ac: y = -0.0076x + 1.2615
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
AC-FT per Acre
Million of AC-FT Pumped
Linear (AC-FT per Acre)
Linear (Million of AC-FT Pumped)


Southwest Kansas Corn Production, Irrigation Application, and Irrigation Water Productivity
Irrigation Water Productivity (Bu/Ac-In): y = 0.0995x + 9.1957
Bu/Ac
Bu/Ac-In or Ac-In/Ac
250
225
200
175
150
125
100
75
50
25
0
25
20
15
10
5
0
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
Acre Inches of Water
Bushels per Acre
Bushels per Acre Inch of Water
Linear (Bushels per Acre Inch of Water)

Water CUP highlighted water meters as a management tool and soil based irrigation scheduling



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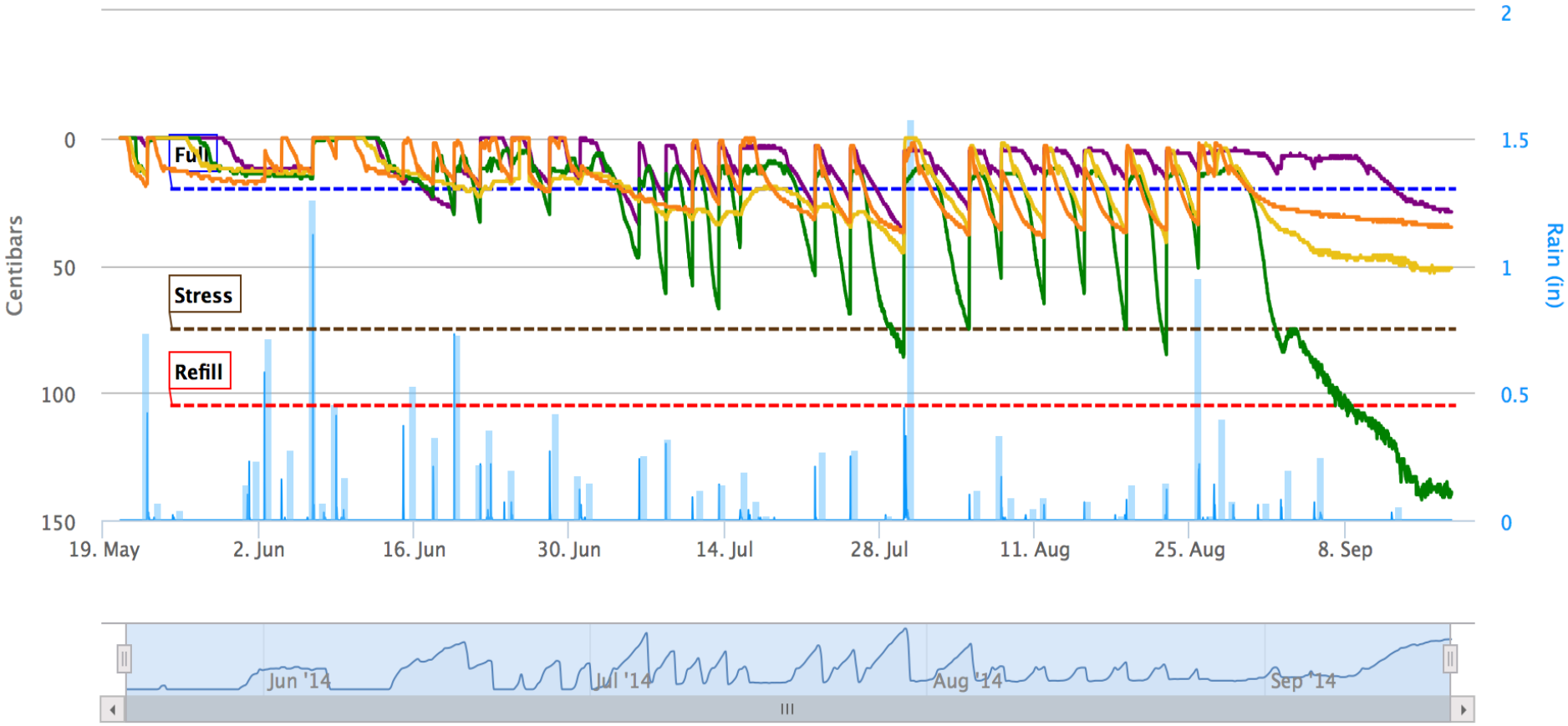

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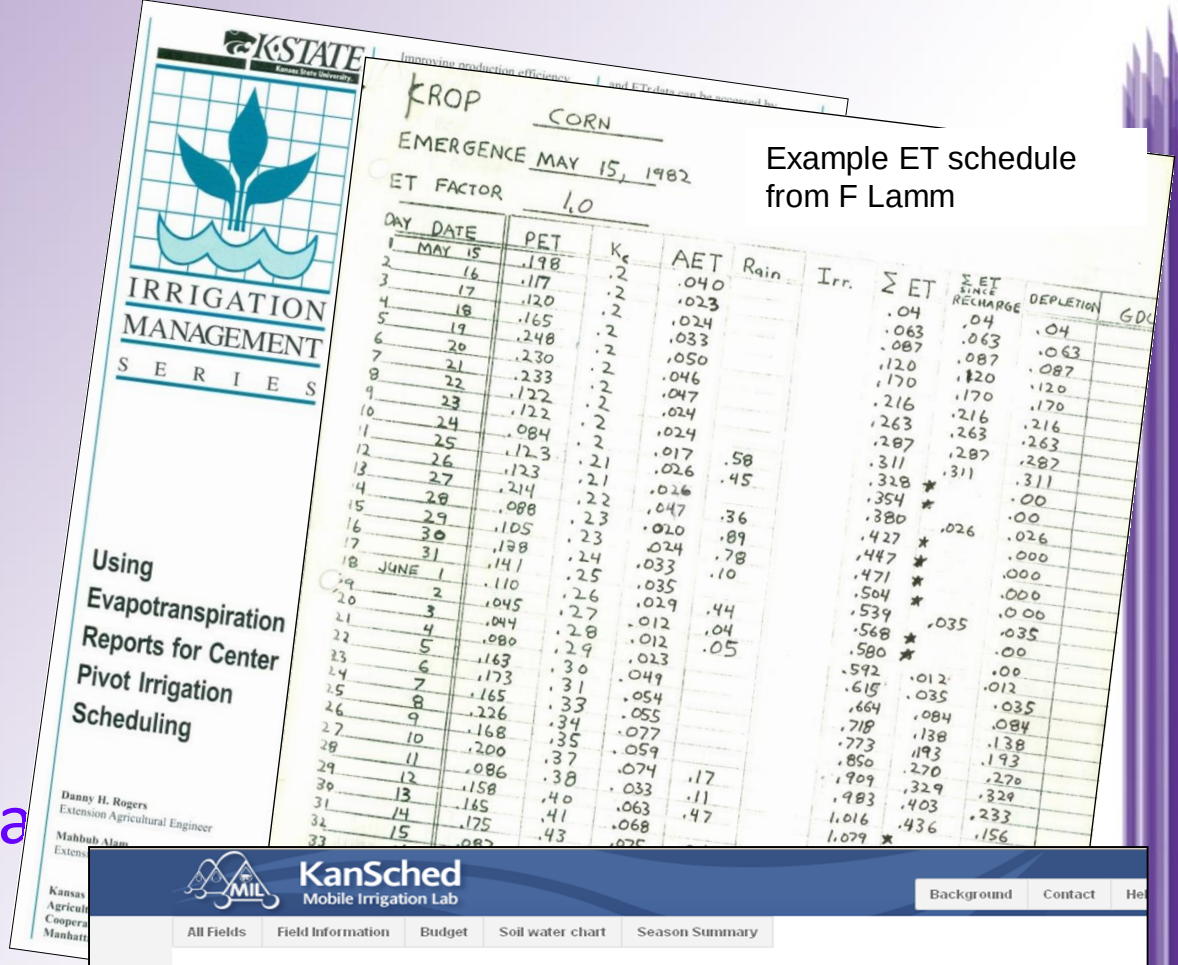

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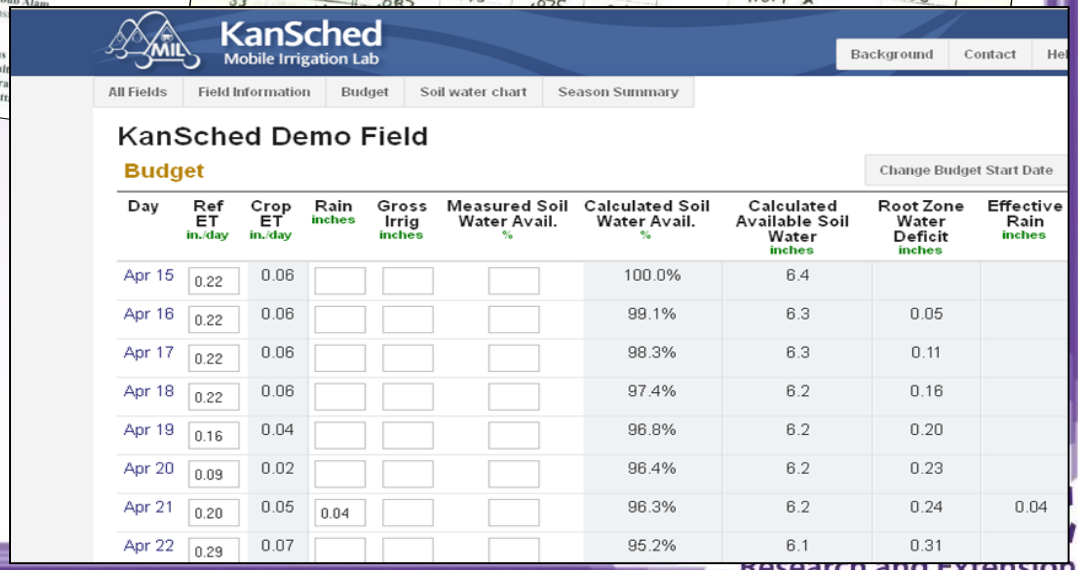

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