AgriLIFE RESEARCH
Texas A&M System

*Improving Life Through Science and Technology*

*Lubbock-Pecos-Halfway*

# Helms Research Farm

## Summary Report

## 2007

Texas AgriLife Research / Mark A. Hussey, Director
The Texas A&M University System / College Station, Texas

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Texas AgriLife Research
Texas AgriLife Extension
*Lubbock/ Halfway*

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## Introduction

The Texas A&M University System purchased 373 acres of farmland form 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 Agricultural Research and Extension Center at Halfway in Hale County.

Current projects at the Helms Research Farm involve production options and economics of subsurface drip irrigation (SDI) and site-specific farming. 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 four wells, 320 to 340 feet deep, pumping at rates of 300 to 400 gallons per minute each.

Reinstallation of SDI laterals. Previous work on SDI design had been complete and new SDI laterals were installed for future experiments, Helms Farm, 2007.


World Cotton Conference Tour made stops at Helms and Halfway to observe ongoing applied research.

Installation of volumetric soil water sensors for comparison to neutron probe water measurement, Helms, 2007.

**Corn Breeding**
Wenwei Xu

**Objective:**
The objective was to develop multiple stress tolerant corn lines and hybrids by transferring desirable genes from exotic germplasm into temperate lines.

**Methodology:**
Helms Farm is a primary test site for our corn breeding program's drought tolerance study. This field has a sub-surface drip irrigation system. Planting date was April 28. In 2007, we conducted a series of studies at the Helms Farm, including: (1) evaluation of 450 experimental hybrids for yield, drought tolerance, and other agronomic traits; (2) research on the effect of genotypes and irrigation treatments on silage yield and quality; and (3) evaluation of commercial hybrids (including drought tolerant transgenic hybrids) for yield and drought tolerance in collaboration with seed companies. Hybrids and lines were grown under 100% ET and V-12 drought stress conditions. Pants under 100% ET were watered throughout the growing season while plants under V-12 drought stress were watered at a 50% level of 100% ET, but watering was stopped two weeks before and after flowering. Total irrigation from planting to physiological maturity was 13.94 acre-inches for 100% ET plots and 1.96 acre-inch for V-12 drought stressed plots. The entire field had a 4 acre-inch surface watering right after planting. The in-season rain totaled 10.25 inch.

**Results:**
The year 2007 was unusually wet and cool. Rainfall totaled 7.36 inches before planting (1.01 in January, 0.07 in February, 4.86 in March, and 1.42 in April) and 10.25 from planting to physiological maturity (4.21 in May, 2.52 in June, 2.07 in July, and 1.45 in August). Temperatures were well below average. Maximum air temperature reached 95$^{o}$F in only three days in the entire growing season (95.8$^{o}$F and 96$^{o}$F on June 18 and 19, and 96.8$^{o}$F on August 8). Frequent rain and low temperatures were challenges to create and impose the target drought stress at the right growth stages. However, we managed to reach our drought stress. The average hybrid yield was 204.8 bu/a under 100% ET irrigation and 93.7 bu/a under V-12 drought stress. Field tests identified new lines and hybrids with good drought tolerance and high yield. These lines include DK888:N11a-5, DK888-N11a-7, S2B73BC, S2B73, and B2C2. The results will be used to support official release of these lines.

**Expectations:**

New drought and heat tolerant lines and hybrids have been developed and will be released to the seed industry and public sectors. About 15 companies have requested and received Tx204 and Tx205 seed. We released these lines by using the test results at Helms Farm. Our multiple stress tolerant lines and hybrids can be used for grain and silage corn production. Adoption of new corn germplasm and strategies for irrigation and crop management can save 5-10% of irrigation water requirements.

**Irrigation Termination for Improved Fiber Maturity on the Texas High Plains**
Craig Bednarz and James P. Bordovsky

**Objective:**
The objective of this study is determine the effect of irrigation termination on lint yield and fiber quality of five cotton varieties. The hypothesis is that early irrigation termination would consistently result in more valuable cotton lint that would partially compensate for lower lint yield while reducing irrigation input.

**Methodology:**
Preliminary studies were initiated at the Texas AgriLife Research Center in Halfway in 2007 in a field site with sub surface drip irrigation. The sub surface drip irrigation system is sub divided into 9 zones with each zone being approximately 1.0 ac. The main plot treatments were timing of irrigation termination and the sub plot treatments were cultivar. Irrigation termination treatments were (1) Nodes Above White Flower = 5, (2) Nodes Above White Flower = 5 + 2 weeks and, (3) First Cracked Boll.

Figure1. View of SDI plots containing the cotton irrigation termination study, Helms Farm, 2007.

**Results:**
Table 1 contains the bur cotton yield data. These preliminary studies indicate irrigation termination treatments were too early. The objective in irrigation termination is for the crop to mature and the soil to become depleted of water concurrently. Proper neutron probe utilization next season will allow us to monitor soil water status such that plant available water does not become depleted to less than ~20% on a volumetric basis. Supplementary irrigation will be applied if needed. Fiber quality analyses are pending.

Table 1. Bur cotton weights (lbs/acre) in irrigation termination studies conducted at the Texas AgriLife Research Center Helms Farm at Halfway, TX in 2007.

| Termination | FM960B2R | FM9063B2F | STV4554B2F | DP444BR | PHY370WR | Mean |
|---|---|---|---|---|---|---|
| NAWF=5 | 4294.61 | 4395.13 | 4132.65 | 4182.92 | 4456.56 | 4280.65 |
| NAWF=5+2 | 5475.38 | 5154.65 | 4847.06 | 5305.43 | 5176.99 | 5191.90 |
| Crack Boll | 5886.24 | 5584.67 | 5713.11 | 5729.87 | 5450.63 | 5672.90 |
| Mean | 5218.74 | 5044.82 | 4897.61 | 5072.74 | 5099.50 | 5065.93 |

**Replicated Transgenic Cotton Variety Demonstration Under LEPA Irrigation**

Mark Kelley, Aaron Alexander, Randy Boman, Rhett Overman, Doug Nesmith, and James P. Bordovsky

**Objective:** The objective of this project was to compare yields, gin turnout, fiber quality and economics of variety and technology selection under LEPA irrigation.

**Methodology:** A randomized complete block design with three replications was utilized. LEPA irrigation applied 9.52 inches during the growing season. Accumulated rainfall amounts of 9.67 inches prior to planting and 10.52 inches from planting to 30-September were recorded.

Lint values ($/lb) were based on CCC loan values from grab samples and ITC HVI results with leaf set a 2 and color grades set a 21 for all samples. Ginning costs were based on $2.45 per cwt of bur cotton and seed value was based on $150/ton. Seed and technology costs were calculated using the appropriate seeding rate (3.2 seed/row-ft) for the 30-inch row spacing and entries using the online Plains Cotton Growers Seed Cost Comparison Worksheet with Monsanto Cap Cost Thresholds available at: http://www.plainscotton.org/Seed/seedindex.html . Net value was determined by subtracting ginning and seed and technology costs from the total value.

**Results**: These results indicate that variety selection can significantly impact final net value/acre (Table 1). Lint turnout ranged from 30.4% for All-Tex Apex B2RF to 33.1% for Paymaster 2141B2RF and DynaGro 2242B2RF. Lint yields varied from a low of 1516 lb/acre (Deltapine 143B2RF) to a high of 1714 lb/acre (DynaGro 2242B2RF). Lint loan values ranged from a low of $0.5580/lb to a high of $0.5917/lb for Deltapine 143B2RF and Paymaster 2141B2RF, respectively. When subtracting ginning costs and seed and technology fees from total value (lint value plus seed value), the net value/acre among varieties ranged from a high of $998.61 (Paymaster 2141B2RF) to a low of $849.88 (Deltapine 143B2RF), a difference of $148.73. These data indicate that substantial differences can be obtained in terms of net value/acre due to variety and technology selection. It should be noted that no inclement weather was encountered at this location to cause preharvest losses of picker-type varieties. Additional multi-site and multi-year applied research is needed to evaluate varieties across a series of environments.

Table 1. Harvest results from the irrigated replicated transgenic cotton variety demonstration, Texas AgriLife Research Center, Helms Farm, Halfway, TX, 2007.

| Entry | Lint turnout | Bur Seed turnout | Cotton yield | Lint yield | Lint Seed yield | Loan value | Lint value | Seed value | Total value | Seed/ Ginning cost | Technology cost | Net value | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | % | % | lb/acre | lb/acre | lb/acre | $/lb | $/acre | $/acre | $/acre | $/acre | $/acre | $/acre | |
| Paymaster 2141B2RF | 33.1 | 49.4 | 5033 | 1668 | 2488 | 0.5917 | 986.99 | 186.60 | 1173.59 | 123.31 | 51.67 | 998.61 | a |
| DynaGro 2242B2RF | 33.1 | 50.8 | 5184 | 1714 | 2632 | 0.5722 | 981.17 | 197.39 | 1178.57 | 127.00 | 56.09 | 995.47 | ab |
| FiberMax 9063B2F | 31.2 | 50.2 | 5258 | 1642 | 2639 | 0.5778 | 948.11 | 197.92 | 1146.03 | 128.82 | 56.87 | 960.34 | abc |
| Stoneville 4554B2RF | 32.6 | 49.8 | 5100 | 1665 | 2540 | 0.5715 | 950.61 | 190.48 | 1141.08 | 124.95 | 57.77 | 958.36 | abc |
| FiberMax 9180B2F | 31.7 | 49.6 | 5101 | 1617 | 2529 | 0.5858 | 946.62 | 189.65 | 1136.27 | 124.97 | 56.31 | 954.99 | abc |
| PhytoGen 485WRF | 32.7 | 51.0 | 4861 | 1588 | 2481 | 0.5902 | 936.92 | 186.07 | 1122.99 | 119.10 | 54.77 | 949.12 | abc |
| Stoneville 5327B2RF | 33.0 | 47.8 | 5068 | 1674 | 2421 | 0.5643 | 943.75 | 181.61 | 1125.36 | 124.16 | 57.77 | 943.42 | bc |
| Deltapine 104B2RF | 30.9 | 52.0 | 5151 | 1592 | 2679 | 0.5693 | 906.30 | 200.96 | 1107.25 | 126.20 | 51.67 | 929.38 | cd |
| Americot 1504B2RF | 32.1 | 50.9 | 4962 | 1592 | 2527 | 0.5743 | 914.16 | 189.56 | 1103.72 | 121.58 | 53.58 | 928.56 | cd |
| Stoneville 4427B2RF | 31.9 | 50.9 | 4999 | 1597 | 2544 | 0.5743 | 917.84 | 190.83 | 1108.68 | 122.48 | 57.77 | 928.42 | cd |
| All-Tex Apex B2RF | 30.4 | 49.3 | 5051 | 1537 | 2488 | 0.5647 | 867.31 | 186.62 | 1053.93 | 123.74 | 53.97 | 876.22 | de |
| Deltapine 143B2RF | 31.3 | 50.3 | 4836 | 1516 | 2432 | 0.5580 | 845.01 | 182.36 | 1027.37 | 118.47 | 59.02 | 849.88 | e |
| Test average | 32.0 | 50.2 | 5050 | 1617 | 2533 | 0.5745 | 928.73 | 190.00 | 1118.74 | 123.73 | 55.61 | 939.40 | |
| CV, % | 4.2 | 3.6 | 3.4 | 3.4 | 3.3 | 2.3 | 3.3 | 3.3 | 3.2 | 3.4 | | 3.4 | |
| OSL | 0.2375 | 0.4007 | 0.1667 | 0.0069 | 0.0211 | 0.1010 | 0.0003 | 0.0210 | 0.0011 | 0.1677 | -- | 0.0004 | |
| LSD | NS | NS | NS | 93 | 143 | NS | 51.39 | 10.75 | 59.95 | NS | -- | 54.31 | |

**Replicated Plant Growth Regulator (PGR) Demonstration Under LEPA Irrigation**

Mark Kelley, Aaron Alexander, Randy Boman, Rhett Overman, Doug Nesmith, and James P. Bordovsky

**Objective:** The objective of this project was to compare final plant measurments, days to cutout, and bur cotton and lint yield of various PGR products at selected rates and application timings under LEPA irrigation.

**Methodology:** Plots were planted to FiberMax 9063B2RF on 17-May in 30-inch rows at a rate of 3.2 seed/row-ft. PGR treatments with 0.25% v/v Induce (4.8 oz/a) were applied at match-head square (MHS) on 17-July, 2 weeks after MHS (MHS+2W) on 1-August, and at 5 nodes above white flower (NAWF5) on 15-August. A randomized complete block design with three replications was utilized. An untreated check (UTC) as well as a treatment consisting only of Induce (surfactant) was included for comparison.

**Results**:

Final plant measurements taken on 1-November indicated that all PGR treatments significantly reduced plant height when compared to the UTC and the Induce treatment. Plant height ranged from a high of 30.5", for the Induce treatment, to a low of 24.2" for Pentia. All PGR treatments resulted in fewer mainstem nodes than the UTC and Induce with the exception of the low rate Stance treatment which was similar to Induce. The test average for mainstem nodes was 18.4 with a range of 17.9 (Pentia and high rate Stance with NAWF5, or cutout, application) to 19.5 (UTC), a difference of 2.6. When other treatments were compared to the UTC, only the high rate Stance with cutout application differed statistically. Both the UTC and Induce treatments had significantly higher height to node ratio values than all PGR treatments. No differences were observed among treatments for days to cutout (88.6 test average). Bur cotton yields ranged from a high of 4690 lb/a (UTC) to a low of 4252 lb/a (high rate Stance with cutout application), with a test average of 4506 lb/a. No differences were observed for lint turnout at this location. The only treatment that significantly reduced lint yield compared to UTC was the high rate Stance with cutout application. This cutout application in combination with earlier high rate multiple applications had a negative effect on lint yield under the environmental conditions at this location, the reasons for which are unclear. Lint yield ranged from a high of 1488 lb/acre to a low of 1310 lb/acre for Pentia and Stance high rate multiple plus cutout application, respectively.

Table 1. Harvest results from the irrigated replicated PGR demonstration, Texas AgriLife Research Center, Helms Farm, Halfway, TX, 2007.

| Treatment | Rate (oz/acre) MHS | MHS+2W | NAWF5 | Final plant height inches | Total mainstem nodes #/plant | Height to node ratio | Days to cutout | Bur Cotton yield lb/acre | Lint turnout percent | Lint yield lb/acre |
|---|---|---|---|---|---|---|---|---|---|---|
| UTC | -- | -- | -- | 30.0 a | 19.5 a | 1.54 a | 90.8 | 4690 a | 30.2 | 1416 ab |
| Mepex | 8.0 | 10.0 | -- | 24.3 bc | 18.2 cd | 1.33 c | 89.5 | 4558 ab | 31.0 | 1414 ab |
| Mepex Ginout | 8.0 | 10.0 | -- | 25.0 bc | 18.1 cd | 1.38 bc | 87.3 | 4426 abc | 31.2 | 1382 bc |
| Stance | 1.5 | 2.0 | -- | 26.2 b | 18.8 bc | 1.39 bc | 89.7 | 4614 a | 31.1 | 1436 ab |
| Stance | 2.0 | 3.0 | -- | 25.7 bc | 18.1 cd | 1.42 bc | 87.8 | 4541 ab | 31.2 | 1416 ab |
| Pentia | 8.0 | 10.0 | -- | 24.2 c | 17.9 d | 1.36 bc | 86.7 | 4679 a | 31.8 | 1488 a |
| Stance | 2.0 | 3.0 | 3.0 | 25.8 bc | 17.9 d | 1.44 b | 87.2 | 4252 c | 30.8 | 1310 c |
| Induce only | -- | -- | -- | 30.5 a | 19.1 ab | 1.59 a | 89.5 | 4292 bc | 31.5 | 1356 bc |
| Test average | -- | -- | -- | 26.5 | 18.4 | 1.43 | 88.6 | 4506 | 31.1 | 1402 |
| CV, % | -- | -- | -- | 4.2 | 2.1 | 3.6 | 3.1 | 3.4 | 3.8 | 3.8 |
| LSD | -- | -- | -- | 2.0 | 0.7 | 0.09 | NS | 270 | NS | 93 |

Numbers within each column followed by the same letter are not significantly different at the 5% level.
Plant measurements represent an average of 30 plants per treatment (10 plants/treatment/rep with 3 reps)

**Sorghum Grain Response to Irrigation**

John Everitt, James P. Bordovsky, Wayne Keeling, and Doug Nesmith

**Objective:** A renewed interest in the water requirement of grain sorghum has be sparked by the construction of several grain ethanol plants. A field experiment was conducted to determine yield and in-season irrigation water value of sorghum production at three irrigation levels.

Fig. 1. Grain sorghum irrigated at Helms farm, 2007.

**Methodology:** The grain sorghum hybrid DKS 3707 was planted under four spans of a variable rate, LEPA irrigation system. Sections of each pivot span were modified to deliver water at three relative levels: 50, 100, and 150% of the base pivot irrigation capacity with treatment names of 0.5BI, 1.0BI, and 1.5BI, respectively. A non-seasonally irrigated, "0.0BI", treatment was also included. Sorghum was planted on 15 June and harvested by commercial combine with grain weighs and moisture content determined. Seasonal base irrigation was 10.09 inches.

**Results:** Grain yield response to the four irrigation treatments in 2007 is given in Figure 1. Grain sorghum replaced corn as a rotational crop with cotton in 2007. Yields ranged from 5406 lbs/A dryland to 8118 lbs/A at the highest irrigation level. Significant yield increases were seen with the low irrigation over dryland, and with the medium irrigation compared to the low irrigation level. No yield increase was observed with the addition irrigation applied to the high water treatment. In-season irrigation water use efficiency was highest at the lowest irrigation treatment and declined as irrigation amounts increase (Figure 2).

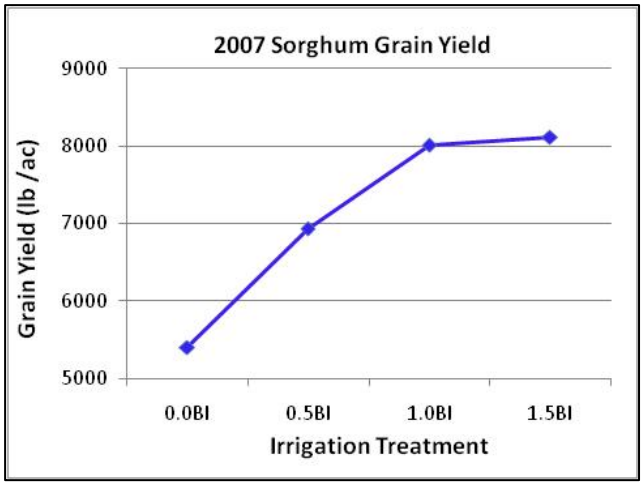



Fig. 1. Grain sorghum yield as a function of four irrigation treatments, Helms Farm, 2007.

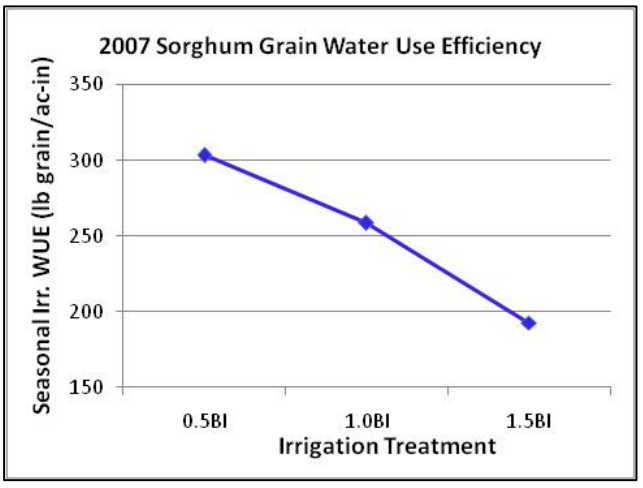



Fig. 2 Sorghum seasonal irrigation water use efficiency, Helms Farm, 2007.

**Strip-till, No-till, and Conventional-till Weed Management Systems in Cotton**

Peter Dotray, Wayne Keeling, Brent Bean, and Lyndell Gilbert

## Objective:

The number of production acres that have been converted to strip-till or no-till have increased in the Texas South Plains and Texas Panhandle over the past five years. The overall objective was to examine weed control options in different tillage systems for effective weed management using Roundup Ready Flex cotton.

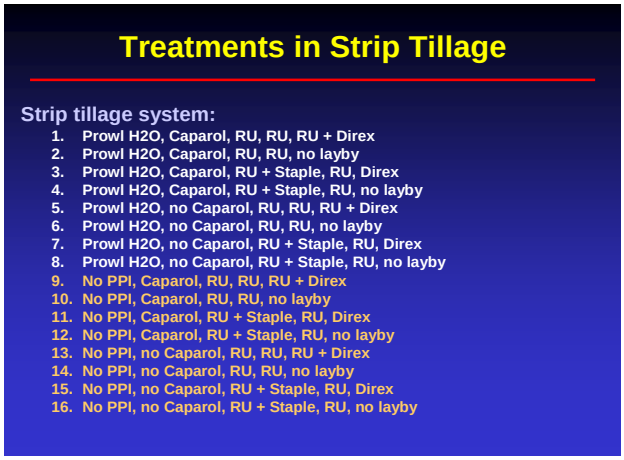



Figure 1. Sixteen preplanned treatments in the strip-tillage system. Note the number of residual herbicides range from four (treatment 3) to zero (treatment 14).

## Methodology:

The study was conducted using an overhead sprinkler irrigation system and followed corn that was planted in 2006. Sixteen treatments were established in conventional till, strip-till and no-till systems using various degrees of soil residual herbicides. Figure 1 shows an example of treatments used in the strip-tillage system. Prowl at 34 oz/A was applied to designated plots on April 11 (conventional tillage) or April 26 (strip-tillage and no-tillage). A Krause disk was used to incorporate the Prowl H20 in the conventional tillage plots and a strip-tillage implement was used to incorporate the herbicide and prepare a seedbed. The entire test area was irrigated with 0.75 inches of water on April 26 to incorporate the herbicides in the no-till and inter-row areas of the strip-till areas. ST4554B2F was planted on May 14. Caparol at 38.4 oz/A was applied broadcast in designated plots on May 14.

## Results:

Cotton stand and yield was greater in conventional tillage compared to no-tillage. Cotton stand and yield in the strip-tillage system was similar to the conventional tillage system and superior to the no-till system. Although different amounts of residual herbicides were used across treatments in all tillage systems, end of season weed control following two Roundup WeatherMax applications was at least 90% in all treatments in the conventional and strip-tillage systems and in most of the no-tillage systems. Figure 2 shows net returns above weed control costs in the strip-tillage system and ranged from $644.52 to $784.87. Although the benefit of a residual herbicide was not apparent in this study, the concern of weed resistance must be considered when developing effective long-term weed management strategies. This study will be continued.

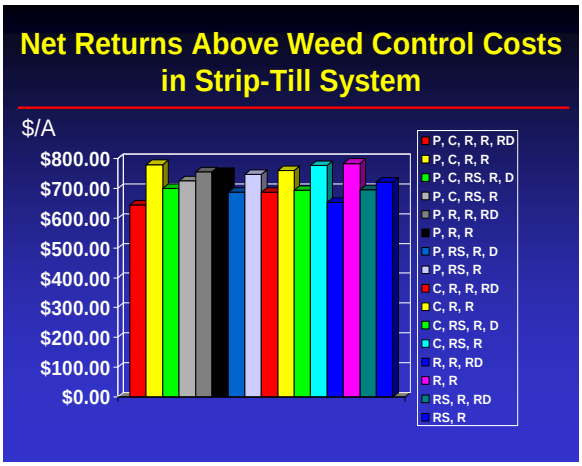



Figure 2. Net returns above weed control costs by treatment in the strip-tillage system.

## Cotton Response to Irrigation Level and Crop Rotation

James P. Bordovsky, Joe Mustian, Matt Blackerby, Chance McMillan, and Doug Nesmith

**Objective:** A field experiment was conducted to determine yield and in-season irrigation water value of cotton production as a function of two popular cotton varieties, three irrigation levels, and three crop sequences.

Fig. 1. Large plot cotton harvest at Helms farm.

**Materials & Methods:** Cotton varieties were Stoneville, ST4554B2RF, a full season "picker" variety that has recently produced high yields on the High Plains, and Paymaster, PM2140B2RF, a high yielding, more determinate "stripper" variety that continues to perform well and is perhaps more tolerant to water stress. The base irrigation level (1.0BI treatment) met approximately 80% of crop water needs using ET scheduling. The other water levels were ±50% of this amount (0.5BI and 1.5BI). All variety x irrigation treatments were planted at 55,000 ppa in areas of either continuous cotton (Cont. Cot.) or in rotation with a grain crop, with corn or sorghum planted every three years (Cot-Grain-Cot or Cot-Cot-Grain treatments). Crop responses were evaluated by harvesting 4 rows x $60^0$ pivot arc with a John Deere 7445 stripper, determining burr weight with calibrated trailer scales, and establishing turnout and fiber data from 3-lb sub-samples from each of three replicates.

**Results:** The crop sequence areas were not replicated, therefore, only general comparisons can be made between these treatments. With the exception of the 0.5BI irrigation level, having a grain crop in rotation with cotton increased cotton yield compared to continuous cotton. Table 1 gives lint yield of the two varieties at the three irrigation levels in the three crop sequence areas. In the Cot-Cot-Grain area at all irrigation levels and in the Cot-Grain-Cot area at the 1.5BI irrigation level, the more determinate Paymaster variety resulted in significantly higher yield than the Stoneville variety. Yields increased significantly with the increase in irrigation from the 0.5BI to the 1.0BI treatment; however, lint yields from treatments irrigated above the 1.0BI level did not consistently rise with additional irrigation. Figure 2 shows increased water value from the 0.5 to the 1.0BI irrigation levels in Cot-Cot-Grain x PM and the Cont. Cot. x ST treatments, however, this value declines in all treatments with irrigations above the 1.0BI level. These field tests will help evaluate management options that maintain productivity in the short term, while improving the value of our limited water resources for the future.

Table 1. Cotton lint yield of two varieties, three crop sequences at three irrigation levels as Texas AgriLife Research Halfway, Helms Farm, 2007.

| | | Crop Sequence | | | |
|---|---|---|---|---|---|
| Irrigation Level | Variety | Cont. Cot | Cot-Cot-Grain | Cot-Grain-Cot | Avg. |
| 0.0BI | ST 4554 B2RF | 706 c | 691 e | 637 d | 678 |
| 0.5BI | PM 2140 B2RF | 1082 b | 987 d | 940 c | 1003 |
| | ST 4554 B2RF | 986 b | 1156 c | 972 c | 1038 |
| | Avg | 1034 | 1072 | 956 | 1021 |
| 1.0BI | PM 2140 B2RF | 1346 a | 1719 a | 1472 b | 1512 |
| | ST 4554 B2RF | 1364 a | 1530 b | 1419 b | 1438 |
| | Avg | 1355 | 1625 | 1446 | 1475 |
| 1.5BI | PM 2140 B2RF | 1434 a | 1692 a | 1661 a | 1596 |
| | ST 4554 B2RF | 1481 a | 1534 b | 1539 b | 1518 |
| | Avg | 1458 | 1613 | 1600 | 1557 |

Column means followed by the same lower case letter are not significantly different (P<0.05, LSD).

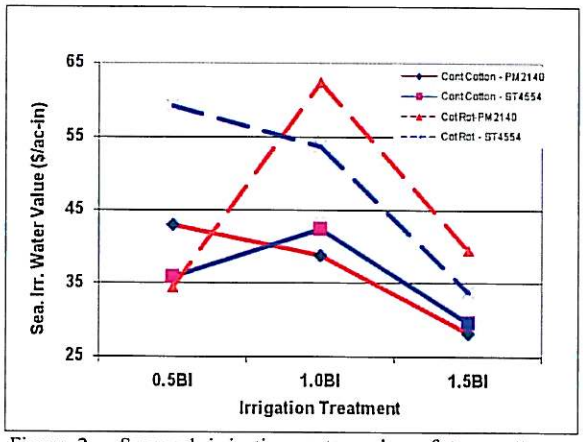



Figure 2. Seasonal irrigation water value of two cotton varieties and two cropping sequences at three irrigation levels, Texas Agrilife Research, Halfway, 2007.

**Cotton Variety Performance as Affected by Low-Energy Precision Application (LEPA) Irrigation Levels at Helms Farm, Halfway, TX, 2007**

Wayne Keeling, James P. Bordovsky, Randy Boman and John Everitt

## Methodology:

| | |
|---|---|
| Plot Size: | 4 rows by 1000 feet, 4 replications |
| Planting Date: | May 7 |
| Varieties: | Stoneville 4554 B2RF |
| | FiberMax 9063 B2RF |
| | Stoneville 4700 B2RF |
| | Delta Pine 117 B2RF |
| Herbicides: | Prowl 2 qt/A PPI |
| | Roundup OriginalMax 22 oz/A POST |
| | Roundup OriginalMax 22 oz/A POST |
| Fertilizer: | 150-80 |
| Plant Growth Regulator: | Pentia 8 oz/A on Medium Irrigation Treatments |
| | Pentia 8 oz/A followed by 10 oz/A on High Irrigation Treatments |
| Irrigation in-season: | Low 3.97” |
| | Medium 6.98” |
| | High 10.10“ |
| Harvest Date: | October 31 |

## Results:

Cotton lint yields ranged from 1025 to 1512 lbs/A. When averaged across irrigation levels, highest yields were produced with FM 9063 B2RF (Table 1). When averaged across varieties, higher yields were produced with 1.0 BI, compared to 0.5 BI, but yields were not higher at the 1.5 BI irrigation level. When averaged across irrigation treatment, highest loan values were produced with FM 9063 B2RF. Cotton quality (loan value) declined as irrigation level increased, mainly due to lower micronaire. This field exhibited significant verticillium wilt damage, which was worsened with increased irrigation.

Table 1. Effects of RRF/BGII variety and LEPA irrigation levels on cotton lint yields at Helms Farm, Halfway, TX, 2007.

| Variety | L | M | H | Avg. |
|---|---|---|---|---|
| | lbs lint/A | | | |
| ST 4554 B2RF | 1035 | 1130 | 1147 | 1104 C |
| ST 4700 B2RF | 1025 | 1163 | 1050 | 1079 C |
| DP 117 B2RF | 1132 | 1310 | 1152 | 1198 B |
| FM 9063 B2RF | 1196 | 1496 | 1512 | 1402 A |
| | 1097 b | 1275 a | 1215 a | |

Table 2. Effects of RRF/BGII variety and LEPA irrigation levels on lint values at Helms Farm, Halfway, TX, 2007.

| Variety | L | M | H | Avg. |
|---|---|---|---|---|
| | ¢/lb | | | |
| ST 4554 B2RF | 56.92 | 54.03 | 50.50 | 53.81 B |
| ST 4700 B2RF | 57.50 | 54.92 | 49.97 | 54.13 B |
| DP 117 B2RF | 53.05 | 53.57 | 44.00 | 50.20 C |
| FM 9063 B2RF | 58.09 | 56.65 | 55.72 | 57.09 A |
| | 56.59 a | 54.79 b | 50.05 c | |

**Cotton Performance as Affected by Seeding Rate using SDI at Helms Farm, 2007**

Wayne Keeling, James P. Bordovsky, Randy Boman, and John Everitt

**Methodology:**

| | |
|---|---|
| Plot Size: | 4 rows by 1600 feet, 3 replications |
| Planting Date: | May 4 |
| Varieties: | Stoneville 4554 B2RF |
| | FiberMax 9063 B2RF |
| Planting Population: | 32, 56, and 80 thousand plants/A |
| Herbicides: | Prowl 2qt/A |
| | Roundup WeatherMax 22 oz/A POST |
| Fertilizer: | 156-94-0 |
| Growth Regulators: | Pentia 8 oz/A on Low Irrigation Treatments |
| | Pentia 8 oz/A followed by 10 oz/A on High Irrigation Treatments |
| Irrigation in-season: | Low 5.6", High 11.6" |
| Harvest Date: | October 25 |

**Results:**

When cotton lint yields were averaged across varieties and irrigation levels, highest yield were produced with the 80,000 seed/A planting rate (Table 1). No effect of seeding rate on quality as measured by loan value was observed. Final populations for the three seeding rates were 27, 42, and 54 thousand seed/A. A comparison of the planting rate to the final plant population is given in Figure 1 and shows a decreased percentage of plants contributing to yield with increased planting rate.

Table 1. Effects of variety, population, and SDI levels on lint yields at Helms Farm, Halfway TX, 2007.

| Variety | 32 (27K) | 56 (42K) | 80 (54K) |
|---|---|---|---|
| | ----------lbs/A---------- | | |
| FM 9063 B2RF Med Irrigation | 1767 | 1750 | 1799 |
| FM 9063 B2RF High Irrigation | 1839 | 1855 | 1977 |
| ST 4554 B2RF Med Irrigation | 1489 | 1662 | 1723 |
| ST 4554 B2RF High Irrigation | 1503 | 1578 | 1944 |
| | 1650 b | 1711 b | 1861 a |

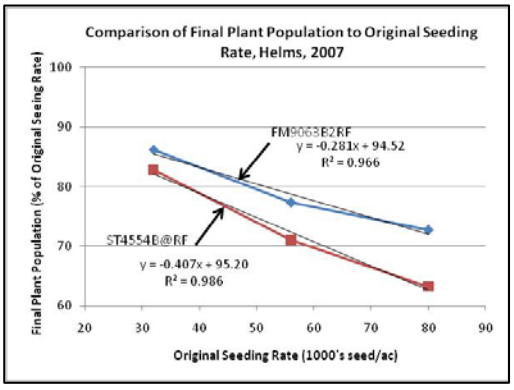



Figure 1. Comparison of original seeding rate to the final plant population, Helms Farm, 2007.

Figure 2. Harvesting field scale research plots within the variey x irrigation level x plant population study, Helms Farm, 2007.

**Cotton Variety Performance as Affected by Subsurface Drip Irrigation (SDI) Levels at Helms Farm, Halfway, TX, 2007**

Wayne Keeling, James P. Bordovsky, Randy Boman, and John Everitt

**Methodology**:

| | |
|---|---|
| Plot Size: | 4 rows by 1600 feet, 3 replications |
| Planting Date: | May 4 |
| Varieties: | Stoneville 4554 B2RF<br>FiberMax 9063 B2RF<br>Stoneville 4700B2RF<br>Delta Pine 117 B2RF |
| Herbicides: | Prowl 2qt/A<br>Roundup WeatherMax 22 oz/A POST |
| Fertilizer: | 156-94-0 |
| Growth Regulators: | Pentia 8 oz/A on Low Irrigation Treatments<br>Pentia 8 oz/A followed by 10 oz/A on High Irrigation Treatments |
| Irrigation in-season: | Low 5.6", High 11.6" |
| Harvest Date: | October 25 |

Fig.1. Field scale plots of the SDI irrigation level by variety experiment, 2007.

**Results:**

Four Roundup Ready Flex/Bollgard II varieties were planted under sub-surface drip irrigation at two levels. Cotton lint yields ranged from 1453 to 1855 lbs/A. When averaged across irrigation levels, high yields were produced with FM 9063 B2RF (Table 1). When varieties were averaged across irrigation levels, similar yields were produced with both irrigation levels. Highest loan values and gross revenues $/A were also produced with FM 9063 B2RF (Tables 2 and 3).

Table 1. Effects of variety and SDI levels on lint yields at Helms Farm, Halfway, TX, 2007.

| Variety | L | H | Avg. |
|---|---|---|---|
| | ----------lbs lint/A---------- | | |
| ST 4554 B2RF | 1662 | 1578 | 1620 BC |
| ST 4700 B2RF | 1453 | 1659 | 1556 C |
| DP 117 B2RF | 1620 | 1698 | 1659 B |
| FM 9063 B2RF | 1750 | 1855 | 1802 A |
| | 1621 a | 1698 a | |

Table 2. Effects of variety and SDI levels on loan values at Helms Farm, Halfway, TX, 2007.

| Variety | L | H | Avg. |
|---|---|---|---|
| | ----------¢/lbs ---------- | | |
| ST 4554 B2RF | 57.97 | 54.97 | 56.46 AB |
| ST 4700 B2RF | 57.50 | 57.56 | 57.53 A |
| DP 117 B2RF | 55.83 | 54.40 | 55.11 B |
| FM 9063 B2RF | 58.93 | 57.20 | 58.07 A |
| | 57.55 a | 56.03 a | |

Table 3. Effects of variety and SDI levels on gross revenues at Helms farm, Halfway, TX, 2007

| Variety | L | H | Avg. |
|---|---|---|---|
| | ----------$/A---------- | | |
| ST 4554 B2RF | 963 | 865 | 914 B |
| ST 4700 B2RF | 835 | 954 | 894 B |
| DP 117 B2RF | 904 | 923 | 913 B |
| FM 9063 B2RF | 1030 | 1061 | 1046 A |
| | 933 a | 951 a | |

**Influence of Soil Nitrogen Level on Seasonal Activity of Cotton Arthropods and Lint Yield under Drip Irrigation**

Megha N. Parajulee, Stanley C. Carroll, Douglas M. Nesmith, and James P. Bordovsky

**Objective:** The objective was to evaluate the effect of nitrogen fertilizer application rates on the population dynamics of cotton arthropods.

**Methodology:** Experimental plots of FM 960B2R cotton were planted on May 4, 2007 at the Helms research farm located near Halfway, Texas. 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 drip irrigation system. We took soil samples from the experimental plots on July 3 and 9 for residual nitrogen analysis and monitored crop growth and insect activity throughout the season. Fertility treatments were applied on July 18 with a soil applicator ground rig.

**Results:** Cotton arthropod populations did not reach treatment threshold in 2007. Thrips densities averaged <1 thrips/plant and did not vary among nitrogen treatments. Cotton fleahopper densities also remained much below economic thresholds. Cotton aphid populations developed in early August and reach the economic threshold on the August 8 sampling date. Cotton aphid densities were elevated at higher nitrogen levels and the populations reached 50 aphids/leaf. After five years of continuous application of variable rate of nitrogen, residual nitrogen levels varied significantly between the 200 lbs/A and lower nitrogen level treatments (Fig. 1).

Variation in residual nitrogen levels coupled with variable nitrogen application resulted in phenotypic expression of nitrogen deficiency in cotton across treatment plots, especially between zero-N plots and nitrogen-applied plots. The zero-N plots produced the lowest yield (1,329 lbs/A) and the yield increased curvilinearly with each additional 50 lbs of added N with numerically highest yield (1,893 lbs/A) at 150 lbs/A (Fig. 2).

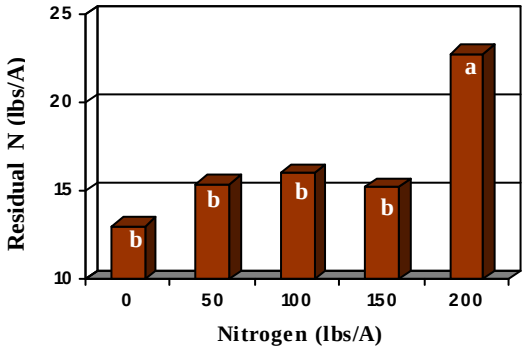



Fig. 1. Effect of nitrogen application rates on residual nitrogen after five years of repetitive applications, 2007.

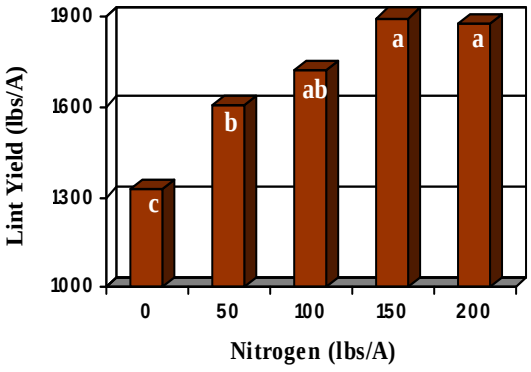



Fig. 2. Effect of nitrogen application rates on lint yields after five years of repetitive applications, 2007.

**Large Scale Cotton Variety Comparison in Subsurface Drip Irrigation (SDI)**
Wayne Keeling, John Everitt, James P. Bordovsky, and Doug Nesmith.

**Objective:**
Compare yield and gross revenues of two popular cotton varieties over several years.

**Methodology:**

| | |
|---|---|
| Planting Date: | May 4, 2007 |
| Varieties: | FiberMax 989 BR; Stoneville 4554 B2F |
| Fertilizer: | 163-87-0 |
| Weed Control: | Prowl – 1 qt/A Preplant |
| | Cotoran + Roundup OriginalMax – (48 oz/A + 22 oz/A)Pre |
| | Roundup OriginalMax - 22 oz/A POST |
| | Roundup OriginalMax - 22 oz/A POST |
| Irrigation: | Seasonal – 10.2” |
| Harvest Date: | October 25, 2007 |

**Results**:
Yields exceeding 2000 lb/A were produced with both varieties (Table 1). Gross revenues were $1223 and 1175/A. Five-year average yields for FM 989 BR were 2158 lbs lint/A (Table 2).

Table 1. Comparison of cotton lint yield and gross revenues for two varieties, 2007.

| Variety | Yield (lb/A) | Gross Revenues ($/A) |
|---|---|---|
| FM 989 BR | 2152 | 1223 |
| ST 4554 B2F | 2050 | 1175 |

Figure 1. Drip tape installation.

Table 2. Cotton lint yields for FM 989BR and comparison variety, Helms Farm, 2002 – 2007.

| Year* | FM989BR | Other Variety | Other Variety Name |
|---|---|---|---|
| 2002 | 1962 | 1746 | PM 2326RR |
| 2003 | 1992 | 1689 | PM 2326RR |
| 2004 | 2189 | 2094 | PM2280RR |
| 2006 | 2495 | - | none |
| 2007 | 2152 | 2050 | ST4554B2F |
| Average | 2158 | 1895 | |

*2005 cotton destroyed by June 16 hailstorm

**Evaluation of Soil Amendments to Improve Germination with Subsurface Drip Irrigation.**
Andy Cranmer and James Bordovsky

**Objective:** Germination of seed with SDI in dry periods has been a consistent problem. The objective was to evaluate the placement of soil amendments in the soil profile to determine their effect on cottonseed germination using SDI under a no/reduced rainfall scenario.

Fig. 1 Installation of TDR sensors for measuring volumetric soil water content in an array above and to each side of the drip lateral.

**Materials & Methods:** Four soil amendments were placed from near drip laterals to near the soil surface at 20 sites in 2006. Soil amendment treatments included two starch-based polymers (Pam and Zeba™ both at 20 lb/ac equivalent), composted cow manure (400 lb/ac), and cow manure and gypsum (400 + 400 lb/ac), along with untreated checks. TDR sensors in arrays above and to each side of the drip lateral were installed. Rainout shelters were constructed and used to prevent rainfall from interfering with soil profile wetting with the drip irrigation system. Seedbeds were undisturbed and no additional amendments were added from 2006 to 2007. Wetting of seedbeds in controlled conditions occurred from 10 July through 13Aug in 2007 with drip applications of 0.1" applied at 12 hour intervals. Volumetric soil water content was measured through mid September using TDR and neutron attenuation methods.

**Results:** The 2006 average change in volumetric soil water at the uppermost sensor during the irrigation and dry down periods is shown in Figure 2. Unadjusted volumetric soil water content for a similar period in 2007 is given in Figure 3. In both years the treatment check resulted in the one of the quickest increases and highest levels of soil water content during the controlled irrigation period. This result indicated that the soil amendments were retarding water movement upward and that a more productive effort might be made by developing a "precision tillage" tool or method that would create a physical pathway between the drip tape and the top of the seed bed to help increase germination with SDI irrigation. In both years, treatment areas containing the Zeba™ polymer appeared to reduce the rate of surface soil drying following irrigation termination while the check treatments resulting in the quickest loss. These results will provide the basis for future efforts to evaluate the application of the Zeba™ polymer in the seed germination zone prior to planting in an attempt to retain moisture from any early season rainfall and improve germination.

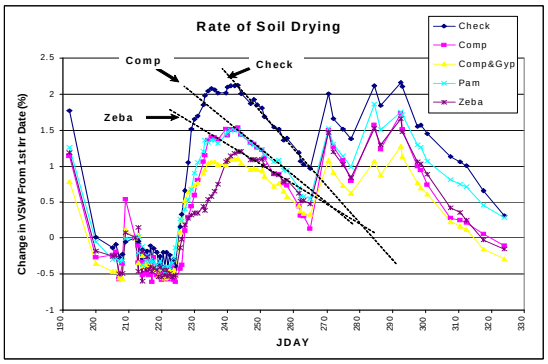



Fig.2. Changes in soil water affected by SDI irrigation measured by the top TDR sensors within soil amendment treatments at Texas AgriLife Research.. Helms Farm. 2006.

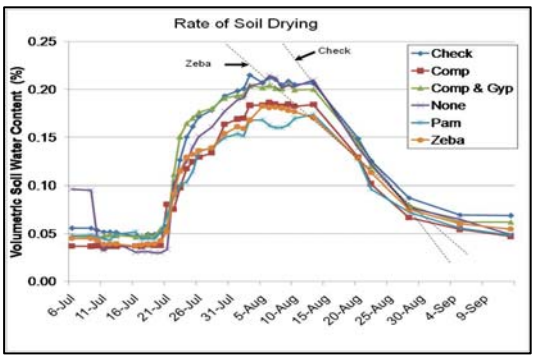



Fig. 3. Changes in soil water affected by SDI irrigation measured by TDR sensors with soil amendment treatments at the Texas AgriLife Research, Helms Farm, 2007.

**Farm Scale Yield Comparisons of Subsurface Drip Irrigation to Center Pivot Irrigation**
James P. Bordovsky, Doug Nesmith, Matt Blackerby, and Chance McMillan

**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 to grow as water availability decreases and opportunities for cost share assistance for water conserving irrigation equipment becomes available. The question of cotton production using SDI verse pivot is often asked. The Helms Research Farm at Halfway provides a unique, controlled environment to answer this question. The problems not normally encountered in small plot research, such as limited irrigation water, inconsistent soils, and/or challenging topography, had to be addressed while irrigating with SDI and LEPA systems during the 2002 to 2007 growing seasons. Details of SDI and LEPA irrigated cotton experiments are contained in the overall annual report. This single page report contains average commercial cotton gin yields and irrigation amounts used to achieve those yields with these 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 recent 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 and 2005 due to cool, wet weather at planting and hail, respectively. Overall cotton yields have been high. SDI yields averaged 1327 lb/ac using 14.09 inches of irrigation compared to LEPA yields of 1165 lb/ac using an average of 11.07 inches. Drip yields from various experiments ranged from over 2400 to 0 lb/acre. LEPA yields ranged within 600 to 2000 lb/acre.

Table 1. Commercial cotton gin lint yield and total irrigation water delivered by SDI and LEPA irrigation systems at Helms, 2002-2007. Data from 2004 is estimated due to inadequate module tracking and gin data.

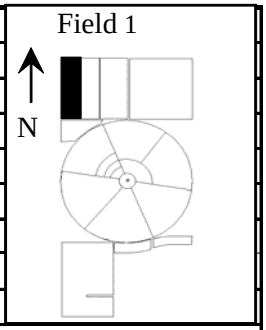
| | SDI | | | LEPA | | |
|---|---|---|---|---|---|---|
| | Area (ac) | Tot. Irr. (in) | Yld. (lb/ac) | Area (ac) | Tot. Irr. (in) | Yld. (lb/ac) |
| 2002 | 71 | 18.47 | 1127 | 84 | 15.71 | 1209 |
| 2003 | 71 | 14.95 | 1086 | 103 | 12.86 | 1084 |
| 2004 | 71 | 14.00 | 1500 | 103 | 10.00 | 1100 |
| 2005 | 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 |
| Avg. | | 14.09 | 1327 | | 11.07 | 1165 |

# APPENDIX

## Operations Summary

| | | |
|---|---|---|
| Year | 2007 | |
| 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 | | |

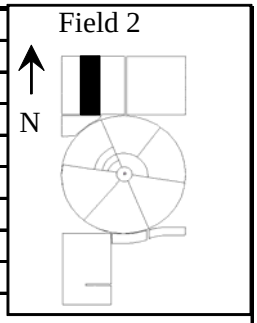
| Field Operations | Date | Activity |
|---|---|---|
| Tillage | 2/19 | Pull stalks Stalks |
| | 2/23 | Disk |
| | 4/4 | Listed |
| | 4/10 | Rolling cultivator |
| | 4/23 | Rolling cultivator |
| | 4/26 | Rod weeded |
| | | |
| Fertility | | |
| | | |
| | | |
| | | |
| Planting | | |
| | | |
| | | |
| | | |
| Herbicide/Growth Regulator | | |
| | | |
| | | |
| | | |
| | | |
| Insecticide | | |
| | | |
| | | |
| | | |
| Irrigation Amt. | | |
| PrePlant & Planting | | |
| Seasonal | | |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |



## Operations Summary

| | | |
|---|---|---|
| Year | 2007 | |
| Farm | Helm | |
| Field ID | Field 2 | Drip Cotton Management  Bordovsky, Bednarz  Irrigation Termination |
| Exp. Design | Replicated, 9 zones, 16 rows x 1300 ft | |
| Soil Type | | |

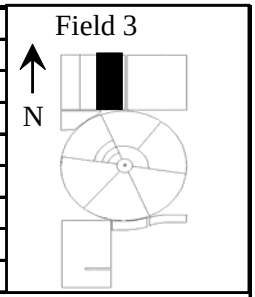
| Field Operations | Date | Activity |
|---|---|---|
| Tillage | 1/27 | Shred stalks |
| | 2/11 | Disk |
| | 2/11 | Sweep plow |
| | 2/11 | Field conditioner |
| | 3/21 | Listed |
| | 5/29 | Rotary hoe |
| | 5/31 | Rotary hoe |
| | 6/8 | Cultivate |
| | 6/19 | Furrow dike |
| | | |
| | | |
| Fertility | 2/28 | 50-84-0  Ground rig |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Planting | 5/16 | FM 9063, Fm 960, St 4554, Phy 370,  Dp 444 |
| | | |
| | | |
| | | |
| | | |
| | | |
| Herbicide/Growth Regulator | 3/8 | Prowl EC  48 oz/a |
| | 5/14 | Roundup Weather Max  22 oz/a |
| | 5/16 | Cotoran 48 oz/a |
| | 7/18 | Pentia 8 oz/a |
| | 7/30 | Pentia 10 oz/a |
| | | |
| | | |
| | | |
| Insecticide | 7/3 | Orthene 4 oz/a |
| | | |
| Harvest aid | 10/19 | Prep and Def  21 oz/a  and 8 oz/a |
| | 10/26 | Gramoxone  24 oz/a |
| Irrigation Amt. | | |
| PrePlant & Planting | | 0.0 in. |
| Seasonal | | 7.73 in. - 1st cut off date, 10.34 in. 2nd cut off date, 11.51 in. 3rd cut off date |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |
| | | |
| | | |



## Operations Summary

| | | |
|---|---|---|
| Year | 2007 | |
| Farm | Helm | |
| Field ID | Field 3 | Tape replacement Bordovsky |
| Exp. Design | No study planted to grain sorghum | |
| Soil Type | | |

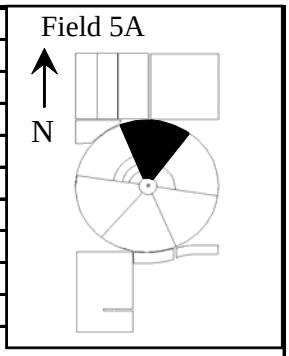
| Field Operations | Date | Activity |
|---|---|---|
| Tillage | 1/27 | Shred stalks |
| | 2/11 | Disk |
| | 2/11 | Sweep plow |
| | 2/11 | Field conditioner |
| | 3/6 | Deep chisel |
| | 3/7 | Disk |
| | 5/17 | Sweep plow |
| | 6/18 | Rolling cultivator |
| | 7/18 | Furrow dike |
| | | |
| | | |
| | | |
| | | |
| Fertility | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Planting | 5/19 | Plant Grain sorghum 30,000 seed/a |
| | | |
| Herbicide/Growth Regulator | 6/18 | Milo Pro 36 oz/a |
| | | |
| | | |
| | | |
| | | |
| | | |
| Insecticide | | |
| | | |
| | | |
| | | |
| Harvest aid | | |
| Irrigation Amt. | | |
| PrePlant & Planting | | 0.0 in. |
| Seasonal | | 0.0 in. |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |
| | | |
| | | |



## Operations Summary

| | |
|---|---|
| Year | 2007 |
| Farm | Helm |
| Field ID | Field 5 A  Randy Boman Flex trials and growth regulator study |
| Exp. Design | Replicated |
| Soil Type | |

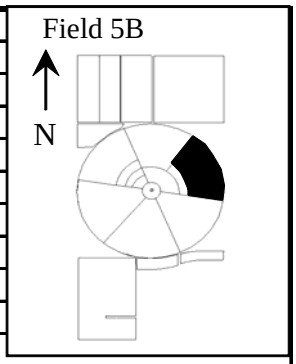
| Field Operations | Date | Activity |
|---|---|---|
| Tillage | 12/5 | Shred stalks |
| | 12/13 | Disk |
| | 12/13 | Sweep Plow |
| | 12/14 | Field conditioner |
| | 4/3 | Incorporated Prowl with disk |
| | 4/20 | Listed |
| | 6/21 | Furrow Dike |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Fertility | 4/2 | 60-100-0 applied with ground dry |
| | 7/6 | 53 lbs/a N with coulter rig |
| | 7/17 - 7/21 | 4.02 lbs/a N through Pivot |
| | 7/23 - 7/27 | 33.78 lbs/a N through Pivot |
| | 7/28 - 7/29 | 32.17 lbs/a N through Pivot |
| | 7/30 - 8/2 | 19.3 lbs/a N through Pivot |
| | | |
| | | |
| | | |
| Planting | 5/17 | Planted Boman varieties |
| | | |
| Herbicide/Growth Regulator | 4/2 | Prowl applied with dry fertilizer 48 oz/a |
| | 6/18 | Glystar Original 32 oz/a |
| | 7/19 | Pentia 8 oz/a except on Growth Regulator Study |
| | 7/31 | Pentia 10 oz/a except on Growth Regulator Study |
| | 8/13 | Glystar Original 32 oz/a |
| | | |
| Insecticide | 8/9 | Intruder 0.7 oz/a |
| | | Temik 3 lbs/a at Planting |
| Harvest aid | 10/19 | Prep and Def  21 oz/a  and 8 oz/a |
| | 10/26 | Gramoxone  24 oz/a |
| | | |
| Irrigation Amt. | | |
| PrePlant & Planting | 4/13 | 0.00 in. |
| Seasonal | 7/9-9/3 | 9.52 in. |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/17 | 9.67 in. |
| Seasonal | 5/17-10/10 | 11.16 in. |
| | | |
| | | |



## Operations Summary

| | |
|---|---|
| Year | 2007 |
| Farm | Helm |
| Field ID | Field 5 B Grain Sorghum Keeling, Bordovsky Water X Variety |
| Exp. Design | |
| Soil Type | |

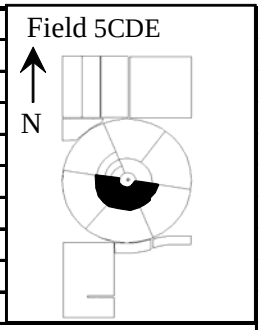
| Field Operations | Date | Activity |
|---|---|---|
| Tillage | 12/5 | Shred stalks |
| | 12/13 | Disk |
| | 12/13 | Sweep Plow |
| | 12/14 | Field conditioner |
| | 4/13 | Disk |
| | 4/20 | Listed |
| | 7/3 | Furrow dike |
| | | |
| | | |
| | | |
| | | |
| | | |
| Fertility | 7/3 | Applied liquid with ground rig 110-50-0 |
| | | |
| | 7/17 - 7/21 | 4.02 lbs/a N through Pivot +/- 50% |
| | 7/23 - 7/27 | 33.78 lbs/a N through Pivot +/- 50% |
| | 7/28 - 7/29 | 32.17 lbs/a N through Pivot +/- 50% |
| | 7/30 - 8/2 | 19.3 lbs/a N through Pivot +/- 50% |
| | | |
| Planting | 5/19 | Planted Keeling's varieties |
| | | |
| | | |
| Herbicide | 4/4 | Roundup Original |
| | 5/15 | Atrazine 32 oz/a |
| | 6/26 | Rifle 6 oz/a |
| | | |
| | | |
| Insecticide | | |
| | | |
| | | |
| | | |
| Harvest aid | | |
| Irrigation Amt. | | |
| PrePlant & Planting | | 0.50 in. |
| Seasonal | | 4.3 in. - Low Level, 8.59 in. - Base Level, 12.89 in. - High Level |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |
| | | |
| | | |



## Operations Summary

| | |
|---|---|
| Year | 2007 |
| Farm | Helm |
| Field ID | Field 5 CDE (Span 2,3,4) Tillage Test |
| Exp. Design | Replicated |
| Soil Type | |

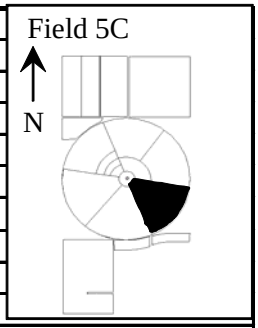
| Field Operations | Date | Activity |
|---|---|---|
| Tillage | 2/20 | Shred stalks |
| | 2/21 | Disk conventional |
| | 4/20 | Listed conventional |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Fertility | 7/3 | Applied liquid with ground rig 110-50-0 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Planting | 5/7 | ST 4554 |
| | | |
| Herbicide/Growth Regulator | 4/11 | Prowl H2O 35 oz/a on conventional |
| | 4/26 | Prowl H2O 35 oz/a on no-till |
| | 5/7 | Roundup Weather Max 22 oz/a |
| | 6/7 | Glystar Plus 32 oz/a |
| | 7/19 | Pentia 8 oz/a |
| | 8/6 | Pentia 10 oz/a |
| | 8/28 | Glystar original 32 oz/a |
| | | |
| Insecticide | 8/9 | Intruder 0.07 oz/a |
| | 5/7 | Temik at plainting 3 lbs/a |
| Harvest aid | 10/19 | Prep and Def 21 oz/a and 8 oz/a |
| | 10/26 | Gramoxone 24 oz/a |
| Irrigation Amt. | | |
| PrePlant & Planting | | 0.50 in. |
| Seasonal | | 8.04 in. |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |
| | | |
| | | |



## Operations Summary

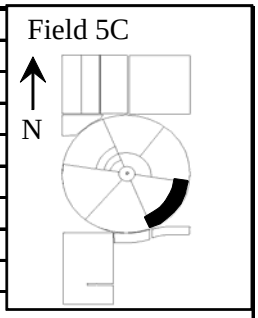
| | |
|---|---|
| Year | 2007 |
| Farm | Helm |
| Field ID | Field 5 C (Span 5-7) |
| Exp. Design | Cotton following corn |
| Soil Type | |

| Field Operations | Date | Activity |
|---|---|---|
| Tillage | 12/5 | Shred stalks |
| | 2/20 | Disk |
| | 2/20 | Sweep plow |
| | 4/20 | List |
| | 6/19 | Furrow dike |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Fertility | 4/2 | 60-100-0 applied with ground rig dry broadcast |
| | | |
| | 7/17 - 7/21 | 4.02 lbs/a N through Pivot +/- 50% |
| | 7/23 - 7/27 | 33.78 lbs/a N through Pivot +/- 50% |
| | 7/28 - 7/29 | 32.17 lbs/a N through Pivot +/- 50% |
| | 7/30 - 8/2 | 19.3 lbs/a N through Pivot +/- 50% |
| | | |
| | | |
| | | |
| Planting | 5/15 | St 4554, Pm 2104 |
| | | |
| Herbicide/Growth Regulator | 4/2 | Prowl applied with dry fertilizer 48 oz/a |
| | 6/7 | Glystar Plus 32 oz/a |
| | 7/20 | Pentia 8 oz/a |
| | 7/31 | Pentia 10 oz/a |
| | 7/31 | Glystar Original 32 oz/a |
| | 8/28 | Glystar Original 32 oz/a |
| | | |
| Insecticide | 8/9 | Intruder 0.7 oz/a |
| | 5/15 | Temik 3 lbs/a at Planting |
| Harvest aid | 10/19 | Prep and Def 21 oz/a and 8 oz/a |
| | 10/26 | Gramoxone 24 oz/a |
| Irrigation Amt. | | |
| PrePlant & Planting | | 0.50 in. |
| Seasonal | | 3.77 in. - Low Level, 7.54 in. - Base Level, 11.31 in. - High Level |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |
| | | |
| | | |



## Operations Summary

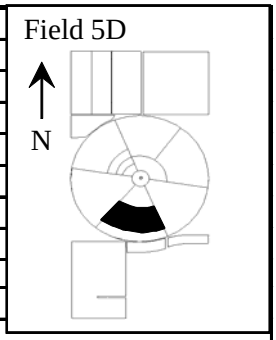
| | | |
|---|---|---|
| Year | 2007 | |
| Farm | Helm | |
| Field ID | Field 5 C (Span 8) Keeling varieties Monsanto | |
| Exp. Design | | |
| Soil Type | | |
| Field Operations | Date | Activity |
| Tillage | 12/5 | Shred stalks |
| | 2/20 | Disk |
| | 2/20 | Sweep plow |
| | 4/20 | List |
| | 6/19 | Furrow dike |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Fertility | 4/2 | 60-100-0 applied with ground rig dry broadcast |
| | | |
| | 7/17 - 7/21 | 4.02 lbs/a N through Pivot +/- 50% |
| | 7/23 - 7/27 | 33.78 lbs/a N through Pivot +/- 50% |
| | 7/28 - 7/29 | 32.17 lbs/a N through Pivot +/- 50% |
| | 7/30 - 8/2 | 19.3 lbs/a N through Pivot +/- 50% |
| | | |
| | | |
| | | |
| Planting | 5/6 | Keeling Varieties |
| | | |
| Herbicide | 4/2 | Prowl applied with dry fertilizer 48 oz/a |
| | 6/7 | Glystar Plus 32 oz/a except Liberty Link |
| | 7/20 | Pentia 8 oz/a |
| | 7/31 | Pentia 10 oz/a |
| | 7/31 | Glystar Original 32 oz/a except Liberty Link |
| | 8/28 | Glystar Original 32 oz/a Eexcept Liberty Link |
| | | |
| Insecticide | 8/9 | Intruder 0.7 oz/a |
| | | Temik 3 lbs/a at Planting |
| Harvest aid | 10/19 | Prep and Def 21 oz/a and 8 oz/a |
| | 10/26 | Gramoxone 24 oz/a |
| Irrigation Amt. | | |
| PrePlant & Planting | | 0.50 in. |
| Seasonal | | 3.77 in. - Low Level, 7.54 in. - Base Level, 11.31 in. - High Level |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |
| | | |
| | | |



## Operations Summary

| | |
|---|---|
| Year | 2007 |
| Farm | Helm |
| Field ID | Field 5 D (Span 5-7)  Cotton Variable Rate Irrigation  Bordovsky |
| Exp. Design | Cotton 2 years after corn |
| Soil Type | |

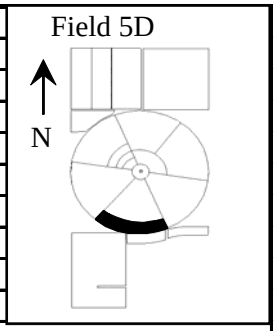
| Field Operations | Date | Activity |
|---|---|---|
| Tillage | 12/5 | Shred stalks |
| | 2/20 | Disk |
| | 2/20 | Sweep plow |
| | 4/20 | List |
| | 6/19 | Furrow dike |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Fertility | 4/2 | 60-100-0 applied with ground rig dry broadcast |
| | | |
| | 7/17 - 7/21 | 4.02 lbs/a N through Pivot +/- 50% |
| | 7/23 - 7/27 | 33.78 lbs/a N through Pivot +/- 50% |
| | 7/28 - 7/29 | 32.17 lbs/a N through Pivot +/- 50% |
| | 7/30 - 8/2 | 19.3 lbs/a N through Pivot +/- 50% |
| | | |
| | | |
| | | |
| Planting | 5/15 | St 4554, Pm 2104 |
| | | |
| Herbicide/Growth Regulator | 4/2 | Prowl applied with dry fertilizer 48 oz/a |
| | 6/7 | Glystar Plus 32 oz/a |
| | 7/20 | Pentia 8 oz/a |
| | 7/31 | Pentia 10 oz/a |
| | 7/31 | Glystar Original 32 oz/a |
| | 8/28 | Glystar Original 32 oz/a |
| Insecticide | 8/9 | Intruder 0.7 oz/a |
| | | Temik 3 lbs/a at Planting |
| Harvest aid | 10/19 | Prep and Def 21 oz/a and 8 oz/a |
| | 10/26 | Gramoxone 24 oz/a |
| Irrigation Amt. | | |
| PrePlant & Planting | | 0.50 in. |
| Seasonal | | 3.77 in. - Low Level, 7.54 in. - Base Level, 11.31 in. - High Level |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |
| | | |



## Operations Summary

| | |
|---|---|
| Year | 2007 |
| Farm | Helm |
| Field ID | Field 5 D Span 8 Keeling |
| Exp. Design | |
| Soil Type | |

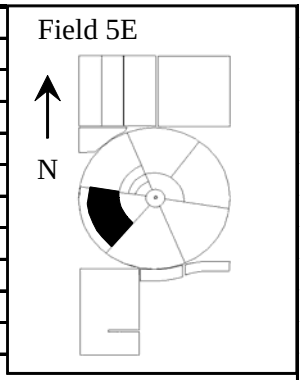
| Field Operations | Date | Activity |
|---|---|---|
| Tillage | 12/5 | Shred stalks |
| | 2/20 | Disk |
| | 2/20 | Sweep plow |
| | 4/20 | List |
| | 6/19 | Furrow dike |
| | | |
| | | |
| | | |
| | | |
| Fertility | 4/2 | 60-100-0 applied with ground rig dry broadcast |
| | | |
| | 7/17 - 7/21 | 4.02 lbs/a N through Pivot +/- 50% |
| | 7/23 - 7/27 | 33.78 lbs/a N through Pivot +/- 50% |
| | 7/28 - 7/29 | 32.17 lbs/a N through Pivot +/- 50% |
| | 7/30 - 8/2 | 19.3 lbs/a N through Pivot +/- 50% |
| | | |
| | | |
| | | |
| Planting | 5/23 | Monsanto varieties |
| | | |
| Herbicide/Growth Regulator | 4/2 | Prowl applied with dry fertilizer 48 oz/a |
| | 7/20 | Pentia 8 oz/a |
| | 7/31 | Pentia 10 oz/a |
| | | |
| | | |
| | | |
| Insecticide | 8/9 | Intruder 0.7 oz/a |
| | | Temik 3 lbs/a at Planting |
| Harvest aid | 10/19 | Prep and Def 21 oz/a and 8 oz/a |
| | 10/26 | Gramoxone 24 oz/a |
| | | |
| Irrigation Amt. | | |
| PrePlant & Planting | | 0.50 in. |
| Seasonal | | 3.77 in. - Low Level, 7.54 in. - Base Level, 11.31 in. - High Level |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |
| | | |



## Operations Summary

| | |
|---|---|
| Year | 2007 |
| Farm | Helm |
| Field ID | Field 5 E (Span 5-7) Cotton Variable Rate Irrigation Bordovsky |
| Exp. Design | Continuous cotton |
| Soil Type | |

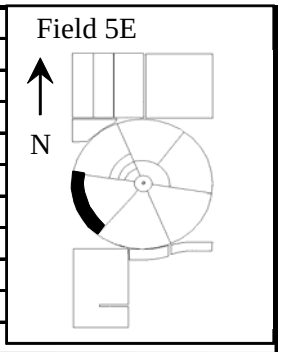
| Field Operations | Date | Activity |
|---|---|---|
| Tillage Treatment | 12/5 | Shred stalks |
| | 2/20 | Disk |
| | 2/20 | Sweep plow |
| | 4/20 | List |
| | 6/19 | Furrow dike |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Fertility | 4/2 | 60-100-0 applied with ground rig dry broadcast |
| | | |
| | 7/17 - 7/21 | 4.02 lbs/a N through Pivot +/- 50% |
| | 7/23 - 7/27 | 33.78 lbs/a N through Pivot +/- 50% |
| | 7/28 - 7/29 | 32.17 lbs/a N through Pivot +/- 50% |
| | 7/30 - 8/2 | 19.3 lbs/a N through Pivot +/- 50% |
| | | |
| | | |
| | | |
| | | |
| | | |
| Planting | 5/15 | St 4554, Pm 2104 |
| | | |
| Herbicide/Growth Regulator | 4/2 | Prowl applied with dry fertilizer 48 oz/a |
| | 6/7 | Glystar Plus 32 oz/a |
| | 7/20 | Pentia 8 oz/a |
| | 7/31 | Pentia 10 oz/a |
| | 7/31 | Glystar Original 32 oz/a |
| | 8/28 | Glystar Original 32 oz/a |
| | | |
| Insecticide | 8/9 | Intruder 0.7 oz/a |
| | | Temik 3 lbs/a at Planting |
| Harvest aid | 10/19 | Prep and Def 21 oz/a and 8 oz/a |
| | 10/26 | Gramoxone 24 oz/a |
| Irrigation Amt. | | |
| PrePlant & Planting | | 0.50 in. |
| Seasonal | | 3.70 in. - Low Level, 7.41 in. - Base Level, 11.12 in. - High Level |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |
| | | |



## Operations Summary

| | |
|---|---|
| Year | 2007 |
| Farm | Helm |
| Field ID | Field 5 E  Span 8  Gannaway |
| Exp. Design | Replicated Variety Test |
| Soil Type | |

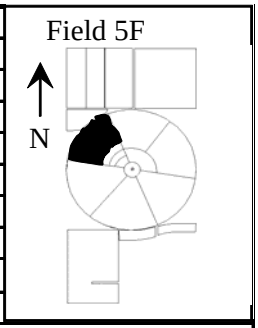
| Field Operations | Date | Activity |
|---|---|---|
| Tillage Treatment | 12/5 | Shred stalks |
| | 2/20 | Disk |
| | 2/20 | Sweep plow |
| | 4/20 | List |
| | 6/19 | Furrow dike |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Fertility | 4/2 | 60-100-0 applied with ground rig dry broadcast |
| | | |
| | 7/17 - 7/21 | 4.02 lbs/a N through Pivot +/- 50% |
| | 7/23 - 7/27 | 33.78 lbs/a N through Pivot +/- 50% |
| | 7/28 - 7/29 | 32.17 lbs/a N through Pivot +/- 50% |
| | 7/30 - 8/2 | 19.3 lbs/a N through Pivot +/- 50% |
| | | |
| | | |
| | | |
| | | |
| | | |
| Planting | 5/22 | Gannaway's varieties |
| | | |
| Herbicide/Growth Regulator | 4/2 | Prowl applied with dry fertilizer 48 oz/a |
| | 6/7 | Glystar Plus 32 oz/a |
| | 7/20 | Pentia 8 oz/a |
| | 7/31 | Pentia 10 oz/a |
| | 7/31 | Glystar Original  32 oz/a |
| | 8/28 | Glystar Original  32 oz/a |
| | | |
| Insecticide | 8/9 | Intruder 0.7 oz/a |
| | | Temik 3 lbs/a at Planting |
| Harvest aid | 10/19 | Prep and Def  21 oz/a  and 8 oz/a |
| | 10/26 | Gramoxone  24 oz/a |
| | | |
| Irrigation Amt. | | |
| PrePlant & Planting | | 0.50 in. |
| Seasonal | | 3.70 in. - Low Level, 7.41 in. - Base Level, 11.12 in. - High Level |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |
| | | |
| | | |



## Operations Summary

| | |
|---|---|
| Year | 2007 |
| Farm | Helm |
| Field ID | Fied 5 F  Water X Variety Keeling Bordovsky |
| Exp. Design | |
| Soil Type | |

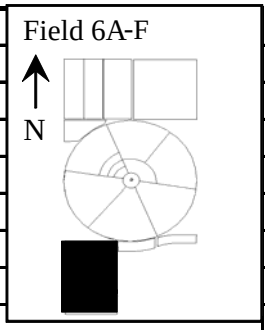
| Field Operations | Date | Activity |
|---|---|---|
| Tillage Treatment | 12/5 | Shred stalks |
| | 2/20 | Disk |
| | 2/20 | Sweep plow |
| | 4/20 | List |
| | 6/19 | Furrow dike |
| | | |
| | | |
| | | |
| | | |
| | | |
| Fertility | 4/2 | 60-100-0 applied with ground rig dry broadcast |
| | | |
| | 7/17 - 7/21 | 4.02 lbs/a N through Pivot +/- 50% |
| | 7/23 - 7/27 | 33.78 lbs/a N through Pivot +/- 50% |
| | 7/28 - 7/29 | 32.17 lbs/a N through Pivot +/- 50% |
| | 7/30 - 8/2 | 19.3 lbs/a N through Pivot +/- 50% |
| | | |
| | | |
| | | |
| | | |
| | | |
| Planting | 5/7 | St 4554, St 4700, Fm 9063, Dp 117 |
| | | |
| Herbicide/Growth Regulator | 4/2 | Prowl applied with dry fertilizer 48 oz/a |
| | 6/7 | Glystar Plus 32 oz/a |
| | 7/20 | Pentia 8 oz/a |
| | 7/31 | Pentia 10 oz/a |
| | 7/31 | Glystar Original  32 oz/a |
| | 8/28 | Glystar Original  32 oz/a |
| | | |
| Insecticide | 8/9 | Intruder 0.7 oz/a |
| | | Temik 3 lbs/a at Planting |
| | | |
| Harvest aid | 10/19 | Prep and Def  21 oz/a  and 8 oz/a |
| | 10/26 | Gramoxone  24 oz/a |
| | | |
| Irrigation Amt. | | |
| PrePlant & Planting | | 0.50 in. |
| Seasonal | | 3.65 in. - Low Level, 7.30 in. - Base Level, 10.95 in. - High Level |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |
| | | |
| | | |



## Operations Summary

| | |
|---|---|
| Year | 2007 |
| Farm | Helm |
| Field ID | Field 6 - Zone A-F  Cotton Drip Irrigated Water X Variety Keeling/Bordovsky |
| Exp. Design | Replicated |
| Soil Type | |

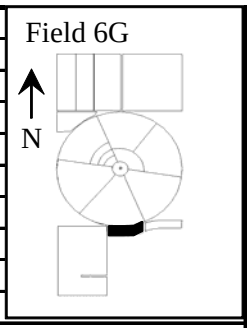
| Field Operations | Date | Activity |
|---|---|---|
| Tillage | 12/4 | Shred stalks |
| | 12/12 | Disk |
| | 12/12 | Sweep plow |
| | 12/13 | Field conditioner |
| | 3/22 | Listed |
| | 6/20 | Furrow dike |
| | | |
| | | |
| | | |
| Fertility | 3/2 | 56-94-0  applied liquid with coulter rig |
| | 7/10 - 8/8 | 98 lbs/a N chemigated |
| | | |
| | | |
| Planting | 5/4 | 32, 56, and 80 thousand seed per acre  St 4554, St 4700, Fm 9063, Dp 117 |
| | | |
| Herbicide/Growth Regulator | 3/9 | Prowl EC  48 oz/a |
| | 5/4 | Roundup Weather Max 22 oz/a |
| | 6/5 | Glystar Plus  32 oz/a |
| | 7/18 | Pentia  8 oz/a a, c, and f |
| | 7/31 | Pentia 10 oz/a  a, c, and f |
| | | |
| | | |
| | | |
| | | |
| Insecticide | 8/9 | Intruder 0.7 oz/a |
| | | Temik 3 lbs/a at Planting |
| | | |
| Harvest aid | 10/19 | Prep and Def  21 oz/a  and 8 oz/a |
| | 10/26 | Gramoxone  24 oz/a |
| Irrigation Amt. | | |
| PrePlant & Planting | | 0.00 in. |
| Seasonal | | 11.08 in. in zones acf, 5.90 in. in zones bde, 0.00 in. in dry zones |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |
| | | |
| | | |



## Operations Summary

| | |
|---|---|
| Year | 2007 |
| Farm | Helm |
| Field ID | Field 6 - Zone G  Cotton Drip Irrigated Nitrogen Level Effects on Insects  Parajulee |
| Exp. Design | Several Nitrogen Levels, Replicated |
| Soil Type | |

| Field Operations | Date | Activity |
|---|---|---|
| Tillage | 12/4 | Shred stalks |
| | 12/12 | Disk |
| | 12/12 | Sweep plow |
| | 12/13 | Field conditioner |
| | 3/22 | Listed |
| | 7/26 | Furrow dike |
| | | |
| | | |
| | | |
| | | |
| Fertility | 7/20 | Rates as directed by Parajulee |
| | | By ground coulter rig |
| | | N rates 0, 50, 100, 150, 200 lbs/a |
| | | |
| | | |
| | | |
| | | |
| Planting | 5/15 | Fm 960 |
| | | |
| | | |
| Herbicide/Growth Regulator | 3/19 | Prowl EC  48 oz/a |
| | 5/17 | Roundup Weather Max 22 oz/a |
| | 7/18 | Pentia  8 oz/a |
| | 7/29 | Pentia 10 oz/a |
| | 8/27 | Glystar original  32 oz/a |
| | | |
| Insecticide | None | |
| | | |
| Harvest aid | 10/19 | Prep and Def  21 oz/a  and 8 oz/a |
| | 10/26 | Gramoxone  24 oz/a |
| Irrigation Amt. | | |
| PrePlant & Planting | | 0 |
| Seasonal | | 9.89 |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |
| | | |
| | | |

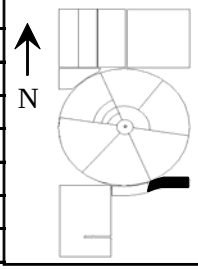


## Operations Summary

| | |
|---|---|
| Year | 2007 |
| Farm | Helm |
| Field ID | Field 6 - Zone H  Cotton Drip Irrigated Variety  Keeling |
| Exp. Design | Replicated |
| Soil Type | |

| Field Operations | Date | Activity |
|---|---|---|
| Tillage | 12/4 | Shred stalks |
| | 12/12 | Disk |
| | 12/12 | Sweep plow |
| | 12/13 | Field conditioner |
| | 3/22 | Listed |
| | 6/19 | Furrow dike |
| Fertility | 3/2 | 52-87-0 applied liquid with coulter rig |
| | 7/10 - 8/8 | 111 lbs/a N chemigated |
| | | |
| | | |
| Planting | 5/4 | Fm 989,  St 4554 |
| | | |
| Herbicide/Growth Regulator | 3/19 | Prowl EC  48 oz/a |
| | 5/7 | Roundup Weather Max  22 oz/a and Cotoran 48 oz/a |
| | 6/5 | Glystar original 32 oz/a |
| | 7/2 | Roundup Weather Max  22 oz/a |
| | 7/18 | Pentia  8 oz/a |
| | 7/29 | Pentia 10 oz/a |
| | 8/1 | Glystar original 32 oz/a |
| | 8/29 | Glystar original 32 oz/a |
| | | |
| Insecticide | 8/9 | Intruder 0.7 oz/a |
| | | Temik 3 lbs/a at Planting |
| | | |
| Harvest aid | 10/19 | Prep and Def  21 oz/a  and 8 oz/a |
| | 10/26 | Gramoxone  24 oz/a |
| Irrigation Amt. | | |
| PrePlant & Planting | | 0 |
| Seasonal | | 9.89 |
| | | |
| Rainfall | | |
| PrePlant & Planting | 1/1-5/5 | 7.64 in. |
| Seasonal | 5/6-10/10 | 13.19 in. |
| | | |
| | | |

Field 6H



Rainfall (in) Helms Irrigation Amounts (inches) L=Lepa Irrigation S=Spray Irrigation

| Date | | | Halfway @ Building | Helms @ Well 1 | Field 2 | | | Field 3 | Field 5A | | Field 5B | | | | Field 5C span 2-4 | Field 5C span 5-8 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Drip | | | Drip | Pivot | | VR-Pivot | | | | Pivot | VR-Pivot | | | |
| | | | | | Cotton | Cotton | Cotton | Sorghum | Cotton | | Sorghum | | | | Cotton | Cotton | | | |
| Mo | Day | Yr | | | T1 | T2 | T3 | Dry | Base | system | Base | Base+ 50% | Base- 50% | system | Base | Base | Base+50% | Base- 50% | system |
| 1 | 13 | 2007 | 0.25 | 0.16 | | | | | | | | | | | | | | | |
| 1 | 20 | 2007 | 0.77 | 0.85 | | | | | | | | | | | | | | | |
| 2 | 2 | 2007 | 0.02 | 0.05 | | | | | | | | | | | | | | | |
| 2 | 11 | 2007 | 0.00 | 0.02 | | | | | | | | | | | | | | | |
| 3 | 10 | 2007 | 0.60 | 0.62 | | | | | | | | | | | | | | | |
| 3 | 11 | 2007 | 1.14 | 1.16 | | | | | | | | | | | | | | | |
| 3 | 12 | 2007 | 0.47 | 0.50 | | | | | | | | | | | | | | | |
| 3 | 22 | 2007 | 0.18 | 0.10 | | | | | | | | | | | | | | | |
| 3 | 24 | 2007 | 0.62 | 0.72 | | | | | | | | | | | | | | | |
| 3 | 25 | 2007 | 0.62 | 0.72 | | | | | | | | | | | | | | | |
| 3 | 28 | 2007 | 0.73 | 0.70 | | | | | | | | | | | | | | | |
| 3 | 30 | 2007 | 0.51 | 0.34 | | | | | | | | | | | | | | | |
| 4 | 8 | 2007 | 0.05 | 0.11 | | | | | | | | | | | | | | | |
| 4 | 12 | 2007 | 0.14 | 0.28 | | | | | | | | | | | | | | | |
| 4 | 13 | 2007 | 0.34 | 0.36 | | | | | 0.50 | S | 0.50 | 0.50 | 0.50 | S | 0.50 | 0.50 | 0.50 | 0.50 | S |
| 4 | 17 | 2007 | 0.15 | 0.39 | | | | | | | | | | | | | | | |
| 4 | 21 | 2007 | 0.39 | 0.28 | | | | | | | | | | | | | | | |
| 5 | 5 | 2007 | 0.48 | 0.28 | | | | | | | | | | | | | | | |
| 5 | 8 | 2007 | 1.76 | 2.03 | | | | | | | | | | | | | | | |
| 5 | 18 | 2007 | 0.13 | 0.13 | | | | | | | | | | | | | | | |
| 5 | 20 | 2007 | 0.32 | 0.22 | | | | | | | | | | | | | | | |
| 5 | 26 | 2007 | 0.40 | 0.40 | | | | | | | | | | | | | | | |
| 5 | 28 | 2007 | 0.44 | 0.78 | | | | | | | | | | | | | | | |
| 5 | 31 | 2007 | 0.45 | 0.37 | | | | | | | | | | | | | | | |
| 6 | 1 | 2007 | 0.45 | 0.37 | | | | | | | | | | | | | | | |
| 6 | 2 | 2007 | 0.18 | 0.04 | | | | | | | | | | | | | | | |
| 6 | 3 | 2007 | 0.39 | 0.49 | | | | | | | | | | | | | | | |
| 6 | 9 | 2007 | 0.28 | 0.34 | | | | | | | | | | | | | | | |
| 6 | 10 | 2007 | 0.28 | 0.35 | | | | | | | | | | | | | | | |
| 6 | 22 | 2007 | 0.03 | 0.03 | 0.38 | 0.38 | 0.40 | | | | | | | | | | | | |
| 6 | 26 | 2007 | 0.91 | 0.90 | | | | | | | | | | | | | | | |
| 7 | 3 | 2007 | | | 0.10 | 0.33 | 0.18 | | | | | | | | | | | | |
| 7 | 5 | 2007 | 0.70 | 0.44 | 0.50 | 0.31 | 0.41 | | | | | | | | | | | | |
| 7 | 9 | 2007 | 0.47 | 0.41 | | | | | 0.08 | L | | | | | | | | | |
| 7 | 11 | 2007 | 0.58 | 0.56 | 0.31 | 0.30 | 0.31 | | | | | | | | | | | | |
| 7 | 13 | 2007 | 0.54 | 0.16 | | | | | | | | | | | | | | | |
| 7 | 17 | 2007 | | | 0.30 | 0.31 | 0.32 | | 0.40 | L | 0.60 | 0.90 | 0.30 | L | 0.40 | 0.40 | 0.60 | 0.20 | L |
| 7 | 18 | 2007 | | | 0.32 | 0.32 | 0.34 | | 0.40 | L | 0.60 | 0.90 | 0.30 | L | 0.20 | 0.20 | 0.30 | 0.10 | L |
| 7 | 19 | 2007 | | | 0.33 | 0.34 | 0.36 | | 0.20 | L | 0.30 | 0.45 | 0.15 | L | 0.40 | 0.40 | 0.60 | 0.20 | L |
| 7 | 20 | 2007 | | | 0.29 | 0.28 | 0.30 | | 0.40 | L | 0.60 | 0.90 | 0.30 | L | 0.40 | 0.40 | 0.60 | 0.20 | L |
| 7 | 21 | 2007 | | | | | | | 0.40 | L | 0.60 | 0.90 | 0.30 | L | 0.20 | 0.20 | 0.30 | 0.10 | L |
| 7 | 23 | 2007 | | | | | | | 0.28 | L | 0.16 | 0.24 | 0.08 | L | 0.16 | 0.16 | 0.24 | 0.08 | L |
| 7 | 24 | 2007 | 0.16 | 0.21 | 0.31 | 0.32 | 0.34 | | 0.15 | L | 0.15 | 0.23 | 0.08 | L | 0.15 | 0.15 | 0.23 | 0.08 | L |
| 7 | 25 | 2007 | | | 0.31 | 0.31 | 0.33 | | 0.15 | L | 0.15 | 0.23 | 0.08 | L | 0.15 | 0.15 | 0.23 | 0.08 | L |
| 7 | 26 | 2007 | | | 0.29 | 0.29 | 0.31 | | 0.20 | L | 0.15 | 0.23 | 0.08 | L | 0.20 | 0.20 | 0.30 | 0.10 | L |
| 7 | 27 | 2007 | | | 0.32 | 0.32 | 0.33 | | 0.13 | L | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L |
| 7 | 28 | 2007 | | | | | | | 0.26 | L | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 7 | 29 | 2007 | | | | | | | 0.13 | L | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L |
| 7 | 30 | 2007 | | | 0.31 | 0.31 | 0.33 | | 0.13 | L | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 7 | 31 | 2007 | | | 0.31 | 0.31 | 0.33 | | 0.26 | L | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L |
| 8 | 1 | 2007 | | | 0.34 | 0.33 | 0.34 | | 0.13 | L | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 8 | 2 | 2007 | 0.72 | 1.50 | 0.29 | 0.28 | 0.28 | | 0.13 | L | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 8 | 3 | 2007 | | | 0.12 | 0.11 | 0.11 | | | | | | | | | | | | |
| 8 | 6 | 2007 | | | | | | | 0.13 | L | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L |
| 8 | 7 | 2007 | | | 0.22 | 0.22 | 0.22 | | 0.26 | L | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 8 | 8 | 2007 | | | 0.32 | 0.31 | 0.30 | | 0.13 | L | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 8 | 9 | 2007 | | | 0.31 | 0.30 | 0.29 | | 0.26 | L | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L |
| 8 | 10 | 2007 | | | 0.32 | 0.31 | 0.31 | | 0.13 | L | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 8 | 11 | 2007 | | | | | | | 0.26 | L | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 8 | 12 | 2007 | | | | | | | | | | | | | | | | | |
| 8 | 13 | 2007 | | | 0.94 | 0.92 | 0.90 | | | | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 8 | 14 | 2007 | | | 0.30 | 0.29 | 0.02 | | 0.13 | L | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 8 | 15 | 2007 | | | 0.10 | 0.10 | | | 0.26 | L | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L |
| 8 | 16 | 2007 | | | 0.31 | 0.30 | | | 0.13 | L | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 8 | 17 | 2007 | 0.21 | 0.11 | 0.29 | 0.28 | | | 0.26 | L | 0.13 | 0.20 | 0.07 | L | | | | | |
| 8 | 18 | 2007 | 0.05 | 0.08 | 0.30 | 0.29 | | | | | | | | | | | | | |
| 8 | 19 | 2007 | | | 0.30 | 0.29 | | | | | | | | | | | | | |
| 8 | 20 | 2007 | | | 0.30 | 0.29 | | | 0.13 | L | 0.13 | 0.20 | 0.07 | L | 0.26 | 0.26 | 0.39 | 0.13 | L |
| 8 | 21 | 2007 | | | 0.30 | 0.28 | | | 0.26 | L | 0.26 | 0.39 | 0.13 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 8 | 22 | 2007 | | | 0.26 | 0.25 | 0.04 | | 0.13 | L | 0.13 | 0.20 | 0.07 | L | 0.26 | 0.26 | 0.39 | 0.13 | L |
| 8 | 23 | 2007 | | | | | | | 0.26 | L | 0.26 | 0.39 | 0.13 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 8 | 24 | 2007 | | | 0.51 | 0.50 | 0.12 | | 0.16 | L | 0.08 | 0.12 | 0.04 | L | 0.21 | 0.21 | 0.32 | 0.11 | L |
| 8 | 25 | 2007 | 1.34 | 1.21 | 0.17 | 0.20 | 0.07 | | | | | | | | | | | | |
| 8 | 26 | 2007 | | | 0.17 | 0.20 | 0.07 | | | | | | | | | | | | |
| 8 | 27 | 2007 | | | 0.17 | 0.20 | 0.07 | | | | | | | | | | | | |
| 8 | 28 | 2007 | | | | | | | 0.13 | L | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L |
| 8 | 29 | 2007 | | | | | | | 0.26 | L | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 8 | 30 | 2007 | 0.10 | 0.06 | 0.18 | | | | 0.13 | L | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L |
| 8 | 31 | 2007 | | | 0.18 | | | | | | | | | | | | | | |
| 9 | 3 | 2007 | | | | | | | 0.13 | L | 0.13 | 0.20 | 0.07 | L | 0.26 | 0.26 | 0.39 | 0.13 | L |
| 9 | 4 | 2007 | | | 0.12 | | | | 0.26 | L | 0.26 | 0.39 | 0.13 | L | 0.13 | 0.13 | 0.20 | 0.07 | L |
| 9 | 5 | 2007 | | | 0.12 | | | | 0.13 | L | 0.13 | 0.20 | 0.07 | L | 0.26 | 0.26 | 0.39 | 0.13 | L |
| 9 | 6 | 2007 | 0.68 | 0.79 | 0.12 | | | | 0.26 | L | 0.13 | 0.20 | 0.07 | L | | | | | |
| 9 | 7 | 2007 | 0.70 | 0.07 | 0.07 | | | | | | | | | | | | | | |
| 9 | 9 | 2007 | 0.08 | 0.09 | | | | | | | | | | | | | | | |
| 9 | 23 | 2007 | 0.57 | 0.41 | | | | | | | | | | | | | | | |
| 10 | 10 | 2007 | 0.64 | 0.64 | | | | | | | | | | | | | | | |
| 12 | 10 | 2007 | 0.17 | 0.32 | | | | | | | | | | | | | | | |
| 12 | 11 | 2007 | 1.00 | 1.00 | | | | | | | | | | | | | | | |
| 12 | 15 | 2007 | 0.20 | 0.20 | | | | | | | | | | | | | | | |
| Pre & At Plant | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | 0.50 | |
| Seasonal | | | | | 11.51 | 10.68 | 7.73 | 0.00 | 8.02 | | 8.59 | 12.89 | 4.30 | | 7.54 | 7.54 | 11.31 | 3.77 | |
| TOTALS | | | 22.39 | 22.35 | 11.51 | 10.68 | 7.73 | 0.00 | 8.52 | | 9.09 | 13.39 | 4.80 | | 8.04 | 8.04 | 11.81 | 4.27 | |

Rainfall (in)

| Date | | | Halfway @ Building | Helms @ Well 1 | Field 5D spans 2-4 | Field 5D span 5-8 | | | | Field 5E spans 2-4 | Field 5E span 5-8 | | | | Field 5F | | | | Field 6A, C, F | Field 6B, D, E | Field 6 Dry | Field 6G | Field 6H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | VR-Pivot | VR-Pivot | | | | VR-Pivot | VR-Pivot | | | | VR-Pivot | | | | Drip | Drip | Drip | Drip | Drip |
| | | | | | Cotton | Cotton | | | | Cotton | Cotton | | | | Cotton | | | | Cotton | Cotton | Cotton | Cotton | Cotton |
| Mo | Day | Yr | | | Base | Base | Base+5 0% | Base-50% | system | Base | Base | Base+ 50% | Base-50% | system | Base | Base+5 0% | Base-50% | system | 1.0 B.I. | 0.5 B.I. | Dry | | |
| 1 | 13 | 2007 | 0.25 | 0.16 | | | | | | | | | | | | | | | | | | | |
| 1 | 20 | 2007 | 0.77 | 0.85 | | | | | | | | | | | | | | | | | | | |
| 2 | 2 | 2007 | 0.02 | 0.05 | | | | | | | | | | | | | | | | | | | |
| 2 | 11 | 2007 | 0.00 | 0.02 | | | | | | | | | | | | | | | | | | | |
| 3 | 10 | 2007 | 0.60 | 0.62 | | | | | | | | | | | | | | | | | | | |
| 3 | 11 | 2007 | 1.14 | 1.16 | | | | | | | | | | | | | | | | | | | |
| 3 | 12 | 2007 | 0.47 | 0.50 | | | | | | | | | | | | | | | | | | | |
| 3 | 22 | 2007 | 0.18 | 0.10 | | | | | | | | | | | | | | | | | | | |
| 3 | 24 | 2007 | 0.62 | 0.72 | | | | | | | | | | | | | | | | | | | |
| 3 | 25 | 2007 | 0.62 | 0.72 | | | | | | | | | | | | | | | | | | | |
| 3 | 28 | 2007 | 0.73 | 0.70 | | | | | | | | | | | | | | | | | | | |
| 3 | 30 | 2007 | 0.51 | 0.34 | | | | | | | | | | | | | | | | | | | |
| 4 | 8 | 2007 | 0.05 | 0.11 | | | | | | | | | | | | | | | | | | | |
| 4 | 12 | 2007 | 0.14 | 0.28 | | | | | | | | | | | | | | | | | | | |
| 4 | 13 | 2007 | 0.34 | 0.36 | 0.50 | 0.50 | 0.50 | 0.50 | S | 0.50 | 0.50 | 0.50 | 0.50 | S | 0.50 | 0.50 | 0.50 | S | | | | | |
| 4 | 17 | 2007 | 0.15 | 0.39 | | | | | | | | | | | | | | | | | | | |
| 4 | 21 | 2007 | 0.39 | 0.28 | | | | | | | | | | | | | | | | | | | |
| 5 | 5 | 2007 | 0.48 | 0.28 | | | | | | | | | | | | | | | | | | | |
| 5 | 8 | 2007 | 1.76 | 2.03 | | | | | | | | | | | | | | | | | | | |
| 5 | 18 | 2007 | 0.13 | 0.13 | | | | | | | | | | | | | | | | | | | |
| 5 | 20 | 2007 | 0.32 | 0.22 | | | | | | | | | | | | | | | | | | | |
| 5 | 26 | 2007 | 0.40 | 0.40 | | | | | | | | | | | | | | | | | | | |
| 5 | 28 | 2007 | 0.44 | 0.78 | | | | | | | | | | | | | | | | | | | |
| 5 | 31 | 2007 | 0.45 | 0.37 | | | | | | | | | | | | | | | | | | | |
| 6 | 1 | 2007 | 0.45 | 0.37 | | | | | | | | | | | | | | | | | | | |
| 6 | 2 | 2007 | 0.18 | 0.04 | | | | | | | | | | | | | | | | | | | |
| 6 | 3 | 2007 | 0.39 | 0.49 | | | | | | | | | | | | | | | | | | | |
| 6 | 9 | 2007 | 0.28 | 0.34 | | | | | | | | | | | | | | | | | | | |
| 6 | 10 | 2007 | 0.28 | 0.35 | | | | | | | | | | | | | | | | | | | |
| 6 | 22 | 2007 | 0.03 | 0.03 | | | | | | | | | | | | | | | | | | | |
| 6 | 26 | 2007 | 0.91 | 0.90 | | | | | | | | | | | | | | | | | | | |
| 7 | 3 | 2007 | | | | | | | | | | | | | | | | | 0.38 | 0.16 | 0.00 | 0.41 | 0.31 |
| 7 | 5 | 2007 | 0.70 | 0.44 | | | | | | | | | | | | | | | | | | | |
| 7 | 9 | 2007 | 0.47 | 0.41 | | | | | | | | | | | | | | | | | | | |
| 7 | 11 | 2007 | 0.58 | 0.56 | | | | | | | | | | | | | | | 0.39 | 0.20 | 0.00 | 0.35 | 0.34 |
| 7 | 13 | 2007 | 0.54 | 0.16 | | | | | | | | | | | | | | | | | | | |
| 7 | 17 | 2007 | | | 0.40 | 0.40 | 0.60 | 0.20 | L | 0.20 | 0.20 | 0.30 | 0.10 | L | 0.20 | 0.30 | 0.10 | L | 0.43 | 0.19 | 0.00 | 0.35 | 0.33 |
| 7 | 18 | 2007 | | | 0.20 | 0.20 | 0.30 | 0.10 | L | 0.40 | 0.40 | 0.60 | 0.20 | L | 0.40 | 0.60 | 0.20 | L | 0.39 | 0.20 | 0.00 | 0.35 | 0.35 |
| 7 | 19 | 2007 | | | 0.40 | 0.40 | 0.60 | 0.20 | L | 0.40 | 0.40 | 0.60 | 0.20 | L | 0.40 | 0.60 | 0.20 | L | 0.40 | 0.24 | 0.00 | 0.35 | 0.43 |
| 7 | 20 | 2007 | | | 0.40 | 0.40 | 0.60 | 0.20 | L | 0.20 | 0.20 | 0.30 | 0.10 | L | 0.20 | 0.30 | 0.10 | L | 0.37 | 0.16 | 0.00 | 0.34 | 0.25 |
| 7 | 21 | 2007 | | | 0.20 | 0.20 | 0.30 | 0.10 | L | 0.40 | 0.40 | 0.60 | 0.20 | L | 0.40 | 0.60 | 0.20 | L | | | | | |
| 7 | 23 | 2007 | | | 0.16 | 0.16 | 0.24 | 0.08 | L | 0.16 | 0.16 | 0.24 | 0.08 | L | 0.28 | 0.42 | 0.14 | L | | | | | |
| 7 | 24 | 2007 | 0.16 | 0.21 | 0.15 | 0.15 | 0.23 | 0.08 | L | 0.15 | 0.15 | 0.23 | 0.08 | L | 0.15 | 0.23 | 0.08 | L | 0.39 | 0.20 | 0.00 | 0.35 | 0.34 |
| 7 | 25 | 2007 | | | 0.20 | 0.20 | 0.30 | 0.10 | L | 0.15 | 0.15 | 0.23 | 0.08 | L | 0.15 | 0.23 | 0.08 | L | 0.38 | 0.20 | 0.00 | 0.34 | 0.33 |
| 7 | 26 | 2007 | | | 0.15 | 0.15 | 0.23 | 0.08 | L | 0.20 | 0.20 | 0.30 | 0.10 | L | 0.15 | 0.23 | 0.08 | L | 0.37 | 0.19 | 0.00 | 0.34 | 0.31 |
| 7 | 27 | 2007 | | | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.20 | 0.07 | L | 0.38 | 0.20 | 0.00 | 0.34 | 0.34 |
| 7 | 28 | 2007 | | | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.39 | 0.13 | L | | | | | |
| 7 | 29 | 2007 | | | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.20 | 0.07 | L | | | | | |
| 7 | 30 | 2007 | | | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.39 | 0.13 | L | 0.38 | 0.20 | 0.00 | 0.34 | 0.34 |
| 7 | 31 | 2007 | | | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.20 | 0.07 | L | 0.37 | 0.18 | 0.00 | 0.30 | 0.31 |
| 8 | 1 | 2007 | | | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.39 | 0.13 | L | 0.05 | 0.11 | 0.00 | 0.00 | 0.26 |
| 8 | 2 | 2007 | 0.72 | 1.50 | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.20 | 0.07 | L | 0.39 | 0.21 | 0.00 | 0.34 | 0.35 |
| 8 | 3 | 2007 | | | | | | | | | | | | | | | | | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 |
| 8 | 6 | 2007 | | | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.20 | 0.07 | L | | | | | |
| 8 | 7 | 2007 | | | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.39 | 0.13 | L | 0.32 | 0.08 | 0.00 | 0.33 | 0.02 |
| 8 | 8 | 2007 | | | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.20 | 0.07 | L | 0.39 | 0.21 | 0.00 | 0.35 | 0.35 |
| 8 | 9 | 2007 | | | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.20 | 0.07 | L | 0.38 | 0.19 | 0.00 | 0.33 | 0.31 |
| 8 | 10 | 2007 | | | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.39 | 0.13 | L | 0.38 | 0.20 | 0.00 | 0.35 | 0.34 |
| 8 | 11 | 2007 | | | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.20 | 0.07 | L | | | | | |
| 8 | 12 | 2007 | | | | | | | | | | | | | | | | | 0.38 | 0.20 | 0.00 | 0.34 | 0.31 |
| 8 | 13 | 2007 | | | | | | | | | | | | | | | | | 0.38 | 0.20 | 0.00 | 0.34 | 0.30 |
| 8 | 14 | 2007 | | | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.39 | 0.13 | L | 0.24 | 0.21 | 0.00 | 0.17 | 0.47 |
| 8 | 15 | 2007 | | | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.20 | 0.07 | L | 0.29 | 0.16 | 0.00 | 0.26 | 0.25 |
| 8 | 16 | 2007 | | | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.39 | 0.13 | L | 0.30 | 0.16 | 0.00 | 0.26 | 0.25 |
| 8 | 17 | 2007 | 0.21 | 0.11 | | | | | | | | | | | | | | | 0.26 | 0.15 | 0.00 | 0.21 | 0.25 |
| 8 | 18 | 2007 | 0.05 | 0.08 | | | | | | | | | | | | | | | 0.29 | 0.16 | 0.00 | 0.26 | 0.25 |
| 8 | 19 | 2007 | | | | | | | | | | | | | | | | | 0.29 | 0.16 | 0.00 | 0.26 | 0.25 |
| 8 | 20 | 2007 | | | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.13 | 0.20 | 0.07 | L | 0.29 | 0.16 | 0.00 | 0.26 | 0.25 |
| 8 | 21 | 2007 | | | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.26 | 0.39 | 0.13 | L | 0.28 | 0.15 | 0.00 | 0.26 | 0.25 |
| 8 | 22 | 2007 | | | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.13 | 0.20 | 0.07 | L | | | | | |
| 8 | 23 | 2007 | | | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.26 | 0.39 | 0.13 | L | | | | | |
| 8 | 24 | 2007 | | | 0.21 | 0.21 | 0.32 | 0.11 | L | 0.21 | 0.21 | 0.32 | 0.11 | L | 0.16 | 0.24 | 0.08 | L | | | | | |
| 8 | 25 | 2007 | 1.34 | 1.21 | | | | | | | | | | | | | | | 0.30 | 0.18 | 0.00 | 0.26 | 0.32 |
| 8 | 26 | 2007 | | | | | | | | | | | | | | | | | 0.30 | 0.18 | 0.00 | 0.26 | 0.32 |
| 8 | 27 | 2007 | | | | | | | | | | | | | | | | | 0.30 | 0.18 | 0.00 | 0.26 | 0.32 |
| 8 | 28 | 2007 | | | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.20 | 0.07 | L | | | | | |
| 8 | 29 | 2007 | | | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.39 | 0.13 | L | | | | | |
| 8 | 30 | 2007 | 0.10 | 0.06 | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.20 | 0.07 | L | 0.14 | 0.08 | 0.00 | 0.13 | 0.12 |
| 8 | 31 | 2007 | | | | | | | | | | | | | | | | | 0.14 | 0.08 | 0.00 | 0.13 | 0.11 |
| 9 | 3 | 2007 | | | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.13 | 0.20 | 0.07 | L | | | | | |
| 9 | 4 | 2007 | | | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.13 | 0.13 | 0.20 | 0.07 | L | 0.26 | 0.39 | 0.13 | L | 0.10 | 0.05 | 0.00 | 0.08 | 0.09 |
| 9 | 5 | 2007 | | | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.26 | 0.26 | 0.39 | 0.13 | L | 0.13 | 0.20 | 0.07 | L | 0.10 | 0.05 | 0.00 | 0.08 | 0.09 |
| 9 | 6 | 2007 | 0.68 | 0.79 | | | | | | | | | | | | | | | 0.10 | 0.05 | 0.00 | 0.08 | 0.09 |
| 9 | 7 | 2007 | 0.70 | 0.07 | | | | | | | | | | | | | | | | | | 0.01 | 0.13 |
| 9 | 9 | 2007 | 0.08 | 0.09 | | | | | | | | | | | | | | | | | | | |
| 9 | 23 | 2007 | 0.57 | 0.41 | | | | | | | | | | | | | | | | | | | |
| 10 | 10 | 2007 | 0.64 | 0.64 | | | | | | | | | | | | | | | | | | | |
| 12 | 10 | 2007 | 0.17 | 0.32 | | | | | | | | | | | | | | | | | | | |
| 12 | 11 | 2007 | 1.00 | 1.00 | | | | | | | | | | | | | | | | | | | |
| 12 | 15 | 2007 | 0.20 | 0.20 | | | | | | | | | | | | | | | | | | | |
| Pre & At Plant | | | | | 0.50 | 0.50 | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | 0.50 | | 0.50 | 0.50 | 0.50 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Seasonal | | | | | 7.67 | 7.67 | 11.51 | 3.84 | | 7.41 | 7.41 | 11.12 | 3.71 | | 7.30 | 10.95 | 3.65 | | 11.08 | 5.90 | 0.00 | 9.77 | 10.15 |
| TOTALS | | | 22.39 | 22.35 | 8.17 | 8.17 | 12.01 | 4.34 | | 7.91 | 7.91 | 11.62 | 4.21 | | 7.80 | 11.45 | 4.15 | | 11.08 | 5.90 | 0.00 | 9.77 | 10.15 |