Lloyd Arthur
Water Efficiency Technologies and Sustainable Cotton

TAWC Field Day September 12, 2019
Floyd Co. Unity Center
• Started working with TAWC in 2012 on two sites
• Site #50-120 acres 8 tower pivot with 1 irrigation well rated at 300 gpm
• Site #51-45 acres drip with 1 irrigation well rated at 150 gpm
• Second year working with a third site with two 68-acre pivots sharing the same two wells on comparing one pivot with 40-inch drops, and one with 80-inch drops. Both pivots have approximately 10-foot elevation difference between the high and low.
• All sites located in Crosby County
• One of the goals is to find ways to be more efficient with irrigation water, producing more with less.
• Over the years many technology devises have been bolted on, used, compared, and studied.
• Some have worked.
• Some did not.
• Some showed promise.
• Some were too costly.
• Some were outdated within a short time.
• Some had no support or service.
the same idea with different design
Variable Rate Irrigation (VRI)

2017 I was approached by TAWC staff to assist them in looking at the advantages of VRI

• System was installed on the pivot on site #50 that would handle such tasks, as well as a digital flow meter and a pressure switch that could be monitored from and controlled by a smart phone (by an app) or desk top computer.

• The system installed was a “FieldNet” by Lindsay Zimmatic.

• Also installed were “CropMetric” subsurface moisture monitoring probes so we could evaluate the results between VRI rates and flat rate irrigation.

• Assistants from TAWC personnel, ForeFront agronomy, Jeff Miller and Lindsay Corp. Farris Hightower
• The first year and second year yields show some increases in the VRI sections over the flat rate sections even with hail damage and drought conditions incurred those first two years. Those results have been shared at previous TAWC meetings.

• Hopefully mother nature will cooperate with good harvest conditions and we can share 2019’s crop yield and other irrigation data at the TAWC Water Collage meeting next year 01/23/2020 in Lubbock TX.

• After 2017 crop I personally saw potential in VRI irrigation that I put FieldNet controllers on half of my pivots in 2018, and at the first of 2019 I place the controller on the remaining pivots that I own and operate.

• Now let us look at some small, simple VRI techniques that anyone can use and be more efficient with irrigation water as well as other inputs.
24/7 alerts and monitoring from your phone

FieldNET: (FieldNET Alert) Level 2 Alert
12 is running wet, 7% / 1.10 in, with 4 psi, at 268.5 degrees, A1=off as of Fri, Aug 23 at 9:12PM CDT

FieldNET: (FieldNET Alert) Level 1 Alert
12 stopped, low pressure at 268.5 degrees as of Fri, Aug 23 at 9:15PM CDT

FieldNET: (FieldNET Alert) Level 2 Alert
12 is running reverse wet, 7% / 1.10 in, with 8 psi, at 268.5 degrees, A1=off as of Fri, Aug 23 at 9:24PM CDT
24/7 alerts and monitoring from your phone

FieldNET: (FieldNET Alert)  
Level 1 Alert  
1932 is stopped wet at 133.4 degrees as of Sun, Jul 21 at 6:59PM CDT

FieldNET: (FieldNET Alert)  
Level 2 Alert  
1932 is running forward wet, 23% / 0.55 in, with 11 psi, at 133.4 degrees, A1=on as of Sun, Jul 21 at 7:33PM CDT
VRI Farm 12 Dashboard

Reverse Wet
1d 21h 3m (2019-09-05 12:00:12 AM)

- TAWC VRI N 1.25

- Rate: 6.3%
- Depth: 1.19 in
- Pressure: 9 psi
- Flow: 300 gpm

Google Map Data

274.9° 222h 13m

Start/Stop  Water  Accessory  Auto-Reverse  Auto-Restart
Water on turn rows/how many gallons wasted?
1518 East VRI irrigation and Fertilization

<table>
<thead>
<tr>
<th>Area</th>
<th>Start</th>
<th>End</th>
<th>H₂O</th>
<th>Chem</th>
<th>Speed</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>20</td>
<td></td>
<td></td>
<td>17.8%</td>
<td>0.95 in</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>65</td>
<td></td>
<td></td>
<td>14.09%</td>
<td>1.20 in</td>
</tr>
<tr>
<td>3</td>
<td>65</td>
<td>88</td>
<td></td>
<td></td>
<td>19.90%</td>
<td>0.85 in</td>
</tr>
<tr>
<td>4</td>
<td>88</td>
<td>92</td>
<td></td>
<td></td>
<td>100%</td>
<td>0.17 in</td>
</tr>
<tr>
<td>5</td>
<td>92</td>
<td>129</td>
<td></td>
<td></td>
<td>19.90%</td>
<td>0.85 in</td>
</tr>
<tr>
<td>6</td>
<td>129</td>
<td>106</td>
<td></td>
<td></td>
<td>17.8%</td>
<td>0.95 in</td>
</tr>
<tr>
<td>7</td>
<td>195</td>
<td>258</td>
<td></td>
<td></td>
<td>14.09%</td>
<td>1.20 in</td>
</tr>
<tr>
<td>8</td>
<td>268</td>
<td>271</td>
<td></td>
<td></td>
<td>100%</td>
<td>0.17 in</td>
</tr>
<tr>
<td>9</td>
<td>271</td>
<td>0</td>
<td></td>
<td></td>
<td>17.8%</td>
<td>0.95 in</td>
</tr>
</tbody>
</table>
### TAWC VRI 19t

<table>
<thead>
<tr>
<th>Area</th>
<th>Start</th>
<th>End</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>54</td>
<td>60</td>
<td>17%</td>
</tr>
<tr>
<td>11</td>
<td>60</td>
<td>66</td>
<td>17.5%</td>
</tr>
<tr>
<td>12</td>
<td>66</td>
<td>72</td>
<td>17.7%</td>
</tr>
<tr>
<td>13</td>
<td>72</td>
<td>78</td>
<td>18%</td>
</tr>
<tr>
<td>14</td>
<td>78</td>
<td>84</td>
<td>18.099%</td>
</tr>
<tr>
<td>15</td>
<td>84</td>
<td>87</td>
<td>18.099%</td>
</tr>
<tr>
<td>16</td>
<td>87</td>
<td>94</td>
<td>90.3%</td>
</tr>
<tr>
<td>17</td>
<td>94</td>
<td>96</td>
<td>10.099%</td>
</tr>
<tr>
<td>18</td>
<td>96</td>
<td>102</td>
<td>18.2%</td>
</tr>
</tbody>
</table>

### Forward

<table>
<thead>
<tr>
<th>Area</th>
<th>Start</th>
<th>End</th>
<th>Hyd</th>
<th>Chem</th>
<th>Speed</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>180</td>
<td>60</td>
<td></td>
<td></td>
<td>11.3%</td>
<td>0.80 in</td>
</tr>
<tr>
<td>2</td>
<td>60</td>
<td>75</td>
<td></td>
<td></td>
<td>15.1%</td>
<td>0.60 in</td>
</tr>
<tr>
<td>3</td>
<td>75</td>
<td>87</td>
<td></td>
<td></td>
<td>22.6%</td>
<td>0.40 in</td>
</tr>
<tr>
<td>4</td>
<td>87</td>
<td>100</td>
<td></td>
<td></td>
<td>15.1%</td>
<td>0.60 in</td>
</tr>
<tr>
<td>5</td>
<td>100</td>
<td>125</td>
<td></td>
<td></td>
<td>15.1%</td>
<td>0.60 in</td>
</tr>
<tr>
<td>6</td>
<td>125</td>
<td>176</td>
<td></td>
<td></td>
<td>12.9%</td>
<td>0.70 in</td>
</tr>
<tr>
<td>7</td>
<td>176</td>
<td>180</td>
<td></td>
<td></td>
<td>90.60%</td>
<td>0.10 in</td>
</tr>
</tbody>
</table>
VRI/48 VRI-Fert
Imaging

Imagery by “Ceres” provided to Jeff Miller ForeFront agronomy

I think we should increase our water amount on the north half of this pivot or make another pass.

VR1 seems to be keeping up better than the flat rate on the next pivot.
1932 - 2018 Seed Germination
SUSTAINABILITY

• That word most likely has as many definitions, as there are people in this room
• Sustainability definition according to Google are as follows
  • #1 (noun) The ability to be maintained at a certain rate or level
  • #2 Avoidance of the depletion of natural resources in order to maintain an ecological balance
• Personally in my opinion #2 should include “Economical and Profitable”
• This is key and an important issue to the Cotton Industry (the farmer). Sustainability is what the Brands (retailers) and Consumers (today’s general public) are wanting. They want their cotton to come from a sustainable industry. I think U. S. cotton farmers are doing that, they just want reassurance.
Following slides are courtesy of the U.S Cotton Trust Protocol
U.S. Cotton Trust Protocol

• Two questions to answer

✓ What is the Protocol?
✓ Why do we need it?
U.S. COTTON TRUST PROTOCOL

• A voluntary farm-level program designed to engage growers in continuous improvement

• A program that can help the industry reach its 2025 goals

• A system that will provide aggregate data that can be passed through the textile supply chain which includes: producers, merchandisers, manufacturers, brands and retailers and others
KEY REQUIREMENTS FOR THE PRODUCER

• Completion of a self-assessment questionnaire

• Use of a data tool

• Farming operation profile

• Selection of Gin(s)

• Verification by an independent party
Self-Assessment Questionnaire

- 9 categories with approx. 100 questions
- Choices for answers
  A. I do this now on my operation
  B. I am implementing on 1 or more of my fields
  C. I will consider in next 3 years
  D. Not appropriate for my farming operation
## Why? To Achieve Industry Goals

<table>
<thead>
<tr>
<th>Best Management Practices</th>
<th>Industry’s 10-Year Goals For Environmental Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reduce Land Use by 13%</td>
</tr>
<tr>
<td>Environmental</td>
<td>Soil Health</td>
</tr>
<tr>
<td></td>
<td>![Checkmark]</td>
</tr>
<tr>
<td>Social</td>
<td>Worker Relations</td>
</tr>
<tr>
<td></td>
<td>Provide a safe work place for all employees, assure fair treatment and compensation.</td>
</tr>
</tbody>
</table>
"It's the Wild West out there right now," says Paul Magel, president of the business applications and technology outsourcing division at CGS, a software company that works with retail clients.

- The needs of customers will vary
- Many brands/retailers accept U.S. cotton as sustainable or responsibly produced
- However, not all have done so. They point to the lack of a standard or independent verification
- We must be flexible in the ability to pass data to the textile supply chain
Why? To Be the Supplier of Choice

• The Protocol is NOT about
  • One grower or one bale being more sustainable than another, or
  • Guaranteeing a premium
• The Protocol IS about U.S. cotton
  • Competing in every market and every supply chain
• The United States cannot afford to lose market access because of a perceived lack of sustainability
We Know the Effects of Loss of Market Access

U.S. cotton understands the importance of market access

All cotton producers feel the impacts of barriers to entering a market
• Questions

• @LDAMAX1