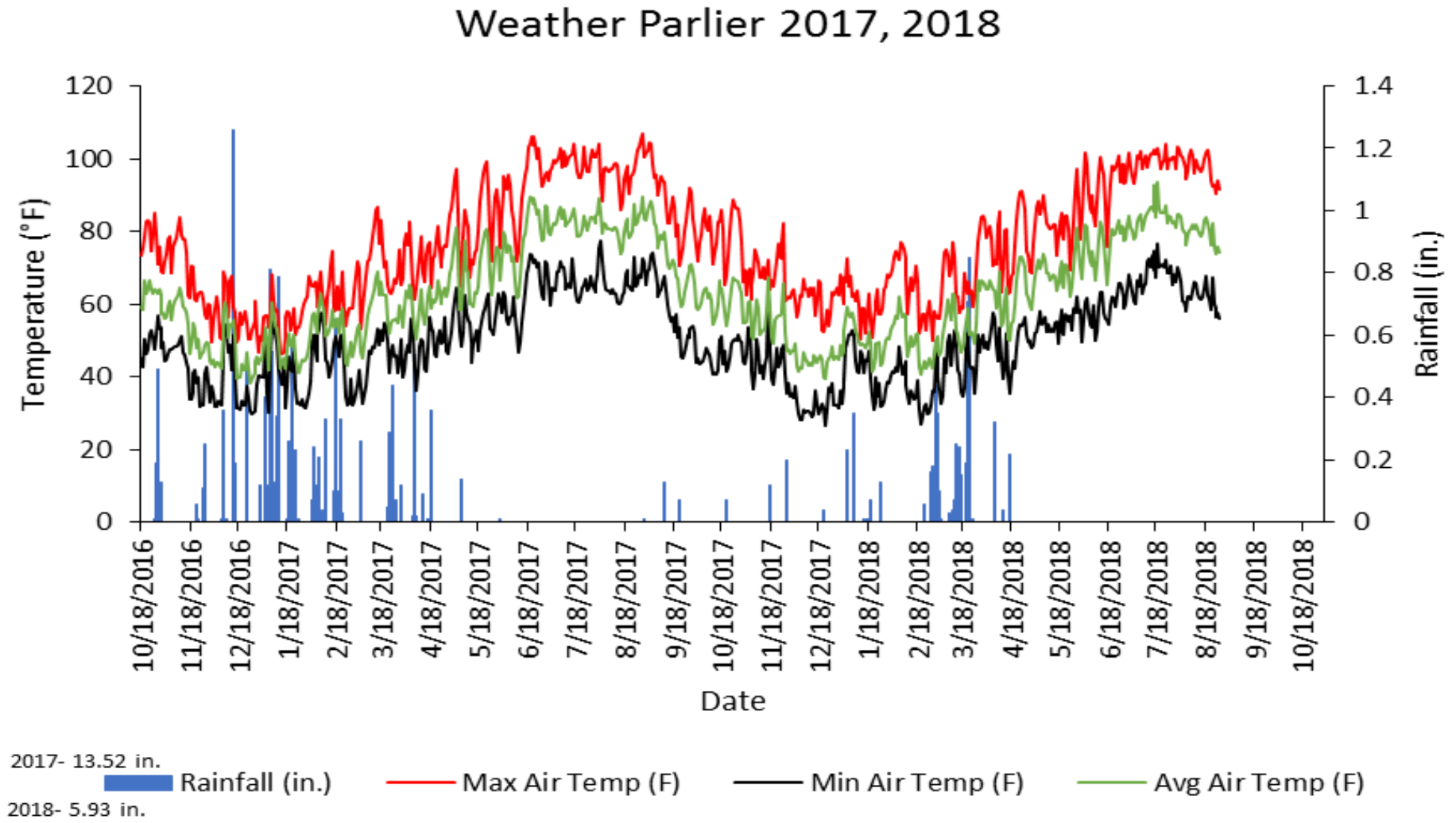
(A)

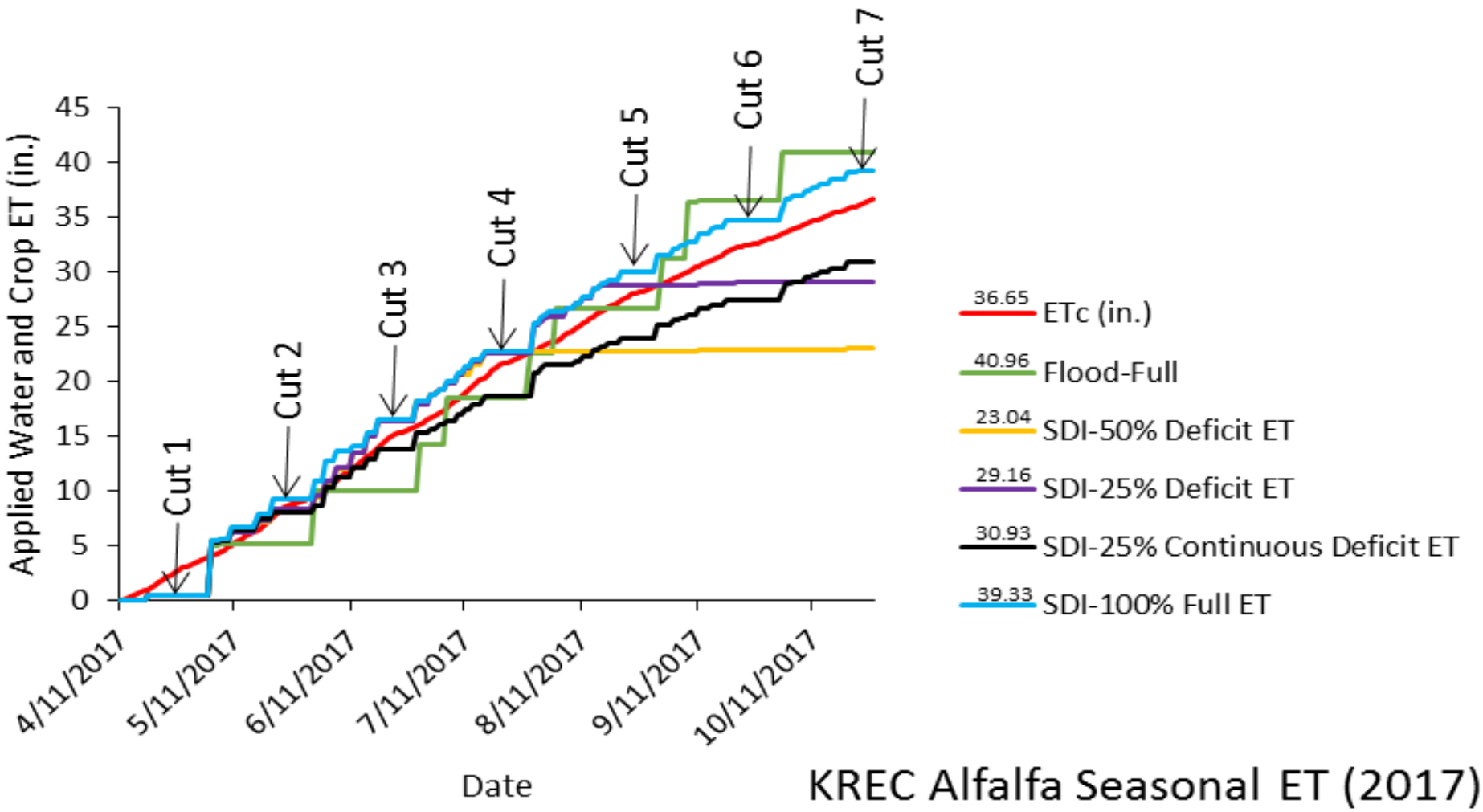
(B)

Kearney Field Day, Parlier, CA2018

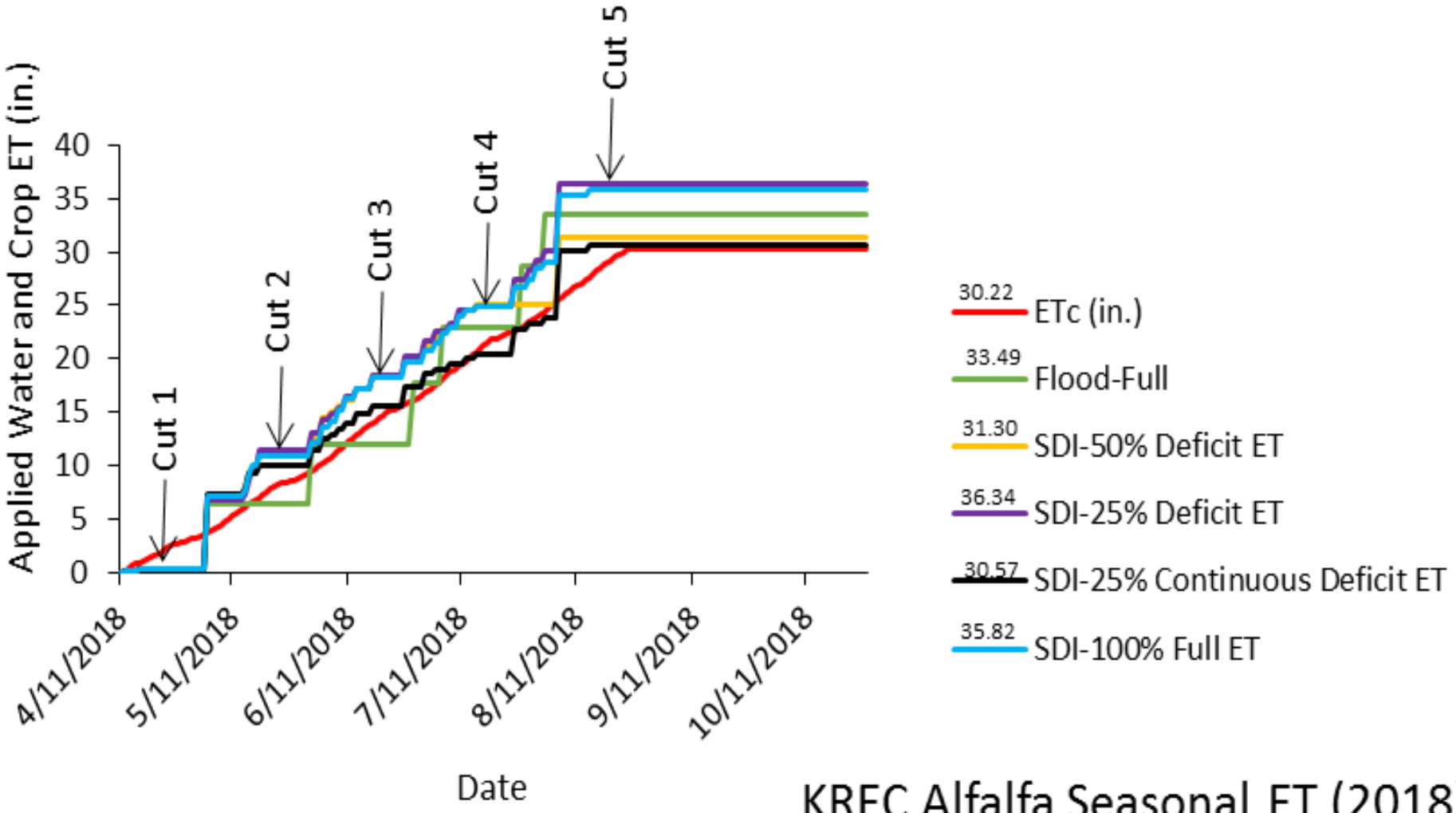
Soil Moisture Sensors- Water Marks

- Watermarks at 12”, 24”, 48” depth

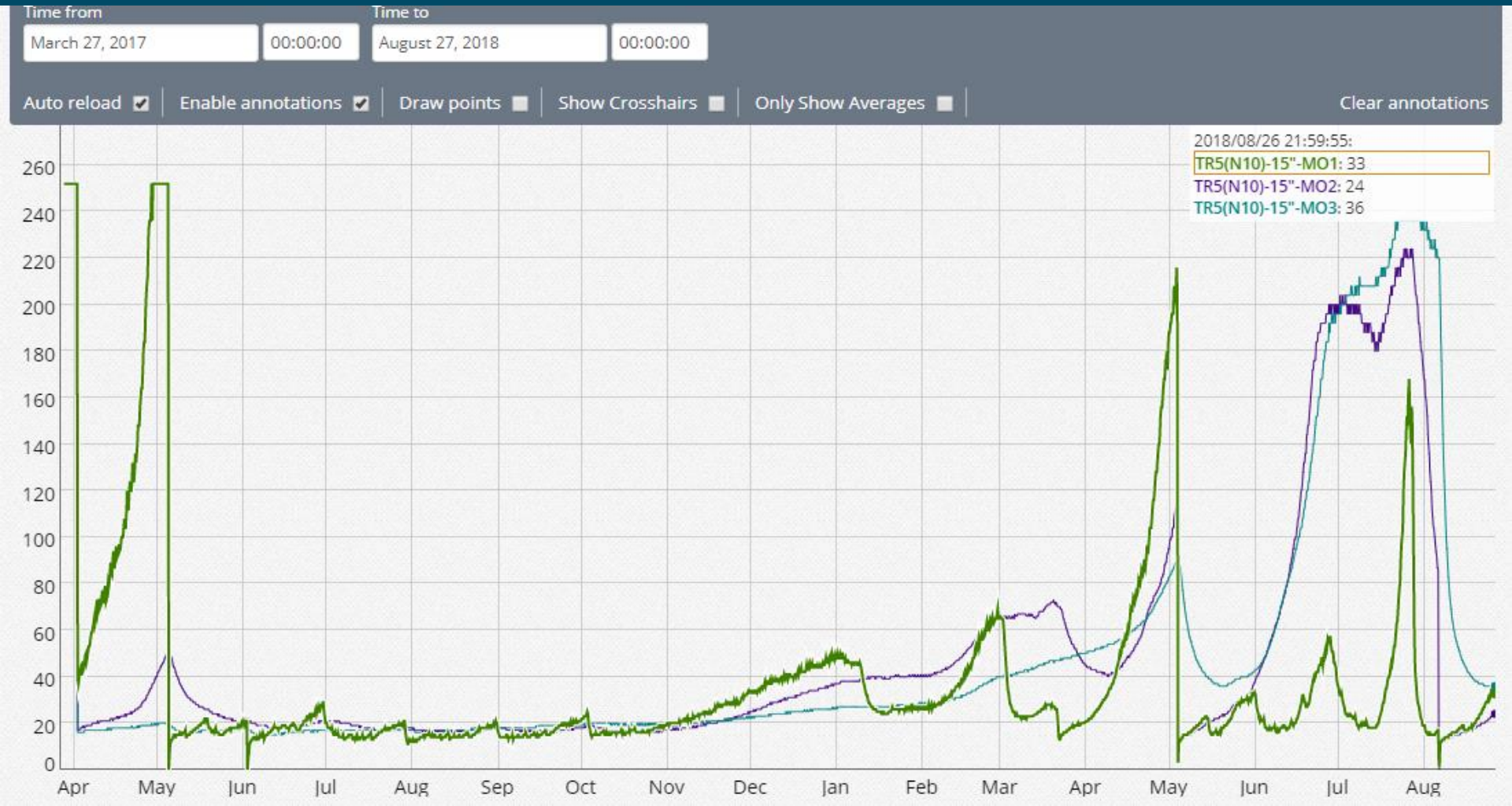

Weather Parlier 2017, 2018
Temperature (°F)
Rainfall (in.)
Date
120
100
80
60
40
20
0
1.4
1.2
1
0.8
0.6
0.4
0.2
0
10/18/2016
11/18/2016
12/18/2016
1/18/2017
2/18/2017
3/18/2017
4/18/2017
5/18/2017
6/18/2017
7/18/2017
8/18/2017
9/18/2017
10/18/2017
11/18/2017
12/18/2017
1/18/2018
2/18/2018
3/18/2018
4/18/2018
5/18/2018
6/18/2018
7/18/2018
8/18/2018
9/18/2018
10/18/2018
2017- 13.52 in.
2018- 5.93 in.
Rainfall (in.)
Max Air Temp (F)
Min Air Temp (F)
Avg Air Temp (F)



KREC Alfalfa Seasonal ET (2017)



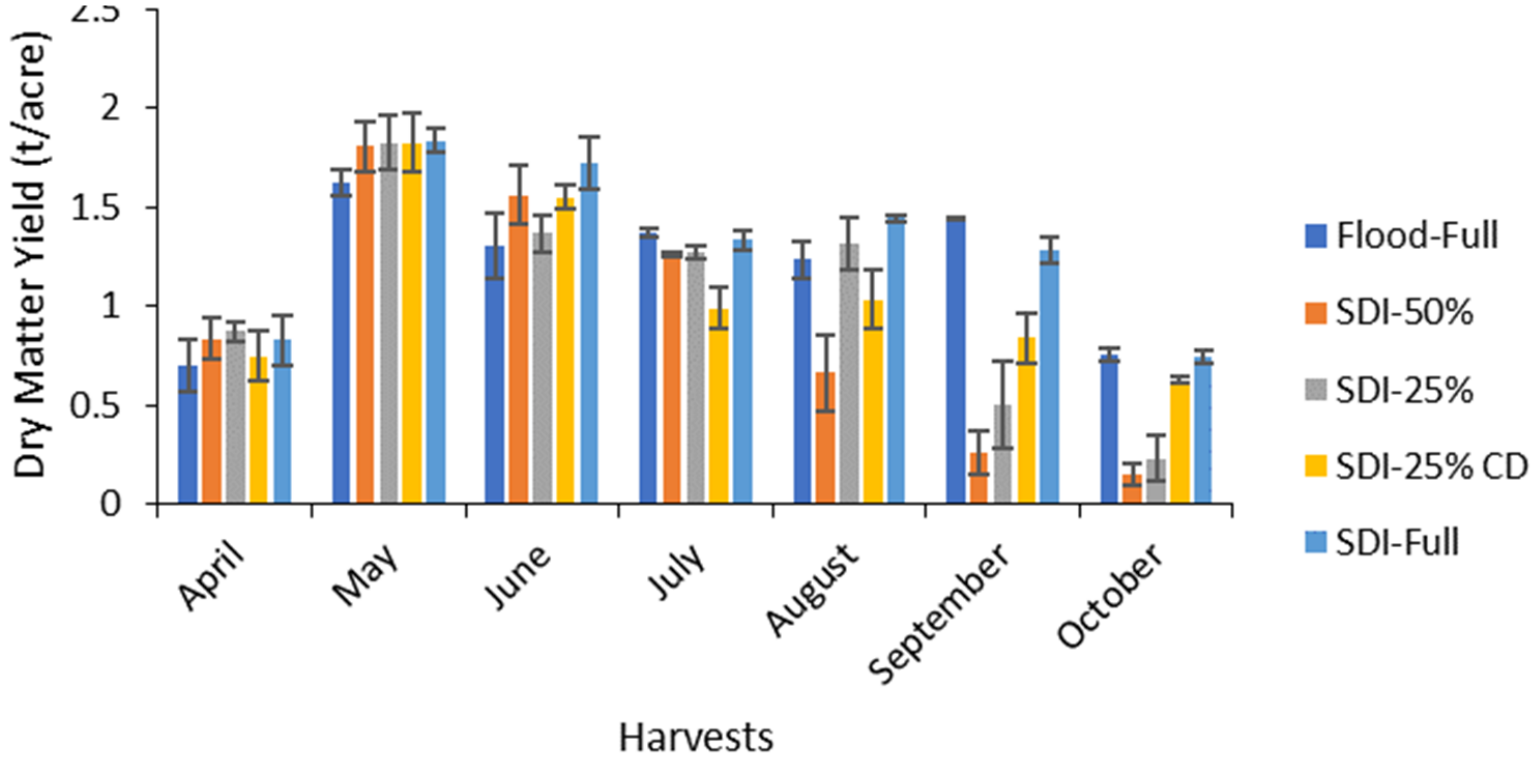
KREC Alfalfa Seasonal ET (2018)


Time from
March 27, 2017
00:00:00
Time to
August 27, 2018
00:00:00
Auto reload
Enable annotations
Draw points
Show Crosshairs
Only Show Averages
Clear annotations
2018/08/26 21:59:55:
TR5(N10)-15"-MO1: 33
TR5(N10)-15"-MO2: 24
TR5(N10)-15"-MO3: 36
260
240
220
200
180
160
140
120
100
80
60
40
20
0
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug

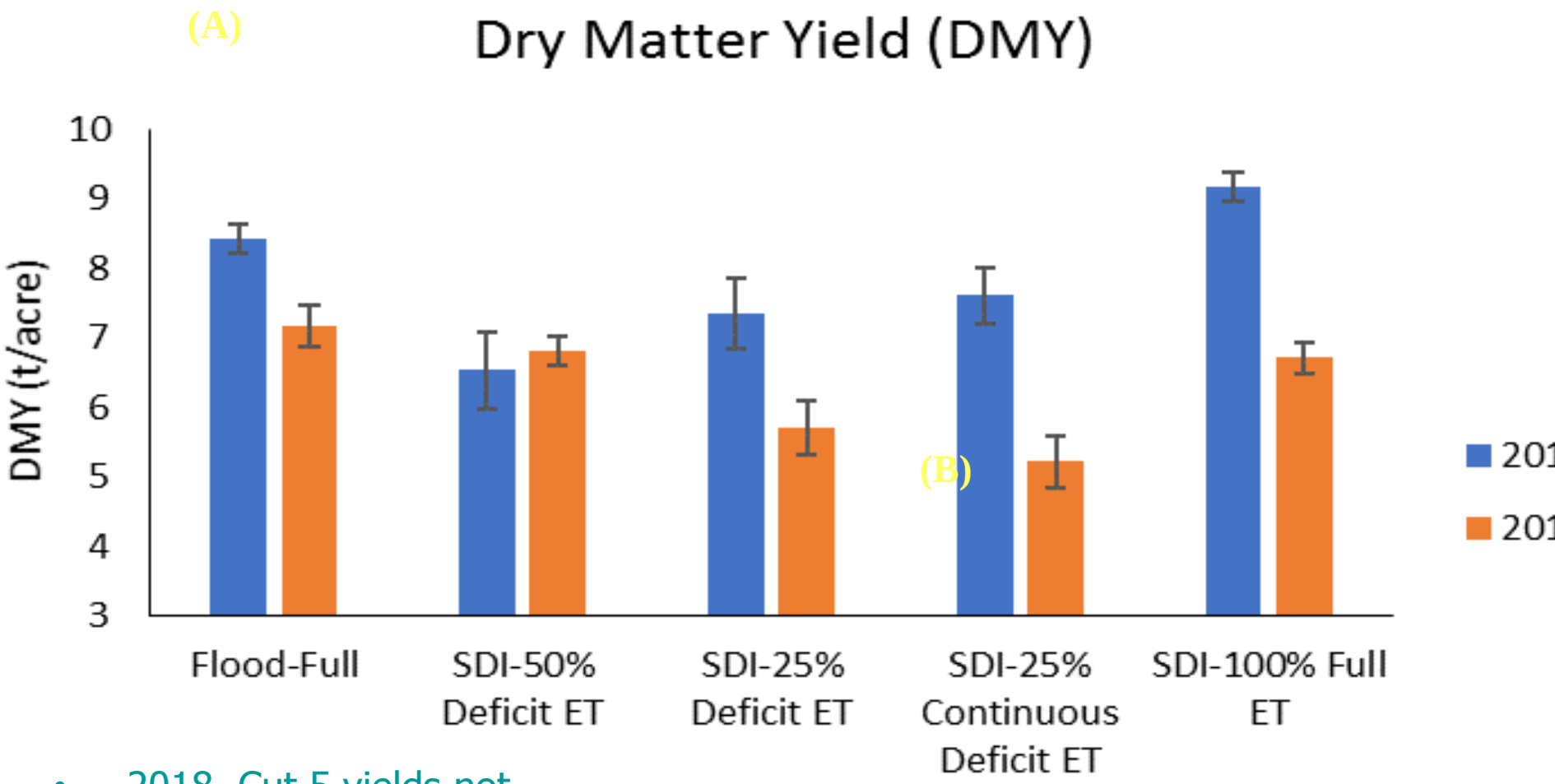
Water Marks Data SDI-50% Deficits ET (2017, 2018)

Kearney Results (Year 1)

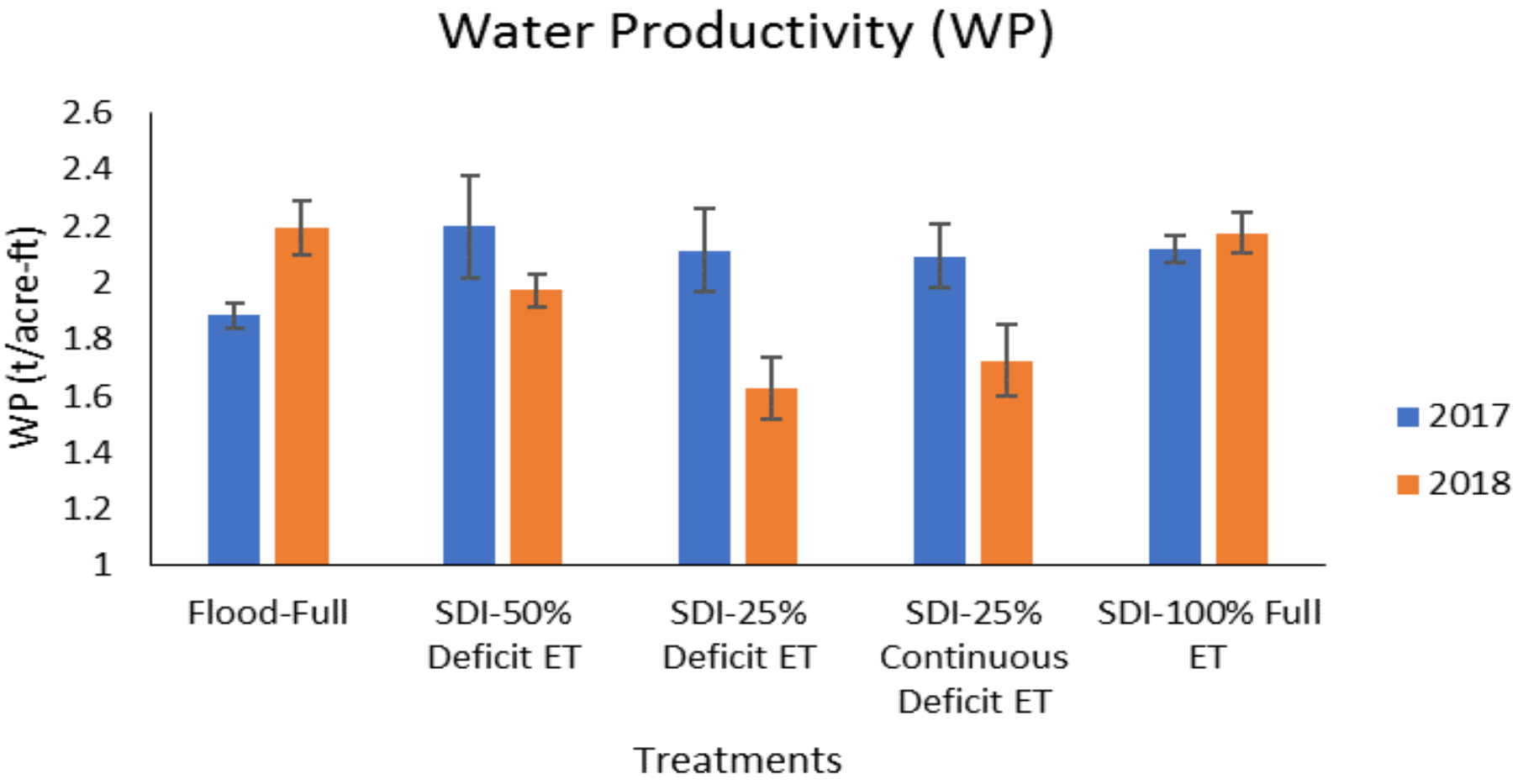
Figure 5: Alfalfa dry matter yield (t/acre) as influenced by treatment effect (2017)



Where
Flood-Full- 100% Applied ET
SDI- 50% Deficit of applied ET
SDI-25% Deficit of applied ET
SDI-25% Continual Deficit (CD) of applied ET
SDI-Full- 100% Applied ET



- 2018, Cut 5 yields not added

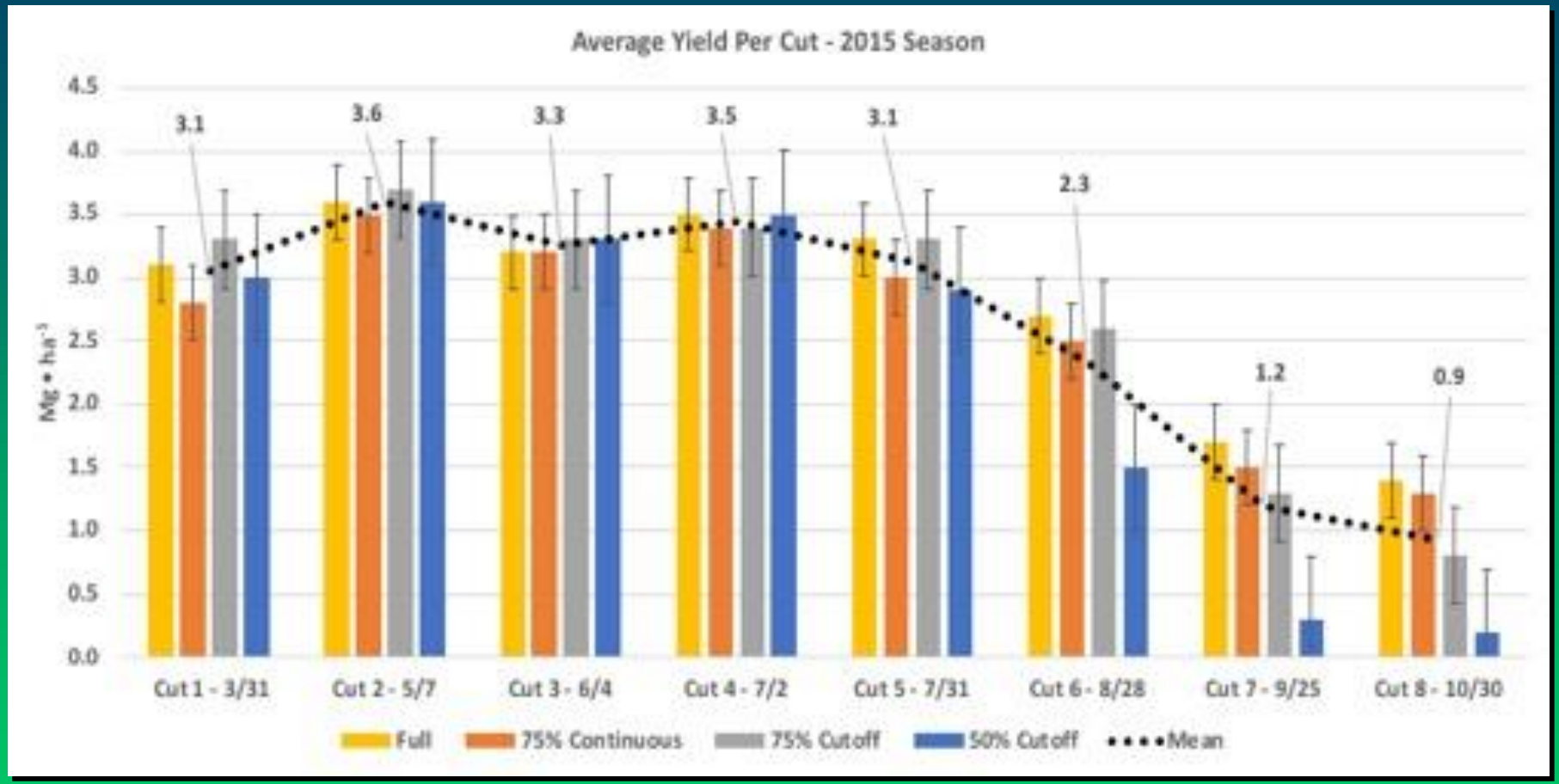

Water Productivity (WP)
WP (t/acre-ft)
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
Flood-Full
SDI-50% Deficit ET
SDI-25% Deficit ET
SDI-25% Continuous Deficit ET
SDI-100% Full ET
Treatments
2017
2018

Davis Results (3 year t/a)

3 Season Totals - Response to Irrigation Treatments					
CUMULATIVE YIELD - UC DAVIS TRIAL (2015-2017) t/a					
Variety	Fall Dormancy	50% Cutoff	75% Continuous	75% Cutoff	Full
NM14GTAF	8	24.47	24.79	28.97	29.16
AFX149092	9	24.50	26.75	26.76	28.76
CUF 101	9	22.86	24.95	25.47	26.28
NM14ALWLHQ	7	23.48	25.41	27.01	26.09
NM14BM1008251	7	22.03	23.48	23.14	25.91
AFX148091	8	23.33	25.61	26.45	25.79
SW10	10	24.34	24.28	28.00	25.26
S8421S	8	24.09	25.09	26.19	25.20
Artesian Sunrise	7	20.31	23.38	22.21	24.30
NM14MLLS2	6	21.37	21.24	25.13	23.62
NM14MALHS3	6	20.95	22.70	22.09	23.24
HybriForce 2600	6	19.92	21.91	23.32	21.93
NuMex Bill Melton	7	22.25	22.55	22.82	21.70
NM14BMHS1	6	21.30	21.19	22.44	21.60
R510Hg812dt	5	17.45	18.73	20.78	21.04
Mean		22.18	23.47	24.72	24.66
Percentage of Full:		90%	95%	100%	100%
F test:		VAR (**), IRR (**); VAR X IRRIG (n.s.)			
		LSD 12.408			
		C.V. 7.7%			

38%

Davis Trial:


Average Yield Per Cut - 2015 Season
Mg • h.n-1
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
3.1
3.6
3.3
3.5
3.1
2.3
1.2
0.9
Cut 1 - 3/31
Cut 2 - 5/7
Cut 3 - 6/4
Cut 4 - 7/2
Cut 5 - 7/31
Cut 6 - 8/28
Cut 7 - 9/25
Cut 8 - 10/30
Full
75% Continuous
75% Cutoff
50% Cutoff
Mean

End of trial

Full Irrigation (100% Seasonal ET)

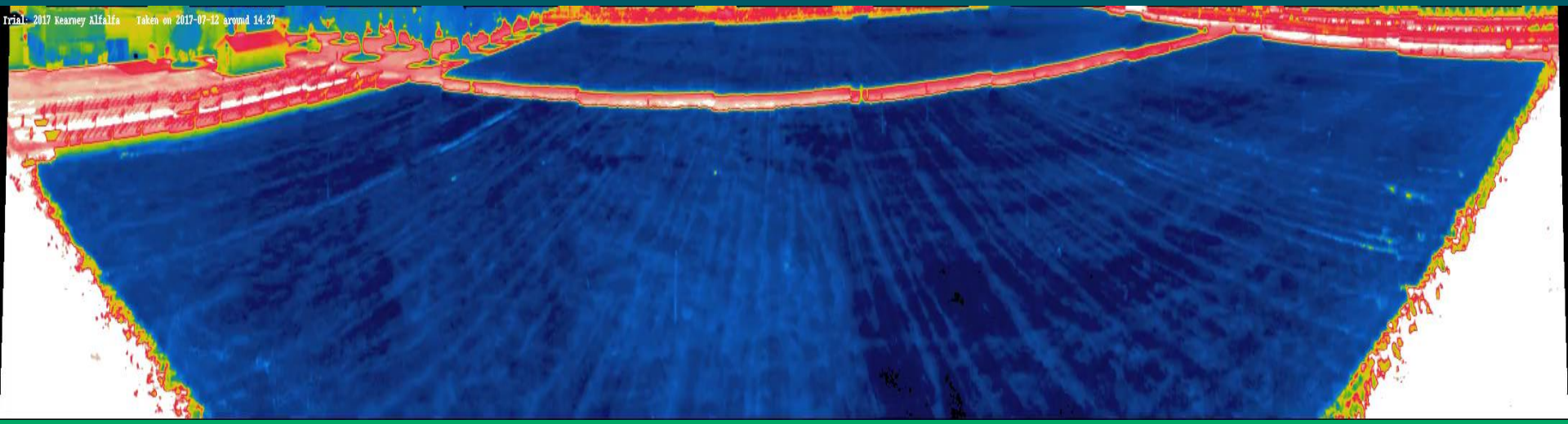
75% (Cutoff)

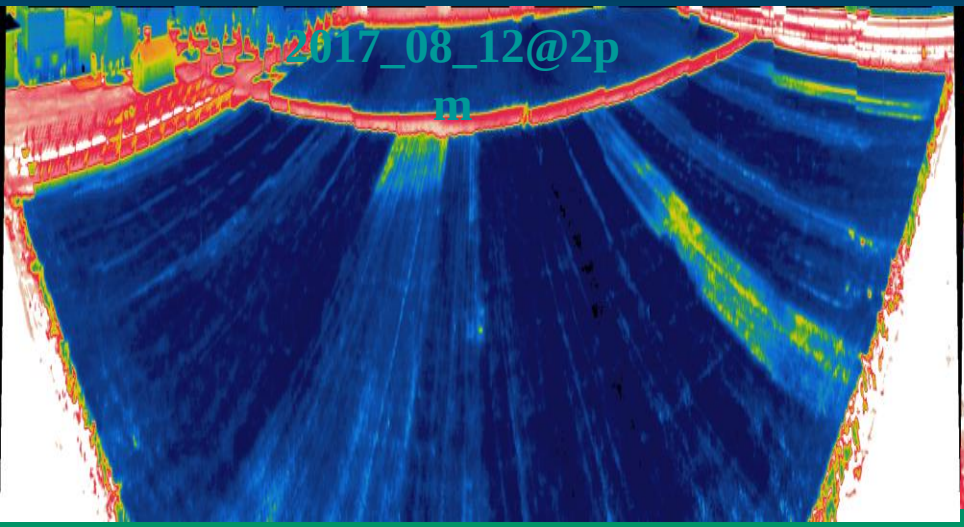
75% (Continuous Deficit)

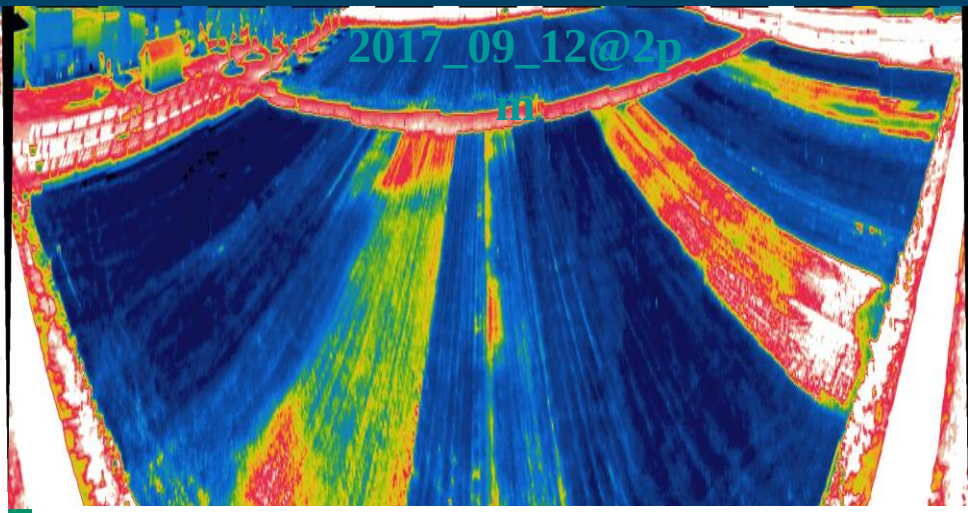
50% (Cutoff)

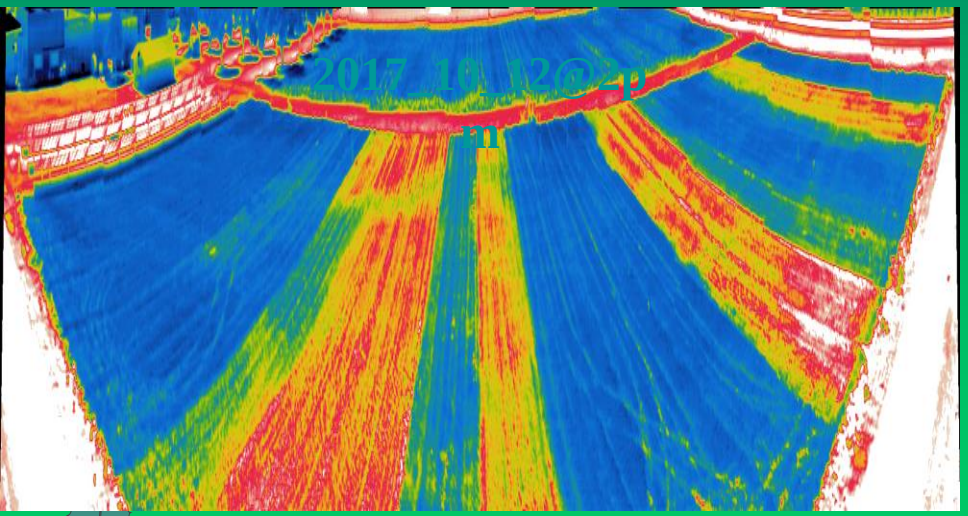
(Oct. 16, 2017 Davis, CA)

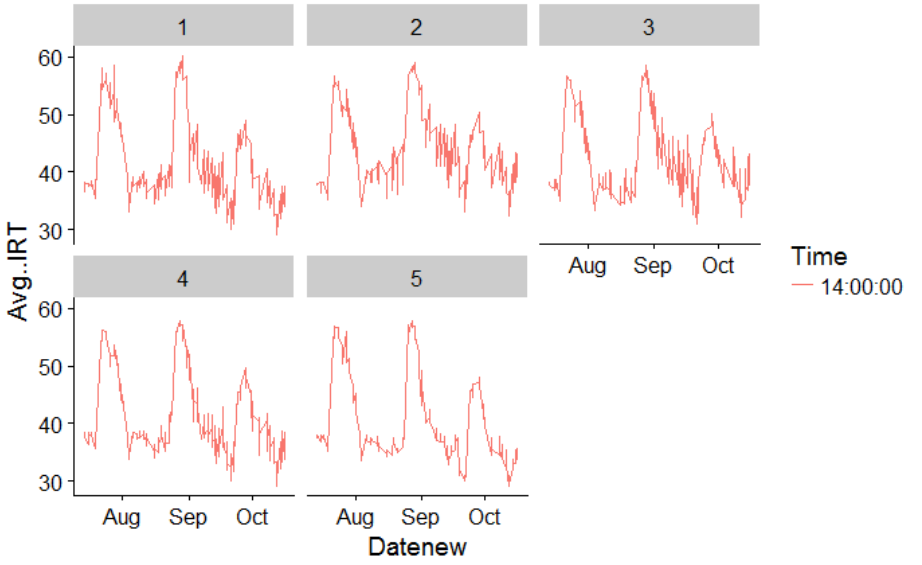
Thermal Imaging -



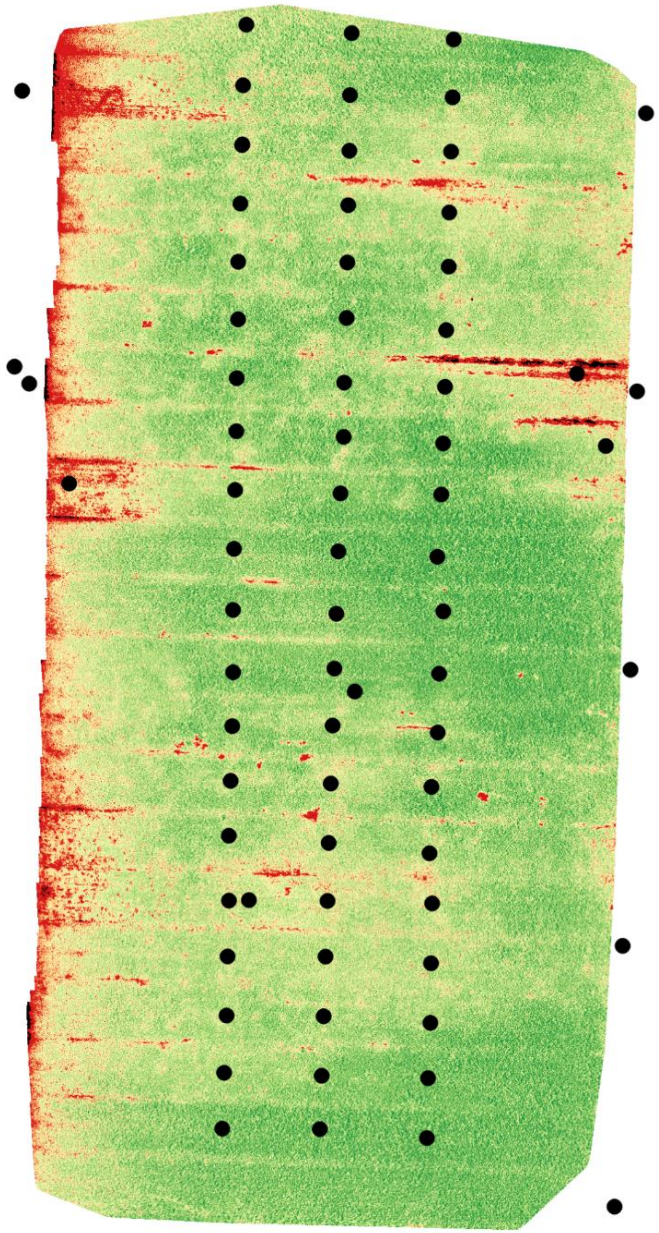

2017_08_12@2p
m


2017_09_12@2p
m


2017_10_12@2p
m


1
2
3
4
5
60
50
40
30
Avg..IRT
Aug
Sep
Oct
Datenew
Time
14:00:00

(A) 2018_08_21_KREC_SDI_NDVI



(B)
2018_08_21_KREC_SDI_EVI

(A) 2018_08_21_KREC_SDI_NDVI

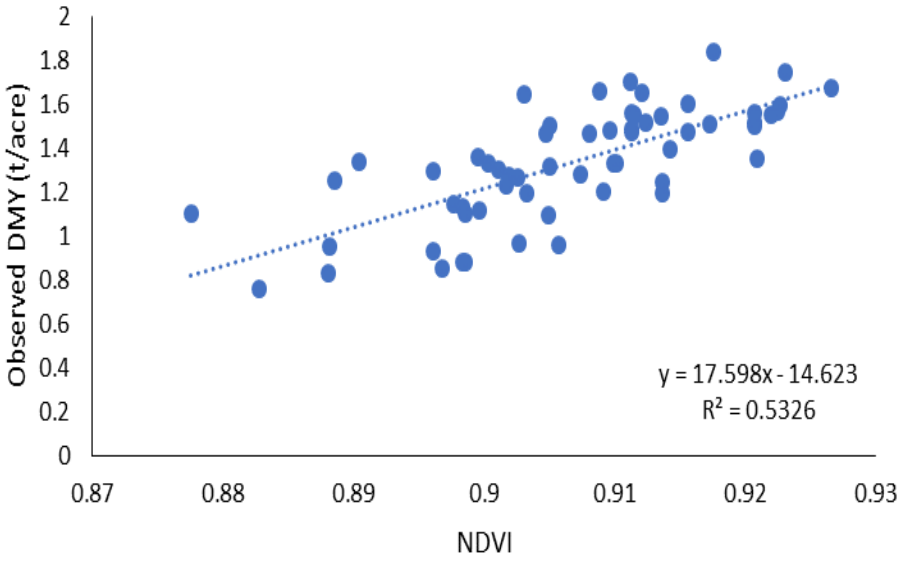
- 0.8287
- 0.8575
- 0.8863
- 0.9151
- 0.9439

(B) 2018_08_21_KREC_SDI_EVI

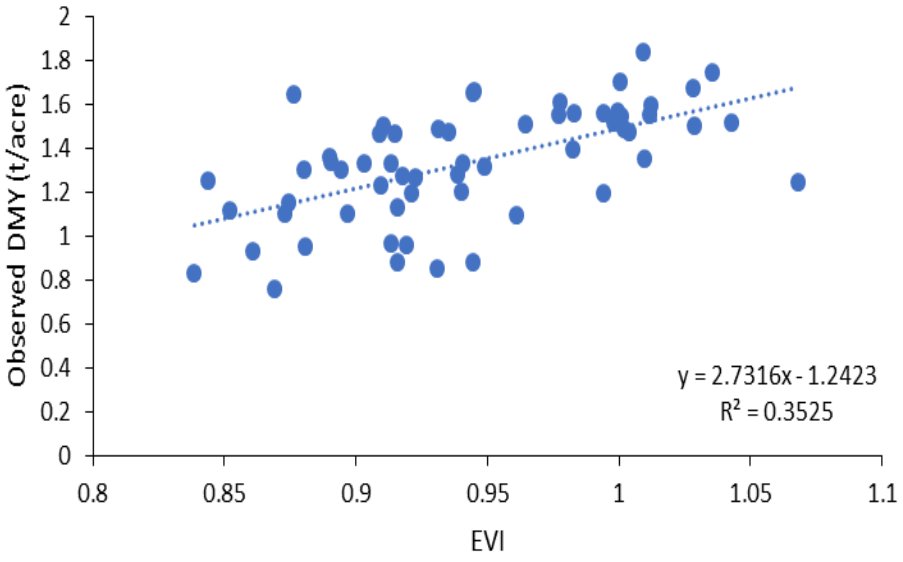
- 0.68
- 0.798
- 0.915
- 1.03
- 1.15

Kearney

(A) NDVI


Observed DMY (t/acre)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.87
0.88
0.89
0.9
0.91
0.92
0.93
NDVI
y = 17.598x - 14.623
R² = 0.5326

(B) EVI


Observed DMY (t/acre)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.8
0.85
0.9
0.95
1
1.05
1.1
EVI
y = 2.7316x - 1.2423
R² = 0.3525

Conclusions

- SDI is a viable technique with possible yield increases and water savings
- Cost and maintenance (gophers) are major negatives
- Alfalfa highly conducive to deficit irrigation strategies
- 'Best Crop to Have in a Drought'
- Partial season irrigations reduce yields, but often result in significant water savings.

Many thanks!

Alfalfa
U.S. Alfalfa Farmer Research Initiative

NETAFIM™
GROW MORE WITH LESS

USDA NIFA
United States Department of Agriculture
National Institute of Food and Agriculture

UC CE University of California
Agriculture and Natural Resources Cooperative Extension

n, WA state, photo