

2007

Solution Days

Water and Nutrients – *Making Them Count*

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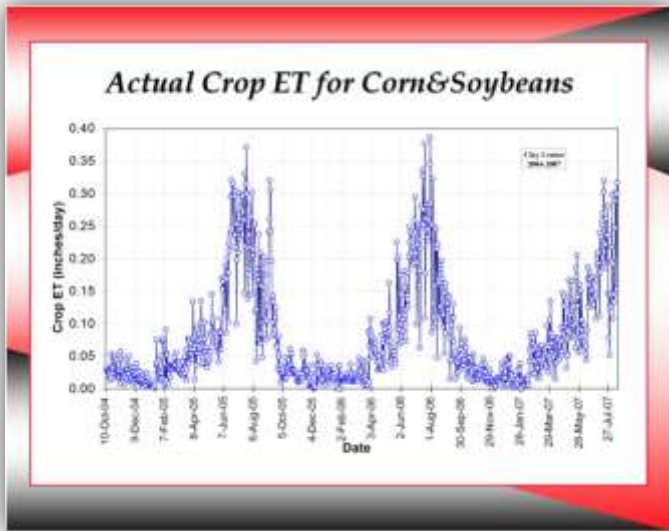
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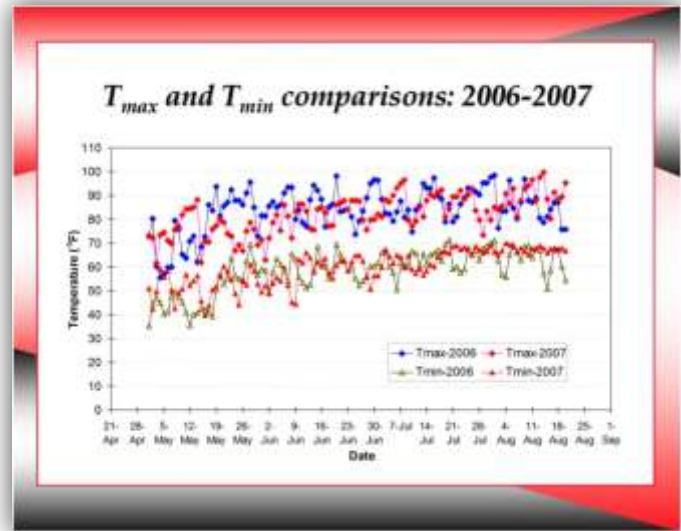
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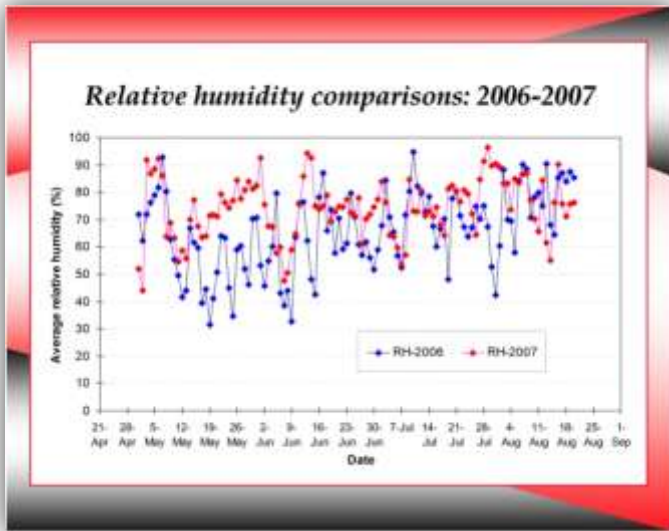
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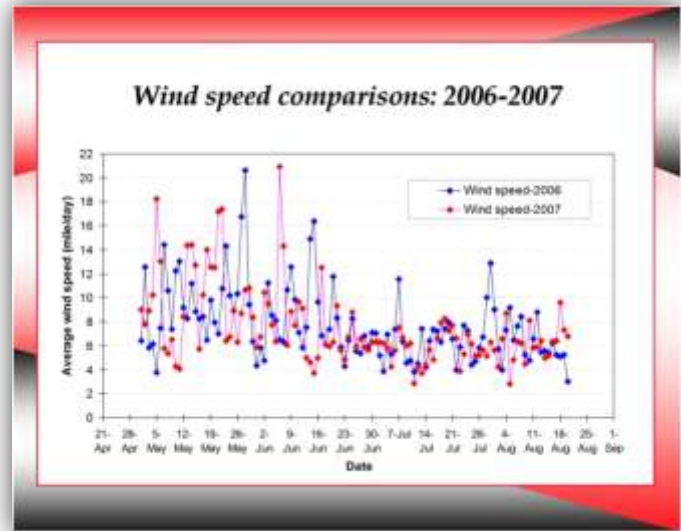
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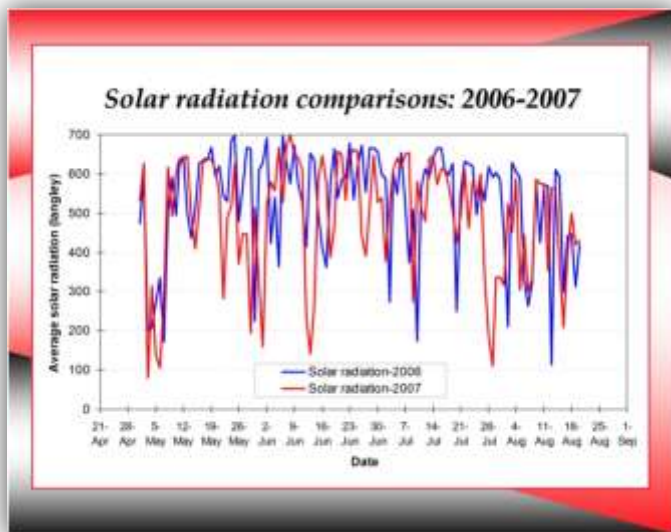
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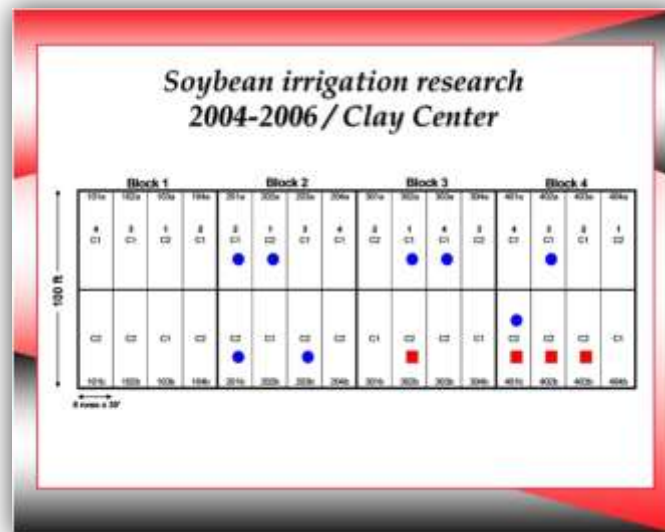
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2007SolutionDays-Water004



2007SolutionDays-Water005



2007SolutionDays-Water006

Soybean irrigation research 2004-2006

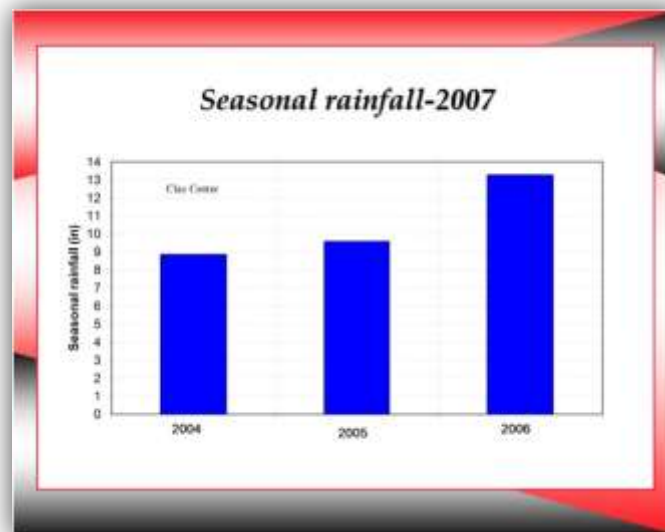
Year	Planting date	Harvest date	Cultivar
2004	May 27	October 12	Mycogen 288RR
2005	May 13	October 4	Golden Harvest 2811
2006	May 22	September 26	P93M11, 92M62

Actual count:

- 6/6: 3ft/plot, 173,000/acre (SE=1,800)
- 9/24: 3ft/plot, 169,000/acre (SE=2,500)

Two counts are statistically equal

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2007SolutionDays-Water008



2007SolutionDays-Water009



2007SolutionDays-Water010

Soybean yield and irrigation 2004-2005

	100%	75%	50%	Dryland
2004	59.0	56.4	54.6	46.8
2005	66.6	58.4	52.5	45.1

	Irrigation (in)			
2004	10.9	8.1	5.2	0.0
2005	7.1	5.6	3.7	0.0

	Gravity (bu/ac)
2004	57.2
2005	57.7

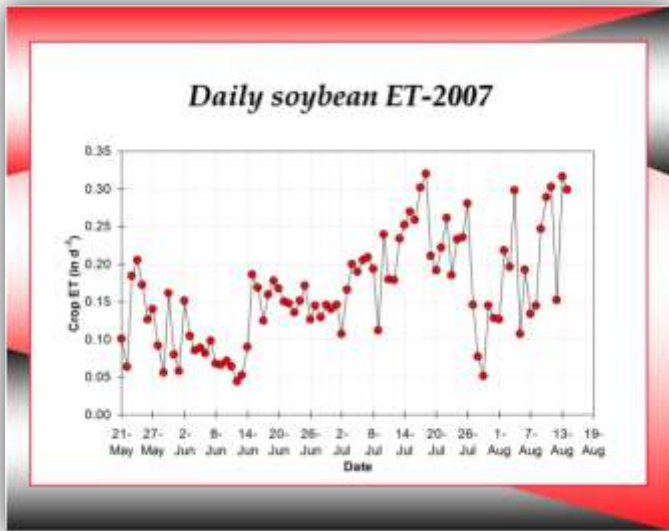
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Soybean yield and irrigation 2006

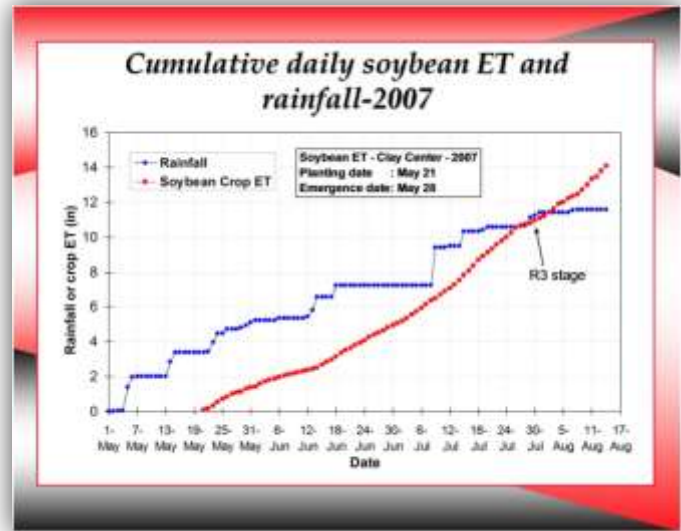
	Yield (bu/ac)			
	100%	67%	Deferred	Dryland
P92M61	73.2	70.5	70.3	69.1
P93M11	73.3	69.4	72.4	68.2

	Irrigation (in)			
	7.6	5.0	6.4	0.0

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2007SolutionDays-Water013

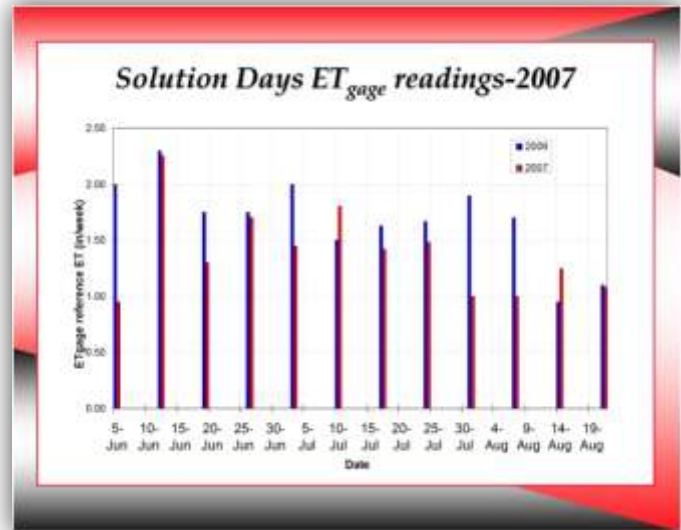


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Solution Days 2007 treatments

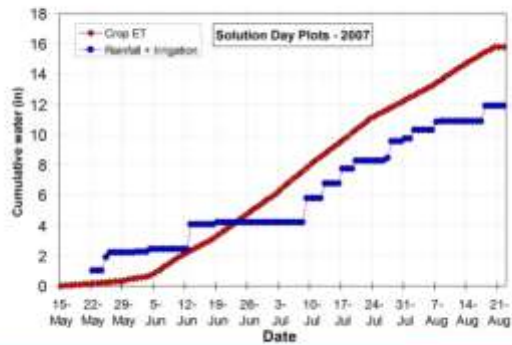
Solution Days Plots				
Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5
3004	3004	3004	3004	3004
Dryland	R3-100 refR & 100% ETc	R3-30% refR & 100% ETc	75% ETc	100% ETc
100,000 Pop.	100,000 Pop.	100,000 Pop.	100,000 Pop.	100,000 Pop.
140,000 Pop.	140,000 Pop.	140,000 Pop.	140,000 Pop.	140,000 Pop.
180,000 Pop.	180,000 Pop.	180,000 Pop.	180,000 Pop.	180,000 Pop.

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2007SolutionDays-Water016

Solution Days Plots cumulative ET, irrigation and rainfall



2007SolutionDays-Water017

Effect of 4 days of visible moisture stress on soybean yield

	Percent Yield Decrease
1 st week flowering	8
1 st week pod development	19
2 nd week flowering	
1 st week of seed filling	36
3 rd week pod development	
4 th week of flowering	
2 nd -4 th week of seed filling	39-45
5 th week of seed filling	12

*Source: Iowa State

2007SolutionDays-Water018

Predicting last irrigation

Normal water requirements for corn, grain sorghum and soybeans between various stages of growth and maturity in Nebraska.

Stage of growth	Approximate number of days to maturity	Water use to maturity (in)
Corn		
Waxy kernel	85	10.5
Dough	54	7.5
Beginning dent	24	5.0
Full dent	15	2.5
Physiological maturity	0.0	0.0
Grain Sorghum		
Half bloom	54	9.0
Soft dough	25	5.0
Hard dough	12	2.0
Physiological maturity	0.0	0.0
Soybeans		
Full pod development (R07)	27	9.0
Beginning seed fill (R5)	29	6.5
Full seed fill (R6)	17	3.5
Beginning maturity (R7)	0.0	0.0

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Predicting last irrigation

Allowable soil moisture deficits and minimum allowable balances at physiological maturity.

Soil type	Available water capacity (inches/feet)	Allowable soil moisture deficit in top 4 feet of soil profile*	Minimum allowable balance in top 4 feet of soil profile*
		(inches)	(inches)
Silty			
clay loam	1.6	2.8	2.6
Upland			
well loam	2.0	4.8	3.2
Bottomland			
silt loam	2.5	6.0	4.0
Very fine			
sandy loam	1.8	4.7	2.9
sandy loam	1.4	3.4	2.2
fine sand	1.0	2.4	1.6

*Based on depletion of 10% of the available water

2007SolutionDays-Water020

Determining soil water depletion from Watermark sensor readings for different soil types

Soil type depletion in inches per foot associated with a given soil matrix potential value measured by the Watermark sensors, and available water holding capacity for different soil types

Soil matrix potential (kPa)	Silt-clay loam topsoil, Silt-clay subsoil (Sherp/Berg)	Silt loam topsoil, Clay loam subsoil (Keith)	Upland silt loam topsoil, Silt-clay loam subsoil (Hastings, Cora, Holdrege)	Bottom-land silt loam (Waterloo, Hall)	Fine sand loam	Sandy loam	Loamy sand (O'Neill)	Fine sand (Vining)
0	0	0	0	0	0	0	0	0
20	0	0	0	0	0.20	0.30	0.30	0.30
33	0.20	0.14	0	0	0.35	0.50	0.65	0.50
50	0.45	0.36	0.12	0.30	0.60	0.70	0.60	0.70
60	0.50	0.40	0.17	0.44	1.0	0.80	0.70	0.70
70	0.60	0.50	0.20	0.50	1.20	0.80	0.60	0.60
80	0.65	0.55	0.26	0.60	1.20	1.00	0.60	1.00
90	0.70	0.60	0.28	0.70	1.40	1.20	1.00	1.00
100	0.80	0.68	0.31	0.80	1.60	1.40	1.10	-
150	0.90	0.86	1.00	1.20	-	-	-	-
200	1.00	0.90	1.20	1.20	-	-	-	-
Available water capacity (inches)	1.8-2.0	1.8-2.0	2.1	2.0	1.8	1.4	1.1	1.8

2007SolutionDays-Water021

Predicting last irrigation

1. Stage of growth _____
 2. Water required to crop maturity (Table) _____
 3. Allowable soil moisture deficit to prevent crop stress (Table) _____
 4. Current soil moisture deficit (Table from Watermark NetGauge) _____
 5. Remaining usable soil moisture (#3 minus #4) _____
 6. Irrigation requirement (assuming no rainfall) (#2 minus #5) _____
- If #5 is greater than or equal to #2, no more irrigation is needed!*

2007SolutionDays-Water022