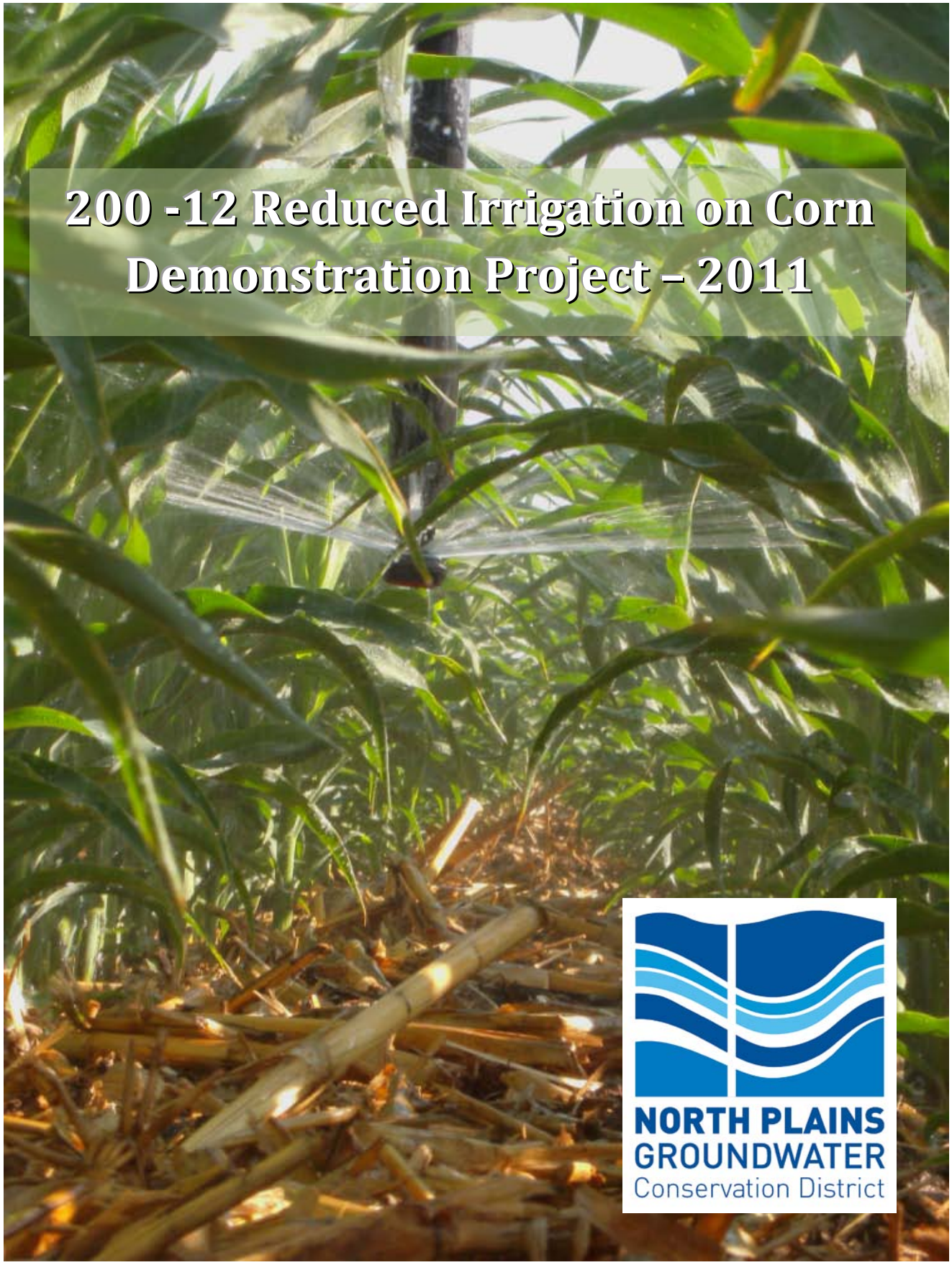
200 -12 Reduced Irrigation on Corn Demonstration Project – 2011



NORTH PLAINS GROUNDWATER Conservation District

Principal Participants:

Leon New – Irrigation Engineer (District Conservationist)

Randy Coon – Natural Resources Specialist

Harold Grall – Moore County Cooperator

Steve Shields – Hutchinson County Cooperator

Danny Krienke – Ochiltree County Cooperator

Phil Haaland – Hartley County Cooperator

Dennis Buss, JBS Hartley Feeders – Hartley County Cooperator

Brian Bezner – Dallam County Cooperator

James Born – Ochiltree County Cooperator

Chad Hicks – Hartley County Cooperator

Joe Reinart – Sherman County Cooperator

A special thanks goes out to all who helped to make the 200-12 demonstrations possible.

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Executive Summary

In 2009, the district began planning a demonstration project, referred to as the "200-12 Project". The purpose of the project is to implement conservation technologies and practices to attempt to grow 200 bushels of corn on 12 inches of irrigation per crop acre. Corn irrigation averaged 21 inches per acre based on 10 years of AgriPartner field demonstrations conducted by AgriLife Extension, while irrigation, rainfall and net soil water averaged 31 inches. The AgriPartner program consisted of 129 field scale corn demonstrations in the Texas Panhandle on 18,815 acres with approximately 150 cooperating growers over ten years. The 200-12 Project is a five year, on-farm, field scale project that demonstrates how water conservation technologies and irrigation management practice adjustments can reduce groundwater use and allow agricultural irrigation producers to remain financially viable with restricted and/or diminishing groundwater resources. For the 2011 growing year, the district expanded the project from 3 demonstration sites and 270 acres to 9 sites involving 682 acres.

In 2010, three district directors (Harold Grall, Danny Krienke and Phil Haaland) dedicated their own irrigated acres to the first year of the 200-12 Project. The cooperators implemented new and proven irrigation management technologies and practices to aid in strategic management of each reduced irrigation demonstration site. In 2011, six more participants, Dennis Buss "JBS Hartley Feeders", Chad Hicks, Joe Reinart, James Born, Steve Shields, and Brian Bezner joined the project and also implemented new strategic management practices.

2010 was a year with above average rainfall, while 2011 was the opposite, with well below average rainfall. The total lack of supplemental rainfall showed early that our goal of 12 inches of irrigation was not likely to be achievable; however one field project came close. Due to extreme drought, six participants were forced to divert water to fields that required more input to prevent devastating financial loss.

Harold Grall of Moore County dedicated 120 acres to the on-farm demonstration. Grall saved ten inches of irrigation for the year compared to his normal practices on twenty other fields. Mr. Grall has an Actual Production History (APH) of 217 bushels for the field in the previous nine years. Grall's acreage yielded 198 bushels in the 200-12 Project in 2010 and 178 in 2011. Even though the yield was 20 bushels less per acre in 2011, it was still considered an excellent result given the much lower than normal rainfall received in 2011. His farm average yield for other fields was 28 percent less than normal. Production averaged 164 bushels per acre on the other fields, 14 bushels less than the 178 harvested in the 200-12 Project field. Mr. Grall saved $94.64 per acre in reduced irrigation, seed and fertilizer but increased harvest costs in 2011. The 14 bushel increase in corn yield amounts to $90.72 per acre. The demonstration's net gain was $185.36 per acre with ten inches less irrigation compared to production from the average of Grall's twenty other fields.

Steve Shields of Hutchinson County dedicated 65 acres to the district's on-farm demonstration. Shield's field has an APH of 180 bushels and produced 153 bushels during the 2011

demonstration year. Shields states the 153 bushels per acre yield is about average in comparison to seven other fields he farms where production ranged from 126 to 190 bushels.

He thinks corn yields were 25 to 30 percent less on his farms in 2011. Shields used about five inches of irrigation in pre-water and following planting, battling the challenging climatic conditions. He did not save any money in reduced irrigation, fertilizer, seed and harvest costs. Irrigation was similar to his other fields. A first year project cooperator using a new center pivot, Shields says he is okay with the 153 bushel yield considering the dry conditions. He remarked, "I had to make a crop."

Danny Krienke of Ochiltree County dedicated 120 acres to the on-farm demonstration. Krienke reduced irrigation by seven inches for the season compared to normal practices for four other fields he farms, where irrigation totaled 28 inches and production averaged 168 bushels per acre. Krienke had an adjusted APH of 196 bushels from the field for 2010. The field demonstration produced 192 bushels during the 2010 demonstration and 121 bushels in 2011. He calculated corn production was 28 percent less than normal from his fields in 2011. Krienke saved $110.19 per acre in cost on corn produced in 2011 due to the reduction in irrigation, seed, fertilizer, and harvest costs. The reduced corn yield cost $304.56 per acre. The demonstration's net loss was $194.37 per acre, with 7 inches less irrigation water used compared to his four other fields. Krienke was forced to make pump repairs the first week in July at a critical plant growth stage. The five days of no irrigation limited corn yield and was typical of what happens with limited pumping capacity.

Phil Haaland had expectations to harvest a grain crop, but near 100 degree temperatures and no meaningful rainfall from May thru September prevented development of a harvestable crop. His 15 acres were harvested for corn silage in July.

Dennis Buss and Hartley Feed Yard made a diligent effort to produce a grain crop on his 62 acres. The plants, already under moisture stress were blasted beyond recovery by 113 degree temperatures and 45 mph winds during a weekend in June. His two wells declined by 100 gpm and available water was diverted to another 60 acres, which also failed. The field was harvested for silage in July.

Brian Bezner received 2.25 inches of rainfall in June and had a promising crop, but did not have sufficient irrigation water to maintain the potential. His 60 acres were harvested for silage.

James Born experienced mechanical failures and down time with a center pivot with limited water already committed to too many acres on a first year farm. His 115 acres of corn stressed in June and was abandoned in favor of grain sorghum that was planted later.

Chad Hicks and 14 Mile Ranch could not irrigate the demonstration as planned because water was also committed to other crop acres in combination with additional wells. His 50 acres were abandoned in July after plants became severely stressed. In 2011, many wells were over extended and could not keep up with the demand.

Joe Reinart shared water from the well that was to irrigate his demonstration with other crop acres. The plants became severely stressed and the 75 acres were abandoned in late June. Three hundred five of the 682 acres (45 %) committed to the 200-12 demonstration project were harvested as planned, 137 (20 %) were harvested for corn silage and 240 (35 %) were abandoned**.**

What We Learned - Crop Residue is essential!

Irrigation can be five inches less by planting in May & June!

More Drought tolerant hybrids are on the horizon!

Growers must manage for production per inch of water!

By reducing current irrigation volumes by as little as three inches over the one million acres of irrigated cropland within the district, it is possible to save up to 250,000 acre-feet of groundwater per year and prolong the viability of irrigated agriculture in the area.

Introduction

In 2009, the district began planning a demonstration project, dubbed the "200-12 Project," that would use the latest water conservation technologies and practices to grow 200 bushels of corn on 12 inches of irrigation water per acre. The goal assumes the demonstration will take place under normal conditions. Normal conditions for area would include approximately 12 inches of irrigation, 8 inches of seasonal rainfall and 6 inches of available soil moisture, to reach 26 inches of total water to produce the crop. The district acknowledges adjustments may be necessary when rainfall and/or soil water are less than these average levels. Corn irrigation averaged 21 inches per acre based on the AgriPartner field demonstrations conducted from 1998-2007, while irrigation, rainfall and net soil water averaged 31 inches. The 200-12 Project demonstrates how water conservation technologies and irrigation management practice adjustments can reduce groundwater use and allow agricultural irrigation producers to remain profitable and financially viable with restricted and diminishing groundwater resources. The 200-12 Project is designed as a five year initiative that provides field-scale profitability and

feasibility demonstrations of producing 200 bushels of corn utilizing 12 inches of irrigation water combined with seasonal rainfall and available water within the crop's root zone soil

profile. In 2010, the 200-12 Project's first year, three of the district's directors, Harold Grall, Phil Haaland and Danny Krienke dedicated 270 of their own irrigated acres to establish the program. In 2011, six additional farmers joined the project, who are as follows: Brian Bezner dedicated 60 acres in Union County, NM; Dennis Buss "JBS Hartley Feeders" dedicated 62 acres in Hartley County; Chad Hicks dedicated 50 acres in Hartley County; Joe Reinart dedicated 75 acres in Sherman County; Steve Shields dedicated 65, acres in Hutchinson county; and James Born dedicated 115 acres in Ochiltree county. Grall and Krienke used 120 acres each again and Haaland 15, making the total 682 acres in 2011. The district is committed to continuing the demonstrations for the remaining three years. Information in this report provides results of the field scale demonstrations conducted in 2011.

Methods

Each of the nine cooperators individually selected commercially available corn hybrids based on their experience as growers and irrigated using center pivot systems. Seeding and fertilizer rates as well as pesticide and herbicide applications were also selected by each cooperator. At each demonstration site, the district installed water meters to record and verify the amount of irrigation applied on each field, rain gauges to measure rainfall, gypsum block moisture sensors at 1, 2, 3, 4 and 5 foot depths in the crop's root zone to monitor soil water content; and AquaSpy™ continuous soil water monitoring probes down to 60 inches. Each irrigation system was equipped with PivoTrac™ remote continuous tracking and control to monitor and manage irrigation application frequency. Each site was provided soil and plant leaf sampling four times during the growing season by Better Harvest, Inc. During the growing season, district personnel collected data and maintained recording equipment weekly in each demonstration field. Appendix A contains the district's tabulated field demonstration data and irrigation system tracking for each harvested site.

The cooperators and the district's conservationist used the real-time data from AquaSpy™ and PivoTrac™ along with the data collected at least weekly from the sites to monitor crop and soil moisture conditions, as well as to schedule irrigation frequency and volumes. All demonstrations began at planting and ended at harvest, which each cooperator managed.
The district compared harvest and irrigation results for each grower to that of other fields which the cooperator farmed. Yields for the field were adjusted to reflect 15.5% moisture content for corn based on the formula used by the National Corn Growers Association. The district analyzed production gains and losses based on a corn price of $6.48 per bushel and the growers expenses relating to irrigation, seed, fertilizer and harvest costs. The district did not analyze land costs because land costs are highly variable between growers and across the

district. The following discussion provides detailed 2011 growing season results and information for each grower's field.

Moore County Demonstration, 2011 – Harold Grall

Planting and Crop Information - For his demonstration, Harold Grall strip tilled and planted 120 acres of corn in the southwest quarter of section 414, "Grall #414". Grall planted the field with Pioneer 34 F 97. In the same field he planted twelve rows of four comparative Pioneer hybrids at two seeding rates in plots of 1.8 acres. He irrigated the corn using a center pivot nozzled at 475 gpm that delivered an average of 1.25 inches of irrigation in a 6.0 day circle. Planting and crop information for Grall #414 is shown in the table below.

Table – Planting and Crop Information for Grall #414

Planted:	June 7	**Fertilizer:**	148-50-2
Hybrid:	Pioneer 34 F 97	**Insecticide:**	Mustang Mag; Stratego fung.
Seeding Rate:	26,000	**Herbicide:**	Burndown, Sharpen, Roundup, Dual
Soil Type:	Sherm Silty Clay Loam	**Harvested:**	October 25
Row Width:	30 Inches	**No. Acres:**	120
GPM Per Acre	4.0	**Tillage:**	Strip Till
Irr/Rain/Soil Water: 21.63"		**Irrigation:**	18.78"

Four Additional Hybrid Plots @ Two Seeding Rates: P33B54, P1151HR, P1324HR, P1498HR

Beginning Soil Water Profile and Growing Season Rainfall –Soil water was mostly depleted at 2 and 3 feet at planting. An irrigation following planting had rewet soil in the first foot, when the gypsum blocks were installed. Soil water was good at 4 and 5 feet in the beginning of the season. Sherm soil holds approximately two inches of available water per foot for crop use. Seasonal rainfall totaled only 2.85 inches. Grall refilled the missing soil water at 2 and 3 feet within about two weeks following planting. Irrigation began soon after planting and continued until a 1.07 inch rain September 16. Additional irrigation followed to finish the crop. Due to the June 7 planting date, the crop was not affected as much from the severe wind, heat and temperature blast in June as crops planted earlier, especially in April. The gypsum block readings graph shows that good soil water levels were available to the crop during the growing season, until September when some plant stress likely occurred. The following table shows monthly rainfall as recorded by a district rain gauge located at the field.

Table – Monthly Rainfall Data for Grall #414

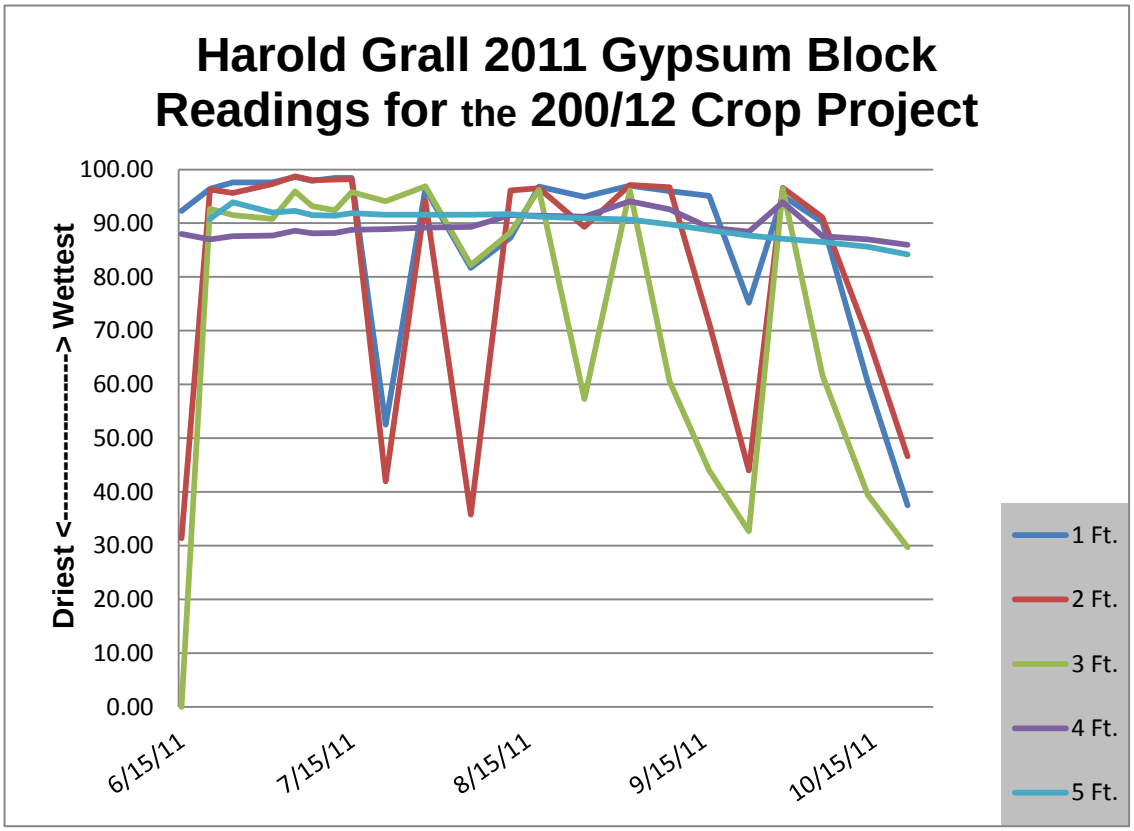
June- 0.20" July- 0" August- 0.99" Sept-1.28" Oct-0.38" Total: 2.85"

Growing Season Water Tracking – The district tracked crop total water throughout the growing season using rain gauges, water meters and both gypsum block and AquaSpy® soil

moisture sensors. A set of five gypsum block soil moisture sensors were installed at 1, 2, 3, 4 and 5 feet and an AquaSpy™ soil moisture probe down to five feet in the root zone to monitor soil water levels in only hybrid 34 F 97. Both sensors were installed in close proximity to each

other in the field following crop emergence. Weekly gypsum block readings for the season are shown in a graph following this paragraph. Growing season water tracked by the district, including rainfall, irrigation, and soil moisture at various growth stages throughout the season, are shown in the next graph. "Total Wet" is the sum of seasonal irrigation, rainfall plus net soil water. A table showing the order of irrigation and rainfall events follows the graphs.

Graph – Gypsum Block Readings for Grall #414



Graph – Growing Season Water Tracking for Grall #414.

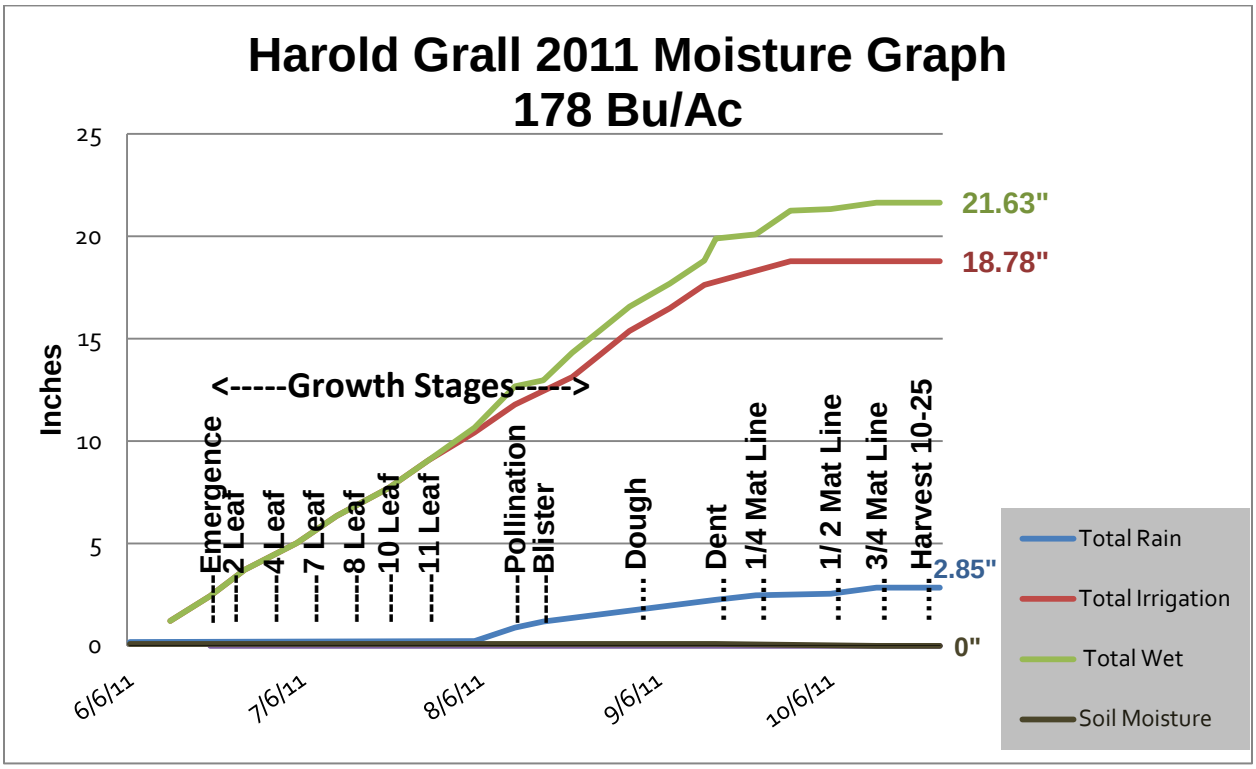


Table – Growing Season Water Tracking for Grall #414

Date	Inches		Water	Gypsum Block Reading (Percent of soil moisture)					Growth
Mo/Day	Rain	Irrig	Meter	1 foot	2 feet	3 feet	4 feet	5 feet	Stage
6/6/11			353857						
6/10/11									
6/13/11		1.22	373667						
6/15/11			393715	92.30	31.40	0.00	88.00		
6/20/11		1.22		96.40	96.30	92.70	87.00	90.80	Emerged
6/24/11			433572	97.60	95.60	91.50	87.60	93.90	2 Leaf
6/26/11		1.29	456329						
7/1/11				97.60	97.30	90.80	87.70	92.00	4 Leaf
7/5/11		1.29	505915	98.60	98.70	95.90	88.60	92.30	4 Leaf
7/8/11			517462	97.90	98.00	93.20	88.10	91.50	7 Leaf
7/12/11		1.33	526065	98.40	98.10	92.40	88.20	91.40	
7/15/11				98.40	98.20	95.80	88.80	91.90	8 Leaf
7/21/11		1.36	560870	52.50	42.00	94.10	88.90	91.60	10 Leaf
7/28/11		1.36	583917	96.40	94.20	96.90	89.20	91.60	11 Leaf
8/5/11	0.24	1.35	632610	81.70	35.80	82.20	89.30	91.60	11 Leaf
8/12/11	0.65	1.36	688845	87.30	96.10	88.30	91.50	91.70	Pollination
8/17/11	0.30		738015	96.80	96.50	96.20	91.40	91.20	Blister
8/22/11		1.34	752836						
8/25/11			781672	94.90	89.30	57.30	91.20	90.90	Blister
8/27/11		1.13	807276						
9/1/11		1.12	814256						
9/2/11				97.00	97.10	96.10	94.10	90.70	Milk
9/8/11		1.12							On Sens
9/9/11			860382	96.00	96.70	60.60	92.60	89.80	Dough
9/14/11		1.13							On Sens
9/16/11	1.07		897834	95.10	71.40	44.00	89.20	88.70	Dent
9/23/11	0.21		928015	75.20	44.00	32.70	88.40	87.70	1/4 Starch
9/29/11		1.16	928015	95.10	96.60	96.40	93.90	87.10	1/4 Starch
10/6/11	0.08		928015	90.20	91.10	61.70	87.60	86.50	1/2 Starch
10/14/11	0.30		965919	60.30	68.80	39.40	87.00	85.60	3/4 Starch
10/21/11			965819	37.50	46.60	29.70	86.00	84.20	Blk Layer
10/25/11			965819						Harvest
Total	2.85	18.78	965819						
Total Rain/Irr/Soil				21.63					

- On 8-26-2011 Meter at pivot timed out to 475 GPM

Harvest Results - The field produced a 178 bushel corn yield. Irrigation totaled 18.78 inches. The crop was not affected as much from the severe climatic growing conditions as earlier planted corn. His farm average yield for other fields was 28 percent less than normal. In comparison, 20 other fields where production averaged 164 bushels per acre, irrigation averaged 28.31 inches. Grall saved ten inches of irrigation for the year when compared to that applied in the other fields, and produced 14 bushels per acre more. The field produced 9.48 bushels (531 lbs) from each inch of irrigation and 8.25 bushels (462 lbs) from irrigation, rainfall and net soil water. In 2010, production was 198 bushels per acre and 6.88 bushels (385 lbs) from irrigation, rain, and additional soil water. Crop production costs were $94.64 per acre less than normal corn production costs from reduced seed, fertilizer, irrigation and increased harvest expenses. At $6.48 per bushel, the additional corn yield amounts to $90.72 more per acre. The demonstration's net gain was $185.36 per acre with 10 inches less irrigation used compared to production from the average of 20 other fields. A summary of the demonstration results are shown in the following table.

Table – 2011 Demonstration Results for Grall #414

Irrigation		Irrig/Rain/Soil	PRODUCTION		CROP VALUE @ $6.48/Bu		
No	Inches	Inches	Bu/Ac	Bu/Ac-In Irrigation	Per Acre	Acre-In of Irrigation	Ac-In of Irrig/Rain/Soil
15	18.78	*21.56	178	9.48	$1153.44	$61.42	$53.50

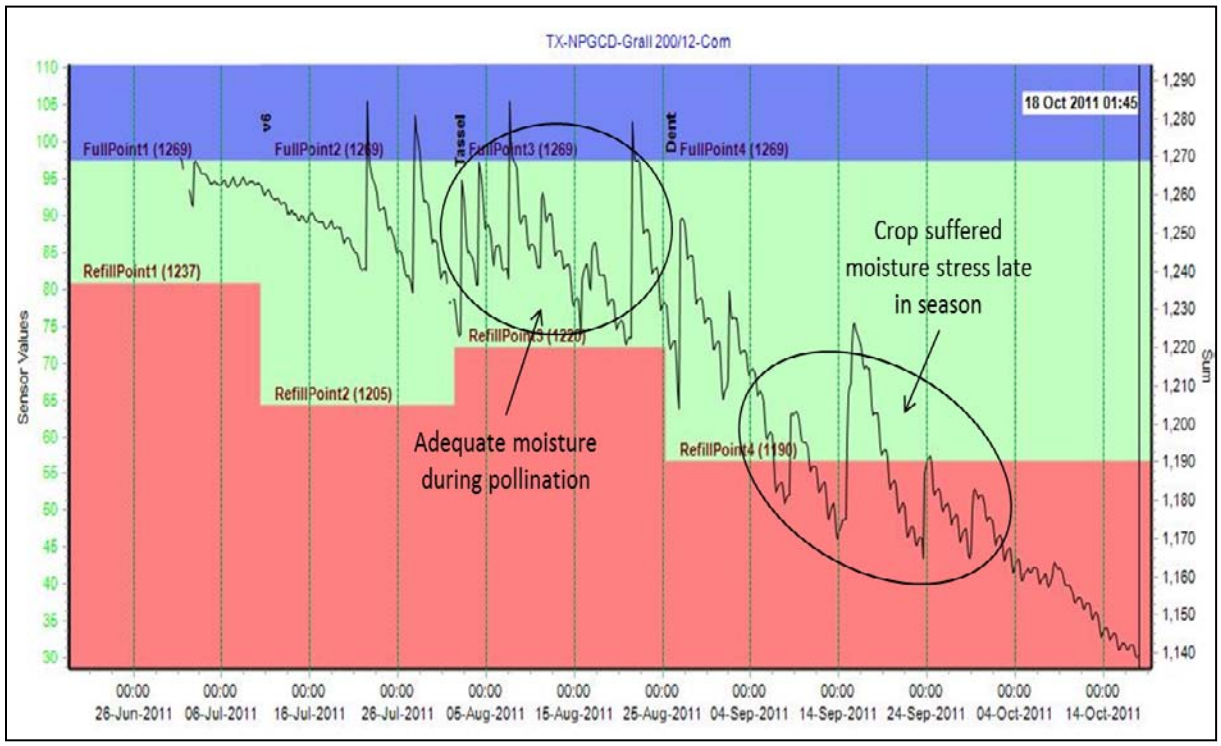
***Includes 0.0 inches of water removed from five feet of soil, rainfall, and irrigation.**

Additional Harvest Results – To support all growers within the district and the district's 200-12 project, potential success includes seeking additional field data concerning performance of alternative hybrids plus the corresponding seeding rate and planting date that can support reduced corn irrigation. In addition to harvesting the field, Grall collected yield samples of Pioneer Hybrid 34 F 97 adjacent to the 12 row Pioneer comparative hybrid plots listed in the table below. Six row plots of Syngenta Brand hybrids were also planted June 9 and harvested October 25 in Grall's field. Corn yields from the 1.8 acre Pioneer and 0.9 acre Syngenta hybrid plots are shown in the Additional Harvest Results below. These data are used to determine which commercially available hybrids performed best under reduced irrigation. Russell French, Agronomist for Pioneer Hybrid International, provided the plot harvest data. The plot test results are shown in the following table.

Table - Additional Harvest Results

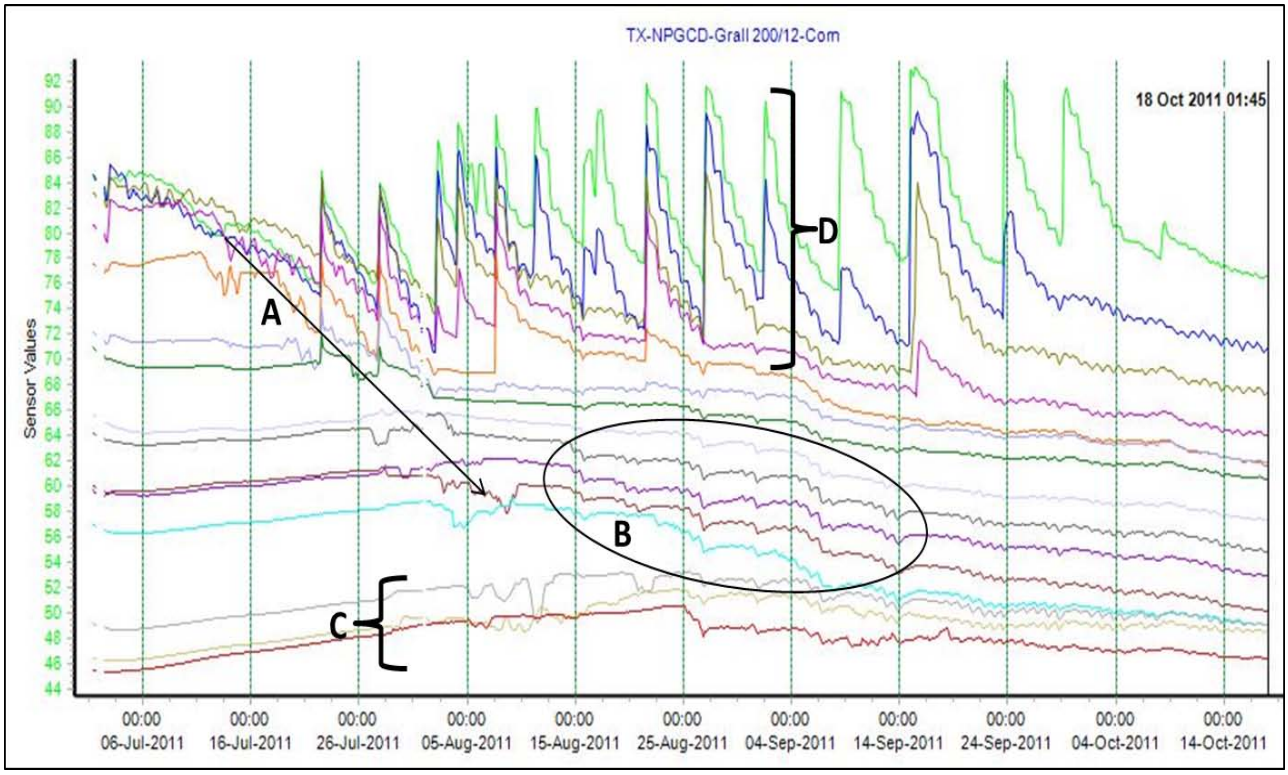
PIONEER HYBRID	SEEDING RATE	PRODUCTION (BUSHELS PER ACRE)	SYNGENTA BRAND HYBRID	SEEDING RATE	Production (BUSHELS PER ACRE)
P34 F 97	24,000	204	NK N68B3111	25,000	205
P1151HR	28,000	197	NK N61P3000GT	25,000	185
P1498HR	28,000	196	NK N60R3000GT	25,000	184
P1498HR	24,000	192	NK N58L3000GT	25,000	184
P1151HR	24,000	186	NK N64S4011	25,000	180
P1324HR	24,000	181	NK 49J3000GT	25,000	172
P1324HR	28,000	175			
P33 B54	24,000	168			

Summary Seasonal Soil Water Report for Grall #414 by AquaSpy™



- Crop had adequate moisture during pollination.
- Soil moisture was actually increased moving into early tassel.
- Crop suffered moisture stress during grain filling. Yield could possibly have been improved with increased late irrigation.

Separate Seasonal Soil Water at Four Inch Increments from AquaSpy™ Probe For Grall # 414



A. Root development to 44” during early growth
B. Crop sought out moisture at 36”-48” level during early grain fill in order to keep up with demand
C. Little depletion despite root activity suggests 52”-60” levels were fairly dry
D. Irrigation was only wetting down to 16”-20”. There was no irrigation below 20”beyond the second irrigation.

Hutchison County Demonstration, 2011 – Steve Shields # 3

Planting and Crop Information – Steve Shields planted the south half of a strip tilled 131 acre circle within section 3 for his demonstration, Shields #3. The 65 acres were planted with Pioneer hybrid 33 D 49 on April 11. Shields planted in double rows on 30 inch beds at a 33,000 seeding rate. The corn was irrigated by a center pivot nozzled at 700 gpm using two wells. Irrigation was 1.38 inches each pass in approximately 2.5 days. The two wells were also used for additional row water as Shields selected.
Additional planting and crop information is listed in the table below.

Table – Planting and Crop Information for Steve Shields #3

Planted:	*April 11*	***Fertilizer:***	*174-56-0*
Hybrid:	*Pioneer 33D49*	***Insecticide:***	*None , Stratego fungicide*
Seeding Rate:	*33,000*	***Herbicide:***	*Balance Flex, Atrazine*
Soil Type:	*Sherm Clay Loam*	***Harvested:***	*September 9*
Row Width:	*30", double row*	***N0. Acres:***	*66*
GPM/Acre:	*10.6 & Shared*	***Tillage:***	*Strip Till*

Beginning Soil Water Profile and Growing Season Rainfall –The demonstration field was pre-watered prior to planting and when the soil moisture gypsum block sensors were installed on May 26. Pre-water and post planting irrigation totaled 5.02 inches. The 5.02 inches of advanced irrigation is included in Shields' total seasonal irrigation. As a result, Shields #3 Gypsum Block Readings Graph shows the beginning soil profile to be fully wet. The crop used all water from 1, 2 and 3 feet, plus irrigation applied in June, the period when the most challenging climatic conditions occurred in 2011. Shields adjusted his irrigation management in July and provided more adequate soil water for the crop while reducing irrigation. Irrigation and the soil profile were more strategically managed finishing the crop, as shown in Shields #3 gypsum block readings. The crop mostly depleted soil water from 1, 2, 3 and 4 feet plus a slight amount from 5 feet finishing the crop in August. The following table lists monthly rainfall recorded by a district rain gauge located at the demonstration field.

Table –Monthly Rainfall Data for Shields #3.

May- .61" June- .09" July- .03" August- .66" September- 0" Total- 1.39"

Growing Season Water Tracking for Shield's #3 - The district tracked total water throughout the growing season with rain gauges, water meters, gypsum blocks and AquaSpy™ sensors. Gypsum block soil moisture sensors were installed at 1, 2, 3, 4 and 5 feet and one AquaSpy™ soil moisture probe was installed down to five feet in the root zone to monitor soil water levels and manage irrigation. Weekly gypsum block readings are shown in a graph

following this paragraph. Growing season water tracked by the district, included rainfall, irrigation, and soil moisture at weekly growth stages throughout the season are shown in the next graph. A table showing the order of irrigation and rainfall events follows the graphs.

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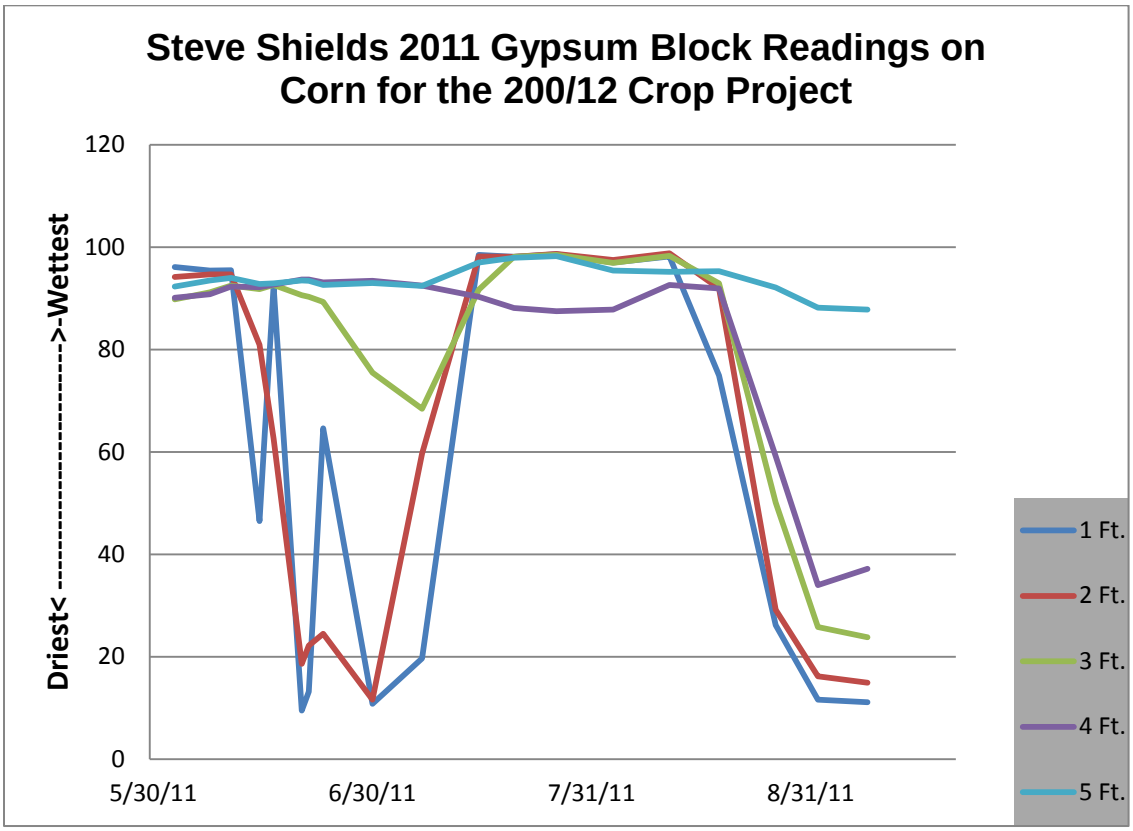
Graph – Gypsum Block Readings for Shields #3



Graph – Growing Season Water Tracking for Shields #3.

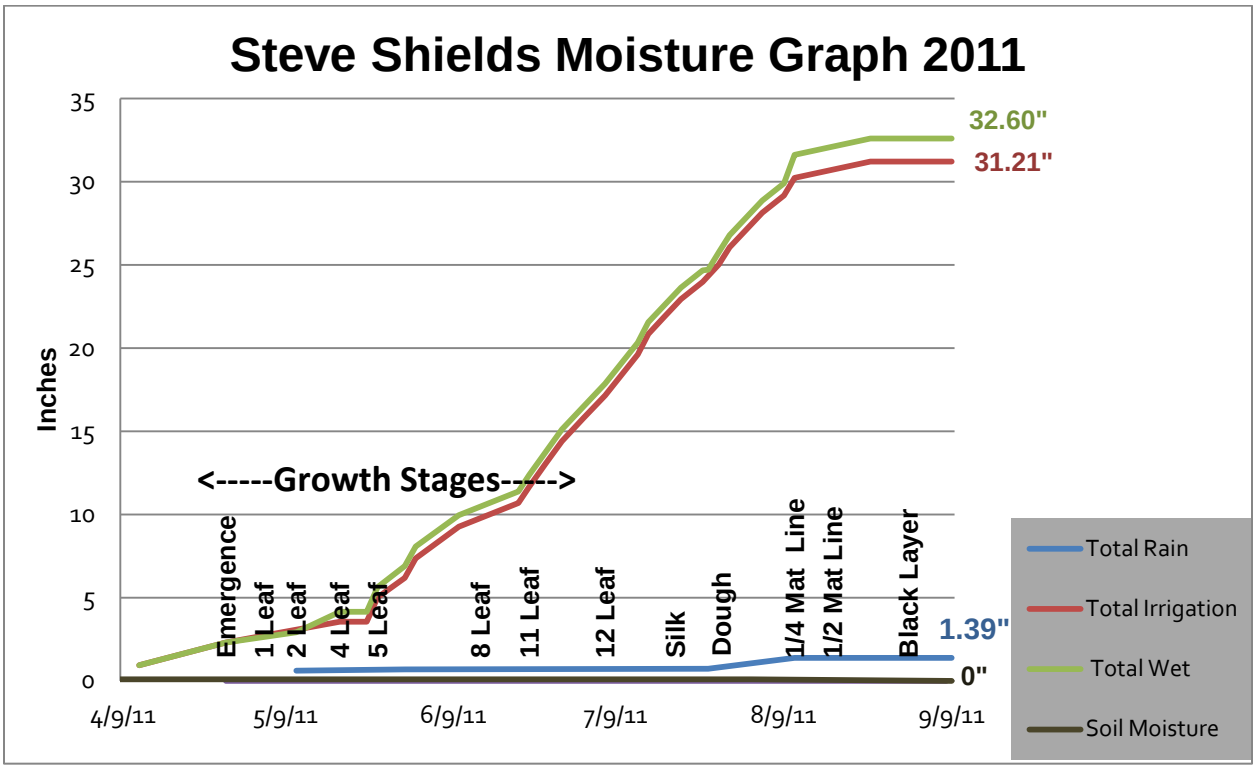


Table – Growing Season Water Tracking for Shields #3

Date	Inches		Water	Moisture Reading					Growth
mm/dd/yy	Rain	Irrig	Meter	1 Ft.	2 Ft.	3 Ft.	4 Ft.	5 Ft.	Stage
3/24/11			11670						
4/5/11		1.09	13623						"Wheat"
4/12/11		0.95	17048						"Wheat"
		0.95							
4/28/11		2.72	24365						"Wheat"
		1.36							
5/5/11		1.44	26957						"Wheat"
5/11/11	0.61		028195						
5/17/11		0.78	028375						"Wheat"
5/19/2011		1.24	30606						4 leaf
5/24/2011		2.0							"Wheat"
5/26/2011		1.47	33238						5 leaf
5/28/2011		1.18							
6/2/2011	0.09	1.17	37449	96.1	94.2	89.8	90.1	92.3	7 leaf
6/7/2011			39143	95.4	94.7	91.2	90.8	93.5	8 leaf
6/10/2011		1.90	40854	95.5	94.7	92.5	92.3	94.0	8 leaf
6/14/2011			40854	46.5	80.9	91.8	92.0	92.8	10 leaf
6/16/2011			41797	92.4	62.6	92.6	92.7	92.9	11 leaf
6/20/2011				9.5	18.6	90.6	93.7	93.5	11 leaf
6/21/2011				13.2	22.2	90.3	93.7	93.4	11 leaf
6/21/2011		1.42	43395						
6/23/2011		0.99	45166	64.6	24.5	89.3	93.1	92.6	12 leaf
6/26/2011		1.37							"270 rev"
6/29/2011		1.36							"90 rev'
6/30/2011			50062	10.8	11.6	75.5	93.4	93.0	12 leaf
7/3/2011		1.37							"90 rev'
7/7/2011		1.38	54986						"270 rev'
7/7/2011			54986	19.7	59.7	68.4	92.5	92.4	silk
7/10/2011		1.23							"90 rev'
7/13/2011		1.23							"270 rev'
7/15/2011		1.23	61598	98.5	98.2	91.7	90.3	97.0	Gr Fill
7/18/2011		1.05						97.9	"270 rev'
7/20/2011			64929	98.1	98.1	98.1	88.1	97.9	Gr Fill
7/21/2011		1.04							"90 rev'
7/25/2011		1.04							"270 stop"
7/26/2011	0.03		69381	98.6	98.7	98.5	87.5	98.2	Gr Fill
7/28/2011		1.04							"90 rev'
7/30/2011		1.04							"270 rev'
8/2/2011		1.04		90 deg					stop

Date	Inches		Water	Moisture Reading					Growth
mm/dd/yy	Rain	Irrig	Meter	1 Ft.	2 Ft.	3 Ft.	4 Ft.	5 Ft.	Stage
8/2/2011		1.04							"90 stop"
8/3/2011			73427	97.0	97.5	96.9	87.8	95.4	dough
8/5/11		1.04							"270 stop"
8/9/11		1.04							"90 stop"
8/11/11	0.66	1.04	78416	98.2	98.8	98.3		95.2	1/4mat line
8/18/2011			78414	74.9	91.9	92.9	91.9	95.3	1/2mat line
825/2011		0.99	80168						
8/26/2011			80168	26.2	29.2	50.1	59.2	92.1	
9/1/2011			80168	11.6	16.2	25.8	34.0	88.2	
9/8/2011			80168	11.1	14.9	23.8	37.2	87.8	blk layer
9/9/2011				153 bu.					harvest
harvest	**1.39**	**31.21**		0	0	0	0	0	
harvest	**rain/irrig/soil water**		**32.6**						

- On 5-26-2011 gypsum blocks were installed
- On 6-7-2011 meter at pivot timed out to 700 GPM
- Numbers in different colors indicate a full revolution

Harvest Results – The field produced 153 bushels per acre. Shields estimates corn yields were 25 -30 % less on his farms in 2011, as a result of the extreme wind, low relative humidity and temperatures, combined with no rainfall. The APH is 180 bushels for the field. Corn yields in seven other fields Shields farms ranged from 126 to 190 bushels per acre. Shields thinks yield from his demonstration field was about average of the other seven. Plants in especially the last two spans and end section of the center pivot on the southwest side of the circle were severely stressed in June from the climatic blasts and did not fully recover. Yields were very low from about 15 % of the acreage. The field produced 4.90 bushels (275 lbs.) per inch of irrigation and 4.69 bushels (263 lbs.) from 32.60 inches of irrigation and rainfall. Approximately 6 inches of irrigation were applied by the six leaf stage. A summary of the demonstration results are shown in the following table.

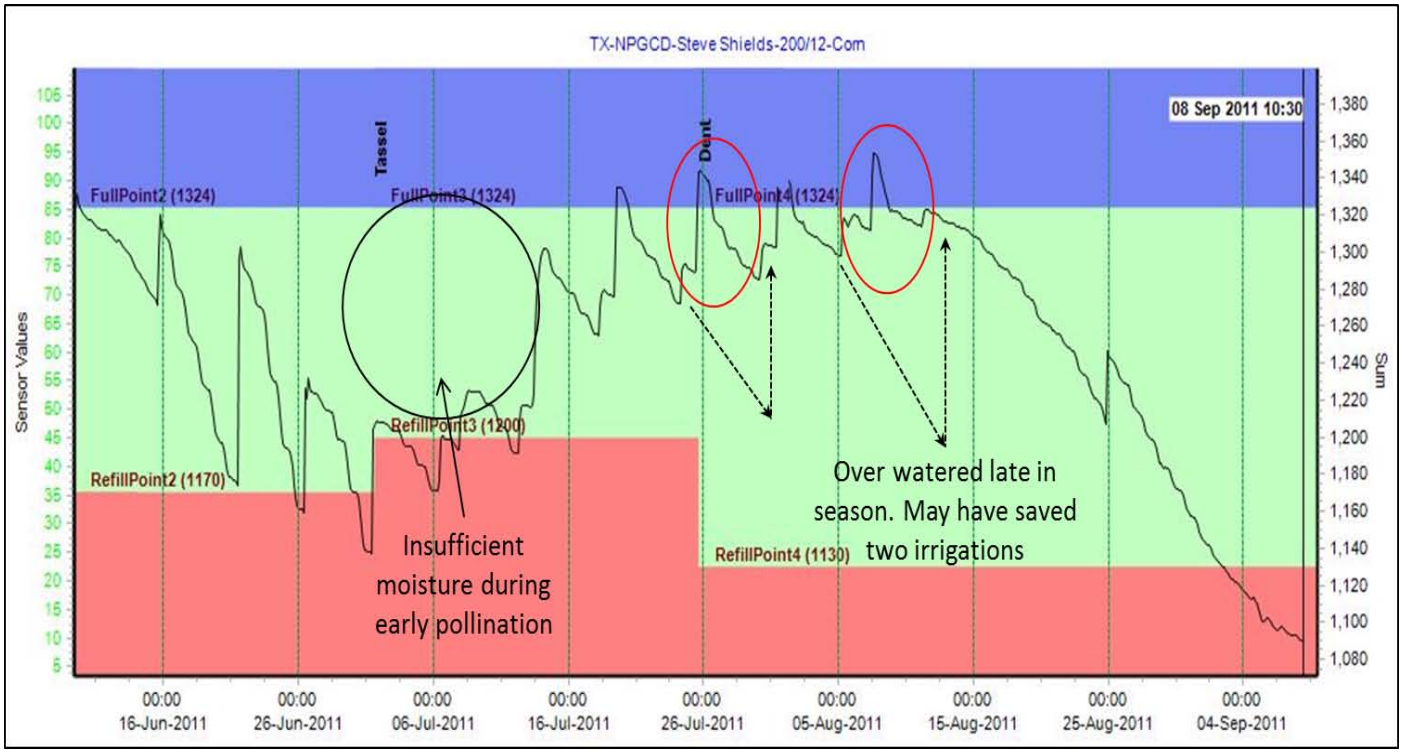
Table – 2011 Demonstration Results for Shields #3

2011 Demonstration Results							
Irrigation		Irrig/Rain/Soil	Production		Crop Value @ $6.48/Bu		
No	Inches	Inches	Bu/Ac	Bu/Ac-In Irrigation	Per Acre	Acre-In of Irrigation	Ac-In of Irrig/Rain/Soil
26	31.21	*32.60	153	4.90	$991.44	$31.77	$30.41

***Includes 0 inches of water removed from five feet of soil, rainfall, and irrigation.**

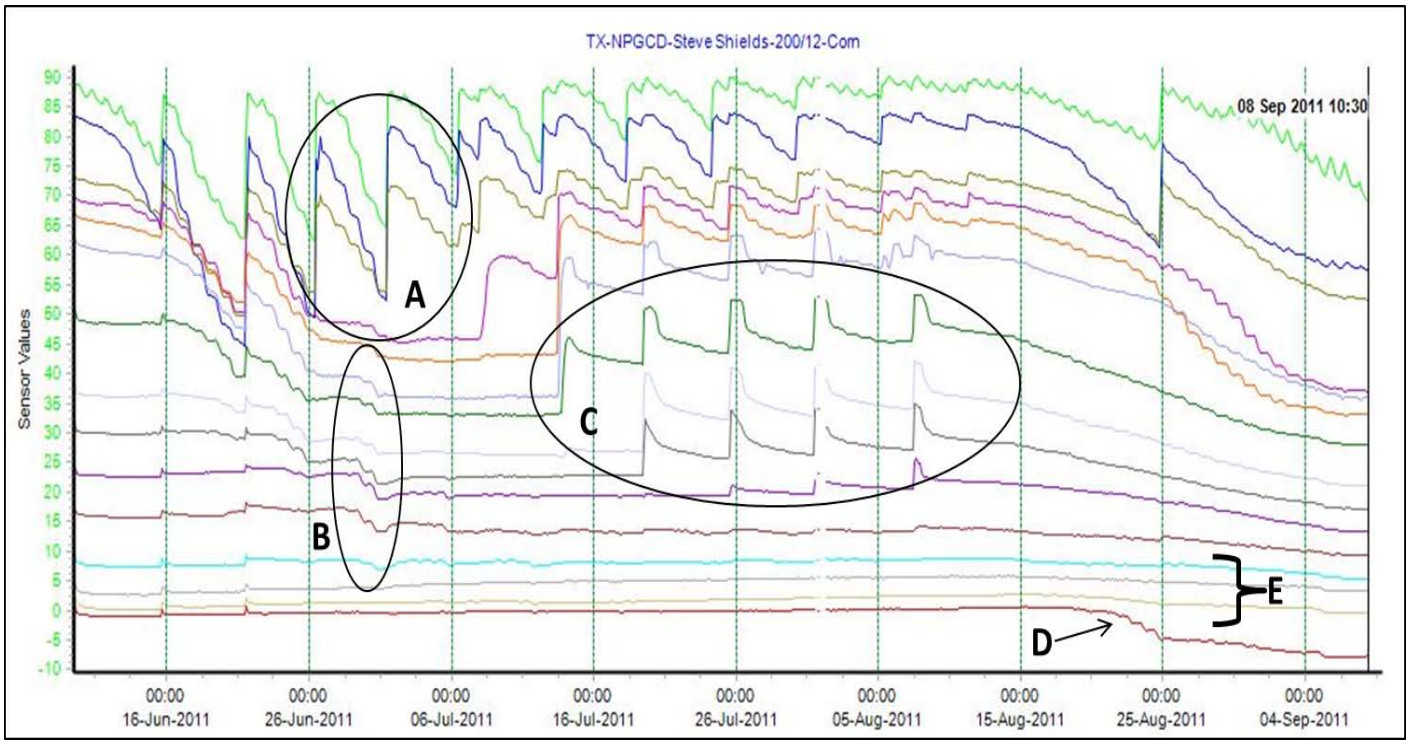
Report For Shields # 3 by AquaSpy™

Summary Seasonal Soil Water for Shields # 3 from AquaSpy™ Probe



- Crop suffered moisture stress during critical early pollination period
- Crop was overwatered late in the season
- Possibly two irrigations could have been saved during grain filling

Separate Seasonal Soil Water at Four Inch Increments For Shields # 3 from AquaSpy™ Probe



A. Irrigation only reaching 12” during early pollination
B. Roots go looking for moisture to supplement crop water demand (stress signature)
C. Overwatering during grain filling. More water is applied than the crop is using. Soil filling in the 16”-32” zone.
D. Roots active all the way to 60”. Strong activity at depth in preference to higher levels suggests plant was chasing nutrients or some other factor (i.e. root damage due to water logging late in season).
E. Little root activity or moisture depletion in 48”-56” zone suggests dry soil or sandy layer

Ochiltree County Demonstration, 2011 – Daniel Krienke

Planting and Crop Information - For his demonstration, Danny Krienke conventionally tilled and planted 120 acres of corn in a field identified by its section number, "Krienke #47". Krienke planted the field with Pioneer 33 B 54. He irrigated the corn through a center pivot nozzled at 600 gpm. The system delivered an average of 0.98 inches of irrigation in 3.7 days. The planting and crop information for Krienke #47 is shown in the table below.

Table – Planting and Crop Information for Krienke #47

Planted:	May 16	**Fertilizer:**	57-52-0
Hybrid:	Pioneer 33B54	**Insecticide:**	None
Seeding Rate:	26,000	**Herbicide:**	Cinch ATZ
Soil Type:	Pullman Silty Clay Loam	**Harvested**:	October 15
Row Width:	30 inches	**No. Acres:**	120
GPM/Acre:	5.0	**Tillage:**	Conventional

Beginning Soil Water Profile and Growing Season Rainfall - The soil profile is assumed to be only partially filled at 1, 2, and 3 feet at planting on May 16. Due to the extreme climatic conditions, 2.58 inches of irrigation were applied following planting to get the crop emerged and to limit soil erosion. Gypsum blocks are normally installed following crop emergence, which was late in 2011. Irrigation following planting refilled the soil profile as shown in the Krienke #47 gypsum block readings graph. The crop used all soil water from 1, 2 and 3 feet by mid-July, plus all irrigation applied in continuous circles. From mid-July, the crop used available water from one foot and 4 feet. Only limited water was used from 5 feet. Well failure the first week in July created one less irrigation and additional untimely plant stress. Rainfall following planting totaled only 2.39 inches. Irrigation was at full capacity from 5.0 gpm per acre. The following table shows monthly rainfall as recorded by a district rain gauge located at the field.

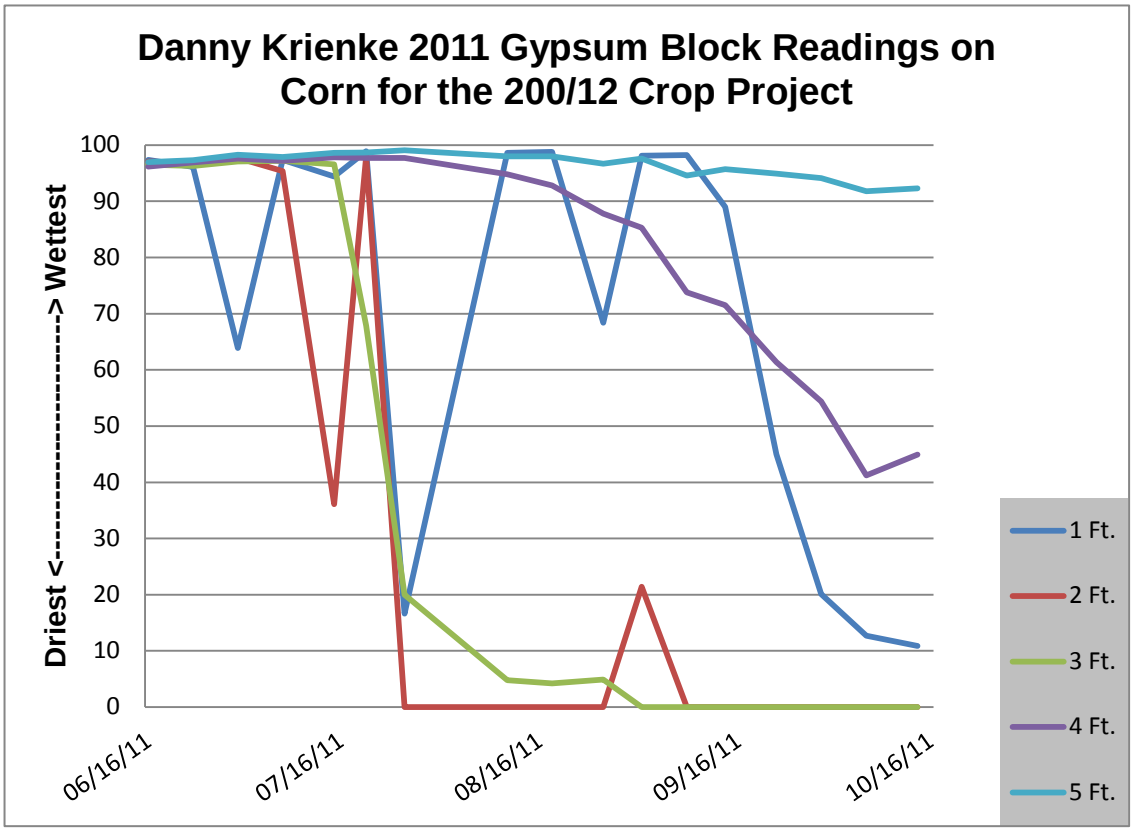
Table – Monthly Rainfall Data for Krienke #47

May- 0" June- .08" July- .38" August- 1.52" Sept- .54" Total: 2.52"

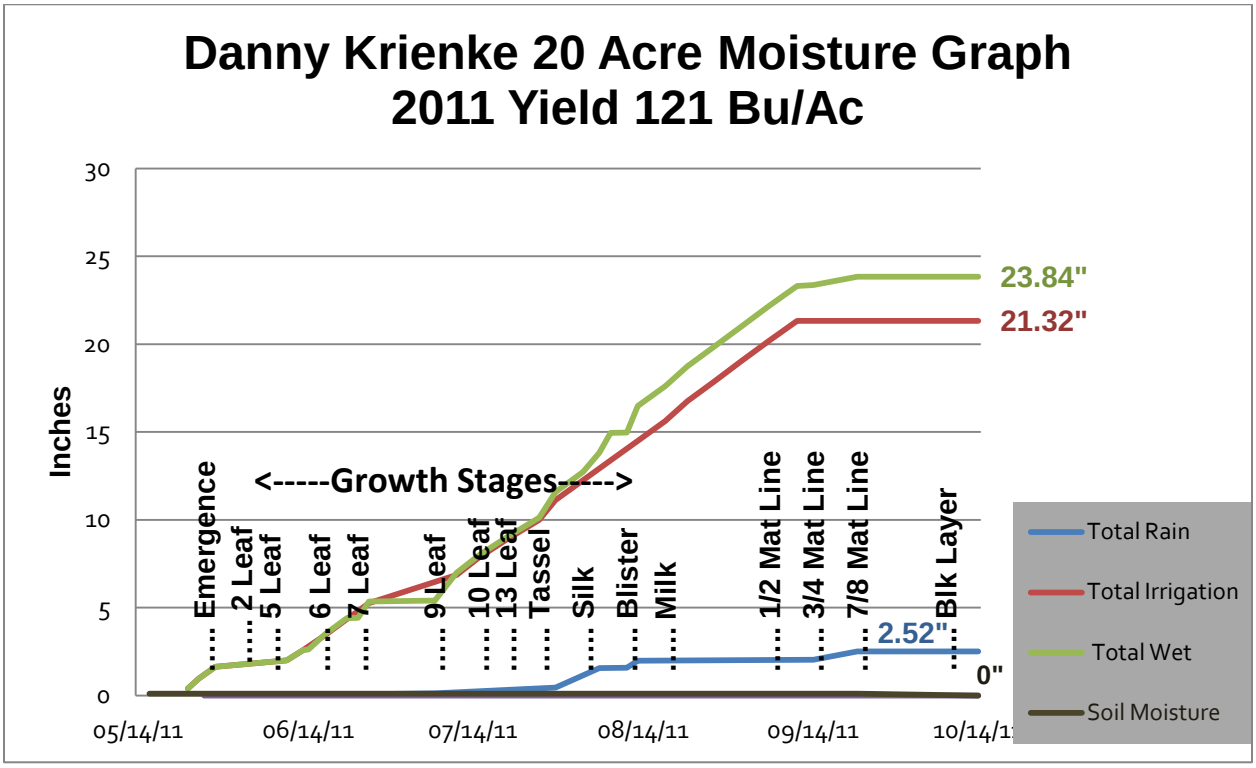
Growing Season Water Tracking for Krienke #47 – The district tracked total water throughout the growing season with rain gauges, water meters, gypsum blocks and AquaSpy™ sensors. Gypsum block soil moisture sensors were installed at 1, 2, 3, 4 and 5 feet and one AquaSpy™ soil moisture probe was installed down to five feet in the root zone to monitor soil water levels and manage irrigation. The gypsum block readings are shown in a graph following this paragraph. Growing season water tracked by the district, including rainfall, irrigation, and

soil moisture at weekly growth stages throughout the season are shown in the next graph. Twenty acres where the soil moisture sensors were located received two less irrigations, 1.08 inches June 30 and 1.16 inches September 15. There are two Krienke #47 water graphs, one for 20 acres and another for 100. A table showing the order of irrigation and rainfall events follows the three graphs.

Graph – Gypsum Block Readings for Krienke #47 20 Acres



Graph – Growing Season Water Tracking for Krienke #47 20 Acres



Graph – Growing Season Water Tracking for Krienke #47 100 Acres

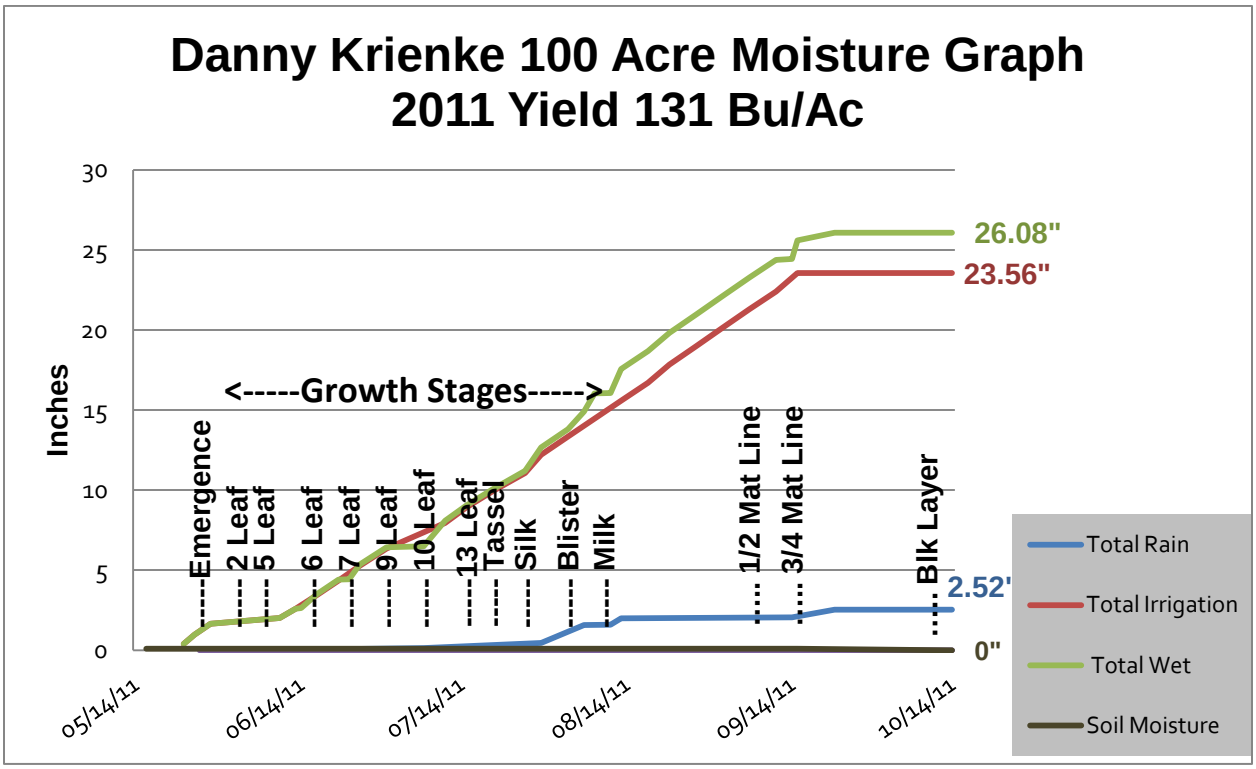


Table – Growing Season Water Tracking for Krienke #47

Date	Inches		Water	Gypsum Block Reading (Percent of soil moisture)					Growth
Mo/Day	Rain	Irr	Meter	1 foot	2 feet	3 feet	4 feet	5 feet	Stage
05/16/11			78053						
05/23/11		0.40	79349						
05/25/11		0.57	81207						
05/26/11									Emergence
05/28/11		0.67	82060						
06/02/11			83375						2 Leaf
06/07/11			86594						5 Leaf
06/10/11		0.37	86944						
06/13/11		0.57	88144						
06/14/11	0.05		89993						5 Leaf
06/16/11			90130	97.40	97.10	96.50	96.20	97.00	6 Leaf
06/17/11		0.87	91747						
06/21/11		0.9	92838						
06/23/11	0.03		95788	96.10	96.80	96.30	96.90	97.30	7 Leaf
06/25/11		0.92	97307						
06/30/11		1.08	98780	63.90	97.70	97.10	97.60	98.30	100 ac only
07/07/11	0.05		101633	97.40	95.40	97.20	97.20	97.90	10 Leaf
07/11/11		1.6	101703						
07/15/11		0.97	106928	94.40	36.10	96.60	97.80	98.60	13 leaf
07/20/11		1.02	106928	98.90	98.00	67.90	97.70	98.70	Tassell
07/26/11		1.13	109271	16.60	0.00	20.00	97.70	99.10	Silk
07/29/11	0.33	1.14	110096						
08/03/11		1.13	113437						Blister
08/06/11	1.10		113936						
08/08/11		1.13							
08/11/11	0.02		118590	98.60	0.00	4.80	94.80	98.00	Milk
08/13/11	0.40	1.11	120840						
08/18/11		1.12	124926	98.80	0.00	4.20	92.80	98.00	Grain Fill
08/22/11		1.13							
08/26/11				68.40	0.00	4.90	87.80	96.70	
08/27/11		1.15	128215						
09/01/11			130703						
09/01/11		1.16		98.10	21.40	0.00	85.30	97.60	
09/06/11		1.15	135487						
09/07/11			136022						
09/08/11			139155	98.20	0.00	0.00	73.80	94.60	1/2 Mat line
09/11/11		1.11	142050						

Table (Continued) – Growing Season Water Tracking for Krienke #47

Date	Inches		Water	Gypsum Block Reading (Percent of soil moisture)				
Mo/Day	Rain	Irrigation	Meter	1 foot	2 feet	3 feet	4 feet	5 feet
09/14/11	0.06		157211	89.00	0.00	0.00	71.50	95.70
09/15/11		1.16	157211					
09/22/11	0.48		157211	45.00	0.00	0.00	61.40	94.90
09/29/11			157211	20.10	0.00	0.00	54.40	94.10
10/06/11			157211	12.70	0.00	0.00	41.20	91.80
10/14/11			157211	10.90	0.00	0.00	44.90	92.30
10/15/11								
Total-100	2.52	23.56						
Total Rain/Irrig/Soil-100		26.08						
Total-20	2.52	21.32						
Total Rain/Irrig/Soil-20		23.84						

- Irrigation within yellow highlighted lines is for 100 acres only
- Numbers in different colors indicate a full revolution

Harvest Results - The 20 acres that received 21.32 inches of irrigation produced 121 bushels per acre. Production was 131 bushels per acre from 23.56 inches of irrigation on the 100 acres. Krienke projects corn production on his farms was down approximately 27% from previous years. Production on five other fields averaged 168 bushels per acre where irrigation was 28 inches. One field planted June 16 produced 203 bushels per acre. The 20 acres produced 5.68 bushels (318 lbs) from each inch of irrigation and 5.07 (284 lbs) from 23.84 inches of irrigation, rainfall and soil water. The 100 acres produced 5.56 bushels (311 lbs) per inch of irrigation and 5.02 (281 lbs) from 26.08 inches of rainfall and irrigation. Corn production costs were approximately $110.19 less than normal production from reduced seed, fertilizer, irrigation and harvest costs. At $6.48 per bushel, the reduced corn yield cost $304.56 per acre for the 20 acres and $239.76 for the 100 acres. The demonstration's net loss was $194.37 per acre for the 20 acres and $129.57 for 100 acres, with 7 inches less irrigation water used compared to Krienke's other farms. A summary of the demonstration results are shown in the following table.

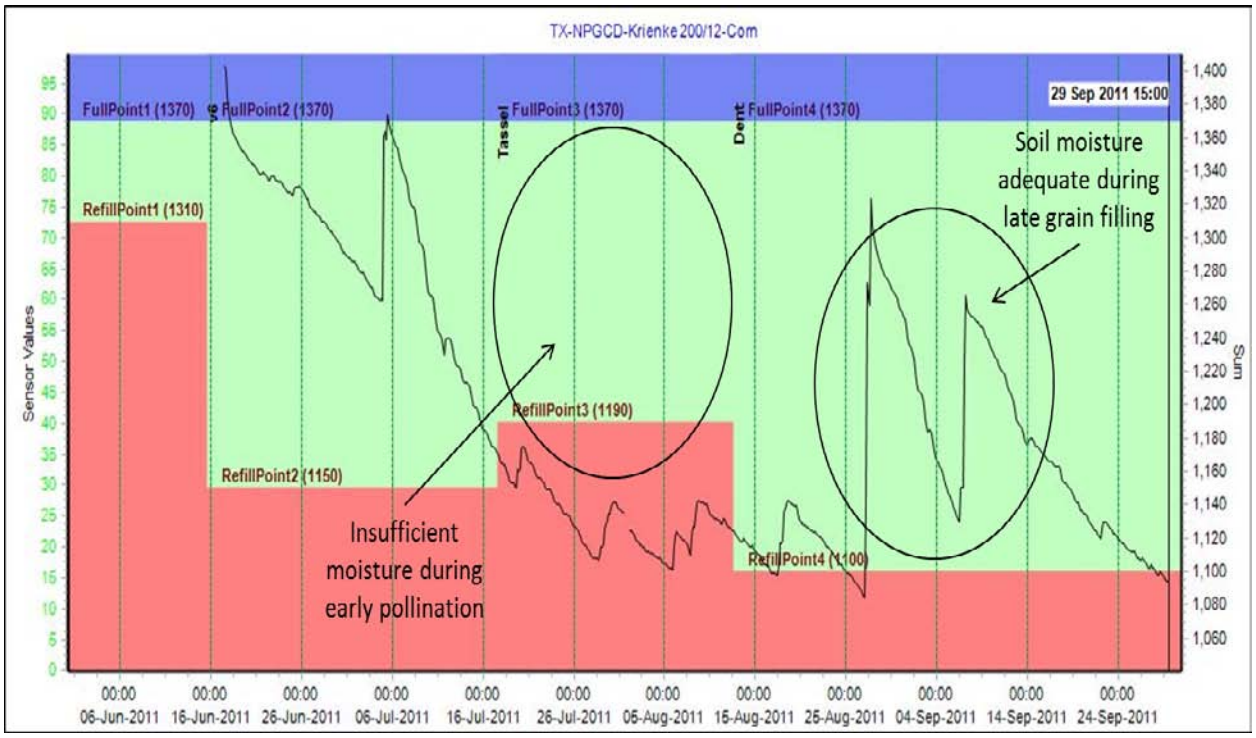
Table – 2011 Demonstration Results for Krienke #47

Irrigation		Irrig/Rain/Soil	PRODUCTION		CROP VALUE @ $6.48/Bu		
No	Inches	Inches	Bu/Ac	Bu/Ac-In Irrigation	Per Acre	Acre-In of Irrigation	Ac-In of Irrig/Rain/Soil
20A-26	21.32	*23.84	121	5.68	$784.00	$36.78	$32.89
100A-28	23.56	*26.08	131	5.56	$848.88	$36.03	$32.55

*Includes 0 inches of water removed from five feet of soil, rainfall, and irrigation.

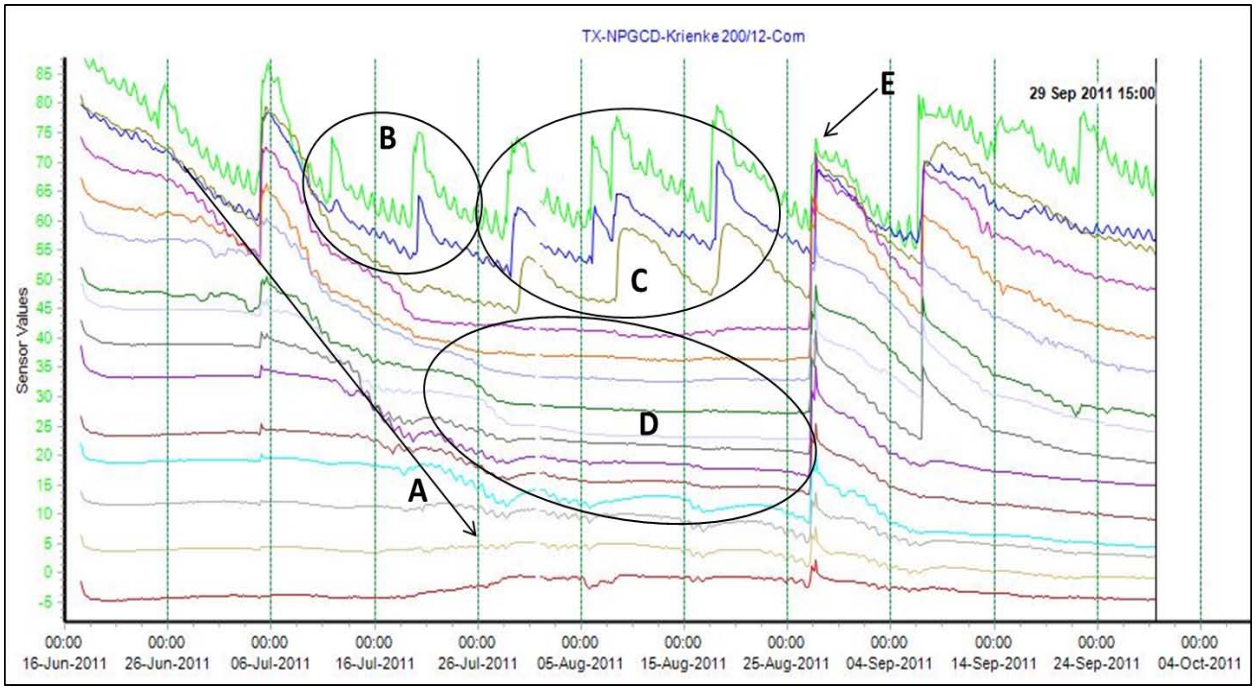
Report for Krienke #47 by AquaSpy™

Summary Seasonal Soil Water for Krienke # 47 on 20 Acres from AquaSpy™ Probe



- Crop appears to suffer severe moisture stress during critical pollination period
- Soil moisture was built back to adequate levels during late grain filling
- Massive irrigation at end of August had positive effect in filling profile. Irrigation apparently well timed at the end of the season to allow adequate growth but finish with dry soil

Separate Seasonal Soil Water at Four Inch Increments For Krienke # 47 from Aquaspy Probe



A. Rapid root growth to 56”
B. Early irrigations ineffective with moisture infiltration only to 8”
C. Irrigation more effective but still only to 12”
D. No penetration of irrigation water below 12”. Soil moisture completely depleted in 16”-52” range. Evidence suggests subsoil below 48” was never fully wet and contributed very little to plant water use.
E. Perhaps soil cracked adjacent to the probe allowing water to leak down to 60 inches.

Demonstrations Harvested For Corn Silage

Hartley County Demonstration, 2011 – Phil Haaland

Planting and Crop Information - Phil Haaland planted corn hybrid P1151HR at seeding rates of 18,000, 22,000, 26,000 and 30,000 in four separate 16 row plots within a strip-tilled 120 acre field. Haaland's planted on April 26th. Hybrid P1498XR was planted in the demonstration as well. The purpose of his demonstration was to collect production data on improved drought tolerant hybrids based on plant populations and other strategies. Irrigation was in alternate 7 day passes, simulating 250 gpm irrigation capacity on a 120 acre field. The center pivot is nozzled for 500 gpm that applies 1.5 inches each pass.

Harvest Results – After two alternate center pivot passes with no irrigation, one on May 27 and another on June 17, the crop became highly stressed. 2011 was not a year that allowed the planned limited irrigation. The demonstration was harvested for silage on July 28. At harvest, 13.09 inches of irrigation had been applied. Two rainfall events following planting totaled .68 inches.

Hartley County Demonstration, 2011 – Dennis Buss, Hartley Feed Yard

Planting and Crop Information – Dennis Buss planted corn hybrid P35F40 on 62 acres of a 120 acre strip-till field on April 22. The seeding rate was 20,000. The center pivot irrigation system was nozzled to deliver 500 gpm and 1.07 inches to the 62 acres in 2.5 days. Unfortunately, the two wells that provided water for the demonstration were also committed to other acreage on the farm. The wells lost gpm, the center pivot was renozzled to 400 gpm on June 16, and the corn had stress due to the lack of water. Water was transferred to another 60 acres that also failed to produce a yield.

Harvest Results – After a diligent effort to produce a grain crop, the weather won the battle. The corn was harvested for silage about the first of August. 2011 was not a year that allowed wells to be shared with separate crop acreages. At silage harvest, 12.02 inches of irrigation had been applied to the demonstration field. Three rainfall events since planting totaled 1.23 inches.

Dallam County Demonstration, 2011- Brian Bezner

Planting and Crop Information – Brian Bezner planted 60 acres of corn hybrid N72D3111 at a 24,000 seeding rate in a 120 acre strip tilled field on May 12th. Eight additional hybrids were planted in six row plots to gain production data on promising drought tolerant hybrids. The center pivot was nozzled to deliver 450 gpm and 1.0 inch per acre in five days. Corn was also planted on the additional 60 acres of the field. Brian had a promising beginning from three rainfall events in May and early June that totaled 2.23 inches. Then the climatic blast of the season began to take control. The irrigation capacity declined to about 400 gpm during the growing season from continuous pumping, while rainfall was much less than normal. The corn became very drought stressed during the challenging growing season.

Harvest Results –There was not enough water**.** The demonstration field was harvested for corn silage on September 23. Rainfall following planting totaled 4.55 inches. Irrigation was 14.22 inches**.**

Demonstrations Abandoned

Ochiltree County Demonstration, 2011 – James Born

Planting and Crop Information – James Born planted 115 acres of corn with hybrid P34F96 at a 24,500 seeding rate within a 230 acre, no-till field on May 9th. Grain sorghum was planted on another 115 acres with the intention of irrigating both crops with a center pivot nozzled to deliver 450 gpm and 0 .75 inches of irrigation in a 7 day pass. This was a new farm for Born, and an unfamiliar center pivot developed mechanical problems early in the growing season and was down for a week. The missed irrigations left the corn severely stressed beyond recovery amidst the challenging climatic conditions. The corn demonstration acres were abandoned in July in an effort to produce a grain sorghum yield with available irrigation.

Growing Season Water Tracking for James Born - The district tracked total water until the demonstration was abandoned with rain gauges, water meters, gypsum blocks and AquaSpy™ sensors. Gypsum block soil moisture sensors were installed at 1, 2, 3, 4 and 5 feet and one AquaSpy™ soil moisture probe was installed down to five feet in the root zone to monitor soil water levels and manage irrigation. Rainfall totaled 1.39 inches. Irrigation was 7.07 inches.

Hartley County Demonstration, 2011 – Chad Hicks, 14 Mile Ranch

Planting and Crop Information – Chad Hicks planted P35F40 corn hybrid at a 26,000 seeding rate on April 27 in a 50 acre minimum-till field. Within the field, Hicks planted 14 rows of P1151HR to gain additional production data on emerging drought tolerant hybrids. Irrigation was with a center pivot nozzled to deliver 500 gpm and 1.33 inches of irrigation in 2.5 days. The center pivot was positioned to irrigate 50 acres. The demonstration acres shared a well with other crops. The demonstration was abandoned on July 1st, along with other fields, as Hicks managed available irrigation to support selected crop acres in the midst of the severe drought.

Growing Season Water Tracking for Chad Hicks, 14 Mile Ranch - The district tracked total water until the demonstration was abandoned with rain gauges, water meters, gypsum blocks and AquaSpy™ sensors. Gypsum block soil moisture sensors installed at 1, 2, 3, 4 and 5 feet and one AquaSpy™ soil moisture probe were installed to five feet in the root zone to monitor soil water levels and to assist in managing irrigation. The district recorded 0.70 inches of rainfall following planting. Irrigation totaled 6.68 inches.

Sherman County Demonstration, 2011 – Joe Reinart

Planting and Crop Information – Joe Reinart planted Channel 21199 corn hybrid at a 17,000 seeding rate in a minimum-till, 75-acre field on June 2. Irrigation was with a center pivot nozzed to deliver 650 gpm and 1.62 inches in a 3.5 day circle. The center pivot was positioned to irrigate a 75 acre circle. Water for irrigation was shared with other acres which was not successful in 2011. The field was abandoned on June 26 after plants became extremely stressed due to the lack of available water.

Growing Season Water Tracking for Joe Reineart - The district tracked total water until the demonstration was abandoned with rain gauges, water meters, gypsum blocks and AquaSpy™ sensors. Gypsum block soil moisture sensors were installed at 1, 2, 3, 4 and 5 feet and one AquaSpy™ soil moisture probe was installed down to five feet in the root zone to monitor soil water levels and to assist in managing irrigation. Rainfall following planting totaled 1.28 inches. Total irrigation was 6.37 inches.

Conclusion

The 200-12 Project demonstrates how water conservation technologies and irrigation management practice adjustments can reduce groundwater use and allow agricultural irrigation producers to remain profitable and financially viable with restricted and diminishing groundwater resources. By using real-time technologies to monitor soil-water conditions in the root zone, all nine demonstrations showed that growers can manage their irrigation water needs better and reduce crop irrigation. In the three demonstrations where grain was harvested, **Grall** produced 178 bushels per acre and reduced irrigation by 10 inches and harvested 14 more bushels per acre than in his other fields while saving $94.64 in seed, fertilizer and irrigation costs. **Shields** produced 153 bushels per acre and applied 31.21 inches of irrigation that was similar to his other fields. His production costs were similar to that of his other fields. **Krienke** produced 121 bushels per acre with 21.32 inches of irrigation which was 7 inches less than his four other fields that averaged 168 bushels per acre. Each cooperator stated corn yields were 25 to 30 percent less from their farms than in normal years. **Haaland** harvested his field for corn silage July 28**, Buss** in early August and **Bezner** in September, after failing to produce the corn grain yield anticipated. **Born** and **Hicks** abandoned their fields in July and **Reinart** in June to commit available water to other acreages to minimize crop production losses. These demonstrations show a condition that an increasing number of growers are facing throughout the district, where there is simply not enough groundwater available to continue to irrigate as usual. It was a very challenging year to produce a crop. We learned that corn planted in May and June offers reduced seasonal irrigation and is more in line with what many growers can apply. We also learned that residue is essential and promising drought tolerant hybrids performed well in 2011. Irrigation systems must get more of the available water to the crop and growers must manage based on crop production per inch of water, not maximum yield. Growers can improve management practices to more timely address beginning soil moisture conditions and use pre-water more effectively following planning. We must be more alert and responsive to advanced weather forecast and reduced soil water conditions in relation to irrigation capacity. The year 2011 delivered a clear message that not much remains “as usual” in profitable irrigated crop production. If the technologies and methods utilized by the demonstrations can be translated to three inches of reduced irrigation over the one million acres of corn and other crops in the district, the water savings will be 250,000 acre-feet of water per year. This water savings can prolong the viability of agriculture irrigation in the area.

Appendix A – District Field Demonstration

NPGCD-200/12

2011-Corn Demonstration
Irrigated Medium Season Corn

Year: 2011 **County:** Moore **Grower:** Harold Grall

No. Acres: 120 **Variety/Hyb:** 34F97 **Soil Type:** Sherm Sillty Loam

Meter Type: McCrometer **Meter SN:** GP10-1695

Meter Mult: Gallons X 100 **Tillage:** Strip Till

Fertilizer: 148-50-2 **Seeding:** *26,000*

Planting Date: June 7 **Harvest:** October 25

Herbicide: BurnDown, Sharpen, RoundUp and Dual **Insecticide:** Mustang Mag, Stratego fung.

Yield: 178 Bushels **Previous crop:** Corn **Row width:** 30"

Irrigation method: Center Pivot **Prewater:** None **Well GPM:** 475

Distance between drops: 60" **Distance from application nozzle to ground:** 12"

Application pattern: LEPA Quad **Crop row direction :** Straight

Elevation: 3793 Ft. **GPS Location:** Latitude: 35.96842 Longitude: -102.13525

Table – Growing Season Water Tracking for Harold Grall #414

Date	Inches		Water	Gypsum Block Reading (Percent of soil moisture)					Growth	Pivot
Mo/Day	Rain	Irrig	Meter	1 foot	2 feet	3 feet	4 feet	5 feet	Stage	Position
4/4			353857							
5/4			353857							
5/11			353857							
5/19			353857							
6/3										
6/6			353857							
6/7									planted	
6/10			373667							355 Y
6/13		1.22	393715							
6/15				92.3	31.4	0	88.0	install		345 Y
6/20		1.22	433572	96.4	96.3	92.7	87.0	90.8		180 N
6/24			456329	97.6	95.6	0	87.6	93.9		25.6 Y
6/26		1.29								1 rev
7/1			505915	97.6	97.3	90.8	87.7	92.0		90 Y
7/5		1.29	517462	98.6	98.7	95.9	88.6	92.3		195.1 N
7/8			526065	97.9	98	93.2	88.1	91.5	7 leaf	270 Y
7/12		1.33		98.4	98.1	92.4	88.2	91.4		
7/15			560870	98.4	98.2	95.8	88.8	91.9	8 leaf	240 N
7/21		1.36	583917	52.5	42	94.1	88.9	91.6	10 leaf	105 Y
7/28		1.36	632610	96.4	94.2	96.9	89.2	91.6	11 leaf	210 Y
8/5	0.24	1.35	688845	81.7	35.8	82.2	89.3	91.6	11 leaves	20 Y
8/12	0.65	1.36	738015	87.3	96.1	88.3	91.5	91.7	pollinate	120 Y
8/17	0.30		752836	96.8	96.5	96.2	91.4	91.2	blister	270 Y
8/21		1.34	781672						blister	
8/25			807276	94.9	89.3	57.3	91.2	90.9	blister	60 Y
8/26			814256							140 Y
8/27		1.13								On sen
9/1		1.12								On sen
9/2			860382	97.0	97.1	96.1	94.1	90.7	dough	195 Y
9/8		1.12								On sen
9/9			897834	96.0	96.7	60.6	92.6	89.8	dough	210 Y
9/14		1.13	928015							stop
9/16	1.07		928015	95.1	71.4	44.0	61.40	88.7	dent	
9/23	0.21		928015	75.2	44	32.7	88.40	87.7	1/4 mat line	150 N
9/29		1.16	965919	95.1	96.6	96.4	93.9	87.1		180 N
10/6	0.08		965819	90.2	91.1	61.7	87.6	86.5	1/2 mat line	180 N
10/14	0.30		965819	60.3	68.8	39.4	87.0	85.6	3/4 mat line	180 N

Table (Continued) – Growing Season Water Tracking for Harold Grall #414

Date	Inches		Water	Gypsum Block Reading (Percent of soil moisture)					Growth	Pivot
Mo/Day	Rain	Irrig	Meter	1 foot	2 feet	3 feet	4 feet	5 feet	Stage	Position
10/25				harvest						
				178 bu						
Total	2.85	18.8		1.04	-0.30	-0.60	0	-0.10		Total soil 0
Total	irrig/rain/soil		21.63 Inches							

- Numbers in pivot position column are system position degrees at reading
- Y- yes, system is running
- N- no, system is not running
- ON 8-26-2011 Meter at pivot timed out to 475 GPM
- Numbers in different colors indicate a full revolution

PivoTrac Irrigation system tracking Data Harold Grall #414

Grower	Harold	120 Acres Corn		Pivot	Acres/Deg----------		475 GPM	1.065 AcIn/Hr	
m/dy/yr	Degrees	Time	AM/PM	DegSince	Acres Irrg	Irrigation	Hours	Days/Rev	
5/21/2011	163.7	5:30	pm	0				stop	
5/23/2011	163.8	7:05	am	0				stop	
5/25/2011	163.8	6:50	am	0				stop	
5/26/2011	163.8	7:45	am	0				stop	
5/28/2011	163.8	8:15	am	0				stop	
5/30/2011	163.9	7:35	am	0				stop	
5/31/2011	163.9	7:10	am	0				stop	
6/1/2011	163.8	7:10	am	0				stop	
6/2/2011	163.7	8:10	am	0				stop	
6/3/2011	180.5	8:30	am	0				stop	
6/4/2011	180.6	7:00	am	0				stop	
6/5/2011	172.8	8:00	am	7.8	moved for field work			stop	
6/6/2011	167.1	8:00	am	5.7	moved for field work			stop	
6/7/2011	180.4	8:30	am	13.3	Planted	*		stop	
6/8/2011	223.4	8:00	am		irrigate			5.7 Y	
6/9/2011	272.3	3:45	am					red	
6/9/2011	273.5	8:15	am					red	
6/10/2011	333.0	8:00	am					5.8	
6/11/2011	33.5	7:45	am					5.9	
6/12/2011	90.3	5:45	am			1.22		pivotrac	
6/13/2011	157.8	8:00	am			*		5.9	
6/14/2011	217.4	7:00	am					5.7	
6/15/2011	279.2	7:00	am					5.7	
6/16/2011	342.0	7:30	am					5.8	
6/17/2011	44.9	8:00	am					5.8	
6/18/2011	109.1	9:00	am					5.8 Y	
6/19/2011	168.1	8:00	am			1.22		5.8 Y	
6/20/2011	181.2	7:15	am			*		stop	
6/21/2011	181.2	8:00	am					stop	
6/22/2011	237.9	8:15	am			*		5.7 Y	
6/23/2011	299.2	8:00	am					5.8	
6/24/2011	356.5	7:30	am					5.9	
6/25/2011	59.9	8:00	am					5.9 Y	
6/26/2011	119.4	7:00	am			1.29		5.8 Y	
6/27/2011	180.0	7:00	am			*		5.5 Y	
6/28/2011	244.0	7:00	am					5.7	
6/29/2011	308.3	8:00	am					5.8 Y	
6/30/2011	7.1	7:00	am					5.8 Y	
7/1/2011	74.2	9:00	am					5.8 Y	

Continued PivoTrac Irrigation system tracking Data Harold Grall #414

Grower	Harold	120 Acres Corn		Pivot	Acres/Deg----------		475 GPM	1.065 AcIn/Hr	
m/dy/yr	Degrees	Time	AM/PM	DegSince	Acres Irrg	Irrigation	Hours	Days/Rev	
7/2/2011	147.9	2:00	pm					Pivotrac	
7/3/2011	195.0	2:30	pm			1.29		Pivotrac	
7/4/2011	195.1	8:00	am			*		stop	
7/5/2011	195.1	8:00	am					stop	
7/6/2011	195.1	8:00	am					stop	
7/7/2011	195.1	8:00	am					stop	
7/8/2011	252.1	7:00	am			*		5.3 F	
7/9/2011	323.7	9:00	am					5.4 F	
7/10/2011	30.7	9:00	am					5.4 Y	
7/11/2011	92.4	8:00	am					5.5 Y	
7/12/2011	161.6	8:00	am		200-12			5.4	
7/13/2011	230.5	9:00	am			*		5.3 Y	
7/14/2011	251.9	9:30	am					stop	
7/15/2011	252.0	8:00	am					stop	
7/16/2011	251.8	8:00	am					stop	
7/17/2011	251.8	7:30	am		pivotrac				
7/18/2011	251.7	8:45	am		pivotrac	*			
7/19/2011	306.0	6:30	am					5.3 Y	
7/20/2011	39.9	4:00	pm					5.3 Y	
7/21/2011	85.9	8:00	am					5.3 Y	
7/22/2011	164.3	12:00	noon		pivotrac	*			
7/23/2011	251.3	6:00	pm					5.3 Y	
7/24/2011	288.2	7:30	am					5.3 Y	
7/25/2011	356.6	7:30	am					5.3 Y	
7/26/2011	65.9	7:30	am					5.3 Y	
7/27/2011	130.6	7:30	am					5.3 Y	
7/28/2011	196.5	7:00	am					5.3 Y	
7/29/2011	272.4	10:00	am					5.3 Y	
7/30/2011	334.6	8:00	am					5.3 Y	
7/31/2011	38.4	7:00	am					5.4 Y	
8/1/2011	109.2	9:30	am					5.4 Y	
8/2/2011	174.7	8:00	am					5.2 Y	
8/3/2011	239.3	7:00	am					5.3 Y	
8/4/2011	305.3	7:00	am					5.4 Y	
8/5/2011	12.2	7:30 AM	am					5.4 Y	
8/6/2011	82.1	8:30	am					5.4 Y	
8/7/2011	145.3	7:30	am					5.4 Y	
8/8/2011	211.0	7:00	am					5.4Y	

Continued PivoTrac Irrigation system tracking Data Harold Grall #414

Grower	Harold	120 Acres Corn		Pivot	Acres/Deg----------		475 GPM	1.065 AcIn/
m/dy/yr	Degrees	Time	AM/PM	DegSince	Acres Irrg	Irrigation	Hours	Days/Rev
8/9/2011	277.8	7:30	am					5.5 Y
8/10/2011	345.6	8:00	am					5.5 Y
8/11/2011	332.4	9:30	am		pivotrac			
8/12/2011	117.7	8:00	am					5.4 Y
8/13/2011	145.4	7:15	am					stop
8/14/2011	145.1	8:00	am					stop
8/15/2011	145.0	8:00	am					stop
8/15/2011	158.1	4:37	pm		pivotrac	*		
8/16/2011	191.2	4:50	am		pivotrac			
8/17/2011	266.1	8:00	am					5.5 Y
8/18/2011	330.4	7:30	am		pivotrac			
8/19/2011	20.5	8:00	am		pivotrac			
8/20/2011	90.6	9:30	am		pivotrac			
8/20/2011	111.0	5:00	am					5.4 Y
8/21/2011	152.2	8:00	am					5.5 Y
8/22/2011	220.7	8:30	am					5.4 Y
8/23/2011	295.4	11:45	am		pivotrac			
8/24/2011	3.20	12:30	pm		pivotrac			
8/25/2011	52.0	6:30	am					5.5 Y
8/26/2011	116.0	6:00	am					5,4 Y
8/27/2011	189.7	9:00	am					5.5 Y
8/28/2011	253.6	8:00	am					5.3 Y
8/29/2011	314.8	6:30	am					5.5 Y
8/30/2011	23.7	7:00	am					5.5 Y
8/31/2011	86.3	7:00	am					5.5 Y
9/1/2011	149.3	6:00	am					5.4 Y
9/2/2011	215.1	6:00	am					5.4 Y
9/3/2011	284.3	7:00	am		pivotrac			
9/4/2011	354.8	8:30	am		pivotrac			
9/4/2011	28.6	8:45	pm		pivotrac			
9/5/2011	31.1	10:30	am					stop
9/6/2011	31.4	10:30	am		pivotrac			
9/7/2011	88.4	8:30	am					5.5 Y
9/8/2011	155.9	8:30	am					5.4 Y
9/9/2011	225.7	9:00	am					5.3 Y
9/10/2011	294.3	10:00	am					5.4 Y
9/11/2011	356.9	8:30	am					5.4 Y
9/12/2011	59.3	7:00	am					5.5 Y
9/13/2011	128.2	8:00	am					5.4 Y

Continued PivoTrac Irrigation system tracking Data Harold Grall #414

Grower	**Harold**	120 Acres Corn		Pivot	Acres/Deg----------		475 GPM	1.065 AcIn/Hr	
m/dy/yr	**Degrees**	**Time**	**AM/PM**	**DegSince**	**Acres Irrg**	**Irrigation**	**Hours**	**Days/Rev**	
9/14/2011	154.5	8:30	am					stop	
9/15/2011	154.5	5:30	pm		pivotrac				
9/16/2011	154.5	6:00	pm		pivotrac				
9/17/2011	154.3	7:00	am					stop	
9/18/2011	154.8	9:00	am					stop	
9/19/2011	154.8	8:30	am					stop	
9/20/2011	154.5	9:20	am		pivotrac				
9/21/2011	154.4	10:00	am		pivotrac				
9/22/2011	154.3	7:00	am					stop	
9/23/2011	154.3	7:00	am					stop	
9/24/2011	191.2	1:00	am		pivotrac				
9/25/2011	259.4	1:00	am		pivotrac				
9/25/2011	307.8	7:00	pm					5.5 Y	
9/26/2011	344.1	8:00	am					5.4 Y	
9/27/2011	54.1	9:30	am					5.4 Y	
9/28/2011	116.0	8:30	am					5.5 Y	
9/29/2011	181	12:00	noon					stop	
9/30/2011	181.2	7:00	am					stop	
10/4/2011	181.2	8:00	am					stop	

- Y- yes, system is running
- N- no, system is not running

NPGCD-200/12

2011-Corn Demonstration
Irrigated Medium Season Corn

Section 3

Pivot 1350 Ft, 131.4 Acres .365 Ac/Deg 700 Gpm

Year: 2011 **County:** Hutchinson **Grower:** Steve Shields

No. Acres: 65 **Variety/Hyb:** 33D49 **Soil Type:** Sherm Clay Loam

65 wheat

Meter Type: Geyser **Meter SN:** 0871814

Meter Mult: Gallons x 1000 **Tillage:** Strip Till

Fertilizer: 174-56-0 **Seeding:** *33,000*

Planting Date: April 11 **Harvest:** September 9

Herbicide: Balance Flex, Atrazine **Insecticide:** *None*

Yield: 153 bushels **Previous crop:** Wheat **Row Width** 40" 2 rows @ 6"

Harvested wheat June 12 2 wells

Irrigation method: Center Pivot **Prewater:** None **Well GPM:** 750

Distance between drops: 60" **Distance from application nozzle to ground:** 12"

Application pattern: Spray Lon **Crop row direction :** circle

Elevation: N/A **GPS Location:** Latitude: 35.903081

Longitude: -101.540443

Table – Growing Season Water Tracking for Shields#3

Date	Inches		Water	Gypsum Block Reading (Percent of soil moisture)					Growth	Pivot
Mo/Day	Rain	Irrig	Meter	1 foot	2 feet	3 feet	4 feet	5 feet	Stage	Position
3/24			11670							
4/5		1.09	13623						"wheat"	
4/12		0.95	17048						"wheat"	
		0.95							corn	
4/15			5001							
4/28		2.72	24365						"wheat"	
		1.36							corn	
5/5		1.44	26957						"wheat"	
5/11	0.61		028195						Running	
5/17		0.78	028375							start 17th
5/19		1.24	30606						4 leaf	
5/24		2.0							"wheat"	
5/26		1.47	33238	install gypsum blocks					5 leaf	irrig tonight
5/28		1.18								
6/2	0.09	1.17	37449	96.1	94.2	89.8	90.1	92.3	7 leaf	270 N
6/7			39143	95.4	94.7	91.2	90.8	93.5	8 leaf	105 Y
6/10		1.90	40854	95.5	94.7	92.5	92.3	94.0	8 leaf	273 N
6/14			40854	46.5	80.9	91.8	92.0	92.8	10 leaf	270 N
6/16			41797	92.4	62.6	92.6	92.7	92.9	11 leaf	135 Y
6/20				9.5	18.6	90.6	93.7	93.5	11 leaf	165.5 N
6/21				13.2	22.2	90.3	93.7	93.4	11 leaf	255 Y
6/21		1.42	43395							270 Y
6/23		0.99	45166	64.6	24.5	89.3	93.1	92.6	12 leaf	63.5 N
6/26		1.37							reverse	273.7 Y
6/29		1.36							reverse	90 stop
6/30			50062	10.8	11.6	75.5	93.4	93.0	12 leaf	195 Y
7/3		1.37							reverse	110.5 Y
7/7		1.38	54986						reverse	Steve
7/7			54986	19.7	59.7	68.4	92.5	92.4	silk	stop
7/10		1.23							reverse	99.1 Y
7/13		1.23							reverse	263.5 Y
7/15		1.23	61598	98.5	98.2	91.7	90.3	97.0	Gr Fill	90 N
7/18		1.05						97.9	reverse	269 Y
7/20			64929	98.1	98.1	98.1	88.1	97.9	Gr Fill	185 Y
7/21		1.04							reverse	99.5 Y
7/25		1.04							stop	279 N
7/26	0.03		69381	98.6	98.7	98.5	87.5	98.2	Gr Fill	175 Y
7/28		1.04							reverse	92.9 N

Table (Continued) – Growing Season Water Tracking for Shields #3

Date	Inches		Water	Gypsum Block Reading (Percent of soil moisture)					Growth	Pivot
Mo/Day	Rain	Irrig	Meter	1 foot	2 feet	3 feet	4 feet	5 feet	Stage	Position
7/30		1.04							reverse	271.7 N
8/2		1.04							stop	96.2 N
8/3			73427	97.0	97.5	96.9	87.8	95.4	dough	100. Y
8/5		1.04							stop	274 N
8/9		1.04							stop	94.8 N
8/11	0.66	1.04	78416	98.2	98.8	98.3		95.2	1/4mat line	90 N
8/18			78414	74.9	91.9	92.9	91.9	95.3	1/2 Mat Lir	90 N
8/25		0.99	80168							
8/26			80168	26.2	29.2	50.1	59.2	92.1		270 N
9/1			80168	11.6	16.2	25.8	34.0	88.2		270 N
9/8			80168	11.1	14.9	23.8	37.2	87.8	blk layer	275 N
9/9				153 bu.					harvest	
harvest	**1.39**	**31.21**		0	0	0	0	0		
harvest	rain/irrig/soil water		**32.60 inches**							

- Numbers in pivot position column are system position degrees at reading
- Y- yes, system is running
- N- no, system is not running
- ON 6-7-2011 Meter at pivot timed out to 700 GPM
- Numbers in different colors indicate a full revolution

PivoTrac Irrigation system tracking Data Steve Shields #3

Demonstration Grower Shields				90-270deg					
Demons Acres Corn 6		65, Wheat	65, Pivot	1305 ft.	Ac/deg	0.365	GPM 700	1.556AcIn/Hr	
m/dy/yr	**Degrees**	**Time**	**AM/PM**	**DegSince**	**Acres Irrg**	**Hours**	**Irrigation**	**Days/Rev**	
6/8/2011	222.2	4.23	pm			installed			
6/9/2011	273.6	5:43	pm			pivotrac	*	irrigate	
6/10/2011	273.7	6:39	am			pivotrac			
6/10/2011	273.6	7:45	am					stop	
6/11/2011	273.8	7:45	am					stop	
6/12/2011	270.3	9:00	am					pivotrac	
6/13/2011	270.3	8:00	am					stop	
6/14/2011	270.1	7:00	am					stop	
6/15/2011	270.1	7:00	am					stop	
6/16/2011	160.8	7:30	am				*	2.4ccw	
6/17/2011	165.4	8:00	am				over &1/2ba	stop	
6/18/2011	165.5	9:00	am					stop	
6/19/2011	165.4	8:00	am					stop	
6/20/2011	165.5	7:00	am					stop	
6/21/2011	237.2	8:00	am					2.8 Y	
21-Jun	270	2:00	pm				finish 1/2	reverse	
6/22/2011	175.2	8:15	am					3.2 Y	
6/23/2011	63.5	8:00	am				*	stop	
6/24/2011	63.4	7:30	am					stop	
6/25/2011	147.1	8:00	am				*	2.9 Y	
6/26/2011	243.5	7:00	am					3.4 Y	
6/26/2011	273.7	1:00	pm	180	65.7	reverse	1.70	2.9 Y	
6/27/2011	196.1	7:00	am					3.6 Y	
6/28/2011	109.7	7:00	am					3.8 Y	
	93.6	6:00	pm			pivotrac	*	stop	
6/29/2011	98.5	8:00	am					3.6 Y	
6/30/2011	185.7	7:00	am					4.5 Y	
7/1/2011	255.0	9:00	am					3.3 Y	
7/2/2011	179.9	11:30	am					pivotrac	
7/3/2011	110.5	12:00	noon			reverse ?		pivotrac	
7/4/2011	111.2	8:00	am					red	
7/5/2011	166.9	8:00	am					4.1 Y	
7/6/2011	248.1	8:00	am					4.1 Y	
7/7/2011	275.9	8:00	am	27.8	0.365	10.15		stop	
7/8/2011	219.6	7:00	am					3.4 Y	
7/9/2011	138.3	9:00	am					4.8 Y	

Continued PivoTrac Irrigation system tracking Data Steve Shields #3

Demonstration Grower Shields				90-270deg					
Demons Acres Corn 6		65, Wheat	65, Pivot	1305 ft.	Ac/deg	0.365	GPM 700	1.556AcIn/Hr	
m/dy/yr	**Degrees**	**Time**	**AM/PM**	**DegSince**	**Acres Irrg**	**Hours**	**Irrigation**	**Days/Rev**	
7/10/2011	99.1	9:00	am			reverse		3.7 Y	
7/11/2011	178.5	8:00	am					4.9 Y	
7/12/2011	260.5	8:00	am					3.8 Y	
7/13/2011	263.5	9:00	am			reverse		2.7 Y	
7/14/2011	176.8	9:30	am					4.9 Y	
7/15/2011	99.0	8:00	am			reverse today		4.0 Y	
7/16/2011	96.7	8:00	am					6.4 Y	
7/17/2011	178.3	7:00	am			pivotrac			
7/18/2011	269.0	8:30	am			pivotrac	reverse		
7/19/2011	261.1	9:30	am			pivotrac	reverse		
7/20/2011	159.4	4:00	pm					5.2 Y	
7/21/2011	99.5	8:00	am					4.0 Y	
7/22/2011	113.1	12:00	noon						
7/23/2011	210.5	6:00	pm					5.0 Y	
7/24/2011	262.9	7:30	am					3.8 Y	
7/25/2011	282.0	7:30	am					stop	
7/26/2011	182.3	7:30	am					4.6 Y	
7/27/2011	101.1	7:30 AM	am					3.9 Y	
7/28/2011	92.9	7:00	am			reverse		0.0 N	
7/29/2011	189	10:00	am					4.9 Y	
7/30/2011	271.7	8:00	am			reverse		stop just	
7/31/2011	272.1	7:00	am					3.6 Y just	
8/1/2011	177.6	9:30 AM	am					4.7 Y	
8/2/2011	96.2	8:00	am			reverse		stop	
8/3/2011	96	7:00	am					stop	
8/4/2011	180.4	7:00	am					4.5 Y	
8/5/2011	274.00	7:30	am					stop	
8/6/2011	274.7	8:30	am					stop	
8/7/2011	274.7	7:30	am				starting up		
8/8/2011	180.7	7:00	am					4.5 Y	
8/9/2011	94.8	7:30	am					stop	
8/10/2011	94.5	8:00	am					stop	
8/11/2011	94.6	1:00	pm					pivorac	
8/12/2011	94.5	8:00	am					stop	
8/13/2011	94.3	7:15	am					stop	
8/14/2011	94.5	8:00	am					stop	
8/15/2011	94.6	8:00	am					stop	
8/16/2011	93.6	3:00	am					pivotrac	

Continued PivoTrac Irrigation system tracking Data Steve Shields #3

Demonstration Grower Shields				90-270deg					
Demons Acres Corn 6		65, Wheat	65, Pivot	1305 ft.	Ac/deg	0.365	GPM 700	1.556AcIn/Hr	
m/dy/yr	**Degrees**	**Time**	**AM/PM**	**DegSince**	**Acres Irrg**	**Hours**	**Irrigation**	**Days/Rev**	
8/17/2011	94.1	8:00	am					stop	
8/18/2011	94.1	3;30	am					pivotrac	
8/19/2011	94.3	3:30	am					pivotrac	
8/20/2011	101.2	4:00	am					pivotrac	
8/20/2011	137.3	5:00	am					2.9 Y	
8/21/2011	188.7	8:00	am			finished		stop	
8/22/2011	188.6	8:30	am					stop	
8/23/2011	190.8	6:30	am						
8/24/2011	218.5	6:45	am					pivotrac	
8/25/2011	267.4	7:00	am					pivotrac	
8/26/2011	267.3	6:00	am					pivotrac	
8/27/2011	268.1	9:00	am					stop	
8/28/2011	268.1	8:00	am					stop	
8/29/2011	267.5	6:30	am					stop	
8/30/2011	267.9	7:00	am					stop	
8/31/2011	267.3	7:00	am					stop	
9/1/2011	267.4	6:00	am					stop	
9/2/2011	288.4	6:00	am			plow		stop	
9/3/2011	288.7	8:45	am			pivotrac			
9/4/2011	288.2	9:50	am			pivotrac			
9/5/2011	288.4	10:30	am					stop	
9/6/2011	288.5	11:00	am			pivotrac			
9/7/2011	288.9	8:45	am					stop	
9/8/2011	288.6	8:30	am					stop	
9/9/2011	288.5	9:00	am			harvest		stop	
9/10/2011	288.2	10:00	am					stop	
9/11/2011	288.6	8:30	am					stop	
9/12/2011	289.1	7:00	am					stop	
9/13/2011	288.5	8:00	am					stop	
9/14/2011	288.5	8:30	am					stop	
9/16/2011	271.6	12:00	mid					pivotrac	

- Y- yes, system is running
- N- no, system is not running

NPGCD-200/12

2011-Corn Demonstration
Irrigated Medium Season Corn

Year: 2011 **County:** Ochiltree **Grower:** Danny Krienke

No. Acres: 120 **Variety/Hyb:** P33B54 **Soil Type:** Sherm Clay Loam

Meter Type: McCrometer **Meter SN:** 99-8-2020N

Meter Mult: Gallons X 1000 **Tillage:** Conventional

Fertilizer: 57-52-0 **Seeding:** *26,000*

May 16 **Harvest:** October 15

Herbicide: Zinch ATZ **Insrcticide:** None

Yield: 121 Bushels & 131 Bushels **Previous crop:** Wheat **Row width:** 30"

Irrigation method: Center Pivot **Prewater:** None **Well GPM:** 570

Distance between drops: 60" **Distance from application nozzle to ground:** 12"

Application pattern: Spray Lon **Crop row direction :** Straight

Elevation: 2940 Feet **GPS Location:** Latitude: 36.40338

Longitude: -100.85404

Table – Growing Season Water Tracking for Danny Krienke #47

Date	Inches		Water	Gypsum Block Reading (Percent of soil moisture)					Growth	Pivot
Mo/Day	Rain	Irrig	Meter	1 foot	2 feet	3 feet	4 feet	5 feet	Stage	Position
5/21			78053						planted	west
5/23		0.40	79349							east
5/25		0.57	81207							west
5/25										east fast
5/26			82060							
5/28		0.67	83375							west wheat
6/2			86594						2 leaf	120 Y
6/7		1.31 no	86944						5 leaf	wheat
6/10		0.37	88144							
6/13		0.57	89993							west
6/14	0.05		90130	install gypsum sensors					4 leaf	315 Y
6/16			91747	97.4	97.1	96.5	96.2	97.0	6 leaf	30 Y
6/17		0.87	92838							east
6/21		0.90	95788							west
6/23	0.03		97307	96.1	96.8	96.3	96.9	97.3		1.6 N then Y
6/25		0.92	98780					84.1		stop, east
6/30			101633	63.9	97.7	97.1	97.6	98.3	9 leaf	275 Y
6/30		1.08	101703							100 Acres on
7/2	0.05		106928	97.4	95.4	97.2	97.2	97.9	10 leaf	360 pump
7/11		1.60	106928							120 Acres
7/15			109271	94.4	36.1	96.6	97.8	98.6	13 leaf	300 Y
7/15		0.97	110096							west
7/19		1.02	113437							east
7/20			113936	98.9	98.0	67.0	97.7	98.7	Tassel	75 Y
7/25		1.13								west
7/26			118590	16.6	0	20.0	97.7	99.1	silk	320 Y
7/29	0.33	1.14	120840							east
8/3			124926	86.6	0	6.6	95.7	98.0	blister	265 Y west
8/3		1.13								west
8/6	1.10									
8/8		1.13	128215							east
8/11	0.02		130703	98.6	0	4.8	94.8	98.0	milk	
8/13	0.40	1.11								west
8/17		1.12	135487							east
8/18			136022	98.8	0	4.2	92.8	98.0	Gr fill	
8/22		1.13	139155							west
8/26			142050	68.4	0	4.9	87.8	96.7		
8/27		1.15								east
9/1			146444	98.1	21.4	0	85.3	97.6		285 Y

Table (Continued) – Growing Season Water Tracking for Danny Krienke #47

Date	Inches		Water	Gypsum Block Reading (Percent of soil moisture)					Growth	Pivot
Mo/Day	Rain	Irrig	Meter	1 foot	2 feet	3 feet	4 feet	5 feet	Stage	Position
9/6		1.15	150421	Danny					1/2 mat lin	east
9/7				over sensors						
9/8			151670	98.2	0	0	73.8	94.6	1/2 mat lin	15 Y
9/11		1.11	154050	Danny					7/8 mat lin	west
9/14	0.06		157211	89	0	0	71.5	95.7	3/4 Mat lin	60 N
9/15		1.16	157211	Danny		100 acres only				east
9/22	0.48		157211	45	0	0	61.4	94.9	7/8 mat lin	60 N
9/29			157211	20.1	0	0	54.4	94.1	blk layer	60 N
10/6			157211	12.7	0	0	41.2	91.8	blk layer	90 N
10/14	.42 no		157211	10.9	0	0	44.9	92.3	blk layer	90 N
10/15									harvest	
as of 10/15	2.52	23.56	100 Acres	0	0	0	0	0	131 bu	
as of 10/15	2.52	21.32	20 Acres	0	0	0	0	0	121 bu	
At harvest	irrig/rain/soil		100 acres						26.08	

- Numbers in pivot position column are system position degrees at reading
- Y- yes, system is running
- N- no, system is not running
- 7-11-2011 Moved Pivot back to 90 deg following pump repair
- ON 7-2-2011 Meter at pivot timed out to 360 GPM
- ON 7-11-2011 Meter at pivot timed out to 527 GPM
- ON 8-3-2011 Meter at pivot timed out to 515 GPM
- Numbers in different colors indicate a full revolution

PivoTrac Irrigation system tracking Data Danny Krienke #47

Grower: Krienke		120 Acres corn, 120 Wheat			Pivot1840	GPM 570	.678Ac/de	1.267AcIn/Hr	
m/dy/yr	**Degrees**	**Time**	**AM/PM**	**DegSince**	**Acres Irrg**	**Hours**	**Ac.Inch**	**Irrigation**	**Days/Rev**
5/21/2011	270	8:40	am						
5/22/2011	0	7:45	am	90	60.9	23.1	29.26	.48"	
5/23/2011	90	7:10	am	90	60.9	23.5	29.77	0.49	
5/25/2011	301.7	6:55	am						5.0
5/26/2011	39.5	7:52	am	262.2	fast east				4.7
5/26/2011	30.8	10:40	am	corn					5.0
8/28/2011	284.7	8:10	am	corn					5.4
8/28/2011	266.9	10:05	am	nto wheat					5.4
8/29/2011	231.0	8.47	am	35.9	24.34	22.7	28.76	1.18	9.1
5/30/2011	206.9	7:35	am	24.1	16.34	?	?		stop red
5/31/2011	206.9	7:10	am	0					stop
6/1/2011	183.4	7:10	am	23.5	15.9				stop
6/2/2011	145.6	8:10	am	37.8	25.63	25.0	31.67	1.23	8.9
6/3/2011	120.1	8:30	am	25.5	17.29	24.33	30.83	1.78	stop
6/4/2011	120.1	7:00	am	0	0				stop
6/5/2011	120.1	8:00	am	0	0				stop
6/6/2011	119.9	8:00	am	0	0				stop
6/7/2011	119.9	8:30	am	0	0				stop
6/8/2011	88.3	8:00	am	moved to irrigate corn					stop
6/9/2011	88.7	8:15	am					pm	stop
6/10/2011	65.0	8:00	am						6.8 Y
6/11/2011	18.3	7:45	am						7.5
6/12/2011	344.6	2:10	am				0.57		Pivotrac
6/13/2011	307.3	8:00	am				*		7.5
6/14/2011	282.7	7:00	am						7.4
6/15/2011	328.7	7:00	am						7.8
6/16/2011	16.9	7:30	am				0.87		7.6
6/17/2011	66.0	8:00	am				*		7.7
6/18/2011	60.8	9:00	am						7.6 Y
6/19/2011	13.8	8:00	am				?		6.2 Y
6/20/2011	327.2	7:15	am						7.6 Y
6/21/2011	278.8	8:00	am				*		7.4 Y
6/22/2011	314.1	8:15	am						7.6 Y
6/23/2011	1.6	8:00	am						stop
6/24/2011	44.9	7:30	am						7.4
6/25/2011	84	8:00	am				*		stop
6/26/2011	83.1	7:00	am						stop
6/27/2011	35.1	7:00	am						9.0 Y
6/28/2011	355.6	7:00	am						9.2

Continued PivoTrac Irrigation system tracking Data Danny Krienke #47

Grower: Krienke		120 Acres corn, 120 Wheat			Pivot1840	GPM 570	.678Ac/de	1.267AcIn/Hr	
m/dy/yr	**Degrees**	**Time**	**AM/PM**	**DegSince**	**Acres Irrg**	**Hours**	**Ac.Inch**	**Irrigation**	**Days/Rev**
6/29/2011	320.2	8:00	am						9.2 Y
6/30/2011	282.8	7:00	am						9.1 Y
7/1/2011	301.9	9:00	am			reversed			9.4 Y
7/2/2011	344.8	12:00	noon						Pivotrac
7/3/2011	24.6	12:30	pm						Pivotrac
7/4/2011	55.5	8:00	am						9.4 Y
7/5/2011	80.9	8:00	am						9.2 Y
7/6/2011	41.2	8:00	am						9.1 Y
7/7/2011	0.60	8:00	am						9.1 Y
7/8/2011	0.40	7:00	am						Pump
7/9/2011	0.30	9:00	am						pump
7/10/2011	0.60	9:00	am						pump
7/11/2011	0.50	8:00	am						pump
7/12/2011	49.5	8:00	am			200-12			7.4 Y
7/13/2011	359.5	9:00	am						7.4 Y
7/14/2011	309.70	9:30	am						7.5 Y
7/15/2011	278.70	8:00	am			reverse			8.2 Y
7/16/2011	315.90	8:00	am						9.9 Y
7/17/2011	353.30	8:15	am			pivotrac			
7/18/2011	31.20	8:30	am			pivotrac			
7/19/2011	65.10	6:30	am						9.8 Y
7/20/2011	57.30	4:00	pm						9.4 Y
7/21/2011	31.10	8:00	am						9.5 Y
7/22/2011	1.10	3:00	am			pivotrac			
7/23/2011	299.70	6:00	pm						9.5 Y
7/24/2011	278.90	7:30	am						9.5 Y
7/25/2011	301.30	7:30	am						10.1 Y
7/26/2011	339.40	7:30	am						10.0 Y
7/27/2011	15.40	7:30	am						9.6 Y
7/28/2011	51.30	7:00	am						9.9 Y
7/29/2011	85.70	10:00	am			200-12			10.1 Y
7/30/2011	55.30	8:00	am			reverse			9.8 Y
7/31/2011	19.60	7:00	am						9.7 Y
8/1/2011	339.60	9:30	am						9.6 Y
8/2/2011	303.40	8:00	am						9.6 Y
8/3/2011	276.40	7:00	am			will reverse			12.2 Y
8/4/2011	309.30	7:00	am						10.9 Y
8/5/2011	346.2	7:30	am						9.9 Y
8/6/2011	24.2	8:30	am						9.9 Y

Continued PivoTrac Irrigation system tracking Data Danny Krienke #47

Grower: Krienke		120 Acres corn, 120 Wheat			Pivot1840	GPM 570	.678Ac/de	1.267AcIn/Hr	
m/dy/yr	**Degrees**	**Time**	**AM/PM**	**DegSince**	**Acres Irrg**	**Hours**	**Ac.Inch**	**Irrigation**	**Days/Rev**
8/7/2011	58.9	7:30	am						11.3 Y
8/8/2011	80.8	7:00	am			reverse			10.2 Y
8/9/2011	43.6	7:30	am						9.9 Y
8/10/2011	6.0	8:00	am						9.9 Y
8/11/2011	158.9	2:40	pm			pivotrac			
8/12/2011	292.5	8:00	am						9.8 Y
8/13/2011	286.2	7:15	am						10.2 Y
8/14/2011	323.0	8:00	am						10.1 Y
8/15/2011	359.0	8:00	am						9.9 Y
8/16/2011	31.6	5:30	am			pivotrac			
8/17/2011	71.9	8:00	am						9.8 Y
8/17/2011	86.9	7:00	pm			pivotrac			reverse
8/18/2011	67.9	7:00	am			pivotrac			
8/19/2011	28.1	9:00	am			pivotrac			
8/20/2011	350.8	10:00	am			pivotrac			
8/20/2011	340.4	4;30	pm						9.8 Y
8/21/2011	317.2	8:00	am						9.9 Y
8/22/2011	279.3	8:30	am			will reverse		west	9.8 Y
8/23/2011	306.0	11:30	am			pivotrac			
8/24/2011	343.9	12:45	pm			pivotrac			
8/25/2011	10.9	6:30	am			going east			9.8 Y
8/26/2011	46.2	6:00	am						9.9 Y
8/27/2011	86.2	9:00	am			reverse	east		10.2 Y
8/28/2011	53.7	8:00	am						9.9 Y
8/29/2011	33.9	6:30	am			pivotrac shows 2:51 am			stop red
8/30/2011	7.1	7:00	am						9.9 Y
8/31/2011	331.3	7:00	am						9.7 Y
9/1/2011	295.1	6:00	am						9.5 Y
9/2/2011	283.5	6:00	am			reverse west			10.4 Y
9/3/2011	324.1	8:30	am			pivotrac			
9/4/2011	343.0	9:00	am			pivotrac			
9/5/2011	37.6	10:00	am						8.6 Y
9/6/2011	78.5	1:00	pm			pivotrac			
9/7/2011	67.2	8:30	am			reverse east			9.8 Y
9/8/2011	31.6	8:30	am			going west			9.7 Y
9/9/2011	354.6	9:00	am						9.9 Y
9/10/2011	317.6	10:00	am						10.0 Y
9/11/2011	283.1	8:30	am			will reverse		west	10.1 Y
9/12/2011	296.6	7:00	am						9.7 Y

Continued PivoTrac Irrigation system tracking Data Danny Krienke #47

Grower: Krienke		120 Acres corn, 120 Wheat			Pivot1840	GPM 570	.678Ac/de	1.267AcIn/Hr	
m/dy/yr	**Degrees**	**Time**	**AM/PM**	**DegSince**	**Acres Irrg**	**Hours**	**Ac.Inch**	**Irrigation**	**Days/Rev**
9/13/2011	334.1	8:00	am			going east			9.9 Y
9/14/2011	10.3	8:30	am						10.0 Y
9/15/2011	43.3	7:00	am						Y
9/15/2011	58.6	7:30	pm						stop
9/16/2011	58.1	7:30	am						stop
9/17/2011	57.7	7:00	am						stop
9/18/2011	58.3	9:00	am						stop
9/19/2011	58.2	8:30	am						stop
9/20/2011	58.3	9:30	am			pivotrac			
9/21/2011	60.6	9:30	am			pivotrac			
9/22/2011	60.0	7:00	am						stop
9/23/2011	60.2	7:00	am						stop
9/24/2011	60.2	2:00	pm						stop
9/25/2011	60.3	2:45	pm						stop
9/26/2011	60.3	8:00	am						stop
9/27/2011	60.4	9:30	am						stop
9/28/2011	60.1	8:30	am						stop
9/29/2011	60.4	12:00	noon						stop
9/30/2011	60.1	7:00	am						stop

- Y- yes, system is running
- N- no, system is not running