

# Evapotranspiration and Soil Water Depletion under 4 irrigation Treatments in the OK Panhandle

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# Cotton Irrigation Research in Panhandle

- In 2019 we initiated this irrigation study
- Goal was to start collecting yield data as a function of irrigation rate
- Conditions were cool and wet prior to squaring and then hot and dry in 2019
- This study was conducted on our Subsurface drip system

# Irrigation Treatments

- The full irrigation provides for 90% replacement of mesonet ET as rainfall + irrigation
- The remaining treatments supply irrigation as a percentage of this full irrigation
  - > 70%
  - > 40%
  - > Full/70%
  - > 40%/70%

# Yield data from 2019

- The lowest irrigation treatment resulted in highest return

Treatment	irrigation Inches	Lint lbs/acre	Loan cents/lb	Return \$/acre
Full	11.65	2245ab	40c	661
70%	8.4	2097ab	46.9b	751
40 %	4.9	1998c	51.4a	<b>761</b>
Full/70%	9.8	2407a	42.9c	711
40/70%	6.9	1958bc	48.8ab	750

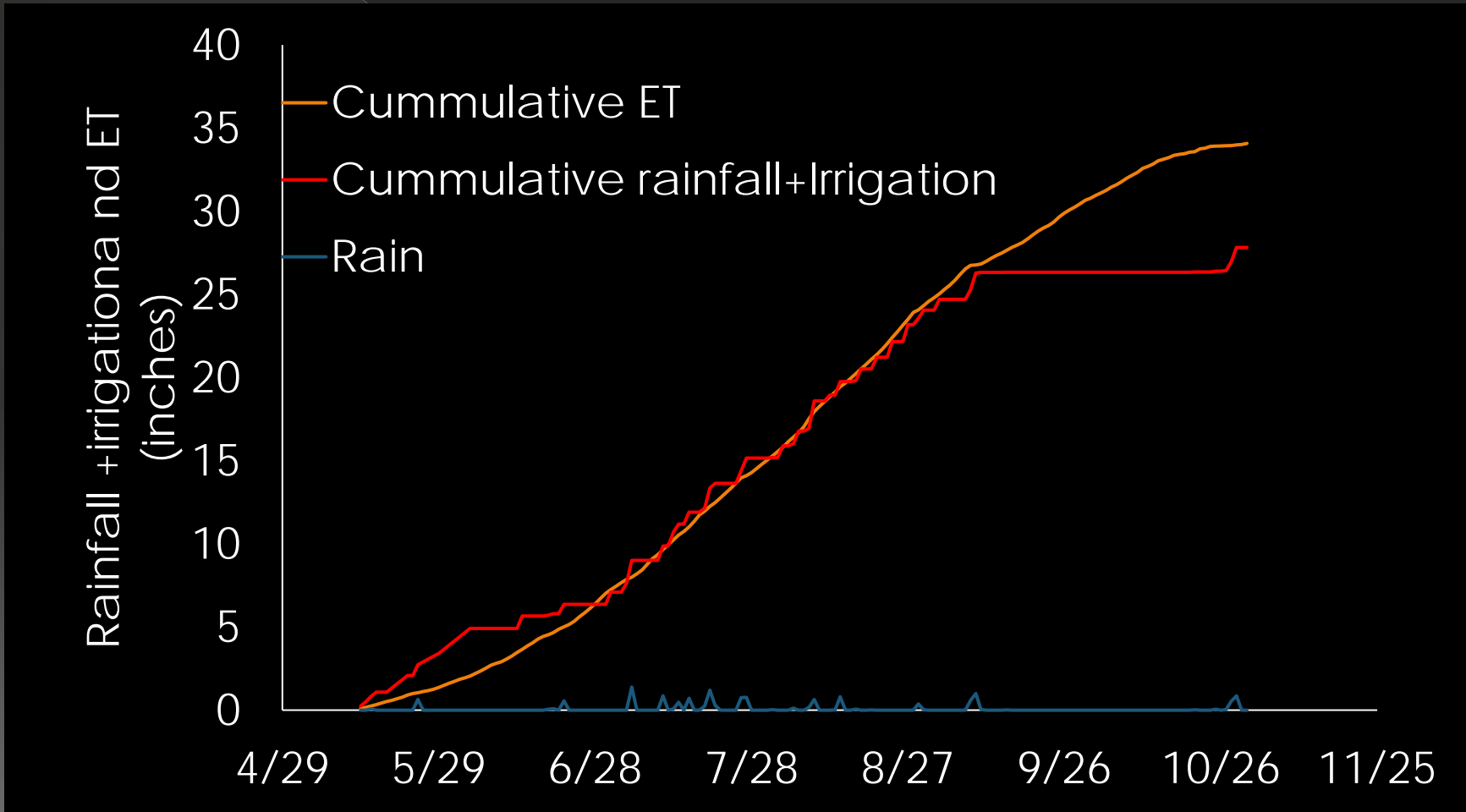
# 2019 Lessons learned

- Mesonet appeared to over estimate ET based on estimated deficits and lack of positive response to irrigation
- Early season excess rain and cool temperatures contributed to immaturity despite an open fall

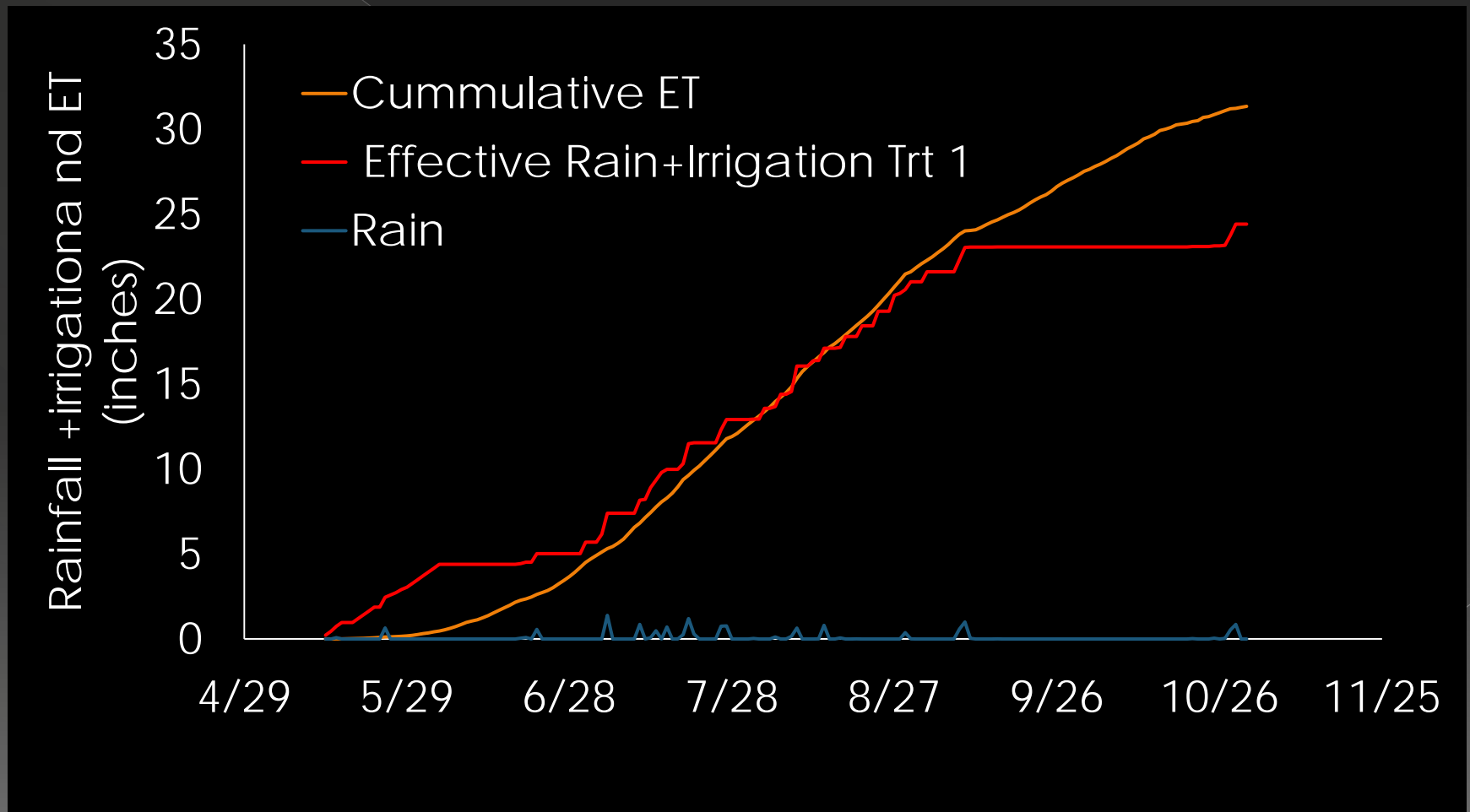
# 2020 Experiment

- The weather was much different
- Spring was dry, windy and warm
- We planted back on same plots
  - > Soil profile was depleted from prior crop and limited winter precipitation
- As a result approximately 4.2 inches of irrigation were applied to germinate cotton

# Mesonet Estimated ET vs Rainfall plus Irrigation

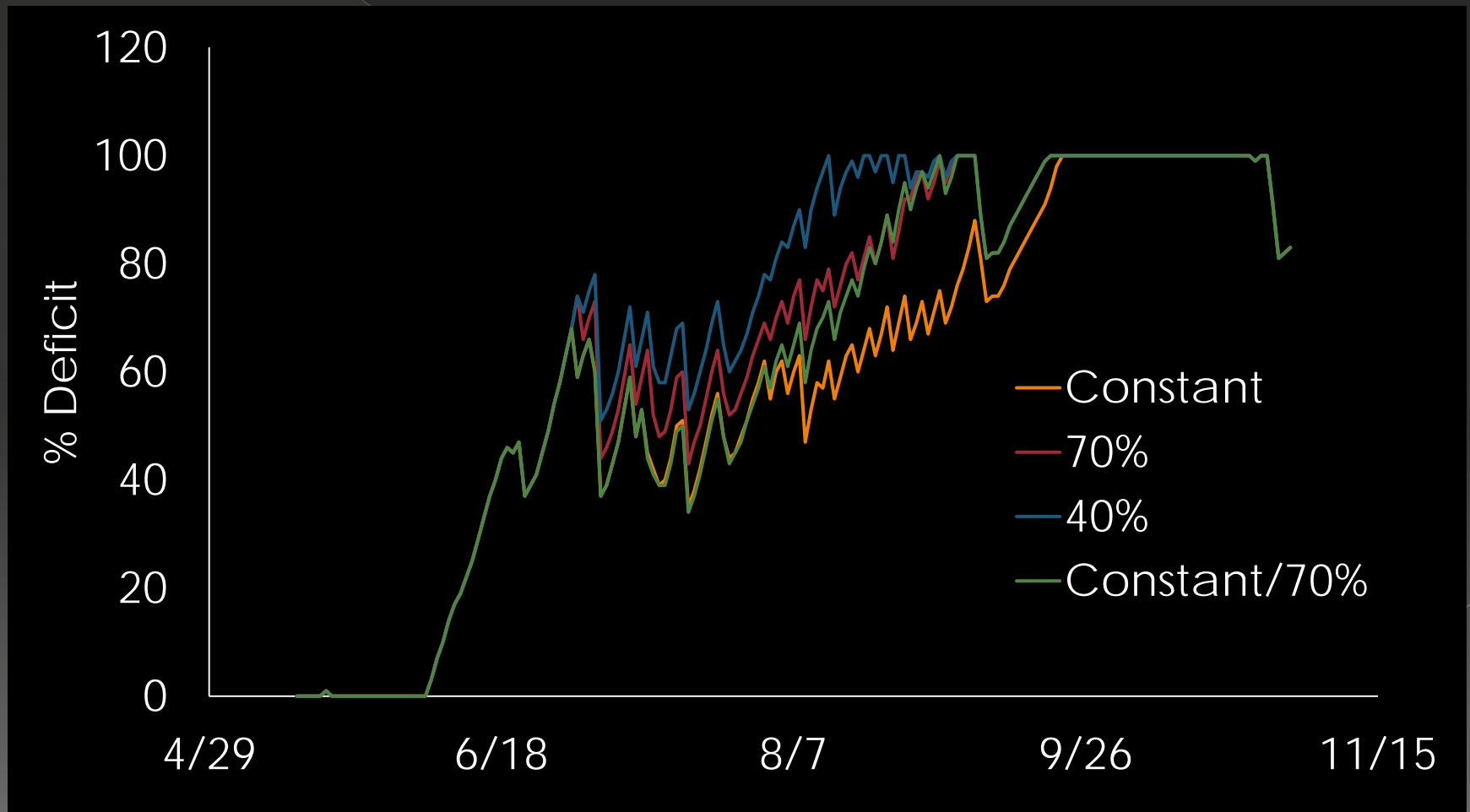


# ET and Effective rainfall + irrigation from Smart irrigation App.

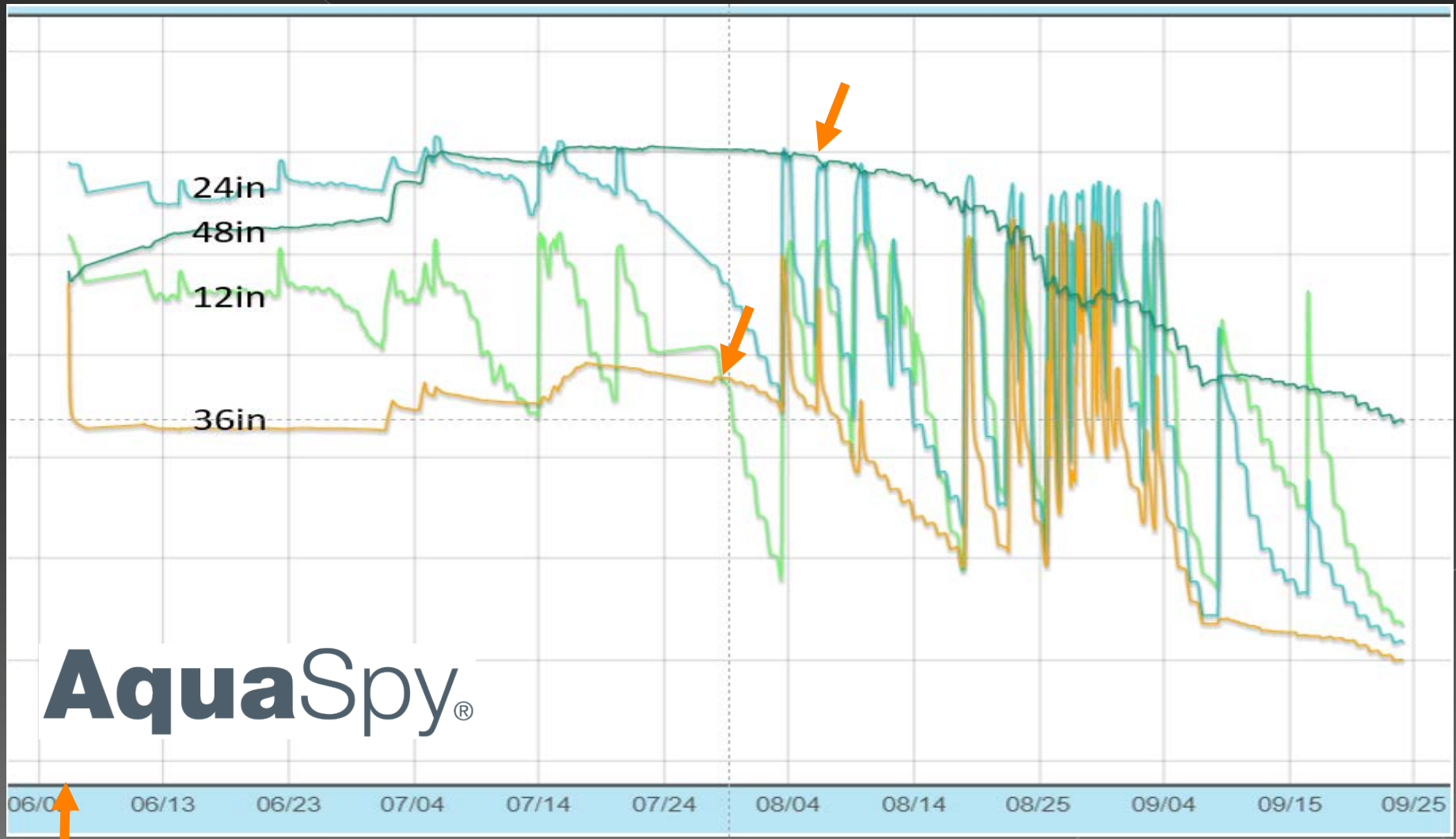




# Soil Profile deficit Estimate from Smart irrigation App

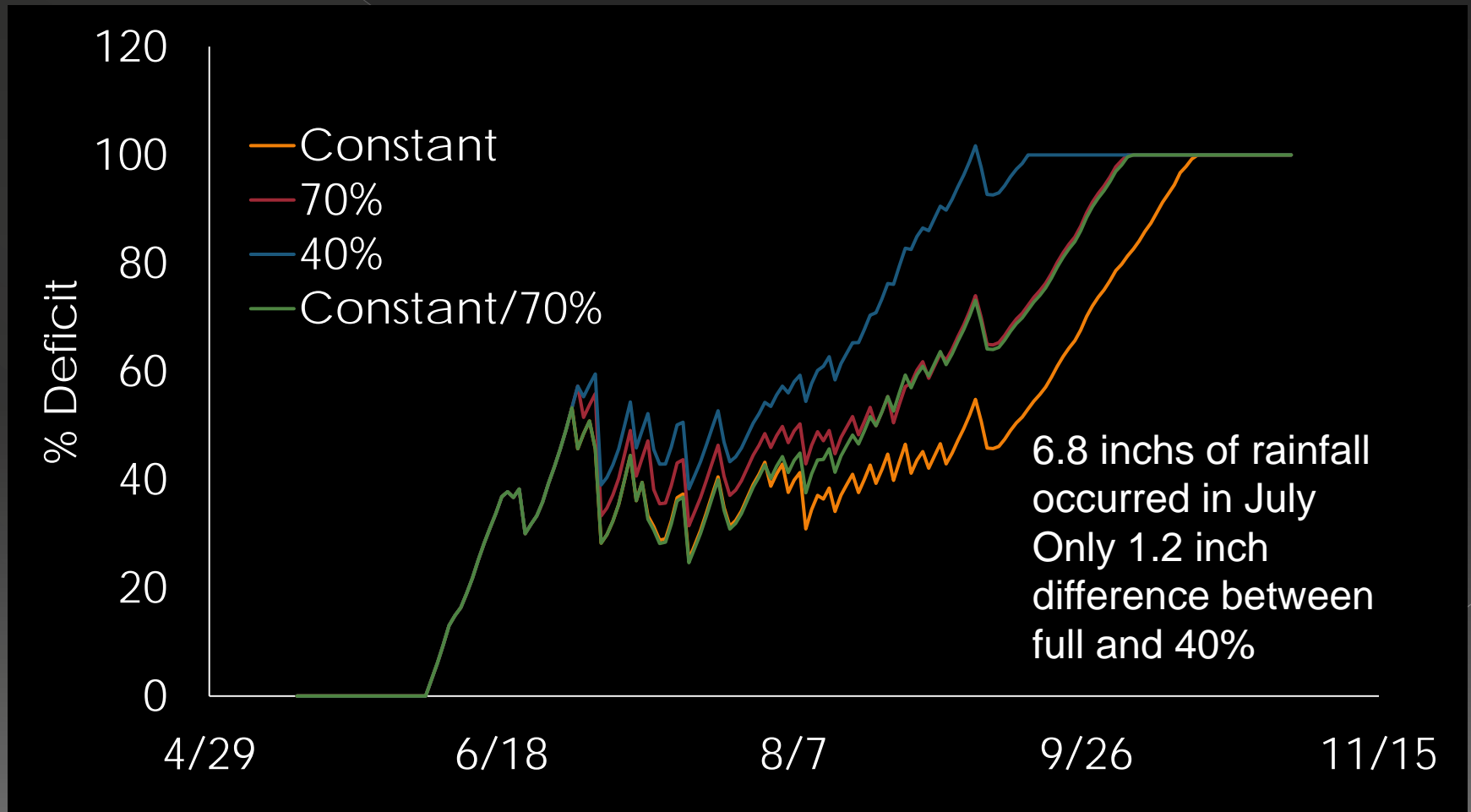


# Aquaspy data from Full irrigation

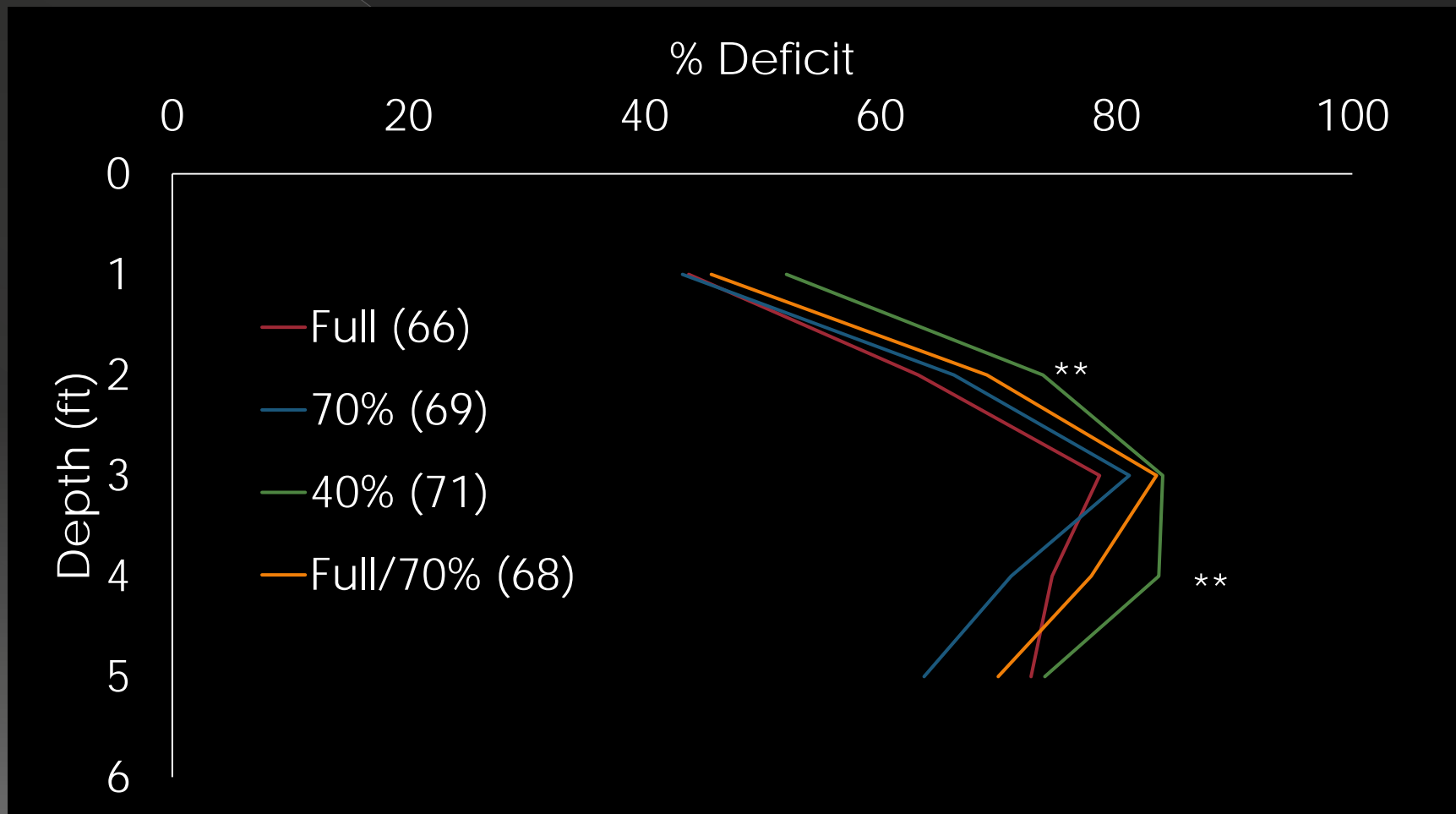


**AquaSpy**®

# Water deficit if 4 ft Rooting depth is used

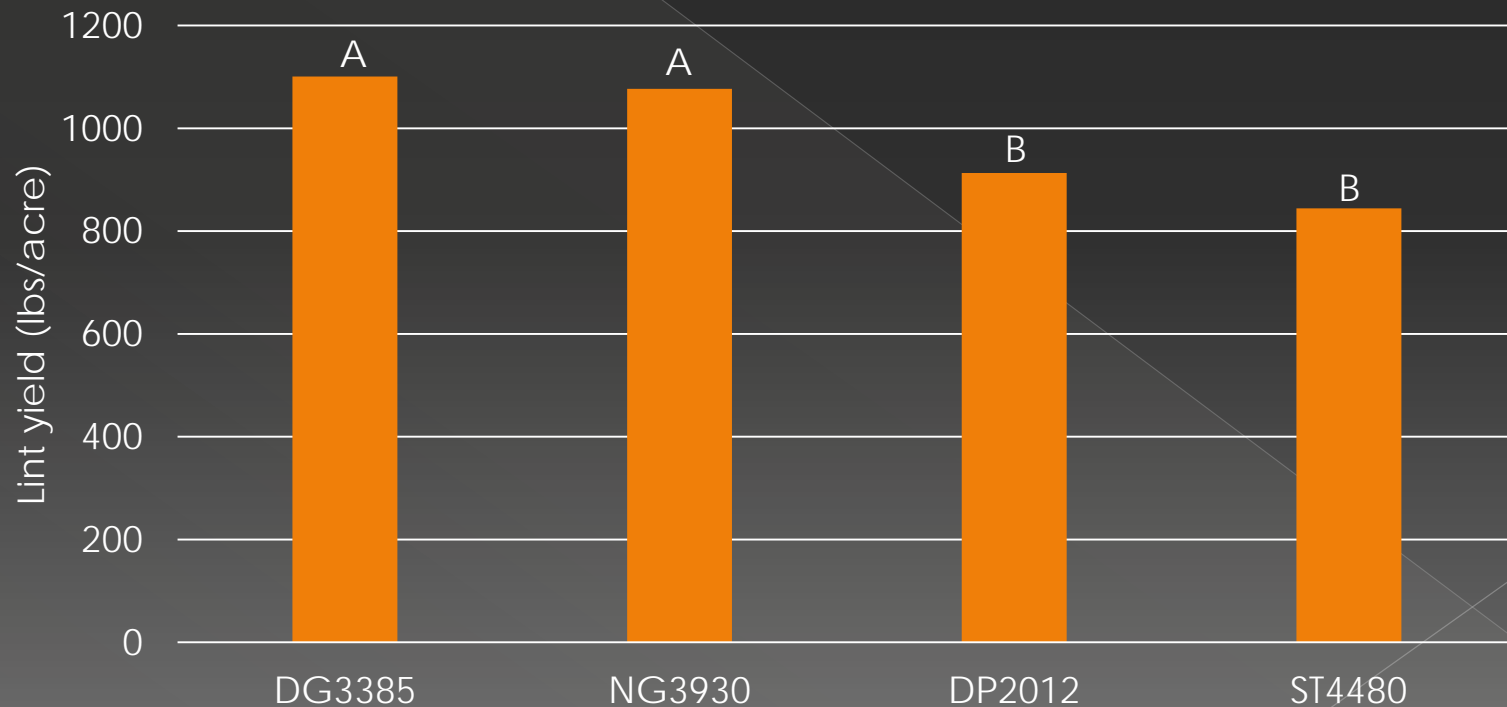


# Deficit measured from soil cores



# 2020 Lint Yield

- Despite late season separation of water budgets, no yield response to irrigation was observed.



# Fiber Quality

Effect	Micronaire	Fiber Length	Fiber Strength	Length Uniformity
Variety		cm	g tex <sup>-1</sup>	%
DG3385	2.72a	2.92a	28.9ab	80.6a
NG3930	2.66a	2.91a	28.1b	80.8a
DP2012	2.37b	2.83b	25.7c	78.9b
ST4480	2.46b	2.96a	29.7a	80.1a
Irrigation				
Full (13.5inch)	2.42b	2.92	27.9	79.6
70% (10.8 inch)	2.47b	2.93	28.1	80.3
40% (8inch)	<b>2.91a</b>	2.86	28.3	80.8
Full/70% (11.4 inches)	2.4b	2.9	28.1	79.7

Difference between 2.42 and 2.91 micronaire is approximately \$0.10/lb!!!!  
 35 vs 44.5 cent/lb



# Full and 40% treatments on August 27

- Full irrigation is on the left
- The 40% is showing signs of stress



# Summary Thoughts

- ◉ We did over irrigate BUT not according to any of the tools we used to assess irrigation need
- ◉ Near freezing temp on Sept 9 did not help us
- ◉ We started dry and ended dry.
- ◉ We need a stress coefficient in our irrigation schedulers



# Questions



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