Texas Alliance for Water Conservation

Rick Kellison, Project Director
Declining Water Resources
Texas High Plains Irrigation
(Ag Census) – all crops
A Cooperative Venture with the Texas Water Development Board

Producers Across the Southern High Plains

Texas Tech University
College of Agricultural Sciences & Natural Resources

USDA
NRCS & ARS

High Plains Underground Water Conservation District

FARM Assistance
Planning Solutions

Texas A&M AgriLife Extension

Texas A&M AgriLife Research
Texas Alliance for Water Conservation

[Map showing the area for the Alliance with highlighted regions for South Plains and the Expanded Area.]
Primary Objectives of Project

- Demonstrate how to reduce total water use
- Demonstrate how to enhance profitability
- Identify effective crop and irrigation systems
- Impact producer decision-making
Crops/Livestock (~Total 5,000 acres)

- Cotton Monocultures
- Corn Cotton
- Grain Sorghum Cotton
- Cotton-Cattle
- Grass-cattle
- Specialty Crops
Irrigation Methods

- Sprinkler
- Sub-surface drip
- Furrow
- Dryland
Site Monitoring

- Rainfall
- Temperature
- Water applied
  - Netirrigate
  - PivoTrac
- Soil moisture
  - AquaSpy
  - Crop Sense
  - Aqua Check
- Production inputs
- Plant & animal yields
- Economic analysis
Field Walks 2013

Field 1
82.8 Acres
Grain Sorghum

Field 2
54.1 Acres
Corn

Field 3
92.3 Acres
Cotton
Crop Evapotranspiration Long-term Average (1997–2011)

(Planting Date: 1 May)

- Corn
- Grain Sorghum
- Cotton

Day of Year

(Rajan and Maas)
Sorghum Evapotranspiration
Long-term Average
(1997–2011)

(Rajan and Maas)
Sensor Graph

4”-20” zones wetting up when drip is turned on.

Rainfall stored moisture all the way to 48”
Pioneer 86G32

82.8 acres produced 8816 pounds/acre

Total water supply = 9.3 inches irrigation and 13.4 inches rain = 22.7 inches

Water use efficiency = 411 lbs/acre-inch
Pioneer Aqua Max Yellow Hybrid

54.1 acres produced 818,240 pounds grain = 240.5 bushels/acre

Total water supply = 16.9 inches irrigation and 13.0 inches rain = 32.9 inches

Water use efficiency = 7.32 bushels/acre-inch
Eddie Teeter

Drip – Cotton

- FM 2484 B2F

- 92.3 acres produced 1891 pounds/acre

- Total water supply = 11 inches irrigation and 13.9 inches rain = 24.9 inches

- Water use efficiency = 75.9 lbs/acre-inch
Water Management LEPA vs LESA

Field 1
66.8 Acres

Cotton

Field 2
55.1 Acres

Millet
Comparison of Irrigation Method

Spray Mode

LEPA Mode

Spray mode is slow to wet up soil

LEPA is quicker to wet up soil
LEPA vs LESA

Spray

LEPA
## LEPA vs LESA Budget Comparison 2011

### PER ACRE GROSS INCOME

<table>
<thead>
<tr>
<th></th>
<th>LEPA</th>
<th>LESA</th>
</tr>
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<tbody>
<tr>
<td>Cotton lint</td>
<td>Quantity: 1001</td>
<td>Total: $900.90</td>
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<tr>
<td>Cotton seed</td>
<td>Quantity: 0.72</td>
<td>Total: $245.39</td>
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<td><strong>PER ACRE TOTAL GROSS INCOME</strong></td>
<td><strong>$1,146.29</strong></td>
<td><strong>$1,006.58</strong></td>
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<tr>
<td><strong>PER ACRE TOTAL OF ALL COST</strong></td>
<td><strong>$968.89</strong></td>
<td><strong>$945.93</strong></td>
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<td><strong>PER ACRE NET PROJECTED RETURNS</strong></td>
<td><strong>$177.40</strong></td>
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<td>Percent Increase</td>
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<td>193%</td>
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### WATER APPLIED - INCHES

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<tr>
<td><strong>26.1</strong></td>
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<tr>
<td>Lint lbs per acre-in of water applied</td>
<td>38.4</td>
<td>33.7</td>
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<tr>
<td>Percent Increase</td>
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<td>13.9%</td>
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## LEPA vs LESA Budget Comparison 2012

<table>
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<tr>
<th>PER ACRE GROSS INCOME</th>
<th>2012</th>
<th>LEPA</th>
<th>Total</th>
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<tr>
<td>Quantity</td>
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<tr>
<td>Cotton lint</td>
<td>1057</td>
<td>$ 951.30</td>
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<td>896</td>
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<tr>
<td>Cotton seed</td>
<td>0.76</td>
<td>$ 213.39</td>
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<td>0.65</td>
<td>$ 180.88</td>
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<td>PER ACRE TOTAL GROSS INCOME</td>
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<td>$ 1,164.69</td>
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<td>$ 987.28</td>
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<td>PER ACRE TOTAL OF ALL COST</td>
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<td>$ 980.33</td>
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<td>$ 950.04</td>
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<tr>
<td>PER ACRE NET PROJECTED RETURNS</td>
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<td>$ 184.35</td>
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<td>$ 37.25</td>
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</table>

- **Percent Increase**
  - 395%

### WATER APPLIED - INCHES

| Lint lbs per acre-in of water applied | 55.6 | 47.2 |
| Percent Increase                     | 18.0% |      |

- **Percent Increase**
  - 18.0%
### LEPA vs LESA Budget Comparison 2013

<table>
<thead>
<tr>
<th>PER ACRE GROSS INCOME</th>
<th>LEPA</th>
<th>LESA</th>
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<tr>
<td>Quantity</td>
<td>Total</td>
<td>Quantity</td>
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<tr>
<td>Cotton lint</td>
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<td>$ 873.75</td>
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<td>$ 184.00</td>
<td>$ 72.20</td>
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<td>Percent Increase</td>
<td>155%</td>
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### WATER APPLIED - INCHES

- Lint lbs per acre-in of water applied:
  - LEPA: 70.6
  - LESA: 62.3
- Percent Increase:
  - LEPA: 13.3%
  - LESA: 13.3%
Solution Aids

“Water is Our Future”
TAWC–Solutions
Resource Allocation Analyzer

- To be used as a planning aid

- Captures changes in commodity price, water availability, and production costs

- Generates several options which maximize net returns/acre
The procedure used to determine:

- When to apply
- How much water to apply
- Specific Management Goals
Potential Evapotranspiration

Wind at 2 meters

Over 75 West Texas Mesonet Stations
Relationship between Cotton Yield and Percent Water Demand

Project Sites 2006–2010

Lbs per Acre

% Crop Water Demand
New Crop Water Balance Track

Site:
Gomez-1
Select the site where this crop is located.

Crop Type:
NHP-Corn
Select the type of crop and crop coefficients. Currently only Northern High Plains (NHP) coefficients are supported.

Select Planting Date:
Feb 21 2011

Weather Station:
Abernathy
Select the nearest or preferred weather station.

Crop Acreage: *
120
Total acreage for this crop, not necessarily the irrigated area.

Starting Moisture [in]: *
0
The initial estimate for moisture in the soil at planting time.

Initial Effective Rain [%]: *
100
This is the initial effective rain percentage, which can be adjusted at a later date if necessary.

Initial Effective Irrigation [%]: *
100
This is the initial effective irrigation value, which can be changed at a later date.

Initial Et [%]: *
100
This is the percentage of predicted evaportranspiration to use. This can be changed at a later date as well.

Create New Crop Water Balance Track  Cancel
## Crop Summary

<table>
<thead>
<tr>
<th>Site</th>
<th>Weather Station</th>
<th>Acreage</th>
<th>Type</th>
<th>Last Et</th>
<th>Moisture Balance</th>
<th>Growth Stage</th>
<th>Total Irrigation</th>
<th>Total Rain</th>
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<td>Old Mill-1</td>
<td>Abernathy</td>
<td>120</td>
<td>Cotton</td>
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<td>0.69</td>
<td>Strip</td>
<td>0.00</td>
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## Daily Measurements

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<tr>
<th>Date</th>
<th>Effective Irrigation</th>
<th>Effective Rain</th>
<th>Percent Et</th>
<th>Irrigation</th>
<th>Rain</th>
<th>Daily Et</th>
<th>Moisture Balance</th>
<th>Growth Days</th>
<th>Growth Stage</th>
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<td>0 2010-05-11</td>
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<td>0.50</td>
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<td>7 2010-05-18</td>
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<td>0.50</td>
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Maximizing Water Use Efficiency
The Goal of Production Agriculture
Thank You!

Texas Alliance for Water Conservation