MINUTES OF THE MARCH 11, 2014
BOARD OF DIRECTORS MEETING OF
NORTH PLAINS GROUNDWATER CONSERVATION DISTRICT

The Board of Directors of North Plains Groundwater Conservation District met in regular session March 11, 2014, at 9:30 a.m. in the Conference Room of the Hampton Inn, 2010 South Dumas Avenue, Dumas, Texas 79029. The following persons were present:

Members Present:

Gene Born; President
Phil Haaland; Director;
Brian Bezner, Director;
Harold Grall, Director;
Bob Zimmer, Secretary; and,
Justin Crownover, Director.

Staff Present during part or all of the meeting:

Steve Walthour, General Manager;
Dale Hallmark, Assistant General Manager and Hydrologist;
Kirk Welch, Assistant General Manager/Outreach
Odell Ward, GIS and Natural Resource Tech Lead;
Pauletta Rhoades, Finance and Administration Coordinator; and,
Paul Sigle, Agricultural Engineer.

Others present during part or all of the meeting:

Sabrina Leven;
Ashley Hanoy;
Amy Haschke;
Miles Frische;
Scott Clawson;
Zach Yoder;
Steve Yoder;
Mark Howard;
F. Keith Good, Attorney; and,
Ellen Orr, Paralegal.

President Born declared a quorum present and called the meeting to order at 9:38 a.m.

Director Bob Zimmer gave the invocation and President Born led the pledge.

President Born asked if there were persons present who desired to make public comment. No public comment was made.

Bob Zimmer moved to remove the review and approval of the minutes of the regular Board Meeting held on February 11, 2014 from the Consent Agenda. Brian Bezner seconded the motion and the motion passed unanimously.

Bob Zimmer moved to approve the remaining items on the Consent Agenda consisting of the review and approval of District expenditures for February 1, 2014 through February 28, 2014, including the General Manager's Expense and Activity Report; and the approval of payment of professional services and out-of-pocket expenses to Lemon, Shearer, Phillips & Good, P.C. in the amount of $10,157.16 for February 1, 2014, through February 28, 2014. Phil Haaland seconded the motion and the motion passed unanimously.

The President and Secretary of the Board certified to the Board that Justin Crownover, candidate for Board of Director of Precinct Three and Harold Grall, candidate for Board of Director of Precinct Four were unopposed in the May 10, 2014 Board of Director Election.

Phil Haaland moved that as the authority responsible for having the official ballot prepared, we hereby certify that Justin Crownover – Precinct No 3 – Sherman County and Harold Grall, Precinct No. 4 – Moore County are unopposed for election to office for the election scheduled to be held on May 10, 2014. Bob Zimmer seconded the motion and the motion passed unanimously.

Phil Haaland moved that the North Plains Groundwater Conservation District hereby cancels the election scheduled to be held in Precinct No. 3 and Precinct No. 4 on May 10, 2014 in accordance with Section 2.053(a) of the Texas Election Code. Justin Crownover – candidate for Director of Precinct No 3 – Sherman County and Harold Grall, candidate for Director of Precinct No. 4 – Moore County have been certified as unopposed and are hereby elected. Justin Crownover seconded the motion and the motion passed unanimously.

The Schedule of Well Permits set forth below was presented to the Board for its review. Justin Crownover moved to approve the Schedule of Well Permits presented to the Board because the Wells are properly equipped and otherwise comply with District Rules. Brian Bezner seconded the motion and it was unanimously approved by the Board.

County	Owner	Well	Meter Location	CL	Max	Qtr	Sec	Blk	Sur	Yards N S	Yards E W
Hartley	Larsen Farms	HA-5132	Well	C	800	NE	25	11	CSS	290N	32E
Hartley	Larsen Farms	HA-5134	Well	C	800	SW	27	A-1	PSL	233S	1000W
Hartley	Larsen Farms	HA-5135	Well	C	800	NW	25	11	CSS	54N	588W
Hartley	Larsen Farms	HA-5196	Well	C	800	SE	25	11	CSS	275S	851E
Hartley	Larsen Farms	HA-5274	Well	C	800	SW	27	A-1	PSL	182S	136W
Hartley	Larsen Farms	HA-5275	Well	C	800	SE	25	11	CSS	33S	166E
Hartley	Larsen Farms	HA-5277	Well	C	800	SW	27	A-1	PSL	381S	531W

Efficient Profitable Irrigation in Corn (EPIC) is a results-oriented demonstration effort conducted by the Texas AgriLife Extension Service and funded primarily by the North Plains Groundwater Conservation District. The foundation of EPIC is the principle of managing irrigation water for maximized profitability as a means for making optimal economic and agronomic use of the water resource, namely the Ogallala aquifer. EPIC targets grain corn producers who historically employ efficient irrigation systems and solid agricultural practices in a production strategy focusing on maximized yields (revenue). EPIC is designed to be a multi-year, staged project that helps high-yield grain corn producers maximize their on-farm production potential and reduce applied irrigation water.

Potential regional water savings under partial adoption of this practice is estimated to exceed 37,500 acre-feet or 12 billion gallons annually.

Scott Strawn and J. R. Sprague presented the 2013 Efficient Profitable Irrigation in Corn report to the Board, a copy of which is attached hereto as Exhibit "A", and is incorporated herein for all purposes.

Following the presentation of Mr. Strawn and Mr. Sprague, the General Manager reported that he would present the actual cost of the EPIC program to the Boart at its next regular meeting.

Phil Haaland moved to continue funding the EPIC Program. Justin Crownover seconded the motion and it was unanimously approved by the Board.

On February 21st, the Joint Planning Committee of GMA-1 ("JPC") met at the Panhandle Regional Planning Commission in Amarillo. Bob Zimmer was elected president of the JPC because of John R. Spearman stepping down from the committee. Danny Krienke was re-appointed by the JPC to be its representative to the Region A Water Planning Committee. Gene Born, Keith Good, Dale Hallmark, and Steve Walthour attended the

meeting. The JPC accepted director Zimmer's offer that the North Plains District staff take the lead in the present joint planning process.

The next JPC meeting will be April 11th. At that meeting, the General Manager has scheduled Wade Oliver from Intera to make a presentation on Estimated Total Recoverable Groundwater. Mr. Oliver, worked directly on the Ogallala model while at the TWDB. The General Manager encouraged the Board to attend this meeting for the presentation. Also, the JPC is scheduled to preliminarily propose DFCs. Other topics will include:

- Discussion of the use of current DFCs and existing estimates of Modeled Available Groundwater for consideration;
- Consideration of aquifer use in GMA-1, including conditions that are substantially different from one geographic area to another;
- Consideration of water supply needs and water management strategies included in the 2012 State Water Plan; and
- Discussion of possible approaches for developing pumping scenarios.

The General Manager made a presentation to the Board on the status of actual measured groundwater production compared to DFCs and Estimated Recoverable Groundwater.

The schedule established by Bill Mullican, the TWDB guidance document and TWDB explanation of estimated recoverable groundwater was presented to the Board.

Bob Zimmer asked that the Board to be prepared to offer what the proposed DFC simulation should be at the next Board meeting.

The General Manager stated that the Board should decide what the baseline of the DFC should be, i.e. the Board's best estimate of what modeled numbers should be at the DFC level.

Mr. Grall stated that it is good news that the District is on track after three years. Mr. Grall also stated that it appeared to him that everyone needs to remain on the path of self-conservation.

The Board recessed at 11:37 a.m. and reconvened at 11:55 a.m.

The General Manager presented the revised proposed Rules to the Board from the February 11, 2014 Board meeting. The General Manager presented an overview of Chapter 1 through Chapter 7 of the proposed Rules.

Justin Crownover stated that he does not like the 15,000 feet that is in proposed Rule 7.6.1 and requested that the Board consider something different.

The Board recessed for lunch at 12:40 p.m. and reconvened at 12:57 p.m.

The General Manager continued the overview of Chapter 8 through Chapter 10 of the proposed Rules.

Justin Crownover moved to change the diagonal pooling distance in the proposed draft of Rule 7.5.1 from 15,000 feet to 25,000 and to leave the other language in proposed Rule 7.5.1 the same. Phil Haaland seconded the motion and a roll call vote was called by the President:

Phil Haaland – Yes

Harold Grall – Yes

Bob Zimmer – Yes

Brian Bezner – Yes

Justin Crownover – Yes

Gene Born – Yes.

The motion passed unanimously.

The General Manager asked the Board to review their calendars for possible dates to hold stakeholder's meeting to review and discuss the Proposed Rules as modified. April 2, 2014, April 8, 2014 and April 15, 16, or 17 were submitted by the Board as possible dates to hold the stakeholder's meetings to discuss the proposed Rules.

At 2:03 p.m. the Board recessed and the Board reconvened at 2:11 p.m.

Steve Walthour presented a report to the Board regarding the District's 200-12 Demonstration Program, the Texas AgriLife Extension EPIC Demonstration and the High Plains Initiative.

200-12

District staff and consultant are collecting yield data from producers and are working on the yearly report for the 200-12.

2014 NRCS Conservation Innovation Grant

District staff has completed a pre-proposal submission for the Fiscal Year 2014. The submission, *"The Ogallala Strategic Irrigation Management and Conservation Initiative,"* expands the ideals of the "200-12" Project to other crops. The District will further persuade partners to expand the project from the Texas High Plains to across the Great Plains, including multiple states in the project. The District's cost share for the grant is $355,031.94 of the total budget of $698,572.20 over three years.

2014 TWDB Agriculture Water Conservation Grants

District staff is currently working on multiple proposal submissions for the Fiscal Year 2013- 2014. They are as follows:

1) $197,313.27 will be requested for continuation of the District's 200-12 Project for years 2015, 2016 and 2017. The District is required to provide matching funds equal to the requested amount.

2) $600,000 will be requested to provide a 50-percent cost share on meters that are officially required by District rules. Matching funds will be collected from cost share recipients.

3) $100,000 will be requested to provide a 50-percent cost share on other monitoring equipment including soil moisture monitors. Matching funds will be collected from cost share recipients.

The General Manager recommended that the Board ratify the actions taken by the District staff in connection with the three grants and direct the General Manager to continue to pursue all three grant applications.

Phil Haaland moved that the Board ratify the actions taken by the District staff in connection with the three grants and direct the General Manager to continue to pursue all three grant applications as set forth above. Harold Grall seconded the motion and it was unanimously approved by the Board.

In February, the General Manager met with Texas A&M AgriLife Research and Extension on the general contractual conditions for use of the Water Conservation Center beginning in September 2014. At that meeting Texas AgriLife shared their memo regarding significant property accounting and proposed disposition at North Plains Research Field. The proposed dispositions of equipment at the field are laid out as follows:

- Table A. No action required; leave at NPRF;
- Table B. Propose to leave at NPRF and settle monetarily with NPGCD;

- Table C. Move equipment to Texas A&M AgriLife Research Amarillo/Bushland for reuse or re-deployment; and

- Table D. Texas A&M AgriLife Research plans to move and sell equipment.

District staff and the Ag Committee will evaluate the memo in the next couple of weeks to determine what the District may wish to retain at the field.

Texas AgriLife also proposed a seasonal Land Research Agreement to continue to conduct wheat breeding research. The agreement would be for two years.

The General Manager met with the Texas Water Development Board on February 26th in Austin to seek information on possibly a low interest loan for the purchase of equipment at the field. The TWDB staff said an Agriculture Conservation Loan is available at 0.13% (0.0013) annual interest rate up to $1,000,000 for up to an eight-year term at the time of the meeting. The agriculture conservation loan can be used for irrigation equipment and infrastructure only. The District could not use the money for other items such as tractors or other farm implements.

The TWDB also has requested applications for matching grants up to $200,000 for irrigation equipment. Since a hard copy of the grant application is due into the TWDB by noon March 12th, the General Manager filed an application requesting an $187,500 TWDB grant to improve irrigation systems at the North Plains Water Conservation Center before the Board meeting.

The General Manager requested that the Board authorize the General Manager, under the direction of the Ag Committee, to complete the following tasks:

- Evaluate the disposition of the equipment at the field and negotiate with Texas A&M AgriLife the equipment or improvements the District wishes to retain;

- Negotiate and execute, if agreeable with the Ag Committee, the seasonal land agreement with Texas AgriLife to continue wheat breeding research at a location mutually agreed to by both parties; and

- To apply for Agricultural Conservation Loan Funding for irrigation or other equipment as determined by the Ag Committee.

Further, the General Manager also requested that the Board ratify the filing of the application to seek TWDB grant funding for irrigation equipment in the amount of $187,500.00.

Harold Grall moved that the Board ratify the filing of the application to seek TWDB grant funding for irrigation equipment in the amount of $187,500.00 and authorize the General Manager, under the direction of the Ag Committee, to complete tasks as follows:

- Evaluate the disposition of the equipment at the field and negotiate with Texas A&M AgriLife the equipment or improvements the District wishes to retain;

- Negotiate and execute, if agreeable with the Ag Committee, the seasonal land agreement with Texas AgriLife to continue wheat breeding research at a location mutually agreed to by both parties;

- To apply for Agricultural Conservation Loan Funding for irrigation or other equipment as determined by the Ag Committee.

Brian Bezner seconded the motion and it was unanimously approved by the Board.

The General Manager reported that the Panhandle Regional Water Planning Group met on February 21, 2014 and that Danny Krienke attended the meeting.

Dale Hallmark presented a draft of a revised Employment, Office and Employee Policy Manual to the Board. Mr. Hallmark stated that revision is necessary to better reflect District management methods and goals, state and federal Law, common business practices, as well as to clarify syntax and intent. Mr. Hallmark also stated that changes were made to the employee benefit sections to better reflect current health benefits offered, to provide employees with 20-years' service an extra four hours per month for annual leave, and to bring the "per diem" section into alignment with IRS guidelines. Many sections were simply rewritten for clarification and to more clearly state District intent. Some sections where more than one interpretation was possible were modified to allow the General Manager discretion in interpretation. Board consideration of the approval of the proposed Employment, Office and Employee Policy will be placed on the Board's next regular meeting agenda.

The City of Dumas approved the special permit application on February 18, 2014, for 605 1st Place, Dumas, Texas. The General Manager has ordered a survey through the District's real estate agent and starting the process to close on the property. Harold Grall moved to purchase Lot 3, Block 4, Coronado Addition, an Addition to the City of Dumas, County of Moore, State of Texas, commonly described as 605 1st Place, Dumas, Texas for the price of $50,000 under the terms of the Contract between the District and Karen Faye McDade, dated February 6, 2014; and to adopt the following resolution authorizing the General Manager, Steve Walthour, to close the acquisition of the property.

> **Be it Resolved**, and it is hereby Resolved, that the General Manager of the North Plains Groundwater Conservation District, Steve Walthour, is hereby authorized on behalf of the District to close the Contract of Sale on certain real property situated at 605 1st Place, Dumas, Texas; to execute on behalf of the District any and all documents required to effect the acquisition of such real property; and to pay the purchase price of $50,000 and any all other closing costs required.

Justin Crownover seconded the motion and the motion was approved unanimously by the Board. The foregoing Resolution was adopted unanimously by the Board.

The General Manager reported that the 2013 Annual Production Reports were due by the end of business on March 3, 2014. The normal due date is March 1st; however, since March 1st was on a weekend the District rules move the due date to the first business day of the month. As of March 5th, the District has received 2578 production reports out of 2751, which is about 94% of the total reports that were mailed out in December. It is possible that some of the missing 6% are at the District, but are stuck to other reports or miss-filed in some way. District employees are currently working to contact the producers that have not submitted a 2013 Production Report.

Harold Grall moved to approve the Minutes of the February 28, 2014 Board of Directors Meeting as presented. Justin Crownover seconded the motion and it was unanimously approved by the Board.

Steve Walthour presented the General Manager's Report, including information concerning upcoming meetings and conferences and the General Manager's activity summary.

No Committee reports were presented.

District Directors reported to the Board regarding meetings and/or seminars attended, weather conditions and economic development in each Director's precinct.

By consensus, the Board set its next Board Meeting at 9:30 a.m. on April 8, 2014.

Phil Haaland moved to adjourn the meeting. Brian Bezner seconded the motion and the motion was unanimously approved. President Born declared the meeting adjourned at 2:42 p.m.

Gene Born, President

Bob Zimmer, Secretary

TEXAS A&M AGRILIFE EXTENSION

2013 Efficient Profitable Irrigation in Corn

Michael Bragg, Kristy Slough, JR Sprague, Marcel Fischbacher, Scott Strawn, Brad Easterling

March 2014

Project in cooperation with and funded by:
North Plains Groundwater Conservation District

2013 Efficient Profitable Irrigation in Corn

Michael Bragg, Kristy Slough, JR Sprague, Marcel Fischbacher,
Scott Strawn, Brad Easterling

Executive Summary

Efficient Profitable Irrigation in Corn (EPIC) is a results demonstration effort conducted by the Texas A&M AgriLife Extension Service county Extension agents in Hartley, Hutchinson, Lipscomb, Moore, Ochiltree and Sherman counties. Funding for the EPIC project was provided by the North Plains Ground Water Conservation District. The foundation of EPIC is the principle of managing irrigation water for maximized profitability as a means for making optional economic and agronomic use of water resource, namely the Ogallala Aquifer. EPIC targeted six (6) grain corn producers and one (1) grain sorghum producer who employ efficient irrigation systems and solid agricultural practices in a production strategy focusing on maximized yields (revenue). EPIC is designed to be a multi-year staged project that helps high yield grain producers maximize their on-farm production potential and reduce applied irrigation water. Potential regional water savings under partial adoption of this practice is estimated to exceed 37,500 acre-feet or 12 billion gallons annually.

EPIC's infield approach utilized two side by side field plots (separate fields or split fields) (Sherman, Moore, Hutchinson, Hartley, separate fields) (Lipscomb, Ochiltree split fields) maintaining one plot as a control (Legacy) and one plot as a treatment (EPIC). Irrigation is managed on the treatment plot (EPIC) to meet two objectives; 1) maintain or improve yields as compared to the control and 2) reduce pumped irrigation water by one to four inches.

In the third season, 2013 six (6) irrigated corn producers and one (1) grain sorghum producer within the North Plains Groundwater Conservation District became EPIC cooperators, contributing field scale control and experimental plots, all farm operations, and all production cost with no monetary compensation from EPIC. The EPIC project provided Pivotrac or Ag Sense monitoring (where applicable) with producer access and AquaSpy soil probes and Aqua Planner crop modeling with or without producer access. The EPIC plot was managed with Texas A&M AgriLife Extension Service county agents inputs based on best management practices and information from management tools.

Total in season rainfall, applied irrigation, and soil water data was collected plus yield data from controls and experiments to help determine effectiveness of applied management practices.

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HARTLEY COUNTY

AGRILIFE EXTENSION

Agriculture and Natural Resources

Efficient Profitable Irrigation in Corn-EPIC
Texas AgriLife Extension Service-Hartley County
Cooperators: Gabe Ferris
Mike Bragg-CEA Agriculture Texas AgriLife Extension Dallam & Hartley County

Summary

Using data from Aqua Planner with a beginning date of May 10th irrigation applied was roughly the same for both the EPIC and Legacy fields. No irrigation savings opportunities were apparent during the growing season due to ongoing drought. On the total irrigation EPIC was 23.57 inches and control Legacy was 23.36 inches. Total precipitation EPIC was 5.40 inches and control Legacy was 5.49 inches. Soil types (see attachment A) where the capacitor probes were placed was a Sherman clay loam comprising over 80% of the predominate soil type. Dumas loam was the next predominate soil type at around 12%. Topography was 22 feet higher on the south side of Legacy when compared to the east side of EPIC field. This change in elevation likely had a role in water distribution as both fields were irrigated via a common irrigation line that was valved to the individual fields. Changes in water pressure were measured through PivotTrac, EPIC field saw end tower pressure changes from a high of around 10 psi to a low of 8.5 psi. In comparison the Legacy field varied for a high of around 10.5 psi to a low of 7. This variation is illustrated on (attachment B). The harvest results favored the EPIC field with a 15 bushel per acre advantage. EPIC had 233 bushel per acre yield compared to Legacy at 218 bu. per acre.

Objective

Efficient Profitable Irrigation in Corn is a results demonstration effort conducted by the Texas AgriLife Extension Service and funded primarily by the North Plains Groundwater Conservation District. The foundation of EPIC is the principle of managing irrigation water for maximized profitability as a means for making optimal economic and agronomic use the water resource from the Ogallala Aquifer. EPIC targets corn producers who typically employ efficient irrigation systems and solid agricultural practices in a production strategy focusing on maximized yields (revenue). EPIC is designed to be a multi-year, staged project that helps high yield grain corn producers maximize their on farm production potential and reduce applied irrigation water. Potential regional water savings under partial adoption of this practice is estimated to exceed 37,500 acre-feet or 12 Billion gallons annually.

Materials and Methods

The infields scientific approach under EPIC utilized a single field plot maintaining one – 125 acre field as a control (Legacy) and a single contiguous field managing the irrigation on the experimental plot 125 acres (EPIC) with two objectives.

1. Maintain or improve yield as compared to the control.
2. Reduce applied irrigation when opportunities were warranted

Both plots were similar prepared and managed according to the cooperators best management practices. The cooperator contributed the field, all farm operation and production cost with no compensation form EPIC. The pivot was equipped with PivotTrac monitoring with producer access and AquaSpy soil probes and Aqua Planner crop modeling. Producer requested access to this technology and access was granted.

Results and Discussion

2013 EPIC results are tabulated below. Corn yields were maintained and even increased when water distribution was more even.

Plot	Irrigation	Soil	Precipitation	Total Inches	Yield
Legacy	23.36	0	5.49	28.85	218.0
EPIC	23.57	0	5.40	28.97	233.0

No soil moisture measurements were taken as both fields were extremely dry prior to pre-watering and had the same previous crop the previous year which was corn.

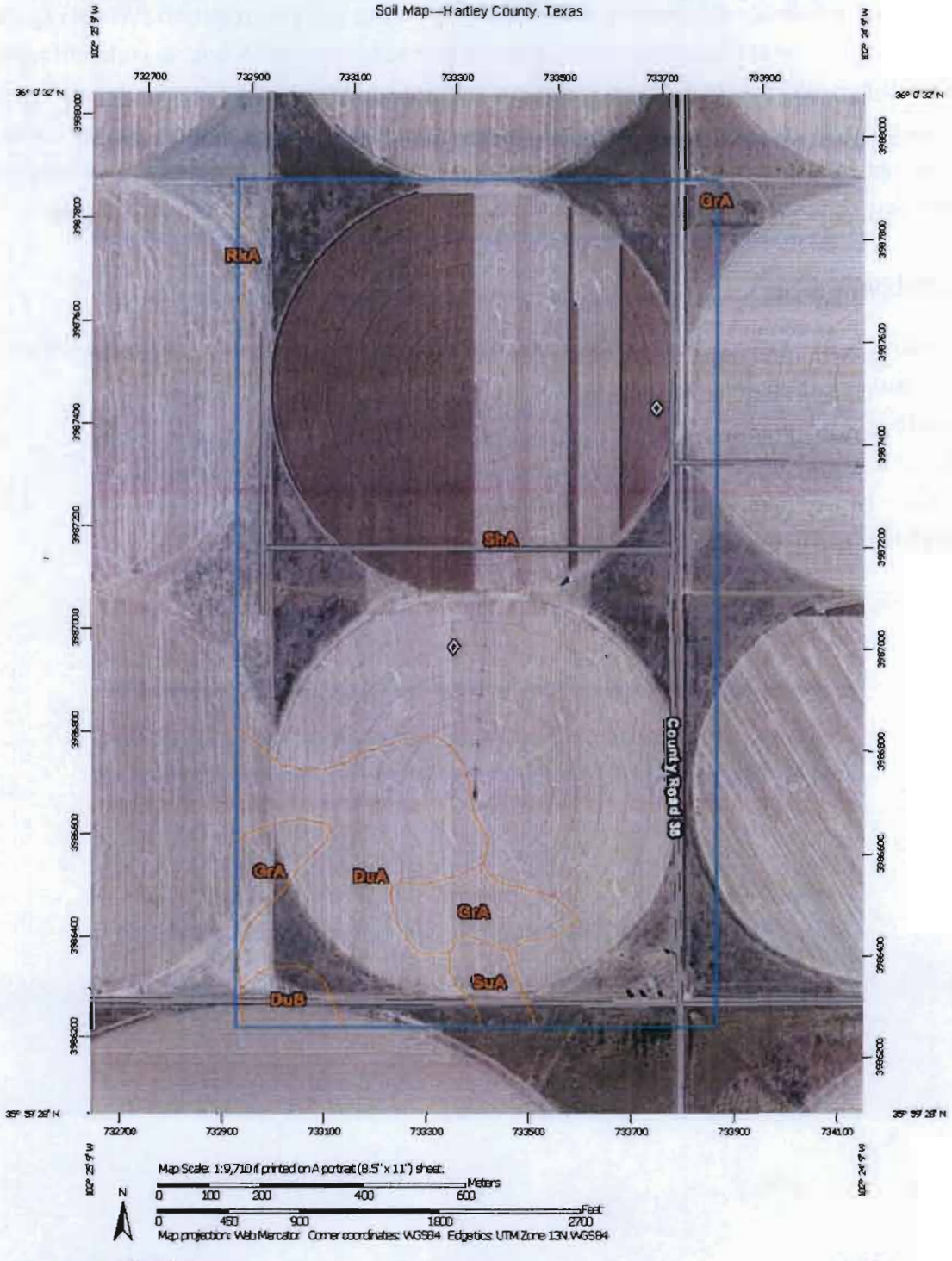
Conclusions

With everything very close to equal regarding inputs it appears the tools used to monitor irrigation and efficiency discovered inefficiency within the current irrigation system regarding water distribution that likely impacted yield and attributed to the 15 bushel yield difference. This is further proof that these new irrigation management tools can help producers improve their current systems and become more efficient with irrigation. Hopefully weather conditions will improve so EPIC can be fully tested in our area to validate this technology and collect more data on how corn yields are impacted using sound irrigation management techniques.

Acknowledgements

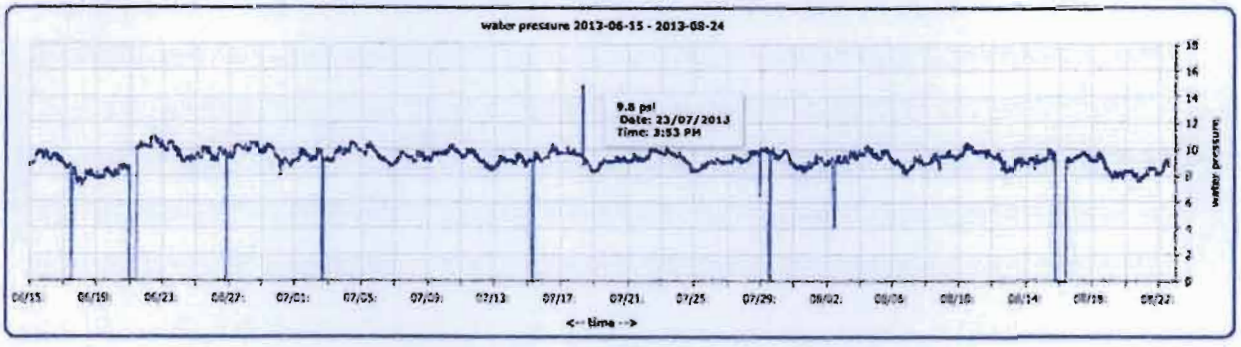
North Plains Groundwater Conservation District - provided funding to conduct the project
Karlyle Haaland – Pivotrac Monitoring
Pat Scarth – Aqua Planner
David Sloan – AquaSpy
Paul Sigle – North Plain Groundwater Conservation District
Kirk Welch – North Plain Groundwater Conservation District

Attachment A

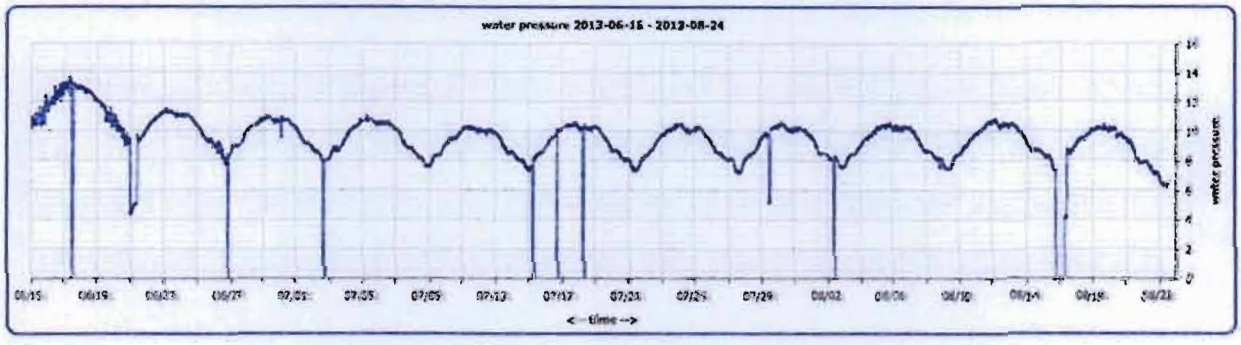


Attachment B

5b Legacy



5a Epic



HUTCHINSON COUNTY

Efficient Profitable Irrigation in Corn – EPIC

Texas A&M AgriLife Extension Service – Hutchinson County
Cooperator: James & John Lieb
Conducted by: Kristy Slough
County Extension Agent – Agriculture & Natural Resources
Texas A&M AgriLife Extension Service – Hutchinson County

Summary

Using data from Aqua Planner and Aqua Spy to correctly manage irrigation practices has allowed for a deeper root growth and therefore stronger and more productive plant with fewer input cost. This provides for a more profitable crop which is the producer's ultimate goal. In Hutchinson County the Lieb Brothers participated for their second year in the North Plains EPIC project. Extension made the management decisions on the irrigation in 2012 and proved to be profitable it was a combined decision to allow the Lieb Brothers to focus on learning to implement the technology in 2013. Because of an early season hail storm yield results were not reliable the sole purpose of the 2013 EPIC shifted to utilizing technology properly. The Corn Irrigation Conference in Morse in August solely focused on how to use the technology. In the end the field managed by the Lieb Brothers under EPIC considerations still out-produced the Legacy field, but as stated the results have been skewed by an early season hail storm.

Objective

As noted in the 2011 Panhandle Region Water Plan: Agricultural Water Demands, the 2006RWP, calculated that over 92% of all water use in the region occurred by the agricultural sector. Irrigated crop use accounted for almost 98% of the total agricultural water use, while livestock production used just over two percent. The magnitude of the water use in agriculture makes efficient and profitable irrigation a necessity. Because of the combination of record setting heat and current drought conditions, producers, land owners and local citizens have become more aware of water used for irrigation therefore raising the necessity to use water efficiently.

Texas A&M AgriLife Extension Service in Hutchinson County worked to promote wise water use; and demonstrate that using water wisely can lead to a higher profitability rate in the common crops of corn and cotton. The North Plains Ground Water Conservation District (NPGWCD) had worked independently among producers since 2010 with their 200-12 Reduced Irrigation on Corn Demonstration. In 2011 they, NPGWCD, partnered with Texas AgriLife Extension Service to broaden their audience. The board of NPGWCD voted to fund the equipment and technology cost associated with Extension's programming

and demonstrations which set out to test the following idea: By closely monitoring the corn water use and available ground moisture, one can reduce irrigation by one or two inches per acre yet still remain profitable. With over 900,000 acres of corn planted in the upper 21 counties of the Texas Panhandle, 17,400 in Hutchinson County, and corn alone accounts for over 53% of the water used for irrigated crops.

Materials and Methods

Irrigation savings cannot truly impact the producers though unless they know how to use the technology to make the best management decisions. In the prior 2 years, the EPIC side of the field has been solely controlled by Extension as far as when and how much water to apply through irrigation. In 2013, this was not the case. Extension worked with the Lieb Brothers once again but this time they were not blind. They participated in the EPIC program and learned to make management decisions based on the reports provided by the advanced technology employed by the demonstration. Only one AquaSpy probe was inserted in their field and the entire field was considered to be EPIC managed. Both brothers had the internet access capabilities and were e-mailed the daily reports from Aqua Planner. Using this technology the brothers began to make and understand the management decisions that were needed.

On June 7th both the EPIC field and the other non-technology managed field of which we were going to compare EPIC's yields survived a drastic hail storm. The plants were shredded and insurance was called. Insurance adjusters did not consider the fields to be a loss therefore the producers had to carry them to harvest. Because the plants had endured a significant amount of damage it was decided that yield would not be a dependable indicator of EPIC success in 2013. The focus of the program then shifted even more to learning to use the technology available. Agents, cooperators and irrigation management specialist worked together to interpret the data and make the best decisions possible.

The 2013 Corn Management Conference held in August focused solely on learning to interpret the technology. The meeting was attended by 15 people, 3 of which were visitors from neighboring water districts who wanted to learn how to use the technology to start programs like EPIC in their area. Producers, water district officials and the irrigation presenters were in agreement that technology does no good unless producers understand how to use the information it provides.

Results and Discussion

The plot was harvested the week of September 30th. In the end the plot that had been managed with access to full technology ended up producing 240 bushels of corn to the acre. The plot that was managed according to traditional standards produced 230 bushels an acre. The cooperators agreed the technology greatly assisted them in managing and timing their irrigations in order to have the "most bang for their buck". Agent Slough assisted them through technology training and interpreting the data and in the end had an irrigation water savings, pumping cost savings and an increased yield.

Conclusions

The Lieb Brothers were in agreement that utilizing technology allowed them to better manage irrigation and reduce input cost while improving yield. After going through the program twice, once blind and the second time learning to make the management decisions, they feel they are ready to step out on their own and plan to implement EPIC practices on all corn acres in 2014. Because of this should funding through the North Plains Groundwater Conservation District continue a new cooperator has been found. He will participate in this demonstration with his son and are looking forward to implementing these practices. According to demonstration protocols he will be blind this first year and Extension will be working to make the management decisions on the EPIC side.

Acknowledgements

North Plains Groundwater Conservation District - provided funding to conduct the project
Pat Scarth – Aqua Planner
David Sloan – AquaSpy
Paul Sigle – North Plains Groundwater Conservation District
Kirk Welch – North Plains Groundwater Conservation District

LIPSCOMB COUNTY

TEXAS A&M AGRILIFE EXTENSION

Agriculture and Natural Resources

Efficient Profitable Irrigation in Crops-EPIC Grain Sorghum
Texas A&M AgriLife Extension Service-Ochiltree County

Cooperator: James Born
Scott Strawn-CEA Agriculture Texas A&M AgriLife Extension Service Ochiltree County

Summary and Objective

Efficient Profitable Irrigation in Crops is a results demonstration effort conducted by the Texas A&M AgriLife Extension Service and funded primarily by the North Plains Groundwater Conservation District. The foundation of EPIC is the principle of managing irrigation water for maximized profitability as a means for making optimal economic and agronomic use the water resource from the Ogallala Aquifer. EPIC targets irrigated grain sorghum producers who typically employ efficient irrigation systems and solid agricultural practices in a production strategy focusing on maximized yields (revenue). EPIC is designed to be a multi-year, staged project that helps high yield grain sorghum producers maximize their on farm production potential and reduce applied irrigation water. Potential Ochiltree County water savings under partial adoption of this practice is estimated to exceed 7,000 acre-feet or 2.3 Billion gallons annually.

In 2013 the experiment side utilized 2.08 inches less of applied irrigation than the control side with a 1.02 bushel per acre increase in yield.

Materials and Methods

The in field scientific approach under EPIC utilized a split field plot maintaining one plot as a control and managing the irrigation on the experimental plot with two objectives;

1) Maintain or improve yield as compared to the control and
2) Reduced pumped irrigation water by one to four inches.

The cooperator contributed provided the field and all farm operations and production costs with no compensation from EPIC. The EPIC project provided Pivotrac monitoring with producer access and AquaSpy soil probes and AquaPlanner crop modeling without producer access in order to maintain the validity of the control plot. The "Control" plot and was managed according to the cooperator's standard practice and the "EPIC" plot was managed with Texas A&M AgriLife irrigation inputs based on management practices and information from management tools.

All other management related to tillage, hybrid selection, diseases, insects, weeds, fertility, planting date, planting rate, harvest date, etc., remained equal across both plots.

Results and Discussion

The 2013 EPIC results are tabulated below. Grain sorghum yields were maintained and even increased with a corresponding reduction in irrigation water applied. It is important to note that the design and scope of this project did not include on-site replication and the results were obtained primarily for the purpose of demonstrating a scientifically sound approach to managing water. Although very compelling, the results should be viewed anecdotally as local examples rather than conclusive scientific evidence.

Plot	Irrigation	Soil	Precipitation	Total Inches	Yield
Control	14.00."	4.80"	8.57"	27.37"	140.43
EPIC	11.92"	4.65"	8.57"	25.14"	141.45

Conclusions

From the preliminary results from the first year of the EPIC Grain Sorghum project, the implication is that above average grain yields can be maintained with a reduction in applied irrigation water. The EPIC side still yielded 1.02 bushels more to the acre with a 2.08" reduction of irrigation applied compared to the control. To further mature this concept and verify these results, it is recommended that this project be continued over several growing seasons and varying weather conditions. The operational recommendation is that producers who have participated in one seasons of blind technology utilization be advanced to full exposure of the management tools and appropriate training. New cooperators would still be expected to participate in one season of blind participation to ensure the control.

Acknowledgements

James Born
North Plains Groundwater Conservation District
Pat Scarth-AquaPlanner
David Sloane-AquaSpy

Efficient Profitable Irrigation in Corn – EPIC
Texas A&M AgriLife Extension Service – Lipscomb County
Cooperator: Mark Howard
JR Sprague – CEA Agriculture
Texas A&M AgriLife Extension Service Lipscomb County

Summary

Using data from Aqua Planner (see attachments H-2, H-3, J-2 andJ-3) with a beginning date of May 29th irrigation applied on the managed (EPIC) was 15.38 inches and control (Legacy) was 17.95 inches. Total irrigation difference was 2.57 inches. Soil types change frequently within the field as is typical in Lipscomb County (see attachment A, B, C and D). The soil types in EPIC and Legacy were the major soils on each side of the field so the soil moisture probes were in different soil types making management of applied irrigation more difficult. The field also has multiple elevation changes (see attachment F). Water loss due to this elevation changes was more than ideal. Water loss was run off (see attachment E). Soil water holding capacity varies with soil type changes (see attachment C). No harvest data is available due to field being harvested incorrectly.

Objective

Efficient Profitable Irrigation in Corn (EPIC) is a result demonstration effort conducted by Texas A&M AgriLife Extension Service and funded primarily by the North Plains Groundwater Conservation District. The foundation of EPIC is the principles of managing irrigation water for maximized profitability as a means for making optimal economic and agronomic use of the water resource form the Ogallala Aquifer. EPIC targets corn producers who typically employ efficient irrigation systems and solid agricultural practices in a production strategy focusing on maximized yields (revenue). EPIC is designed to be a multi-year staged project that helps high yield grain corn producers maximize their on farm production potential and reduce applied irrigation water.

Potential regional water savings under partial adoption of the practice is estimated to exceed 37,500 acre-feet or 12 billion gallons annually.

Materials and Methods

The infields scientific approach under EPIC utilized a split field plot maintaining one - sixty acre (60) plot as a control (Legacy) and one plot managing the irrigation on the experimental plot (sixty acres)(EPIC) with two objectives.

1. Maintain or improve yield as compared to the control.
2. Reduce applied irrigation water by one to four inches.

Both plots were similar prepared and managed according to the cooperators best management practices with the exception of applied irrigation. The cooperator contributed the field, all farm operation and production cost with no compensation form EPIC. The pivot was equipped with Ag Sense monitoring with producer access and AquaSpy soil probes and Aqua Planner crop modeling. Producer requested access to this technology and access was granted.

Corn was planted May 15, 2013 in a strip till system. Previous crop was grazed out triticale making this a double crop system. Pre plant fertilizer was twelve (12) gallons of a blend containing nitrogen, sulfur, iron, phosphorus and potassium in a deep band plus iron, zinc, potassium, magnesium, sulfur and phosphorus in a planter band. A total of 174 pound of nitrogen was applied after emergence. Five (5) ton compost applied per plant.

Soil water was looked at three times per week on the EPIC plot to make adjustments as necessary (see attachment G). EPIC plot was the west side of the field and Legacy plot was the eastside of field.

Results and Discussion

Plot	Irrigation	Precipitation	Soil Moisture Use	Total Water	Plant Population	Planting Date	Previous Crop	Cropping Pattern
Legacy	17.95	16.60	0	34.55	28,000	5/15	Triticale	Double Crop
EPIC	15.38	16.60	0	31.98	28,000	5/15	Triticale	Double Crop

No soil moisture measurements were taken as field was extremely dry at planting due to growing triticale. All moisture available to the corn crop was either applied irrigation or rainfall after planting. Harvests of the fields were completed on October 7, 2013. Fields were harvested the wrong direction so no Legacy or EPIC yields were available. The field harvested as North ½ circle and South ½ circle, therefore no data is available. However the yield differences between the North ½ yielding 245.21 bushels/acre and the South ½ yielding 179.32 bushels/acre shows the dramatic difference in soil type and yield potential of the soils. The average field yield was 212.27 bushel/acre.

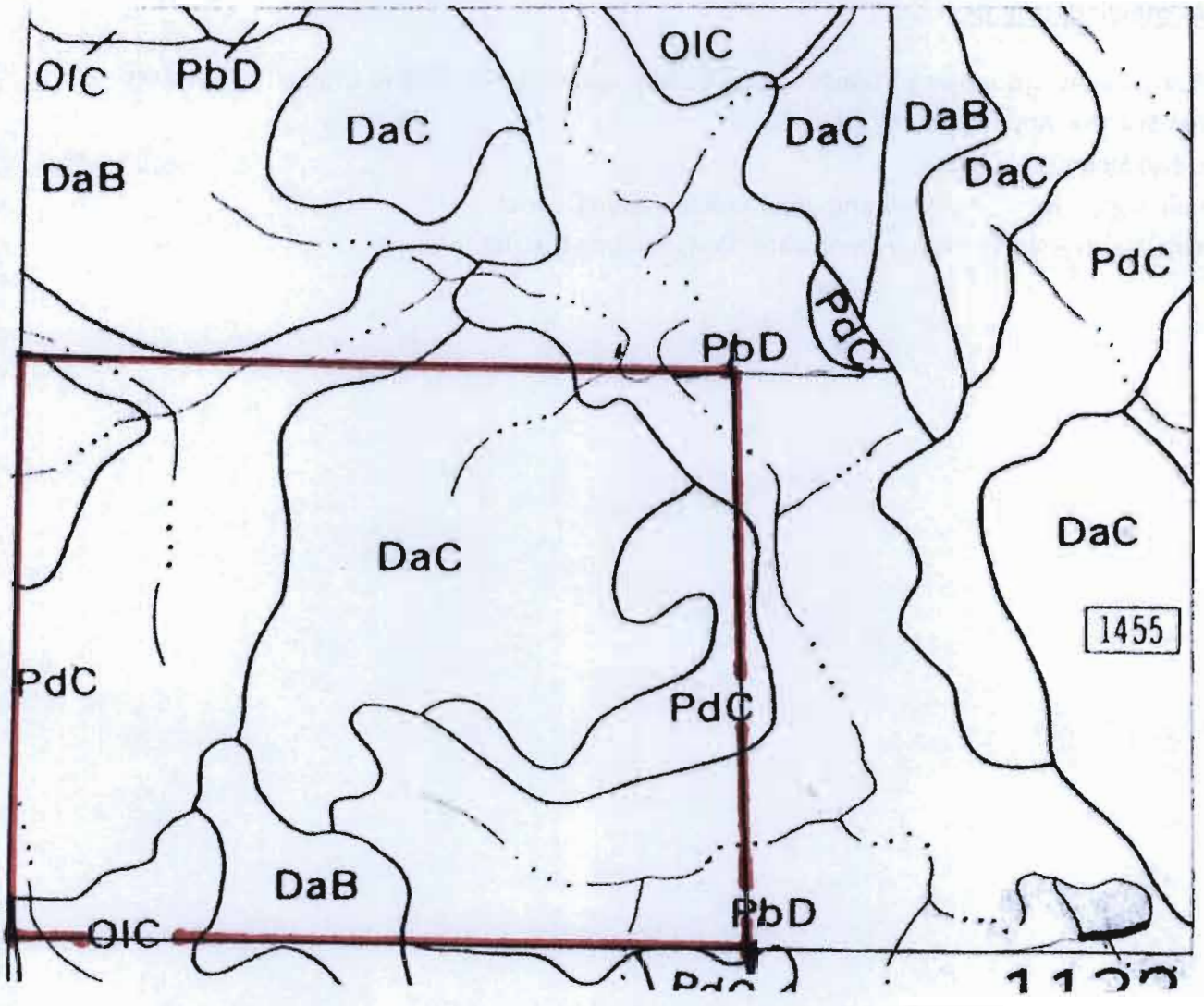
Conclusions

The EPIC project was started on ½ of a irrigated circle of corn on May 15, 2013 and concluded after harvest. Because of the error in harvesting there is no results to this project, however, there was yield data that suggest that soil type plays a major factor in the yield potentials of any given field. Attached are several documents to help understand the conclusion that soil type is a limiting factor in Lipscomb County corn production and soil type play a role in irrigation management (see attachment G and L). Cooperator bought into the technology and used it to aide in irrigation management. Attachments I-1, I-2, K-1 and K-2 are satellite images showing crop stress and differences in the fields

Acknowledgements

North Plains Groundwater Conservation District - provided funding to conduct the project
Pat Scarth – Aqua Planner
David Sloan – AquaSpy
Paul Sigle – North Plain Groundwater Conservation District
Kirk Welch – North Plain Groundwater Conservation District

Attachment A



Attachment B

	DaB	Darrouzett Silty Clay Loam	1 - 3% slope
East AquaSpy	DaC	Darrouzett Silty Clay Loan	3 - 5% slope
West AquaSpy	PdC	Quanah Soils	3-5% slope Combo of Veal, Berda, Portales
	PdD	Quanah Soils	Rolling Combo of Veal, Berda, Portales
	OlC	Olton Clay Loam	3 – 5% slope

Attachment C

Soil Water Holding Capacity

DaB and DaC

0 – 6"	.15 - .20"	=	.9"
6 – 55"	.15 - .20"	=	7.35"
55 – 75"	.15 - .20"	=	.75"
	Total Profile to 60"		9.0"

PdC and PdD

0 – 9"	.14 - .17	=	1.26"
9 – 28"	.10 - .12	=	1.09"
28 – 66"	.14 - .17	=	4.48"
	Total Profile to 60"		6.83"

OIC

0 – 10"	.15 - .20	=	1.5"
10 – 36"	.15 - .20	=	3.9"
36 – 90"	.10 - .15	=	2.4"
	Total Profile to 60"		7.8"

2.17 inch Difference

Attachment D

Irrigation Capability Class

DaB – 3

DaC – 4

PdC – 4

PdD – No Rating

OIC – 4

4 = Soils have very severe limitations.

3 = Soils have severe limitations.

Attachment E

Effect of topography and soil type on irrigation efficiency.

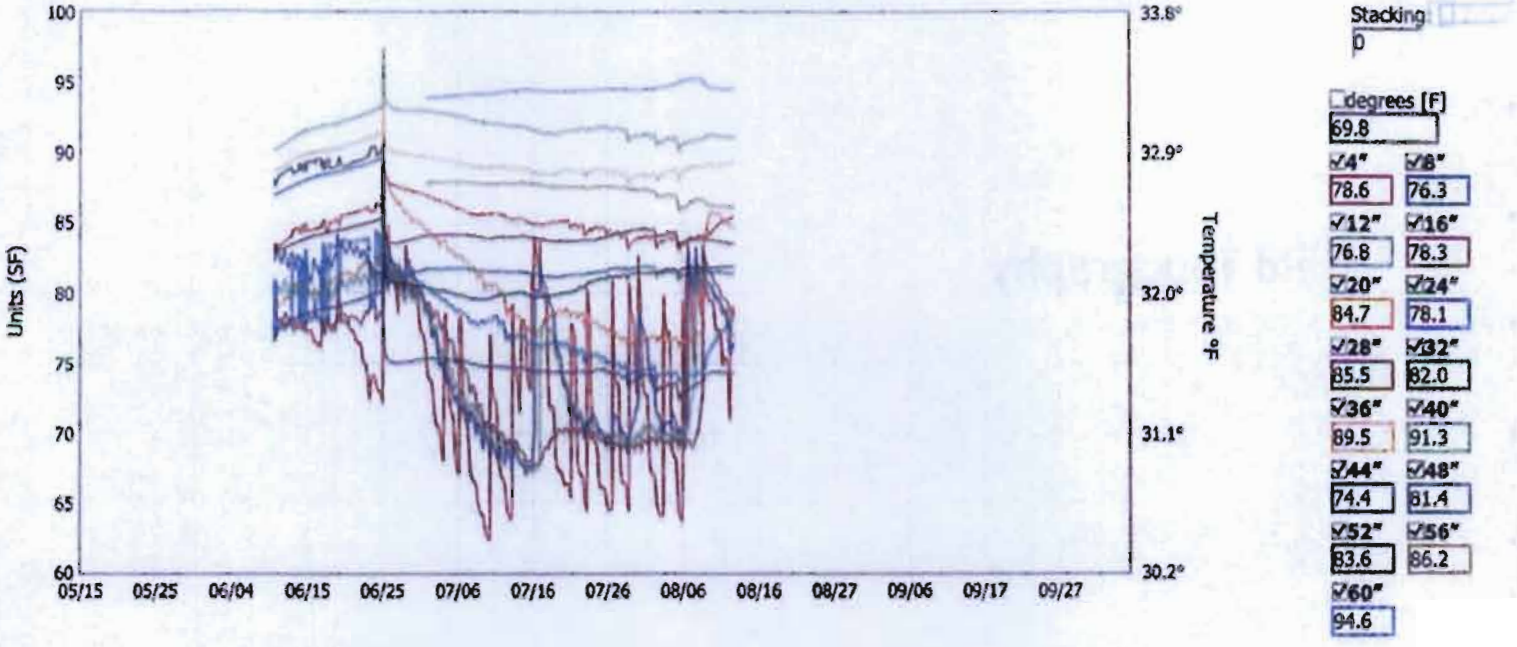
Attachment F

Field Topography

Attachment G

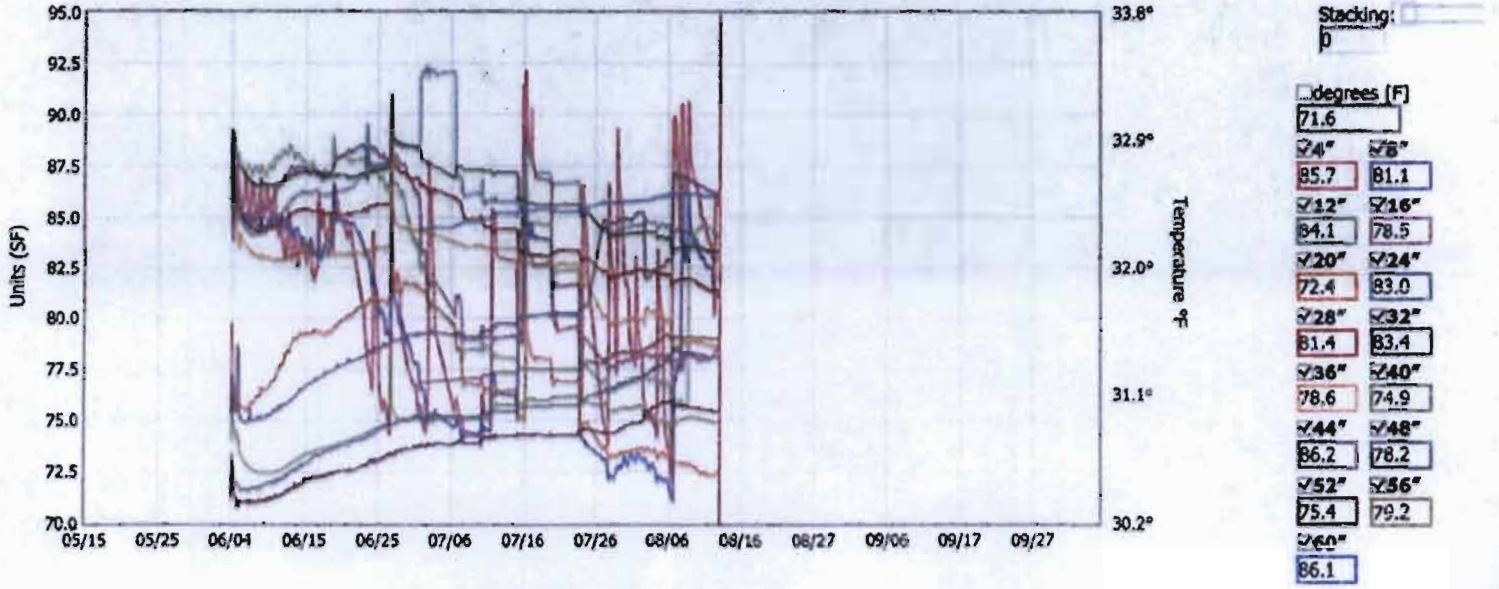
Tue Aug 13 2013 09:45 AM (Central Standard Time)

EPIC



Tue Aug 13 2013 10:15 AM (Central Standard Time)

Legacy



AquaPlanner

Field Detail Report

Lipscomb County - AL

1157S EPIC

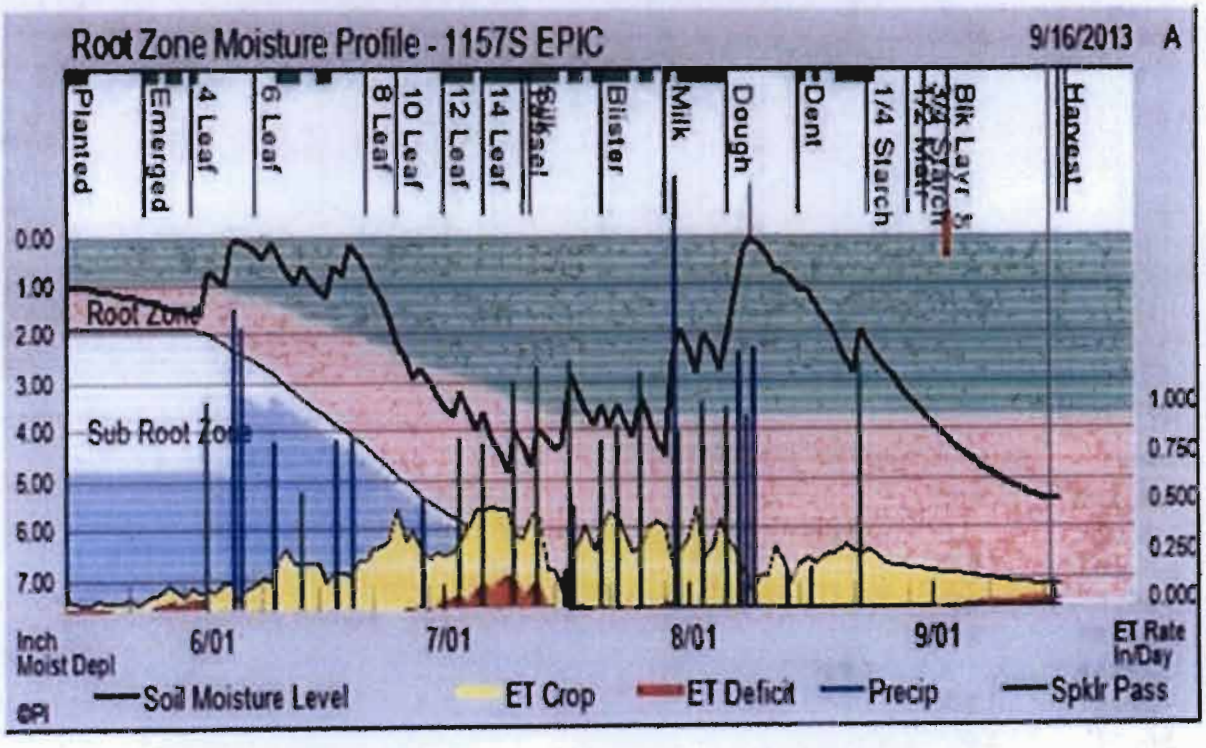
12/20/2013

Field Information

Item	Value
Field Name	1157S EPIC - 60ac.
Soil Type	Fine Sandy Loam
Moisture Holding Cap.	1.90
Crop	Corn - Medium Season
Plant Date	5/14/2013
Plant Population	0
Growth Stage	
System Status	OFF
Application Rate	900 GPM - 15.0 GPM/Ac
Rotation Time	1.57 days
Inches per Pass	1.25 in
Cost per Inch	5.00
Distribution Eff.	90 %
Irrigate Application Rate	1.25
Budgetted Precipitation	60 Pct of Average
Full Irrigation Yield	240

Crop Production Statistics

Item	Crop YTD	% ET	Sched.
ET crop	29.20		2.01
ET net	26.50		1.47
Precipitation	13.03	45%	0.00
Applied Irr.	15.38	47%	0.00
Soil Water Used	1.53	5%	-1.15
Total Percent of ET	97%		87%
Net Precip	13.03		
Net Irr.	13.84		0.00
Percolation	1.06		
Irr. Cost / Acre	$76.90		$0.00
Heat Units	2544		
Crop Stage			
Mature Date	Sep 03		
Harvest Date			Sep 17
Yield Potential	88%		



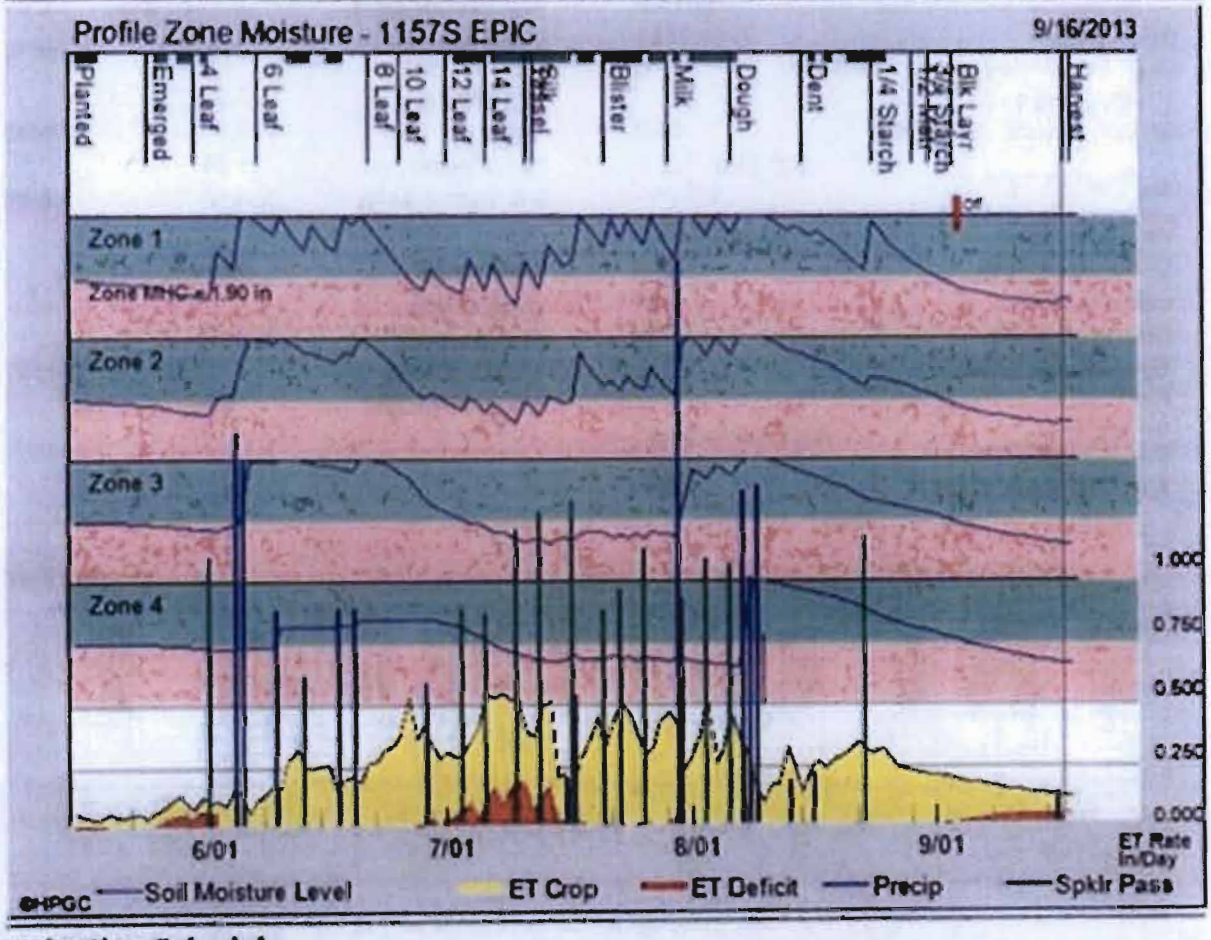
AquaPlanner

Field Detail Report

Lipscomb County - AL

1157S EPIC

12/20/2013

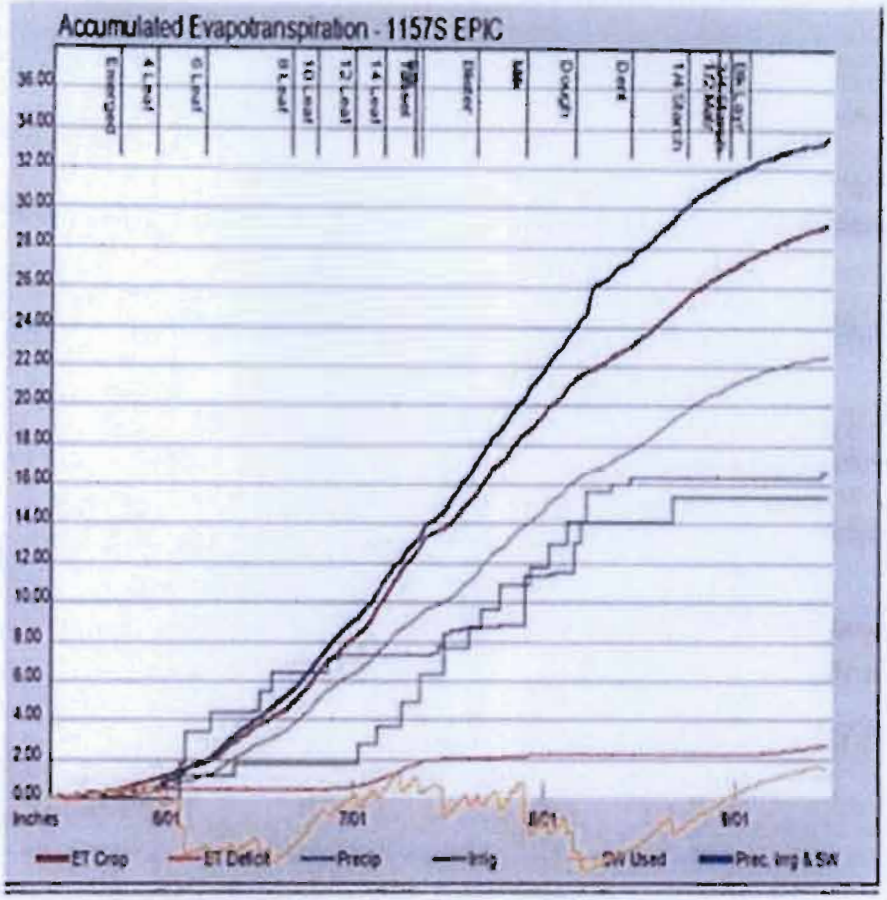


Irrigation Schedule

Date	Rainfall	Actual Irr	Scheduled Irr
May 29	0.02		
Jun 01		1.16	
Jun 04	1.75		
Jun 05	1.63		
Jun 09	0.99		
Jun 13		0.65	
Jun 17	1.00		
Jun 19	1.00		
Jun 20	0.03		

Jun 28	0.71		
Jun 30	0.13		
Jul 03		0.94	
Jul 06		0.92	
Jul 07	0.02		
Jul 10		1.28	
Jul 13		1.36	
Jul 15	0.10		
Jul 16	0.33		
Jul 17	0.66	1.40	
Jul 18	0.16		
Jul 20	0.08		
Jul 21	0.06	0.93	
Jul 23		1.02	
Jul 25	0.05		
Jul 26	0.03	1.20	
Jul 28	0.06		
Jul 30	2.51		
Jul 31		0.98	
Aug 03	0.03	1.16	
Aug 04	0.12		
Aug 06		1.13	
Aug 07	1.49		
Aug 08	1.13		
Aug 09	1.51		
Aug 13	0.32		
Aug 16	0.35		
Aug 17	0.02		
Aug 23		1.25	
Sep 14	0.02		
Sep 16	0.27		
Sep 17	0.02		0.00
Total	16.60	15.38	0.00

Field Detail Report



Accumulated Statistics

Item			Crop YTD	Percent of ET
ET crop			29.20	
Gross Precipitation			16.67	57.09%
Gross Irrigation			15.38	52.68%
Beg Soil Moist	50.00%	3.75 in.		
End Soil Moist	44.34%	3.37 in.		
Soil Moist Used			1.53	5.24%
Total Moisture			33.58	115.01%

AquaPlanner

Field Satellite Data Report

Lipscomb County - AL - 1157S EPIC 12/20/2013

Field Name	CROP	Scene Date	Growth Stage	System Status	Irrigation Appl Rate	7_Day Precip	RZ RAW	Z1 RAW	Z2 RAW	Z3 RAW
1157S EPIC	CORN_M	7/27/2013	Blister	ON	1.08 - 1 days ago	0.00	51%	87%	67%	39%

Visible Range

False Color - Infrared

1157S EPIC
SWIR - 2013-07-27
Percent Clouds: 0

Mean: 9.74
Median: 9.83
StDev: 0.80

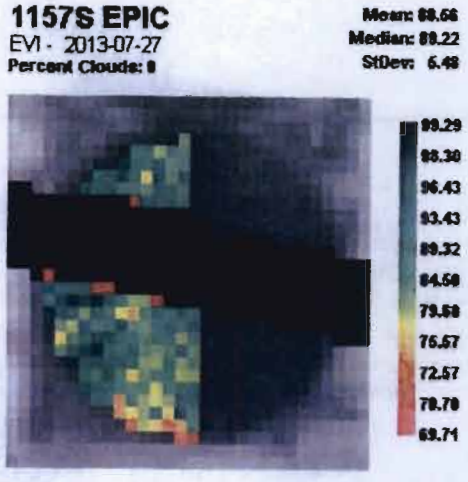
1157S EPIC
NDVI - 2013-07-27
Percent Clouds: 0

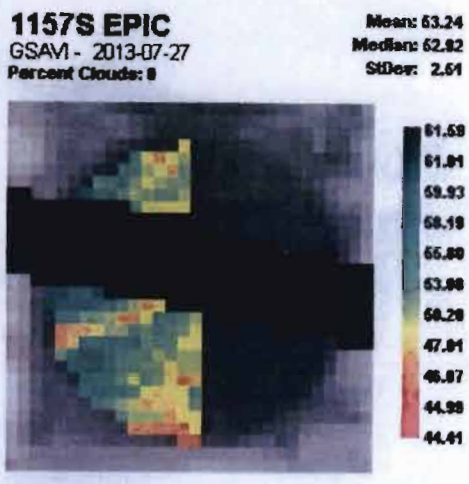
Mean: 77.31
Median: 77.16
StDev: 2.89

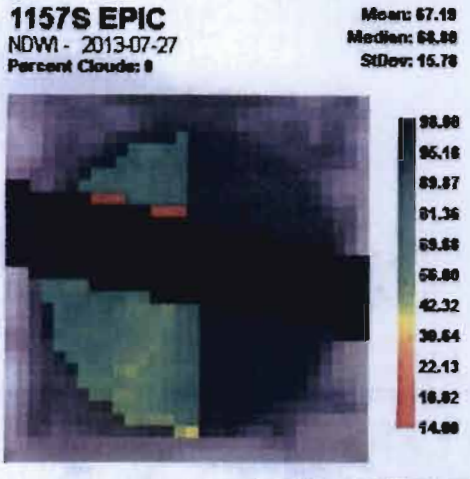
AquaPlanner

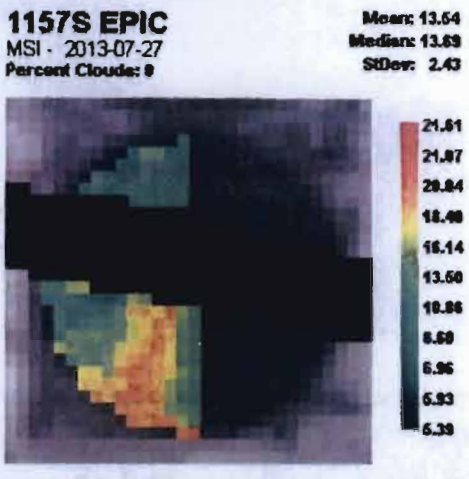
Field Satellite Data Report

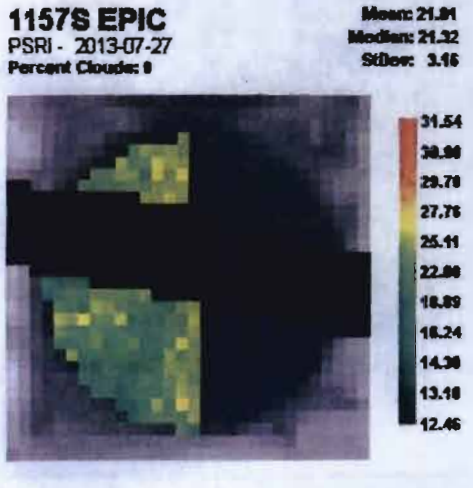
Lipscomb County - AL - 1157S EPIC 12/20/2013











NDVI Normalized Difference Vegetation Index

General Crop Health

EVI Enhanced Vegetation Index

General Crop Health; More Sensitive after Canopy Established

GSAVI Green Soil Adjusted Vegatation Index

Sensitive to Nitrogen Sufficiency

NDWI Normalized Difference Water Index

The Normalized Difference Water Index (NDWI) is sensitive to changes in vegetation canopy water content

MSI Moisture Stress Index

The MSI is inverted relative to the other water VIs; higher values indicate greater water stress and less water content

PSRI

An increase in PSRI indicates increased canopy stress (carotenoid pigment), the onset of canopy senescence, and plant fruit ripening

Field Count: 0

Report Guide

AquaPlanner

Field Detail Report

Lipscomb County - AL

1157S Legand

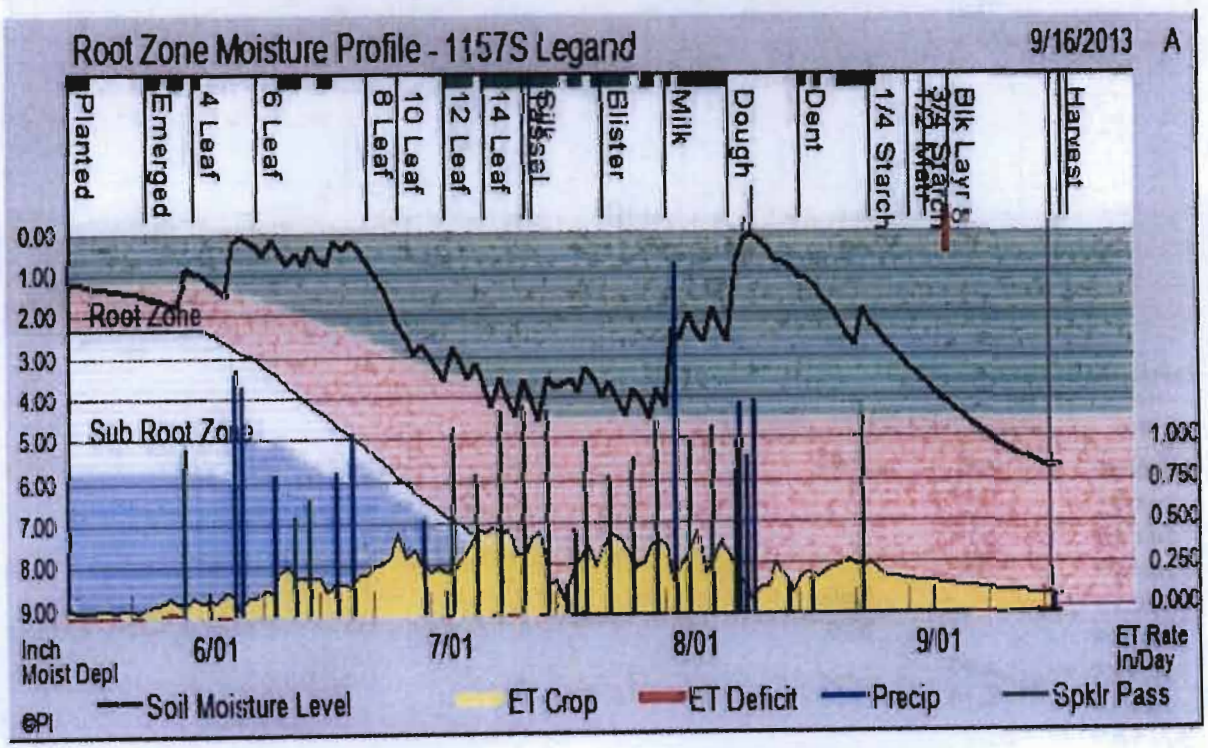
12/20/2013

Field Information

Item	Value
Field Name	1157S Legand - 60ac.
Soil Type	Silty Clay Loam
Moisture Holding Cap.	2.30
Crop	Corn - Medium Season
Plant Date	5/14/2013
Plant Population	0
Growth Stage	
System Status	OFF
Application Rate	900 GPM - 15.0 GPM/Ac
Rotation Time	1.57 days
Inches per Pass	1.25 in
Cost per Inch	5.00
Distribution Eff.	90 %
Irrigate Application Rate	1.25
Budgetted Precipitation	60 Pct of Average
Full Irrigation Yield	240

Crop Production Statistics

Item	Crop YTD	% ET	Sched.
ET crop	29.21		2.02
ET net	28.67		1.83
Precipitation	12.96	44%	0.00
Applied Irr.	17.95	55%	0.00
Soil Water Used	1.03	4%	-1.48
Total Percent of ET	103%		92%
Net Precip	12.96		
Net Irr.	16.15		0.00
Percolation	1.36		
Irr. Cost / Acre	$89.73		$0.00
Heat Units	2544		
Crop Stage			
Mature Date	Sep 03		
Harvest Date			Sep 17
Yield Potential	98%		



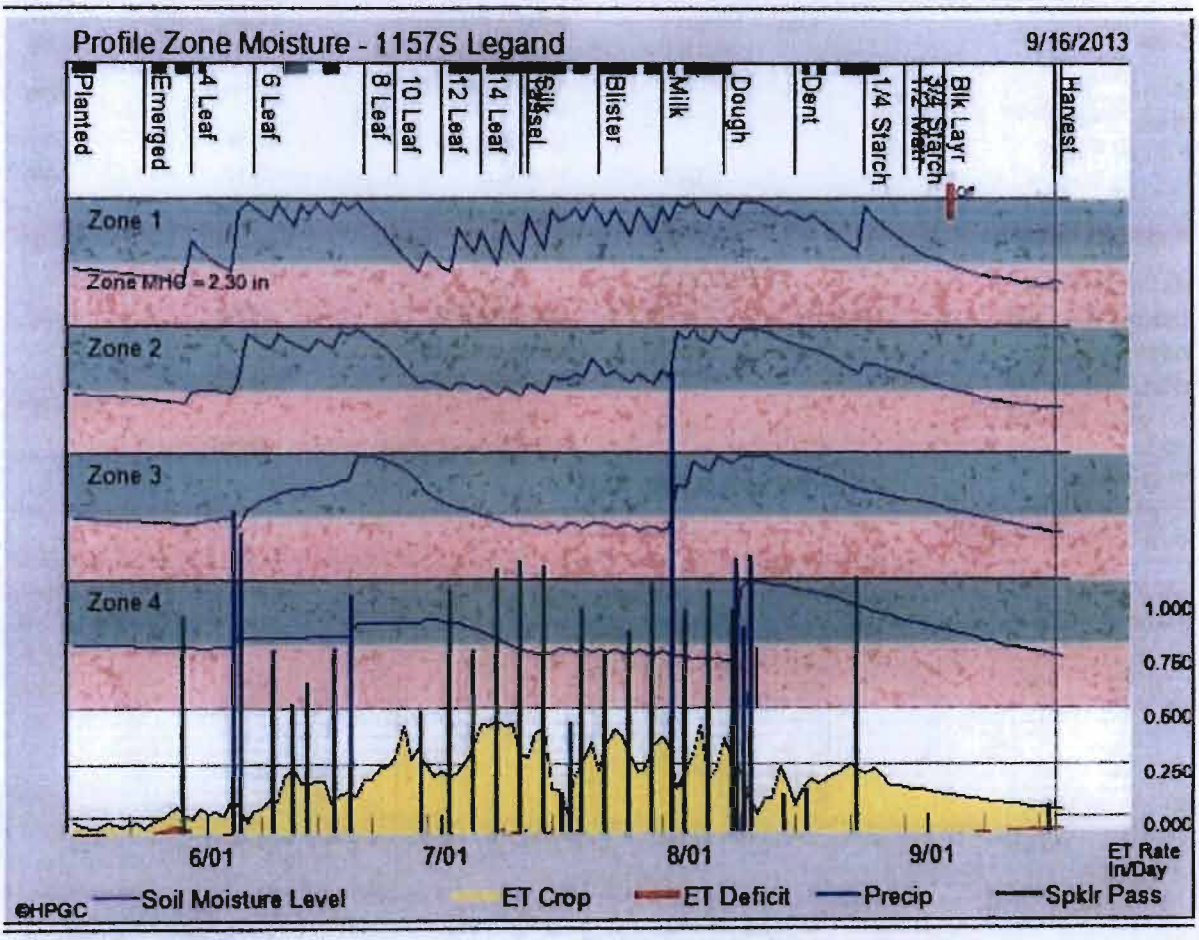
AquaPlanner

Field Detail Report

Lipscomb County - AL

1157S Legand

12/20/2013



Irrigation Schedule

Date	Rainfall	Actual Irr	Scheduled Irr
May 29	0.02	1.10	
Jun 04	1.75		
Jun 05	1.63		
Jun 09	0.99		
Jun 12		0.66	
Jun 14		0.76	
Jun 17	1.00		
Jun 19	1.30		
Jun 20	0.03		

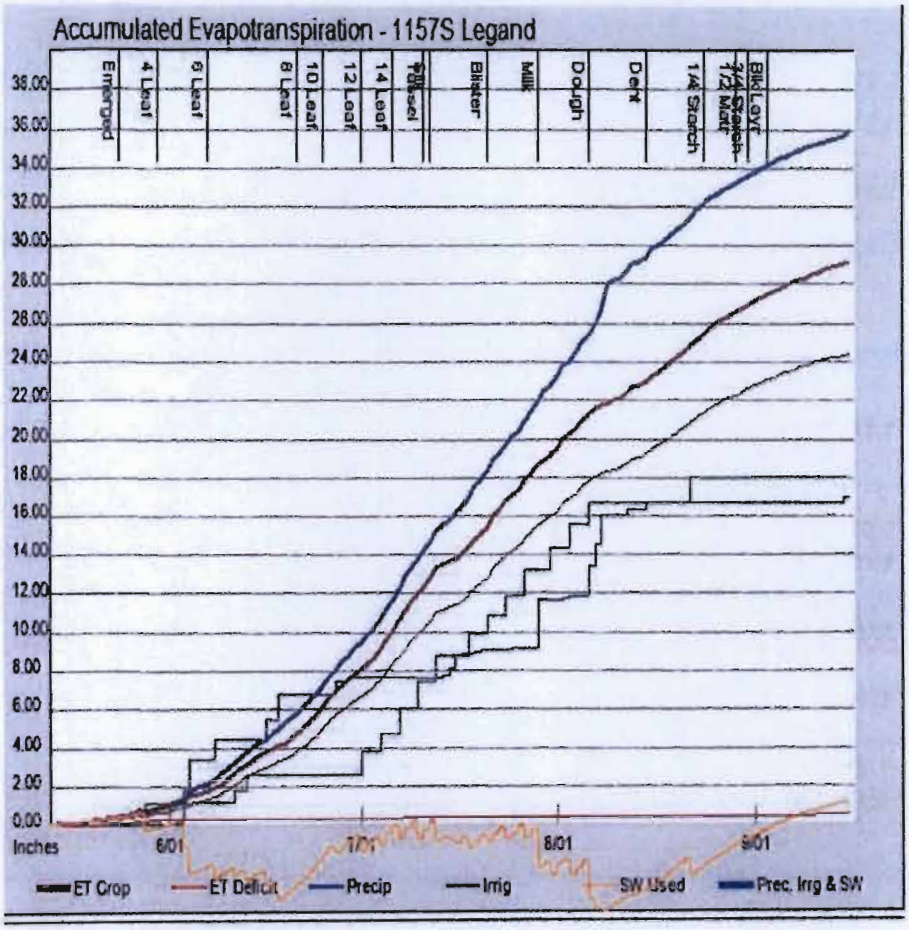
Jun 28	0.71		
Jun 30	0.13		
Jul 02		1.24	
Jul 05		0.94	
Jul 07	0.02		
Jul 08		1.35	
Jul 11	0.01	1.38	
Jul 14		1.36	
Jul 15	0.10		
Jul 16	0.33		
Jul 17	0.66		
Jul 18	0.16		
Jul 19		1.14	
Jul 20	0.08		
Jul 21	0.06		
Jul 22		0.92	
Jul 25	0.05	1.02	
Jul 26	0.03		
Jul 28	0.06	1.27	
Jul 30	2.51		
Aug 01	0.01	1.14	
Aug 03	0.03		
Aug 04	0.12	1.23	
Aug 07	1.49	1.13	
Aug 08	1.13		
Aug 09	1.51		
Aug 13	0.32		
Aug 16	0.35		
Aug 17	0.02		
Aug 23		1.30	
Sep 14	0.02		
Sep 16	0.27		
Sep 17	0.02		0.00
Total	16.92	17.95	0.00

AquaPlanner

Field Detail Report — **Lipscomb County - AL**

1157S Legand — **12/20/2013**

Field Detail Report



Accumulated Statistics

Item			Crop YTD	Percent of ET
ET crop			29.21	
Gross Precipitation			16.97	58.09%
Gross Irrigation			17.95	61.43%
Beg Soil Moist	50.00%	4.55 in.		
End Soil Moist	54.35%	5.00 in.		
Soil Moist Used			1.03	3.53%
Total Moisture			35.95	123.05%

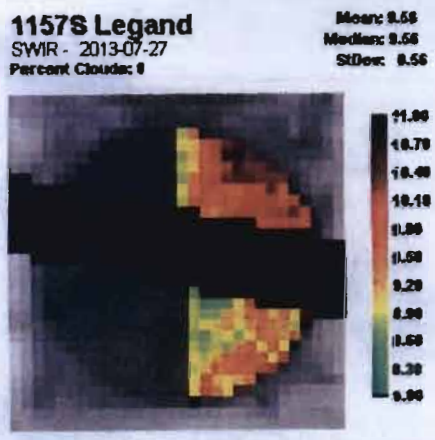
AquaPlanner

Field Satellite Data Report

Lipscomb County - AL - 1157S Legand 12/20/2013

Field Name	CROP	Scene Date	Growth Stage	System Status	Irrigation Appl Rate	7_Day Precip	RZ RAW	Z1 RAW	Z2 RAW	Z3 RAW
1157S Legand	CORN_M	7/27/2013	Blister	ON	0.92 - 2 days ago	0.00	51%	75%	57%	44%

Visible Range **False Color - Infrared**



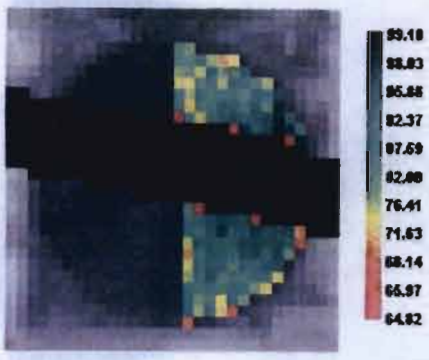
AquaPlanner

Field Satellite Data Report

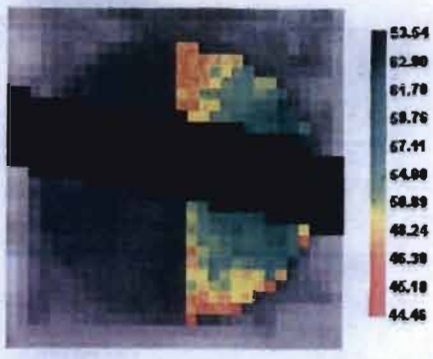
Lipscomb County - AL - 1157S Legand 12/20/2013

Field Satellite Data Report

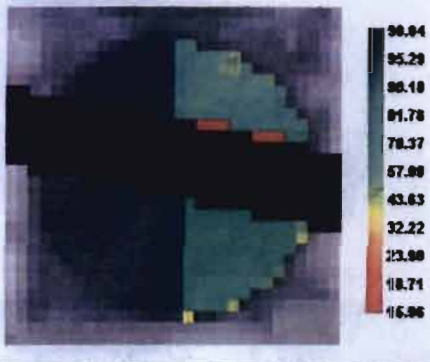
1157S Legand
EVI - 2013-07-27
Percent Clouds: 0
Mean: 89.25
Median: 89.97
StDev: 7.23



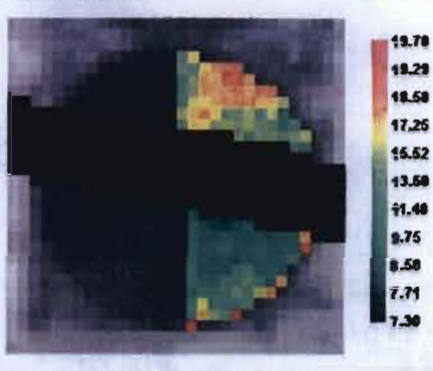
1157S Legand
GSAVI - 2013-07-27
Percent Clouds: 0
Mean: 63.82
Median: 63.31
StDev: 2.86



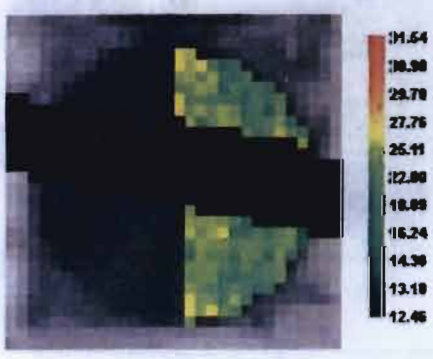
1157S Legand
NDWI - 2013-07-27
Percent Clouds: 0
Mean: 67.51
Median: 69.85
StDev: 15.23



1157S Legand
MSI - 2013-07-27
Percent Clouds: 0
Mean: 13.29
Median: 13.34
StDev: 1.82



1157S Legand
PSRI - 2013-07-27
Percent Clouds: 0
Mean: 21.97
Median: 21.23
StDev: 3.88



NDVI Normalized Difference Vegetation Index
General Crop Health

EVI Enhanced Vegetation Index
General Crop Health; More Sensitive after Canopy Established

GSAVI Green Soil Adjusted Vegatation Index
Sensitive to Nitrogen Sufficiency

NDWI Normalized Difference Water Index
The Normalized Difference Water Index (NDWI) is sensitive to changes in vegetation canopy water content

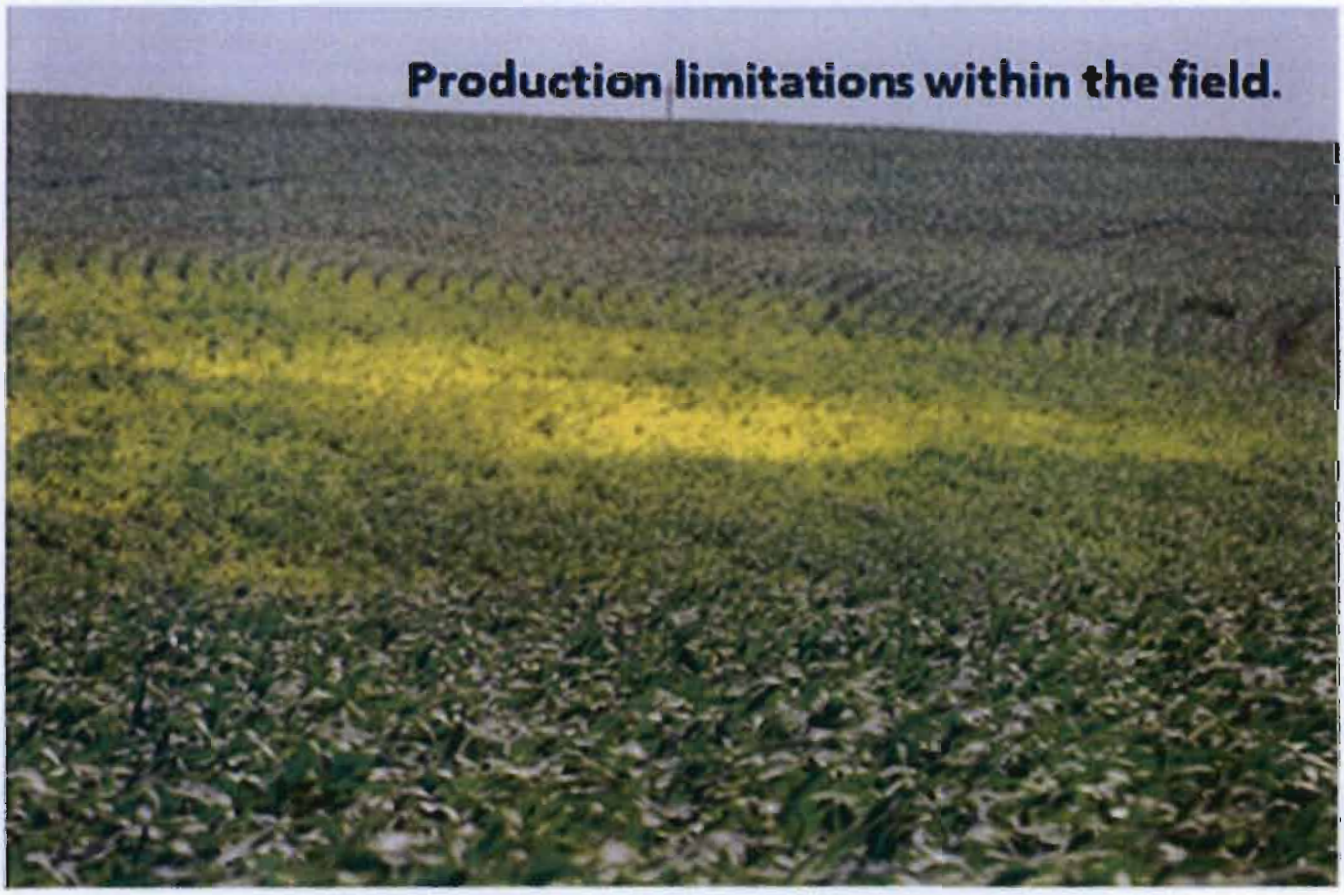
MSI Moisture Stress Index
The MSI is inverted relative to the other water VIs; higher values indicate greater water stress and less water content

PSRI
An increase in PSRI indicates increased canopy stress (carotenoid pigment), the onset of canopy senescence, and plant fruit ripening

Field Count: 0

Report Guide

Attachment L



MOORE COUNTY

AGRILIFE EXTENSION

Agriculture and Natural Resources

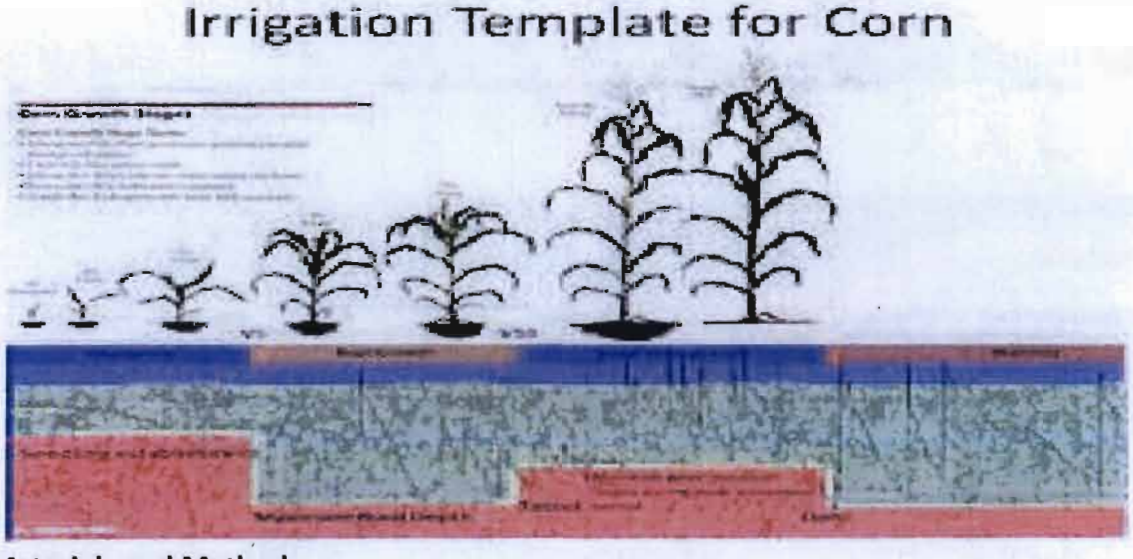
Efficient Profitable Irrigation in Corn – EPIC
Texas A&M AgriLife Extension Service – Moore County
Cooperator: Darren Stallwitz
Marcel Fischbacher Jr. – CEA – Agriculture Texas A&M AgriLife Extension Service – Moore County

Summary

Using irrigation technologies from Aqua Planner, Aqua Spy, Hydro Bio, and Pivotrac by producer and agent assist with irrigation decisions. The EPIC field had a significantly higher yield with less water, but there were several factors that led to the better performance. The EPIC nozzle package was for 500 gallons while the Legacy was for 600 gallons. The Legacy was probably under supplied with water and is probably inaccurate. The varieties were different with the EPIC plot having a drought tolerant variety that could have an advantage under drought conditions. Total in season precipitation was 6.74 inches, which is well below normal. We were faced with another year of drought conditions and below adequate pumping capacity.

Objective

To provide access and have producer gain knowledge of irrigation tools: Aqua Planner, Aqua Spy, Hydro Bio, and Pivotrac. To assist the producer to improve yields by more efficiently use of irrigation methods and knowledge of water and corn relationship.



Materials and Methods

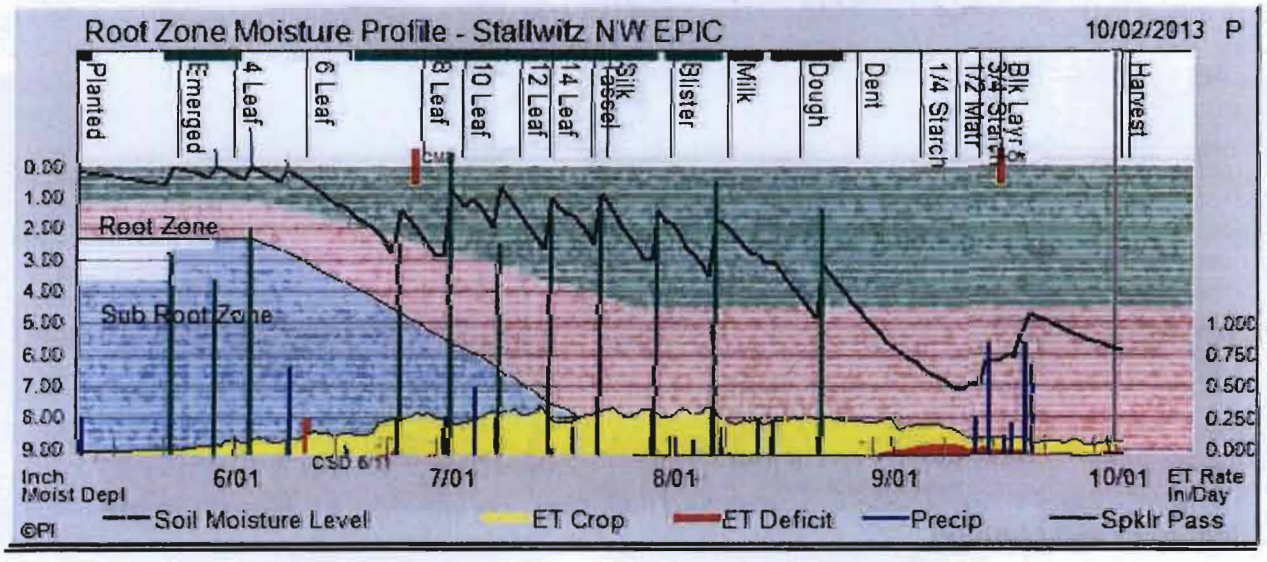
The scientific approach under EPIC utilized a 120 acre field under a single irrigation pivot and a control (Legacy) 120 acre pivot both planted to corn with two objectives.

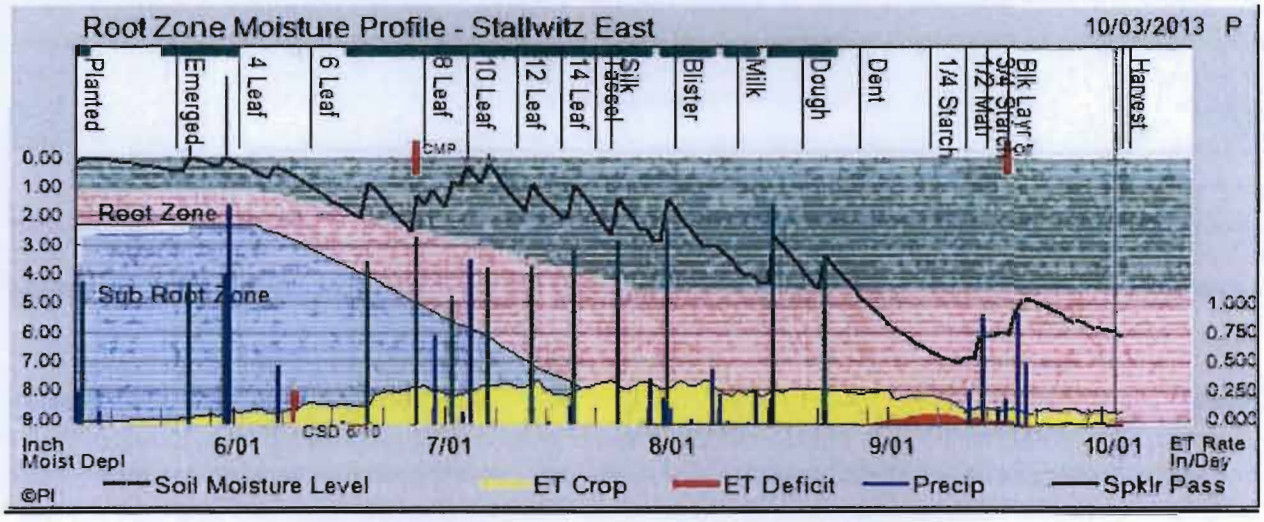
1. Maintain or improve yield as compared to the control
2. Teach irrigation technology knowledge to the cooperator

Plots were planted on May 20, both fields were no-till, but EPIC had an advantage of being behind wheat that was harvested in June of 2012 and the Legacy followed corn that was harvested in October 2012. Both systems were switched to bubbler nozzles after germination and the water definitely followed the roots in the corn after corn. Irrigation system was shut off mid June for herbicide applications, but remained on the remainder of season and never got ahead of water demands for crop. 224 pounds of Nitrogen and around 55 pounds of Phosphorus was applied through the pivot. We applied around 2 inches per pass On EPIC and 1.5 on Legacy. The Aqua Spy showed Legacy to only root down 16 inches but with field examinations with a push probe showed that the roots followed the water to the old root system in the corn behind corn. Neither field was pre-watered but the Aqua Spy showed advantage in soil moisture in the EPIC plot early in the season. Both fields were showing signs of water stress around July 5th, but we had 10 days of below normal temperatures after that that reduced water demands of the corn and assisted the irrigation to gain some ground during pollination.

Results and Discussion

Plot	Irrigation	Precipitation	Total Water	Variety	Plant Population	Planting Date	Previous Crop	Tillage	Yield
Legacy	27.80	10.45	38.25	Pioneer P1498AM1	30,000	5/20	Corn	No-till	197
EPIC	22.59	6.74	29.33	Pioneer 1151R	30,000	5/20	Wheat	No-till	231





Conclusions

The EPIC project was started with 2 irrigated circles of corn on May 20, 2013 and concluded after harvest on October 5. There are more variables that go into yield differences than just the data. The EPIC plot had an advantage in sub soil moisture following wheat. The Aqua Max 1151 corn variety could have also bias data. We also must remind producers to use push probes and to adjust technologies through season as needed. Bubbler irrigation applications may have a more uneven peculation through soils, especially when on no-till. Also, that applying larger amounts of irrigation with each pass can increase soil moisture efficiency, but getting sprinklers stuck can increase. Darren Stallwitz also said "I should have changed the nozzle package on the southeast circle but didn't. It might have yielded better. And the inches per acre number is based on the amount of time I ran multiplied by the nozzle package of the the sprinkler. So the numbers for the southeast circle is probably not right." He has also plans to use Pivotrac, Aqua Spy, and Aqua Planner in 2014.

Acknowledgements

North Plains Groundwater Conservation District - provided funding to conduct the project
Pat Scarth – Aqua Planner
David Sloan – AquaSpy
Paul Sigle – North Plain Groundwater Conservation District
Kirk Welch – North Plain Groundwater Conservation District

OCHILTREE COUNTY

Agriculture and Natural Resources

Efficient Profitable Irrigation in Corn-EPIC
Texas A&M AgriLife Extension Service-Ochiltree County

Cooperator: Ramon Vela
Scott Strawn-CEA Agriculture Texas A&M AgriLife Extension Service Ochiltree County

Summary and Objective

Efficient Profitable Irrigation in Corn is a results demonstration effort conducted by the Texas A&M AgriLife Extension Service and funded primarily by the North Plains Groundwater Conservation District. The foundation of EPIC is the principle of managing irrigation water for maximized profitability as a means for making optimal economic and agronomic use the water resource from the Ogallala Aquifer. EPIC targets corn producers who typically employ efficient irrigation systems and solid agricultural practices in a production strategy focusing on maximized yields (revenue). EPIC is designed to be a multi-year, staged project that helps high yield grain corn producers maximize their on farm production potential and reduce applied irrigation water. Potential Ochiltree County water savings under partial adoption of this practice is estimated to exceed 7,000 acre-feet or 2.3 Billion gallons annually.

In 2013 the experiment side utilized 1.25 inches less of applied irrigation than the control side. Conclusive effect on yield could not be determined due to excessive wind damage on the experimental side of the field the day before harvest.

Materials and Methods

The in field scientific approach under EPIC utilized a split field plot maintaining one plot as a control and managing the irrigation on the experimental plot with two objectives;

1) Maintain or improve yield as compared to the control and
2) Reduced pumped irrigation water by one to four inches.

The cooperator contributed provided the field and all farm operations and production costs with no compensation from EPIC. The EPIC project provided Pivotrac monitoring with producer access and AquaSpy soil probes and AquaPlanner crop modeling without producer access in order to maintain the validity of the control plot. The "Control" plot and was managed according to the cooperator's standard practice and the "EPIC" plot was managed with Texas A&M AgriLife irrigation inputs based on management practices and information from management tools.

All other management related to tillage, hybrid selection, diseases, insects, weeds, fertility, planting date, planting rate, harvest date, etc., remained equal across both plots.

Results and Discussion

The 2013 EPIC results are tabulated below. Even with an apparent loss due to wind damage before harvest, an above average corn yield for Ochiltree County was maintained with a corresponding reduction in irrigation water applied. It is important to note that the design and scope of this project did not include on-site replication and the results were obtained primarily for the purpose of demonstrating a scientifically sound approach to managing water. Although very compelling, the results should be viewed anecdotally as local examples rather than conclusive scientific evidence.

Plot	Irrigation	Soil	Precipitation	Total Inches	Yield[1]
Control	27.40"	3.93"	7.45"	38.78"	249.0
EPIC	26.15"	4.17"	7.45"	37.77"	226.0

[1]The field suffered an extreme amount of lodging and ear loss due to a major wind storm the day before harvest. Especially on the west side where the EPIC trial was located. Therefore this must be taken in consideration before drawing conclusions related to the yield differences.

Conclusions

From the preliminary results from the third year of the EPIC project, the implication is that above average grain yields can be maintained with a reduction in applied irrigation water. The EPIC side still yielded 226 bushels to the acre with a 1.25" reduction of irrigation applied, despite excessive wind damage prior to harvest. To further mature this concept and verify these results, it is recommended that this project be continued over several growing seasons and varying weather conditions. The operational recommendation is that producers who have participated in one seasons of blind technology utilization be advanced to full exposure of the management tools and appropriate training. New cooperators would still be expected to participate in one season of blind participation to ensure the control

Acknowledgements

Ramon Vela
North Plains Groundwater Conservation District
Pat Scarth-AquaPlanner
David Sloane-AquaSpy

Agriculture and Natural Resources

Efficient Profitable Irrigation in Crops-EPIC Grain Sorghum
Texas A&M AgriLife Extension Service-Ochiltree County

Cooperator: James Born
Scott Strawn-CEA Agriculture Texas A&M AgriLife Extension Service Ochiltree County

Summary and Objective

Efficient Profitable Irrigation in Crops is a results demonstration effort conducted by the Texas A&M AgriLife Extension Service and funded primarily by the North Plains Groundwater Conservation District. The foundation of EPIC is the principle of managing irrigation water for maximized profitability as a means for making optimal economic and agronomic use the water resource from the Ogallala Aquifer. EPIC targets irrigated grain sorghum producers who typically employ efficient irrigation systems and solid agricultural practices in a production strategy focusing on maximized yields (revenue). EPIC is designed to be a multi-year, staged project that helps high yield grain sorghum producers maximize their on farm production potential and reduce applied irrigation water. Potential Ochiltree County water savings under partial adoption of this practice is estimated to exceed 7,000 acre-feet or 2.3 Billion gallons annually.

In 2013 the experiment side utilized 2.08 inches less of applied irrigation than the control side with a 1.02 bushel per acre increase in yield.

Materials and Methods

The in field scientific approach under EPIC utilized a split field plot maintaining one plot as a control and managing the irrigation on the experimental plot with two objectives;

1) Maintain or improve yield as compared to the control and
2) Reduced pumped irrigation water by one to four inches.

The cooperator contributed provided the field and all farm operations and production costs with no compensation from EPIC. The EPIC project provided Pivotrac monitoring with producer access and AquaSpy soil probes and AquaPlanner crop modeling without producer access in order to maintain the validity of the control plot. The "Control" plot and was managed according to the cooperator's standard practice and the "EPIC" plot was managed with Texas A&M AgriLife irrigation inputs based on management practices and information from management tools.

All other management related to tillage, hybrid selection, diseases, insects, weeds, fertility, planting date, planting rate, harvest date, etc., remained equal across both plots.

Results and Discussion

The 2013 EPIC results are tabulated below. Grain sorghum yields were maintained and even increased with a corresponding reduction in irrigation water applied. It is important to note that the design and scope of this project did not include on-site replication and the results were obtained primarily for the purpose of demonstrating a scientifically sound approach to managing water. Although very compelling, the results should be viewed anecdotally as local examples rather than conclusive scientific evidence.

Plot	Irrigation	Soil	Precipitation	Total Inches	Yield
Control	14.00."	4.80"	8.57"	27.37"	140.43
EPIC	11.92"	4.65"	8.57"	25.14"	141.45

Conclusions

From the preliminary results from the first year of the EPIC Grain Sorghum project, the implication is that above average grain yields can be maintained with a reduction in applied irrigation water. The EPIC side still yielded 1.02 bushels more to the acre with a 2.08" reduction of irrigation applied compared to the control. To further mature this concept and verify these results, it is recommended that this project be continued over several growing seasons and varying weather conditions. The operational recommendation is that producers who have participated in one seasons of blind technology utilization be advanced to full exposure of the management tools and appropriate training. New cooperators would still be expected to participate in one season of blind participation to ensure the control.

Acknowledgements

James Born
North Plains Groundwater Conservation District
Pat Scarth-AquaPlanner
David Sloane-AquaSpy

SHERMAN COUNTY

Efficient Profitable Irrigation in Corn - EPIC

Texas A&M AgriLife Extension Service - Sherman County
Cooperator: Justin Crownover
Brad Easterling - CEA - Agriculture/Natural Resources

Summary

By using many of the currently available irrigation technologies in combination with making at least weekly visits to the field to check soil moisture by hand using the "hand-feel" method, the EPIC field was able to yield considerably more bushels of corn than the "Check" field while only using .54 inch more irrigation water. The inefficient pivot used on the Check field probably contributed to the yield advantage that the EPIC field had over the Check field. With the leaky pivot at the freeze plug, the application was very non-uninform. This affected overall application efficiency and rooting depth of the plants.

Objective

The objective of this study is to validate whether or not the use of these new irrigation technologies are both reliable and economically feasible for use in day to day production agriculture in the northern Texas Panhandle. Dependability is a great concern as one missed or late irrigation can cost producers thousands of dollars. However, this technology must still be affordable in order for the average producer to purchase and utilize it.

Materials and Methods

In this study, two identical fields of approximately 120 acres were planted side by side to a white corn variety 32B16 on May 2, 2013. These fields were no-tilled following grain sorghum in 2012. All pre-water, fertility, and herbicide was conducted exactly the same according to producers best management practices for optimum yields. Seeding rate was 32,000 seeds per acre. Both fields were Shem Silty Clay Loam soils.

During the course of the growing season we had by far the best growing conditions that we have had during the three years that we have performed this study. On the EPIC field we received 10.09" of rain and applied 21.9" of irrigation for a total of 31.99 inches of Rain/Irrigation. On the Check field we received 10.11" of rain and applied 21.36 inches of irrigation for a total of 31.47 Rain/Irrigation.

With the rains that we received towards the end of the summer, we were able to shut the systems down this year and try to conserve some irrigation water. We shut the pivots down twice for a total of nearly a month at the end of July and several weeks in August.

Results and Discussion

The EPIC field yielded 305.76 bu/ac while the Check field yielded 280.18 bu/ac. This is a yield advantage of 25.58 bu/ac at a cost of .52" of water or .54" of irrigation. The fields were irrigated exactly the same until the end of July when the EPIC field was left down a little longer than the Check field. From there on they were on different cycles and the EPIC field made one more pass in the end.

Irrigation efficiency played a large part in the yield of the Check field. With the leaking freeze plug a tremendous amount of water was spraying out of the end tower, soaking the field and running to the southeast corner of the field. A large area of corn died in the southeast corner affecting yield. Also as the leak sprayed out it continuously kept the top 8-12 inches of soil wet throughout most of the field, but did not allow for as much deep percolation of water to help with deep root growth. Therefore when both pivots where shut down, the Check field suffered from moisture stress sooner than the EPIC field.

Conclusions

Both fields were water very well; the biggest difference was in the application efficiency of the Check field. Had the Check field had a new pivot on it, the two fields would have been very similar. I still feel that some of this technology needs checking as sometimes one application will say irrigate and another will say you are fine. There needs to be some calibration of this equipment between soil types, heat, wind, crops, etc... The best method is to back it up with manual sampling until we figure it all out.

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