

Yuma Fall 2025 Romaine Trial

EF Polymer – Water Reduction Trial

PI: Robert Masson

Assistant Ag Extension Agent

Yuma County Cooperative Extension



THE UNIVERSITY OF ARIZONA

Cooperative Extension

Yuma County

Trial Summary

- Full and reduced water groups were irrigated differently but did not show a dramatic difference in yields.
- Similar average plant weights were seen across all treatments with a slight trend of increased yields in UTC
- A great deal of variance was seen in the reduced water UTC walkby percentage (marketable heads) in comparison to other treatments
- Composite soil samples are currently being analyzed in the lab and will be included in final report.
- Note: Soil Cub and GrowBud Dro salinity sensors used for the first time. Salinity readings were found to be highly correlated to soil moisture. Working with manufacturers to refine technology for our soil types.
- Note: Temperatures were significantly hotter than normal, advancing harvest date a week ahead of initial forecast
- Note: Aphids encountered on plants but spray was applied multiple times to control them with very minimal damage.

Trial Details

- Product water reduction trial
 - Trt 1: Full water UTC
 - Trt 2: Full water EF Polymer: 8 KG/AC
 - Trt 3: Full water EF Polymer: 16 KG/AC
 - Trt 4: Reduced water UTC
 - Trt 5: Reduced water EF Polymer: 8 KG/AC
 - Trt 6: Reduced water EF Polymer: 16 KG/AC
- treatment, six replication trial
- Single preplant application, broadcast and incorporated into bed
- 3-line romaine of 42” beds
- Variety: Del Sol
- Planting Date: 11 Nov 2025
- Harvest Date: 23 Feb 2026 (105 DAP)

Fertilization Plan

- Total # N/AC: 151
- 200# 11-52-0 MAP at preplant
- 12 GPA UAN 32 (43# N per application)
 - 12/8 (27 DAP)
 - 1/13 (63 DAP)
 - 2/2 (83 DAP)

Field Map

Mar-5-2026 (T-8 EF Polymer Romaine 2025)

University of Arizona

Testing EF Polymer water retention soil amendment at two application rates under a full
 Trial ID: T-8 EF Polymer Romaine 2025
 Protocol ID: T-8 EF Polymer Romaine 2025 Location: Yuma Arizona Trial Year: 2025
 Project ID: T-8 EF Polymer Romaine 2025
 Study Director: Robert Masson Sponsor Contact:
 Investigator:

Trial Map Treatment Description

Trt	Code	Description
1	CHK	Full Irrigation;UTC
2		Full Irrigation;Lower Rate EF Polymer
3		Full Irrigation;Higher Rate EF Polymer
4		Reduced Irrigation;UTC
5		Reduced Irrigation;Lower Rate EF Polymer
6		Reduced Irrigation;Higher Rate EF Polymer



Irrigation

Sprinkler rate: 0.1 IN/HR
 Drip rate: 0.186 Acre IN/HR

**Total Water Applied to full water
 treatment area 14.128 Acre IN
 Reduced Area 10.966**

Irrigation Date	Type	Full Irr Treatment Irrigation Hours	Full Irr Water Used (AC IN)	Reduced Irr Treatment Irrigation Hours	Reduced Irr Treatment Water Used (AC IN)
11/11	Sprinkler	10	1.000	10	1.000
11/12	Sprinkler	10	1.000	10	1.000
11/13	Sprinkler	8	0.800	8	0.800
11/14	Sprinkler	8	0.800	8	0.800
11/19	Sprinkler	8	0.800	8	0.800
11/20	Sprinkler	8	0.800	8	0.800
11/25	Drip	4	0.744	4	0.744
12/8	Drip	6	1.116	6	1.116
12/9	Drip	3	0.558	3	0.558
12/22	Drip	4	0.744	0	0
1/7	Drip	4	0.744	0	0
1/13	Drip	5	0.930	5	0.930
1/29	Drip	2	0.372	2	0.372

Irrigation

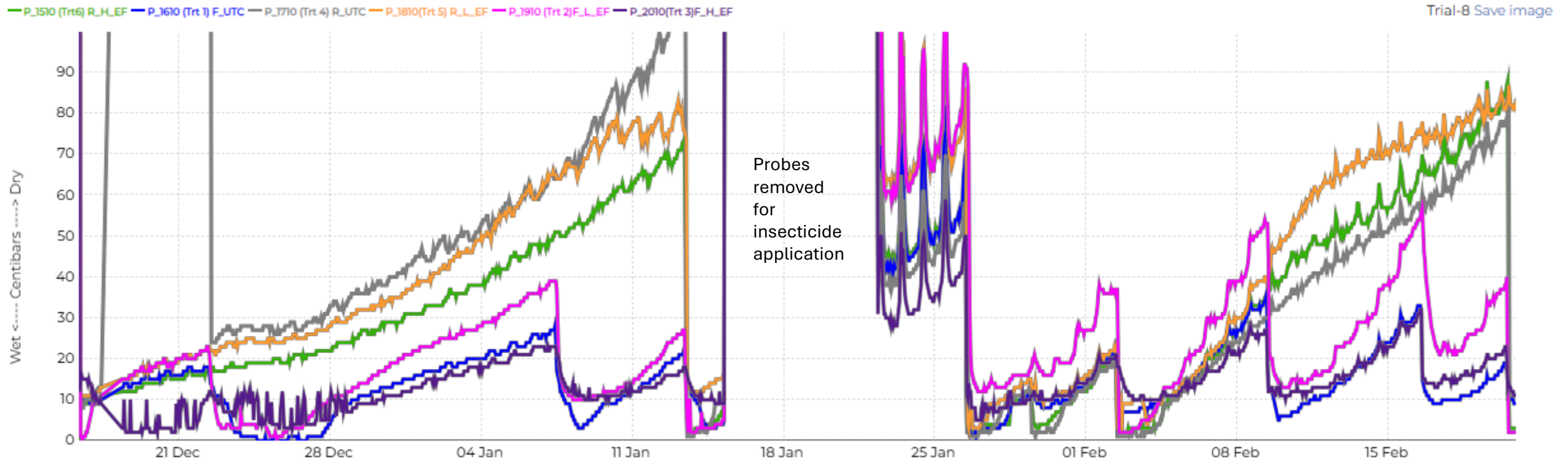
Sprinkler rate: 0.1 IN/HR

Drip rate: 0.186 Acre IN/HR

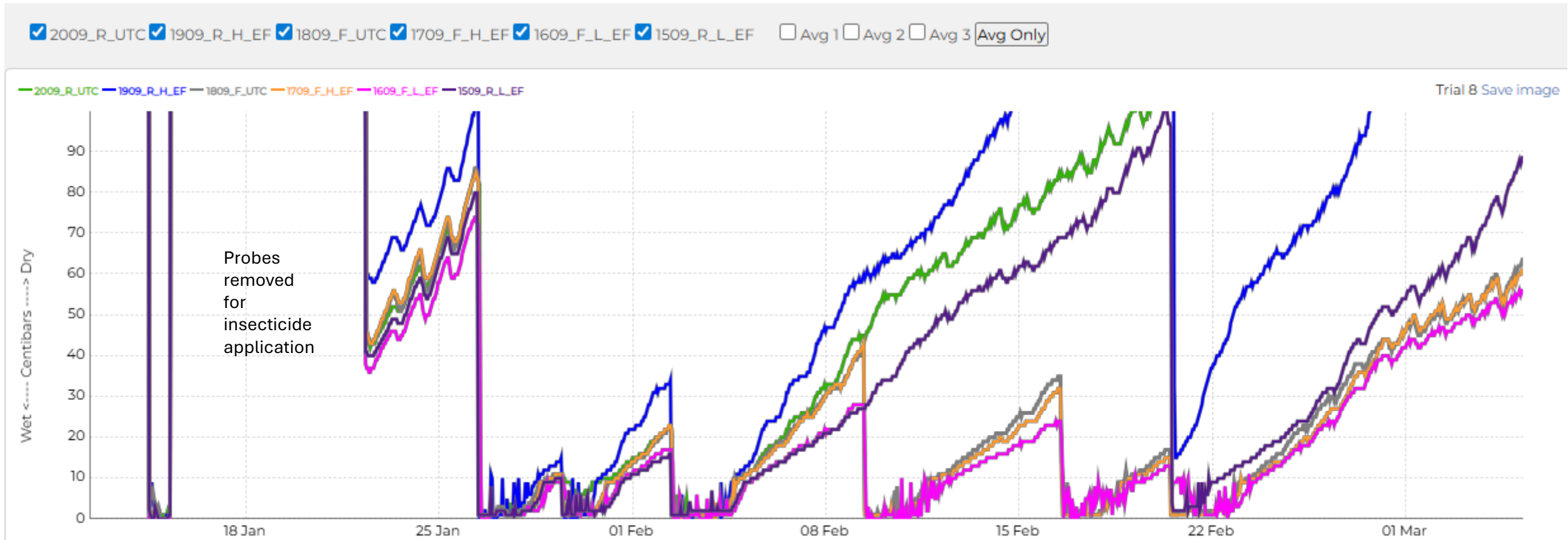
**Total Water Applied to full water
treatment area 14.128 Acre IN
Reduced area 10.966**

Irrigation Date	Type	Full Irr Irrigation Hours	Full Irr Water Used (AC IN)	Reduced Irr Treatment Irrigation Hours	Reduced Irr Treatment Water Used (AC IN)
2/2	Drip	5	0.930	5	0.930
2/5	Drip	2	0.372	2	0.372
2/9	Drip	5	0.930	0	0
2/16	Drip	4	0.744	0	0
2/21	Drip	4	0.744	4	0.744
Total			14.128		10.966

IC-10 Moisture Probe Data (Unit 1)



IC-10 Moisture Probe Data (Unit 2)



Pesticide

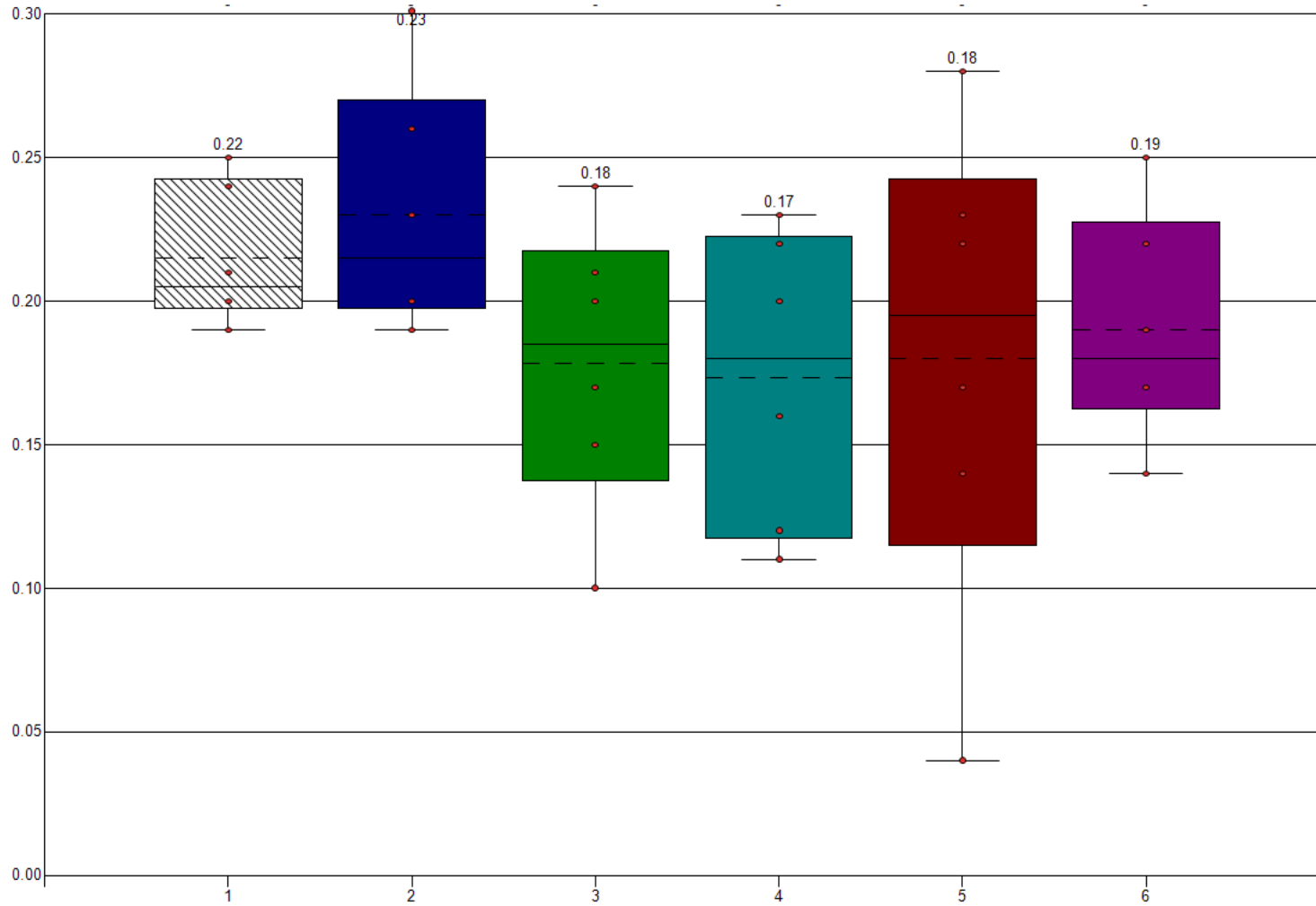
Date	Pesticide	Rate	Type	Method
11/13	Prefar	6.0 Q/A	Pre-emerge Herbicide	Sprinkler
1/15	Orondis Ultra	8.0 Oz/A	Fungicide	Spray
1/15	Quadris	12.0 Oz/A	Fungicide	Spray
1/15	Nu-Film	4.0 Oz/A	Adjuvant	Spray
1/25	Sequoia	4.0 Oz/A	Insecticide	Spray
2/4	Verimark	10.0 Oz/A	Insecticide	Spray
2/5	Verimark	10.0	Insecticide	Drip

In Season Measurements (Dr. Bhupinder Singh)

- Net photosynthesis
- Gas exchange traits
 - Transpiration rate
 - Stomatal conductance
 - Vapor pressure deficit
- Light uptake traits
 - Maximum quantum yield
 - FY/FM
 - Electron transport rate
 - Chlorophyll content
- Meteorological traits
 - Canopy temperature
 - Surface temperature

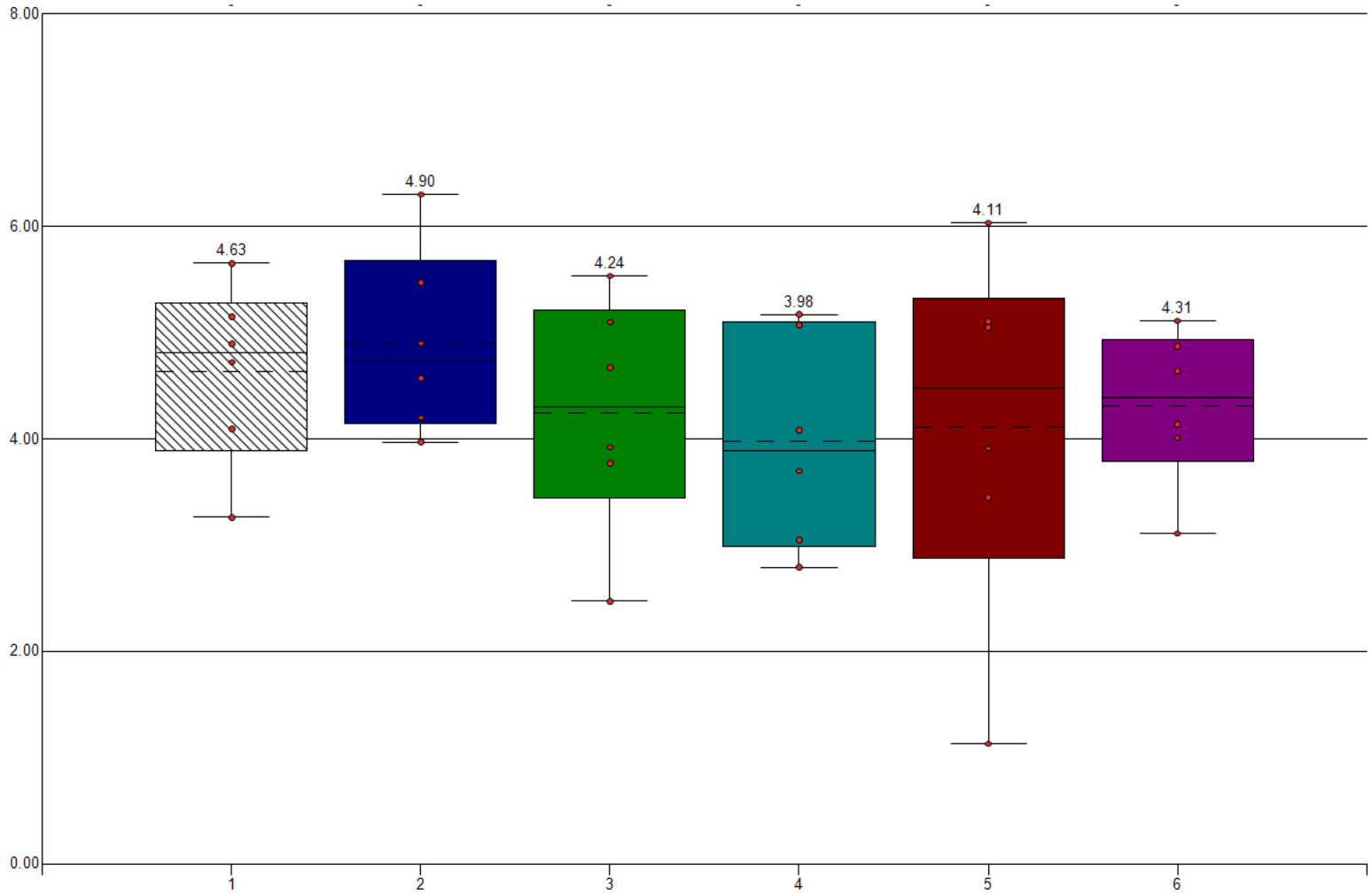


mol m⁻² Stomtal conductance



- 1 Full Irrigation; UTC
- 2 Full Irrigation; Lower Rate EF Polymer
- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

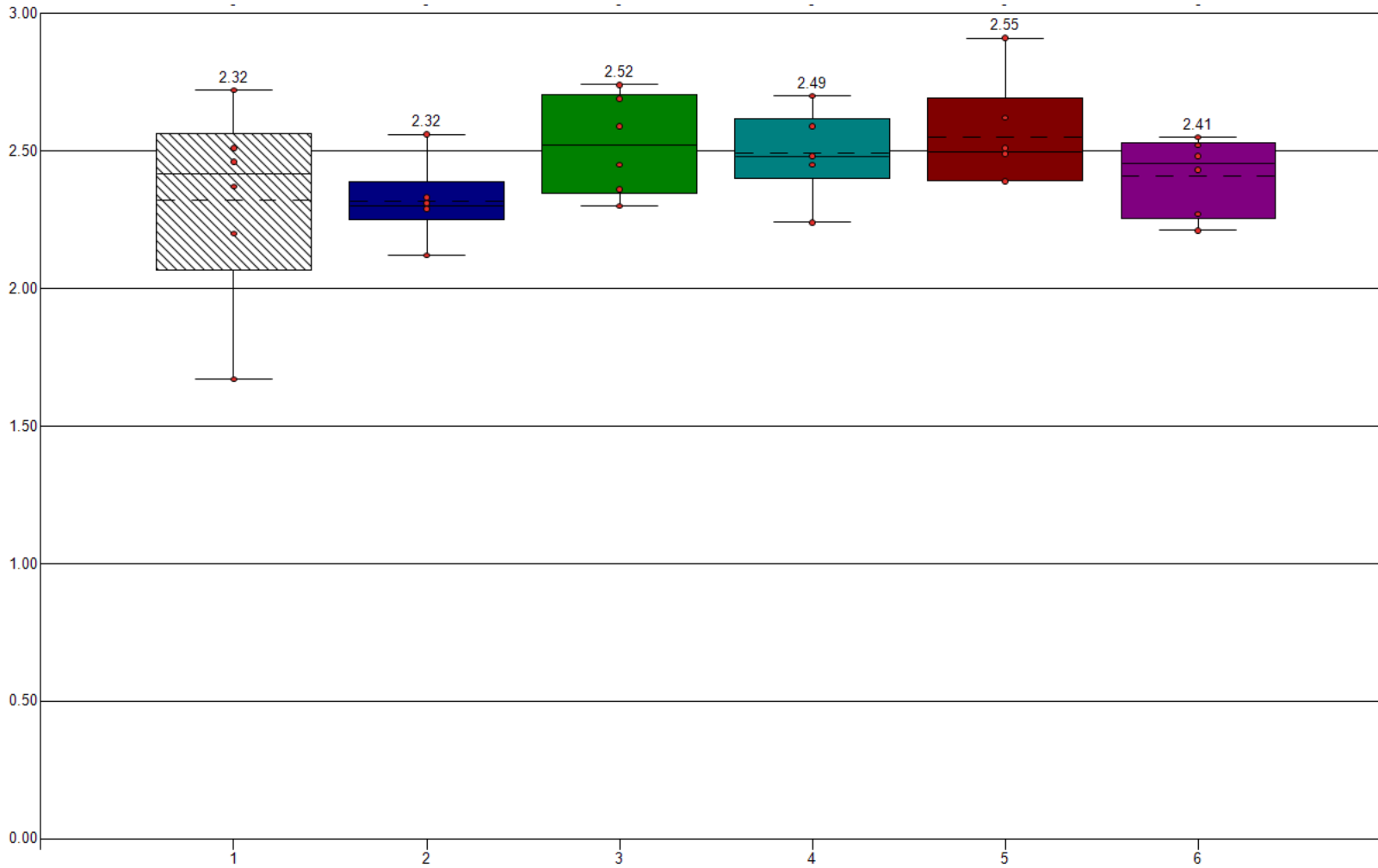
mol m-2 Transpiration



- 1 Full Irrigation;UTC
- 2 Full Irrigation;Lower Rate EF Polymer
- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

Yuma Romaine - EF Polymer Trial - Fall 2025

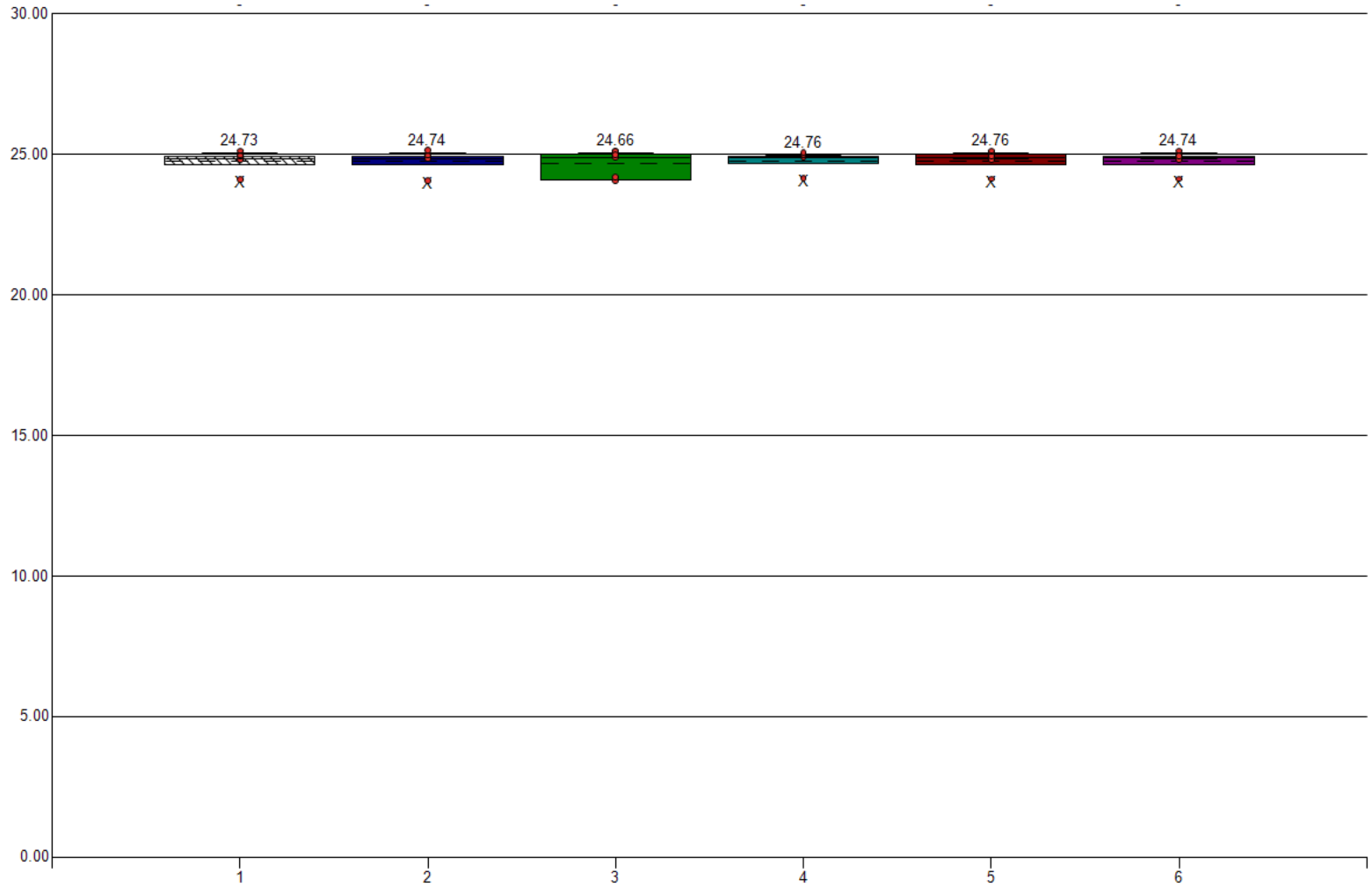
kPa VPDleaf



- 1 Full Irrigation;UTC
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- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
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Yuma Romaine - EF Polymer Trial - Fall 2025

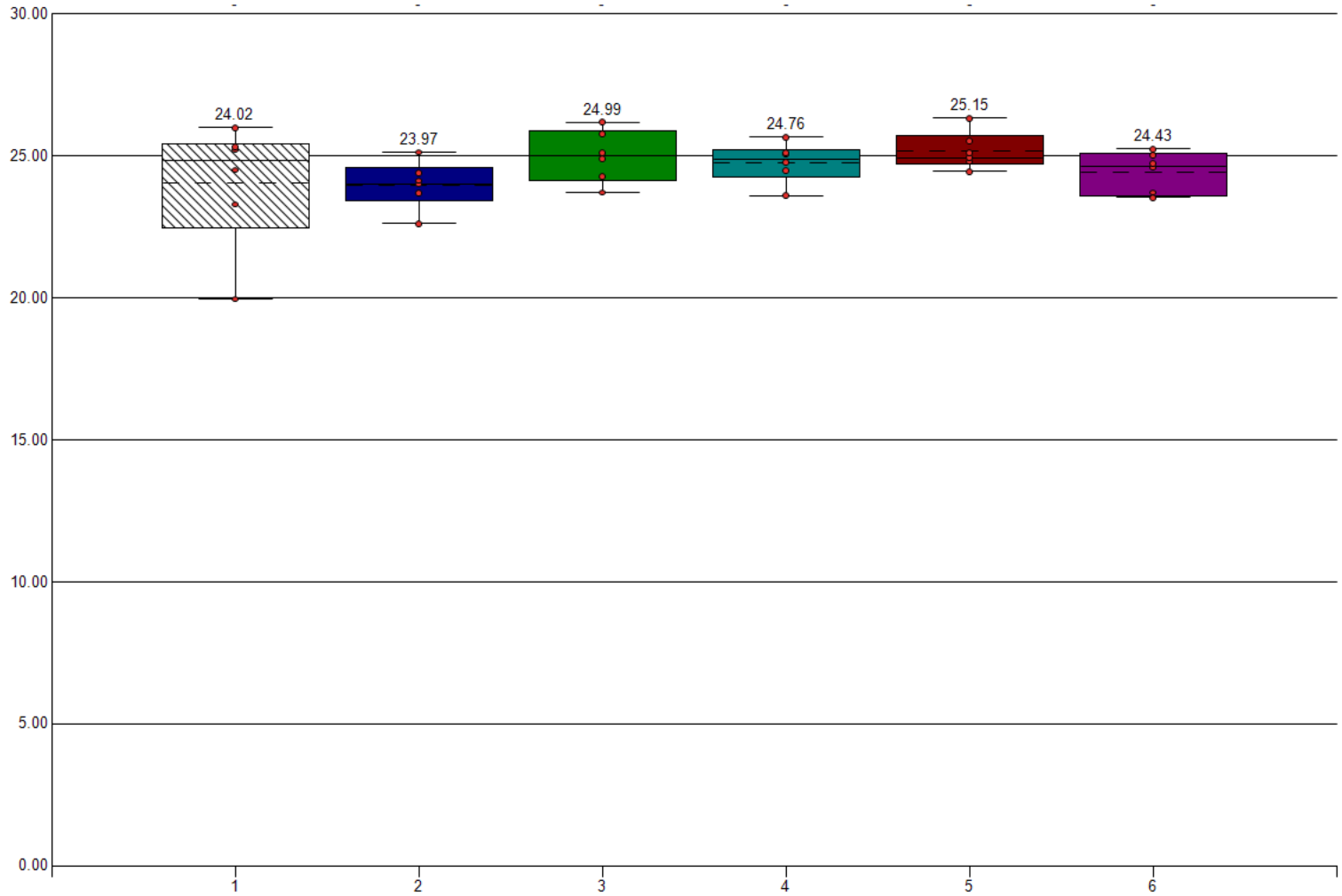
°C air temperature



- 1 Full Irrigation; UTC
- 2 Full Irrigation; Lower Rate EF Polymer
- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

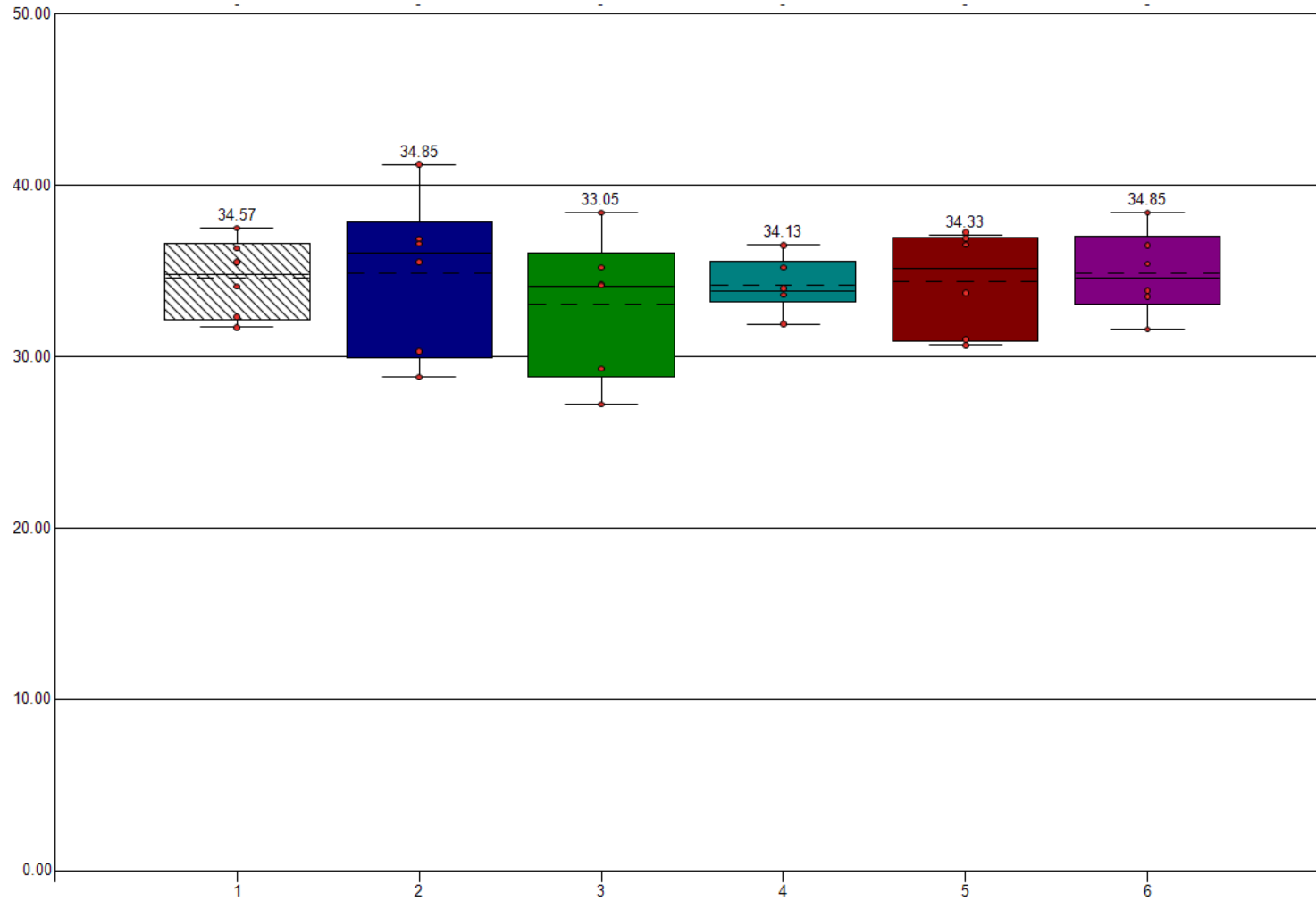
Yuma Romaine - EF Polymer Trial - Fall 2025

°C Canopy Temperature



- 1 Full Irrigation; UTC
- 2 Full Irrigation; Lower Rate EF Polymer
- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

µg m-2 Chlorophyll content



- 1 Full Irrigation; UTC
- 2 Full Irrigation; Lower Rate EF Polymer
- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

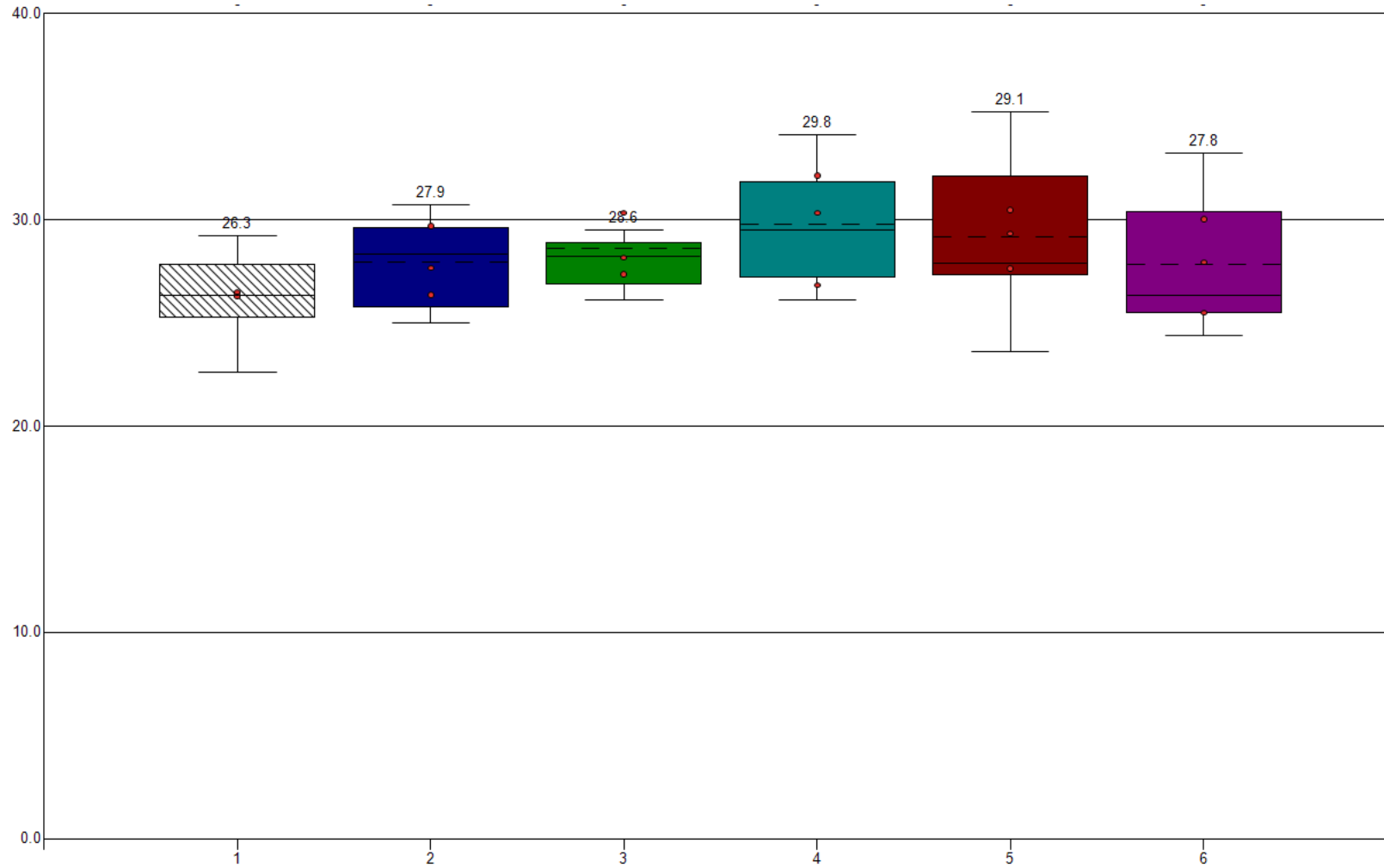
Salinity Meters

Evaluation of the Soil Cub and GrowBud DRO moisture and salinity meters.

Soil Cub 12/16

Yuma Romaine - EF Polymer Trial - Fall 2025

Soil VWC %

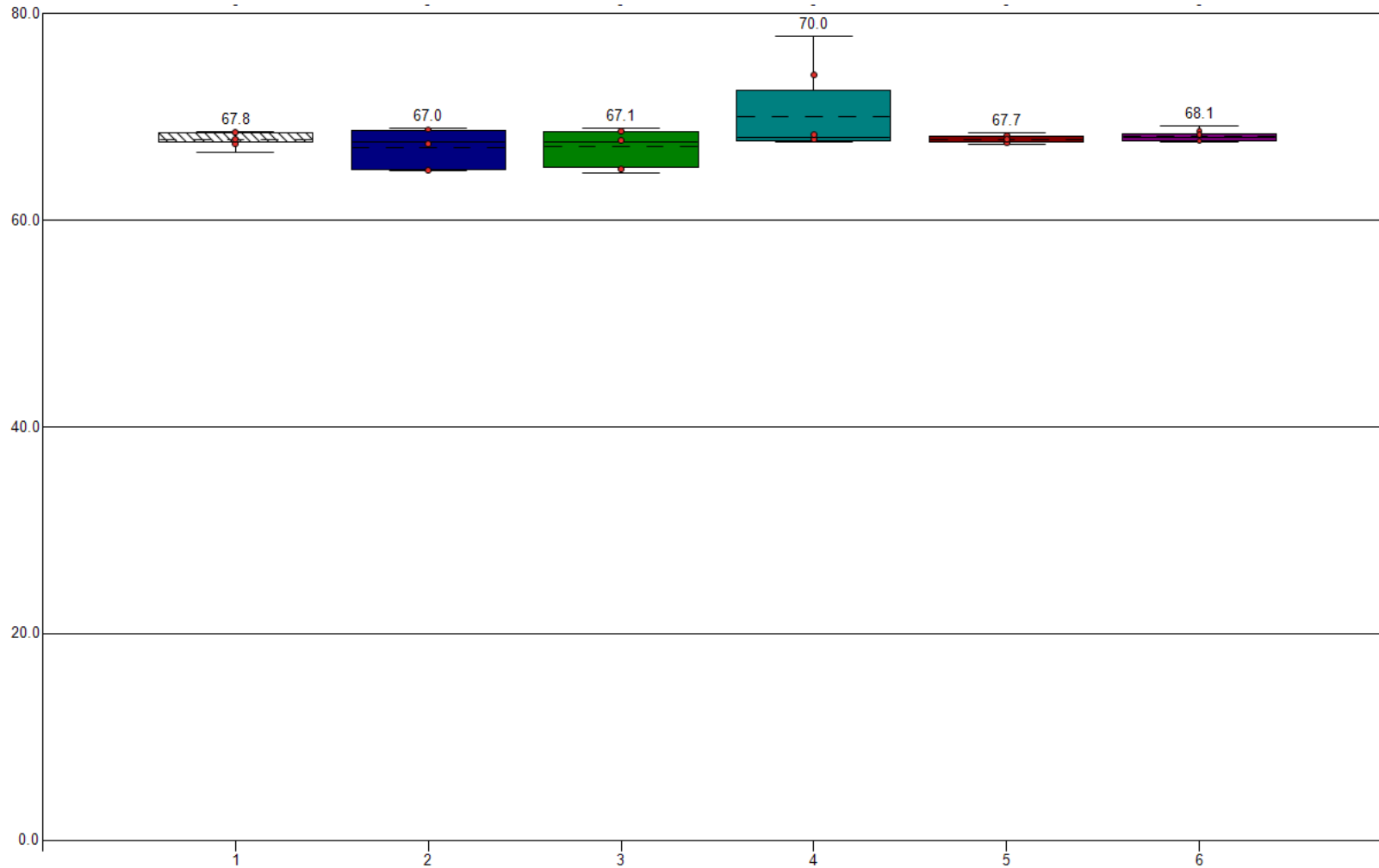


- 1 Full Irrigation; UTC
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- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

Soil Cub 12/16

Yuma Romaine - EF Polymer Trial - Fall 2025

Soil Temp °F

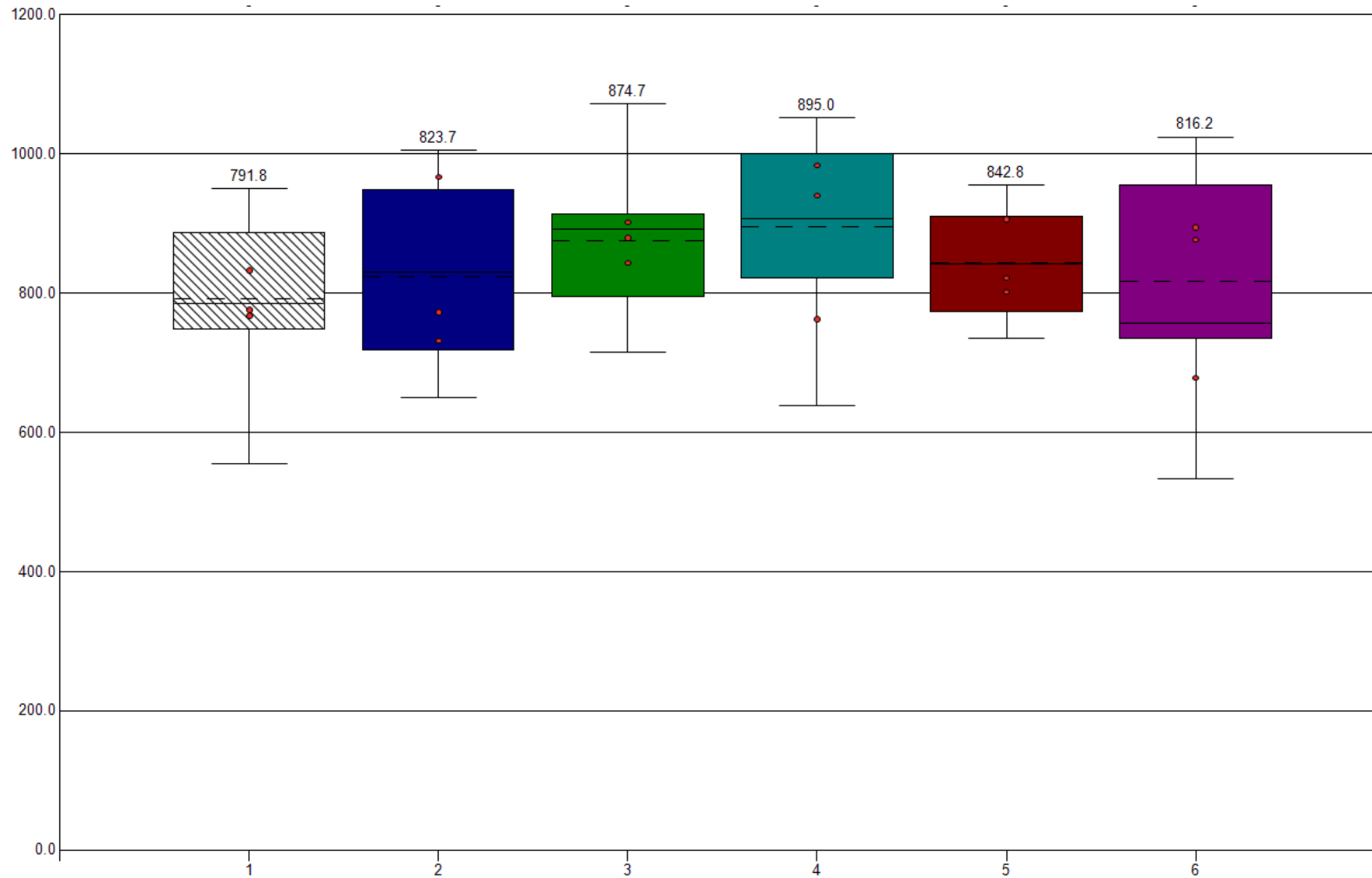


- 1 Full Irrigation; UTC
- 2 Full Irrigation; Lower Rate EF Polymer
- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

Soil Cub 12/16

Yuma Romaine - EF Polymer Trial - Fall 2025

Soil E.C uS/cm

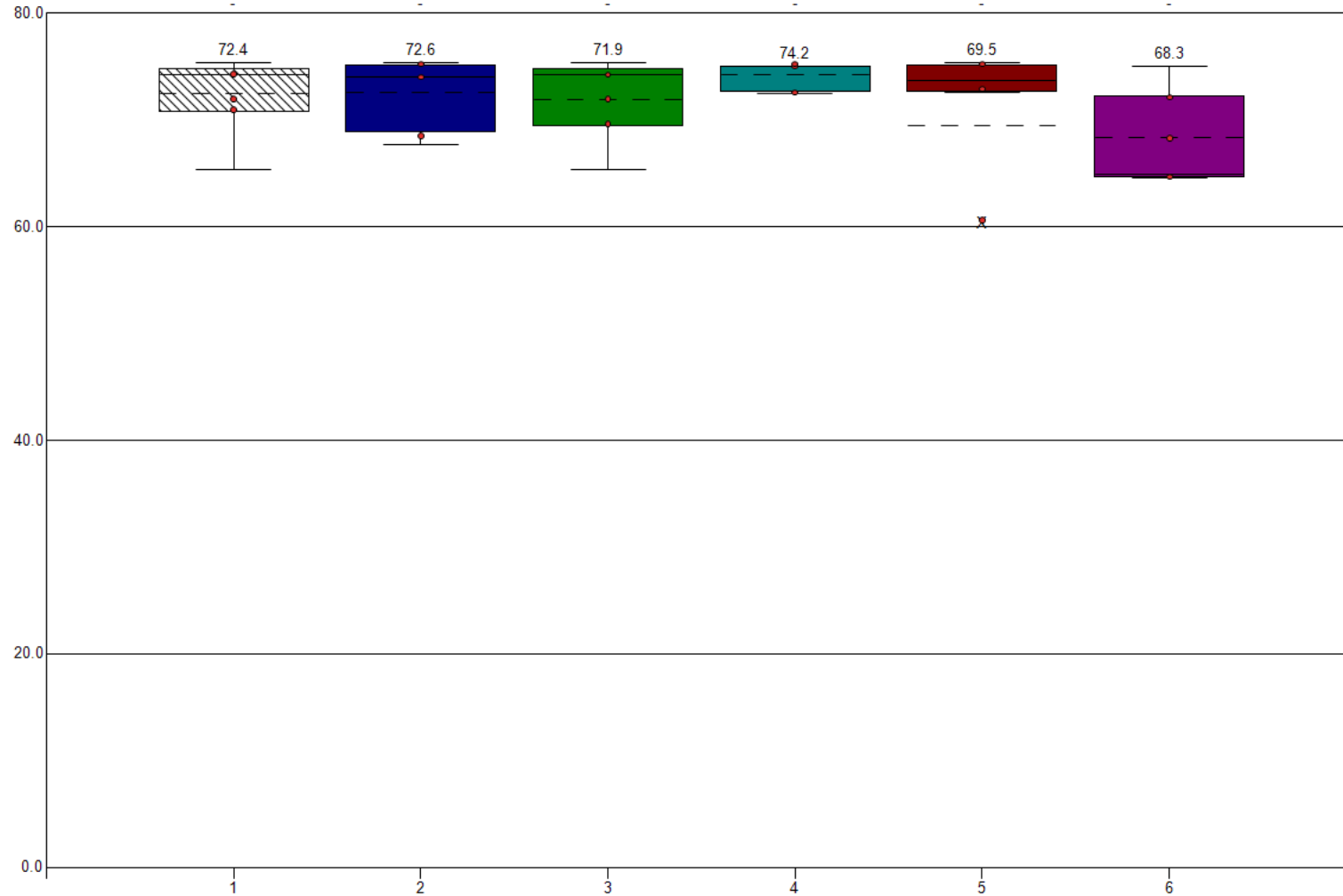


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- 3 Full Irrigation;Higher Rate EF Polymer
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- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

Soil Cub 12/16

Yuma Romaine - EF Polymer Trial - Fall 2025

Ambient Temperature °F

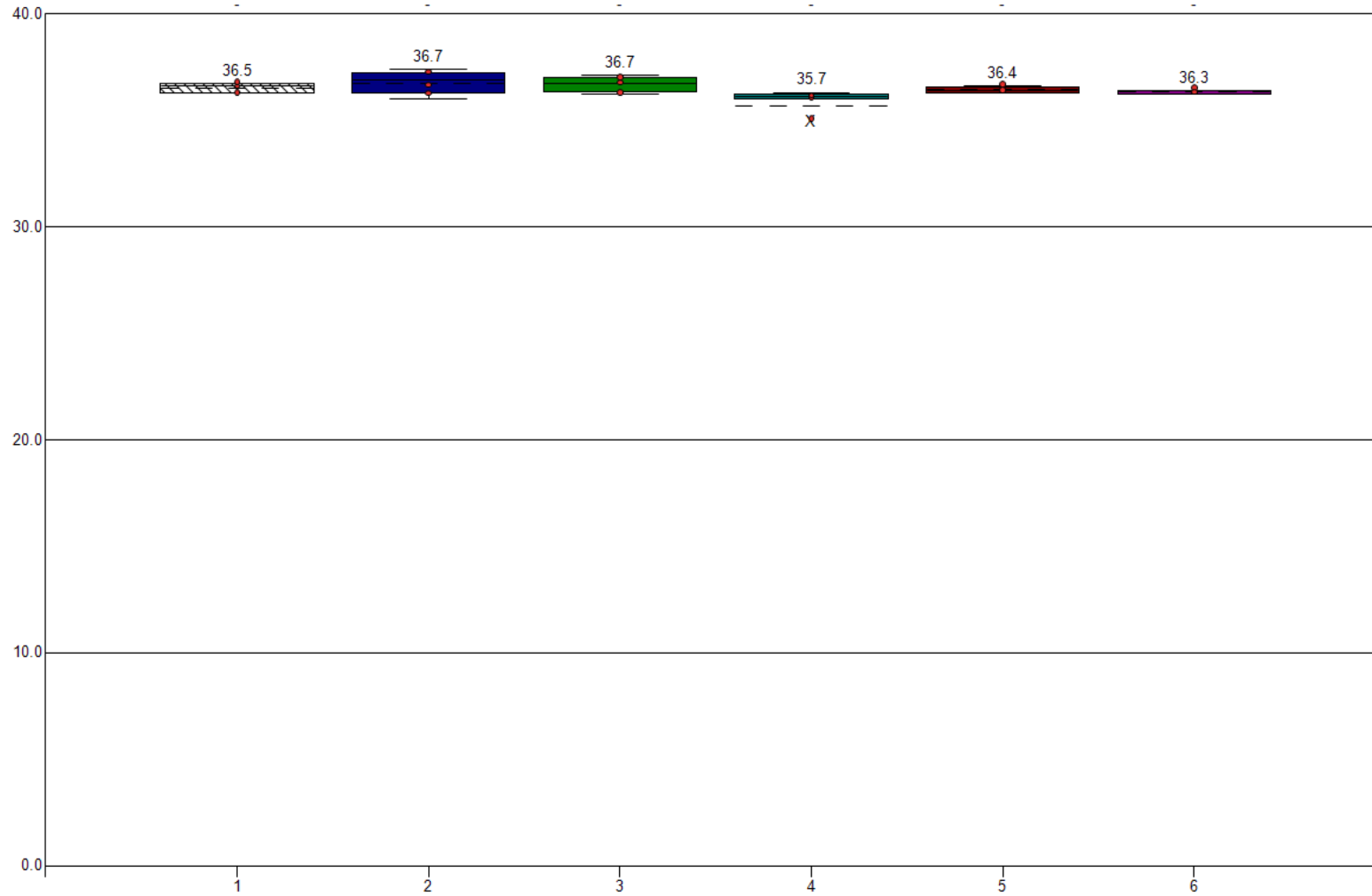


- 1 Full Irrigation;UTC
- 2 Full Irrigation;Lower Rate EF Polymer
- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

Soil Cub 12/16

Yuma Romaine - EF Polymer Trial - Fall 2025

Relative Humidity %

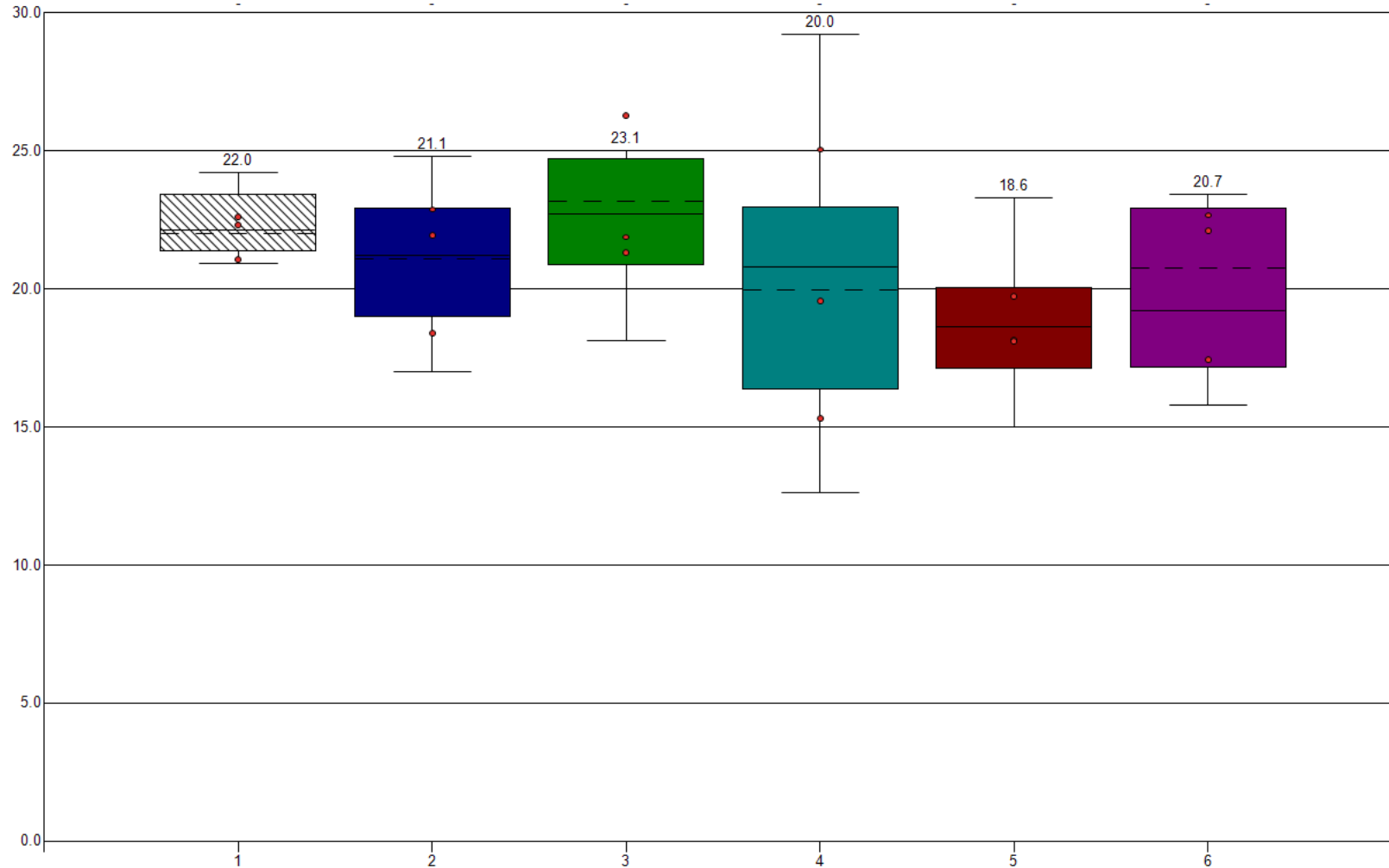


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- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

Soil Cub 1/22

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Soil VWC %

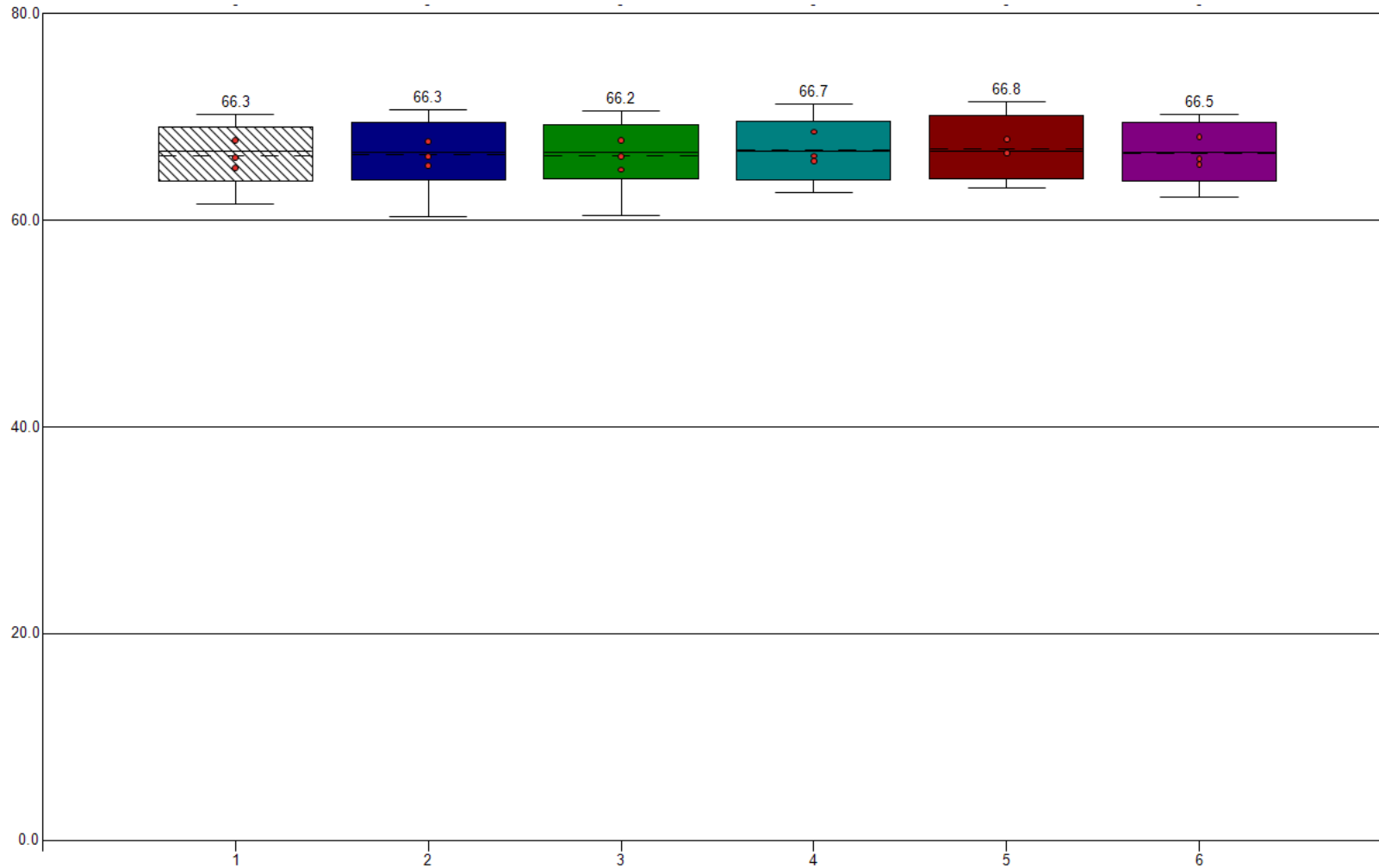


- 1 Full Irrigation, UTC
- 2 Full Irrigation; Lower Rate EF Polymer
- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

Soil Cub 1/22

Yuma Romaine - EF Polymer Trial - Fall 2025

Soil Temp °F

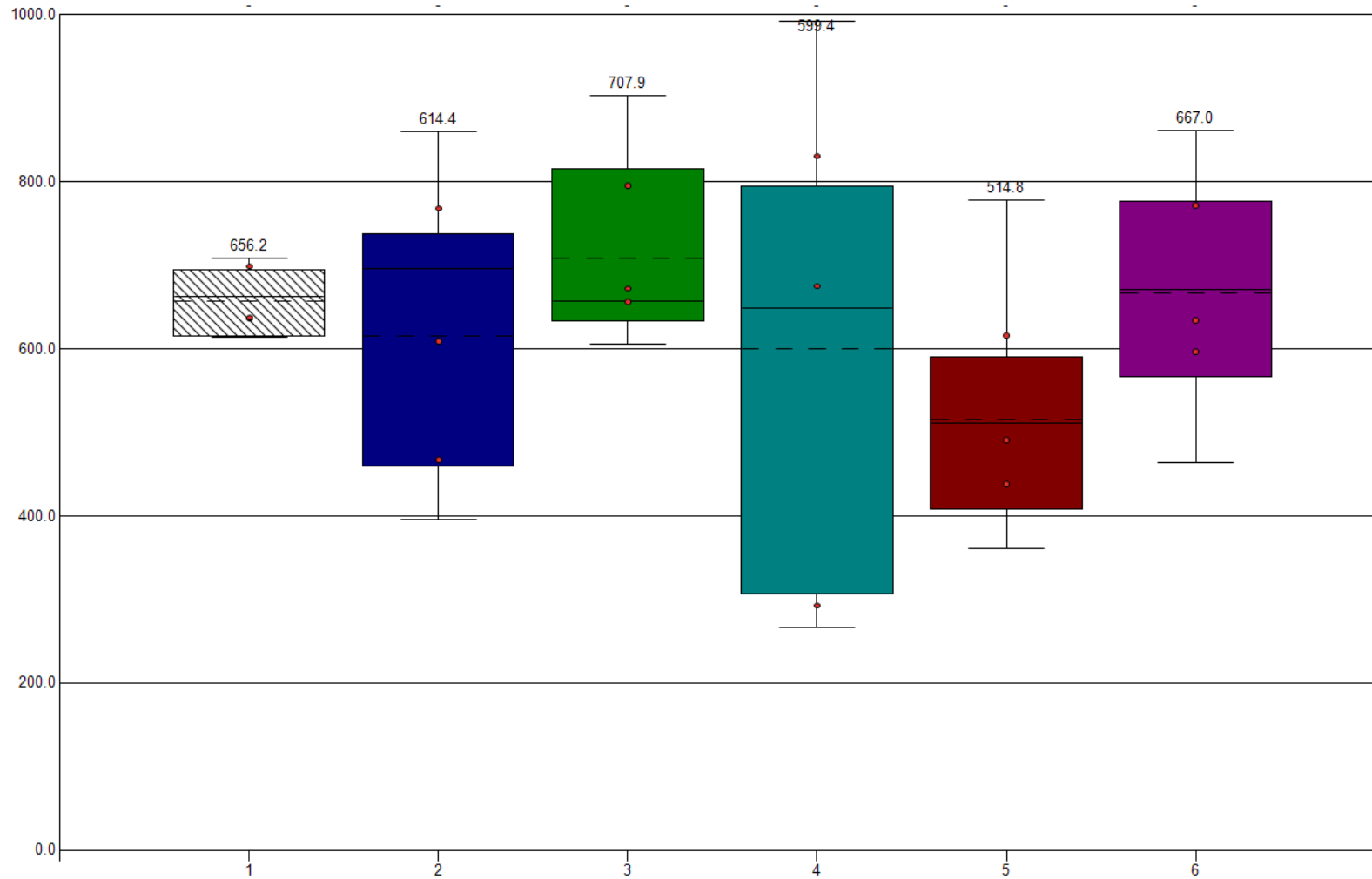


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- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

Soil Cub 1/22

Yuma Romaine - EF Polymer Trial - Fall 2025

Soil E.C uS/cm

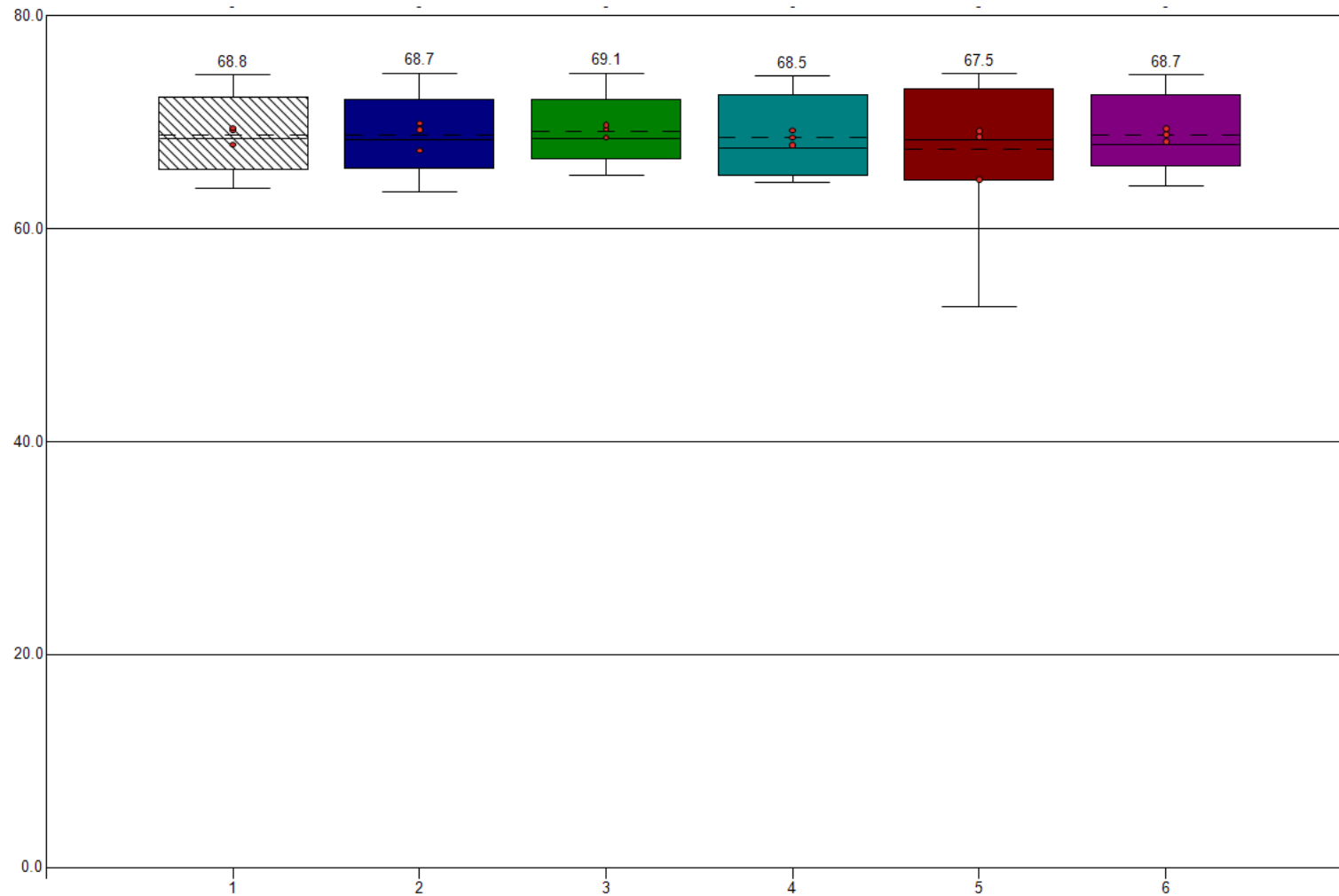


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- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
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Soil Cub 1/22

Yuma Romaine - EF Polymer Trial - Fall 2025

Ambient Temperature °F

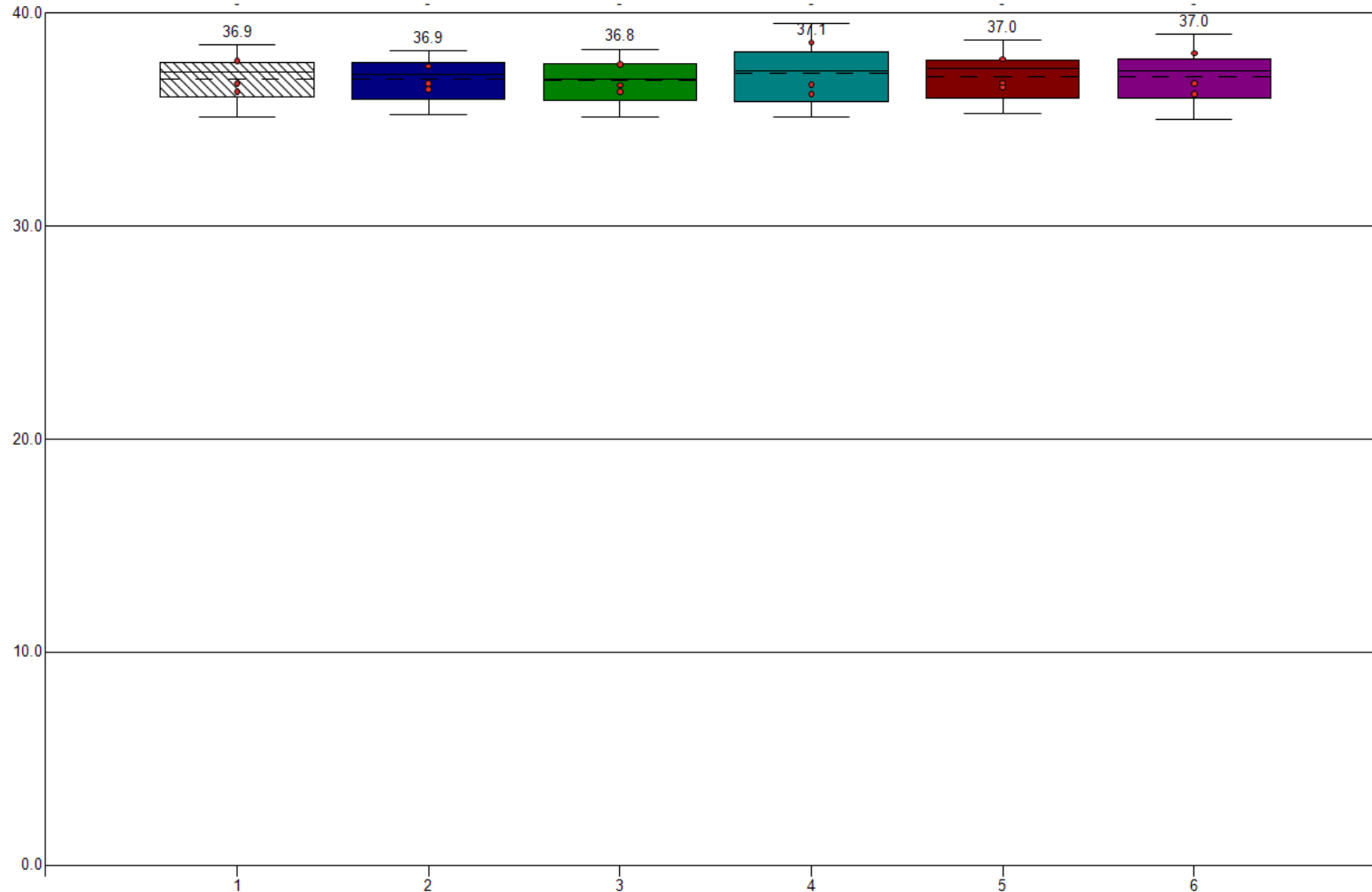


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- 5 Reduced Irrigation;Lower Rate EF Polymer
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Soil Cub 1/22

Yuma Romaine - EF Polymer Trial - Fall 2025

Relative Humidity %

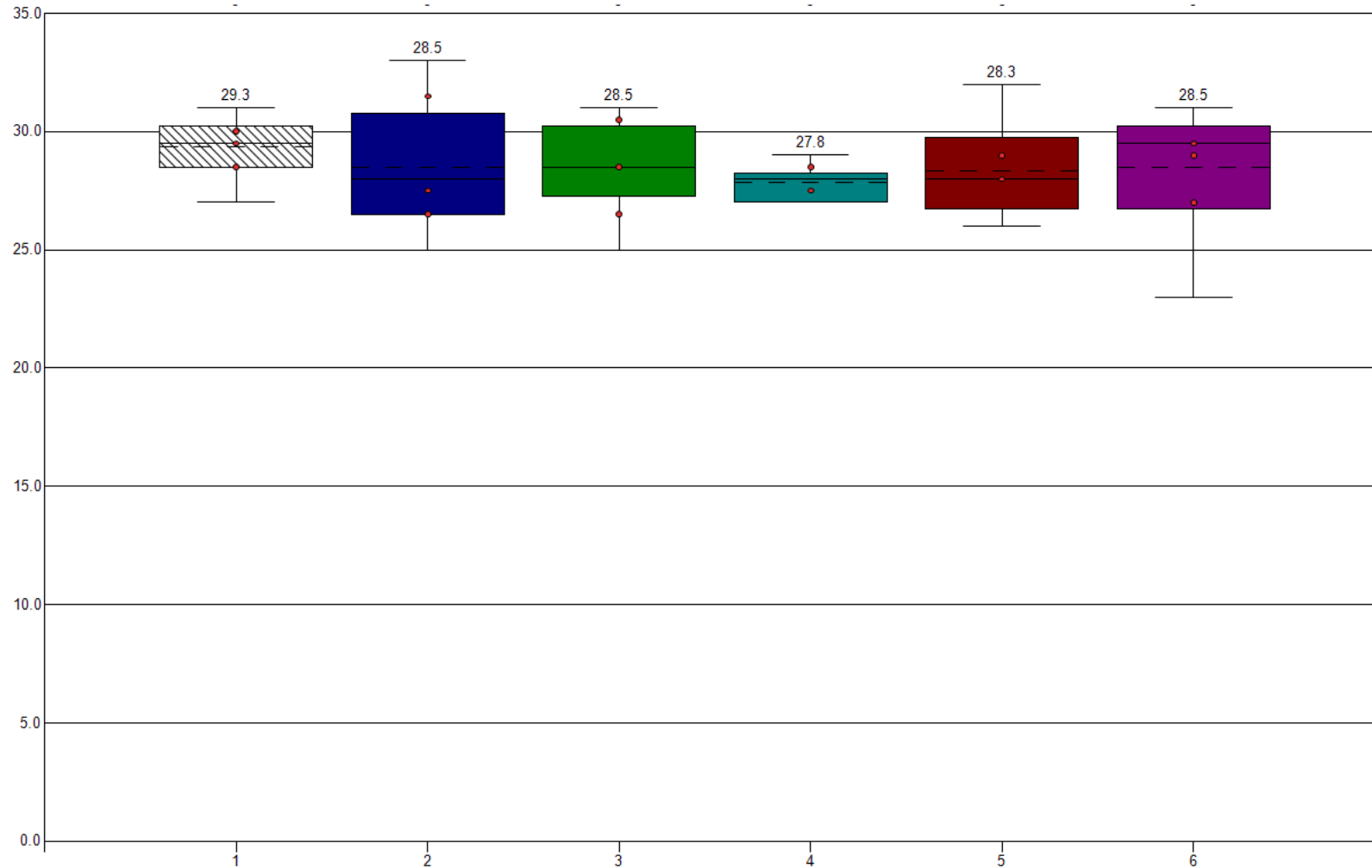


- 1 Full Irrigation; UTC
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- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

GrowBud DRO 3/2

Yuma Romaine - EF Polymer Trial - Fall 2025

Water Content

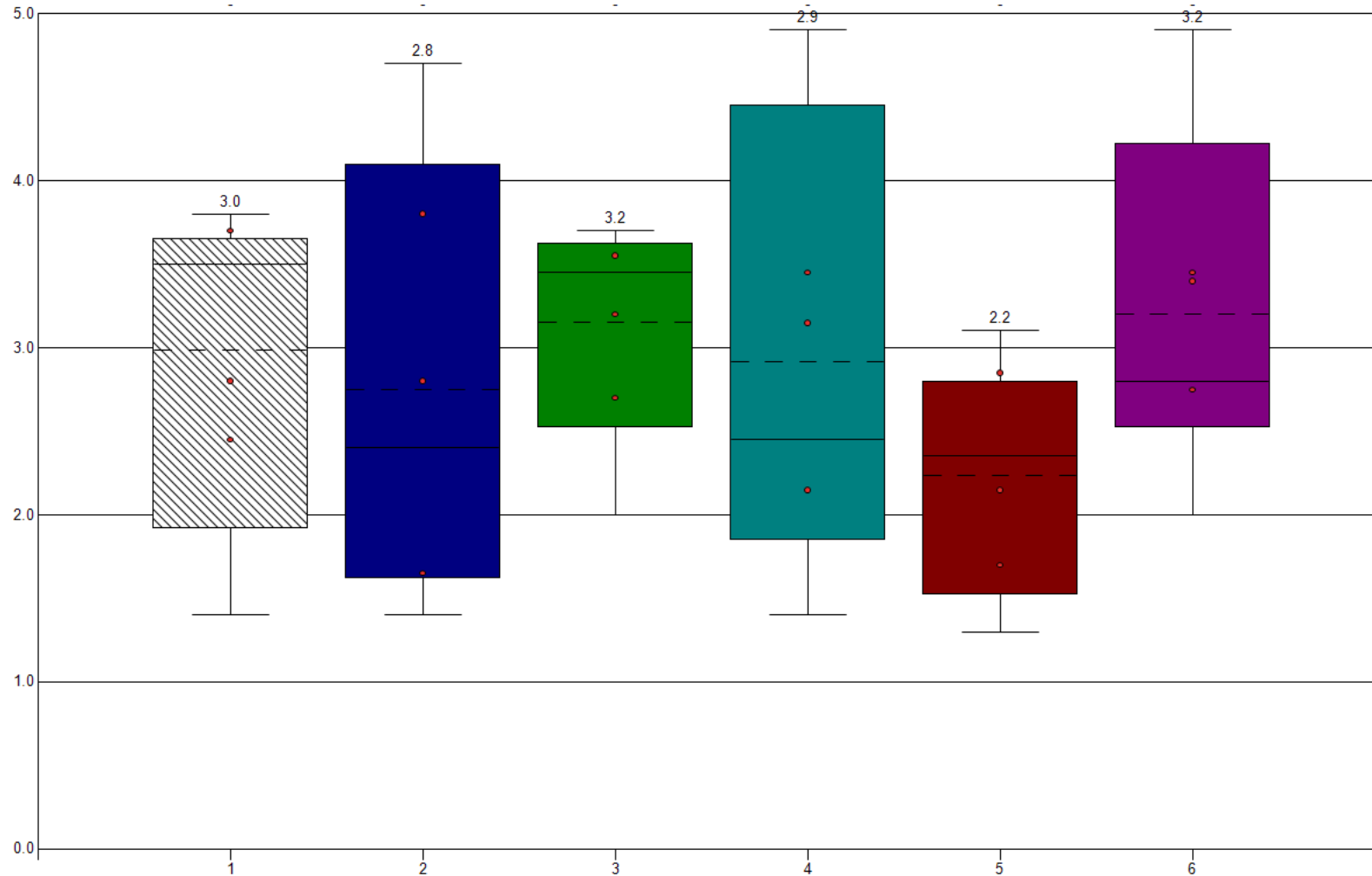


- 1 Full Irrigation; UTC
- 2 Full Irrigation; Lower Rate EF Polymer
- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

GrowBud DRO

Yuma Romaine - EF Polymer Trial - Fall 2025

Pore Water EC

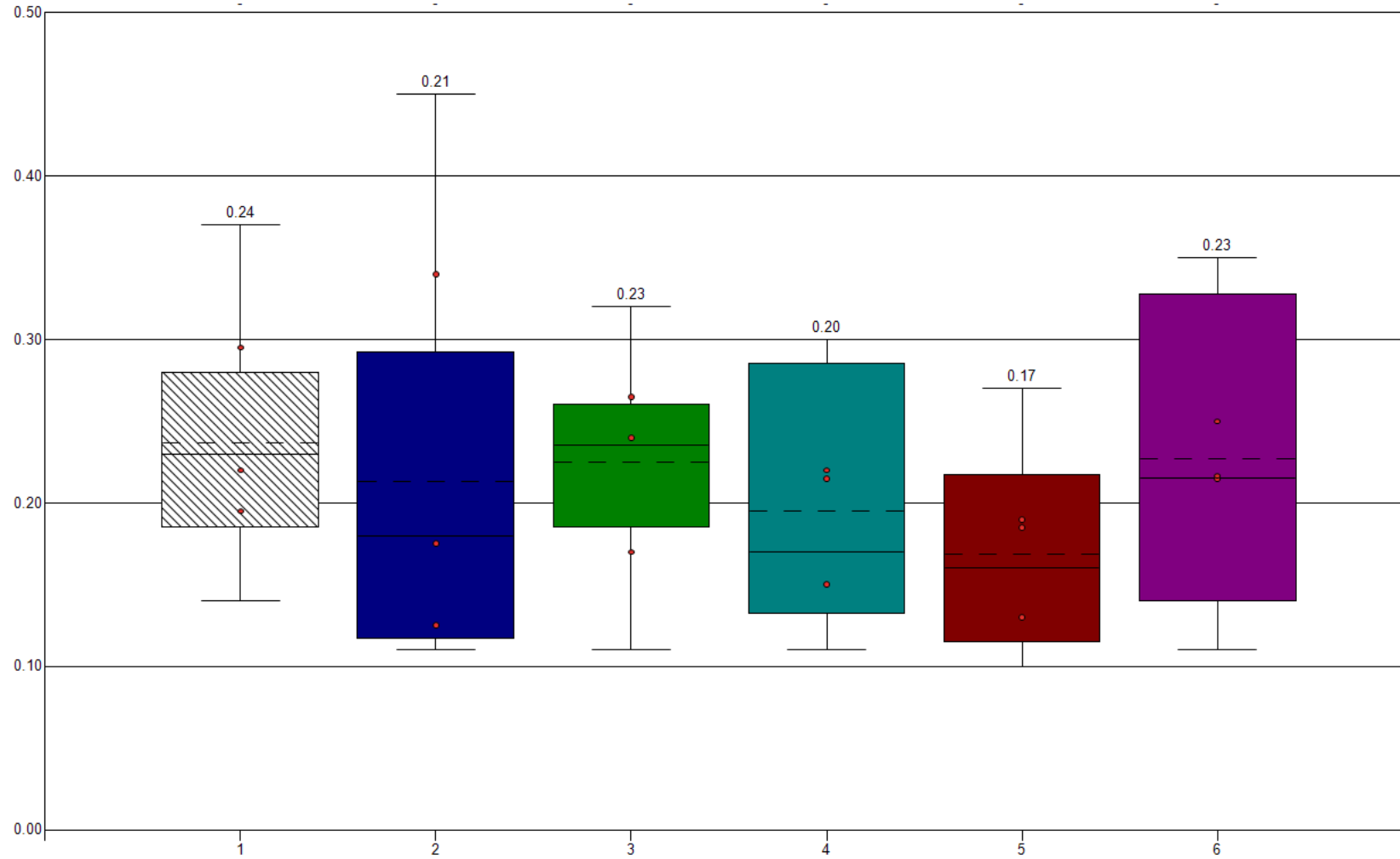


- 1 Full Irrigation; UTC
- 2 Full Irrigation; Lower Rate EF Polymer
- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

GrowBud DRO

Yuma Romaine - EF Polymer Trial - Fall 2025

Bulk EC

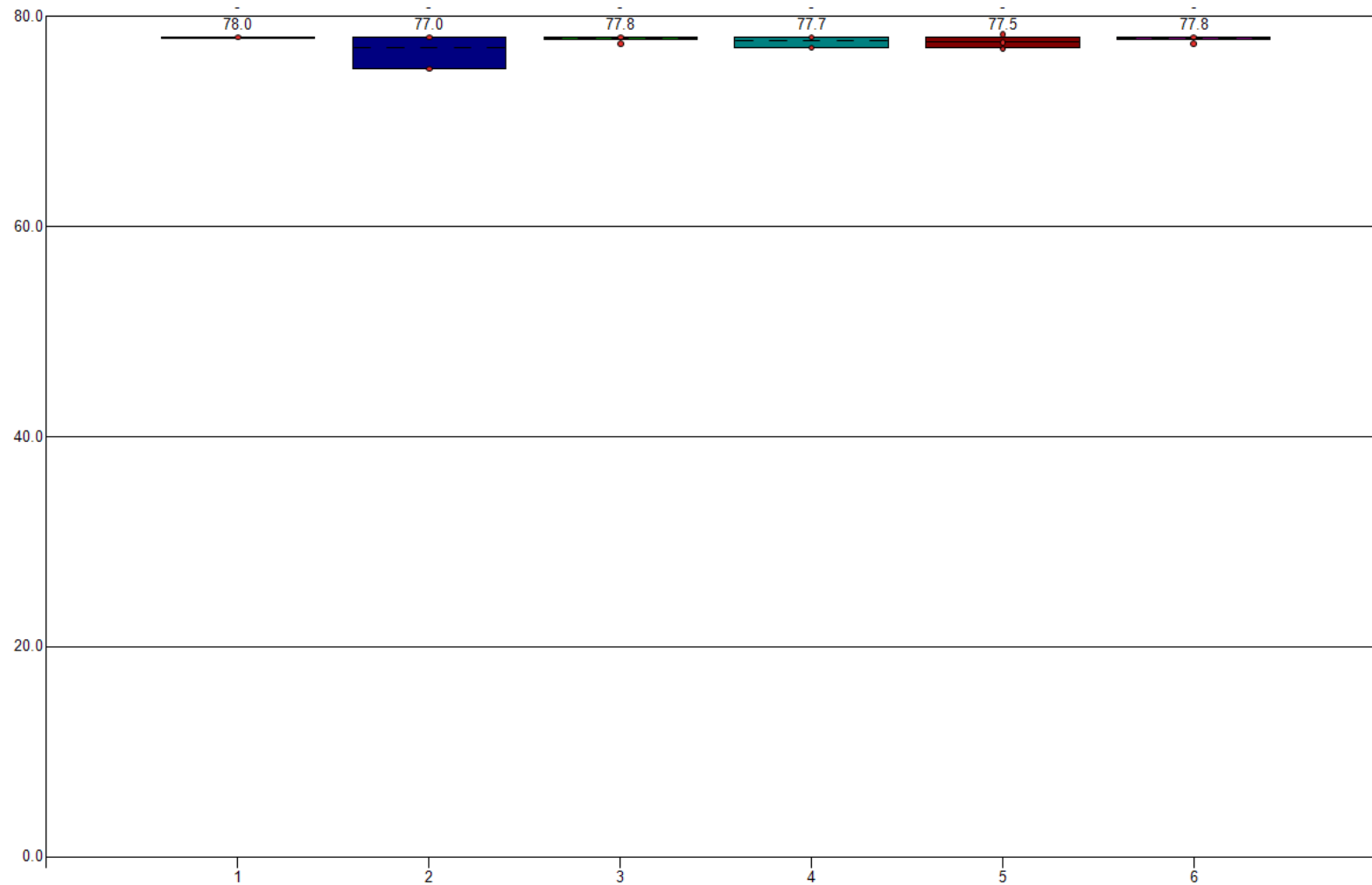


- 1 Full Irrigation, UTC
- 2 Full Irrigation; Lower Rate EF Polymer
- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

GrowBud DRO

Yuma Romaine - EF Polymer Trial - Fall 2025

Air Surface Temp

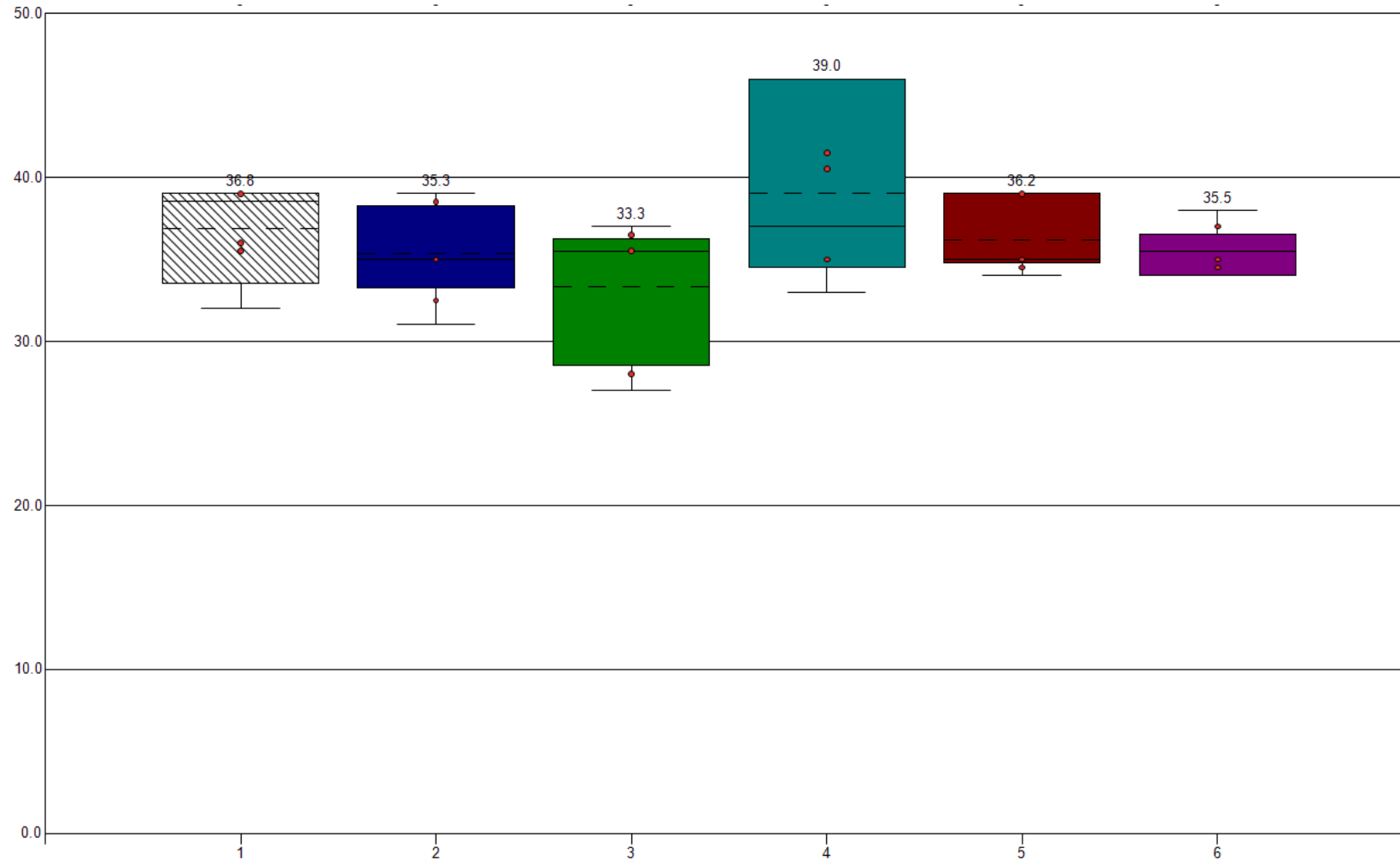


- 1 Full Irrigation; UTC
- 2 Full Irrigation; Lower Rate EF Polymer
- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

GrowBud DRO

Yuma Romaine - EF Polymer Trial - Fall 2025

Humidity

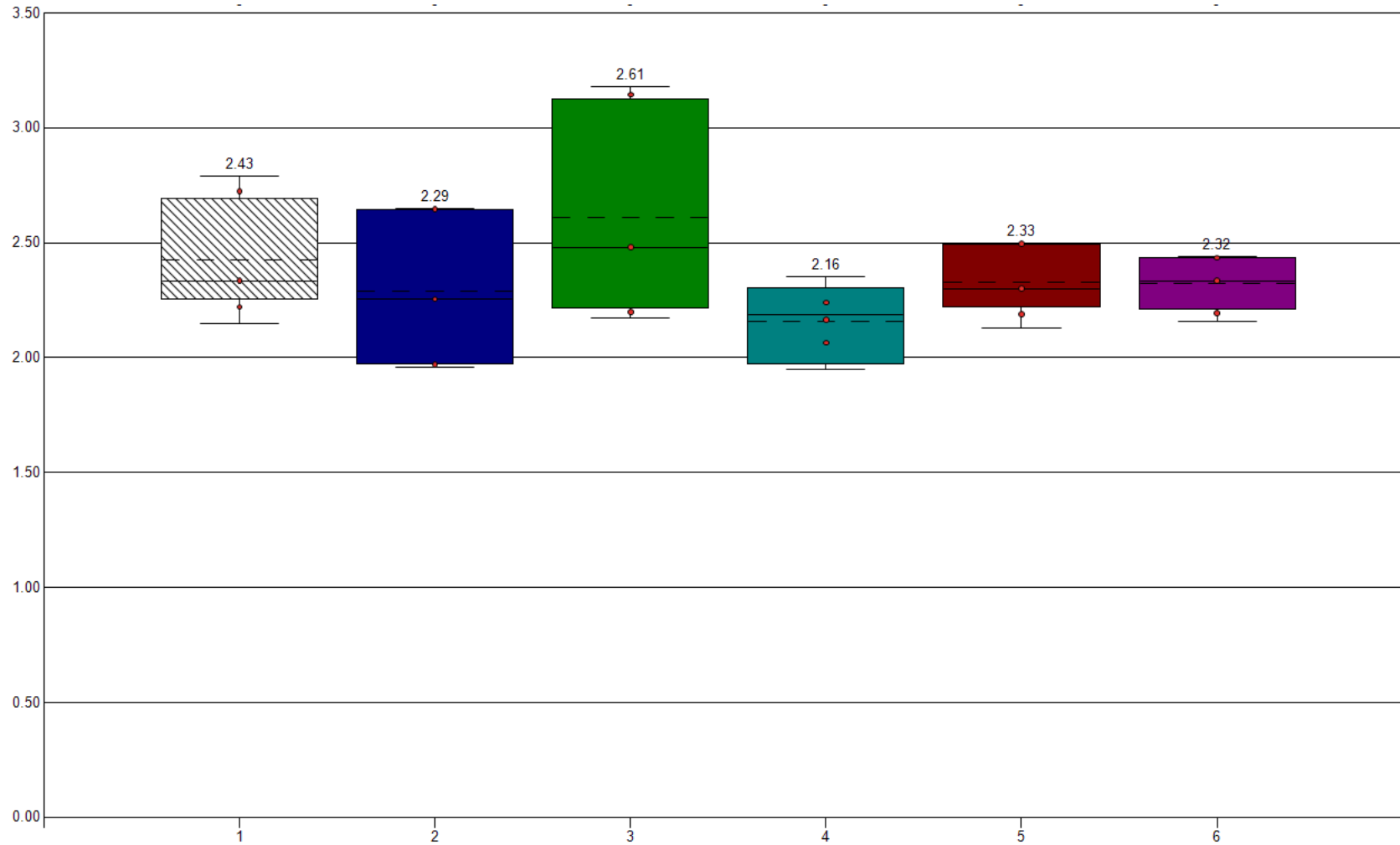


- 1 Full Irrigation;UTC
- 2 Full Irrigation;Lower Rate EF Polymer
- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

GrowBud DRO

Yuma Romaine - EF Polymer Trial - Fall 2025

VPD

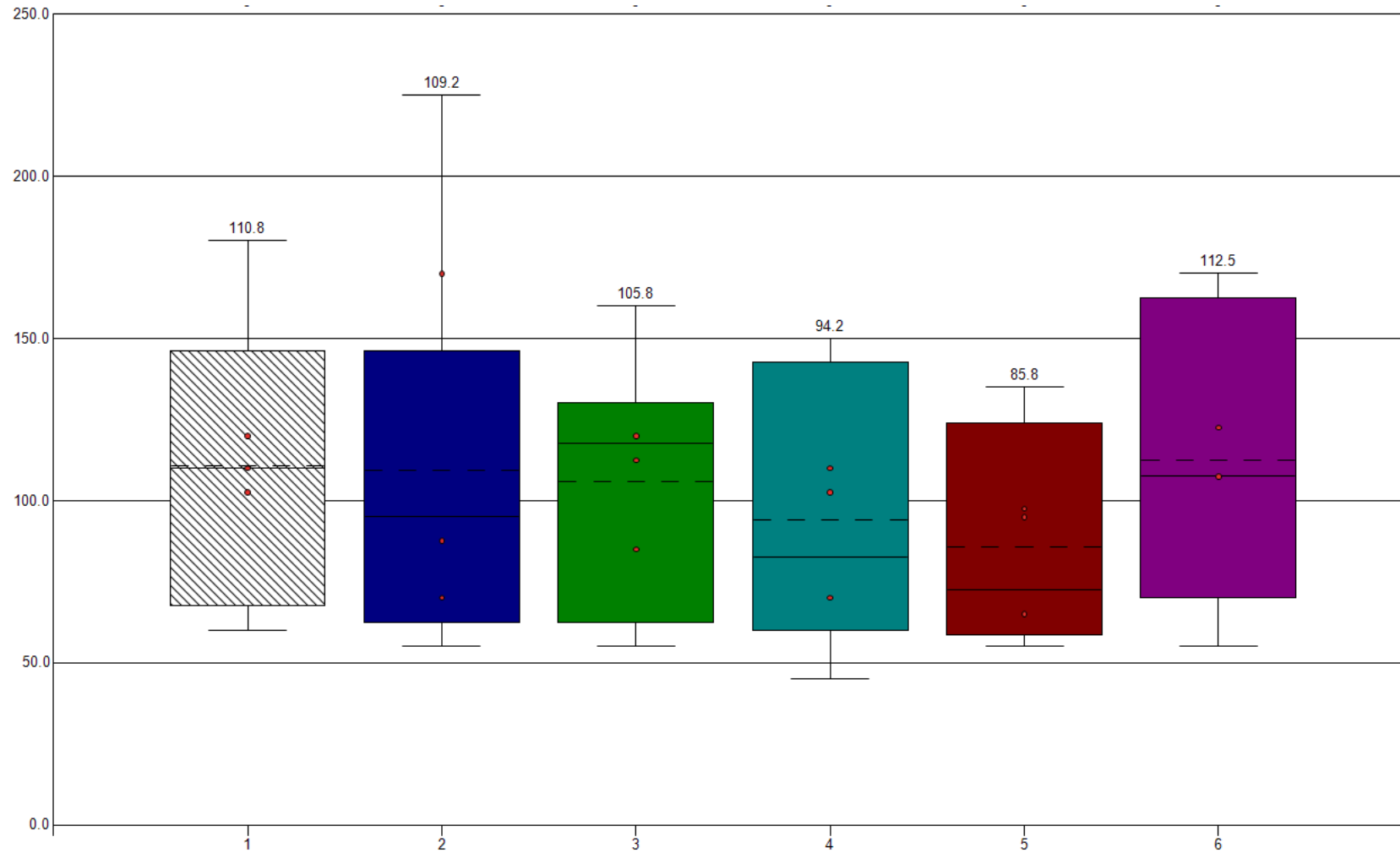


- 1 Full Irrigation; UTC
- 2 Full Irrigation; Lower Rate EF Polymer
- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

GrowBud DRO

Yuma Romaine - EF Polymer Trial - Fall 2025

TDS



- 1 Full Irrigation; UTC
- 2 Full Irrigation; Lower Rate EF Polymer
- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

Harvest

- 23 Feb 2026
- Harvest a 10 foot section of each plot
- Each plant weighed for total above ground biomass
- Hearts were trimmed from the biomass and weighed individually
- Walkby percentage was calculated by counting the plants that did not make a marketable heart (lower values = more harvestable plants per plot)
- Heart circumference and length was recorded for each trimmed head



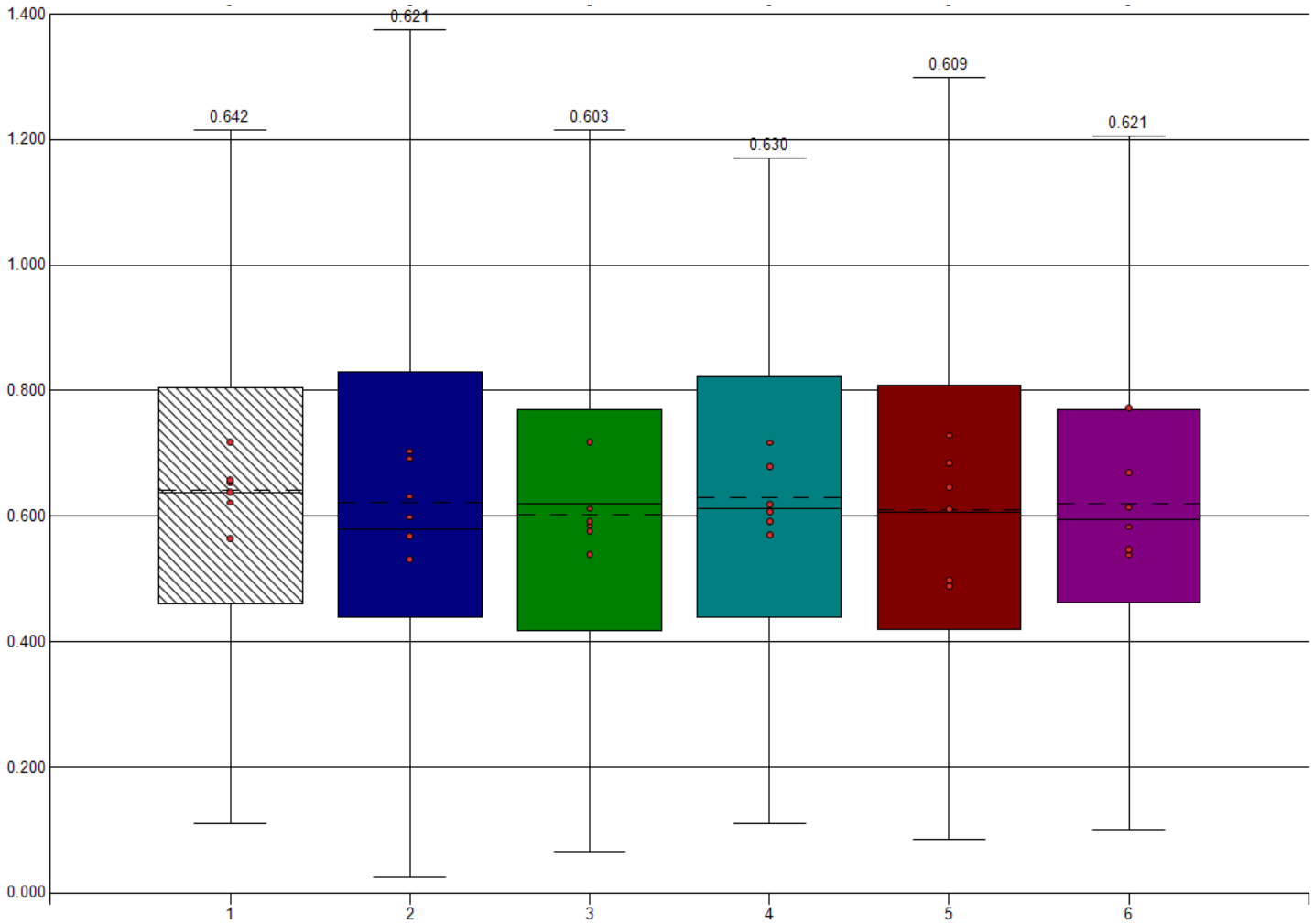






Yuma Romaine - EF Polymer Trial - Fall 2025

KG/Plant Above Ground Biomass



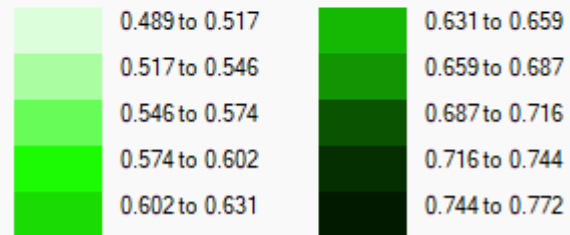
- 1 Full Irrigation; UTC
- 2 Full Irrigation; Lower Rate EF Polymer
- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

Assessment Map - Column 1 - KG/Plant Above Ground Biomass

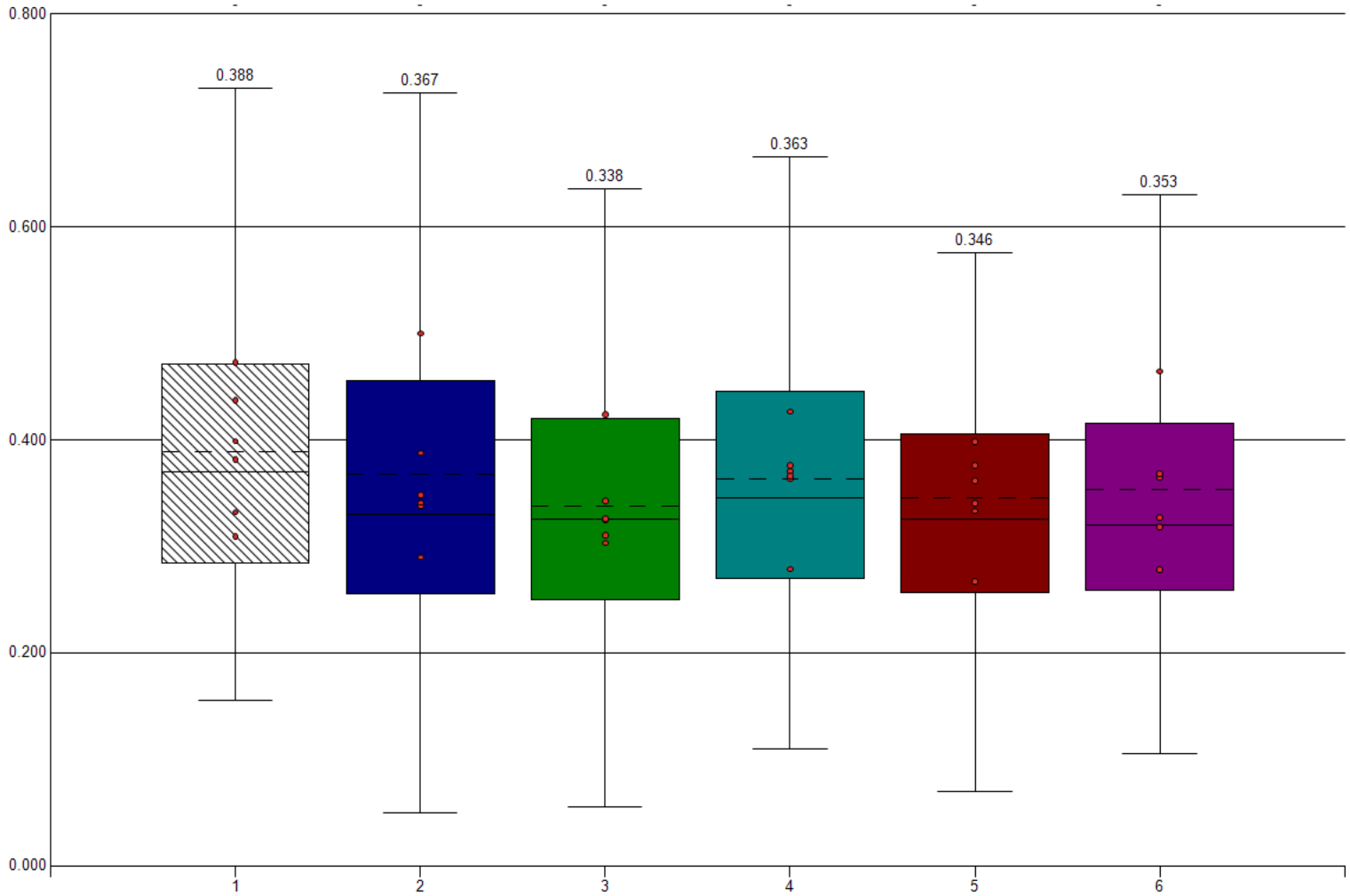
Navigation icons: zoom in, zoom out, pan, home, 100%, refresh, Always size to fit



Color Description Options Treatment Description Level Description Assessment Description



KG/Heart Heart Weight



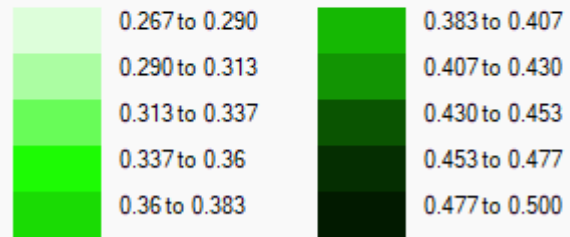
- 1 Full Irrigation; UTC
- 2 Full Irrigation; Lower Rate EF Polymer
- 3 Full Irrigation; Higher Rate EF Polymer
- 4 Reduced Irrigation; UTC
- 5 Reduced Irrigation; Lower Rate EF Polymer
- 6 Reduced Irrigation; Higher Rate EF Polymer

Assessment Map - Column 2 - KG/Heart Heart Weight

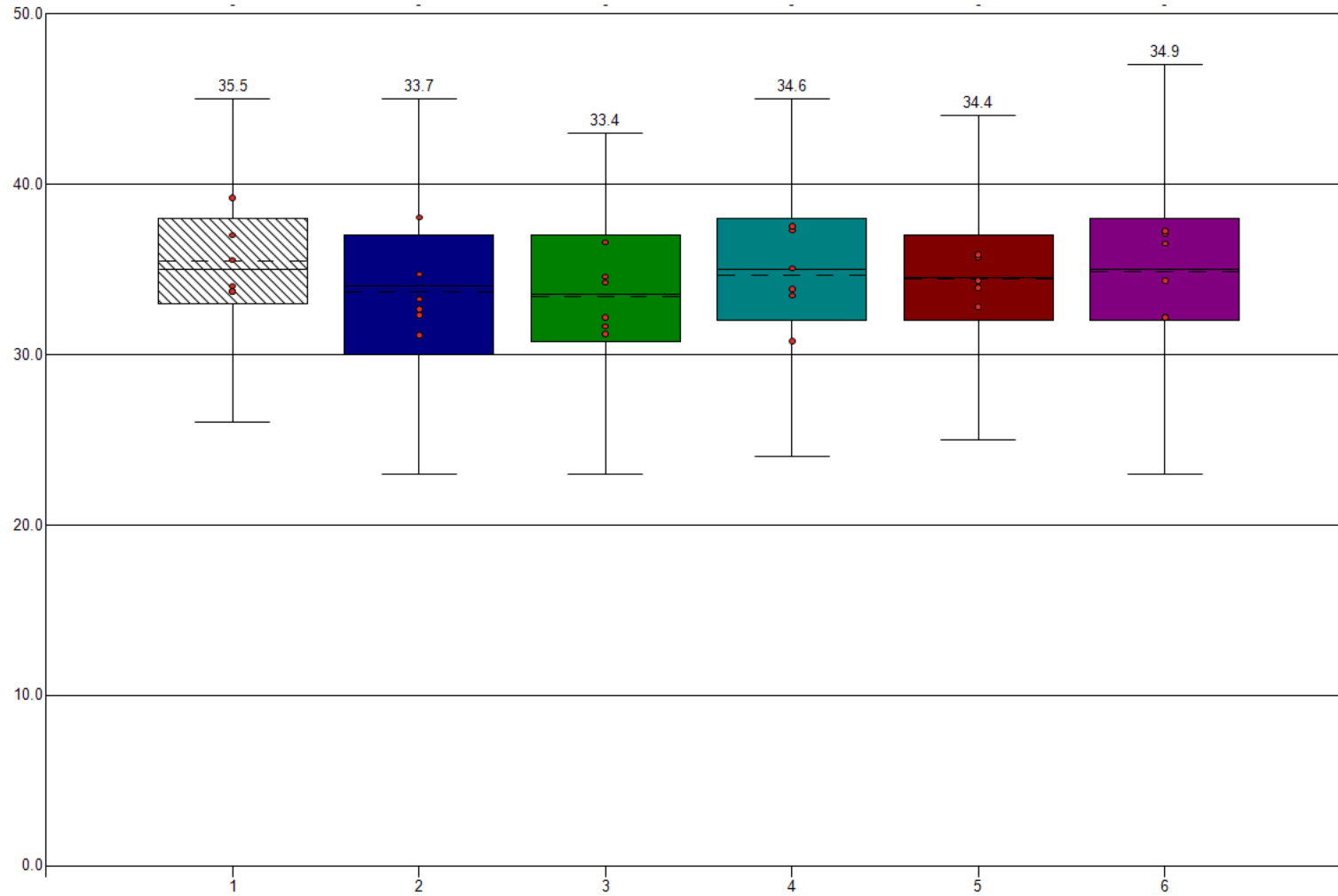
100% Always size to fit



Color Description Options Treatment Description Level Description Assessment Description



CM/Heart Circumference



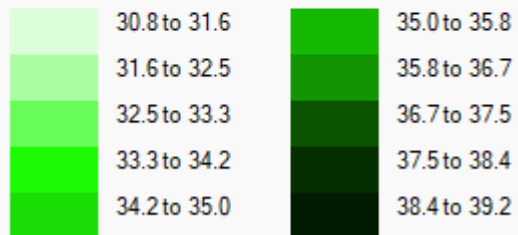
- 1 Full Irrigation;UTC
- 2 Full Irrigation;Lower Rate EF Polymer
- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

Assessment Map - Column 3 - CM/Heart Circumference

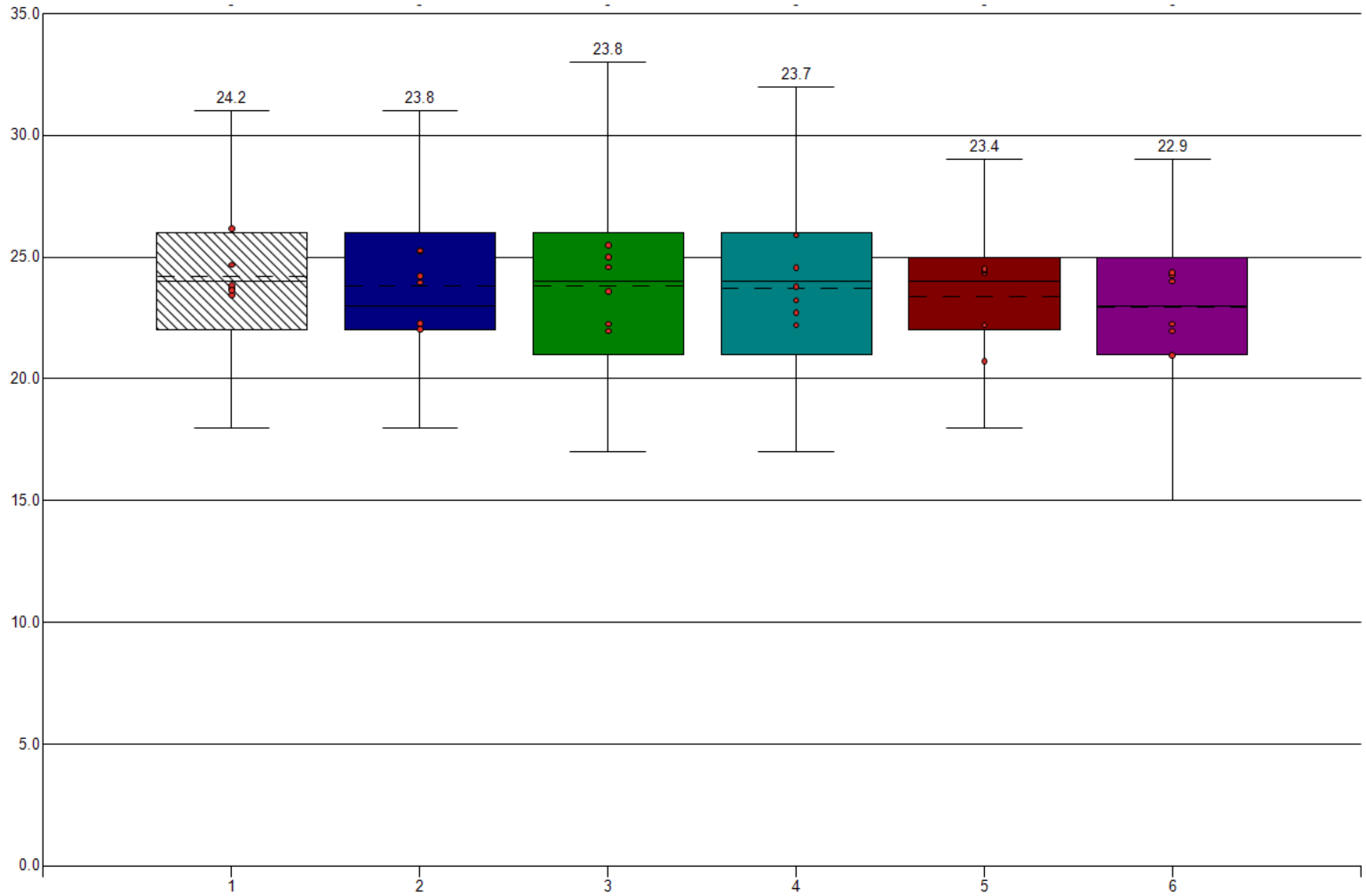
Navigation icons: zoom in, zoom out, hand, play, stop, 100%, pan, and a checked box for "Always size to fit".



Color Description Options Treatment Description Level Description Assessment Description



CM/Heart Heart Length



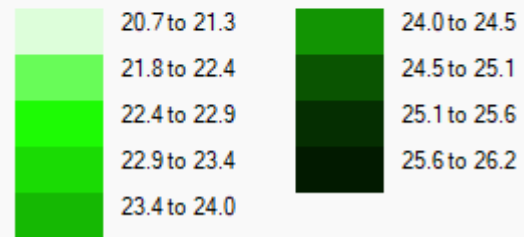
- 1 Full Irrigation;UTC
- 2 Full Irrigation;Lower Rate EF Polymer
- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

Assessment Map - Column 4 - CM/Heart Heart Length

Navigation icons: Home, Back, Forward, Stop, Refresh, Zoom In, Zoom Out, 100%, Always size to fit (checked)

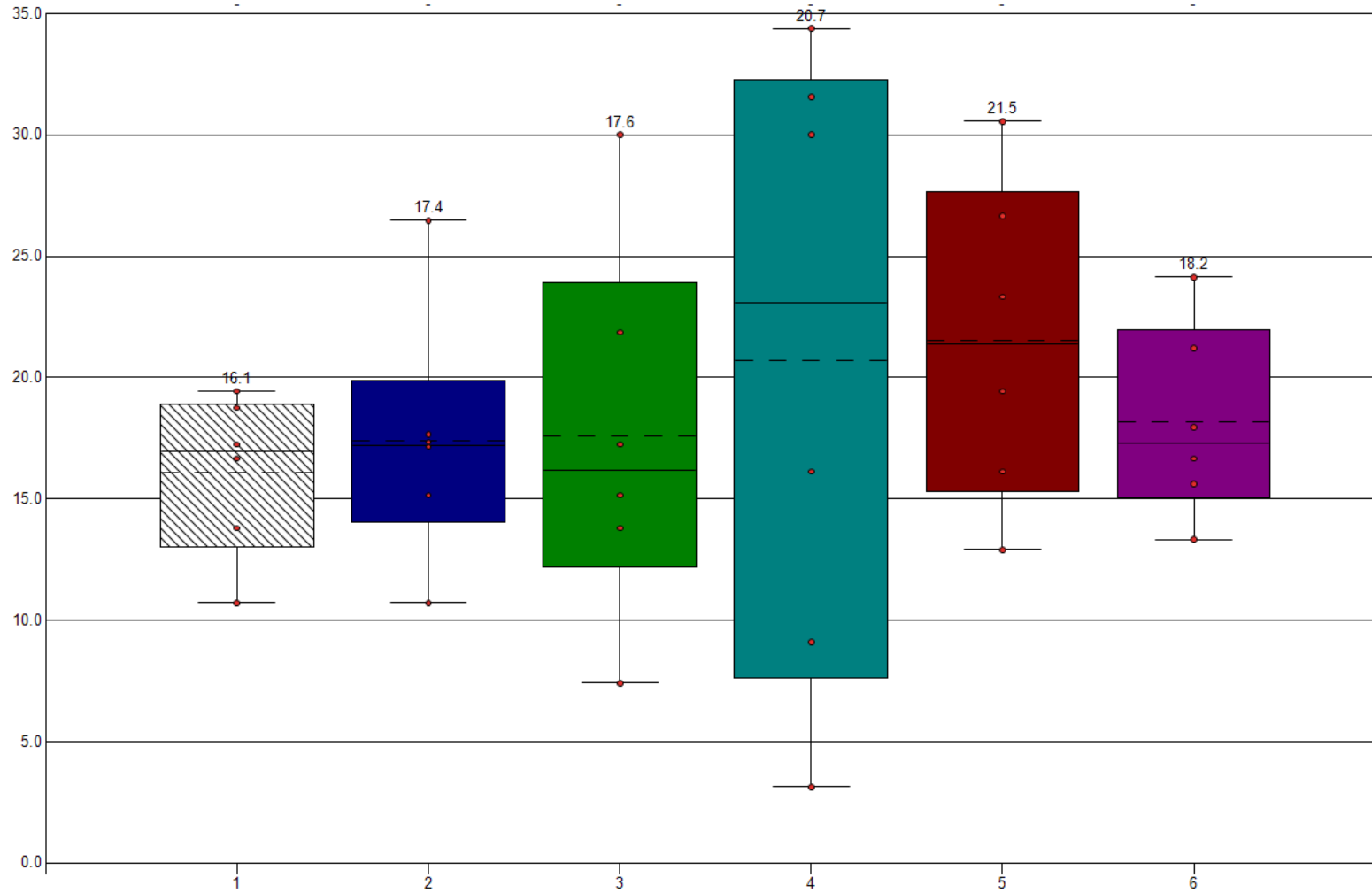


Color Description Options Treatment Description Level Description Assessment Description



Yuma Romaine - EF Polymer Trial - Fall 2025

Walkby Percentage



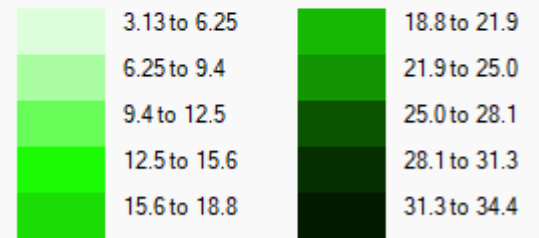
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- 3 Full Irrigation;Higher Rate EF Polymer
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- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

Assessment Map - Column 5 - Walkby Percentage

Navigation icons: zoom in, zoom out, pan, play, 100%, zoom reset, and a checked checkbox for "Always size to fit".



Color Description Options Treatment Description Level Description Assessment Description



University of Arizona

Testing EF Polymer water retention soil amendment at two application rates under a full and reduced irrigation level.

Trial ID: T-8 EF Polymer Romaine 2025
 Protocol ID: T-8 EF Polymer Romaine 2025 Location: Yuma Arizona Trial Year: 2025
 Project ID: T-8 EF Polymer Romaine 2025
 Study Director: Robert Masson Sponsor Contact:
 Investigator:

Rating Date	1	2	3	4	5	6
SE Group No.						
Rating Unit	KG/Plant	KG/Heart	CM/Heart	CM/Heart		
Rating Min/Max/Interval	0.01, 3, -	0.01, 3, -	1, 60, -			0.01, 2, -
Number of Subsamples	40	32	32	32	1	40
Description	Above Ground B>	Heart Weight	Circumference	Heart Length	Walkby Percenta>	Above Ground B>
Number of Decimals	3	3	1	1	1	1
Data Entry Date	Feb-24-2026	Feb-24-2026	Feb-24-2026	Feb-24-2026	Feb-24-2026	Feb-25-2026
Trt Treatment	1*	2*	3*	4*	5*	6*
No. Name						
Rate						
Rate Unit						
1 Full Irrigation UTC	0.642 -	0.388 -	35.5 -	24.2 -	16.1 -	0.6425 -
2 Full Irrigation Lower Rate EF Polymer 8 kg/a	0.621 -	0.367 -	33.7 -	23.8 -	17.4 -	0.6242 -
3 Full Irrigation Higher Rate EF Polymer 16 kg/a	0.603 -	0.338 -	33.4 -	23.8 -	17.6 -	0.6159 -
4 Reduced Irrigation UTC	0.630 -	0.363 -	34.6 -	23.7 -	20.7	0.6474 -
5 Reduced Irrigation Lower Rate EF Polymer 8 kg/a	0.609 -	0.346 -	34.4 -	23.4 -	21.5 -	0.6033 -
6 Reduced Irrigation Higher Rate EF Polymer 16 kg/a	0.621 -	0.353 -	34.9 -	22.9 -	18.2 -	0.6236 -
LSD P=.05	0.0760	0.0508	1.92	1.42	6.49	0.07769
Standard Deviation	0.0639	0.0427	1.61	1.20	5.39	0.06534
CV	10.29	11.9	4.69	5.05	29.68	10.43
Levene's F^	0.475	0.966	0.251	0.20	4.295*	0.963
Levene's Prob(F)	0.792	0.454	0.936	0.96	0.009*	0.456
Shapiro-Wilk^	0.9813	0.9749	0.9862	0.961	0.9747	0.961
P(Shapiro-Wilk)^	0.7881	0.5727	0.9235	0.2306	0.6749	0.2316
Skewness^	0.0413	-0.053	-0.3071	-0.4328	-0.1885	0.7312
P(Skewness)^	0.9169	0.8934	0.4393	0.2778	0.6621	0.0709
Kurtosis^	-0.5836	-0.6906	0.2625	-0.2322	-0.0708	1.5153
P(Kurtosis)^	0.4524	0.3747	0.7346	0.7642	0.9329	0.0565
Analyzed as	RCB	RCB	RCB	RCB	RCB	RCB
Replicate F	2.725	5.598	5.983	2.971	1.369	3.153
Replicate Prob(F)	0.0425	0.0014	0.0009	0.0307	0.2776	0.0242
Treatment F	0.283	1.051	1.372	0.789	0.845	0.382
Treatment Prob(F)	0.9180	0.4105	0.2682	0.5677	0.5130	0.8564

University of Arizona

Testing EF Polymer water retention soil amendment at two application rates under a full and reduced irrigation level.						
Trial ID: T-8 EF Polymer Romaine 2025						
Protocol ID: T-8 EF Polymer Romaine 2025 Location: Yuma Arizona Trial Year: 2025						
Project ID: T-8 EF Polymer Romaine 2025						
Study Director: Robert Masson Sponsor Contact:						
Investigator:						
Rating Date	7	8	9	10	11	12
SE Group No.					mol m ⁻²	mol m ⁻²
Rating Unit						
Rating Min/Max/Interval	0.01, 2, -	1, 100, -				
Number of Subsamples	32	32	32	1	1	1
Description	Hearts	Circumference	Heart Length	Walkby Percenta>	Stomtal conduct>	Transpiration
Number of Decimals					2	2
Data Entry Date	Feb-25-2026	Feb-25-2026	Feb-25-2026	Feb-25-2026	Mar-5-2026	Mar-5-2026
Trt Treatment	7*	8*	9*	10*	11*	12*
No. Name						
Rate						
Rate Unit						
1 Full Irrigation	0.3527 -	35.0 -	23.7 -	21.7665956550 -	0.22 -	4.63 -
UTC						
2 Full Irrigation	0.3758 -	33.9 -	23.6 -	21.0071609024 -	0.23 -	4.90 -
Lower Rate EF Polymer						
8 kg/a						
3 Full Irrigation	0.3426 -	34.2 -	23.6 -	24.0882184122 -	0.18 -	4.24 -
Higher Rate EF Polymer						
16 kg/a						
4 Reduced Irrigation	0.3634 -	34.8 -	23.5 -	24.1912267643 -	0.17 -	3.98 -
UTC						
5 Reduced Irrigation	0.3534 -	34.6 -	23.5 -	25.4659523666 -	0.18 -	4.11 -
Lower Rate EF Polymer						
8 kg/a						
6 Reduced Irrigation	0.3488 -	34.9 -	23.4 -	24.4845109951 -	0.19 -	4.31
Higher Rate EF Polymer						
16 kg/a						
LSD P= .05	0.05455	1.46	1.08	7.87269155473	0.063	1.354
Standard Deviation	0.04588	1.23	0.91	6.62085288322	0.053	1.124
CV	12.88	3.56	3.85	28.17	27.2	25.71
Levene's F ^A	1.051	0.896	0.23	1.065	1.066	0.633
Levene's P Prob(F)	0.407	0.496	0.946	0.399	0.399	0.644
Shapiro-Wilk ^A	0.9712	0.9846	0.9687	0.9589	0.9634	0.9525
P(Shapiro-Wilk) ^A	0.4587	0.8861	0.3902	0.1981	0.2732	0.1966
Skewness ^A	-0.6004	-0.2358	-0.2005	0.4455	-0.1405	0.297
P(Skewness) ^A	0.1351	0.5519	0.6127	0.2641	0.7225	0.4922
Kurtosis ^A	0.676	-0.286	-0.3791	-0.18	1.65*	1.1094
P(Kurtosis) ^A	0.3848	0.7118	0.6247	0.8161	0.0387*	0.1932
Analyzed as	RCB	RCB	RCB	RCB	RCB	RCB
Replicate F	3.439	12.250	4.556	9.442	0.774	1.254
Replicate Prob(F)	0.0168	0.0001	0.0043	0.0001	0.5778	0.3218
Treatment F	0.397	0.707	0.078	0.407	1.124	0.698
Treatment Prob(F)	0.8463	0.6236	0.9951	0.8391	0.3734	0.6024

University of Arizona

Testing EF Polymer water retention soil amendment at two application rates under a full and reduced irrigation level.

Trial ID: T-8 EF Polymer Romaine 2025
 Protocol ID: T-8 EF Polymer Romaine 2025 Location: Yuma Arizona Trial Year: 2025
 Project ID: T-8 EF Polymer Romaine 2025
 Study Director: Robert Masson Sponsor Contact:
 Investigator:

Rating Date					Dec-16-2025	Dec-16-2025	
SE Group No.	13	14	15	16	17	18	
Rating Unit	kPa	°C	°C	µg m-2			
Rating Min/Max/Interval							
Number of Subsamples	1	1	1	1	3	3	
Description	VPDleaf	air temperature	Canopy Temperat>	Chlorophyll con>	Soil VWC %	Soil Temp °F	
Number of Decimals	2	2	2	2	1	1	
Data Entry Date	Mar-5-2026	Mar-5-2026	Mar-5-2026	Mar-5-2026	Mar-5-2026	Mar-5-2026	
Trt Treatment	Rate						
No. Name	Rate Unit						
1 Full Irrigation UTC		2.32	24.73 -	24.02	34.57 -	26.3 -	67.8 -
2 Full Irrigation Lower Rate EF Polymer	8 kg/a	2.32 -	24.74 -	23.97 -	34.85 -	27.9 -	67.0 -
3 Full Irrigation Higher Rate EF Polymer	16 kg/a	2.52 -	24.66 -	24.99 -	33.05 -	28.6 -	67.1 -
4 Reduced Irrigation UTC		2.49 -	24.76 -	24.76 -	34.13 -	29.8 -	70.0
5 Reduced Irrigation Lower Rate EF Polymer	8 kg/a	2.55 -	24.76 -	25.15 -	34.33 -	29.1 -	67.7 -
6 Reduced Irrigation Higher Rate EF Polymer	16 kg/a	2.41 -	24.74 -	24.43 -	34.85 -	27.8 -	68.1 -
LSD P=.05		0.187	0.492	0.824	4.053	3.05	2.04
Standard Deviation		0.155	0.414	0.684	3.409	1.68	1.08
CV		6.32	1.67	2.77	9.94	5.94	1.6
Levene's F^		1.054	0.105	1.433	0.465	0.712	0.248
Levene's Prob(F)		0.40	0.99	0.252	0.799	0.626	0.905
Shapiro-Wilk^		0.9827	0.7383*	0.9837	0.975	0.9755	0.9481
P(Shapiro-Wilk)^		0.8923	0.0*	0.9134	0.5755	0.8928	0.4957
Skewness^		0.3144	-1.3954*	-0.3497	-0.1851	-0.1632	-0.1441
P(Skewness)^		0.4673	0.0011*	0.4194	0.6402	0.7645	0.8075
Kurtosis^		0.2403	0.5357	-0.1165	-0.4765	0.1868	-0.8964
P(Kurtosis)^		0.7749	0.4901	0.8897	0.5391	0.8593	0.4372
Analyzed as		RCB	RCB	RCB	RCB	RCB	RCB
Replicate F		1.529	0.106	2.353	0.165	1.896	3.264
Replicate Prob(F)		0.2256	0.9900	0.0781	0.9730	0.2004	0.0919
Treatment F		2.226	0.051	2.855	0.234	1.549	0.588
Treatment Prob(F)		0.1026	0.9982	0.0506	0.9438	0.2596	0.6808

University of Arizona

Testing EF Polymer water retention soil amendment at two application rates under a full and reduced irrigation level.						
Trial ID: T-8 EF Polymer Romaine 2025						
Protocol ID: T-8 EF Polymer Romaine 2025 Location: Yuma Arizona Trial Year: 2025						
Project ID: T-8 EF Polymer Romaine 2025						
Study Director: Robert Masson Sponsor Contact:						
Investigator:						
Rating Date	Dec-16-2025	Dec-16-2025	Dec-16-2025	Jan-22-2026	Jan-22-2026	Jan-22-2026
SE Group No.	19	20	21	22	23	24
Rating Unit						
Rating Min/Max/Interval						
Number of Subsamples	3	3	3	3	3	3
Description	Soil E.C uS/cm	Ambient Tempera>	Relative Humidi>	Soil VWC %	Soil Temp °F	Soil E.C uS/cm
Number of Decimals	1	1	1	1	1	1
Data Entry Date	Mar-5-2026	Mar-5-2026	Mar-5-2026	Mar-5-2026	Mar-5-2026	Mar-5-2026
Trt Treatment	19*	20*	21*	22*	23*	24*
No. Name		dAA				
Rate						
Rate Unit						
1 Full Irrigation UTC	791.8 -	72.4 -	36.5 -	22.0 -	66.3 -	656.2 -
2 Full Irrigation Lower Rate EF Polymer 8 kg/a	823.7 -	72.6 -	36.7 -	21.1 -	66.3 -	614.4 -
3 Full Irrigation Higher Rate EF Polymer 16 kg/a	874.7 -	72.0 -	36.7 -	23.1 -	66.2 -	707.9 -
4 Reduced Irrigation UTC	895.0 -	74.2 -	35.7	20.0 -	66.7 -	599.4 -
5 Reduced Irrigation Lower Rate EF Polymer 8 kg/a	842.8 -	69.8 -	36.4 -	18.6 -	66.8 -	514.8 -
6 Reduced Irrigation Higher Rate EF Polymer 16 kg/a	816.2 -	68.4 -	36.3 -	20.7 -	66.5 -	667.0 -
LSD P=.05	174.71	7.35 - 7.47	0.44	5.16	0.59	272.45
Standard Deviation	96.03	2.58t	0.23	2.84	0.33	149.76
CV	11.42	4.47t	0.64	13.56	0.49	23.9
Levene's F^	0.486	0.263	0.42	0.583	0.858	0.818
Levene's Prob(F)	0.78	0.925	0.791	0.713	0.536	0.56
Shapiro-Wilk^	0.9493	0.9289	0.9907	0.9794	0.9744	0.9747
P(Shapiro-Wilk)^	0.4141	0.1857	0.9996	0.9433	0.875	0.8792
Ske wness^	0.0245	-0.5757	0.2147	0.0901	-0.0782	-0.3301
P(Ske wness)^	0.9641	0.298	0.7169	0.8685	0.8857	0.5463
Kurtosis^	0.1192	0.3443	-0.2217	-0.5708	-0.0978	0.5036
P(Kurtosis)^	0.9099	0.7442	0.846	0.5895	0.9261	0.6337
Analyzed as	RCB	RCB	RCB	RCB	RCB	RCB
Replicate F	0.312	0.583	4.489	0.785	93.149	0.491
Replicate Prob(F)	0.7388	0.5764	0.0493	0.4822	0.0001	0.6262
Treatment F	0.481	0.790	1.802	0.919	1.782	0.602
Treatment Prob(F)	0.7833	0.5802	0.2218	0.5068	0.2043	0.7003

University of Arizona

Testing EF Polymer water retention soil amendment at two application rates under a full and reduced irrigation level.						
Trial ID: T-8 EF Polymer Romaine 2025						
Protocol ID: T-8 EF Polymer Romaine 2025 Location: Yuma Arizona Trial Year: 2025						
Project ID: T-8 EF Polymer Romaine 2025						
Study Director: Robert Masson Sponsor Contact:						
Investigator:						
Rating Date		Jan-22-2026	Jan-22-2026			
SE Group No.		25	26	27	28	29
Rating Unit						
Rating Min/Max/Interval						
Number of Subsamples		3	3	2	2	2
Description		Ambient Tempera>	Relative Humidi>	Water Content	Pore Water EC	Bulk EC
Number of Decimals		1	1	1	1	2
Data Entry Date		Mar-5-2026	Mar-5-2026	Mar-5-2026	Mar-5-2026	Mar-5-2026
Trt Treatment	Rate	25*	26*	27*	28*	29*
No. Name	Rate Unit					30*
1	Full Irrigation UTC	68.8 -	36.9 -	29.3 -	3.0 -	0.24 -
2	Full Irrigation Lower Rate EF Polymer 8 kg/a	68.7 -	36.9 -	28.5 -	2.8 -	0.21 -
3	Full Irrigation Higher Rate EF Polymer 16 kg/a	69.1 -	36.8 -	28.5 -	3.2 -	0.23 -
4	Reduced Irrigation UTC	68.5 -	37.1 -	27.8 -	2.9 -	0.20 -
5	Reduced Irrigation Lower Rate EF Polymer 8 kg/a	67.5	37.0 -	28.3 -	2.2 -	0.17 -
6	Reduced Irrigation Higher Rate EF Polymer 16 kg/a	68.7 -	37.0 -	28.5 -	3.2 -	0.23 -
LSD P= .05		1.07	0.50	2.87	1.27	0.112
Standard Deviation		0.57	0.28	1.58	0.70	0.062
CV		0.83	0.75	5.54	24.37	29.24
Levene's F^		1.293	0.441	1.155	0.688	0.522
Levene's Prob(F)		0.336	0.812	0.385	0.642	0.755
Shapiro-Wilk^		0.9202	0.951	0.9564	0.9474	0.9416
P(Shapiro-Wilk)^		0.1938	0.4405	0.5348	0.3863	0.3082
Ske wness^		-0.4613	0.5538	0.2797	0.398	0.8095
P(Ske wness)^		0.4397	0.3162	0.6087	0.4682	0.1496
Kurtosis^		0.8844	0.8319	0.5872	-0.4339	0.6819
P(Kurtosis)^		0.4433	0.4338	0.5789	0.6811	0.5199
Analyzed as		RCB	RCB	RCB	RCB	RCB
Replicate F		5.890	52.098	0.619	0.528	0.484
Replicate Prob(F)		0.0268	0.0001	0.5580	0.6055	0.6302
Treatment F		0.444	0.447	0.281	0.762	0.503
Treatment Prob(F)		0.7744	0.8066	0.9131	0.5972	0.7683

University of Arizona

Testing EF Polymer water retention soil amendment at two application rates under a full and reduced irrigation level.

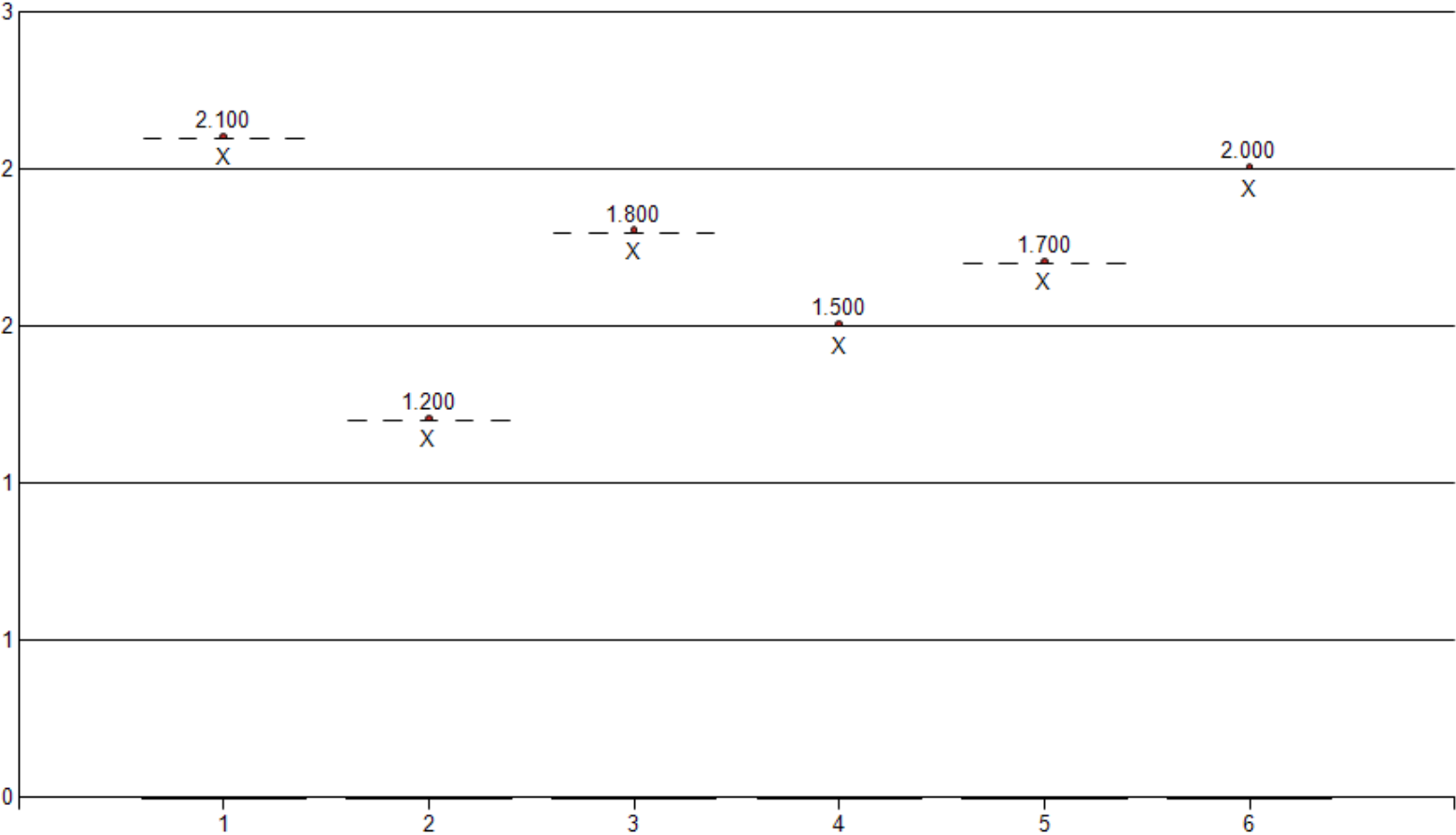
Trial ID: T-8 EF Polymer Romaine 2025
 Protocol ID: T-8 EF Polymer Romaine 2025 Location: Yuma Arizona Trial Year: 2025
 Project ID: T-8 EF Polymer Romaine 2025
 Study Director: Robert Masson Sponsor Contact:
 Investigator:

Rating Date	Jan-22-2026	Jan-22-2026				
SE Group No.	25	26	27	28	29	30
Rating Unit						
Rating Min/Max/Interval						
Number of Subsamples	3	3	2	2	2	2
Description	Ambient Tempera>	Relative Humidi>	Water Content	Pore Water EC	Bulk EC	Air Surface Temp
Number of Decimals	1	1	1	1	2	1
Data Entry Date	Mar-5-2026	Mar-5-2026	Mar-5-2026	Mar-5-2026	Mar-5-2026	Mar-5-2026
Trt Treatment	25*	26*	27*	28*	29*	30*
No. Name						
Rate						
Rate Unit						
1 Full Irrigation UTC	68.8 -	36.9 -	29.3 -	3.0 -	0.24 -	78.0 -
2 Full Irrigation Lower Rate EF Polymer 8 kg/a	68.7 -	36.9 -	28.5 -	2.8 -	0.21 -	77.0
3 Full Irrigation Higher Rate EF Polymer 16 kg/a	69.1 -	36.8 -	28.5 -	3.2 -	0.23 -	77.8 -
4 Reduced Irrigation UTC	68.5 -	37.1 -	27.8 -	2.9 -	0.20 -	77.7 -
5 Reduced Irrigation Lower Rate EF Polymer 8 kg/a	67.5	37.0 -	28.3 -	2.2 -	0.17 -	77.5 -
6 Reduced Irrigation Higher Rate EF Polymer 16 kg/a	68.7 -	37.0 -	28.5 -	3.2 -	0.23 -	77.8 -
LSD P=.05	1.07	0.50	2.87	1.27	0.112	0.62
Standard Deviation	0.57	0.28	1.58	0.70	0.062	0.33
CV	0.83	0.75	5.54	24.37	29.24	0.42
Levene's F^	1.293	0.441	1.155	0.688	0.522	0.473
Levene's Prob(F)	0.336	0.812	0.385	0.642	0.755	0.755
Shapiro-Wilk^	0.9202	0.951	0.9564	0.9474	0.9416	0.9585
P(Shapiro-Wilk)^	0.1938	0.4405	0.5348	0.3863	0.3082	0.6656
Skewness^	-0.4613	0.5538	0.2797	0.398	0.8095	0.0535
P(Skewness)^	0.4397	0.3162	0.6087	0.4682	0.1496	0.9278
Kurtosis^	0.8844	0.8319	0.5872	-0.4339	0.6819	-0.7997
P(Kurtosis)^	0.4433	0.4338	0.5789	0.6811	0.5199	0.4873
Analyzed as	RCB	RCB	RCB	RCB	RCB	RCB
Replicate F	5.890	52.098	0.619	0.528	0.484	2.923
Replicate Prob(F)	0.0268	0.0001	0.5580	0.6055	0.6302	0.1114
Treatment F	0.444	0.447	0.281	0.762	0.503	1.000
Treatment Prob(F)	0.7744	0.8066	0.9131	0.5972	0.7683	0.4609

Soil Samples (End of Trial)

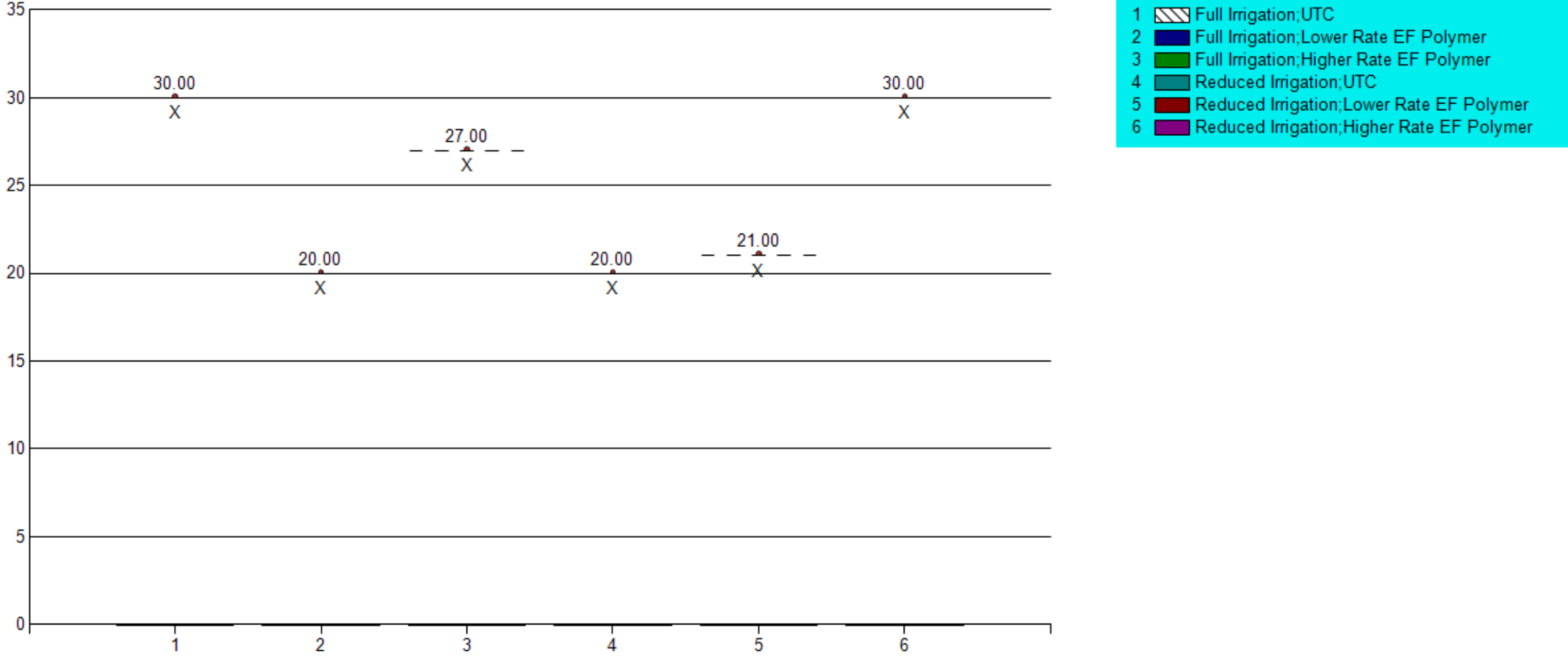
Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples

OM

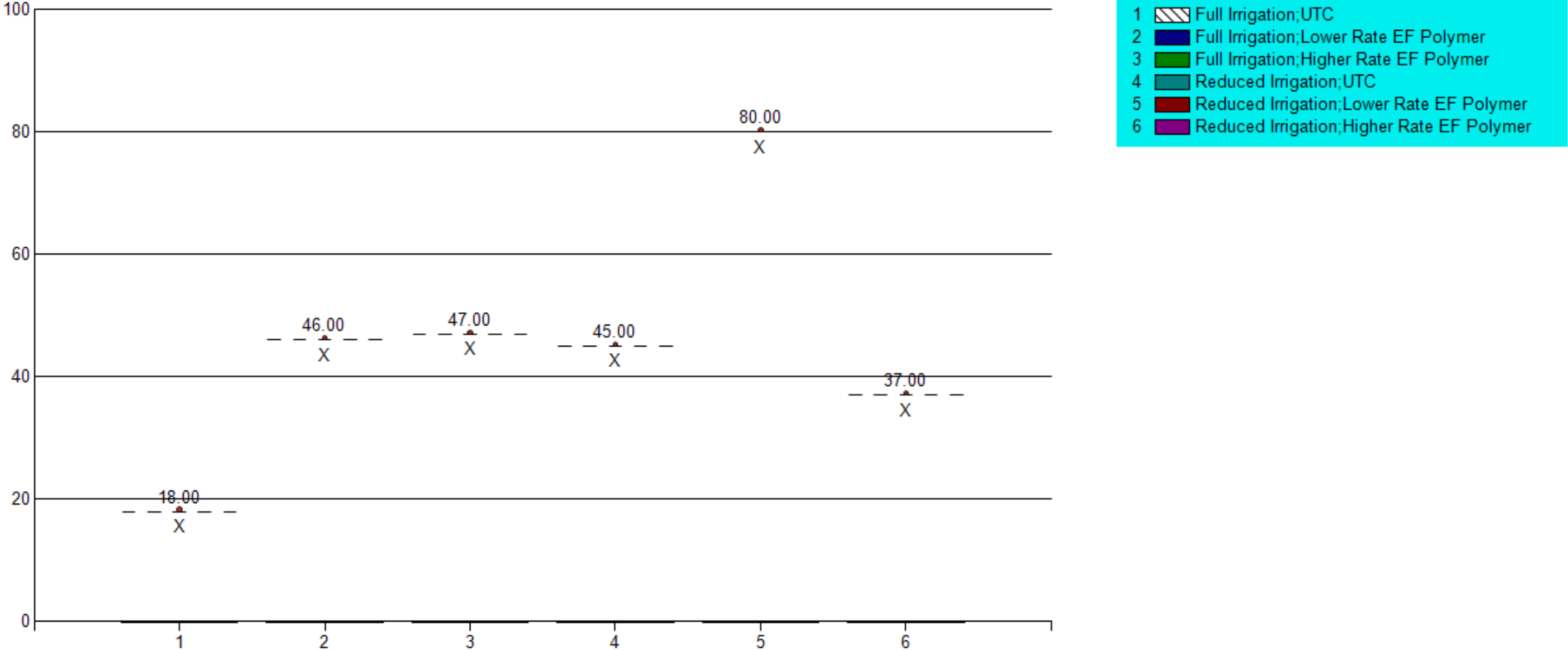


- 1 Full Irrigation;UTC
- 2 Full Irrigation;Lower Rate EF Polymer
- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples



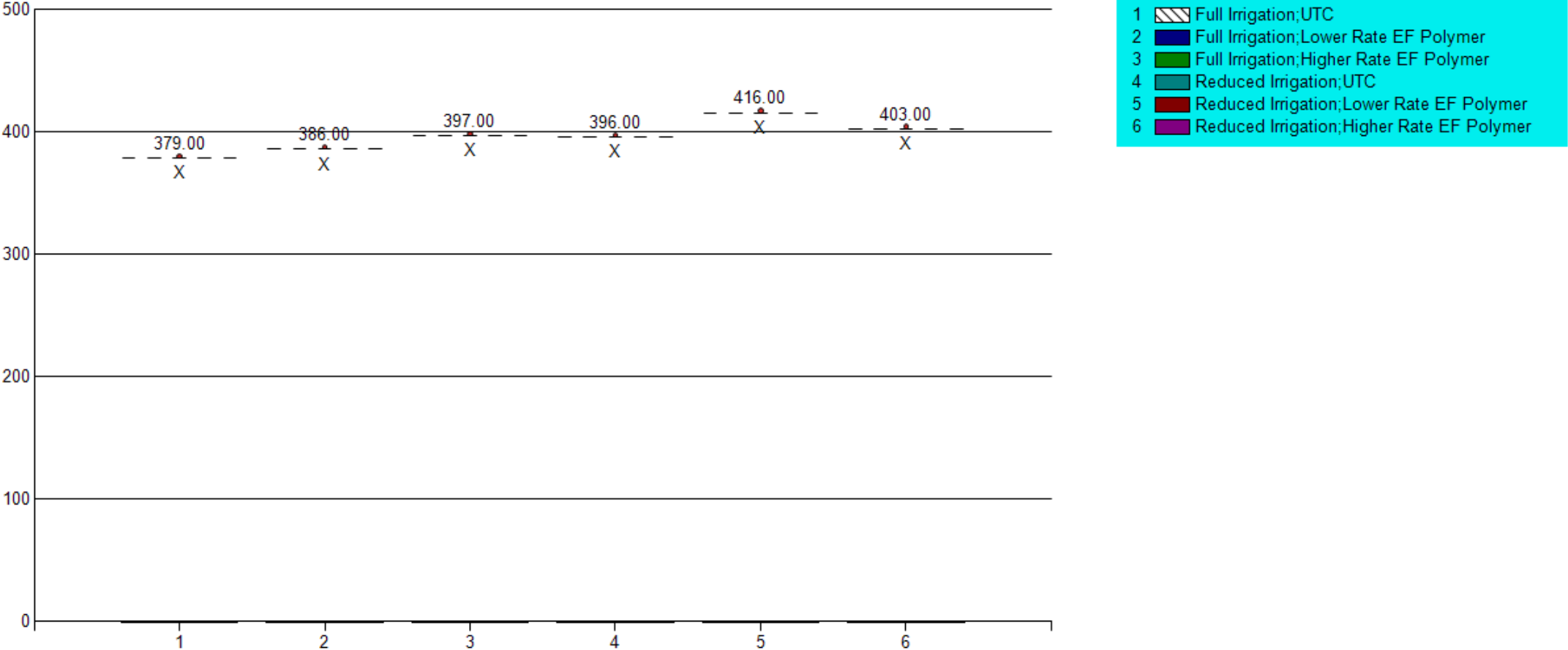
Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples



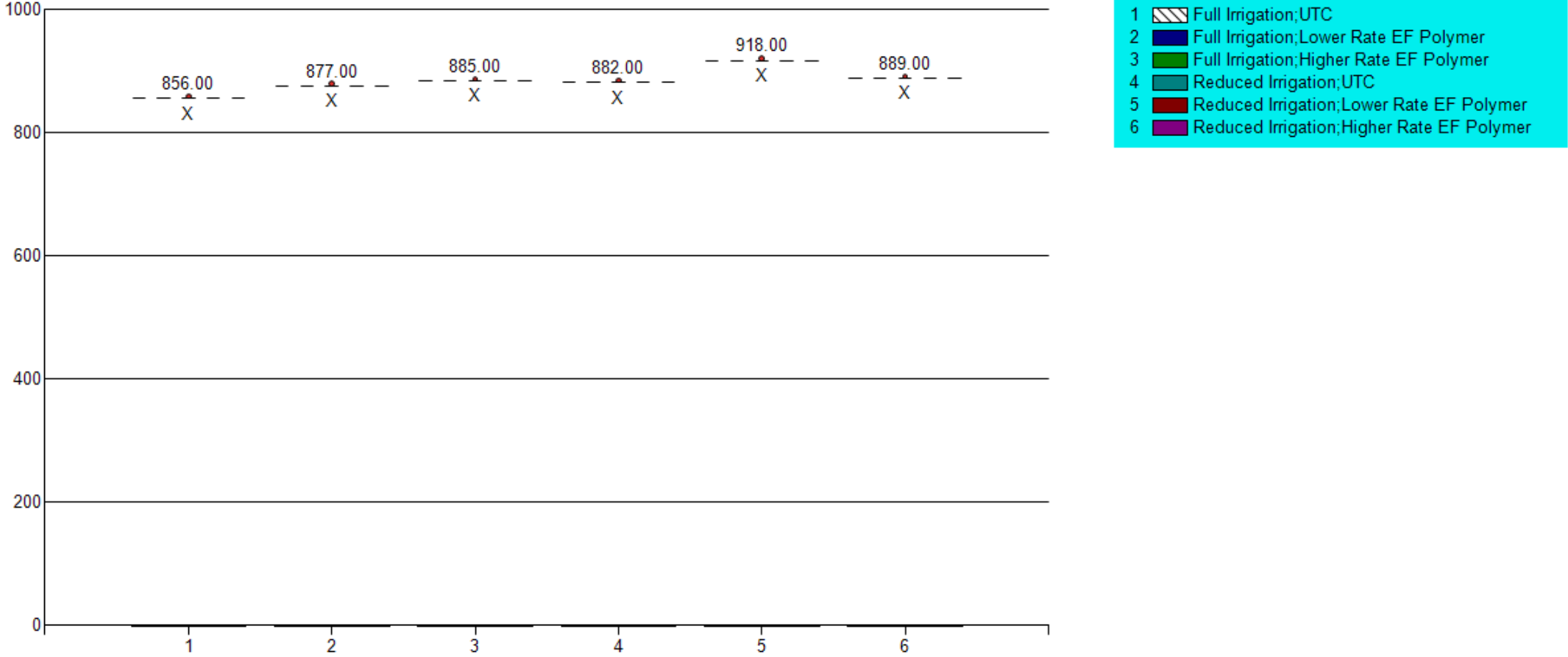
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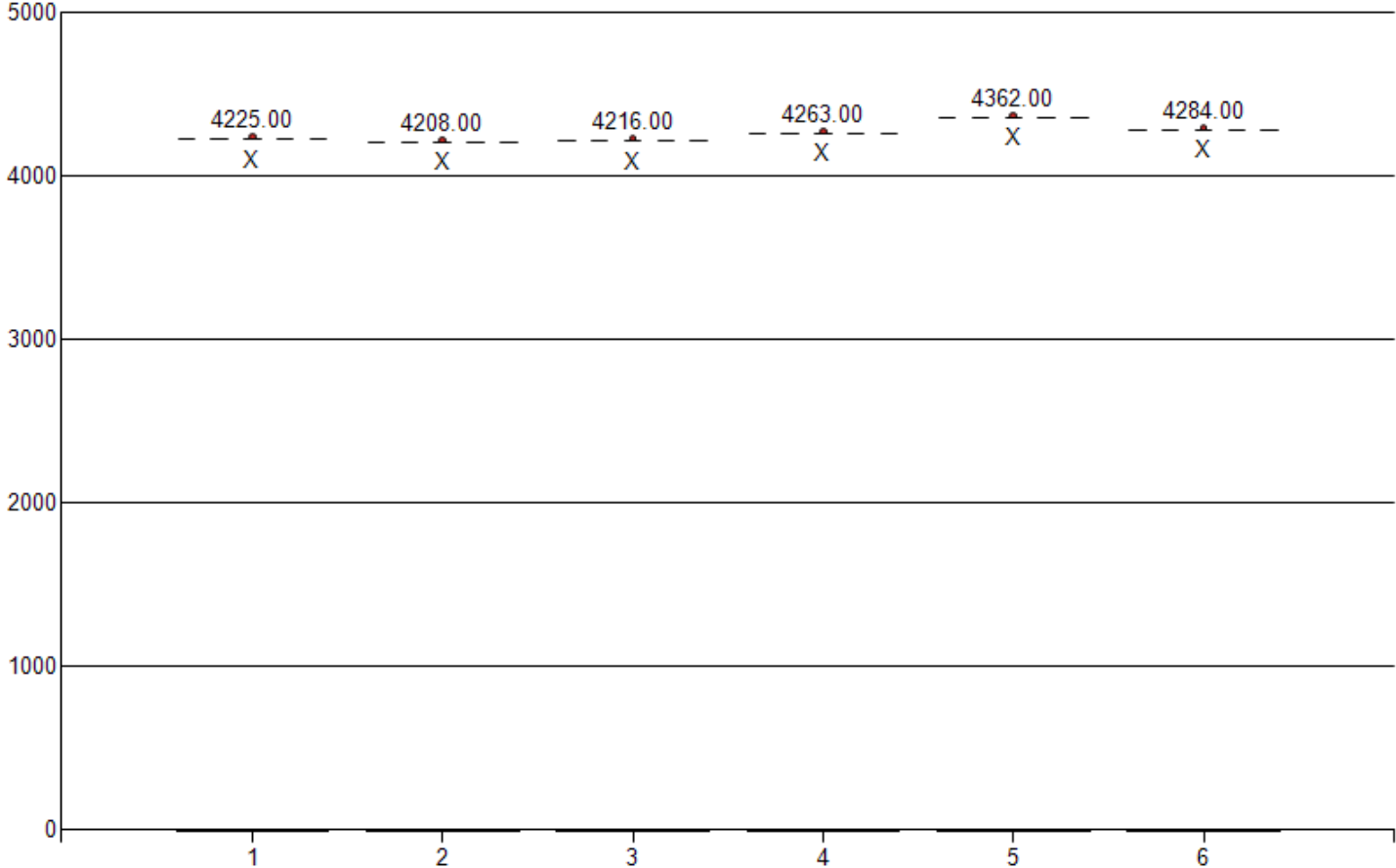
Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples



Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples



Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples

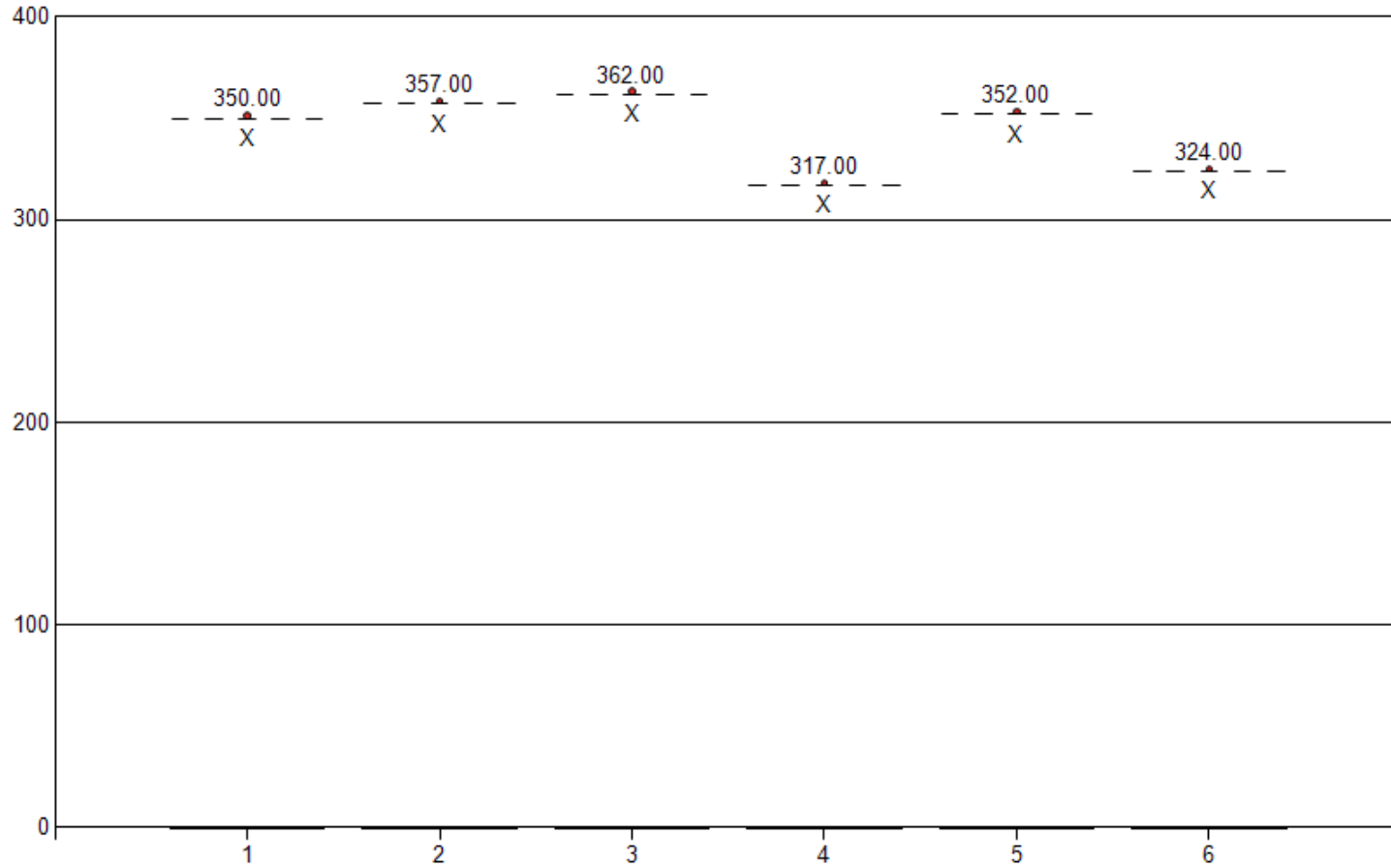


- 1 Full Irrigation;UTC
- 2 Full Irrigation;Lower Rate EF Polymer
- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

Ca

Ca

Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples



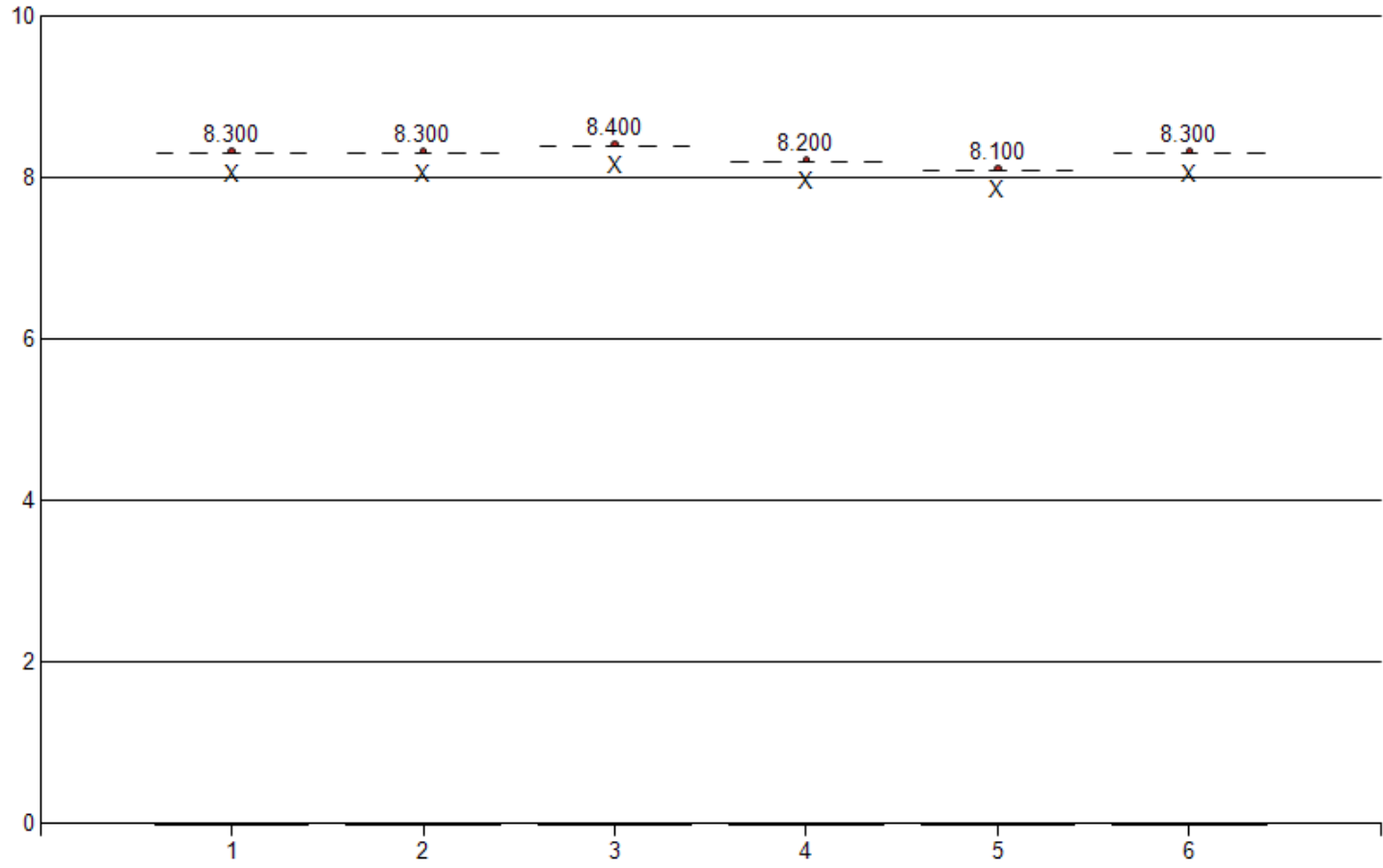
- 1 Full Irrigation;UTC
- 2 Full Irrigation;Lower Rate EF Polymer
- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

Na

Na

Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples

pH

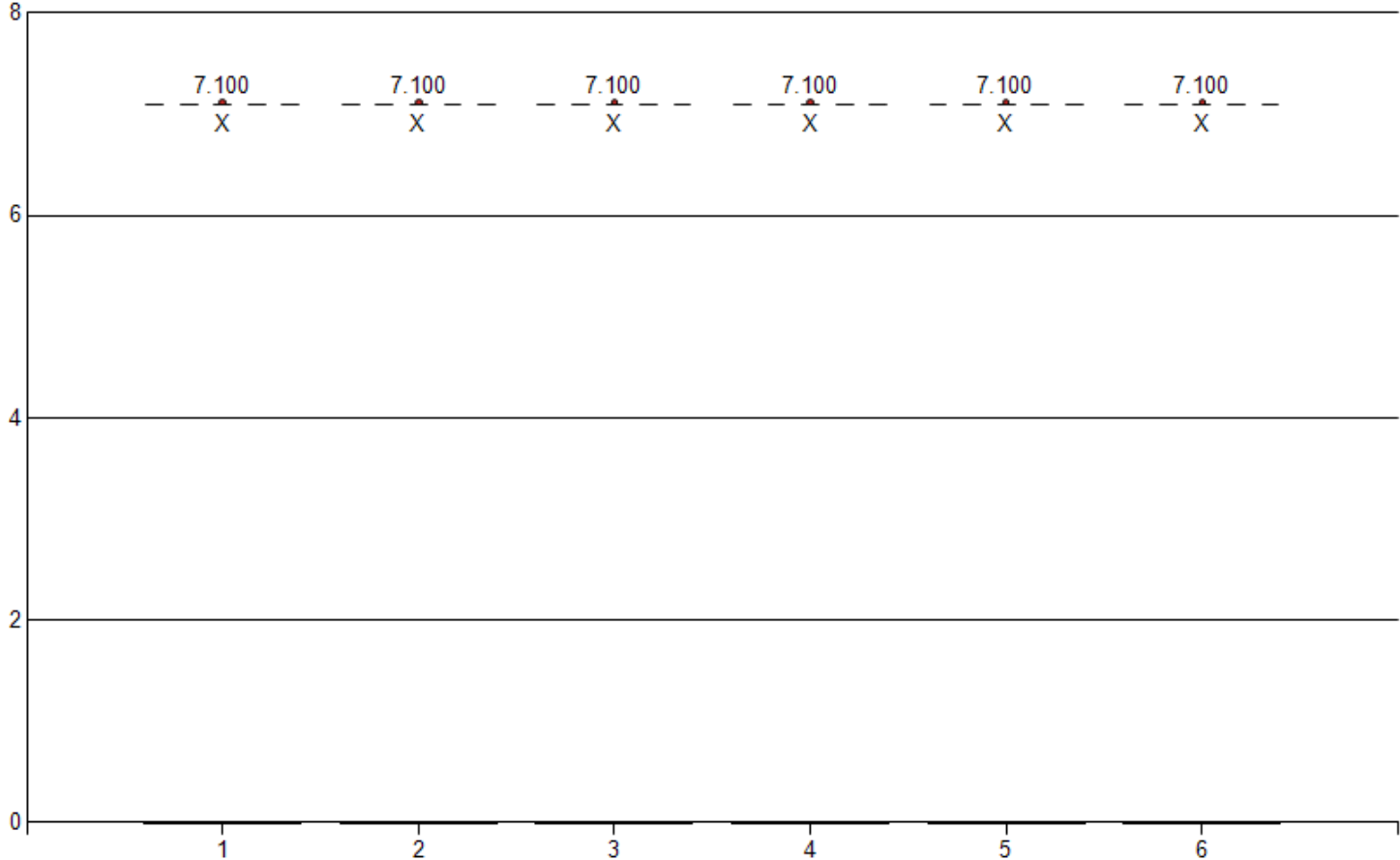








- 1 Full Irrigation;UTC
- 2 Full Irrigation;Lower Rate EF Polymer
- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

pH

Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples

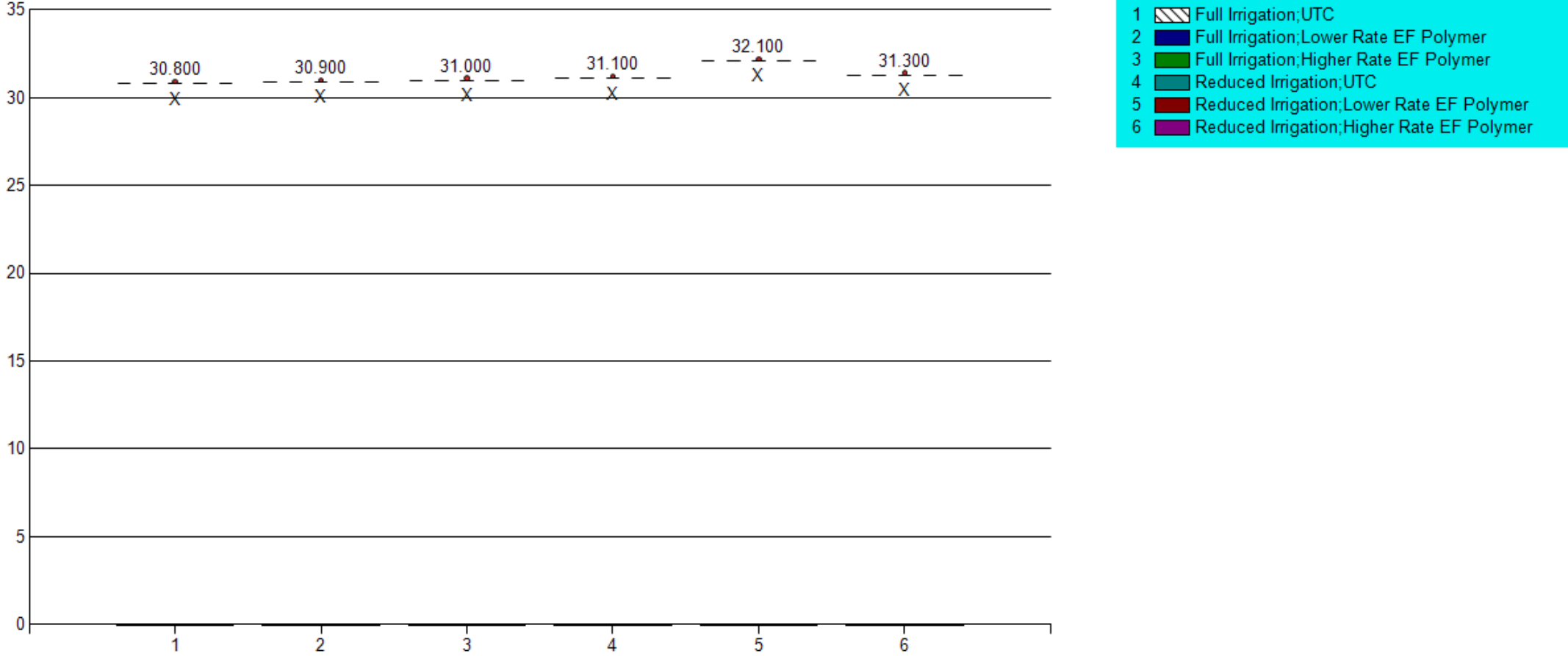
BpH



- 1  Full Irrigation;UTC
- 2  Full Irrigation;Lower Rate EF Polymer
- 3  Full Irrigation;Higher Rate EF Polymer
- 4  Reduced Irrigation;UTC
- 5  Reduced Irrigation;Lower Rate EF Polymer
- 6  Reduced Irrigation;Higher Rate EF Polymer

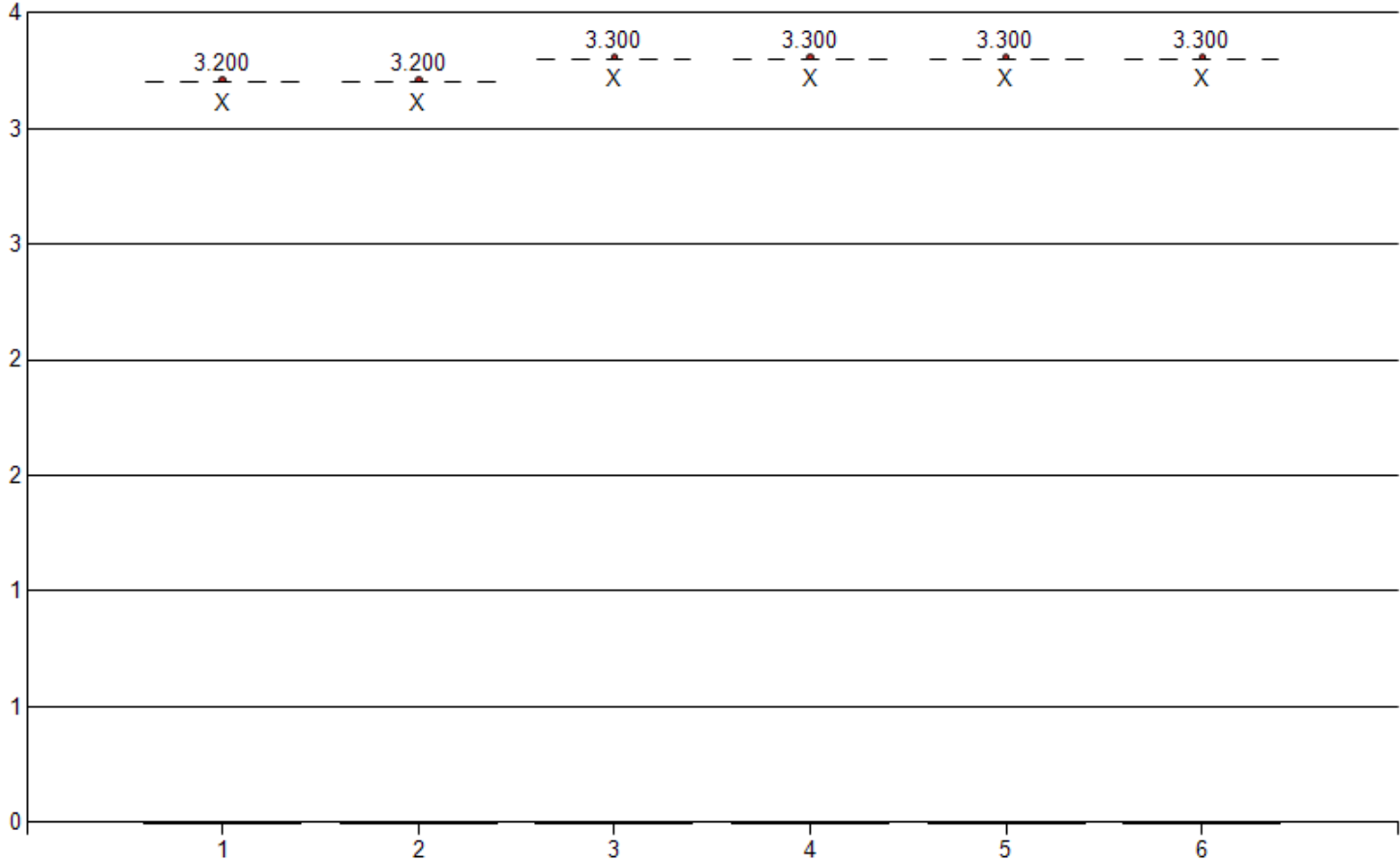
BpH

Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples



Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples

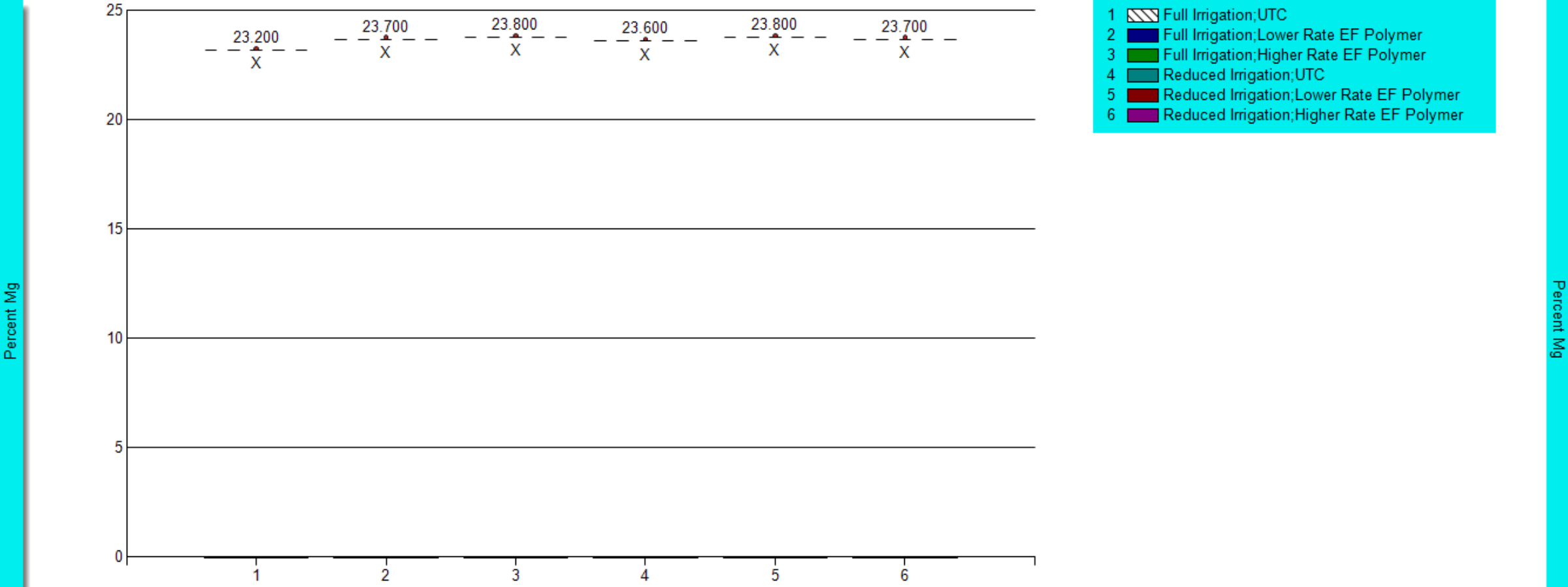
Percent K



- 1 Full Irrigation;UTC
- 2 Full Irrigation;Lower Rate EF Polymer
- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

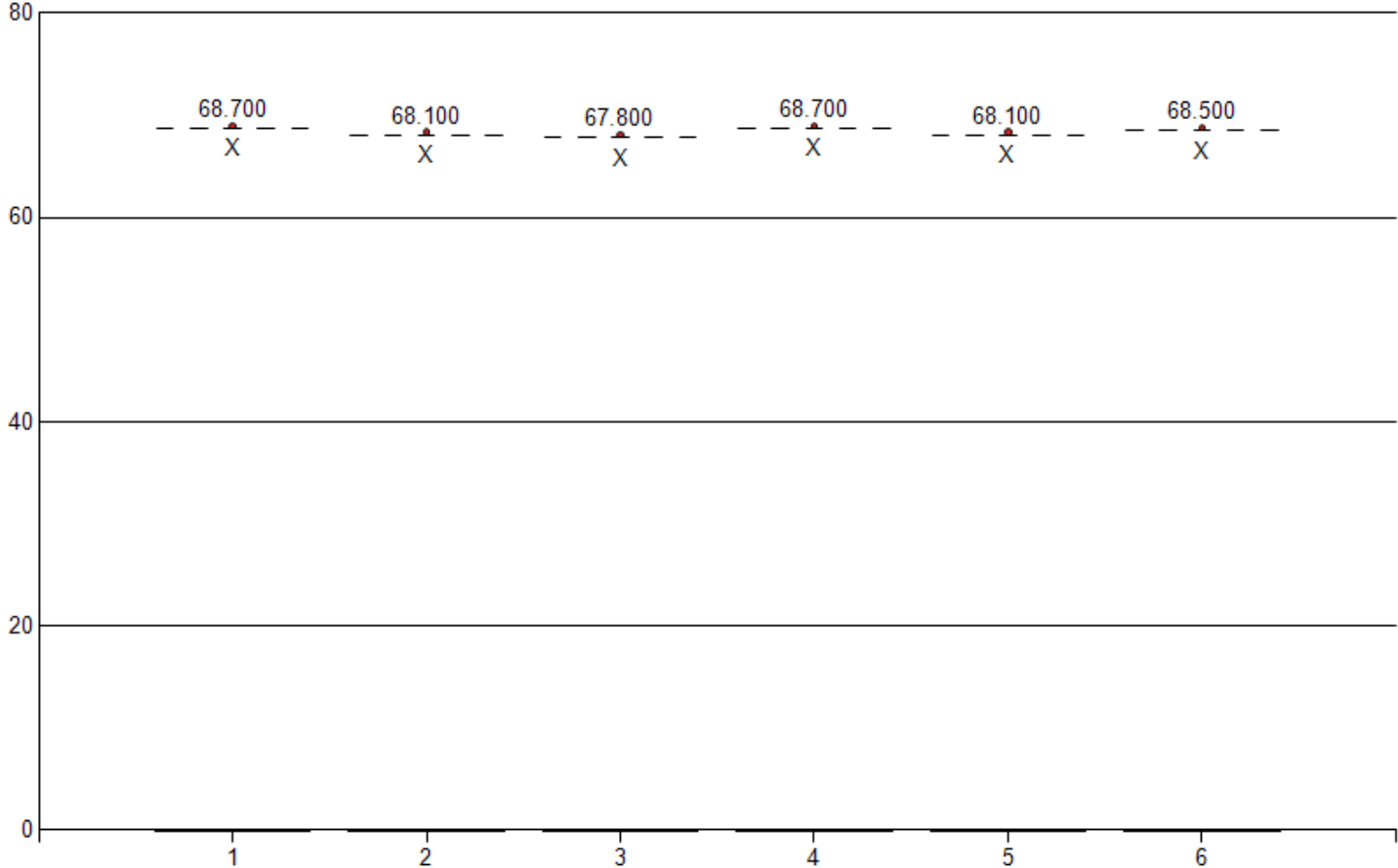
Percent K

Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples



Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples

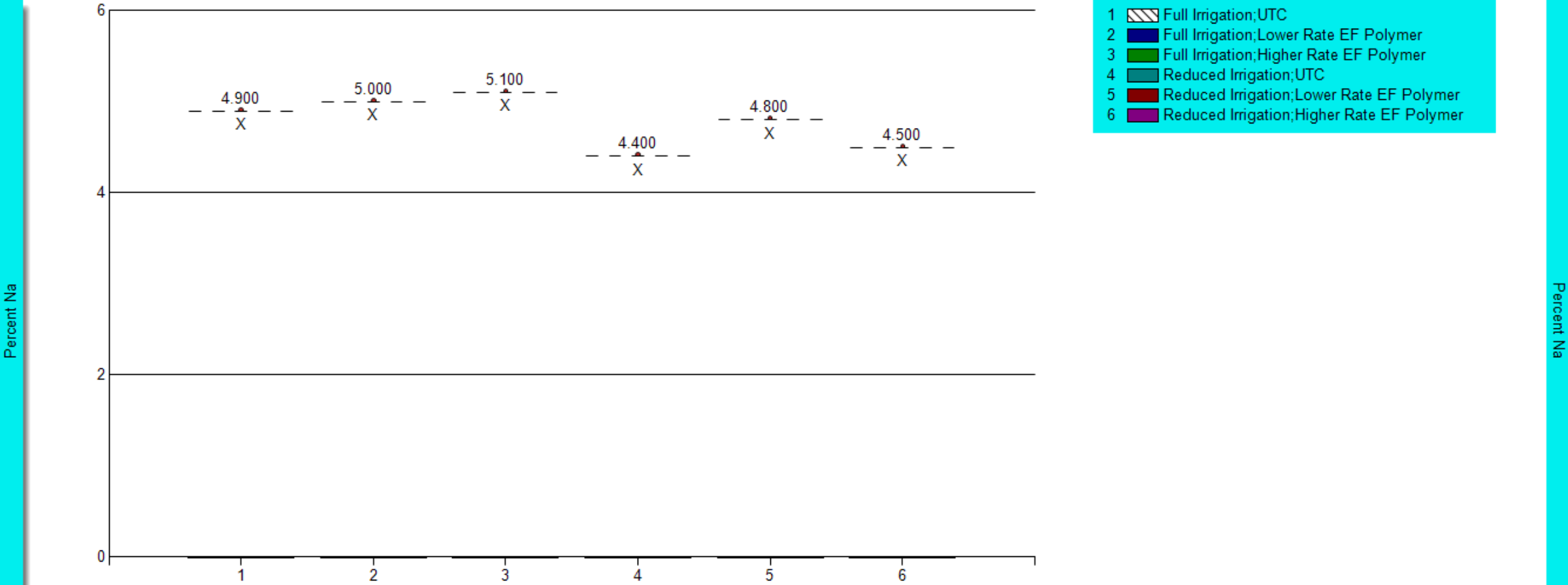
Percent Ca



- 1 Full Irrigation;UTC
- 2 Full Irrigation;Lower Rate EF Polymer
- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
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- 6 Reduced Irrigation;Higher Rate EF Polymer

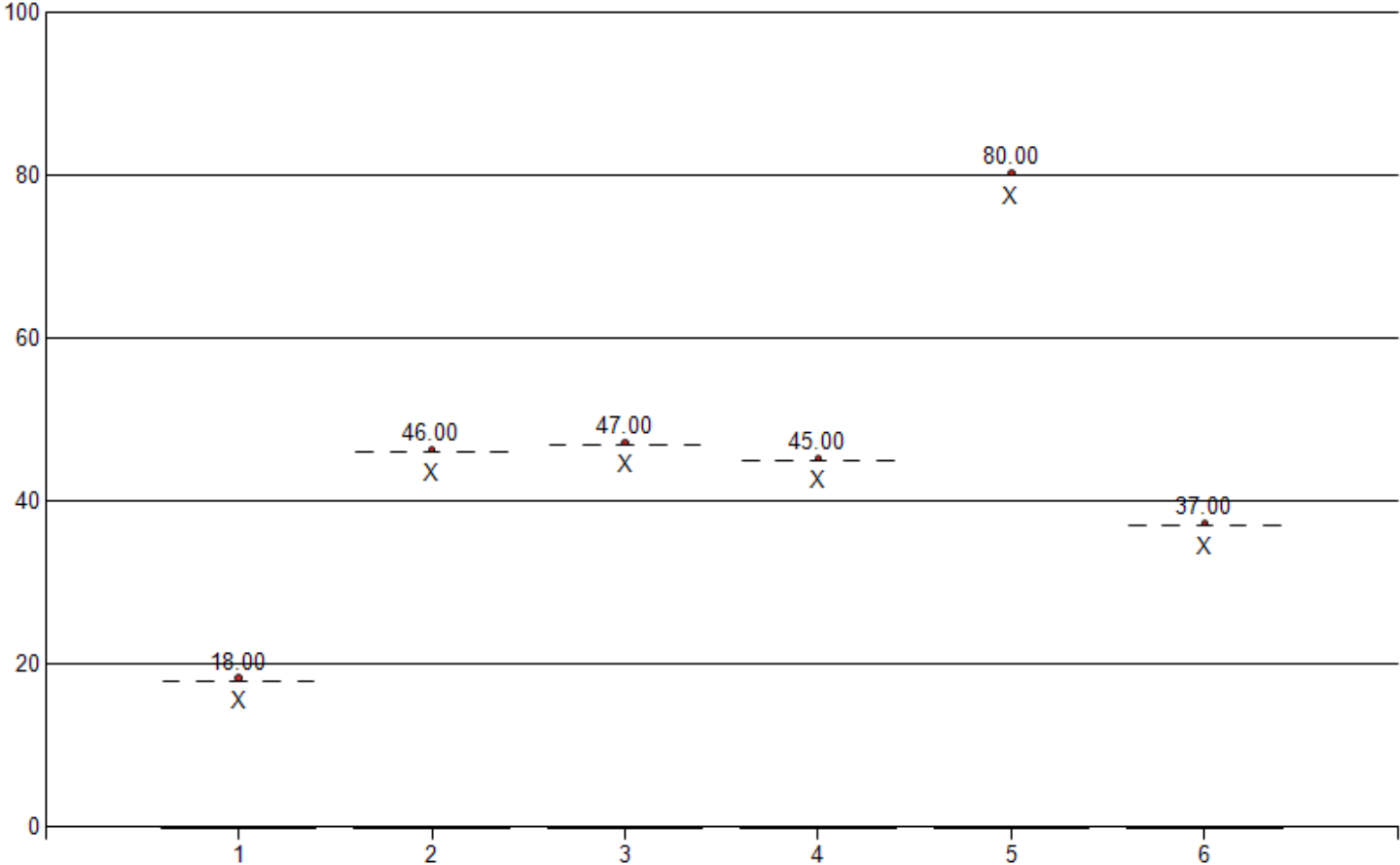
Percent Ca

Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples



Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples

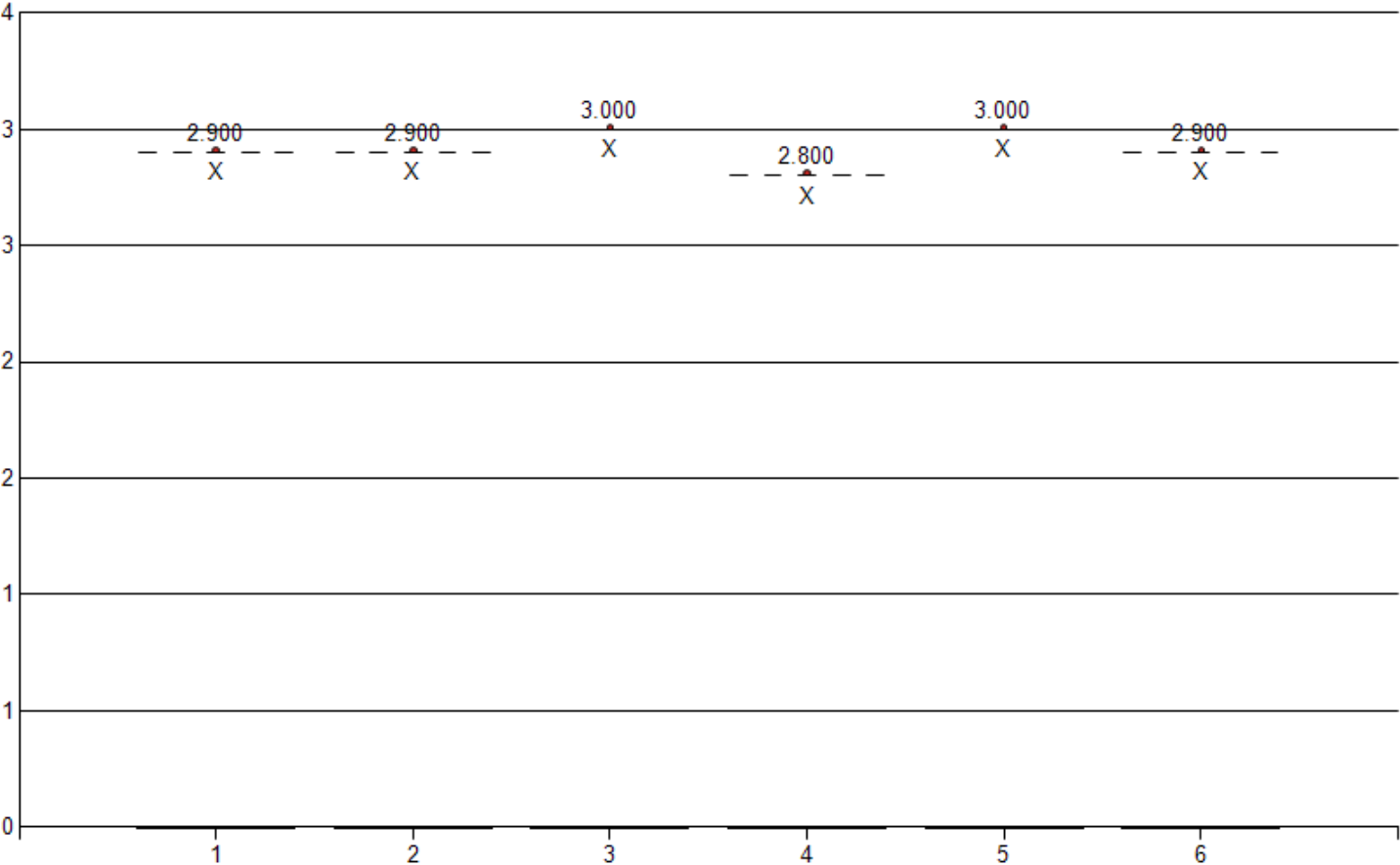
Bicarb



- 1 Full Irrigation;UTC
- 2 Full Irrigation;Lower Rate EF Polymer
- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
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Bicarb

Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples



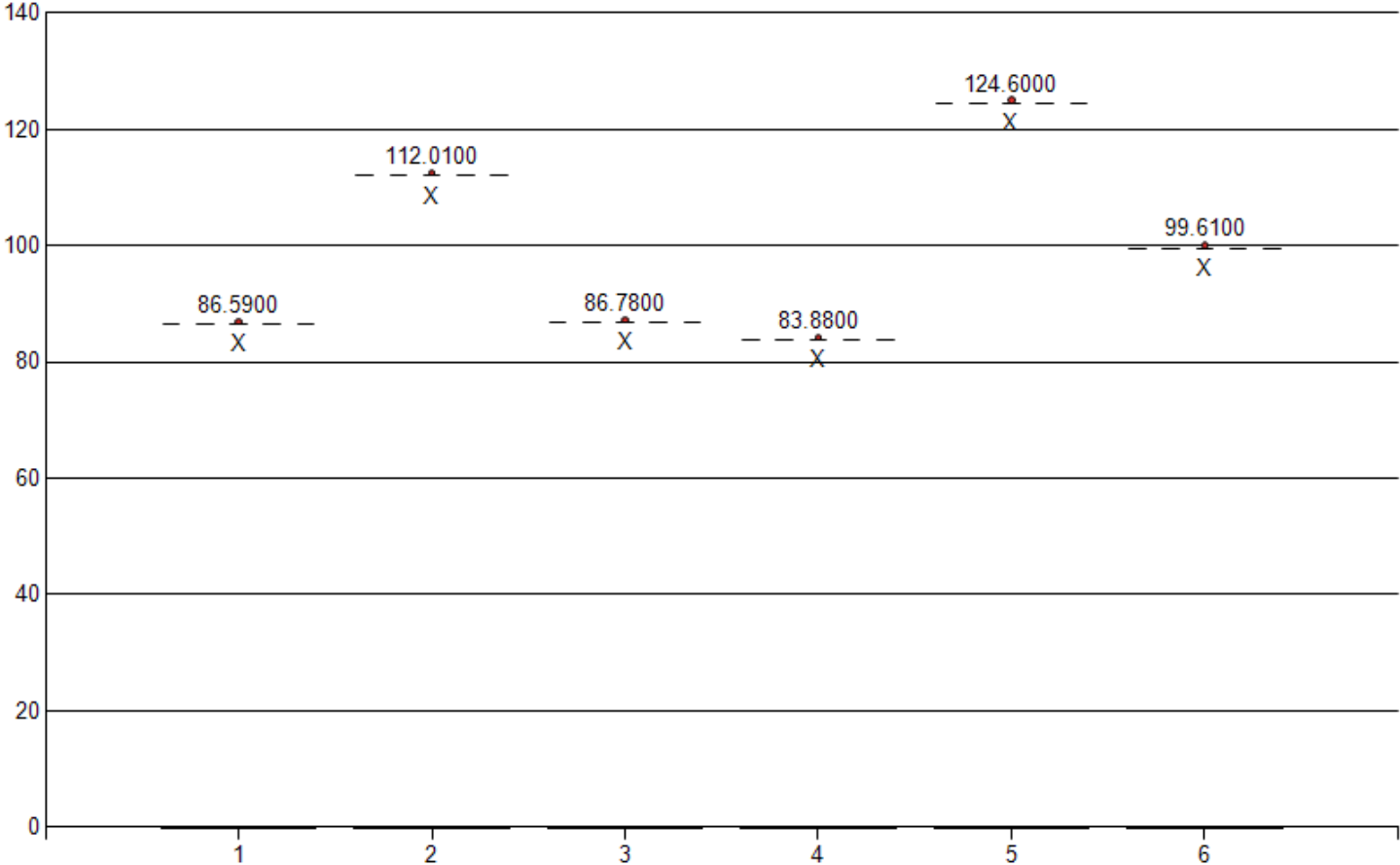
- 1 Full Irrigation;UTC
- 2 Full Irrigation;Lower Rate EF Polymer
- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
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SAR

SAR

Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples

SAR_NA

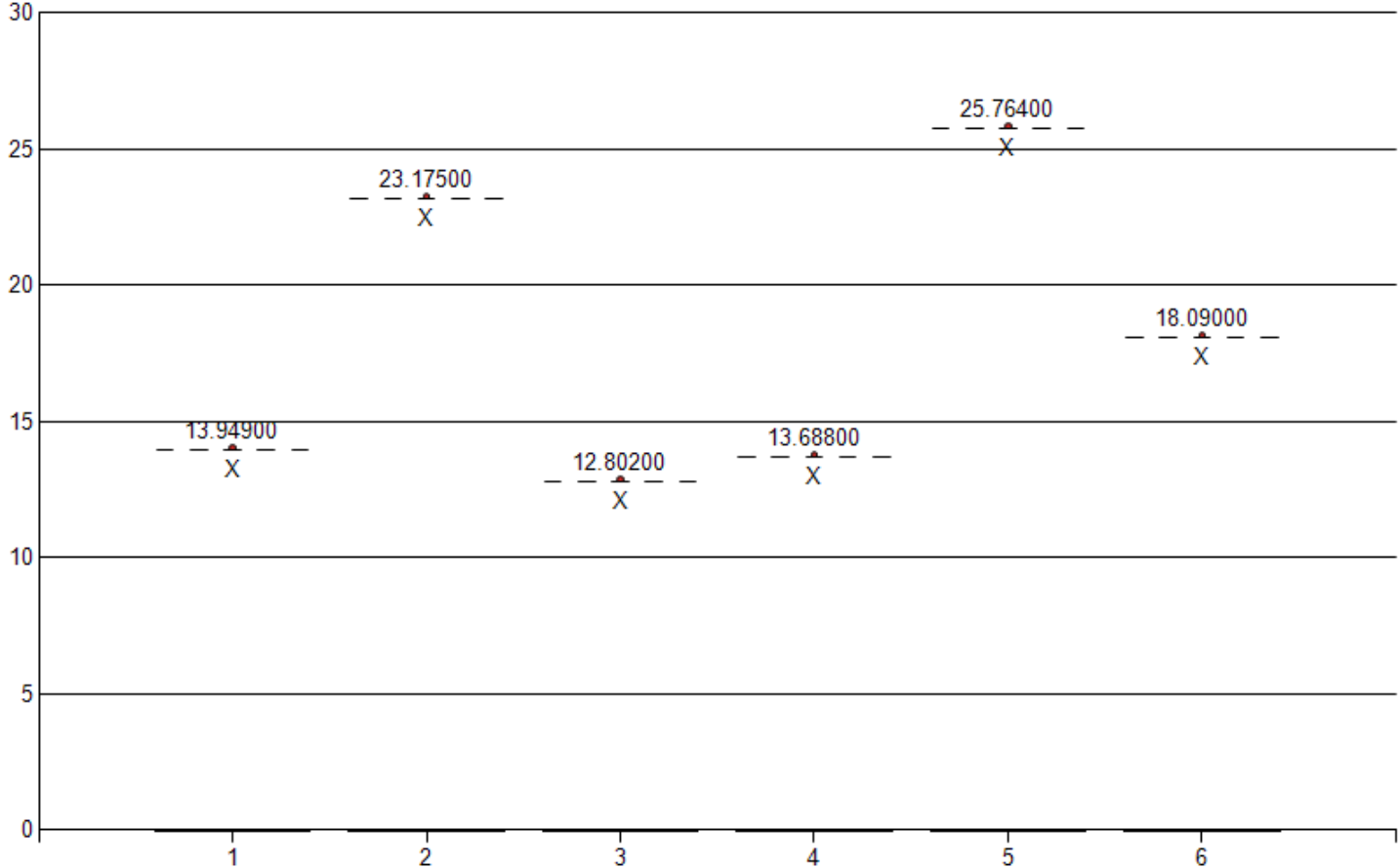


- 1 Full Irrigation;UTC
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- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

SAR_NA

Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples

SAR_MG

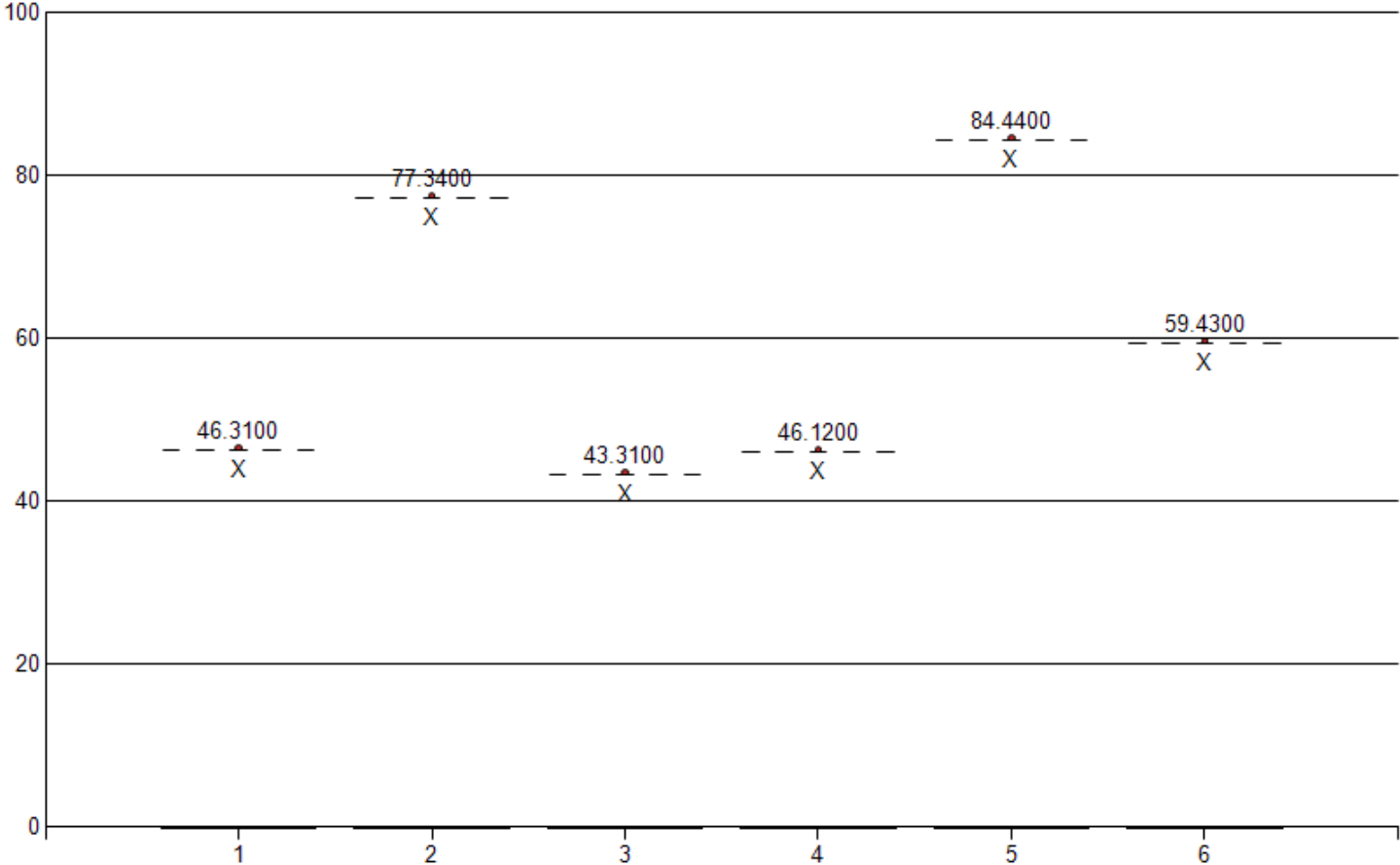


- 1 Full Irrigation;UTC
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- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

SAR_MG

Yuma Romaine - EF Polymer - Fall 2025 - End of Season Soil Samples

SAR_CA



- 1 Full Irrigation;UTC
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- 3 Full Irrigation;Higher Rate EF Polymer
- 4 Reduced Irrigation;UTC
- 5 Reduced Irrigation;Lower Rate EF Polymer
- 6 Reduced Irrigation;Higher Rate EF Polymer

SAR_CA

Plot Photos



Plot-1507
Trt-2

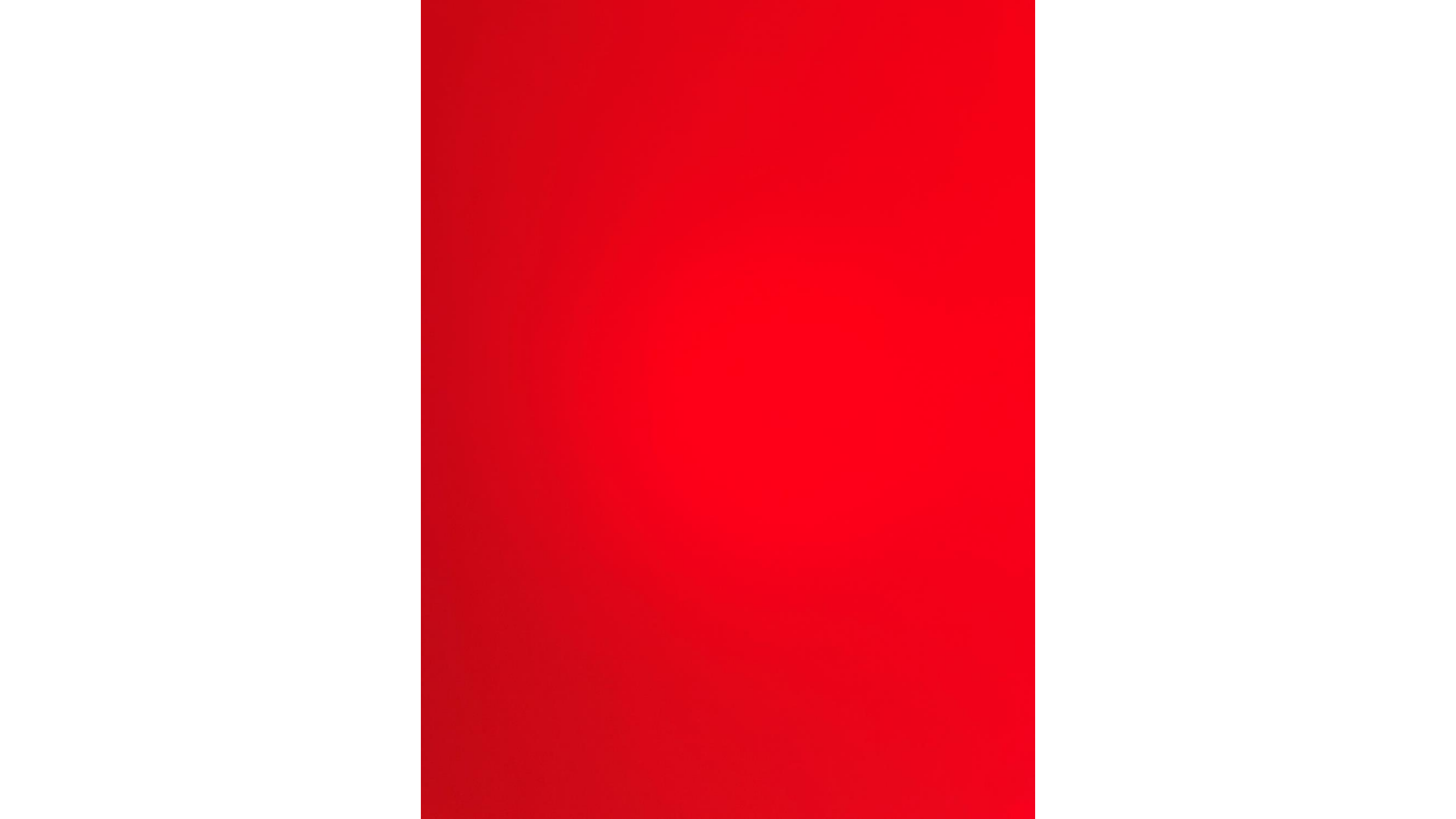






Plot-1807
Trt-6











Plot-1708

Tvt-6



Plot-1808
Tvt-2



Plot-1908
Tvt-5









Plot-1709
Tvt-3







Plot-2009
Tvt-4



Plot- 1510
Trt - 6





Plot-1710
Tvt-4







Plot-2010
Tvt-3



Plot-1511
Tvt-4



Plot-1611
Trt-6



Plot-1711
Tvt-5





Plot-1911
Tvt-3



Plot-2011
Tvt-2





Plot-1612
Tvt-5



Plot-1712
Tvt-2



Plot-1812
Tvt-4



Plot-1912
Tvt-1



Plot-2012
Tvt-6

