Snap Shot of Our Irrigation Research in the Panhandle

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Irrigation Management Resources in the Panhandle

- We Utilize subsurface drip irrigation in Goodwell at OPREC and a variable rate irrigation pivot at McCaull R&D Farm Near Elkhart
- Each system is remotely managed and monitored
- Each can provide replicated water treatments
Testing Ag Performance Solutions (TAPS)

- Located at McCaull under pivot VRI
- Participants tell us how much water and N to apply
- Pre-plant, sidedress and fertigation
- Irrigation applied at 0-1.25 inch/5 days  
  - Target but not always happens!
- Remote data was provided to participants to aid in decision making
Pre-plant Strip Tillage
Variable Rate Irrigation and fertigation System
Aerial Imagery is Used to Monitor Plots

OSU TAPS Imagery data

8/15/19 update

The values in the table below are NDVI readings that we extracted from the center 10 ft of your TAPS plots we then averaged them across the plots. We also clipped 50 ft off the end of each plot so as to not include the impact of any delay time in our fertilizer applicator during fertilization. The absolute value of the NDVI has little value because it will change as a function of atmospheric conditions, therefore expressed the values a % of the check (TAPS7).

<table>
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<tr>
<th></th>
<th>11-Jun</th>
<th>21-Jun</th>
<th>23-Jun</th>
<th>9-Jul</th>
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<td>0.153</td>
<td>0.129</td>
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Expressed as a % of the Zero N check:

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Integrated Irrigation Scheduling Tools

Corn P1197AM - Gruver clay loam, 0 to 1 percent slopes

[Graph showing depletion levels with various data points and lines representing different parameters such as permanent wilting point, crop stress, field capacity, safety, refill, historical depletion, projected depletion (with irrigation), and net irrigation.]
Soil Moisture Data was Provided

- Water was not the only factor but was important

Lowest Yielding (14.5 in)  Highest Yielding (17.3 in)
TAPS Yield

Yield as a Function of Nitrogen

Yield (bu/acre) vs. N Applied (lbs/acre)

Yield as a Function of Water

Yield (bu/acre) vs. Irrigation Applied (Inches)

\[ y = 12.046x - 12.63 \]

\[ R^2 = 0.7855 \]
Plans for Next Year for TAPS

- Incorporate other soil moisture sensors and crop model products
- Increase the number of participants.
- Engage growers with on-farm demonstrations of technologies
  - We initiated this with 2 farmers using the integrated crop model system.
  - One of them is investing in this next year.
Cotton Irrigation Research

- Located on subsurface drip irrigation system at OPREC (Goodwell).
- Objective was to evaluate various irrigation strategies for cotton in Panhandle.
- Short season suggests that management to stimulate maturity is key to success.
- We applied treatments to replace different amount of mesonet estimated ET.
Treatment in Thermal image (Aug. 13)

| 36% then 63% |  |
| 63% |  |
| 90% |  |
| 36% |  |
| 90% then 63% |  |
| 36% then 63% |  |
| 90% then 63% |  |
| 63% |  |
| 90% |  |
| 63% |  |
| 36% then 63% |  |
| 90% then 63% |  |
| 36% |  |
| 90% |  |
| 63% |  |
Seed Lint Yield

- Seed lint yield was optimized at 9 inches
- Need ginned yield and quality to draw a better picture
Low Water May Have Better Quality

36% ET

90% ET
Summary of Cotton Research

- Providing adequate irrigation during squaring is important in maximizing seed lint yield
- Irrigation rate can be reduced during bloom to 63% of ET
- Early season stress can reduce yield
- The quality component will be very important in evaluating value of cotton
- We will conduct similar research at Altus in 2020.
Questions

- Jason.warren@okstate.edu
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- www.Ogallala.org
Evaluation of N Response Under Different Irrigation Rates

- Objective was to evaluate N response at a field scale under different irrigation rates
- Conducted at McCaul R&D farm in 2018 and 2019
- Altered speed of pivot to apply 1, 1.25, and 1.5 inch/revolution
- N rates applied at 0-270 lbs N/acre preplant.
Water applications

Water was applied at different rates in replicated slices using Fieldnet Controller.
2018 Grain Yield

![Graph showing the relationship between N rate (lbs/acre) and Yield (bu/acre) with different soil moisture levels (1", 1.25", and 1.5") as represented by different markers.]
Irrigation Applied in 2018

The 1” treatment was sufficient to maintain >85% ET replacement
2019 Grain Yield

Yield (bu/acre) vs. N Rate (lbs/acre)

- 1.0"
- 1.25"
- 1.5"

Graph showing the relationship between N rate and yield for different irrigation depths.
Irrigation Applied in 2019

Cumulative ET
Cumulative Rain+Irr. (1.0”) [14.1]
Cumulative Rain+Irr. (1.25”) [17.6]
Cumulative Rain+Irr. (1.5”) [21.3]

Pivot breakdowns limited the amount of water we could apply, the 1” treatment could not keep up.

Early season rainfall was not very helpful
Summary of Nitrogen Study

- Crop Yields have been optimized with 200 lbs N/acre in the 2 years
- Response to irrigation is dependent on in-season rainfall
- This project was meant to simulate on-farm conditions
  - Pivot breakdown
- We will continue this project and process aerial imagery to assess its value in managing water and N.
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USDA
United States Department of Agriculture
National Institute of Food and Agriculture