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Lubbock-Pecos-Halfway

Helm Research Farm

Summary Report

2011

Texas AgriLife Research / Craig Nessler, Director
The Texas A&M University System / College Station, Texas

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Introduction

The Texas A&M University System purchased 373 acres of farmland from the estate of Ardella Helm in December, 1999, for the sole purpose of conducting large scale research and extension programs to enhance producer profitability and sustainability in an irrigated environment. The farm is located 2 miles south of the Texas AgriLife Research and Extension Center at Halfway in Hale County.

Current projects at the Helm Research Farm involve production options and economics of subsurface drip irrigation (SDI). Other research projects include weed and insect control, plant breeding and yield trials for several commodities and production systems projects. Irrigated experiments were conducted under the 130 acre center pivot and on 86-acres of SDI.

The soils are predominantly deep clay loams and silty clay loams, with 0-1% and 1-3% slopes, moderately to moderately slowly permeable subsoils and high water and fertility holding capacities. Supplemental water for irrigation comes from five wells, 320 to 340 feet deep, pumping at rates of 300 to 400 gallons per minute each.

Large plot irrigated grain sorghum study conducted on 130 acres equipped with a center pivot at Helm Research Farm, Halfway, TX.

Cotton is harvested with a modified John Deere 7445 stripper at Helm Research Farm, Halfway, TX. Bulk seed cotton weights and fiber data sub-samples are obtained from SDI treatments.

Corn Breeding (Field 1)
Wenwei Xu

Objectives: The overall objective of this study is to develop corn germplasm with improved drought and heat tolerance, resistance to corn earworm, and low risk of aflatoxin accumulation. The specific objectives for 2011 were to install a new subsurface drip irrigation (SDI) system and to drill a higher capacity well at the experiment site.

Methodology: this site is one of the primary test sites for the corn breeding program's drought tolerance study. The test site was originally arranged with SDI laterals placed in every furrow on 40" centers along each 1340-ft row in the 12-acre field (allowing for 5 SDI zones). To better reflect regional corn production practices, the field was modified to accommodate SDI laterals in every furrow on 30" centers and the test site was split into two 6-acre test areas. This allows us to increase the number of SDI zones to evaluate a wider range of water treatments. A new well was drilled with increased water pumping capacity to provide irrigation for critical timing treatments without interrupting water supplies to other research areas. In 2011, 400 lines were planted for heat and drought tolerance evaluation prior to the completion of the new SDI system.

Results: The experimental hybrids made from these lines had fared well at this site and other locations in Texas. However, because the SDI system was not operational during the early crop growth season, the 2011 experiments were abandoned due to excessive heat stress, and poor weed control.

Expectations: The new SDI system and the increased pumping capacity will significantly enhance our ability to test and develop new drought and heat tolerant corn germplasm. This site will also be suitable to study water management strategies for corn production under reduced water supply. Multiple stress tolerant lines and germplasm developed in this program can also be used for grain and silage corn production, providing an estimated 5-10% savings in corn irrigation requirements.

Subsurface Drip Irrigation Pre-plant Irrigation Timing Effects on Germination and Cotton Yield (Field 2)

James Bordovsky and Joe Mustian

Objective: To determine the effects on germination and cotton lint yield of three pre-plant irrigation sequences using SDI.

Methodology: Plot size was 8 rows by 1300' with three replications. Treatment factors were pre-plant irrigation sequence and depth of planting. SDI laterals were spaced at 60 inches. Crop rows were spaced 30 inches apart with two rows planted on single 60 inch beds. All tillage and seedbed shaping occurred immediately following the 2010 harvest, therefore, the seedbeds were undisturbed from December 2010 until cotton planting in May 2011. Three irrigation sequences were replicated three times in a complete randomized block design and are depicted graphically in Figure 1. Additional treatments within each of the three sequences included removing dry soil from the planting bed surface with disks in front of planter units in an attempt to place seed into wetted soil (deep planting).

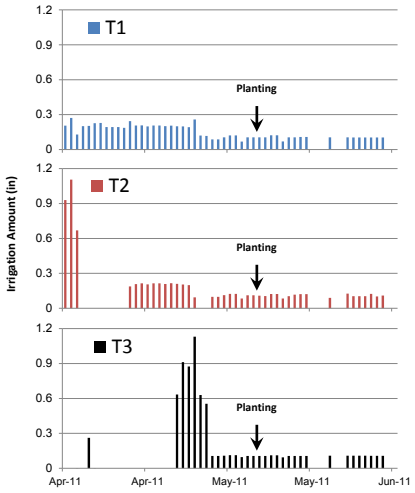

Figure 1. Pre-plant and early season irrigation sequences in germination study at the Texas AgriLife Research Center, Helm Farm, 2011.

Figure 2. Subsurface drip irrigated cotton germination test plot. This picture was taken on July 6 during the record drought of 2011 at the Helm Research Farm.

Results: Germination was low and erratic in all treatments with final plant stands at less than 25% of initial seed drop (Figure 2). All treatments were identically irrigated through the growing season at approximately 40% ETc. In-season rain was low at 1.5 inches. Plots from each treatment and replicate were harvested by traditional methods. Although plant stands were extremely poor, average cotton lint yield of all treatments was 859 lb/ac (Figure 3). Removing dry soil in front of the planter failed to improve germination, failed to consistently improve yield, and would have caused additional germination problems with significant rain immediately following planting. When considering normal planting methods, applying a large pre-plant irrigation immediately prior to planting (T3) resulted in significantly less yield than applying a sequence of smaller irrigations (T1 and T2). The 2011 growing season was extremely hot, dry and windy, particularly during the early stages. As such, these single year test results may not represent those of a more typical growing season.

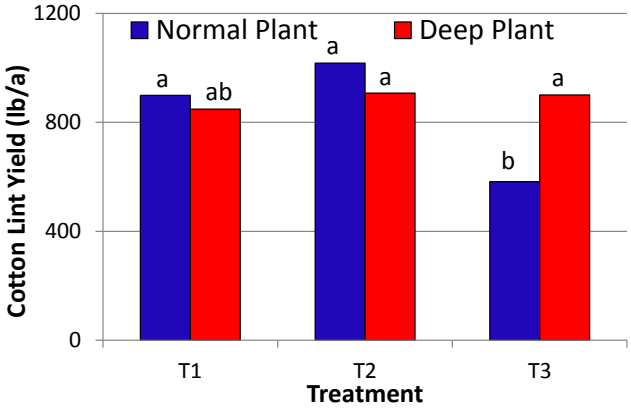

Figure 3. Cotton lint yield resulting from pre-plant irrigation sequences of 0.2 in/d for 25 days (T1), 2.5 inch plus 0.2 in/d for 12 days (T2), and 5.0 inch immediately prior to plant (T3). Cotton was planted with normal planter settings and also following the removal of some dry soil or "deep planting" at the Helm Research Farm, Halfway, TX, 2011.

Cotton Response to Irrigation Interval and Level as Affected by Field Topography Using Subsurface Drip Irrigation (SDI) (Field 3).

Cora Lea Emerson, James P. Bordovsky, Joe Mustian and Andy Cranmer

Objective: To determine SDI cotton response to irrigation intervals of 0.25-, 2- and 7-days at two irrigation levels in a field with slopes common to the Texas Southern Plains.

Methodology: In 2009 - 2011, two irrigation levels and three irrigation intervals were used to determine the effects of each irrigation level/interval combination on cotton production. High irrigation met ~ 80% of crop water needs using ET scheduling: Low irrigation was 50% of the high. Irrigation intervals were .25-, 2- and 7-d. Six 8-row X 1300' treatment plots were established in each of four blocks within a field characterized by decreasing elevations from SW to NE, and rows oriented N-S. In 2011, Fibermax 9180B2F was planted 13 May at ~ 58,000 ppa with 30" row spacing. Seasonal irrigation was from 21 June – 7 September. Sub-plots of 4 rows by ~ 60' were harvested at three field positions (elevations) along each 8-row treatment and lint yield determined using harvested area, harvest weight and turnout percentage of 1-2 lb sub-samples from each replicate. Yield and seasonal irrigation water use efficiency (SIWUE) were determined, and results were averaged and compared using standard ANOVA with separation of means by Fisher's LSD method.

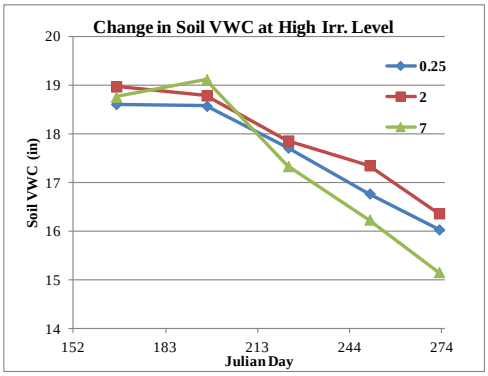

Figure 1. Change in soil volumetric water content, June 1 through October 1, Helm Research Farm, Halfway, Texas, 2011.

Results: 2011 was characterized by severe drought and high temperatures. Table 1 shows yield and SIWUE outcomes for 2011 in all treatments. At both irrigation levels, average yield increased from .25-, to 2- and 7-d intervals. This is in contrast to previous years (data shown in previous reports) with adequate or near-normal rainfall. There were no significant differences (α=.05) in average yield among irrigation intervals at the low irrigation level; however, at the high irrigation level, average yield was significantly higher (1540 lbs/ac) at the 7-d interval versus the .25- and 2-d intervals. As in previous years, yield increases were seen at the 2- and 7-d intervals compared to the .25-d interval at field positions nearest the supply manifold (high elevation). SIWUEs followed yield trends. At both irrigation levels, SIWUE was significantly higher at 7-d intervals and high field elevations versus .25- and 2-d intervals. SIWUE was generally lower in the high irrigation levels versus the low levels. The 7-d interval extracted more profile water than 2-d or 0.25-d, particularly at the high irrigation level (Fig. 1).

Table 1. Average yield (lbs/A), loan values ($/lb) and SIWUE (lbs/A-in) at two irrigation levels, three irrigation intervals and three field elevations, Helm Research Farm, Halfway, TX 2011.

		Low Irrigation Level				**High Irrigation Level**			
	Irr. Int. (d)	High Elev.	Mid	Low Elev.	**Avg**	High Elev.	Mid	Low Elev.	**Avg**
2011 Yield	*.25*	805$^{[Aa]}$	717$^{[Aa]}$	916$^{[Aa]}$	**813$^{[A]}$**	1218$^{[Aa]}$	941$^{[Aa]}$	1177$^{[Aa]}$	**1112$^{[A]}$**
	2	832$^{[Aab]}$	763$^{[Aa]}$	944$^{[Ab]}$	**846$^{[A]}$**	1411$^{[Aa]}$	1092$^{[Aa]}$	1087$^{[Aa]}$	**1197$^{[A]}$**
	7	972$^{[Ba]}$	899$^{[Aa]}$	886$^{[Aa]}$	**919$^{[A]}$**	1792$^{[Ba]}$	1489$^{[Bab]}$	1340$^{[Ab]}$	**1540$^{[B]}$**
	Avg.	**870**	**793**	**915**		**1474**	**1174**	**1201**	
2011 SIWUE	*.25*	76$^{[Aa]}$	64$^{[Aa]}$	91$^{[Aa]}$	**77$^{[A]}$**	64$^{[Aa]}$	46$^{[Aa]}$	61$^{[Aa]}$	**57$^{[A]}$**
	2	80$^{[Aab]}$	70$^{[Aa]}$	95$^{[Ab]}$	**82$^{[A]}$**	76$^{[Aa]}$	56$^{[Aa]}$	55$^{[Aa]}$	**62$^{[A]}$**
	7	98$^{[Ba]}$	89$^{[Aa]}$	87$^{[Aa]}$	**91$^{[A]}$**	101$^{[Ba]}$	81$^{[Bab]}$	72$^{[Ab]}$	**85$^{[B]}$**
		85	**74**	**91**		**80**	**61**	**63**	

Means with the same letters are not significantly different (Fisher's LSD Method; α=.05). Upper case letters indicate vertical comparison; lower case letters indicate horizontal comparison.

Effect of Invinsa (1-MCP) Plant Growth Regulator Applied Through Irrigation on Corn Yield (Field 5a).

Wayne Keeling, Jim Bordovsky, Jacob Reed, Michael Petty, and Michael Urwiler

Objective: Determine the effect of Invinsa (1-MCP)—a plant growth regulator—applied sequentially through chemigation on corn grown under two irrigation levels.

Methodology: Invinsa, a plant growth regulator being investigated by Syngenta Crop Protection, has shown potential in other crops to reduce the adverse effects of moisture stress on crop growth and yield. The material was applied four times through a chemigation simulator applying 0.20" of water (Figures 1 and 2). Treatments were applied four times at weekly intervals beginning when corn reached V12. Treatments were applied to corn under two irrigation levels (base, 11.6" and base + 50%, 17.4"). Corn was planted May 2 and harvested September 12. Detailed agronomic information is in the appendix.

Results: Corn yields in both irrigation levels trended higher with Invinsa treatments compared to the untreated but were not statistically different. It appeared chemigation applications had more effect on yield than ground applications. Further evaluation of this compound is warranted.

Table 1. Corn yields at Helm Research Farm, Halfway, TX 2011.

		Corn Yield	
Treatment	Rate (g ai/A)	Base Irr.	High Irr.
		-------bu/A--------	
Untreated	--	44	181
Invinsa	1.0	68	185
Invinsa	2.0	67	205
Invinsa	5.0	65	202
Invinsa	5.0*	56	185

*Treatments 1-4 applied by chemigation, treatment 5 applied by ground at 10 GPA.

Figure 1. Invinsa application on corn using a chemigation simulator at Helm Research Farm, 2011.

Figure 2. Chemigation simulator at Helm Research Farm, 2011.

Large Plot Tillage Comparison in Cotton at Helm Research Farm in 2011 (Field 5b)
Peter Dotray and Lyndell Gilbert

Objective: To compare cotton stand and lint yield across strip-tillage (ST), no-tillage (NT), and conventional-tillage (CT) production systems.

Methodology: Field preparations began April 6 when stubble in CT plots were cut using a disc and the beds were re-listed. On April 19, a preplant incorporated (PPI) application of Prowl H2O at 1 lb ai/A (33.7 oz/A) was made to the entire trial area. ST plots were incorporated with one pass from a ST implement with chisels set at a depth of 8 to 10 inches (Figure 1a), while CT plots were surface incorporated with one pass from a rolling cultivator (Figure 1b). After herbicide application, NT plots (Figure 1c) were incorporated, as well as the remaining non-tilled areas, with 0.7 inches of overhead irrigation on April 27. Stoneville ST4288 B2 Flex was planted May 12. Prometryn (3 pt/A) tank mixed with glyphosate (Glystar Gold (32 oz/A)) was applied immediately after planting. Three additional applications of glyphosate were made June 29, July 14, and August 4. Plant stand was recorded late-season.

Results: Data representing 2007 to 2009, in *t* test comparisons at Pr>t at 0.05, cotton stand in ST was similar to stand in CT in one of three years, greater than stand in CT in one of three years, and less than stand in CT in one of three years; however, cotton stand in ST was greater than stand in NT in all three years. Cotton lint yield in ST was greater than yield in CT in two of three years, and was similar in one of three years; however, ST cotton yield was greater than yield in NT in all three years. In 2010, cotton stand in ST was similar to stand in CT, and greater than cotton stand in NT. ST lint yield was similar to yield in CT and greater than yield in NT. In 2011 following a 2010 grain crop (sorghum), we again compared cotton stand and yield in ST, CT, and NT systems. Cotton stand in ST was similar to stand in CT and NT (Table 1). Cotton was machine harvested November 4. There were no differences in lint yield in 2011. Results from 2011 and from the previous four years of large-plot field research suggest that ST cotton stand was equal to or greater than stand in CT in four of five years. Lint yield in ST was equal to or superior to cotton yield in CT in all five years. In four of five years, cotton stand and yield in ST was superior to stand and yield in NT.

Figure 1a. Strip-tillage incorporation.

Figure 1b. Conventional-tillage incorporation.

Figure 1c. No-tillage herbicide application.

Table 1. Cotton stand and lint yield by tillage in 2011.

Treatment	Cotton Stand	Yield
	plants per 6.6 ft.	lb/A
Strip-till	12.8	629
No-till	12.9	664
Conventional-till	11.9	701
pValue	0.4176	0.2387
$LSD_{(0.10)}$	NS	NS

Cotton Response to Irrigation Level, Crop Rotation, and Variety (Field 5b,c,e)
James Bordovsky, Wayne Keeling, Jacob Reed, and Michael Petty.

Objective: A field experiment was conducted to determine yield and in-season water use efficiency of four cotton varieties irrigated at three levels in a rotation sequence of two years of cotton and one year of grain sorghum.

Methodology: Four popular cotton varieties were evaluated in a long term cotton-sorghum rotation. The base irrigation level (11.83" of seasonal irrigation in 2011) met approximately 60% of crop water needs using ET scheduling. Other water levels were ±50% of the base amount (5.91" and 17.75"). All variety x irrigation treatments were planted in areas of either continuous cotton or in rotation with grain sorghum, with sorghum planted every three years. Crop responses were evaluated by harvesting 4 rows x 60^0 pivot arc and establishing turnout and fiber data from 2-lb sub-samples from each treatment within four replicates.

Results: Cotton yield for 2010 and 2011 are shown in Figure 1. The crop sequence areas were not replicated, thus, only general comparisons are made among these treatments. Having a grain crop in rotation with cotton generally increased cotton yield compared to continuous cotton. This result is partially due to reduction in cotton diseases following a sorghum crop (see Wheeler, et al. report). Differences in yield response to irrigation in wet (2010) versus dry (2011) years can easily be seen. In 2010, yield generally plateaued at the base irrigation rate, however in 2011, yields of all varieties and in all rotation sequences continued significant increases from the Base to the High irrigation level. At High irrigation, FM 9180B2F followed closely by NG 3348B2F tended to result in the highest yields while DP 912B2F yielded well at the Mid to Low irrigation levels. These field tests provide management options that help maintain grower productivity in the short term while providing information to improve water value in the future.

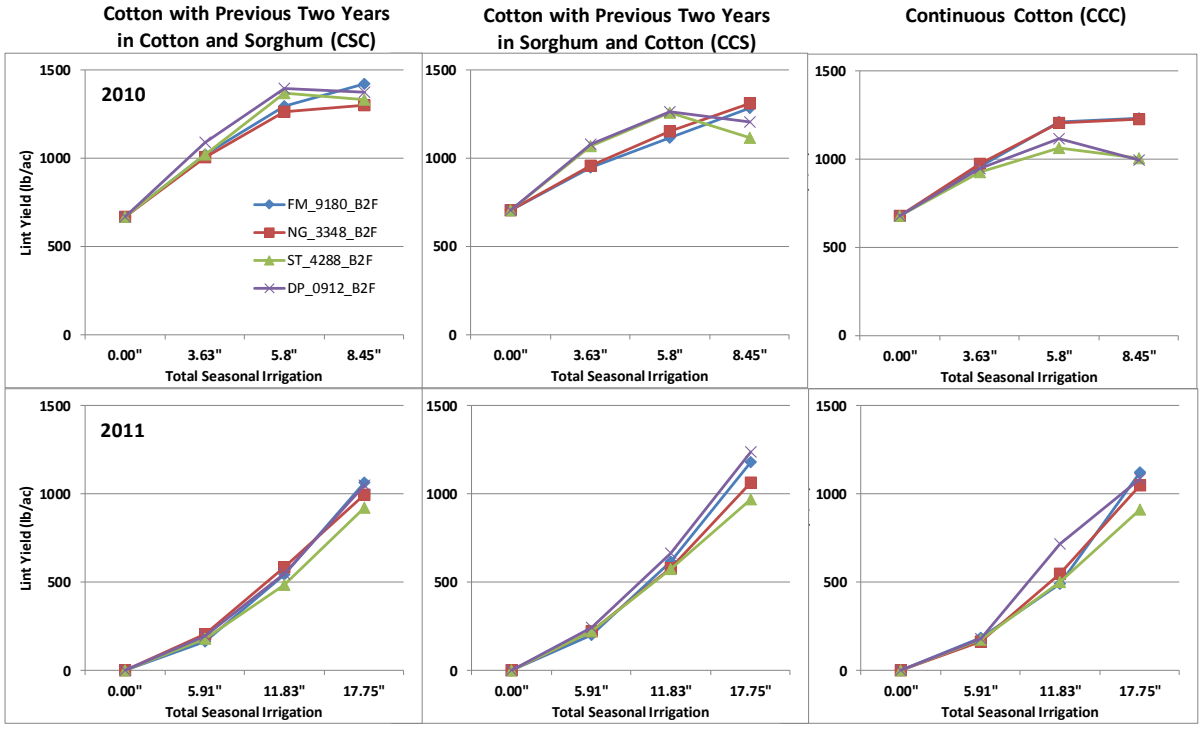

Figure 1. Cotton lint yield of four cotton varieties and three cropping sequences at three irrigation levels at the Helm Research Farm, 2010 and 2011.

Farm Scale Yield Comparisons of Subsurface Drip Irrigation to Center Pivot Irrigation

James P. Bordovsky, Casey Hardin, Andy Cranmer, and Joe Mustian

Objective: Compare lint yields and irrigation quantities from farm scale cotton production irrigated by subsurface drip irrigation (SDI) and LEPA.

Methodology: Interest in subsurface drip continues as water availability decreases and opportunities for cost share assistance for water conserving irrigation equipment remains available. The question of cotton production using SDI verse pivot is continually asked. The Helms Research Farm at Halfway provides a unique, controlled environment that sheds light on this question. The problems not normally encountered in small plot research, such as limited irrigation water, inconsistent soils, and/or challenging topography, are reflected in results while irrigating with SDI and LEPA systems over past growing seasons. Details of SDI and LEPA irrigation experiments are contained elsewhere within this document. This individual report contains average commercial cotton gin yields and irrigation amounts used to achieve those yields with respective irrigation systems.

Results: Lack of early season rainfall and typical high winds and low humidity at planting have caused cotton germination problems in SDI areas in some years. Excess drip irrigation to achieve germination also resulted in moving planter applied insecticides away from the seed drill resulting in foliar insecticide battles with thrip. In cool years, young cotton plants in all areas struggled resulting in slow early growth. Yields were low in 2003, 2005 and 2008 due to cool, wet weather at planting, hail, and short growing season, respectively. Yields were low due to extreme drought and the limited irrigation trials in 2011. Overall, cotton yields have been at or above county averages. For the years where data is available, SDI yields averaged 1289 lb/ac using 15.6 inches compared to LEPA yields of 1045 lb/ac using an average of 12.19 inches of total annual irrigation. Drip yields from various experiments in various years have ranged from 0 to over 2400 lb/acre. LEPA yields have ranged between 200 and 2000 lb/acre.

Table 1. Commercial cotton gin lint yield and total irrigation water delivered by SDI and LEPA irrigation systems at Helms, 2002-2011.

	SDI			LEPA		
	Area (ac)	Tot. Irr. (in)	Yld. (lb/ac)	Area (ac)	Tot. Irr. (in)	Yld. (lb/ac)
2002	71	18.47	1127	84	15.71	1209
2003	71	14.95	1086	103	12.86	1084
2004	71	14.00	1500	103	10.00	1100
2005	53.6	10.86	1041	60	3.05	828
2006	71	17.33	1566	100	16.73	1537
2007	55.3	8.95	1642	104	8.06	1232
2008	71.3	18.13	1335	93	15.13	909
2011	83.0	22.14	1016	68	16.00	467
Avg.		15.60	1289		12.19	1045

Grain Sorghum Performance at Multiple Irrigation Levels (Field 5d)
James Bordovsky, Wayne Keeling, Jacob Reed, and Michael Petty

Objective: A field experiment was conducted to determine yield and in-season water use efficiency of grain sorghum at three irrigation levels.

Methodology: Grain sorghum was planted using Pioneer 84G62-N271 and DeKalb DKS 44-20 hybrids. The **Base** irrigation level (11.8" of seasonal irrigation) met approximately 60% of crop water needs using ET scheduling. The other water levels were ±50% of the **Base** amount (**Low** - 5.9"and **High** - 17.75"). The test area had been in cotton in 2010. Other agronomic information is included in the appendix.

Results: Due to low rainfall, high heat, and high winds during the spring and summer of 2011, herbicides were ineffective in controlling weeds in this and neighboring grain sorghum fields. As such, competition with uncontrolled weeds and the general effect of the drought caused drastic reductions in yields and water use efficiency compared to 2009 and 2010 (Figure 2). Yields were less than one third of those in the previous two years. This is a clear example of inadequate pest management having a devastating effect on water use efficiency.

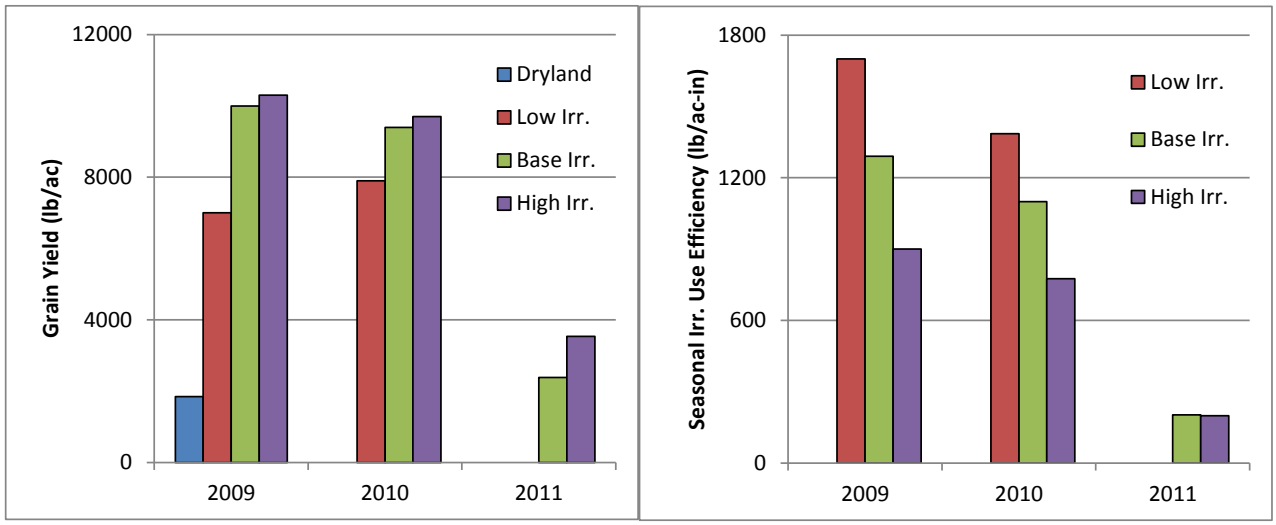

Figure 2. Grain sorghum (Pioneer 84G62) grain yield and seasonal irrigation use efficiency at the Helm Research Farm, 2009-2011.

Sorghum Hybrid FACT Performance with Low-Energy Precision Application (LEPA) Irrigation (Field 5d)

Wayne Keeling, Jim Bordovsky, Jacob Reed, and Michael Petty

Methodology: Plot size was 4 rows x 250 feet with three replications. Sixteen sorghum hybrids, including commercial and experimental hybrids, were planted on 31 May and harvested on 11 October. Sorghum hybrids are contained in Table 1. Detailed agronomic information is contained in the appendix.

Results: Sorghum yields ranged from 529 to 3248 lbs/A. Yields were low and more variable due to hot dry conditions and were reduced due to lodging for some of the earlier hybrids. Overall yields were only 20-30% of 2010 averages.

Table 1. Sorghum yields at Helm Research Farm, Halfway, TX 2011.

Hybrid	*Yield (lbs/A)*
DKS 36-06	1816
MSI 279	1724
MSI 281	1670
MSI 384	1644
MSI 280	3248
DKS 28-05	2321
DKS 37-07	2462
DKS 29-28	529
MSI 375	2044
MSI 281	2887
DKS 49-45	2433
MSI 280	1782
Pioneer 85G01	1719
MSI 374	2219
MSI 384	683
DKS 44-20	2197

Grain Sorghum Seeding Rate Effect on Irrigated Yield (Field 5d)
Calvin Trostle and Sean Wallace

Objective: Determine the effect of seeding rate under irrigation for two grain sorghum hybrids.

Methodology: This third-year test was planted using Pioneer 84G62, a popular medium-long maturity hybrid, and ChannelBio 7C22, a medium maturity hybrid often chosen for dryland and limited irrigation. On 1 June, six replicated plots (four rows X ~38-50') were planted for each hybrid at seeding rates ranging from 1.5 to 7.5 seeds per foot on 30-inch rows (26,000 to 130,000) using an air-vacuum John Deere® Max Emerge planter and followed by 0.5" of irrigation. Tests were harvested October 12 - 13. Detailed agronomic information is contained in the appendix.

Results: Due to the drought, results were poor and not consistent among seeding rates. The highest yields were near 3,000 lbs. per acre, but the variability in the data resulted in test results that are not considered research quality and are not reported for this test.

Effect of Cropping Systems and Irrigation Rate on Verticillium Wilt in Cotton (Field 5c, d, e)
T. A. Wheeler, J. P. Bordovsky, V. Mendoza, and G. Clark

Objective: To report of the effects of two cotton-grain sorghum rotations, with three irrigation rates on Verticillium wilt incidence and density of the fungal spores (called microsclerotia) in the soil.

Methodology: Verticillium wilt has been present at the Helm farm each year since 2007. A long term crop rotation study has been in place since 2001, where three wedges are in a one year sorghum followed by two years of cotton rotation. The other three wedges were in continuous cotton since 2001. However, two of the continuous cotton wedges were placed in a one year cotton/one year sorghum rotation, starting in 2010. This was done to determine if this rotation can lessen the impact of Verticillium wilt on the cotton, once a significant Verticillium wilt problem has been established.

Results: This disease was monitored at 16 additional fields with a history of Verticillium wilt, besides the Helms location, and in no other site did a significant amount of disease develop in 2011. This disease is typically not a problem under very hot and dry conditions. However, there was some disease at Helms Farm, particularly in the high irrigation rate (Table 1), though the impact on yield was much less than in previous years (data not shown in this report). The incidence of Verticillium wilt for the rotation with one year sorghum followed by one year cotton where the fungus was already at high levels in the soil was as bad following the first cycle of the rotation as in continuous cotton (Table 1). The long term rotation with two years cotton and one year sorghum had much lower incidence of Verticillium wilt in comparison (Table 1). Similar trends were seen with the density of the fungus in the soil (Table 1). A short term sorghum/cotton rotation when the fungus is already a problem in the soil is not going to quickly solve the problem of Verticillium wilt.

Table 1. Effect of cropping system[1] and irrigation on incidence of Verticillium wilt and microsclerotia density of *V. dahlia* in soil.

Irrigation Rate[2]	Incidence of Verticillium wilt			Microsclerotia/cm^3 soil		
	CC	R1	R2	CC	R1	R2
0	0.0 cz[3]	0.0 cz	0.0 bz	10.5 cz[4]	9.8 bz	2.2 az
0.5	1.8 cz	0.0 cz	0.5 bz	9.9 cz	5.6 bz	1.7 az
1.0	8.8 bz	4.4 by	1.6 by	29.7 bz	11.1 by	3.4 ay
1.5	32.6 ay	46.3 az	10.9 ax	51.9 az	38.3 az	11.2 ay

[1]Cropping systems included continuous cotton (CC), long-term cotton with only 2010 in sorghum (R1), and a long-term rotation with 1 year sorghum and 2 years cotton (R2).
[2]The base irrigation rate (1.0) was designed to meet 60% of the evapotranspiration that occurred, and the other two rates were 50% above and below that rate. The 0 rate received no in-season irrigation.
[3]Within a cropping system, mean separations (based on the PDIFF option in SAS version 9.1, PROC MIXED) went from a to c, with different letters indicating a significant difference between irrigation rates within that cropping system. Comparisons between cropping systems, but within an irrigation rate started at z.
[4]Differences were based on a square root transformation of microsclerotia density.

Effects of SDI Irrigation Level, Nitrogen Rate and Harvest Method on Cotton Yield and Fiber Quality (Field 6a-f)

Wayne Keeling, James Bordovsky, Eric Hequet, and John Wanjura

Objective: To determine the effects on cotton production, particularly fiber quality, of excess nitrogen, harvest method, and variety at two irrigation levels.

Methodology: Plot size was 8 rows by 1600' with three replications. Treatment factors were irrigation level, cotton variety, nitrogen level and harvest method. Excess nitrogen was applied in appropriate plots prior to planting with the remainder applied during seasonal irrigations. Previous tests have indicated excess nitrogen lowered fiber quality. All treatments were irrigated with SDI. The *Base* water level was irrigated at 100% ET, the *Low* level at 50% of the *Base*. Four rows from each plot were harvested by either cotton picker (Oct 17) or stripper (Oct 25) with 200-lb samples to be analyzed at the Fiber and Biopolymer Research Lab at Texas Tech. Detailed agronomic information is contained in the appendix.

Table 1. Effects of SDI irrigation level, nitrogen rate, and harvest method on cotton lint yield at Helms Farm 2011.

Variety	Irrigation Level	Nitrogen Level (lb/A)	Yield (lb/A)		Lint Value ($/lb)		Gross Return ($/A)	
			Harvest Method		Harvest Method		Harvest Method	
			Picker	Stripper	Picker	Stripper	Picker	Stripper
DP 0912B2RF	Base Irrigation							
		High N (153)	1319 a*	1292 a	54.77 a	54.77 a	723 a	708 a
		Base N (82)	1169 b	1204 a	54.70 a	54.13 b	640 b	654 a
	Low Irrigation							
		High N (147)	865 c	924 b	51.63 b	50.82 b	447 c	469 b
		Base N (60)	807 c	919 b	52.20 b	51.63 b	421 c	475 b
		Avg.	1040 A**	1085 A	53.33 A	52.84 B	558 A	577 A
FM 9180B2F	Base Irrigation							
		High N (153)	1176 a	1265 a	57.50 a	57.38 a	677 a	728 a
		Base N (82)	1095 a	1188 a	57.57 a	57.52 a	630 a	682 a
	Low Irrigation							
		High N (147)	872 b	853 b	57.02 ab	56.83 b	497 c	485 b
		Base N (60)	850 b	864 b	57.33 a	56.35 c	487 c	487 b
		Avg.	998 A	1043 A	57.35 A	57.02 B	573 A	595 A

* Lower-case letters compare parameter means for a variety within a harvest method
**upper-case letters compare parameter means for a variety across harvest methods

Results: Lint yields with DP 0912B2F were higher with base compared to the low irrigation for both picker and stripper harvesting. Increased N fertility improved yield only in the high irrigation picked plots. With FM 9180B2F, yields were increased with high irrigation but increased N had no effect. Similar yields were produced with both harvest methods regardless of irrigation or N level. Lint value was higher with picker harvesting, generally increased with higher irrigation, and was not affected by N levels. Gross revenues were increased by irrigation level but not affected by variety, harvest method, or N level.

Efficacy of Transform to Cotton Fleahopper in Cotton (Field 6g)
David Kerns and Bo Kesey

Objective: To evaluate the new insecticide Transform (sulfoxalfor) for activity toward cotton fleahopper.

Methodology: FM 9063B2RF was planted on 15 June on 40-inch rows and was drip irrigated. The test was a RCB design with four replications. Plots were 4-rows wide × 50 ft in length. Insecticides were applied with a CO_2 pressurized hand-boom sprayer calibrated to deliver 10 gpa through TX-6 hollow cone nozzles (2 per row) at 40 psi. Insecticides were applied to the all four rows of each plot on 5 Aug, approximately 5 days prior to first bloom. CFH populations were estimated on 5, 8, 12, 18 and 25 Aug utilizing a 36-inch x 40-inch black drop cloth. Drop cloths were laid between the rows and approximately 1.5 row-ft of cotton were shaken onto the drop cloth from each row; five drop cloth samples were taken per plot. Data were analyzed using ANOVA and means for CFHs were separated using the F-protected LSD ($P \leq 0.05$) method.

Results: Prior to treating on 5 Aug, CFH averaged 5.7 total CFHs per 15 row-ft. There were no significant differences among treatments at this time (Figure 1). At 3 DAT, adult CFH had declined sharply, which isn't unusual for a mobile pest in a small plot test, subsequently no differences were ever detected for adult CFHs. At 3 DAT there were fewer nymphs and total CFHs in the insecticide treatments than in the untreated. By 7 DAT, the cotton was blooming and although blooming cotton is thought to be highly tolerant to CFH, the test was carried forward. At 7 and 13 DAT CFH numbers remained static and there were fewer CFHs in the insecticide treatments than in the untreated. By 20 DAT, the CFH population had increased across the entire test, but total CFHs were still fewer in the insecticide treatments than in the untreated.

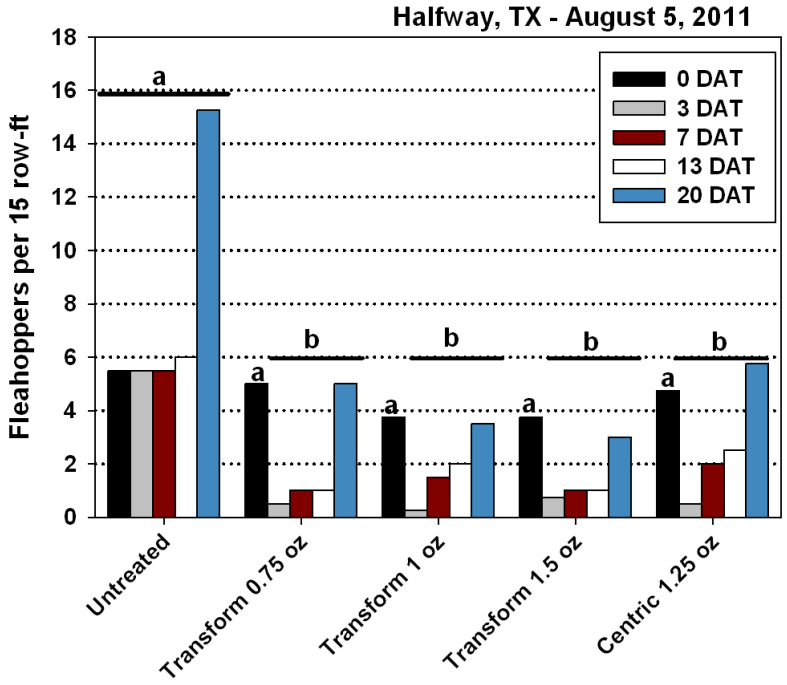

Figure 1. Number of cotton fleahoppers per 15 row-ft following insecticide application.

Influence of Soil Nitrogen Level on Seasonal Activity of Cotton Arthropods and Lint Yield Under Drip Irrigation (Field 6h)

M.N. Parajulee, S.C. Carroll, R.B. Shrestha, A.M. Cranmer, J.P. Bordovsky

Objective: The objective was to evaluate the effect of nitrogen fertilizer application rates on the population dynamics of cotton arthropods, plant growth parameters, and lint yield.

Methodology: Experimental plots of DP 104 B2RF cotton were planted on June 14, 2011; delayed due to lack of seed-bed planting moisture. The experiment was a randomized block design with five treatments and five replications. The five treatments included side-dress applications of nitrogen fertilizer at rates of 0, 50, 100, 150, and 200 lbs/acre. Cotton was planted (approximately 56,000 seeds per acre) in 30-inch rows and was irrigated with a subsurface drip irrigation system. We took soil samples from the experimental plots on April 27 in order to determine the residual nitrogen. Crop growth and arthropod activity were monitored throughout the season. Fertility treatments were applied on August 3 with a soil applicator ground rig.

Results: Cotton arthropod activity remained non-existent throughout the 2011 growing season due to unusually high temperatures and drought throughout the crop growing season. Higher rates of applied N (>100 lbs/A) resulted in significantly higher leaf chlorophyll content compared to that in lower or zero N plots. A strong correlation was found between leaf chlorophyll content and lint yield.

Soil residual N was significantly lower in zero, 50, 100, and 150-lb N treatments compared with that in 200-lb N after the 2010 crop (Fig. 1). Nitrogen fertility level influenced fruiting profile and boll maturity. Plants ceased setting additional squares in zero and 50-lb N plots 2 wk into flowering while higher N plots were actively producing squares. Nevertheless, crop cut-out occurred abruptly at around the same time (60 DAP) in all treatments due to extreme temperature.

Although not significant, zero-N plots produced the lowest yield and yield increased curvilinearly, with highest average yield occurring in 150 lb N/acre treatment (Fig. 2). Because planting was severely delayed, overall yield was much lower than expected.

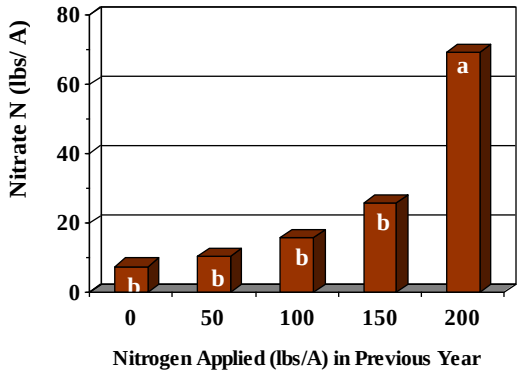

Fig. 1. Effect of previous years' nitrogen application rates on residual nitrogen in 2011.

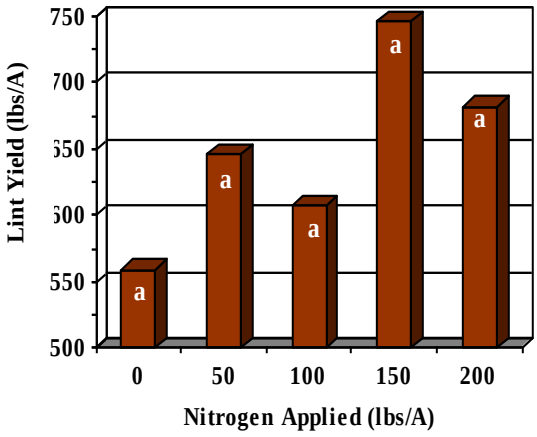

Fig. 2. Effect of nitrogen application rates on lint yield after 9 years of repetitive applications, 2011.

APPENDIX

2010 Rainfall and Irrigation Amounts at Helm Farm and Halfway

Rainfall (inches) Helm Irrigation Amounts (inches) D= drip irrigation, L = LEPA irrigation, S = spray irrigation, F= furrow water

Date			Halfway @ Building	Helms @ Well 1	Field 2				Field 3								Field 5 - A spans 2-4	Field 5 - A spans 5-8				Field 5 - B spans 2-4	Field 5 - B spans 5-8				Field 5 - C spans 2-4	Field 5 - C spans 5-8	
					Drip				Drip								Pivot	Pivot				VR-Pivot	VR-Pivot				Pivot	Pivot	
					Cotton	Cotton	Cotton		Cotton								Corn	Corn				Cotton	Cotton				Cotton	Cotton	
Mo	Da	Yr			T 1	T 2	T 3	system	T1	T2	T3	T4	T5	T6	Border	system		Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system		Base	Base+50%
11	10	2010			0.40	0.40	0.40	D	0.84						0.84	D													
11	11	2010			0.40	0.40	0.40	D		0.89	0.89	0.89	0.89	0.89		D													
2	6	2011	0.28	0.53																									
3	4	2011	0.56	0.55																									
3	19	2011	0.50	0.13																									
3	28	2011																											
3	29	2011																											
3	30	2011																											
3	31	2011																											
4	1	2011																											
4	2	2011																											
4	3	2011																											
4	4	2011																											
4	5	2011																											
4	6	2011																											
4	7	2011																											
4	8	2011			0.21	0.93		D																					
4	9	2011			0.26	1.10		D																					
4	10	2011			0.15	0.67		D																					
4	11	2011			0.20			D	0.14	0.14	0.14	0.14	0.14	0.14	0.12	D													
4	12	2011			0.20			D	0.14	0.14	0.14	0.14	0.14	0.14	0.08	D						0.80	0.80	0.80	0.80	S			
4	13	2011			0.22		0.26	D	0.15	0.15	0.15	0.15	0.15	0.15	0.11	D	1.60	1.60	1.60	1.60	S								
4	14	2011			0.22			D	0.15	0.15	0.15	0.15	0.15	0.15	0.11	D													
4	15	2011			0.19			D	0.15	0.15	0.15	0.15	0.15	0.15	0.12	D													
4	16	2011			0.20			D	0.14	0.14	0.14	0.14	0.14	0.14	0.12	D	0.70	0.70	0.70	0.70	S								
4	17	2011			0.20			D	0.12	0.12	0.12	0.12	0.12	0.12	0.10	D													
4	18	2011			0.19			D	0.13	0.13	0.13	0.13	0.13	0.13	0.11	D													
4	19	2011			0.24	0.19		D	0.16	0.16	0.16	0.16	0.16	0.16	0.11	D	0.60	0.60	0.60	0.60	S								
4	20	2011			0.21	0.21		D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D						0.70	0.70	0.70	0.70	S			
4	21	2011			0.21	0.21		D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D											1.00	1.00	1.00
4	22	2011			0.20	0.21		D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D													
4	23	2011			0.21	0.21		D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D													
4	24	2011			0.20	0.22		D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D	0.60	0.60	0.60	0.60	S	0.50	0.50	0.50	0.50	S			
4	25	2011			0.20	0.21		D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D											1.00	1.00	1.00
4	26	2011			0.21	0.22		D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D													
4	27	2011			0.20	0.21	0.63	D	0.13	0.13	0.13	0.13	0.13	0.13	0.11	D													
4	28	2011			0.20	0.20	0.91	D	0.12	0.12	0.12	0.12	0.12	0.12	0.11	D						0.50	0.50	0.50	0.50	S			
4	29	2011			0.19	0.20	0.87	D	0.12	0.12	0.12	0.12	0.12	0.12	0.11	D											0.50	0.50	0.50
4	30	2011			0.26	0.09	1.13	D	0.15	0.15	0.15	0.15	0.15	0.15	0.16	D													

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Rainfall (inches) Helm Irrigation Amounts (inches) D= drip irrigation, L = LEPA irrigation, S = spray irrigation, F= furrow water

Date			Halfway @ Building	Helms @ Well 1	Field 2				Field 3								Field 5 - A spans 2-4	Field 5 - A spans 5-8				Field 5 - B spans 2-4	Field 5 - B spans 5-8				Field 5 - C spans 2-4	Field 5 - C spans 5-8	
					Drip				Drip								Pivot	Pivot				VR-Pivot	VR-Pivot				Pivot	Pivot	
					Cotton	Cotton	Cotton		Cotton								Corn	Corn				Cotton	Cotton				Cotton	Cotton	
Mo	Da	Yr			T 1	T 2	T 3	system	T1	T2	T3	T4	T5	T6	Border	system		Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system		Base	Base+50%
5	1	2011			0.13		0.63	D	0.09	0.09	0.09	0.09	0.09	0.09	0.05	D													
5	2	2011			0.09		0.55	D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D													
5	3	2011			0.1	0.10	0.11	D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D													
5	4	2011			0.09	0.10	0.10	D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D													
5	5	2011			0.11	0.11	0.11	D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D													
5	6	2011			0.12	0.14	0.11	D	0.15	0.15	0.15	0.15	0.15	0.15	0.14	D													
5	7	2011			0.12	0.11	0.11	D	0.16	0.16	0.16	0.16	0.16	0.16	0.13	D													
5	8	2011			0.08	0.08	0.10	D	0.11	0.11	0.11	0.11	0.11	0.11	0.05	D													
5	9	2011			0.11	0.11	0.11	D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D													
5	10	2011			0.10	0.11	0.10	D	0.13	0.13	0.13	0.13	0.13	0.13	0.11	D													
5	11	2011	0.10	0.17	0.11	0.11	0.11	D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D													
5	12	2011			0.11	0.11	0.11	D	0.11	0.11	0.11	0.11	0.11	0.11	0.11	D													
5	13	2011			0.12	0.11	0.11	D	0.15	0.15	0.15	0.15	0.15	0.15	0.14	D						0.40	0.40	0.40	0.40	S	0.40	0.40	0.40
5	14	2011			0.12	0.13	0.11	D	0.15	0.15	0.15	0.15	0.15	0.15	0.14	D													
5	15	2011			0.08	0.08	0.09	D	0.10	0.10	0.10	0.10	0.10	0.10	0.05	D													
5	16	2011			0.10	0.10	0.11	D	0.13	0.13	0.13	0.13	0.13	0.13	0.11	D													
5	17	2011			0.11	0.12	0.11	D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D						0.25	0.25	0.25	0.25	S	0.25	0.25	0.25
5	18	2011															0.60	0.60	0.60	0.60	S								
5	19	2011																											
5	20	2011																											
5	21	2011																											
5	22	2011			0.11	0.13	0.11	D	0.15	0.15	0.15	0.15	0.15	0.15	0.10	D													
5	23	2011			0.11	0.11	0.11	D	0.14	0.14	0.14	0.14	0.14	0.14	0.10	D													
5	24	2011															0.70	0.70	0.70	0.70	S								
5	25	2011			0.11	0.09	0.10	D	0.13	0.13	0.13	0.13	0.13	0.13	0.11	D													
5	26	2011			0.11	0.13	0.11	D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D											0.40	0.40	0.40
5	27	2011			0.10	0.11	0.11	D	0.13	0.13	0.13	0.13	0.13	0.13	0.11	D	0.60	0.60	0.60	0.60	S	0.40	0.40	0.40	0.40	S			
5	28	2011			0.11	0.10	0.11	D	0.13	0.13	0.13	0.13	0.13	0.13	0.11	D													
5	29	2011			0.11	0.10	0.10	D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D													
5	30	2011			0.11	0.12	0.11	D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D													
5	31	2011			0.11	0.10	0.11	D	0.13	0.13	0.13	0.13	0.13	0.13	0.11	D													
6	1	2011			0.11	0.11	0.11	D	0.14	0.14	0.14	0.14	0.14	0.14	0.11	D						0.40	0.40	0.40	0.40	S			
6	2	2011															0.70	0.70	0.70	0.70	S								
6	3	2011																											
6	4	2011															0.60	0.60	0.60	0.60	S								
6	5	2011																											
6	6	2011																											
6	7	2011																											
6	8	2011																											
6	9	2011																				0.20	0.20	0.20	0.20	S			
6	10	2011															0.60	0.60	0.60	0.60	S						0.60	0.60	0.60
6	11	2011																											
6	12	2011																											
6	13	2011															0.20	0.20	0.30	0.10	L								
6	14	2011															0.30	0.30	0.45	0.15	L								
6	15	2011															0.20	0.20	0.30	0.10	L								

2010 Rainfall and Irrigation Amounts at Helm Farm and Halfway

Rainfall (inches) Helm Irrigation Amounts (inches) D= drip irrigation, L = LEPA irrigation, S = spray irrigation, F= furrow water

Date			Halfway @ Building	Helms @ Well 1		Field 2				Field 3								Field 5 - A spans 2-4	Field 5 - A spans 5-8				Field 5 - B spans 2-4	Field 5 - B spans 5-8				Field 5 - C spans 2-4	Field 5 - C spans 5-8	
						Drip				Drip								Pivot	Pivot				VR-Pivot	VR-Pivot				Pivot	Pivot	
						Cotton	Cotton	Cotton		Cotton								Corn	Corn				Cotton	Cotton				Cotton	Cotton	
Mo	Da	Yr				T 1	T 2	T 3	system	T1	T2	T3	T4	T5	T6	Border	system		Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system		Base	Base+50%
6	16	2011																0.20	0.20	0.30	0.10	L								
6	17	2011																										0.30	0.30	0.45
6	18	2011																0.20	0.20	0.30	0.10	L	0.30	0.30	0.45	0.15	L			
6	19	2011																												
6	20	2011																0.20	0.20	0.30	0.10	L								
6	21	2011				0.10	0.10	0.10	D	0.05	0.05		0.11	0.11		0.11	D	0.20	0.20	0.30	0.10	L								
6	22	2011				0.09	0.09	0.09	D	0.06	0.06	0.35	0.10	0.10	0.73	0.11	D	0.20	0.20	0.30	0.10	L								
6	23	2011				0.09	0.09	0.09	D	0.05	0.05		0.09	0.09		0.11	D	0.20	0.20	0.30	0.10	L								
6	24	2011				0.10	0.10	0.10	D	0.05	0.05		0.11	0.11		0.11	D	0.20	0.20	0.30	0.10	L								
6	25	2011				0.10	0.10	0.10	D	0.06	0.06		0.10	0.10		0.11	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
6	26	2011				0.13	0.13	0.13	D	0.06	0.06		0.11	0.11		0.11	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
6	27	2011				0.11	0.11	0.11	D	0.05	0.05		0.11	0.11		0.11	D	0.20	0.20	0.30	0.10	L								
6	28	2011				0.12	0.12	0.12	D	0.05	0.05	0.35	0.11	0.11	0.21	0.11	D	0.20	0.20	0.30	0.10	L								
6	29	2011				0.10	0.10	0.10	D	0.06	0.06		0.10	0.10	0.52	0.11	D													
6	30	2011				0.10	0.10	0.10	D	0.07	0.07		0.10	0.10		0.11	D						0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	1	2011				0.09	0.09	0.09	D	0.08	0.08		0.14	0.14		0.10	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	2	2011				0.09	0.09	0.09	D	0.08	0.08		0.14	0.14		0.10	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	3	2011				0.12	0.12	0.12	D	0.09	0.09		0.17	0.17		0.23	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	4	2011				0.13	0.13	0.13	D	0.07	0.07	0.53	0.17	0.17	0.03	0.23	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	5	2011				0.10	0.10	0.10	D	0.08	0.08	0.16	0.10	0.10	0.79	0.16	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	6	2011				0.10	0.10	0.10	D	0.07	0.07		0.20	0.20	0.47	0.17	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	7	2011				0.10	0.10	0.10	D	0.08	0.08		0.15	0.15		0.23	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	8	2011				0.11	0.11	0.11	D	0.08	0.08		0.15	0.15		0.20	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	9	2011				0.10	0.10	0.10	D	0.08	0.08		0.15	0.15		0.20	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	10	2011				0.10	0.10	0.10	D	0.07	0.07		0.16	0.16		0.21	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	11	2011				0.07	0.07	0.07	D	0.09	0.09	0.29	0.12	0.12		0.09	D	0.20	0.20	0.30	0.10	L								
7	12	2011	0.40	0.79		0.10	0.10	0.10	D	0.10	0.10	0.16	0.18	0.18	0.61	0.21	D													
7	13	2011	0.15	0.28		0.10	0.10	0.10	D	0.11	0.11		0.19	0.19	0.75	0.21	D													
7	14	2011				0.10	0.10	0.10	D	0.11	0.11		0.20	0.20		0.21	D	0.15	0.15	0.23	0.08	L								
7	15	2011				0.10	0.10	0.10	D	0.11	0.11		0.20	0.20		0.20	D	0.18	0.18	0.27	0.09	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23
7	16	2011				0.10	0.10	0.10	D	0.10	0.10		0.20	0.20		0.21	D	0.18	0.18	0.27	0.09	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23
7	17	2011				0.11	0.11	0.11	D	0.09	0.09		0.20	0.20		0.22	D	0.18	0.18	0.27	0.09	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23
7	18	2011				0.08	0.08	0.08	D	0.09	0.09	0.34	0.10	0.10		0.20	D	0.18	0.18	0.27	0.09	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23
7	19	2011				0.15	0.15	0.15	D	0.08	0.08	0.36	0.19	0.19	0.64	0.21	D	0.18	0.18	0.27	0.09	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23
7	20	2011				0.08	0.08	0.08	D	0.10	0.10		0.17	0.17	0.49	0.10	D	0.18	0.18	0.27	0.09	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	21	2011				0.10	0.10	0.10	D	0.10	0.10		0.20	0.20	0.15	0.21	D	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27
7	22	2011				0.11	0.11	0.11	D	0.10	0.10		0.18	0.18		0.20	D	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27
7	23	2011	0.25	0.61		0.11	0.11	0.11	D	0.08	0.08		0.18	0.18		0.23	D	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27
7	24	2011				0.11	0.11	0.11	D	0.14	0.14		0.20	0.20		0.20	D	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27
7	25	2011				0.19	0.19	0.19	D	0.05	0.05	0.46	0.21	0.21		0.15	D	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27
7	26	2011				0.19	0.19	0.19	D	0.13	0.13	0.30	0.21	0.21	0.35	0.27	D	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27
7	27	2011				0.20	0.20	0.20	D	0.13	0.13		0.25	0.25	0.84	0.27	D	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27
7	28	2011				0.20	0.20	0.20	D	0.11	0.11		0.24	0.24	0.51	0.25	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	29	2011				0.20	0.20	0.20	D	0.11	0.11		0.23	0.23		0.25	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	30	2011				0.20	0.20	0.20	D	0.11	0.11		0.23	0.23		0.25	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
7	31	2011				0.18	0.18	0.18	D	0.09	0.09		0.23	0.23		0.27	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30

2010 Rainfall and Irrigation Amounts at Helm Farm and Halfway

Rainfall (inches) Helm Irrigation Amounts (inches) D= drip irrigation, L = LEPA irrigation, S = spray irrigation, F= furrow water

Date			Halfway @ Building	Helms @ Well 1	Field 2				Field 3								Field 5 - A spans 2-4	Field 5 - A spans 5-8				Field 5 - B spans 2-4	Field 5 - B spans 5-8				Field 5 - C spans 2-4	Field 5 - C spans 5-8	
					Drip				Drip								Pivot	Pivot				VR-Pivot	VR-Pivot				Pivot	Pivot	
					Cotton	Cotton	Cotton		Cotton								Corn	Corn				Cotton	Cotton				Cotton	Cotton	
Mo	Da	Yr			T 1	T 2	T 3	system	T1	T2	T3	T4	T5	T6	Border	system		Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system		Base	Base+50%
8	1	2011			0.20	0.20	0.20	D	0.13	0.13	0.35	0.19	0.19	0.49	0.27	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	2	2011			0.18	0.18	0.18	D	0.13	0.13	0.33	0.25	0.25	0.83	0.26	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	3	2011			0.21	0.21	0.21	D	0.13	0.13		0.25	0.25	0.52	0.26	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	4	2011			0.19	0.19	0.19	D	0.11	0.11		0.25	0.25		0.26	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	5	2011			0.20	0.20	0.20	D	0.10	0.10		0.22	0.22		0.25	D													
8	6	2011			0.20	0.20	0.20	D	0.10	0.10		0.22	0.22		0.26	D													
8	7	2011			0.17	0.17	0.17	D	0.11	0.11		0.20	0.20		0.27	D													
8	8	2011			0.20	0.20	0.20	D	0.13	0.13	0.51	0.23	0.23		0.27	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	9	2011			0.20	0.20	0.20	D	0.13	0.13	0.59	0.25	0.25	0.48	0.25	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	10	2011			0.20	0.20	0.20	D	0.14	0.14		0.25	0.25	0.83	0.27	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	11	2011	0.10		0.20	0.20	0.20	D	0.11	0.11		0.25	0.25	0.53	0.24	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	12	2011			0.20	0.20	0.20	D	0.11	0.11		0.24	0.24		0.26	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	13	2011			0.20	0.20	0.20	D	0.14	0.14		0.24	0.24		0.26	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	14	2011			0.21	0.21	0.21	D	0.13	0.13		0.24	0.24		0.27	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	15	2011			0.21	0.21	0.21	D	0.13	0.13	0.59	0.25	0.25		0.27	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	16	2011			0.16	0.16	0.16	D	0.13	0.13	0.35	0.25	0.25	0.49	0.26	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	17	2011			0.15	0.15	0.15	D	0.13	0.13		0.25	0.25	0.82	0.26	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	19	2011			0.21	0.21	0.21	D	0.11	0.11		0.25	0.25	0.50	0.26	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	20	2011			0.20	0.20	0.20	D	0.11	0.11		0.22	0.22		0.26	D	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	21	2011			0.20	0.20	0.20	D	0.10	0.10		0.22	0.22		0.26	D						0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	22	2011			0.20	0.20	0.20	D	0.13	0.13	0.58	0.23	0.23		0.26	D						0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	23	2011			0.20	0.20	0.20	D	0.13	0.13	0.36	0.25	0.25	0.48	0.25	D						0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	24	2011			0.21	0.21	0.21	D	0.13	0.13		0.24	0.24	0.82	0.26	D						0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	25	2011			0.21	0.21	0.21	D	0.13	0.13		0.24	0.24	0.52	0.26	D						0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	26	2011			0.21	0.21	0.21	D	0.20	0.20		0.24	0.24		0.27	D													
8	27	2011														D													
8	28	2011			0.03	0.03	0.03	D	0.28	0.28		0.20	0.20		0.01	D													
8	29	2011			0.11	0.11	0.11	D	0.08	0.08	0.51	0.35	0.35		0.18	D						0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	30	2011			0.11	0.11	0.11	D	0.09	0.09		0.16	0.16	0.75	0.18	D						0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
8	31	2011			0.11	0.11	0.11	D	0.09	0.09		0.21	0.21	0.26	0.25	D						0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
9	1	2011			0.10	0.10	0.10	D	0.08	0.08		0.28	0.28		0.19	D						0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
9	2	2011			0.11	0.11	0.11	D	0.10	0.10		0.28	0.28		0.18	D						0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
9	3	2011	0.60	0.50	0.10	0.10	0.10	D	0.09	0.09		0.28	0.28		0.19	D													
9	4	2011			0.11	0.11	0.11	D	0.09	0.09		0.28	0.28		0.17	D													
9	5	2011			0.11	0.11	0.11	D				0.28	0.28		0.18	D													
9	6	2011			0.10	0.10	0.10	D				0.28	0.28		0.19	D													
9	7	2011			0.07	0.07	0.07	D				0.18	0.18			D						0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
9	8	2011																				0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
9	9	2011																				0.20	0.20	0.30	0.10	L	0.20	0.20	0.30
9	10	2011																				0.12	0.12	0.18	0.06	L	0.12	0.12	0.18
9	11	2011																											
9	12	2011																											
9	13	2011																											
9	14	2011																											
9	15	2011	0.30	0.50																									

2010 Rainfall and Irrigation Amounts at Helm Farm and Halfway

Rainfall (inches) Helm Irrigation Amounts (inches) D= drip irrigation, L = LEPA irrigation, S = spray irrigation, F= furrow water

Date			Halfway @ Building	Helms @ Well 1		Field 2				Field 3								Field 5 - A spans 2-4	Field 5 - A spans 5-8				Field 5 - B spans 2-4	Field 5 - B spans 5-8				Field 5 - C spans 2-4	Field 5 - C spans 5-8	
						Drip				Drip								Pivot	Pivot				VR-Pivot	VR-Pivot				Pivot	Pivot	
						Cotton	Cotton	Cotton		Cotton								Corn	Corn				Cotton	Cotton				Cotton	Cotton	
Mo	Da	Yr				T 1	T 2	T 3	system	T1	T2	T3	T4	T5	T6	Border	system		Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system		Base	Base+50%
& At Plant			1.44	1.38		8.46	8.60	8.46		7.25	7.30	7.30	7.30	7.30	7.30	5.96		7.30	7.30	7.30	7.30		4.15	4.15	4.15	4.15		4.15	4.15	4.15
asonal			1.80	2.68		10.84	10.84	10.84		7.50	7.50	7.47	15.38	15.38	15.41	15.58		11.59	11.59	17.39	5.79		11.83	11.83	17.75	5.91		11.83	11.83	17.75
TOTALS			3.24	4.06		19.30	19.44	19.30		14.75	14.80	14.77	22.68	22.68	22.71	21.54		18.89	18.89	24.69	13.10		15.98	15.98	21.90	10.07		15.98	15.98	21.90

2010 Rainfall and Irrigation Amounts at Helm Farm and Halfway

Date			Rainfall (inches)			Helm Irrigation Amounts (inches) D= drip irrigation, L = LEPA irrigation, S = spray irrigation, F= furrow water																							
			Halfway @ Building	Helms @ Well 1		Field 5 - D spans 2-4		Field 5 - D spans 5-8					Field 5 - E spans 2-4		Field 5 - E spans 5-8				Field 5 - F spans 2-4		Field 5 - F spans 5-8				Field 6 - A,C,F	Field 6 - B,D,E	Field 6 - DRY	Field 6 - G	Field 6 - H	
						Pivot		Pivot					VR-Pivot		VR-Pivot				VR-Pivot		VR-Pivot				Drip	Drip		Drip	Drip	
						Sorghum		Sorghum					Cotton		Cotton				Cotton		Cotton				Cotton	Cotton		Cotton	Cotton	
Mo	Da	Yr				Base-50%	system		Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system		1.0 B.I.	0.5 B.I.				system
11	10	2010																						0.78	0.78	0.78	0.80	0.80	D
11	11	2010																											
2	6	2011	0.28	0.53																									
3	4	2011	0.56	0.55																									
3	19	2011	0.50	0.13																									
3	28	2011																						0.23	0.23	0.23	0.01	0.25	D
3	29	2011																						0.26	0.26	0.26	0.26	0.25	D
3	30	2011																						0.23	0.23	0.23	0.26	0.26	D
3	31	2011																						0.24	0.24	0.24	0.26	0.25	D
4	1	2011																						0.24	0.24	0.24	0.26	0.25	D
4	2	2011																						0.24	0.24	0.24	0.26	0.25	D
4	3	2011																						0.23	0.23	0.23	0.25	0.26	D
4	4	2011																						0.24	0.24	0.24	0.26	0.25	D
4	5	2011																						0.23	0.23	0.23	0.25	0.25	D
4	6	2011																						0.23	0.23	0.23	0.25	0.25	D
4	7	2011																											
4	8	2011																											
4	9	2011																											
4	10	2011																											
4	11	2011																						0.11	0.11	0.11	0.13	0.13	D
4	12	2011																						0.12	0.12	0.12	0.13	0.13	D
4	13	2011																						0.13	0.13	0.13	0.13	0.13	D
4	14	2011																						0.13	0.13	0.13	0.13	0.13	D
4	15	2011																	0.50	0.50	0.50	0.50	S	0.13	0.13	0.13	0.13	0.13	D
4	16	2011																	0.50	0.50	0.50	0.50	S	0.11	0.11	0.11	0.13	0.13	D
4	17	2011																	0.70	0.70	0.70	0.70	S	0.11	0.11	0.11	0.13	0.11	D
4	18	2011																	0.55	0.55	0.55	0.55	S	0.11	0.11	0.11	0.13	0.10	D
4	19	2011																						0.14	0.14	0.14	0.13	0.12	D
4	20	2011																						0.12	0.12	0.12	0.13	0.12	D
4	21	2011				1.00	S																	0.12	0.12	0.12	0.13	0.12	D
4	22	2011						1.00	1.00	1.00	1.00	S												0.11	0.11	0.11	0.13	0.12	D
4	23	2011											1.00	1.00	1.00	1.00	S	0.25	0.25	0.25	0.25	S	0.12	0.12	0.12	0.13	0.12	D
4	24	2011																						0.12	0.12	0.12	0.13	0.12	D
4	25	2011				1.00	S																	0.12	0.12	0.12	0.13	0.13	D
4	26	2011						1.00	1.00	1.00	1.00	S												0.12	0.12	0.12	0.13	0.13	D
4	27	2011											1.00	1.00	1.00	1.00	S							0.12	0.12	0.12	0.13	0.12	D
4	28	2011																						0.11	0.11	0.11	0.13	0.12	D
4	29	2011				0.50	S																	0.11	0.11	0.11	0.13	0.13	D
4	30	2011						0.50	0.50	0.50	0.50	S												0.16	0.16	0.16	0.13	0.12	D

2010 Rainfall and Irrigation Amounts at Helm Farm and Halfway

Rainfall (inches) | Helm Irrigation Amounts (inches) D= drip irrigation, L = LEPA irrigation, S = spray irrigation, F= furrow water

Date			Halfway @ Building	Helms @ Well 1				Field 5 - D spans 2-4	Field 5 - D spans 5-8				Field 5 - E spans 2-4	Field 5 - E spans 5-8				Field 5 - F spans 2-4	Field 5 - F spans 5-8				Field 6 - A,C,F	Field 6 - B,D,E	Field 6 - DRY	Field 6 - G	Field 6 - H	
								Pivot	Pivot				VR-Pivot	VR-Pivot				VR-Pivot	VR-Pivot				Drip	Drip		Drip	Drip	
								Sorghum	Sorghum				Cotton	Cotton				Cotton	Cotton				Cotton	Cotton		Cotton	Cotton	
Mo	Da	Yr				Base-50%	system		Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system	1.0 B.I.	0.5 B.I.				system
5	1	2011											0.50	0.50	0.50	0.50	S						0.07	0.07	0.07	0.13	0.12	D
5	2	2011																					0.12	0.12	0.12	0.13	0.13	D
5	3	2011																					0.13	0.13	0.13	0.13	0.12	D
5	4	2011																					0.12	0.12	0.12	0.13	0.13	D
5	5	2011																					0.12	0.12	0.12	0.13	0.13	D
5	6	2011																									0.62	D
5	7	2011																									0.62	D
5	8	2011																									0.62	D
5	9	2011																					0.15	0.15	0.15			D
5	10	2011																					0.11	0.11	0.11	0.13	0.13	D
5	11	2011	0.10	0.17																			0.11	0.11	0.11	0.12	0.12	D
5	12	2011											0.40	0.40	0.40	0.40	S	0.40	0.40	0.40	0.40	S	0.11	0.11	0.11	0.13	0.12	D
5	13	2011				0.40	S																0.13	0.13	0.13	0.13	0.10	D
5	14	2011																					0.13	0.13	0.13	0.12	0.11	D
5	15	2011																					0.08	0.08	0.08	0.13	0.11	D
5	16	2011											0.25	0.25	0.25	0.25	S	0.25	0.25	0.25	0.25	S	0.11	0.11	0.11	0.13		D
5	17	2011				0.25	S																0.11	0.11	0.11	0.13		D
5	18	2011																					1.67	1.67	1.67			F
5	19	2011																					1.67	1.67	1.67			F
5	20	2011																					1.67	1.67	1.67			F
5	21	2011																										
5	22	2011																					0.13	0.13	0.13	0.13		D
5	23	2011																					0.12	0.12	0.12	0.13		D
5	24	2011																										
5	25	2011																0.40	0.40	0.40	0.40	S	0.11	0.11	0.11	0.13		D
5	26	2011				0.40	S						0.40	0.40	0.40	0.40	S						0.13	0.13	0.13	0.13	0.13	D
5	27	2011																					0.12	0.12	0.12	0.13	0.13	D
5	28	2011																					0.11	0.11	0.11	0.12	0.13	D
5	29	2011																					0.12	0.12	0.12	0.13	0.12	D
5	30	2011																					0.13	0.13	0.13	0.13	0.13	D
5	31	2011																					0.11	0.11	0.11	0.22	0.13	D
6	1	2011						0.50	0.50	0.50	0.50	S											0.12	0.12	0.12	0.03	0.13	D
6	2	2011																										
6	3	2011						0.50	0.50	0.50	0.50	S																
6	4	2011																										
6	5	2011																										
6	6	2011																1.00	1.00	1.00	1.00	S						
6	7	2011											0.60	0.60	0.60	0.60	S											
6	8	2011						0.60	0.60	0.60	0.60	S																
6	9	2011																										
6	10	2011				0.60	S																					
6	11	2011																										
6	12	2011																										
6	13	2011																										
6	14	2011																								0.72	0.73	D
6	15	2011																								0.77	0.78	D

2010 Rainfall and Irrigation Amounts at Helm Farm and Halfway

Date			Rainfall (inches)			Helm Irrigation Amounts (inches) D= drip irrigation, L = LEPA irrigation, S = spray irrigation, F= furrow water																						
			Halfway @ Building	Helms @ Well 1				Field 5 - D spans 2-4	Field 5 - D spans 5-8				Field 5 - E spans 2-4	Field 5 - E spans 5-8				Field 5 - F spans 2-4	Field 5 - F spans 5-8				Field 6 - A,C,F	Field 6 - B,D,E	Field 6 - DRY	Field 6 - G	Field 6 - H	
								Pivot	Pivot				VR-Pivot	VR-Pivot				VR-Pivot	VR-Pivot				Drip	Drip		Drip	Drip	
								Sorghum	Sorghum				Cotton	Cotton				Cotton	Cotton				Cotton	Cotton		Cotton	Cotton	
Mo	Da	Yr				Base-50%	system		Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system	1.0 B.I.	0.5 B.I.				system
6	16	2011											0.30	0.30	0.45	0.15	L	0.30	0.30	0.45	0.15	L				0.78	0.78	D
6	17	2011				0.15	L	0.30	0.30	0.45	0.15	L														0.77	0.78	D
6	18	2011																								0.78	0.78	D
6	19	2011																										
6	20	2011																										
6	21	2011																					0.11	0.10		0.13	0.13	D
6	22	2011																					0.10	0.13		0.13	0.12	D
6	23	2011																					0.11	0.08		0.13	0.12	D
6	24	2011																0.20	0.20	0.30	0.10	L	0.11	0.10		0.13	0.13	D
6	25	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L						0.11	0.10		0.12	0.12	D
6	26	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.13	0.17		0.13	0.12	D
6	27	2011																					0.12	0.13		0.13	0.12	D
6	28	2011																					0.17	0.10		0.28		D
6	29	2011																0.20	0.20	0.30	0.10	L	0.14	0.05		0.06	0.25	D
6	30	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L						0.13	0.10		0.22		D
7	1	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.11	0.08		0.16	0.25	D
7	2	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.11	0.08		0.17		D
7	3	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.08		0.20	0.25	D
7	4	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.2	0.08		0.20		D
7	5	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.16	0.05		0.04	0.25	D
7	6	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.14	0.11		0.28		D
7	7	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.15	0.05		0.04	0.25	D
7	8	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.15	0.09		0.18		D
7	9	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.15	0.09		0.18	0.25	D
7	10	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.15	0.09		0.18		D
7	11	2011																0.20	0.20	0.30	0.10	L	0.13	0.04		0.15	0.19	D
7	12	2011	0.40	0.79																			0.20	0.13				D
7	13	2011	0.15	0.28																			0.19	0.06		0.16	0.19	D
7	14	2011																					0.19	0.13				D
7	15	2011				0.08	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23	0.08	L	0.19	0.09		0.16	0.19	D
7	16	2011				0.08	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23	0.08	L	0.19	0.09				D
7	17	2011				0.08	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23	0.08	L	0.19	0.09		0.16	0.19	D
7	18	2011				0.08	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23	0.08	L	0.19	0.06				D
7	19	2011				0.08	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23	0.08	L	0.15	0.15	0.23	0.08	L	0.25	0.06		0.16	0.19	D
7	20	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L						0.19	0.13				D
7	21	2011				0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.19	0.05		0.16	0.19	D
7	22	2011				0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.23	0.15				D
7	23	2011	0.25	0.61		0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.23	0.15		0.34	0.18	D
7	24	2011				0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.24	0.16		0.34	0.18	D
7	25	2011				0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.26	0.05			0.31	D
7	26	2011				0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.20	0.21		0.34	0.03	D
7	27	2011				0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.18	0.18	0.27	0.09	L	0.25	0.05			0.30	D
7	28	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.19	0.16		0.32	0.04	D
7	29	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.25	0.10			0.30	D
7	30	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.25	0.10		0.34	0.03	D
7	31	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.24	0.10			0.30	D

2010 Rainfall and Irrigation Amounts at Helm Farm and Halfway

Date			Rainfall (inches)		Helm Irrigation Amounts (inches) D= drip irrigation, L = LEPA irrigation, S = spray irrigation, F= furrow water																						
			Halfway @ Building	Helms @ Well 1			Field 5 - D spans 2-4	Field 5 - D spans 5-8				Field 5 - E spans 2-4	Field 5 - E spans 5-8				Field 5 - F spans 2-4	Field 5 - F spans 5-8				Field 6 - A,C,F	Field 6 - B,D,E	Field 6 - DRY	Field 6 - G	Field 6 - H	
							Pivot	Pivot				VR-Pivot	VR-Pivot				VR-Pivot	VR-Pivot				Drip	Drip		Drip	Drip	
							Sorghum	Sorghum				Cotton	Cotton				Cotton	Cotton				Cotton	Cotton		Cotton	Cotton	
Mo	Da	Yr				Base-50%	system		Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system	1.0 B.I.	0.5 B.I.				system
8	1	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.21	0.20		0.34	0.02	D
8	2	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.26	0.05			0.31	D
8	3	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.18	0.16		0.30	0.03	D
8	4	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.24	0.05			0.28	D
8	5	2011						0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L						0.24	0.15		0.34	0.02	D
8	6	2011																					0.23	0.15			0.30	D
8	7	2011																					0.23	0.16		0.24	0.02	D
8	8	2011				0.10	L											0.20	0.20	0.30	0.10	L	0.41	0.01		0.01	0.29	D
8	9	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.21	0.33		0.30		D
8	10	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.42	0.01		0.01	0.29	D
8	11	2011	0.10			0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.21	0.33		0.32	0.02	D
8	12	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.35	0.10			0.29	D
8	13	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.35	0.10		0.31		D
8	14	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.35	0.09			0.30	D
8	15	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.21	0.32		0.31		D
8	16	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.36	0.01			0.26	D
8	17	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.21	0.30		0.19		D
8	19	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.36				0.26	D
8	20	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.28	0.20		0.39		D
8	21	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.25	0.20			0.26	D
8	22	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.25	0.21			0.26	D
8	23	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.35			0.13		D
8	24	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.30		0.06	0.26	D
8	25	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.35			0.20		D
8	26	2011																					0.21	0.30				D
8	27	2011																										
8	28	2011																					0.11	0.02				D
8	29	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.15	0.13		0.07	0.15	D
8	30	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.16	0.10				D
8	31	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.17	0.10		0.15	0.14	D
9	1	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.07		0.06		D
9	2	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.16	0.10				D
9	3	2011	0.60	0.50																		0.17	0.10		0.06		D
9	4	2011																				0.17	0.09				D
9	5	2011																				0.17	0.10		0.10		D
9	6	2011																				0.15	0.13			0.10	D
9	7	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.23			0.17		D
9	8	2011				0.10		0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L						
9	9	2011				0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L	0.20	0.20	0.30	0.10	L						
9	10	2011				0.06	L	0.12	0.12	0.18	0.06	L	0.12	0.12	0.18	0.06	L	0.12	0.12	0.18	0.06	L						
9	11	2011																										
9	12	2011																				0.15	0.19		0.14	0.23	D
9	13	2011																				0.18					D
9	14	2011																									
9	15	2011	0.30	0.50																							

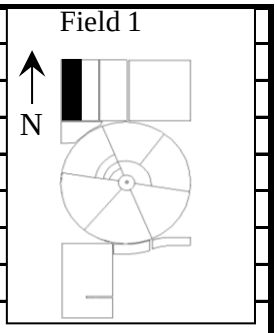
2010 Rainfall and Irrigation Amounts at Helm Farm and Halfway

			Rainfall (inches)				Helm Irrigation Amounts (inches) D= drip irrigation, L = LEPA irrigation, S = spray irrigation, F= furrow water																			
Date			Halfway @ Building	Helms @ Well 1			Field 5 - D spans 2-4	Field 5 - D spans 5-8				Field 5 - E spans 2-4	Field 5 - E spans 5-8				Field 5 - F spans 2-4	Field 5 - F spans 5-8				Field 6 - A,C,F	Field 6 - B,D,E	Field 6 - DRY	Field 6 - G	Field 6 - H	
							Pivot	Pivot				VR-Pivot	VR-Pivot				VR-Pivot	VR-Pivot				Drip	Drip		Drip	Drip	
							Sorghum	Sorghum				Cotton	Cotton				Cotton	Cotton				Cotton	Cotton		Cotton	Cotton	
Mo	Da	Yr				Base-50%	system	Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system		Base	Base+50%	Base-50%	system	1.0 B.I.	0.5 B.I.				system
At Plant			1.44	1.38		4.15	4.10	4.10	4.10	4.10		4.15	4.15	4.15	4.15		4.55	4.55	4.55	4.55	#	10.23	10.23	10.23	5.55	6.54	
asonal			1.80	2.68		5.91	11.83	11.83	17.75	5.91		11.83	11.83	17.75	5.91		11.83	11.83	17.75	5.91	#	16.28	8.88	0.00	9.92	9.26	
TOTALS			3.24	4.06		10.07	15.93	15.93	21.85	10.02		15.98	15.98	21.90	10.07		16.38	16.38	22.30	10.47		26.51	19.11	10.23	15.47	15.80	

Operations Summary

Year	2010	
Farm	Helm	
Field ID	Field 1	Corn Hybrids for Drought Tolerance Xu
Exp. Design	5 zones, 24 rows x 1300' plots, 40" row width	
Soil Type		

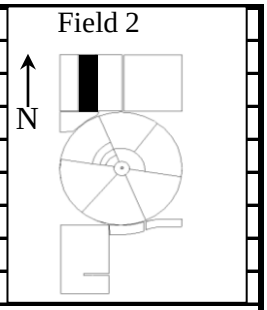
Field Operations	Date	Activity
Tillage		
Fertility		
Planting		
Herbicide/Growth Regulator		
Insecticide		
Harvest aid		
Irrigation Amt.		
PrePlant & Planting		
Seasonal		
Rainfall		
PrePlant & Planting		
Seasonal		



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 2
Exp. Design	Cotton
Soil Type	

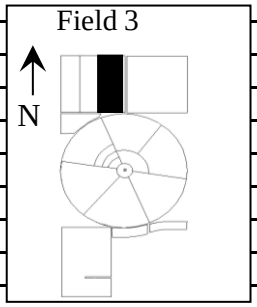
Field Operations	Date	Activity
Tillage	11/22/10	Shred
	12/13/10	Row Stalk Puller
	12/21/10	Chisel
	12/23/10	Field Cultivator
	2/24/11	Field Cultivator
	2/25/11	List on 60" with bed roller
	5/4/11	List on 30" with bed roller (8 row skips)
	7/19/11	Cultivate and Dike
Fertility	11/11/10	24 lbs N/ac + 82 lbs P/ac (10-34-0 liquid applied thru coulter rig)
	7/5-13/11	36.7 lbs N /ac (32-0-0 applied thru Drip)
Planting	5/13/11	FiberMax 9180B2F @ 58,303 seed/ac
		(8 rows planted just in moisture and 8 rows busted down deep into moisture)
Herbicide/Growth Regulator	2/22/11	Prowl H2O @ 3pts/ac
	5/16/11	Gly-star Gold @ 32oz/ac and Caparol @ 3pts/ac
	6/9/11	Gly-star Gold @ 32oz/ac
Insecticide	6/9/11	Acephate 5.5 oz/ac
Harvest aid	10/3/11	Bollbuster + AIM
	10/15/12	Paraquat
Irrigation Amt.		
PrePlant & Planting	11/10 to 6/1	Trt. 1 8.4 in.; Trt. 8.60 in.; Trt.3 8.46 in.
Seasonal	6/21 to 9/7	Trt. 1 10.84 in.; Trt. 10.8 in.; Trt.3 10.8 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 3
Exp. Design	Cotton Response to Irrigation Interval and Field Topography
Soil Type	

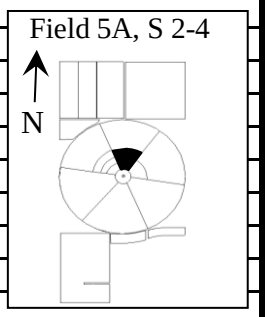
Field Operations	Date	Activity
Tillage	11/22/10	Shred
	12/13/10	Row Stalk Puller
	12/21/10	Chisel
	12/23/10	Field Cultivator
	2/24/11	Field Cultivator
	2/25/11	List on 60" with bed roller
	5/4/11	List on 30" with bed roller (8 row skips)
	6/14/11	Cultivate and Dike
Fertility	11/12/10	22 lbs N + 74 lbs P (10-34-0 liquid applied thru coulter rig)
	7/5-27/11	130.5 lbs N / ac on High Irr. (32-0-0 applied thru Drip)
	7/5-27/11	88 lbs N / ac on Low Irr. (32-0-0 applied thru Drip)
Planting	5/13/11	FiberMax 9180B2F @ 58,303 seed/ac
Herbicide/Growth Regulator	2/22/11	Prowl H2O @ 3pts/ac
	5/16/11	Gly-star Gold @ 32oz/ac and Caparol @ 3pts/ac
	6/9/11	Gly-star Gold @ 32oz/ac
Insecticide	5/13	Temik @ 3lbs/ac
	6/9/11	Acephate 5.5 oz/ac
Harvest aid	10/3/11	Bollbuster + AIM
	10/15/12	Paraquat
Irrigation Amt.		
PrePlant & Planting	11/10 to 6/1	Trt. 1 7.25 in.; Trt. 2,3,4,5,6 7.30 in.; Border 5.96 in.
Seasonal	6/21 to 9/7	Trt. 1 & 2 7.50 in.
	6/21 to 9/7	Trt. 4 & 5 15.38 in.
	6/21 to 9/7	Trt. 3 14.77 in.
	6/21 to 9/7	Trt. 6 22.71 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 5a Spans 2-4
Exp. Design	Corn
Soil Type	

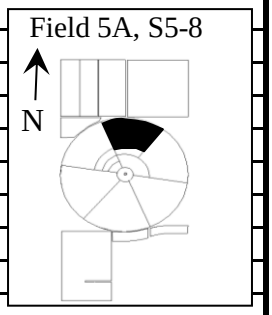
Field Operations	Date	Activity
Tillage	11/20/10	Shed
	1/13/11	Chisel
	3/16/11	Field Cutivator
	3/17/11	Lister
	5/20/11	Scratcher
	5/29/11	Scratcher
	6/8/11	Cultivated and Dike
Fertility	3/14/11	Dry 70-70-0
	6/7/11	84 lbs N / ac (32-0-0 liquid applied with coulter rig)
Planting	5/2/11	92D (Span 4 outside 32 rows at 23,522 seed/ac)
	5/2/11	N-78N-3111 (Span 2-4 at 23,522 seed/ac)
Herbicide/Growth Regulator	5/2/11	Harness Xtra 3 pts/ac
	6/9/11	Gly-Star Gold 28 oz/ac
Insecticide		
Harvest aid		
Irrigation Amt.		
PrePlant & Planting	4/13 to 5/27	7.30 in.
Seasonal	6/2 to 8/20	11.59 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 5a Spans 5-8
Exp. Design	Corn
Soil Type	

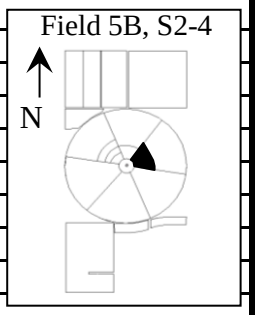
Field Operations	Date	Activity
Tillage	11/20/10	Shed
	1/13/11	Chisel
	3/16/11	Field Cutivator
	3/17/11	Lister
	5/20/11	Scratcher
	5/29/11	Scratcher
	6/8/11	Cultivated and Dike
Fertility	3/14/11	Dry 70-70-0
	6/7/11	84 lbs N / ac (32-0-0 liquid applied with coulter rig on Base Irr.)
	6/7/11	122 lbs N / ac (32-0-0 liquid applied with coulter rig on +50% Irr.)
Planting	5/2/11	Span7 FACT Test (mixed varieties at 35,733 seed/ac)
	5/2/11	Span 5,6,7,8 N-78N-3111 at 35,733 seed/ac and 92D at 23,522 seed/ac
Herbicide/Growth Regulator	5/2/11	Harness Xtra 3 pts/ac
	6/9/11	Gly-Star Gold 28 oz/ac
Insecticide		
Harvest aid		
Irrigation Amt.		
PrePlant & Planting	4/13 to 5/27	7.30 in.
Seasonal	6/2 to 8/20	Base = 11.59 in., +50% = 17.39 in., -50% = 5.79 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 5b Spans 2-4
Exp. Design	Cotton
Soil Type	

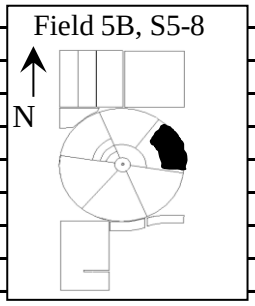
Field Operations	Date	Activity
Tillage	4/6/11	Span 3&4 Disk Conventional Strips
	4/6/11	Span 3&4 List Conventional Strips
	4/19/11	Span 2 Striptill
	4/19/11	Span 3&4 Striptill
	4/19/11	Span 3&4 Rolling Cultivated
	4/19/11	List Conventioal Strips
Fertility	3/14/11	70-70-0 Dry
Planting	5/12/11	Stoneville 4288 B2F at 52,272 seed/ac
Herbicide/Growth Regulator	6/29/11	Gly-Star Gold 48 oz/ac
	7/14/11	Gly-Star Gold 48 oz/ac
	8/4/11	Gly-Star Gold 34 oz/ac
Insecticide	6/7/11	Acephate 90 WSP 5.5 oz/ac
Harvest aid	10/3/11	Bollbuster + AIM
	10/15/12	Paraquat
Irrigation Amt.		
PrePlant & Planting	4/12 to 5/26	4.15 in.
Seasonal	6/1 to 9/10	11.83 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 5b Spans 5-8
Exp. Design	Cotton
Soil Type	

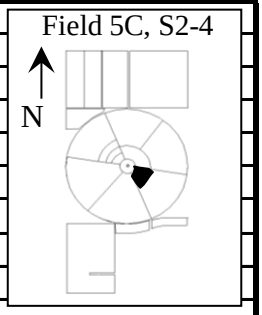
Field Operations	Date	Activity
Tillage	11/12/10	Shed
	1/12/11	Chisel
	3/24/11	Field Cutivator
	3/25/11	Lister
	5/20/11	Scratcher
	6/10/11	Scratcher
	6/24/11	Cultivated and Dike
	7/15/11	Cultivated and Dike
Fertility	3/21	70-70-0 Dry
	6/16	42 lbs N /ac (Liquid 32-0-0 applied with coulter rig on +50% Irr.)
Planting	5/11/11	NG 3348 B2RF at 52,272 seed/ac (Overhang)
	5/11/11	FM 9180B2F, DP 0912 B2RF, NG 3348 B2RF, ST 4288 B2F at 52,272 seed/ac (Spans 5-8)
Herbicide/Growth Regulator	3/23/11	Prowl H2O 3 pts/ac
	6/29/11	Gly-Star Gold 48 oz/ac
	7/14/11	Gly-Star Gold 48 oz/ac
	8/4/11	Gly-Star Gold 34 oz/ac
Insecticide	6/7/11	Acephate 90 WSP 5.5 oz/ac
Harvest aid	10/3/11	Bollbuster + AIM
	10/15/12	Paraquat
Irrigation Amt.		
PrePlant & Planting	4/12 to 5/26	4.15 in.
Seasonal	6/1 to 9/10	Base = 11.83 in., +50% = 17.75 in., -50% = 5.91 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 5c Spans 2-4
Exp. Design	Cotton
Soil Type	

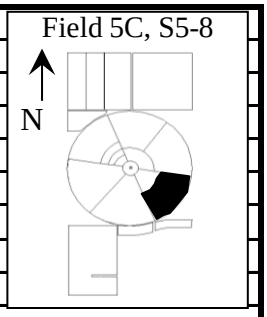
Field Operations	Date	Activity
Tillage	11/19/10	Shed
	1/7-10/11	Chisel
	3/24/11	Field Cutivator
	3/24/11	Lister
	5/5/11	Scratcher
	5/20/11	Scratcher
	6/10/11	Scratcher
	6/24/11	Cultivated and Dike
	7/15/11	Cultivated and Dike
Fertility	3/21/11	70-70-0 Dry
Planting	5/19/11	DOW Test with Plot Planter onSpans 3&4
	5/20/11	PHY 367 WRF at 52,272 seed/ac on Spans 2,3&4
	5/24/11	DOW Test with Plot Planter on Span4
Herbicide/Growth Regulator	5/23/11	Caporal 3 pts/ac & Gly-Star Gold 32 oz/ac
	6/28/11	Gly-Star Gold 48 oz/ac
	7/14/11	Gly-Star Gold 48 oz/ac
	8/4/11	Gly-Star Gold 32 oz/ac
Insecticide		
Harvest aid	10/4/11	Folex 12 oz/ac & Super Bowl 1.3 pt/ac
	10/17/11	Helmquat 24 oz/ac & LI 700 5 oz/ac
Irrigation Amt.		
PrePlant & Planting	4/21 to 5/26	4.15 in.
Seasonal	6/10 to 9/10	11.83 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2010
Farm	Helm
Field ID	Field 5c Spans 5-8
Exp. Design	Cotton
Soil Type	

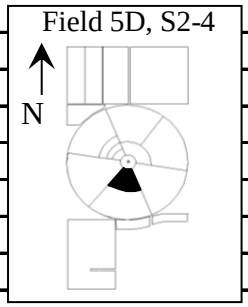
Field Operations	Date	Activity
Tillage	11/19/10	Shed
	1/7-10/11	Chisel
	3/24/11	Field Cutivator
	3/24/11	Lister
	5/5/11	Scratcher
	5/20/11	Scratcher
	6/10/11	Scratcher
	6/24/11	Cultivated and Dike
	7/15/11	Cultivated and Dike
Fertility	3/21/11	70-70-0 Dry
	6/16/11	42 lbs N /ac (Liquid 32-0-0 applied with coulter rig on +50% Irr.)
Planting	5/11/11	NG 3348 B2RF at 52,272 seed/ac (Overhang)
	5/11/11	FM 9180B2F, DP 0912 B2RF, NG 3348 B2RF, ST 4288 B2F at 52,272 seed/ac (Spans 5-8)
Herbicide/Growth Regulator	3/23/11	Prowl H2O 3 pts/ac
	5/23/11	Caporal 3 pts/ac & Gly-Star Gold 32 oz/ac
	6/29/11	Gly-Star Gold 48 oz/ac
	7/14/11	Gly-Star Gold 48 oz/ac
	8/4/11	Gly-Star Gold 32 oz/ac
Insecticide	6/7/11	Acephate 90 WSP 5.5 oz/ac
Harvest aid	10/4/11	Folex 12 oz/ac & Super Bowl 1.3 pt/ac
	10/17/11	Helmquat 24 oz/ac & LI 700 5 oz/ac
Irrigation Amt.		
PrePlant & Planting	4/21 to 5/26	4.15 in.
Seasonal	6/10 to 9/10	Base = 11.83 in., +50% = 17.75 in., -50% = 5.91 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 5d Spans 2-4
Exp. Design	Sorghum
Soil Type	

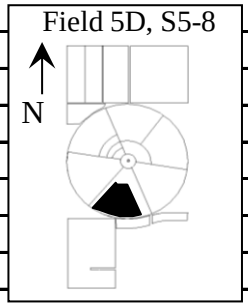
Field Operations	Date	Activity
Tillage	11/19/10	Shed
	1/11/11	Chisel
	3/23/11	Field Cutivator
	3/24/11	Lister
	5/5/11	Scratcher
	5/20/11	Scratcher
	6/10/11	Scratcher
	6/24/11	Cultivated and Dike
	7/11/11	Cultivated and Dike
Fertility	3/21/11	70-70-0 Dry
Planting	5/31/11	Pioneer 84g62-N271 at 60,000 seed/ac (Span 2&4)
	6/1/11	Pioneer 84g62-N271, Channel Bio 7C22, Pioneer 85Y40 at Mixed Rates(Span 3)
Herbicide/Growth Regulator	5/31/11	Bullet 2 qt/ac & Gly-Star Gold 32 oz/ac
	6/3/11	Gly-Star Gold 60 oz/ac
	7/14/11	Medal 1 pt/ac
Insecticide		
Harvest aid		
Irrigation Amt.		
PrePlant & Planting	4/22 to 5/26	4.10 in.
Seasonal	6/1 to 9/10	11.83 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 5d Spans 5-8
Exp. Design	Sorghum
Soil Type	

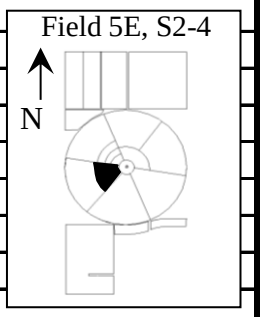
Field Operations	Date	Activity
Tillage	11/19/10	Shed
	1/11/11	Chisel
	3/23/11	Field Cutivator
	3/24/11	Lister
	5/5/11	Scratcher
	5/20/11	Scratcher
	6/10/11	Scratcher
	6/24/11	Cultivated and Dike
	7/11/11	Cultivated and Dike
Fertility	3/21/11	70-70-0 Dry
	6/16/11	42 lbs N /ac (Liquid 32-0-0 applied with coulter rig on +50% Irr.)
Planting	5/31/11	Sorghum Plot Test at 60,000 seed/ac (Overhang)
	5/31/11	Pioneer 84G62-N271, Dekalb DKS 44-40 at 60,000 seed/ac (Spans 5-8)
Herbicide/Growth Regulator	5/31/11	Bullet 2 qt/ac & Gly-Star Gold 32 oz/ac
	6/3/11	Gly-Star Gold 60 oz/ac
	7/14/11	Medal 1 pt/ac
Insecticide		
Harvest aid		
Irrigation Amt.		
PrePlant & Planting	4/22 to 5/26	4.10 in.
Seasonal	6/1 to 9/10	Base = 11.83 in., + 50% = 17.75 in., - 50% = 5.91 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 5e Spans 2-4
Exp. Design	Cotton
Soil Type	

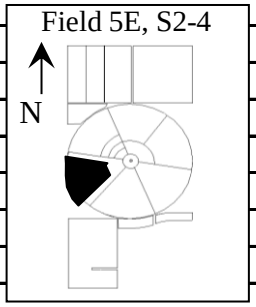
Field Operations	Date	Activity
Tillage	11/19/10	Shed
	1/3-4/2011	Chisel
	3/17/11	Field Cutivator
	3/17/11	Lister
	5/5/11	Scratcher
	5/20/11	Scratcher
	6/10/11	Scratcher
	6/23/11	Cultivated and Dike
	7/14/11	Cultivated and Dike
Fertility	3/14/11	70-70-0 Dry
Planting	5/12/11	NG 3348 B2RF at 52,272 seed/ac
Herbicide/Growth Regulator	3/15/11	Powl H2O 3 pts/ac
	6/28/11	Gly-Star Gold 48 oz/ac
	7/15/11	Gly-Star Gold 48 oz/ac
	8/5/11	Gly-Star Gold 32 oz/ac
Insecticide	6/7/11	Acephate 90 WSP 5.5 oz/ac
Harvest aid	10/3/11	Bollbuster + AIM
	10/15/12	Paraquat
Irrigation Amt.		
PrePlant & Planting	4/23 to 5/26	4.15 in.
Seasonal	6/7 to 9/10	11.83 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2010
Farm	Helm
Field ID	Field 5e Spans 5-8
Exp. Design	Cotton
Soil Type	

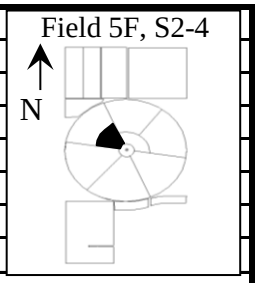
Field Operations	Date	Activity
Tillage	11/19/10	Shed
	1/3-4/2011	Chisel
	3/17/11	Field Cutivator
	3/17/11	Lister
	5/5/11	Scratcher
	5/20/11	Scratcher
	6/10/11	Scratcher
	6/23/11	Cultivated and Dike
	7/14/11	Cultivated and Dike
Fertility	3/14/11	70-70-0 Dry
	6/16/11	42 lbs N /ac (Liquid 32-0-0 applied with coulter rig on +50% Irr.)
Planting	5/11/11	NG 3348 B2RF at 52,272 seed/ac (Overhang)
	5/11/11	FM 9180B2F, DP 0912 B2RF, NG 3348 B2RF, ST 4288 B2F at 52,272 seed/ac (Spans 5-8)
Herbicide/Growth Regulator	3/15/11	Powl H2O 3 pts/ac
	5/12/11	Capoarol 3 pts/ac
	6/28/11	Gly-Star Gold 48 oz/ac
	7/15/11	Gly-Star Gold 48 oz/ac
	8/5/11	Gly-Star Gold 32 oz/ac
Insecticide	6/7/11	Acephate 90 WSP 5.5 oz/ac
Harvest aid	10/3/11	Bollbuster + AIM
	10/15/12	Paraquat
Irrigation Amt.		
PrePlant & Planting	4/23 to 5/26	4.15 in.
Seasonal	6/7 to 9/10	Base = 11.83 in., + 50% = 17.75 in., - 50% = 5.91 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 5f Spans 2-4
Exp. Design	Cotton
Soil Type	

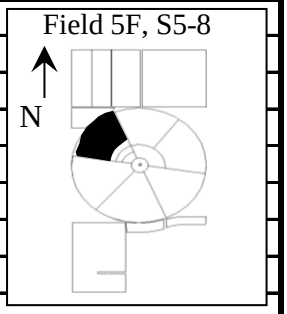
Field Operations	Date	Activity
Tillage	11/12/10	Shed
	1/5-6/2011	Chisel
	3/16/11	Field Cutivator
	3/17/11	Lister
	5/20/11	Scratcher
	6/10/11	Scratcher
	6/23/11	Cultivated and Dike
	7/14/11	Cultivated and Dike
Fertility	3/14/11	70-70-0 Dry
Planting	5/10/11	Mixed Varieties at 52,272 seed/ac (Span 4)
	5/12/11	ST 4288 B2F at 52.272 seed/ac (Span 2)
	5/31/11	Pioneer 84G62-N271 at 60,000 seed/ac (Span 2)
Herbicide/Growth Regulator	3/15/11	Powl H2O 3 pts/ac (Span 3-8)
	5/11/11	Caparol 3 pts/ac & Roundup 32 oz/ac (Span 3-8)
	5/12/11	Caparol 3 pts/ac & Roundup 32 oz/ac (Span 2 strips)
	5/31/11	Bullet 2 qt/ac & Gly-Star Gold 32 oz/ac (Span 2 strips)
	6/9/11	Gly-Star Gold 28 oz/ac
	7/15/11	Gly-Star Gold 48 oz/ac (Span 3-8)
	8/5/11	Gly-Star Gold 32 oz/ac (Span 3-8)
Insecticide	6/9/11	Acephate 90 WSP 5.5 oz/ac
Harvest aid	10/3/11	Bollbuster + AIM
	10/15/12	Paraquat
Irrigation Amt.		
PrePlant & Planting	4/15 to 5/25	4.55 in.
Seasonal	6/6 to 9/10	11.83 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 5f Spans 5-8
Exp. Design	Cotton
Soil Type	

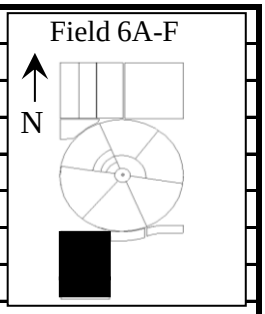
Field Operations	Date	Activity
Tillage	11/12/10	Shed
	1/5-6/2011	Chisel
	3/16/11	Field Cutivator
	3/17/11	Lister
	5/20/11	Scratcher
	6/10/11	Scratcher
	6/23/11	Cultivated and Dike
	7/14/11	Cultivated and Dike
Fertility	3/14/11	70-70-0 Dry
	6/16/11	42 lbs N /ac (Liquid 32-0-0 applied with coulter rig on +50% Irr.)
Planting	5/11/11	DP 0912 B2RF at 52,272 seed/ac (Overhang)
	5/11/11	Bayor Cap FM 2484 B2F, FM 9170 B2F, FM 90F8F, FM 2011 GT, FM 9250 GT LL(Span 5-8)
		at 52,272 seed/ac
Herbicide/Growth Regulator	3/15/11	Powl H2O 3 pts/ac (Span 3-8)
	5/11/11	Caparol 3 pts/ac & Roundup 32 oz/ac (Span 3-8)
	6/9/11	Gly-Star Gold 28 oz/ac
	7/15/11	Gly-Star Gold 48 oz/ac (Span 3-8)
	8/5/11	Gly-Star Gold 32 oz/ac (Span 3-8)
Insecticide	6/9/11	Acephate 90 WSP 5.5 oz/ac
Harvest aid	10/3/11	Bollbuster + AIM
	10/15/12	Paraquat
Irrigation Amt.		
PrePlant & Planting	4/15 to 5/25	4.55 in.
Seasonal	6/6 to 9/10	Base =11.83in., +50% = 17.75 in., -50% = 5.91 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 6 - Zone A-F
Exp. Design	Cotton
Soil Type	

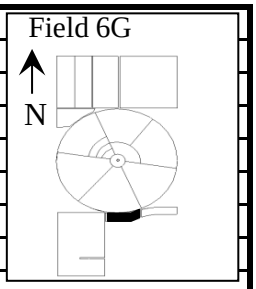
Field Operations	Date	Activity
Tillage	11/26/10	Shred
	12/3/11	Row Stalk Puller
	12/15-16/11	Chisel
	12/21/11	Field Cultivator
	2/23/11	Field Cultivator
	2/24/11	List on 60" with bed roller
	5/17/11	Bullets for row water
	6/16/11	Cultivated & Dike
Fertility	11/11/10	19.5 lbs N/ac + 66 lbs/ac P (10-34-0 applied thru coulter rig)
	4/26/11	86 lbs N/ac (32-0-0 applied thru coulter rig on High Irr. High Fert.)
	4/26/11	31 lbs N/ac (32-0-0 applied thru coulter rig on High Irr. Low Fert.)
	4/26/11	77 lbs N/ac (32-0-0 applied thru coulter rig on Low Irr. High Fert.)
	4/26/11	24 lbs N/ac (32-0-0 applied thru coulter rig on Low Irr. Low Fert.)
	7/5-20/11	42 lbs N/ac (32-0-0 applied thru Drip on High Irr.)
	7/5-20/11	26 lbs N/ac (32-0-0 applied thru Drip on Low Irr.)
Planting	5/16/11	FM 9180B2F, DP 0912 B2F at 58,303 seed/ac
Herbicide/Growth Regulator	2/22/11	Powl H2O 3 pts/ac
	5/17/11	Gly-Star Gold 32 oz/ac & Caparol 3 pts/ac
	6/10/11	Gly-Star Gold 32 oz/ac
	8/2/11	Gly-Star Gold 32 oz/ac
Insecticide	6/10/11	Acephate 5.5 oz/ac
Harvest aid	10/3/11	Bollbuster + AIM
	10/15/12	Paraquat
Irrigation Amt.		
PrePlant & Planting	11/10 to 6/1	Dry 10.23 in., Low 10.23 in., High 10.23 in.
Seasonal	6/21 to 9/13	Dry 0.0 in., Low 8.88 in., High 16.28 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 6 - Zone G
Exp. Design	Cotton Drip Irrigated Nitrogen Level Effects on Insects Parajulee
Soil Type	

Field Operations	Date	Activity
Tillage	11/23/10	Shred
	12/3/10	Row Stalk Puller
	12/20/10	Chisel
	12/22/10	Field Cultivator
	2/23/11	Field Cultivator
	2/24/11	List on 60" with bed roller
	7/18/11	Cultivate & Dike
Fertility		
Planting	6/14/11	DP 104 B2RF at 56,114 seed/ac
Herbicide/Growth Regulator	8/2/11	Gly-Star Gold 32 oz/ac
Insecticide	8/12/11	Karate 5 oz/ac
	8/19/11	Karate 5 oz/ac
	8/26/11	Karate 5 oz/ac
	9/2/11	Karate 5 oz/ac
Harvest aid	10/17/11	Folex 12 oz/ac & Super Bowl 1.3 pts/ac
	10/25/11	Helmquat 24 oz/ac & LI 700 5 oz/ac
Irrigation Amt.		
PrePlant & Planting	11/10 to 6/1	5.55 in.
Seasonal	6/14 to 9/12	9.92 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38 in.
Seasonal	6/2 to9/15	2.68 in.



Operations Summary

Year	2011
Farm	Helm
Field ID	Field 6 - Zone H
Exp. Design	Cotton Drip Irrigated
Soil Type	

Field Operations	Date	Activity
Tillage	11/23/10	Shred
	12/3/10	Row Stalk Puller
	12/20/10	Chisel
	12/22/10	Field Cultivator
	2/23/11	Field Cultivator
	2/24/11	List on 60" with bed roller
	3/23/11	Field Cultivator
	3/28/11	List on 60" with bed roller
	7/18/11	Cultivate & Dike
Fertility	11/12/10	21 lbs N/ac & 72 lbs P/ac (10-34-0 applied with coulter rig)
Planting	6/14/11	DP 104 B2RF at 56,144 seed/ac (Planted skip row on top of drip tape)
Herbicide/Growth Regulator	3/23/11	Powl H2O 3 pts/ac
	7/15/11	Gly-Star Gold 48 oz/ac
	8/2/11	Gly-Star Gold 32 oz/ac
Insecticide		
Harvest aid	10/17/11	Folex 12 oz/ac & Super Bowl 1.3 pts/ac
	10/25/11	Helmquat 24 oz/ac & LI 700 5 oz/ac
Irrigation Amt.		
PrePlant & Planting	11/10 to 6/1	6.54 in.
Seasonal	6/14 to 9/12	9.26 in.
Rainfall		
PrePlant & Planting	2/6 to 6/1	1.38"
Seasonal	6/2 to9/15	2.68"