Deficit Irrigation Management for Corn and Sorghum

16th Annual Crop Clinic

April 10th, 2015; Goodwell, OK

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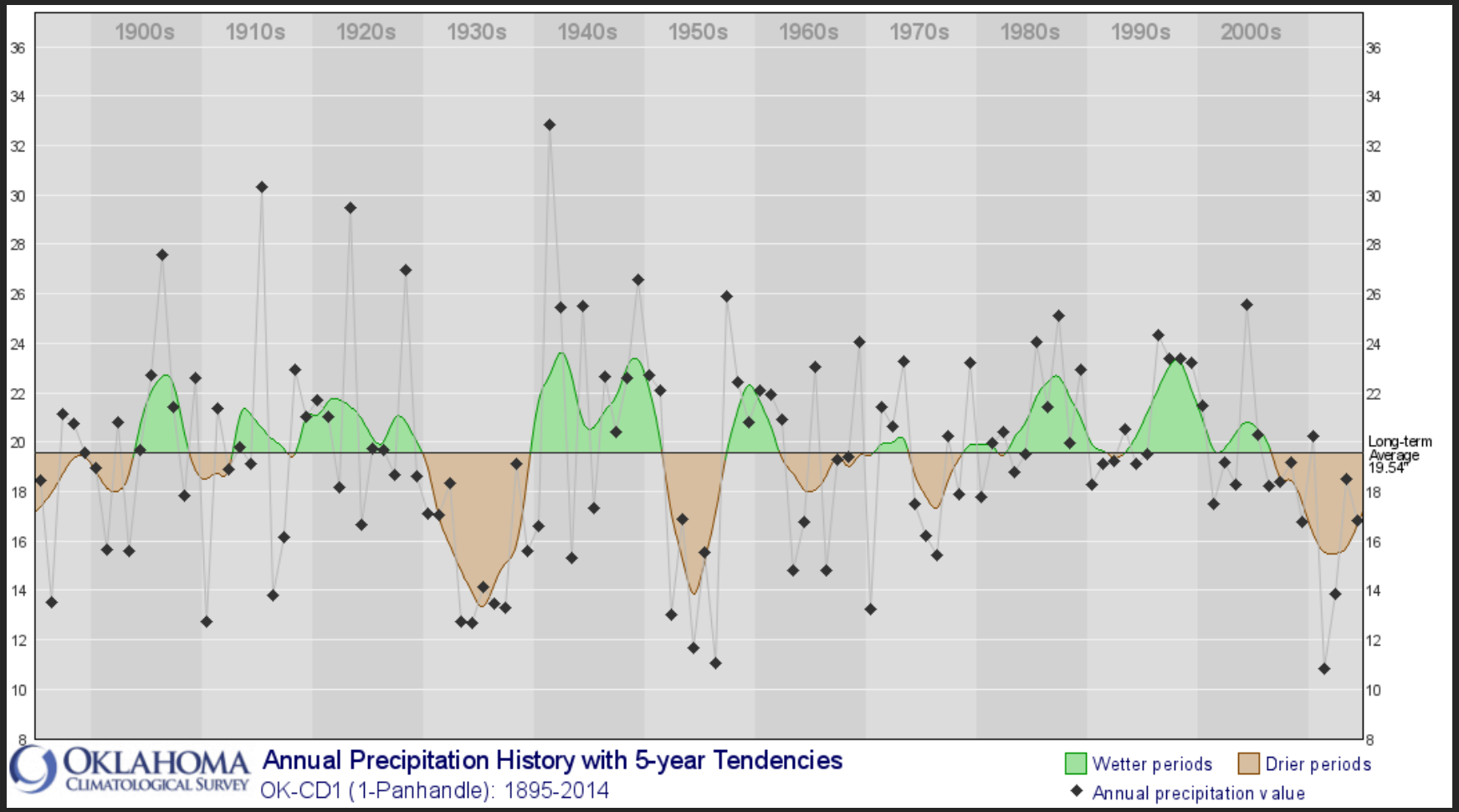
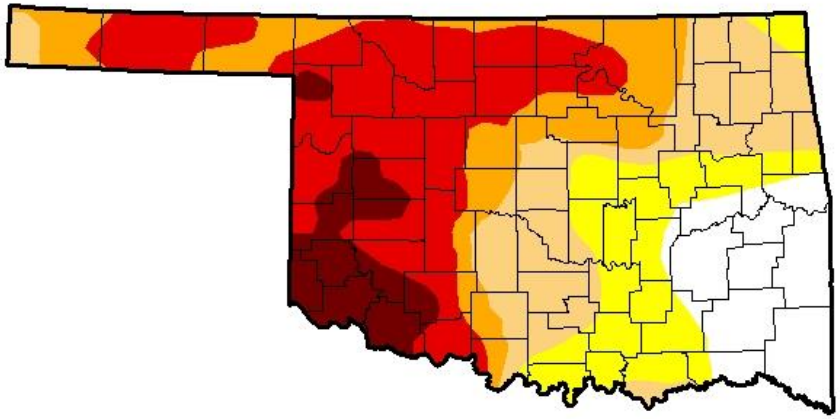
Past, Present, Future



Drought Condition

U.S. Drought Monitor
Oklahoma



March 24, 2015

(Released Thursday, Mar. 26, 2015)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	14.36	85.64	70.40	50.96	35.74	8.41
Last Week 3/17/2015	8.63	91.37	70.50	47.81	31.72	5.75
3 Months Ago 12/23/2014	25.63	74.37	62.03	40.84	21.67	5.71
Start of Calendar Year 12/30/2014	25.63	74.37	62.03	40.84	21.74	5.70
Start of Water Year 9/30/2014	8.55	91.45	73.31	58.13	20.92	4.64
One Year Ago 3/25/2014	4.05	95.95	77.41	32.48	24.03	8.58

Intensity:

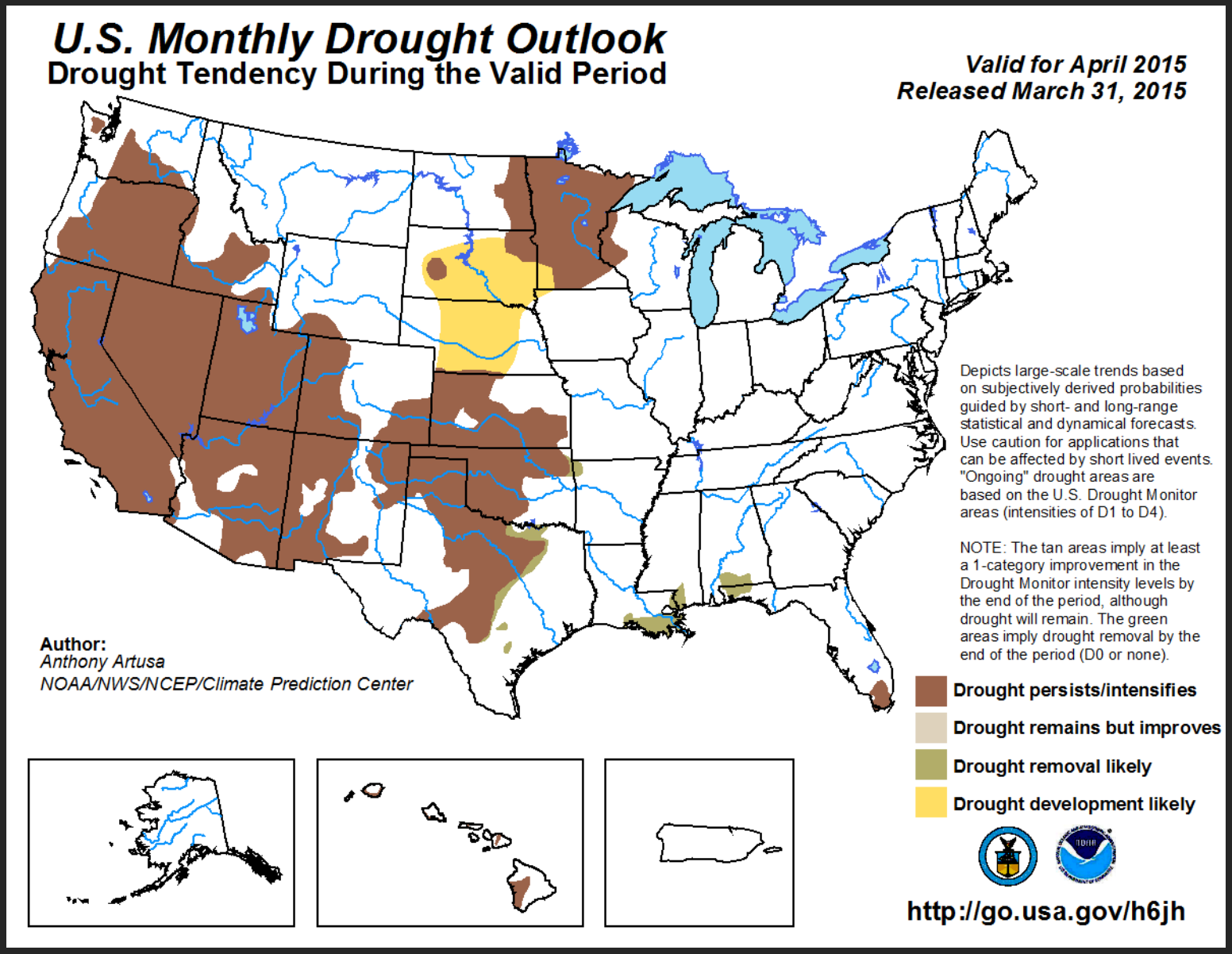
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Eric Luebehusen
U.S. Department of Agriculture

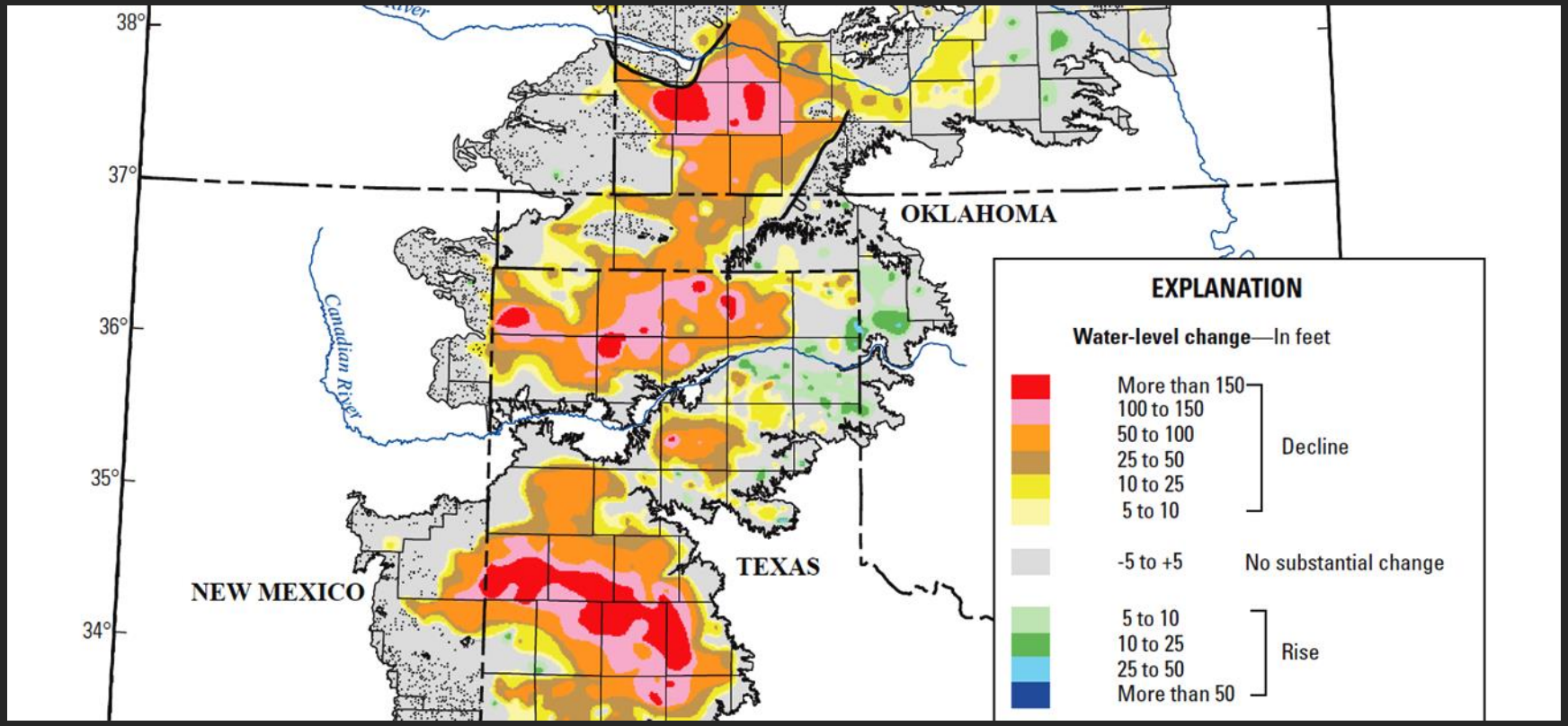
http://droughtmonitor.unl.edu/

Forecast


U.S. Monthly Drought Outlook
Drought Tendency During the Valid Period
Valid for April 2015
Released March 31, 2015
Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).
NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).
Author:
Anthony Artusa
NOAA/NWS/NCEP/Climate Prediction Center
Drought persists/intensifies
Drought remains but improves
Drought removal likely
Drought development likely
http://go.usa.gov/h6jh

Groundwater Resources

Groundwater Resources



Source: USGS Scientific Investigations Report 2012–5291

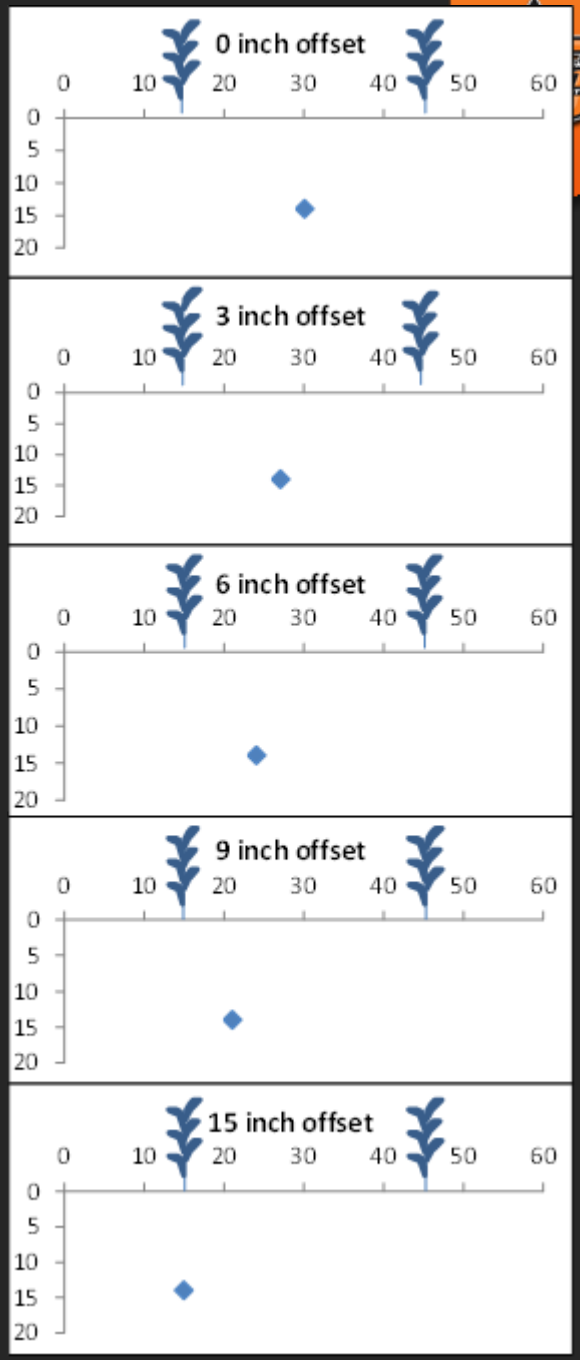
Research/Extension Project

Developing Management Strategies for Subsurface Drip Irrigation in the Oklahoma Panhandle

- **Evaluate the impact of:**
  - ✓ **Crop row placement with respect to drip lines**
  - ✓ **Irrigation application rates (100%, 75%, and 50%)**
- **Investigate the performance of two irrigation management tools:**
  - ✓ **Soil moisture**
  - ✓ **Canopy temperature**

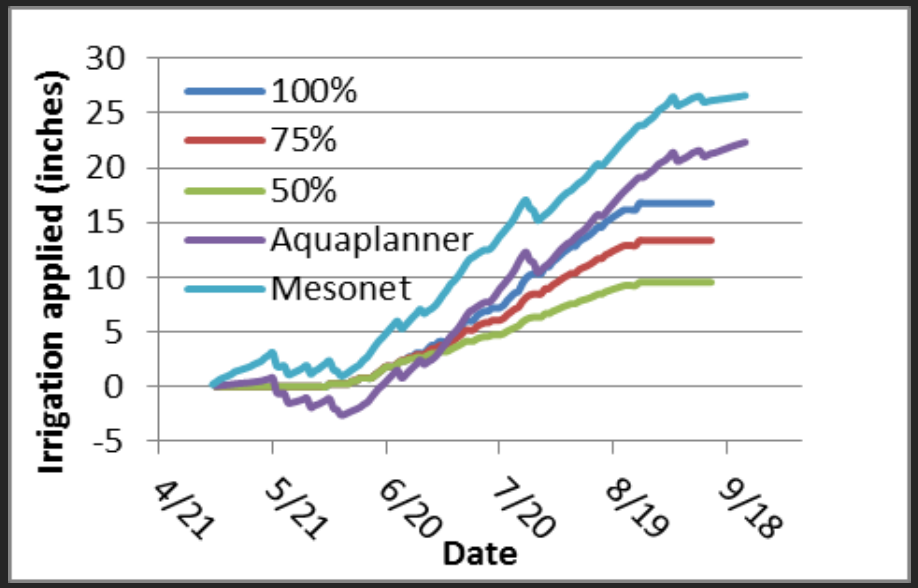
Row placement

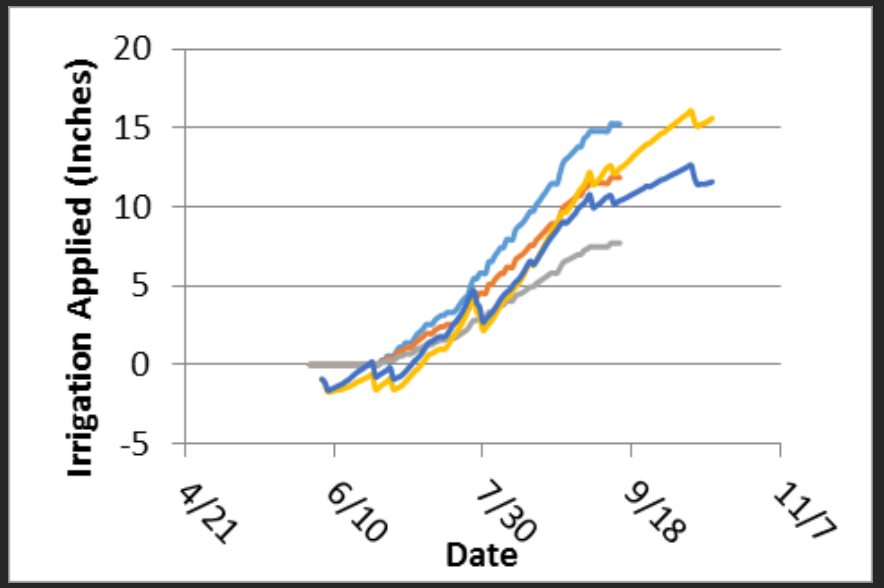
- Rows were offset using RTK Guidance
- Plots: 6 rows wide (15ft) and 30 ft long
- Planting: 5/5 (corn); 6/6 (sorghum)



Irrigation

- Application rate: 0.04 inch/hr
- Min. Application: 0.3 inch
- Total irrigation corn: 16.5, 13.5 and 9.4 inches
- Total irrigation sorghum: 15.1, 11.7 and 7.6 inches





Soil Moisture Sensors

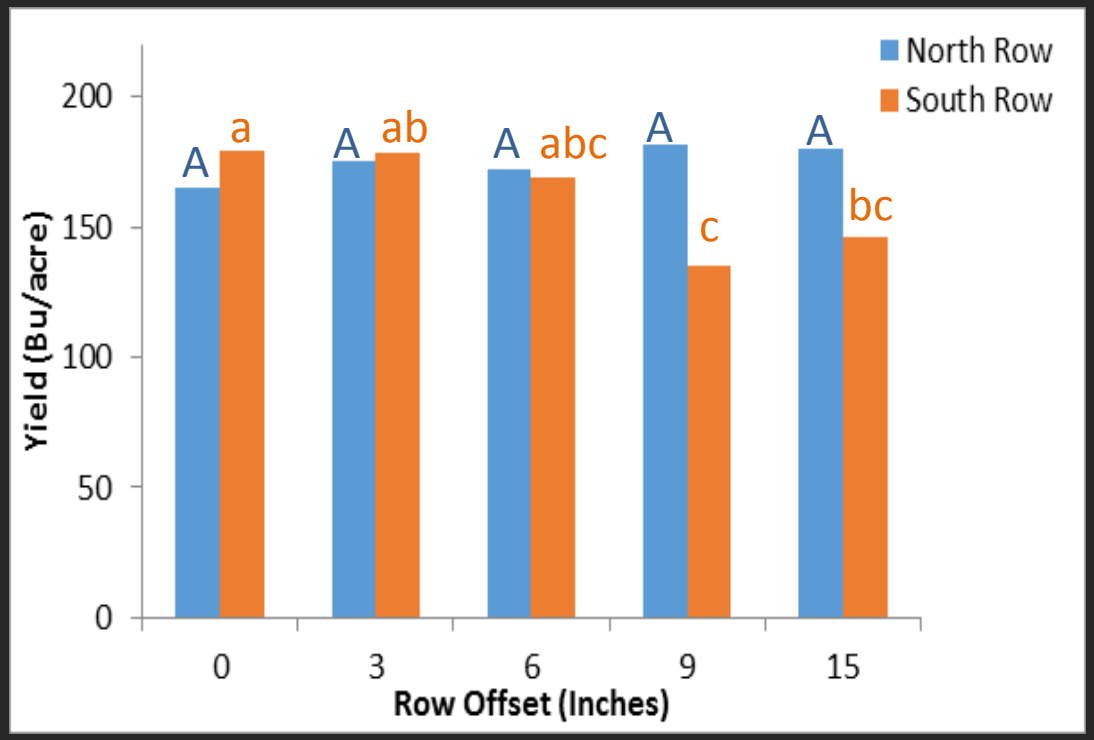
7/24/2014

8/12/2014

8/12/2014

Corn Grain Yield by Row

- Placement of S row further from tape decreased yield
- Moving N row closer to tape did not increase yield



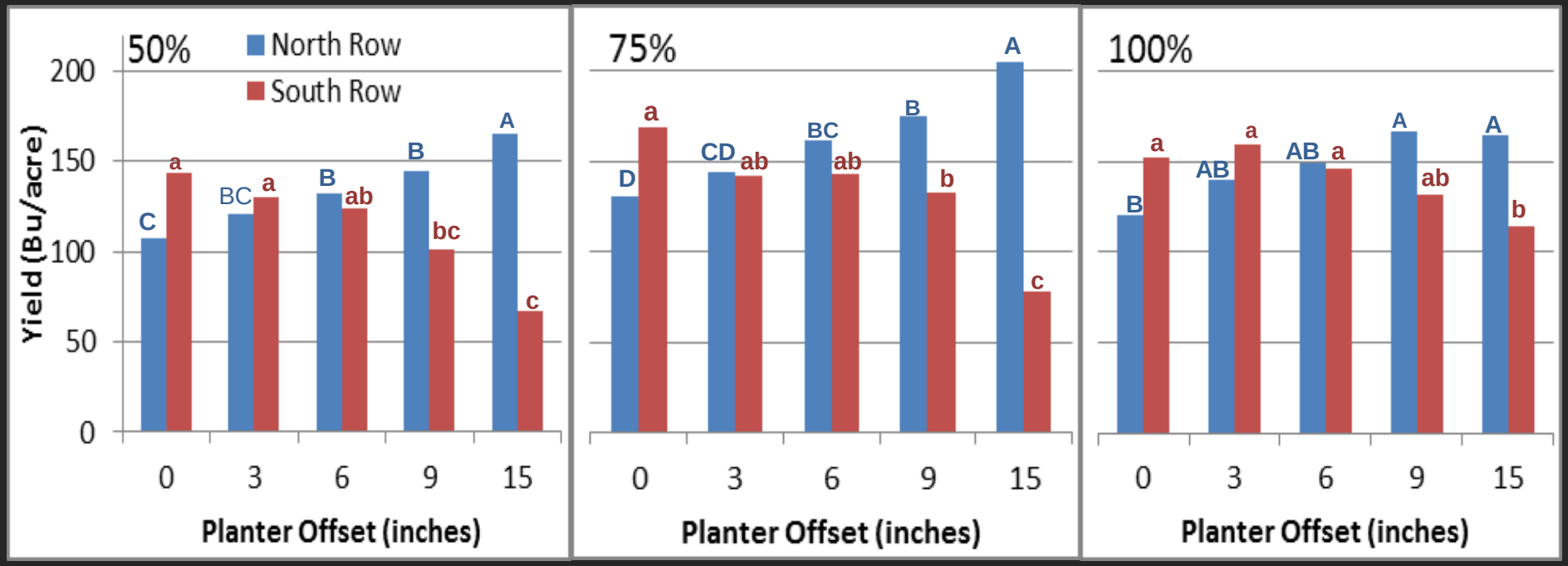
Corn Grain Yield by Plot

- **Increasing the offset resulted in a decreased yield**
  - ✓ **Most prevalent at 50 and 75% Irrigation**
- **Decreasing irrigation amount resulted in a decreased yield**

Offset	50%	75%	100%	Average
Inches	----------Bu acre^{-1}----------			
0	132	178	206	172a
3	140	177	212	177a
6	131	172	208	170ab
9	119	151	204	158b
15	120	163	206	163ab
Average	129	168	207	

Sorghum Grain Yield by Row

- **Individual row yields were significantly influenced by distance from tape**



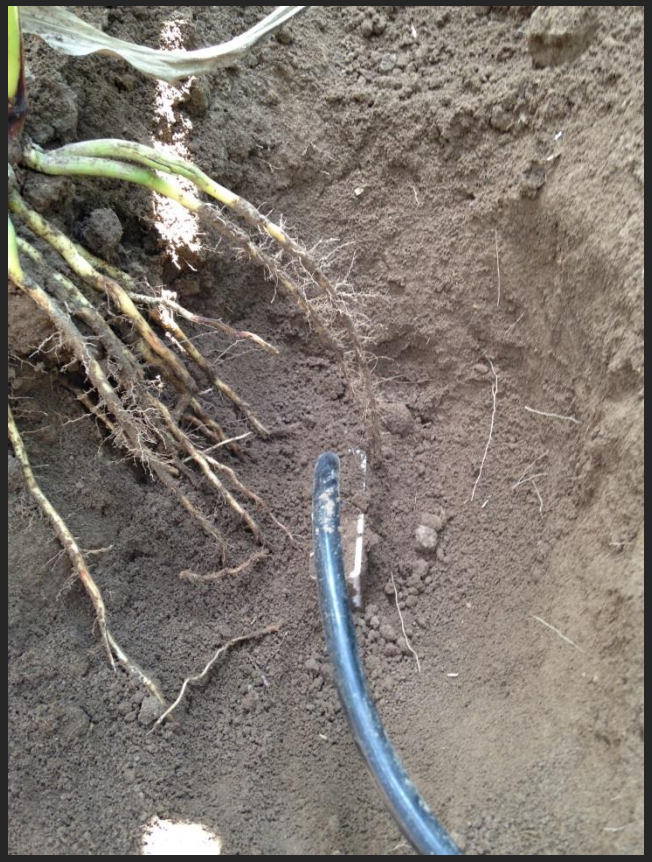
Sorghum Grain Yield by Plot

- Sorghum yields were not influenced by offset treatments
- Decreasing irrigation amount resulted in a decreased yield
  - ✓ 75% irrigation was sufficient

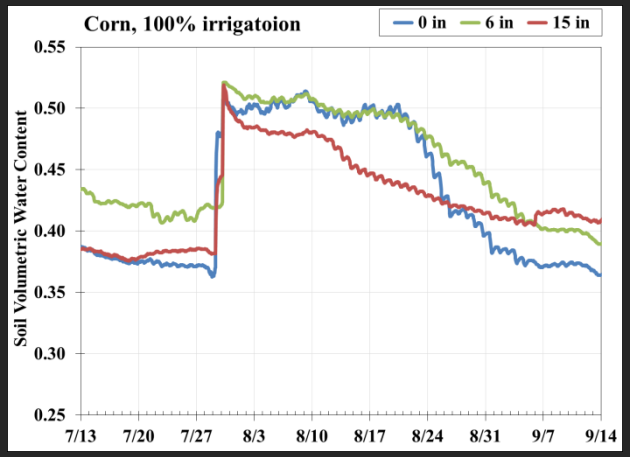
Offset	50%	75%	100%	Average
Inches	----------Bu acre^{-1}----------			
0	120	150	152	141
3	127	164	149	147
6	128	154	152	145
9	133	146	152	144
15	126	151	154	144
Average	127	153	152	

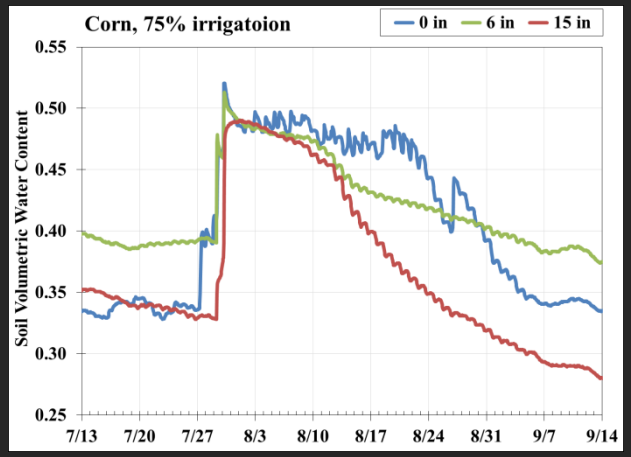
Soil Moisture Sensors

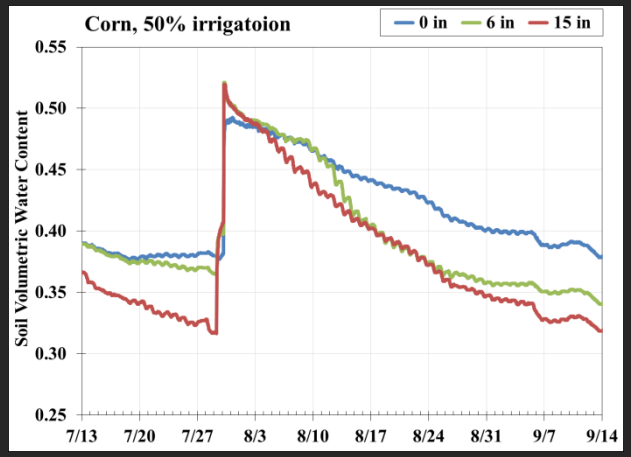
- Campbell Sci. 655
- Rod length: 4.7 in
- Sensing Volume: 220 in^3

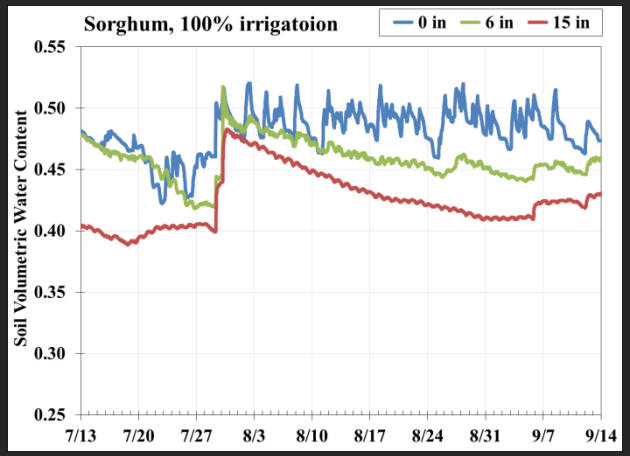


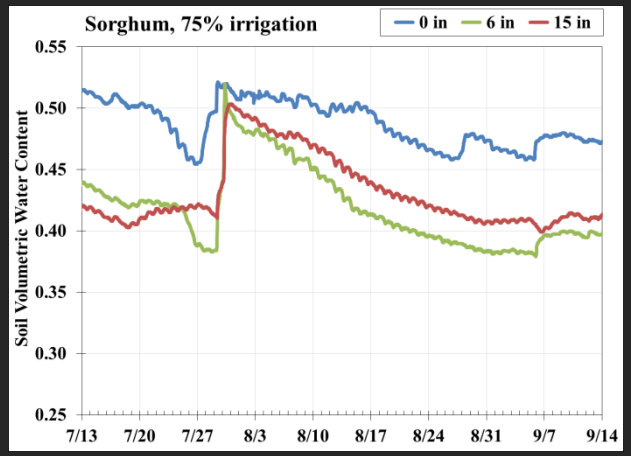
Soil Moisture Variations

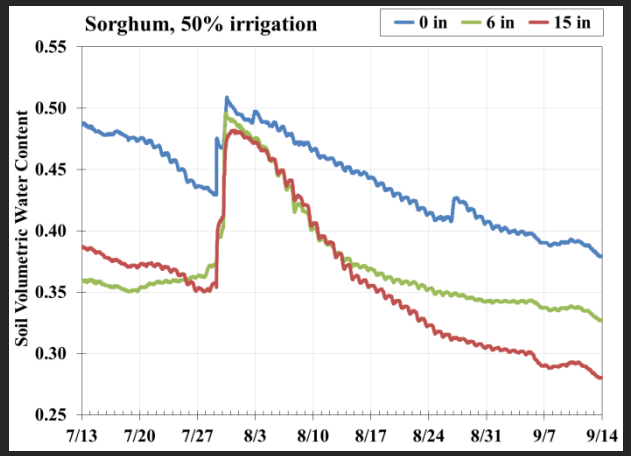












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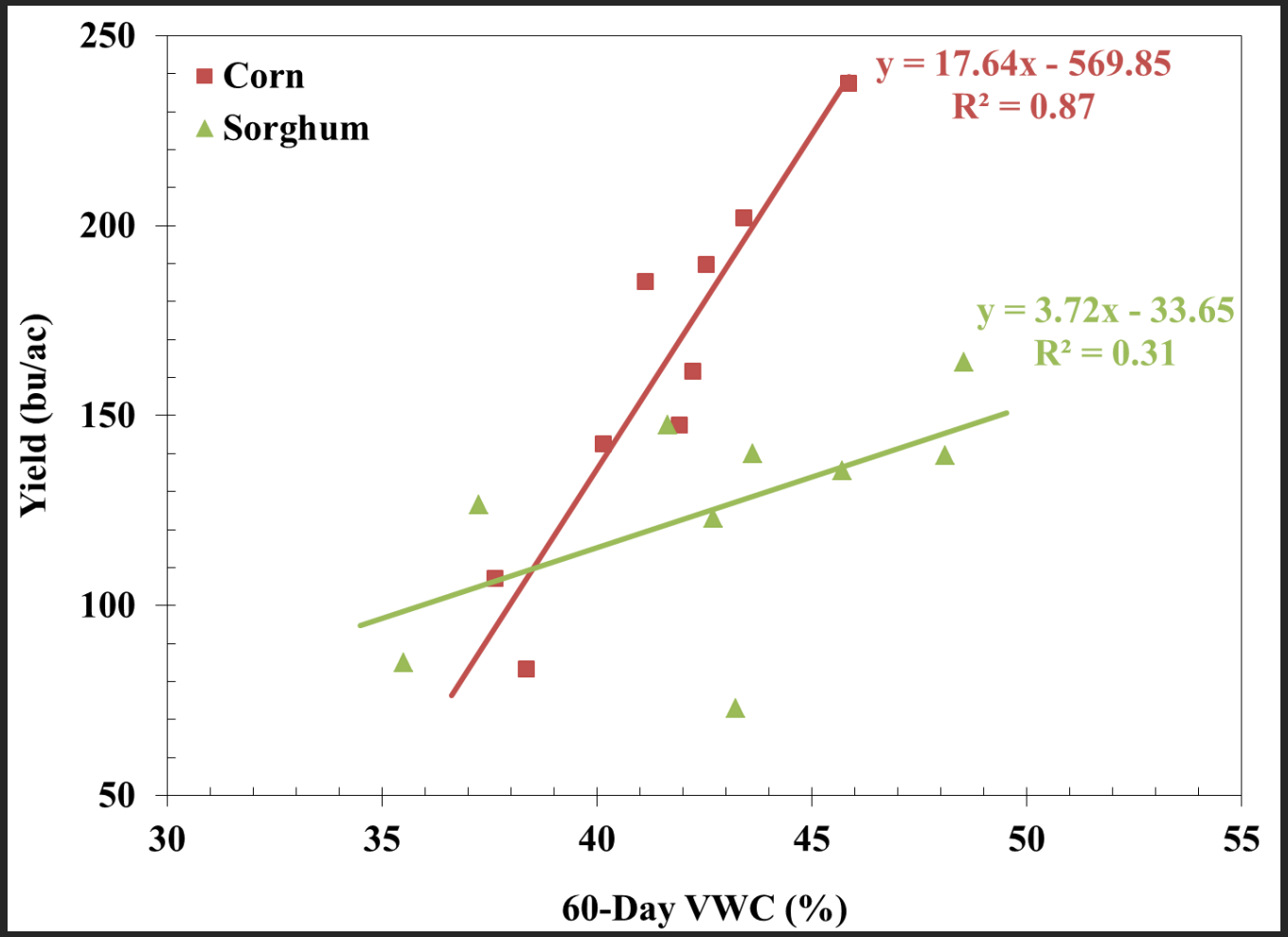
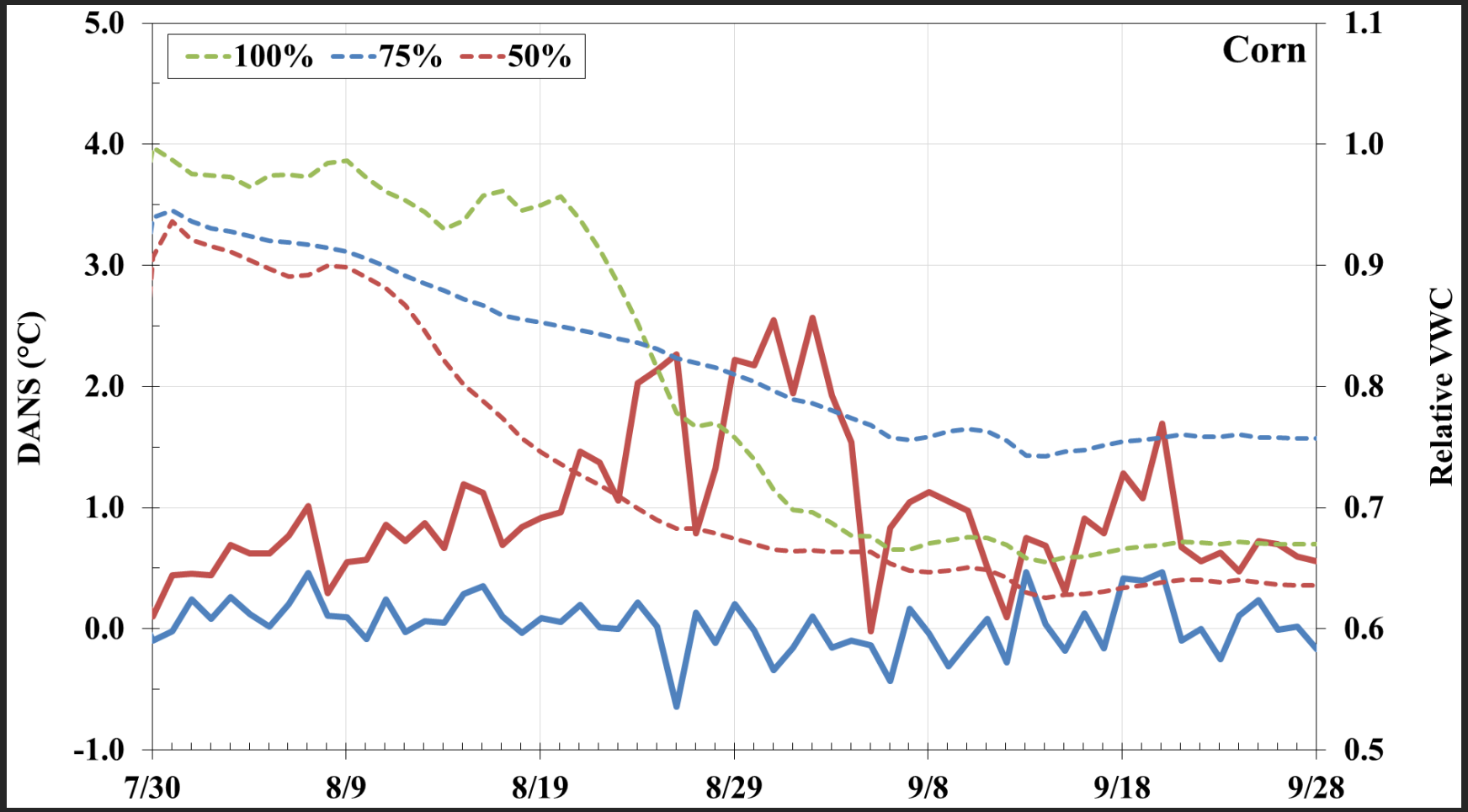


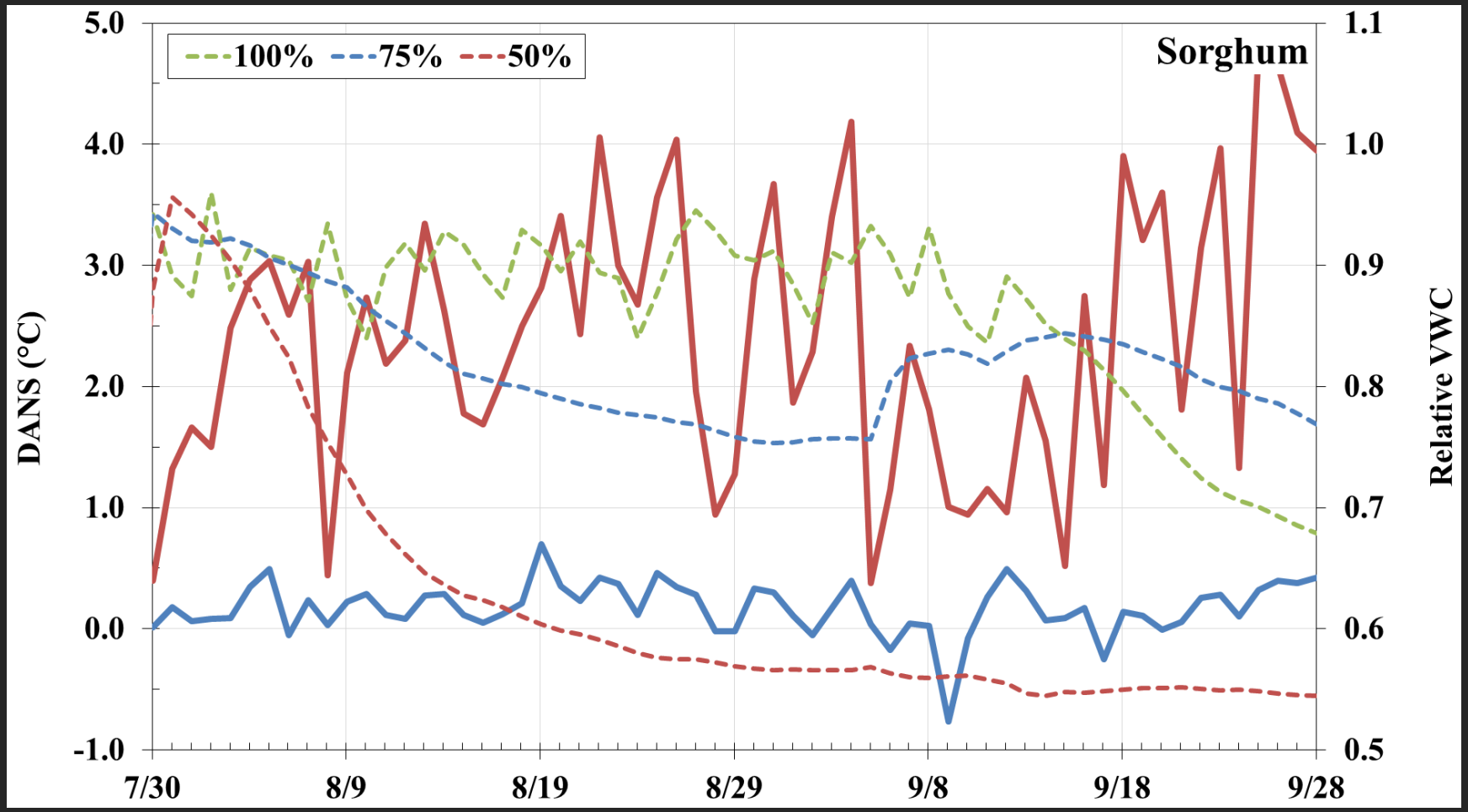
Canopy Temperature

- Apogee IRT SI-111
- Accuracy: 0.36 ºF

Canopy Temperature

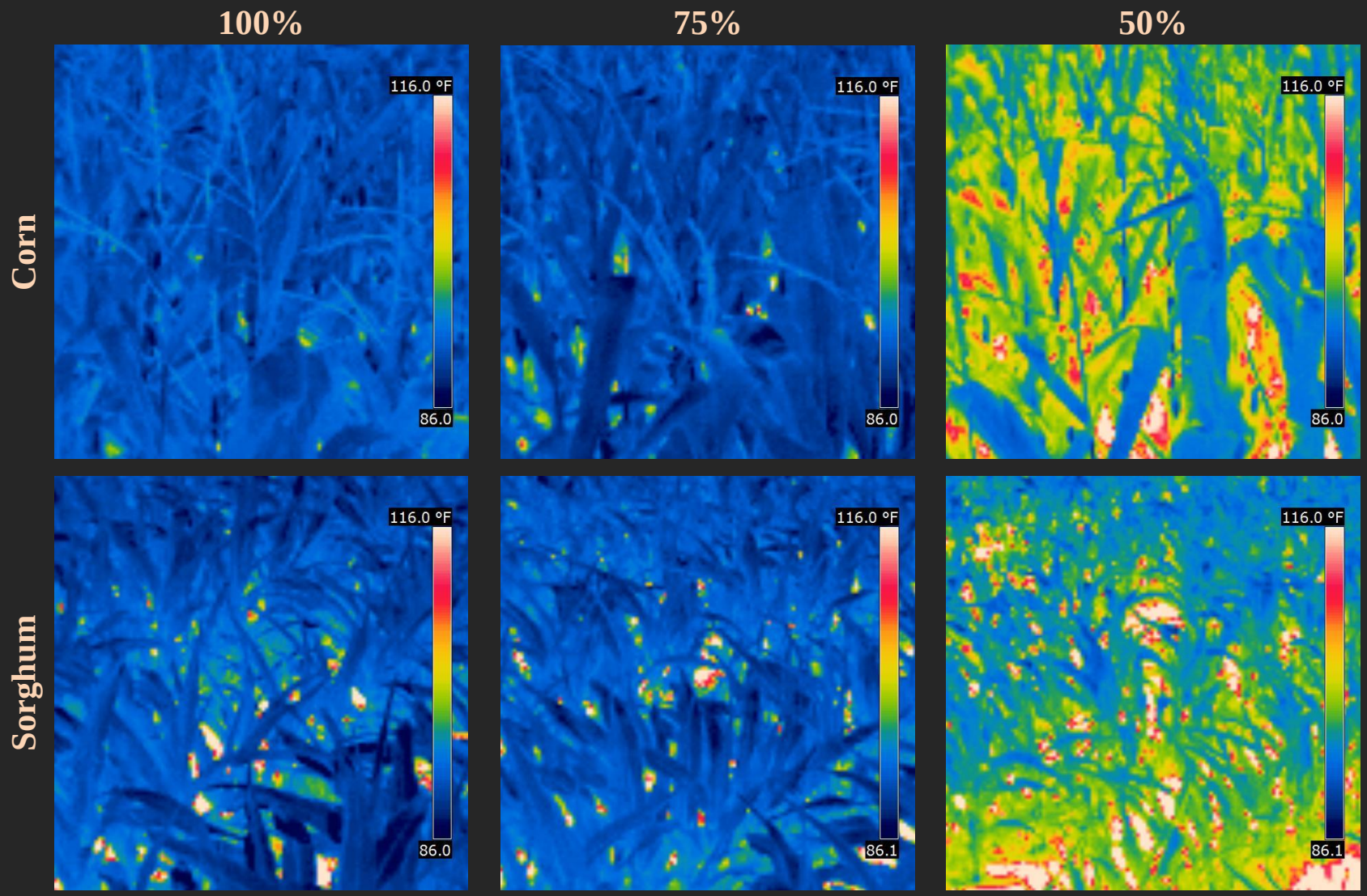


Canopy Temperature

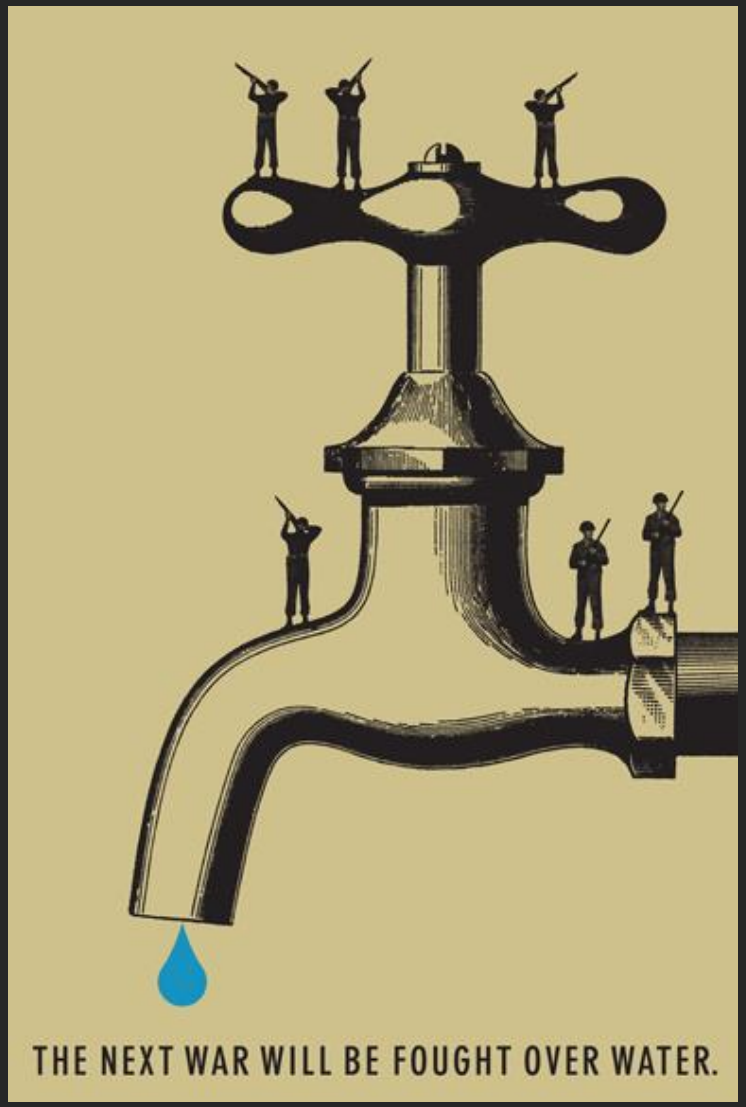


Why Canopy Temperature?

Canopy Temperature



Questions



Source: Scorsone Drueding Posters