

Yuma Fall 2025 Romaine Trial

RDX-N – Nitrogen Replacement Trial

PI: Robert Masson

Assistant Ag Extension Agent

Yuma County Cooperative Extension



THE UNIVERSITY OF ARIZONA

Cooperative Extension

Yuma County

Trial Summary

- Significant differences observed between the full and reduced fertilizer groups indicating fertilizer was successfully applied
- Significant yield and quality improvement attributed to RDX-N in the full fertilizer group.
- A trend of higher yield attributed RDX-N was observed in the reduced fertilizer group, but not to as extreme levels as in the full fertilizer group.
- Note: Rep 6 removed due to a bad stand in plot 2712
- 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 comparison trial
 - Trt 1: Grower Standard Practice Fertilizer (GSP)
 - Trt 2: GSP + RDX-N
 - Trt 3: Reduced GSP
 - Trt 4: Reduced GSP + RDX-N
- Four treatment, six replication trial
- 3-line romaine of 42” beds
- Variety: Del Sol
- Planting Date: 11 Nov 2025
- Harvest Date: 25 Feb 2026 (106 DAP)

Application Schedule

T-12

Oct-27-2025 (T-12 Redox Romaine 2025)

ARM 2025.4 Trial Map Page 1 of 2

University of Arizona

RDX-N nitrogen replacement study on romaine lettuce Fall 2025
 Trial ID: T-12 Redox Romaine 2025
 Protocol ID: T-12 Redox Romaine 2025 Location: Yuma Arizona Trial Year: 2025
 Project ID: T-12 Redox Romaine 2025
 Study Director: Robert Masson Sponsor Contact:
 Investigator:

Trial Map Treatment Description

Trt	Code	Description
1	CHK	Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
2		Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
3		Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
4		Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu



Preplant: Add 100#/AC 11-52
 By Tractor applied
 To all plots
 Then add 110g
 to Trt 1 & 2 by hand

Schedule for Oct-25-2025 to Oct-25-2026

Trial	Task	Description
T-12 Redox Romaine 2025	(None)	No Scheduled Tasks

Includes tasks: Treat, Assess, Other
 Reps: 6 Appl Code: A Plots: 3.5 by 30 feet
 Appl. Amount: 40 GAL/AC Mix Size: 2.19 L (total for 6 plots: minimum=2.19 L)

Trt No.	Treatment Name	Form Type	Rate	Unit	Appl Code	Amt Product to Measure	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6
1	Full Fert - Grower Standard - 11-52	D	200 lb/a	A		218.7 g/1 pl	2807	2608	2509	2610	2711	2512
2	Full Fert + RDX-N - 11-52	D	200 lb/a	A		218.7 g/1 pl	2507	2708	2609	2810	2511	2712
3	Reduced - Grower Standard - 11-52	D	100 lb/a	A		109.3 g/1 pl	2707	2808	2709	2510	2811	2612
4	Reduced Fert + RDX-N - 11-52	D	100 lb/a	A		109.3 g/1 pl	2607	2508	2809	2710	2611	2812

Reps: 6 Appl Code: B Plots: 3.5 by 30 feet
 Appl. Amount: 40 GAL/AC Mix Size: 2.19 L (total for 6 plots: minimum=2.19 L)

Trt No.	Treatment Name	Form Type	Rate	Unit	Appl Code	Amt Product to Measure	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6
1	Full Fert - Grower Standard - UAN-32	L	12 gal/a	BCD		109.5 mL/1 pl	2807	2608	2509	2610	2711	2512
2	Full Fert + RDX-N - UAN-32	L	12 gal/a	BCD		109.5 mL/1 pl	2507	2708	2609	2810	2511	2712
3	Reduced - Grower Standard - UAN-32	L	6 gal/a	BCD		54.74 mL/1 pl	2707	2808	2709	2510	2811	2612
4	Reduced Fert + RDX-N - UAN-32	L	6 gal/a	BCD		54.74 mL/1 pl	2607	2508	2809	2710	2611	2812
	Reduced Fert + RDX-N	L	13.6 fl oz/a	BCD		0.9695 mL/1 pl						

Reps: 6 Appl Code: C Plots: 3.5 by 30 feet

Application Schedule

Oct-28-2025 (T-12 Redox Romaine 2025)

ARM 2025.4 Spray/Seeding Plan Page 1 of 2

University of Arizona

RDX-N nitrogen replacement study on romaine lettuce Fall 2025

Trial ID: T-12 Redox Romaine 2025
 Protocol ID: T-12 Redox Romaine 2025 Location: Yuma Arizona Trial Year: 2025
 Project ID: T-12 Redox Romaine 2025
 Study Director: Robert Masson Sponsor Contact:
 Investigator:

Reps: 6 Appl Code: A Plots: 3.5 by 30 feet
 Appl. Amount: 40 GAL/AC Mix Size: 2.19 L (total for 6 plots; minimum=2.19 L)

Trt No.	Treatment Name	Form Type	Rate	Unit	Appl Code	Amt Product to Measure	Rep 1	2	3	4	5	6
1	Full Fert - Grower Standard - 11-52	D	200 lb/a	A	A	1312.1 g/mx	2807	2808	2809	2810	2811	2812
2	Full Fert + RDX-N - 11-52	L	200 lb/a	A	A	1312.1 g/mx	2507	2708	2609	2810	2511	2712
	Full Fert + RDX-N	L	8 fl oz/a	A	A	3.422 mL/mx						
3	Reduced - Grower Standard - 11-52	D	100 lb/a	A	A	656.0 g/mx	2707	2808	2709	2510	2811	2612
4	Reduced Fert + RDX-N - 11-52	D	100 lb/a	A	A	656.0 g/mx	2607	2508	2809	2710	2611	2812
	Reduced Fert + RDX-N	L	8 fl oz/a	A	A	3.422 mL/mx						

Reps: 6 Appl Code: B Plots: 3.5 by 30 feet
 Appl. Amount: 40 GAL/AC Mix Size: 2.19 L (total for 6 plots; minimum=2.19 L)

Trt No.	Treatment Name	Form Type	Rate	Unit	Appl Code	Amt Product to Measure	Rep 1	2	3	4	5	6
1	Full Fert - Grower Standard - UAN-32	L	12 gal/a	BCD	BCD	656.9 mL/mx	2807	2608	2509	2610	2711	2512
2	Full Fert + RDX-N - UAN-32	L	12 gal/a	BCD	BCD	656.9 mL/mx	2507	2708	2609	2810	2511	2712
	Full Fert + RDX-N	L	27.2 fl oz/a	BCD	BCD	11.63 mL/mx						
3	Reduced - Grower Standard - UAN-32	L	6 gal/a	BCD	BCD	328.5 mL/mx	2707	2808	2709	2510	2811	2612
4	Reduced Fert + RDX-N - UAN-32	L	6 gal/a	BCD	BCD	328.5 mL/mx	2607	2508	2809	2710	2611	2812
	Reduced Fert + RDX-N	L	13.6 fl oz/a	BCD	BCD	5.817 mL/mx						

12-8-26

Reps: 6 Appl Code: C Plots: 3.5 by 30 feet
 Appl. Amount: 40 GAL/AC Mix Size: 2.19 L (total for 6 plots; minimum=2.19 L)

Trt No.	Treatment Name	Form Type	Rate	Unit	Appl Code	Amt Product to Measure	Rep 1	2	3	4	5	6
1	Full Fert - Grower Standard - UAN-32	L	12 gal/a	BCD	BCD	656.9 mL/mx	2807	2608	2509	2610	2711	2512
2	Full Fert + RDX-N - UAN-32	L	12 gal/a	BCD	BCD	656.9 mL/mx	2507	2708	2609	2810	2511	2712
	Full Fert + RDX-N	L	27.2 fl oz/a	BCD	BCD	11.63 mL/mx						
3	Reduced - Grower Standard - UAN-32	L	6 gal/a	BCD	BCD	328.5 mL/mx	2707	2808	2709	2510	2811	2612
4	Reduced Fert + RDX-N - UAN-32	L	6 gal/a	BCD	BCD	328.5 mL/mx	2607	2508	2809	2710	2611	2812
	Reduced Fert + RDX-N	L	13.6 fl oz/a	BCD	BCD	5.817 mL/mx						

1-13-26

Reps: 6 Appl Code: D Plots: 3.5 by 30 feet
 Appl. Amount: 40 GAL/AC Mix Size: 2.19 L (total for 6 plots; minimum=2.19 L)

Trt No.	Treatment Name	Form Type	Rate	Unit	Appl Code	Amt Product to Measure	Rep 1	2	3	4	5	6
1	Full Fert - Grower Standard - UAN-32	L	12 gal/a	BCD	BCD	656.9 mL/mx	2807	2608	2509	2610	2711	2512
2	Full Fert + RDX-N - UAN-32	L	12 gal/a	BCD	BCD	656.9 mL/mx	2507	2708	2609	2810	2511	2712
	Full Fert + RDX-N	L	27.2 fl oz/a	BCD	BCD	11.63 mL/mx						
3	Reduced - Grower Standard - UAN-32	L	6 gal/a	BCD	BCD	328.5 mL/mx	2707	2808	2709	2510	2811	2612
4	Reduced Fert + RDX-N - UAN-32	L	6 gal/a	BCD	BCD	328.5 mL/mx	2607	2508	2809	2710	2611	2812
	Reduced Fert + RDX-N	L	13.6 fl oz/a	BCD	BCD	5.817 mL/mx						

2-2-26

Fertilization Plan

Treatment 1:

- Total # N/AC: 151
- Preplant: 200#/A 11-52-0 MAP (22# N)
- 12.0 Gal/A UAN 32 (43# N per application)
 - 12/8 (27 DAP)
 - 1/13 (63 DAP)
 - 2/2 (83 DAP)

Treatment 2:

- Total # N/AC: 151
- Preplant: 200#/A 11-52-0 MAP + RDX-N 8 oz/A
- 12.0 Gal/A UAN 32 + 27.2 oz/A (43# N per application)
 - 12/8 (27 DAP)
 - 1/13 (63 DAP)
 - 2/2 (83 DAP)

Treatment 3:

- Total # N/AC: 74
- Preplant: 100#/A 11-52-0 MAP (11#N)
- 6 Gal/A UAN 32 (21# N per application)
 - 12/8 (27 DAP)
 - 1/13 (63 DAP)
 - 2/2 (83 DAP)

Treatment 4:

- Total # N/AC: 74
- Preplant: 100#/A 11-52-0 MAP + 8 oz/A RDX-N (11#N)
- 6 Gal/A UAN 32 + 13.6 oz/A RDX-N (21# N per application)
 - 12/8 (27 DAP)
 - 1/13 (63 DAP)
 - 2/2 (83 DAP)

Field Map

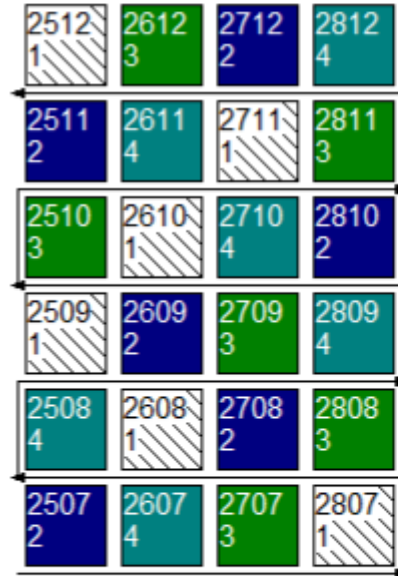
Mar-15-2026 (T-12 Redox Romaine 2025)

University of Arizona

RDX-N nitrogen replacement study on romaine lettuce Fall 2025	
Trial ID: T-12 Redox Romaine 2025	
Protocol ID: T-12 Redox Romaine 2025	Location: Yuma Arizona Trial Year: 2025
Project ID: T-12 Redox Romaine 2025	
Study Director: Robert Masson Sponsor Contact:	
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Trial Map Treatment Description

Trt	Code	Description
1	CHK	Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
2		Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
3		Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
4		Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu



Irrigation

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

**Total Water Applied to full water
treatment area 14.686 Acre IN**

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

Irrigation

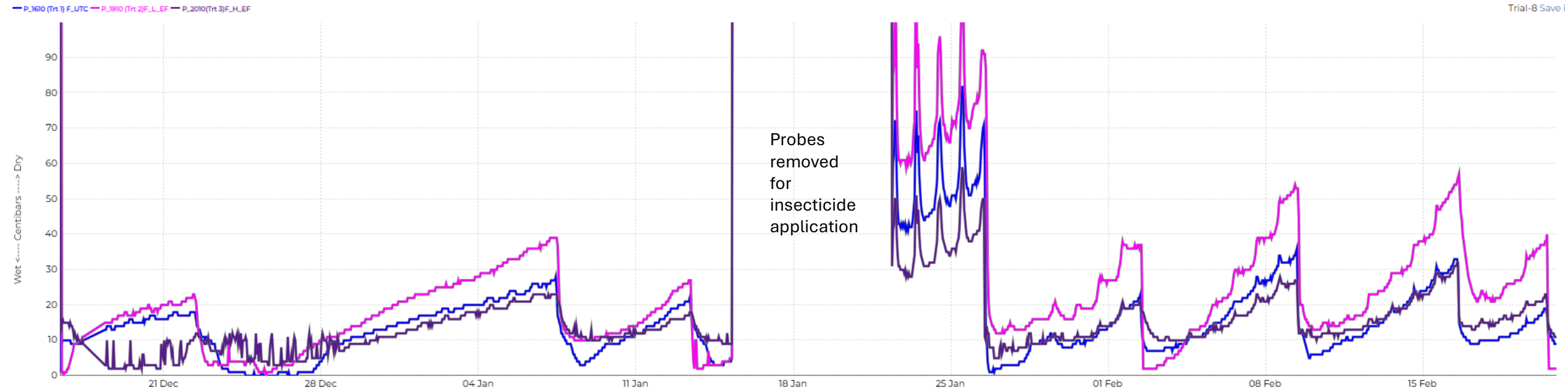
Sprinkler rate: 0.1 IN/HR

Drip rate: 0.186 Acre IN/HR

**Total Water Applied to full water
treatment area 14.686 Acre IN**

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

IC-10 Moisture Probe Data (Unit 1)



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

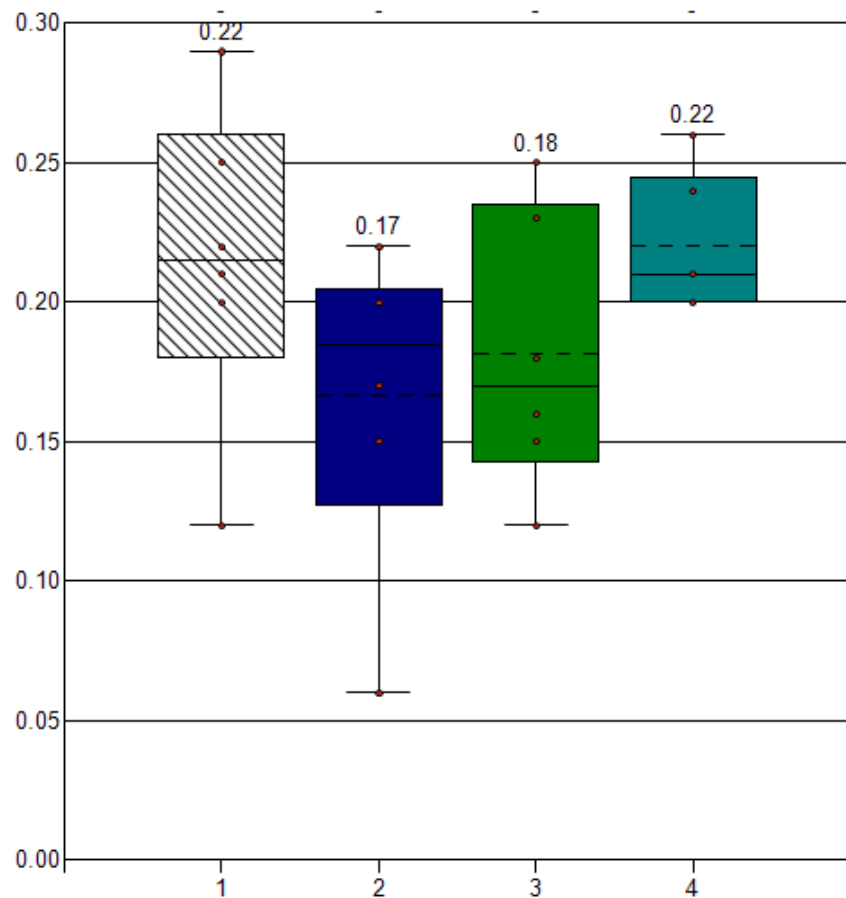
In Season Measurements (Dr. Bhupinder Singh)

- 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



Yuma Romaine - RDX-N - Fall 2025

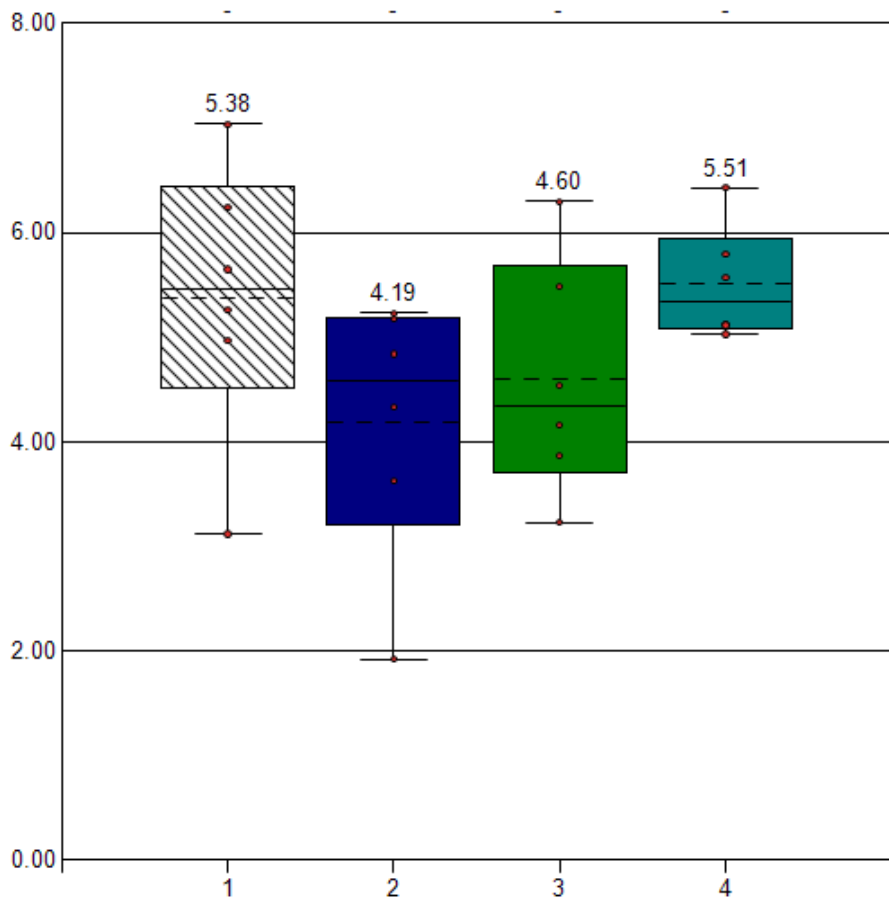
mol m⁻² Stomtal conductance



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - ...
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; ...
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - ...
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32...

Yuma Romaine - RDX-N - Fall 2025

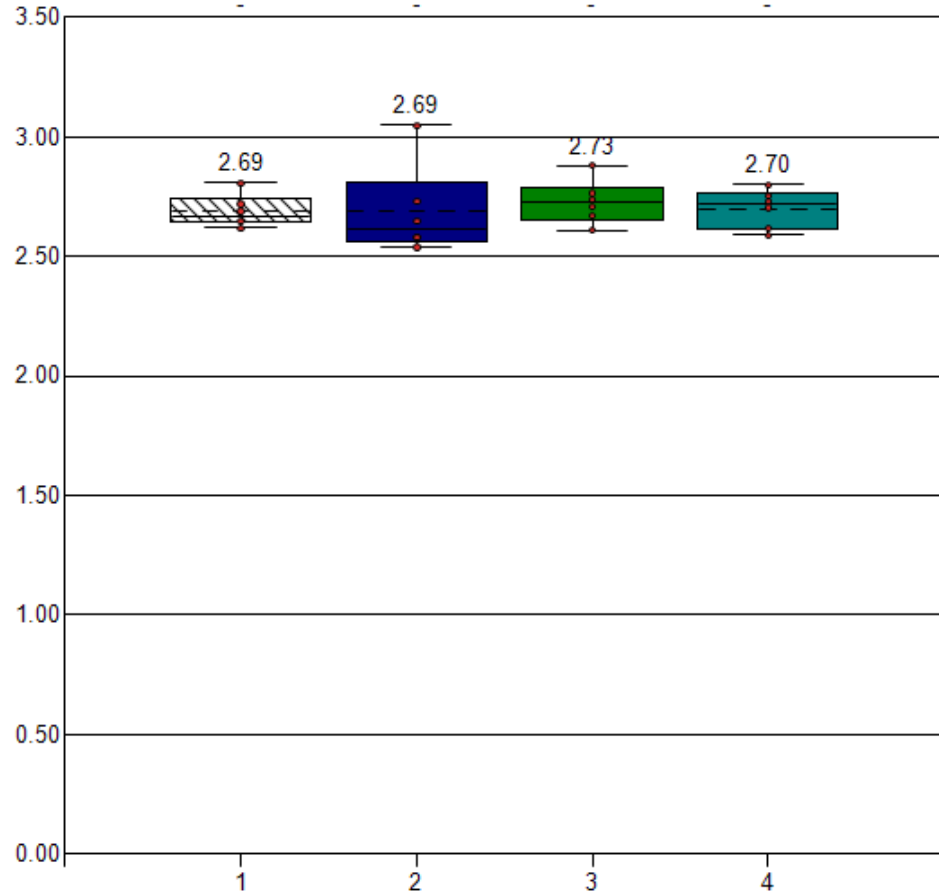
mol m⁻² Transpiration



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full...
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UA...
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 G...

Yuma Romaine - RDX-N - Fall 2025

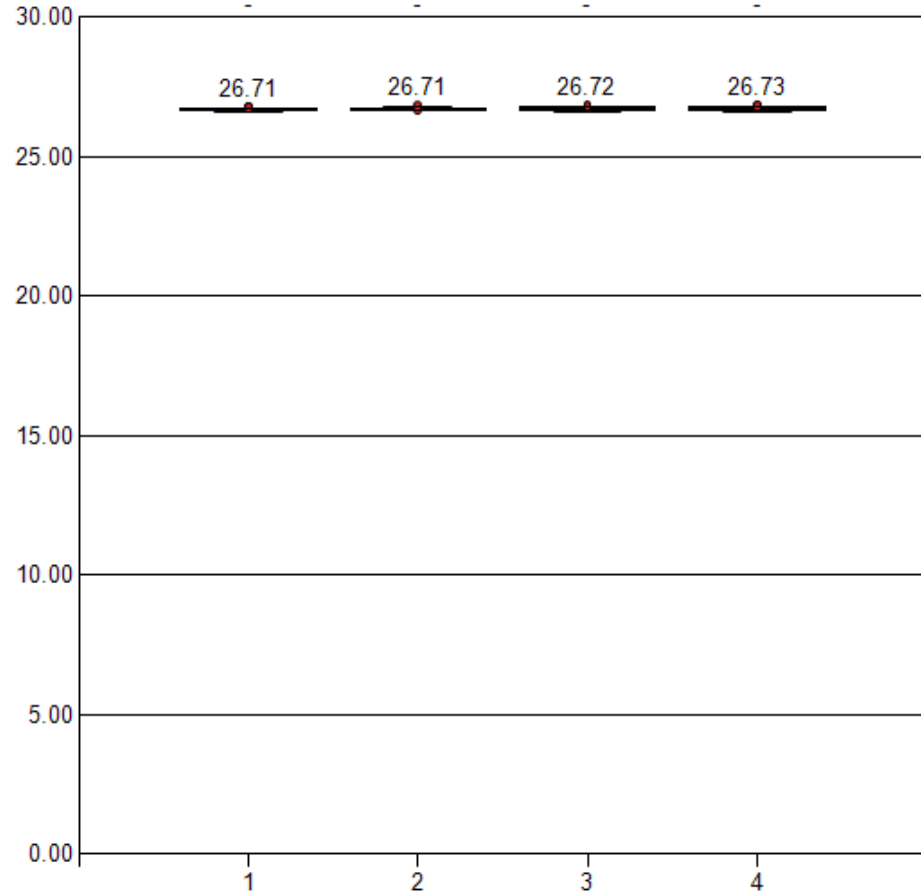
kPa VPDleaf



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A...

Yuma Romaine - RDX-N - Fall 2025

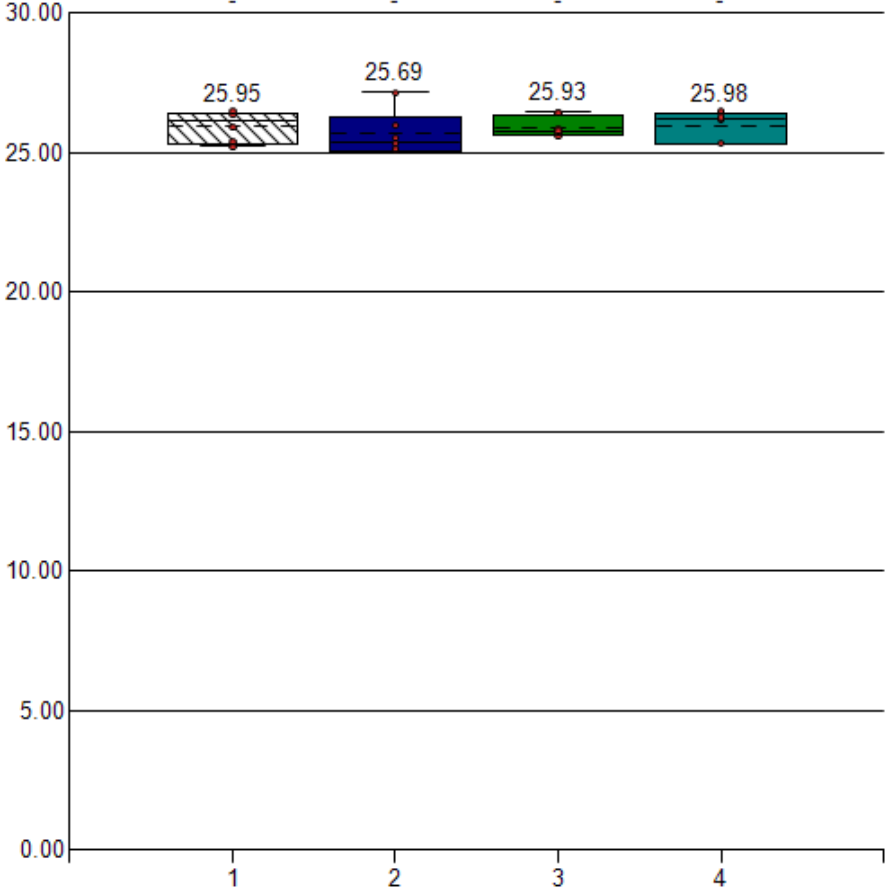
°C air temperature



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN...
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GA...

Yuma Romaine - RDX-N - Fall 2025

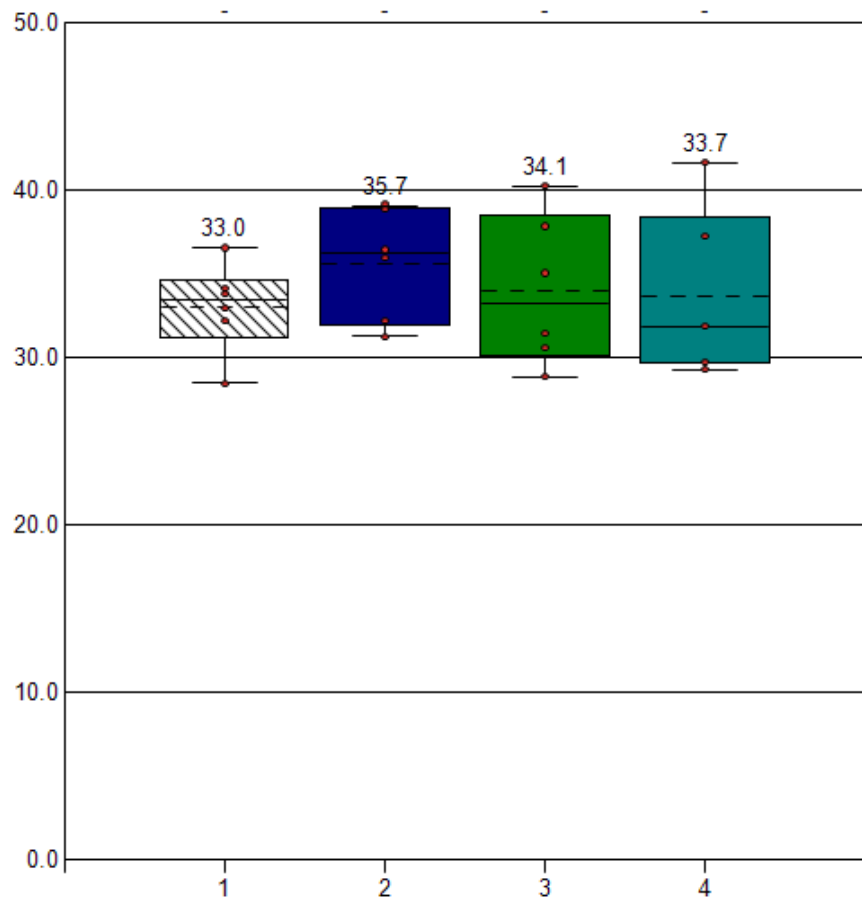
°C Canopy Temperature



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UA...
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full...
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - U...
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6...

Yuma Romaine - RDX-N - Fall 2025

µg m⁻² Chlorophyll content



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - U...
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; F...
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - ...
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6...

Harvest

- 25 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



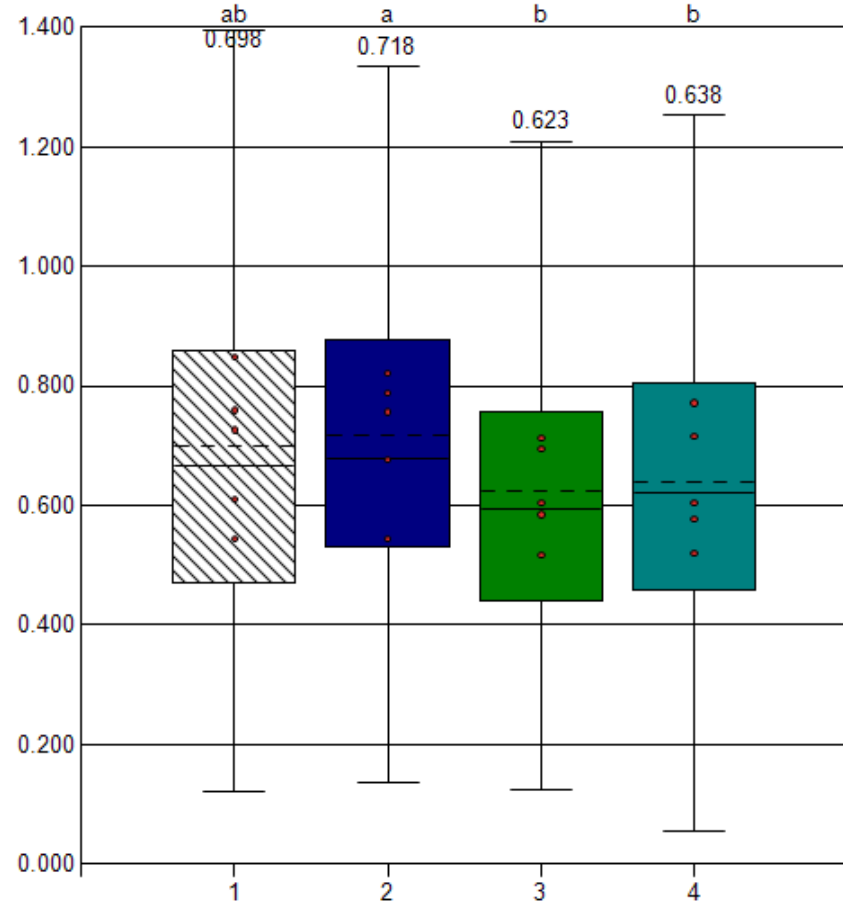






Yuma Romaine - RDX-N - Fall 2025

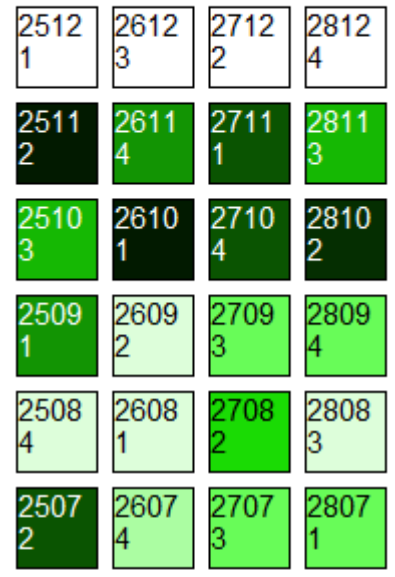
KG/Plant Above Ground Biomass



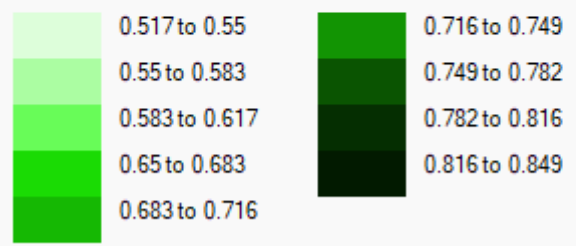
- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard...
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/...
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standar...
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-3...

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

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

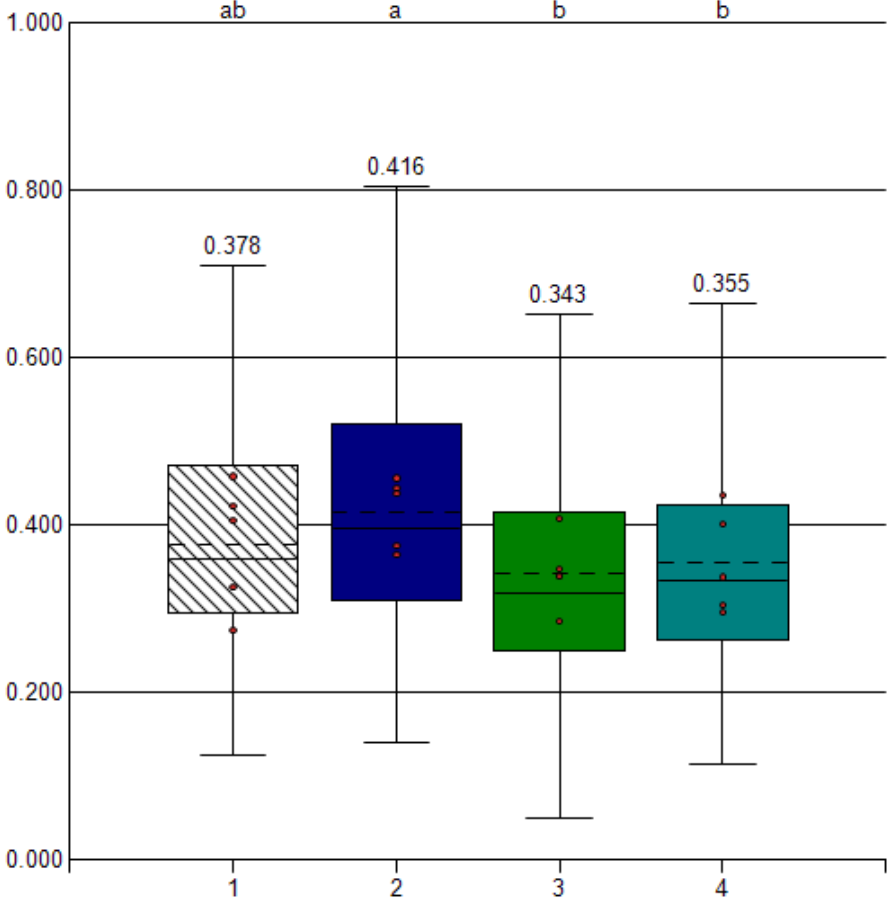


Color Description Options Treatment Description Assessment Description



Yuma Romaine - RDX-N - Fall 2025

KG/Heart Heart Weights













- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UA...
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full...
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - U...
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6...

Assessment Map - Column 2 - KG/Heart Heart Weights

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

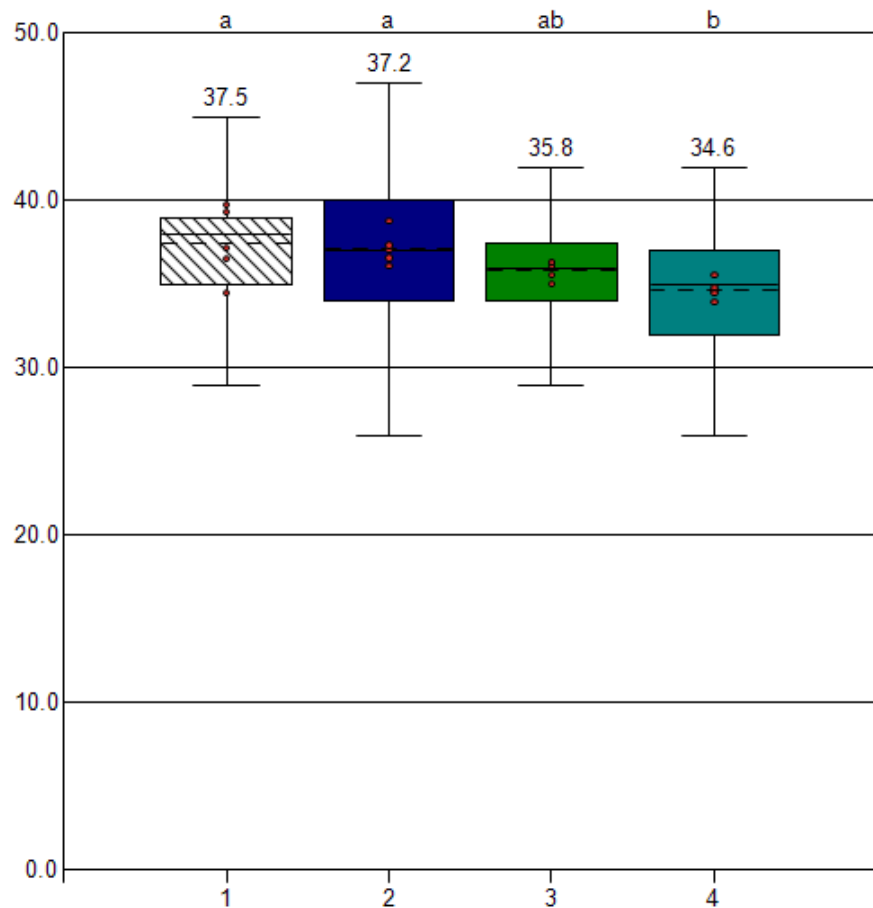
2512 1	2612 3	2712 2	2812 4
2511 2	2611 4	2711 1	2811 3
2510 3	2610 1	2710 4	2810 2
2509 1	2609 2	2709 3	2809 4
2508 4	2608 1	2708 2	2808 3
2507 2	2607 4	2707 3	2807 1

Color Description Options Treatment Description Assessment Description

	0.275 to 0.293		0.367 to 0.385
	0.293 to 0.312		0.385 to 0.404
	0.312 to 0.33		0.404 to 0.422
	0.33 to 0.349		0.422 to 0.440
	0.349 to 0.367		0.440 to 0.459

Yuma Romaine - RDX-N - Fall 2025

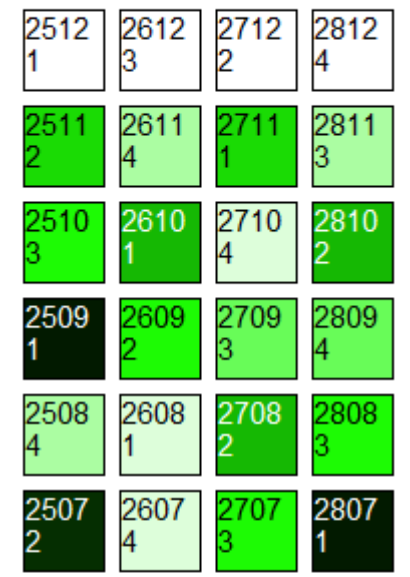
CM/Heart Circumference



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UA...
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Ful...
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - U...
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6...

Assessment Map - Column 3 - CM/Heart Circumference

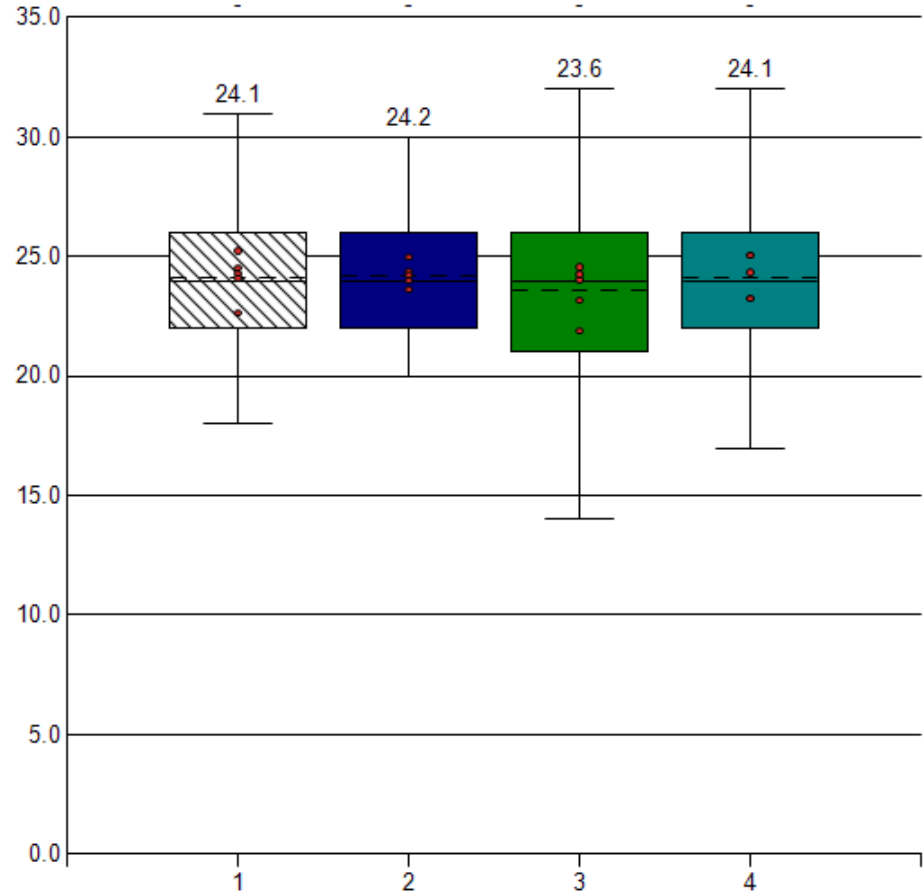
Navigation icons: zoom in, zoom out, pan, play, 100%, zoom reset, and a checked checkbox labeled "Always size to fit".



Color Description	Options	Treatment Description	Assessment Description
	34.0 to 34.5		36.3 to 36.8
	34.5 to 35.1		36.8 to 37.4
	35.1 to 35.7		38.6 to 39.2
	35.7 to 36.3		39.2 to 39.7

Yuma Romaine - RDX-N - Fall 2025

CM/Heart Length











- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-...
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL...

Assessment Map - Column 4 - CM/Heart Length

Navigation icons: zoom in, zoom out, pan, play, refresh, 100%, Always size to fit (checked)

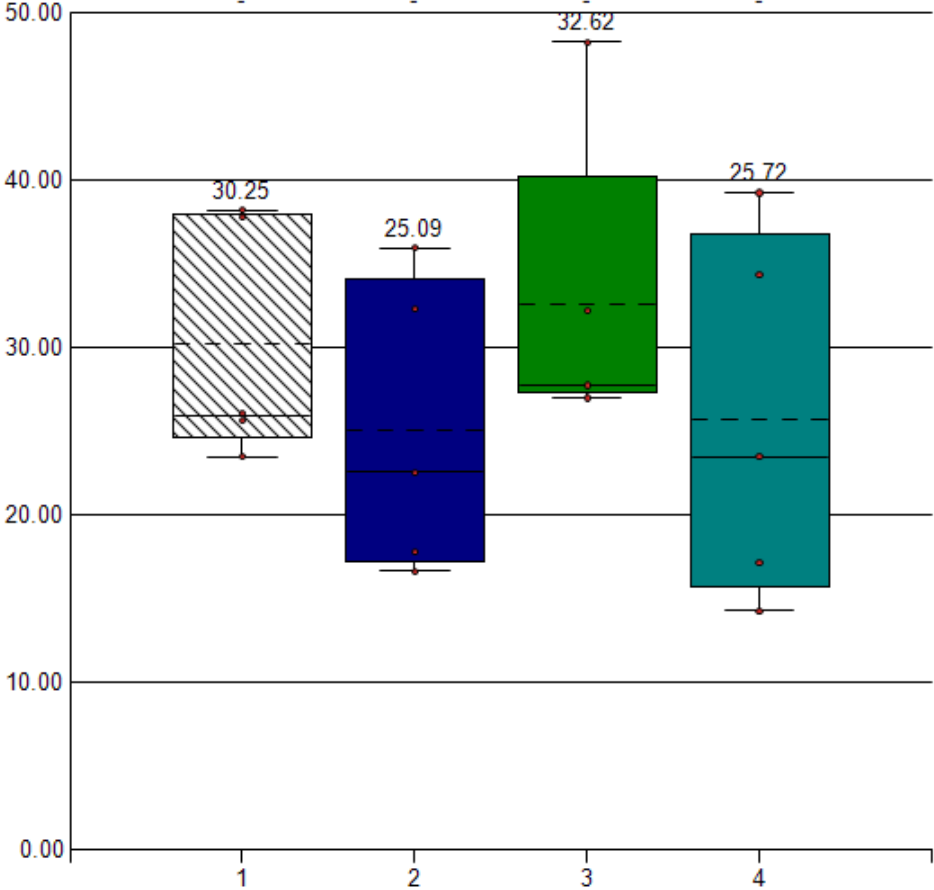
2512 1	2612 3	2712 2	2812 4
2511 2	2611 4	2711 1	2811 3
2510 3	2610 1	2710 4	2810 2
2509 1	2609 2	2709 3	2809 4
2508 4	2608 1	2708 2	2808 3
2507 2	2607 4	2707 3	2807 1

Color Description Options Treatment Description Assessment Description

	21.9 to 22.2		23.6 to 23.9
	22.6 to 22.9		23.9 to 24.2
	22.9 to 23.2		24.2 to 24.6
	23.2 to 23.6		24.9 to 25.3

Yuma Romaine - RDX-N - Fall 2025

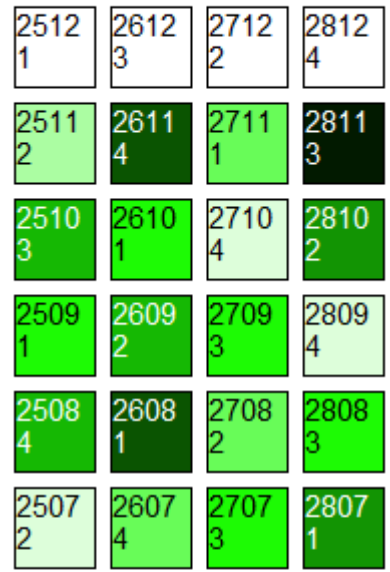
Percent Walkby



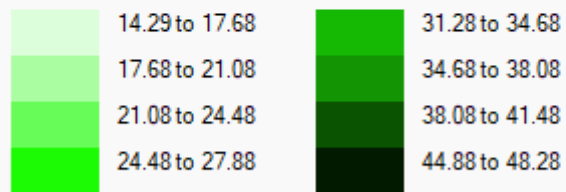
- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-...
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/...

Assessment Map - Column 5 - Percent Walkby

Navigation icons: zoom in, zoom out, hand, play, 100%, zoom in, Always size to fit (checked)



Color Description Options Treatment Description Assessment Description



University of Arizona

RDX-N nitrogen replacement study on romaine lettuce Fall 2025							
Trial ID: T-12 Redox Romaine 2025							
Protocol ID: T-12 Redox Romaine 2025 Location: Yuma Arizona Trial Year: 2025							
Project ID: T-12 Redox Romaine 2025							
Study Director: Robert Masson Sponsor Contact: Investigator:							
SE Group No.		1	2	3	4	5	
Rating Unit		KG/Plant	KG/Heart	CM/Heart	CM/Heart		
Rating Min/Max/Interval		0.01, 2, -	0.01, 2, -	1, 60, -	1, 60, -		
Number of Subsamples		37	29	29	29	1	
Description		Above Ground Bi	Heart Weights	Circumference	Length	Percent Walkby	
ARM Action Codes							
Number of Decimals		3	3	1	1	2	
Data Entry Date		Feb-25-2026	Feb-25-2026	Feb-25-2026	Feb-25-2026	Feb-25-2026	
Trt Treatment	Rate	Appl	1*	2*	3*	4*	5*
No. Name	Rate Unit	Code					
1 Full Fert - Grower Standard - 11-52	200 lb/a	A	0.698 -	0.378 ab	37.5 a	24.1 -	30.25 -
Full Fert - Grower Standard - UAN-32	12 gal/a	BCD					
2 Full Fert + RDX-N - 11-52	200 lb/a	A	0.718 -	0.416 a	37.2 a	24.2 -	25.09 -
Full Fert + RDX-N - UAN-32	12 gal/a	BCD					
Full Fert + RDX-N	8 fl oz/a	A					
Full Fert + RDX-N	27.2 fl oz/a	BCD					
3 Reduced - Grower Standard - 11-52	100 lb/a	A	0.623 -	0.343 b	35.8 ab	23.6 -	32.62 -
Reduced - Grower Standard - UAN-32	6 gal/a	BCD					
4 Reduced Fert + RDX-N - 11-52	100 lb/a	A	0.638 -	0.355 b	34.6 b	24.1 -	25.72 -
Reduced Fert + RDX-N - UAN-32	6 gal/a	BCD					
Reduced Fert + RDX-N	8 fl oz/a	A					
Reduced Fert + RDX-N	13.6 fl oz/a	BCD					
LSD P= .10			0.0669	0.0448	1.39	0.95	11.136
Standard Deviation			0.0593	0.0397	1.24	0.85	9.879
CV			8.87	10.66	3.41	3.52	34.76
Levene's F^			2.312	0.985	0.646	0.259	0.285
Levene's P rob(F)			0.115	0.425	0.597	0.854	0.836
Shapiro-Wilk^			0.9716	0.9641	0.9634	0.9325	0.9188
P(Shapiro-Wilk)^			0.7892	0.6288	0.613	0.1721	0.0942
Skewness^			-0.4428	0.3363	-0.6114	-0.7025	0.2507
P(Skewness)^			0.398	0.5192	0.2472	0.1861	0.63
Kurtosis^			0.9428	-0.7668	0.4255	-0.3896	-1.3165
P(Kurtosis)^			0.354	0.4492	0.6729	0.699	0.2004
Replicate F			9.510	5.263	1.085	1.374	0.326
Replicate P rob(F)			0.0011	0.0110	0.4068	0.3002	0.8551
Treatment F			3.002	3.203	5.665	0.656	0.672
Treatment P rob(F)			0.0727	0.0621	0.0118	0.5948	0.5854

University of Arizona

RDX-N nitrogen replacement study on romaine lettuce Fall 2025							
Trial ID: T-12 Redox Romaine 2025							
Protocol ID: T-12 Redox Romaine 2025 Location: Yuma Arizona Trial Year: 2025							
Project ID: T-12 Redox Romaine 2025							
Study Director: Robert Masson Sponsor Contact:							
Investigator:							
SE Group No.		7	8	9	10	11	
Rating Unit		mol m ⁻²	mol m ⁻²	kPa	°C	°C	
Rating Min/Max/Interval							
Number of Subsamples		1	1	1	1	1	
Description		Stomtal conduct>	Transpiration	VPDleaf	air temperature	Canopy Temperat>	
ARM Action Codes				ET2			
Number of Decimals		2	2	2	2	2	
Data Entry Date		Mar-15-2026	Mar-15-2026	Mar-15-2026	Mar-15-2026	Mar-15-2026	
Trt Treatment	Rate	Appl					
No. Name	Rate Unit	Code	6*	7*	8*	9*	10*
1 Full Fert - Grower Standard - 11-52	200 lb/a	A	0.22 -	5.38 -	2.69 -	26.71 -	25.95 -
Full Fert - Grower Standard - UAN-32	12 gal/a	BCD					
2 Full Fert + RDX-N - 11-52	200 lb/a	A	0.17 -	4.19 -	2.69	26.71 -	25.69 -
Full Fert + RDX-N - UAN-32	12 gal/a	BCD					
Full Fert + RDX-N	8 fl oz/a	A					
Full Fert + RDX-N	27.2 fl oz/a	BCD					
3 Reduced - Grower Standard - 11-52	100 lb/a	A	0.18 -	4.60 -	2.73 -	26.72 -	25.93 -
Reduced - Grower Standard - UAN-32	6 gal/a	BCD					
4 Reduced Fert + RDX-N - 11-52	100 lb/a	A	0.22 -	5.51 -	2.70 -	26.73 -	25.98 -
Reduced Fert + RDX-N - UAN-32	6 gal/a	BCD					
Reduced Fert + RDX-N	8 fl oz/a	A					
Reduced Fert + RDX-N	13.6 fl oz/a	BCD					
LSD P=.10			0.053	1.217	0.096	0.072	0.554
Standard Deviation			0.053	1.203	0.092	0.071	0.547
CV			26.93	24.45	3.38	0.27	2.11
Levene's F^			1.004	1.12	0.266	1.846	1.789
Levene's Prob(F)			0.411	0.365	0.77	0.171	0.182
Shapiro-Wilk^			0.9681	0.9858	0.9751	0.9712	0.9364
P(Shapiro-Wilk)^			0.6199	0.9752	0.8855	0.6959	0.1358
Ske wness^			0.1022	0.0164	0.1096	-0.0665	0.3736
P(Ske wness)^			0.8306	0.9726	0.8405	0.8893	0.4369
Kurtosis^			0.6635	0.6063	-0.4823	-0.8995	-1.1126
P(Kurtosis)^			0.477	0.5154	0.648	0.3372	0.2377
Replicate F			0.462	0.403	0.320	0.039	1.468
Replicate Prob(F)			0.7981	0.8395	0.8897	0.9990	0.2580
Treatment F			1.440	1.651	0.283	0.076	0.362
Treatment Prob(F)			0.2707	0.2199	0.7594	0.9721	0.7813

University of Arizona

RDX-N nitrogen replacement study on romaine lettuce Fall 2025

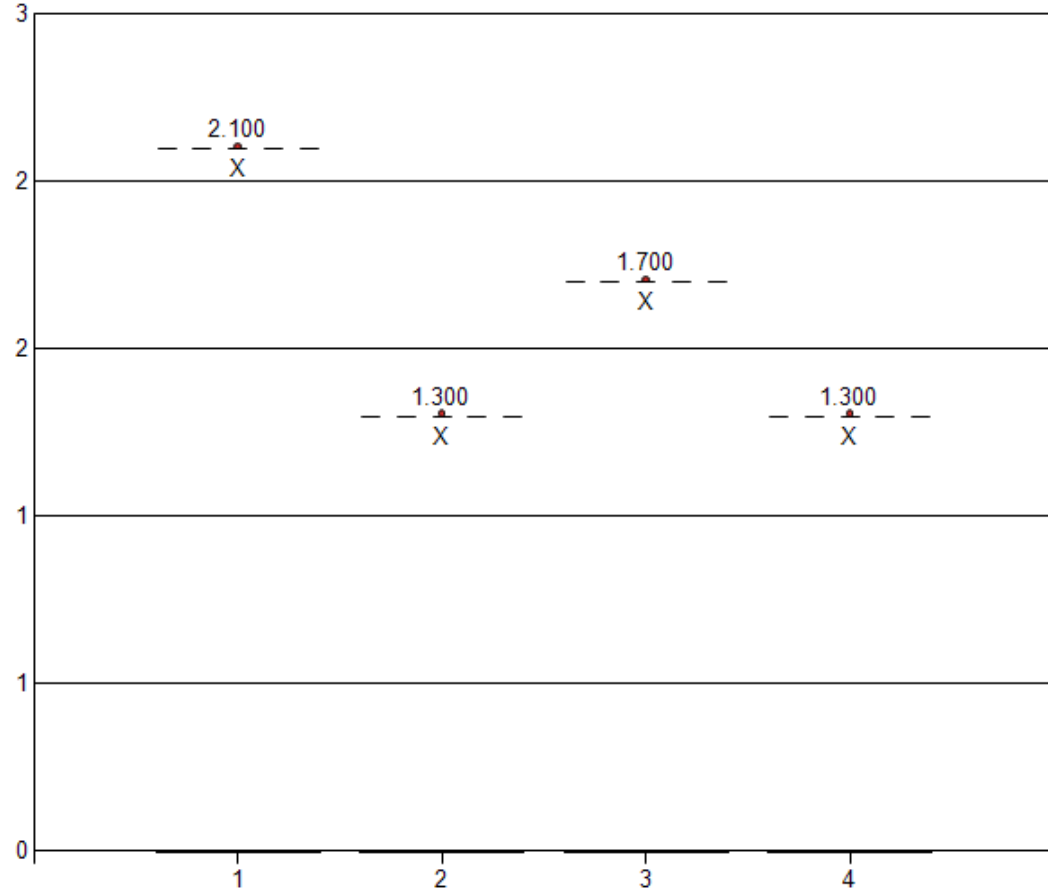
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 Protocol ID: T-12 Redox Romaine 2025 Location: Yuma Arizona Trial Year: 2025
 Project ID: T-12 Redox Romaine 2025
 Study Director: Robert Masson Sponsor Contact:
 Investigator:

SE Group No.				12
Rating Unit				µg m-2
Rating Min/Max/Interval				
Number of Subsamples				1
Description				Chlorophyll con>
ARM Action Codes				
Number of Decimals				1
Data Entry Date				Mar-15-2026
Trt Treatment		Rate	Appl	11*
No. Name		Rate Unit	Code	
1	Full Fert - Grower Standard - 11-52	200 lb/a	A	33.0 -
	Full Fert - Grower Standard - UAN-32	12 gal/a	BCD	
2	Full Fert + RDX-N - 11-52	200 lb/a	A	35.7 -
	Full Fert + RDX-N - UAN-32	12 gal/a	BCD	
	Full Fert + RDX-N	8 fl oz/a	A	
	Full Fert + RDX-N	27.2 fl oz/a	BCD	
3	Reduced - Grower Standard - 11-52	100 lb/a	A	34.1 -
	Reduced - Grower Standard - UAN-32	6 gal/a	BCD	
4	Reduced Fert + RDX-N - 11-52	100 lb/a	A	33.7 -
	Reduced Fert + RDX-N - UAN-32	6 gal/a	BCD	
	Reduced Fert + RDX-N	8 fl oz/a	A	
	Reduced Fert + RDX-N	13.6 fl oz/a	BCD	
LSD P= .10				4.20
Standard Deviation				4.15
CV				12.16
Levene's F^				0.197
Levene's Prob(F)				0.897
Shapiro-Wilk^				0.972
P(Shapiro-Wilk)^				0.7174
Skewness^				-0.1959
P(Skewness)^				0.6821
Kurtosis^				-0.6357
P(Kurtosis)^				0.4955
Replicate F				0.578
Replicate Prob(F)				0.7162
Treatment F				0.442
Treatment Prob(F)				0.7267

End of Season Soil Samples

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

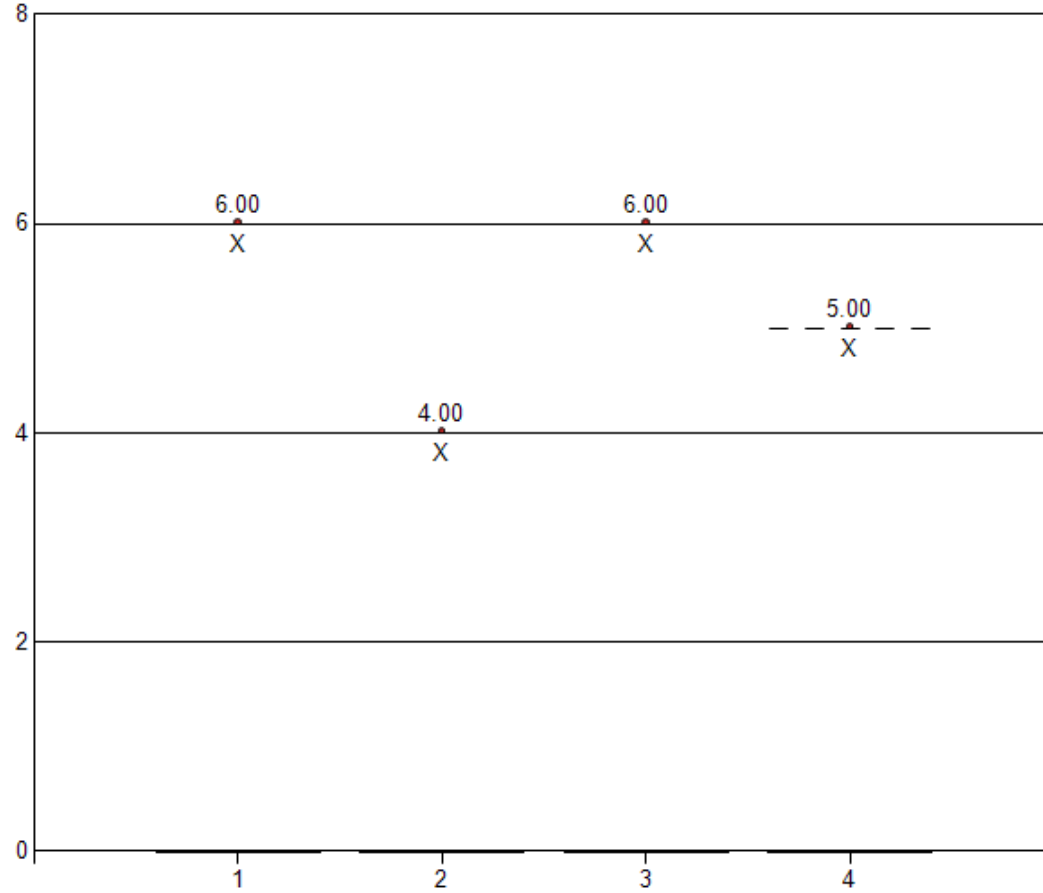
OM



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

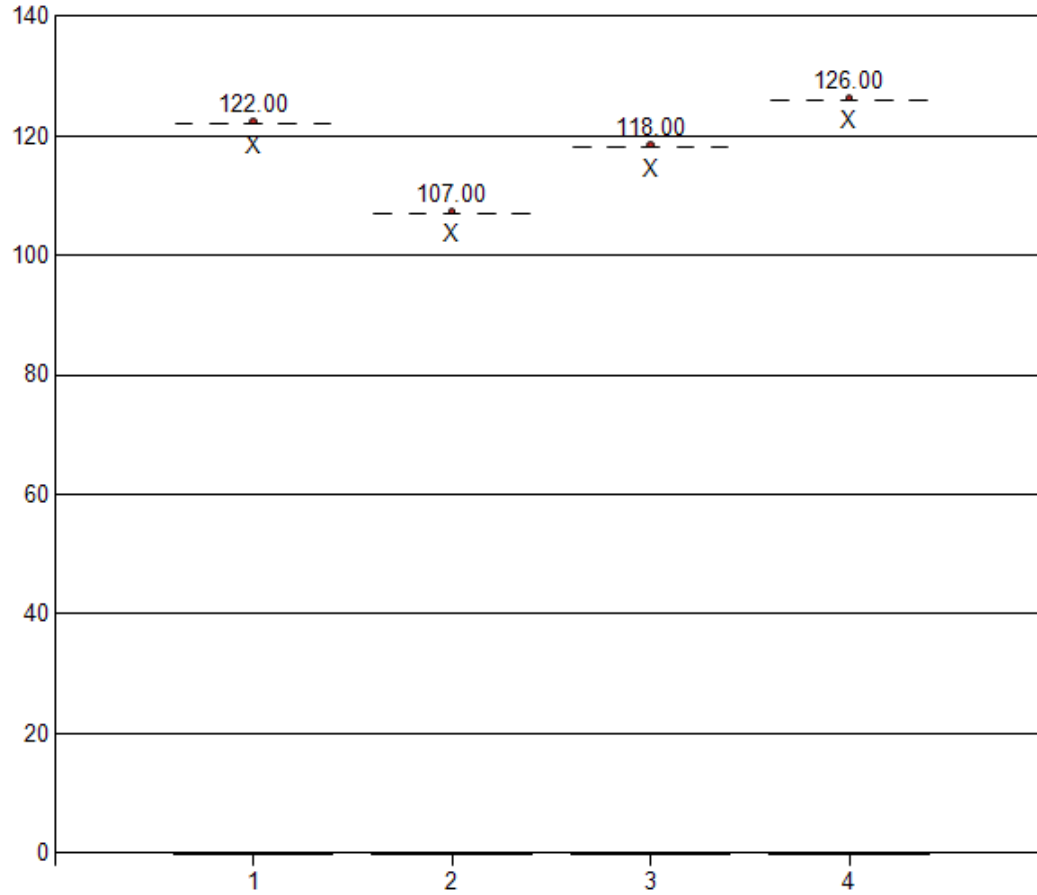
Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

P1



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

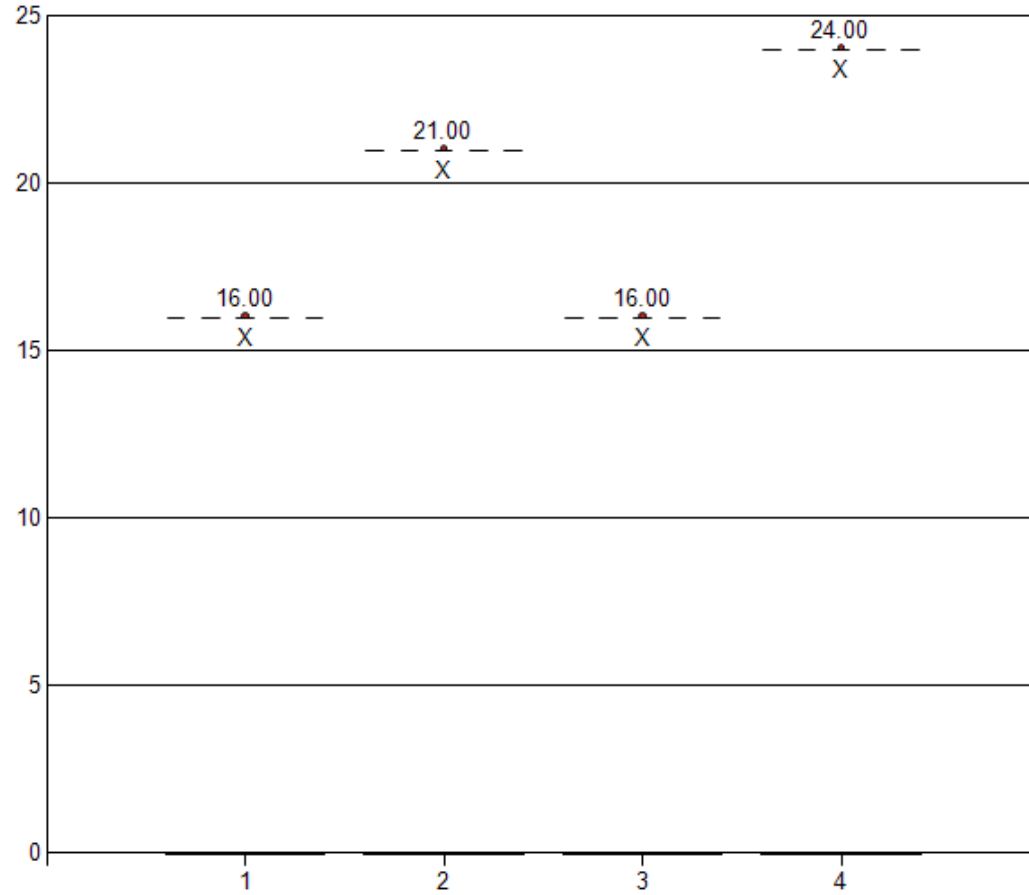


- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

P2

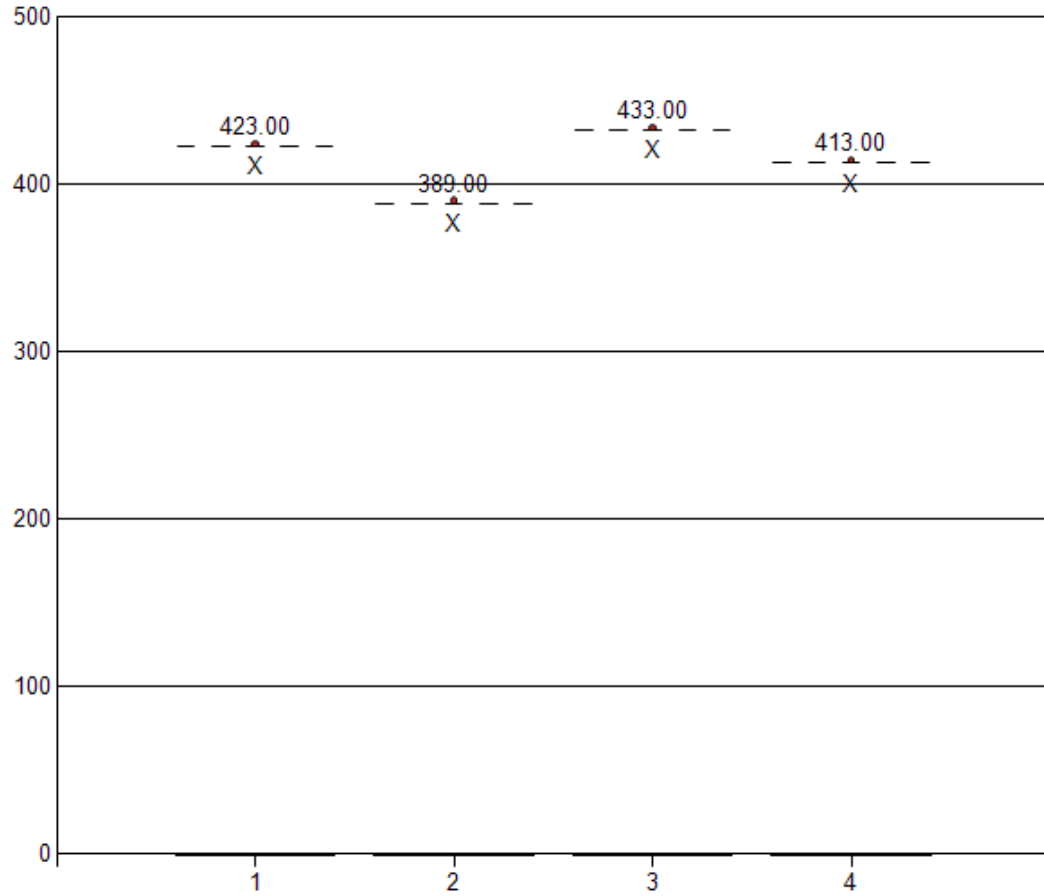
Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

Olsen



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

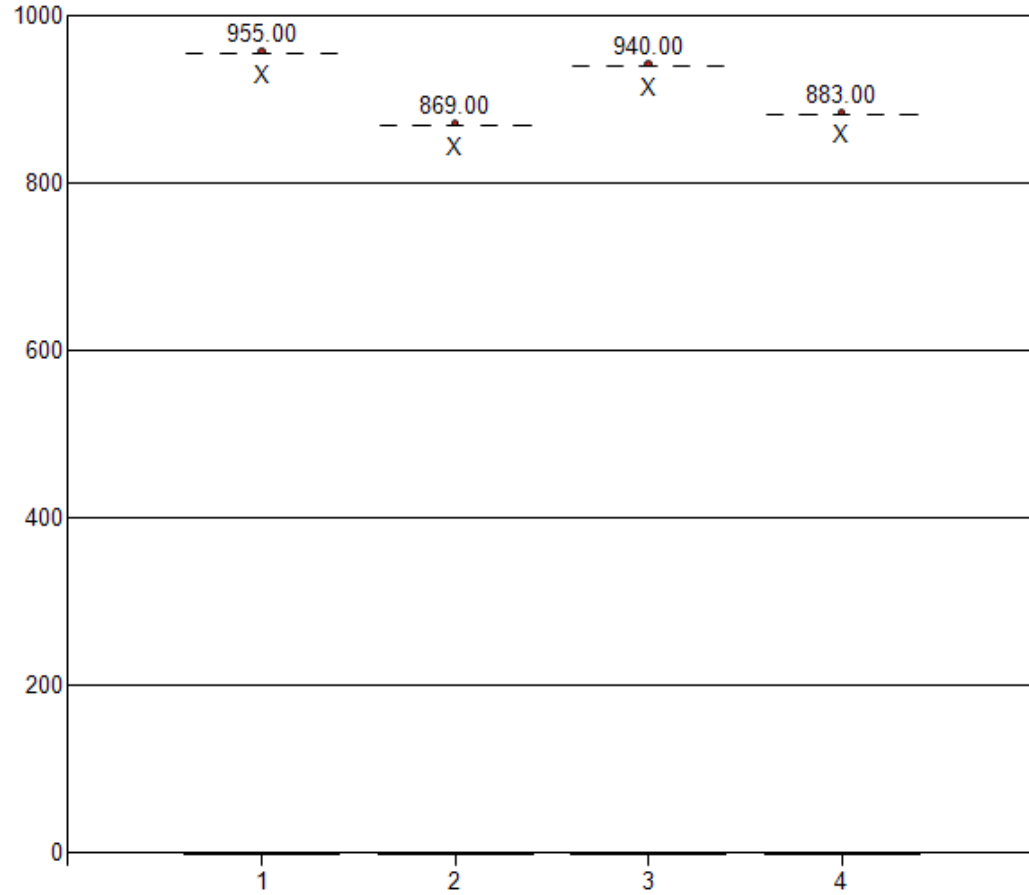


- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

K

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

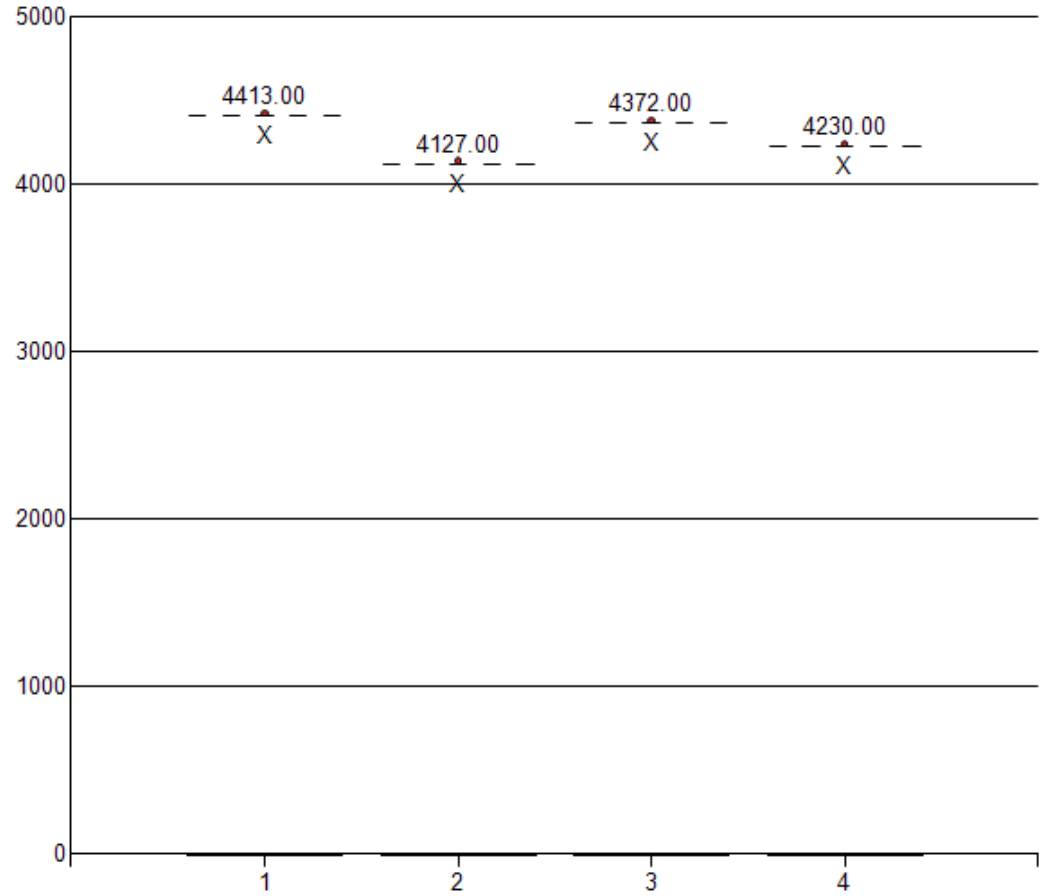
Mg



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

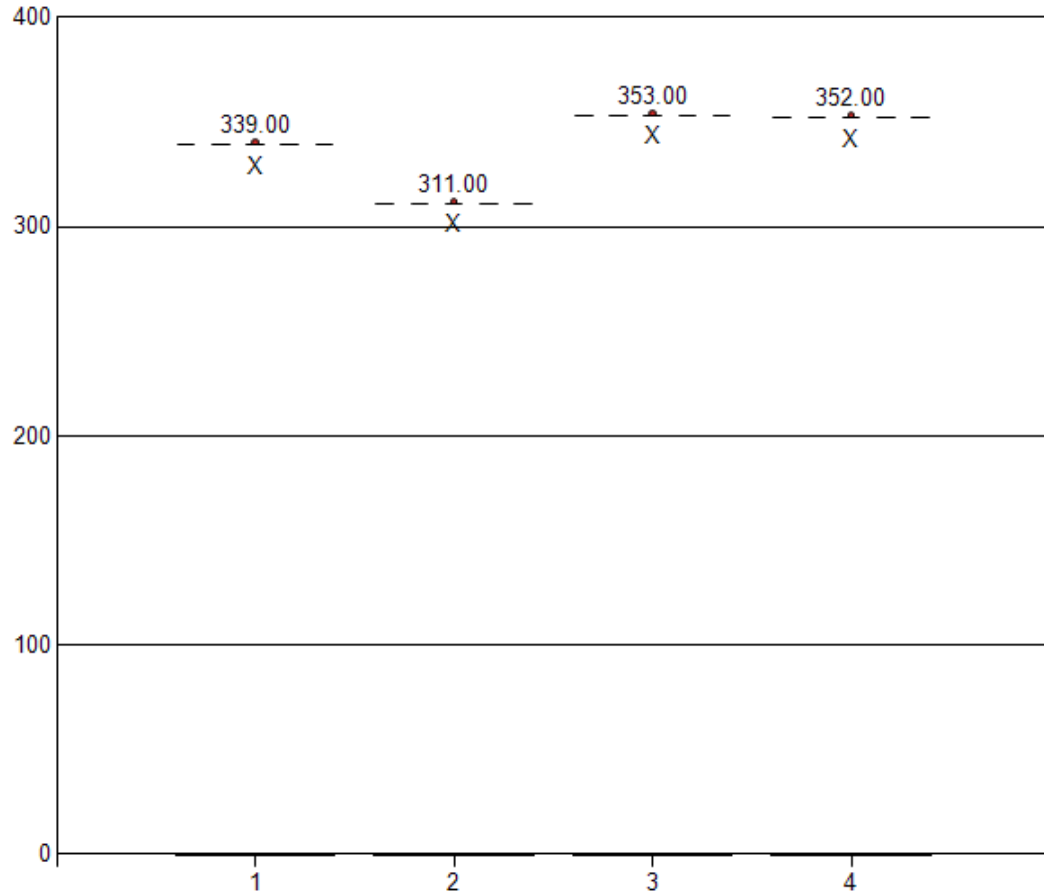
Ca



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

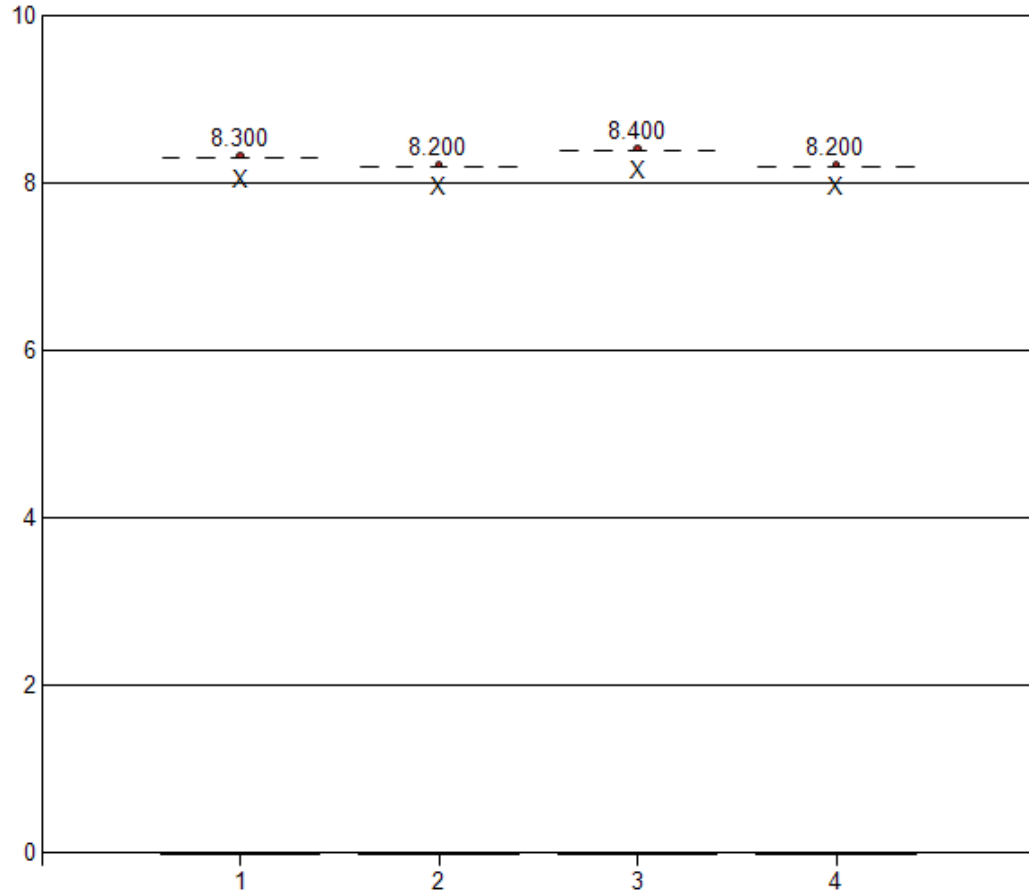
Na



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

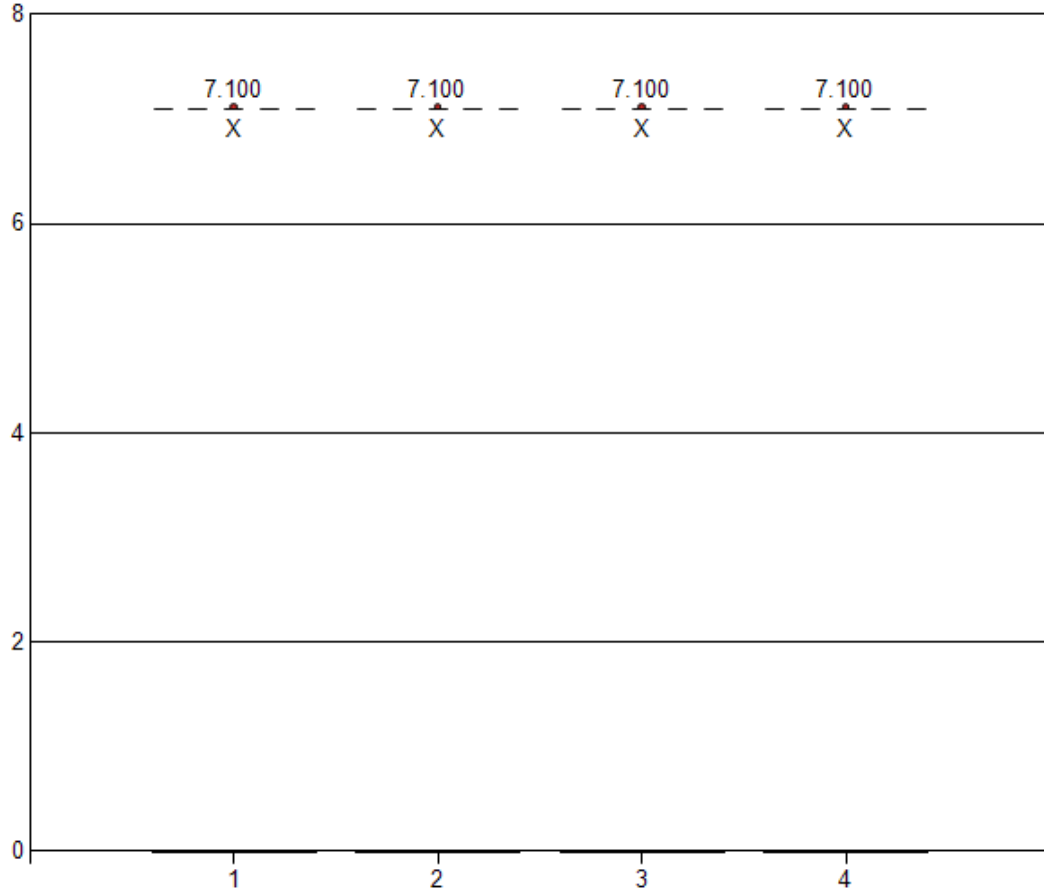
pH



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

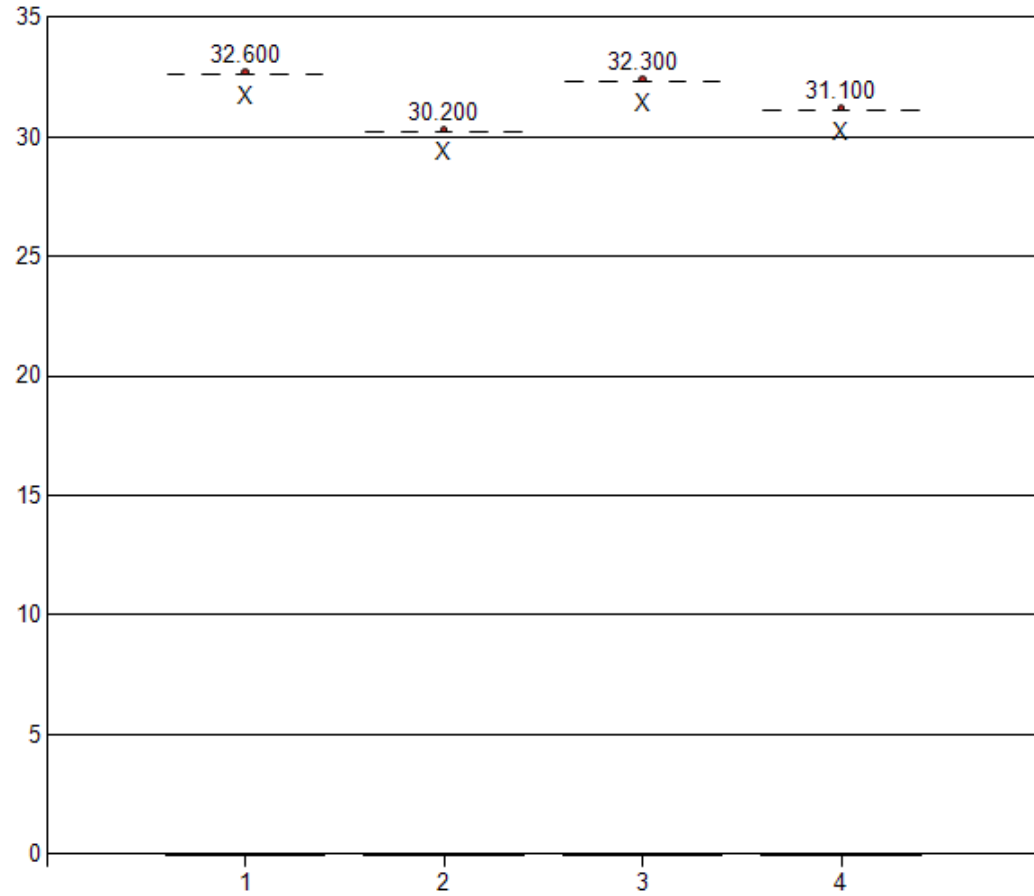
BpH



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

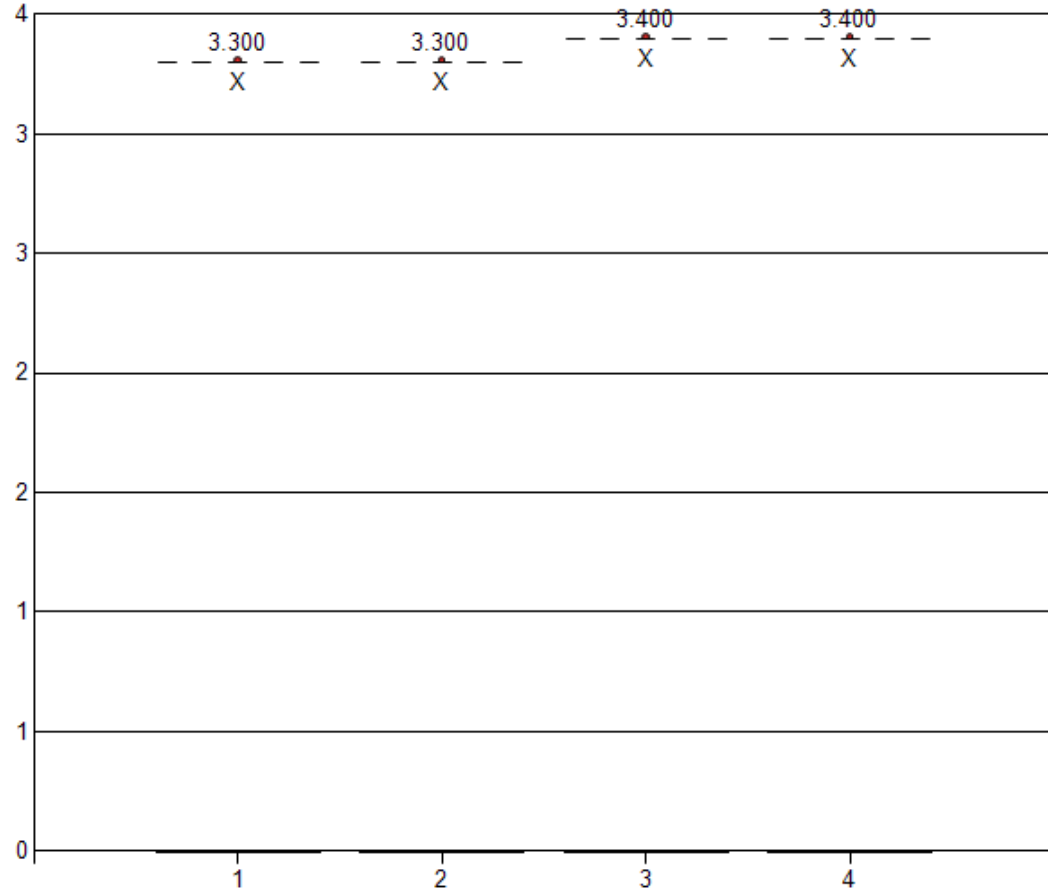
CEC



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

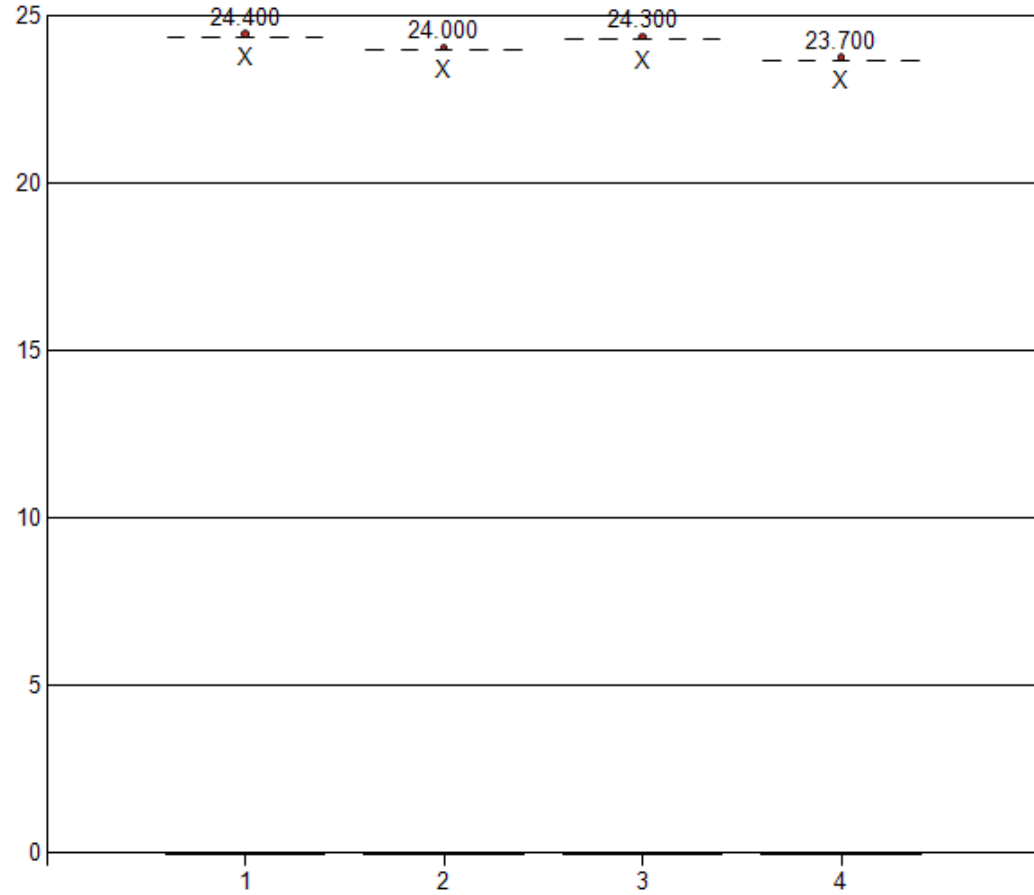
Percent K



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

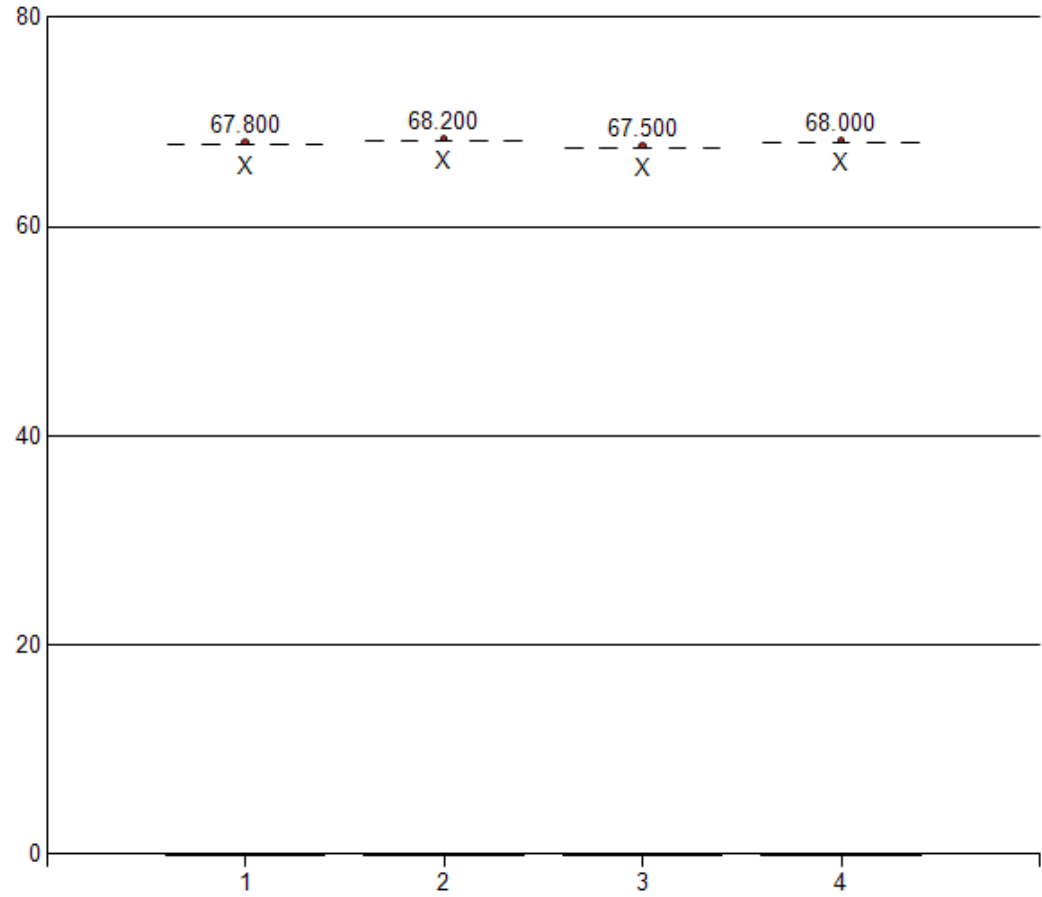
Percent Mg



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

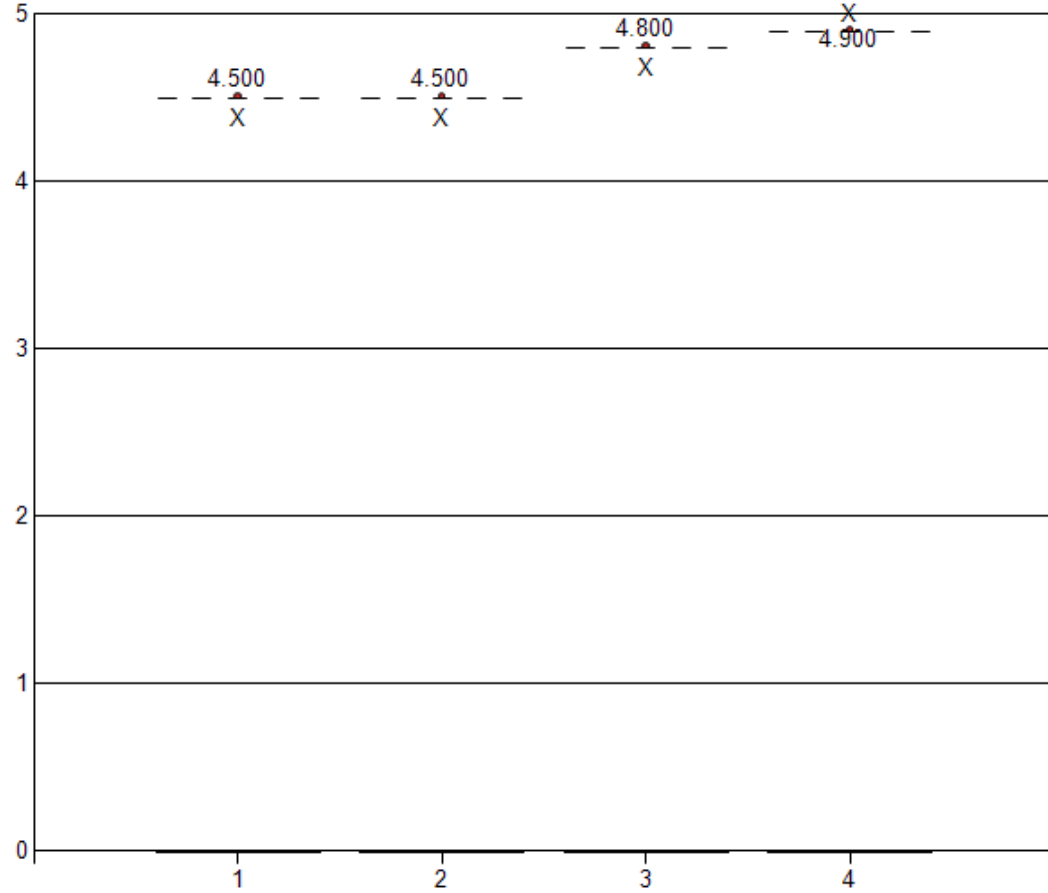
Percent Ca



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

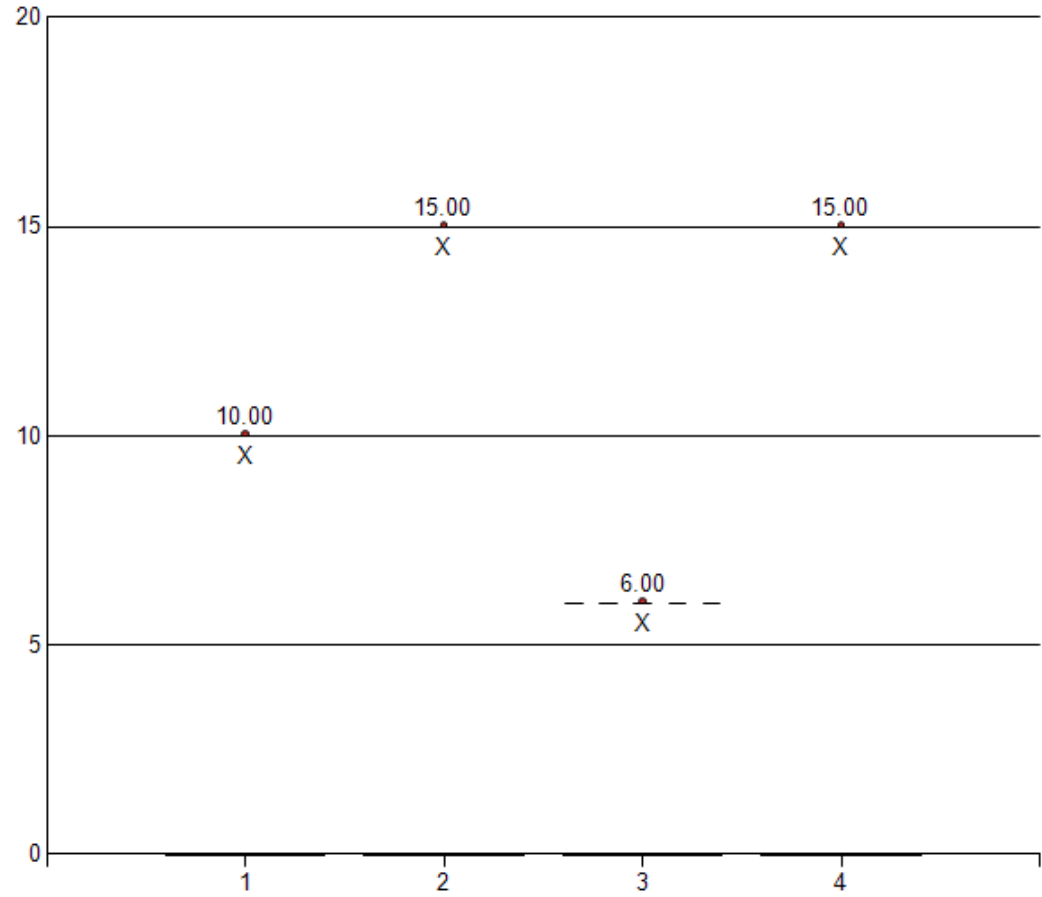
Percent Na



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

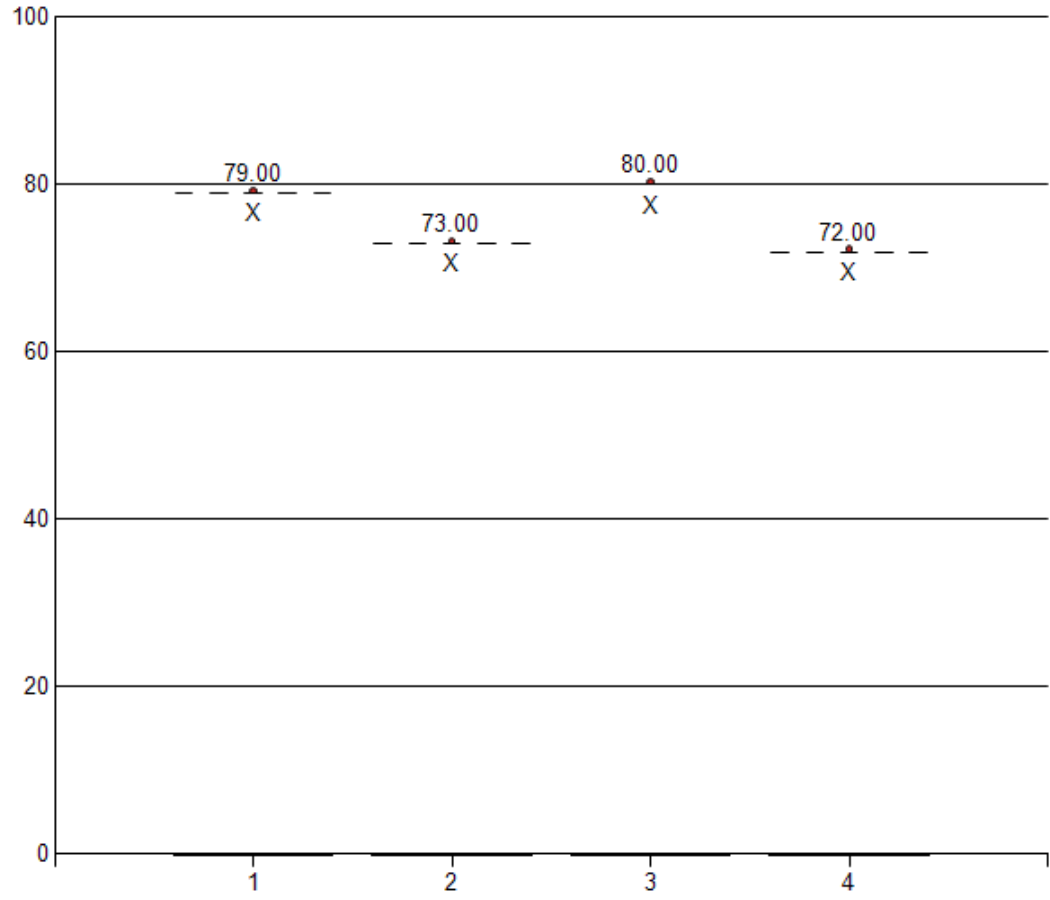
Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

NO3



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

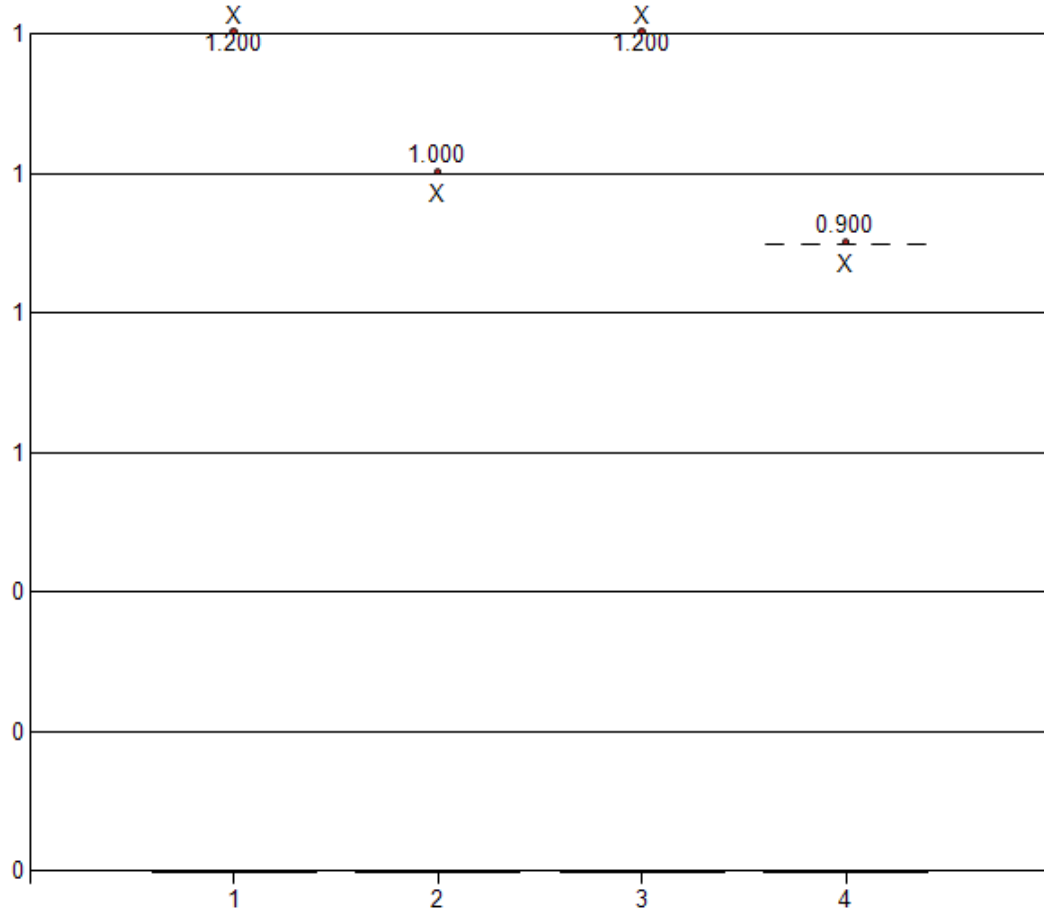


- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

5

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

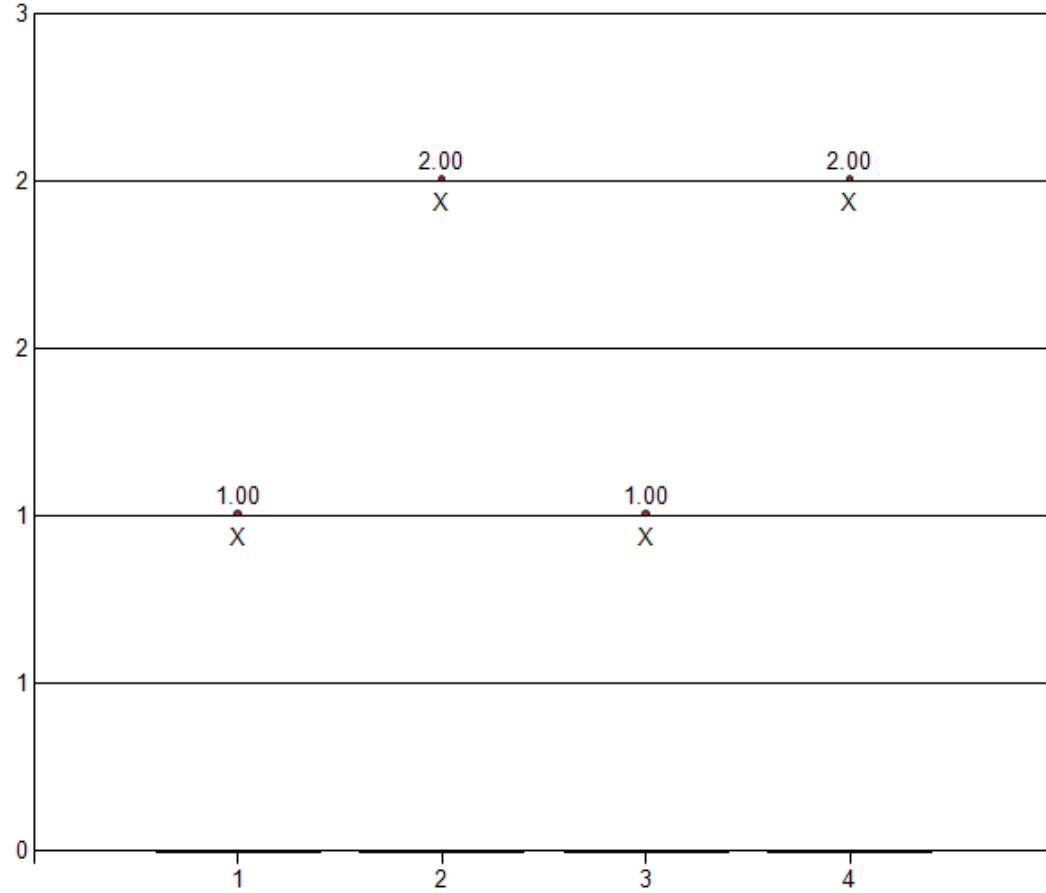
Zn



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

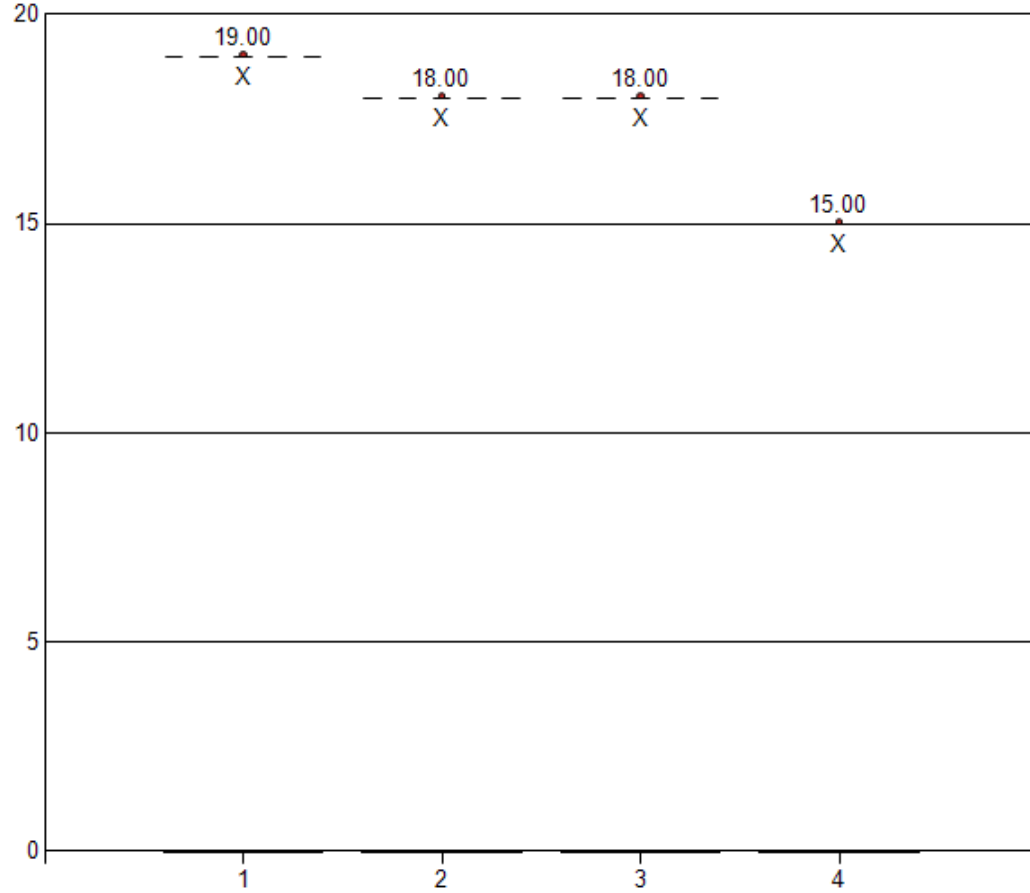
Mn



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

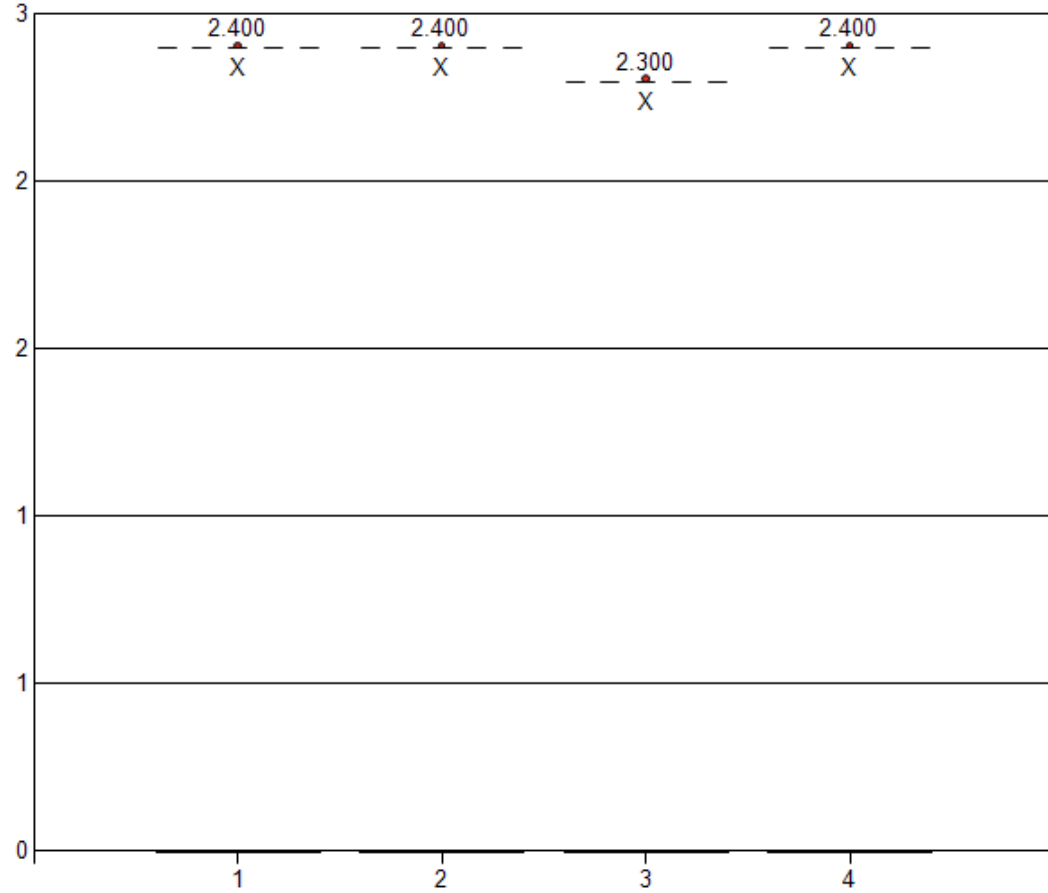
Fe



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

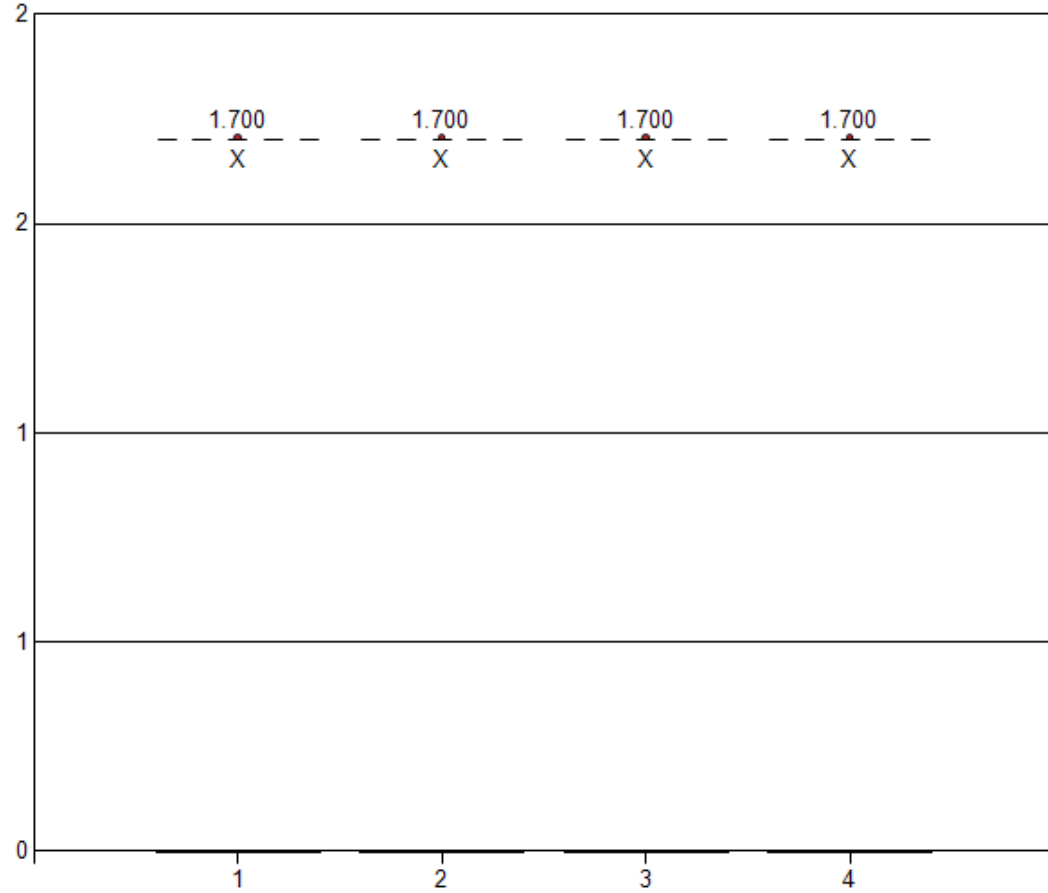
Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

Cu



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

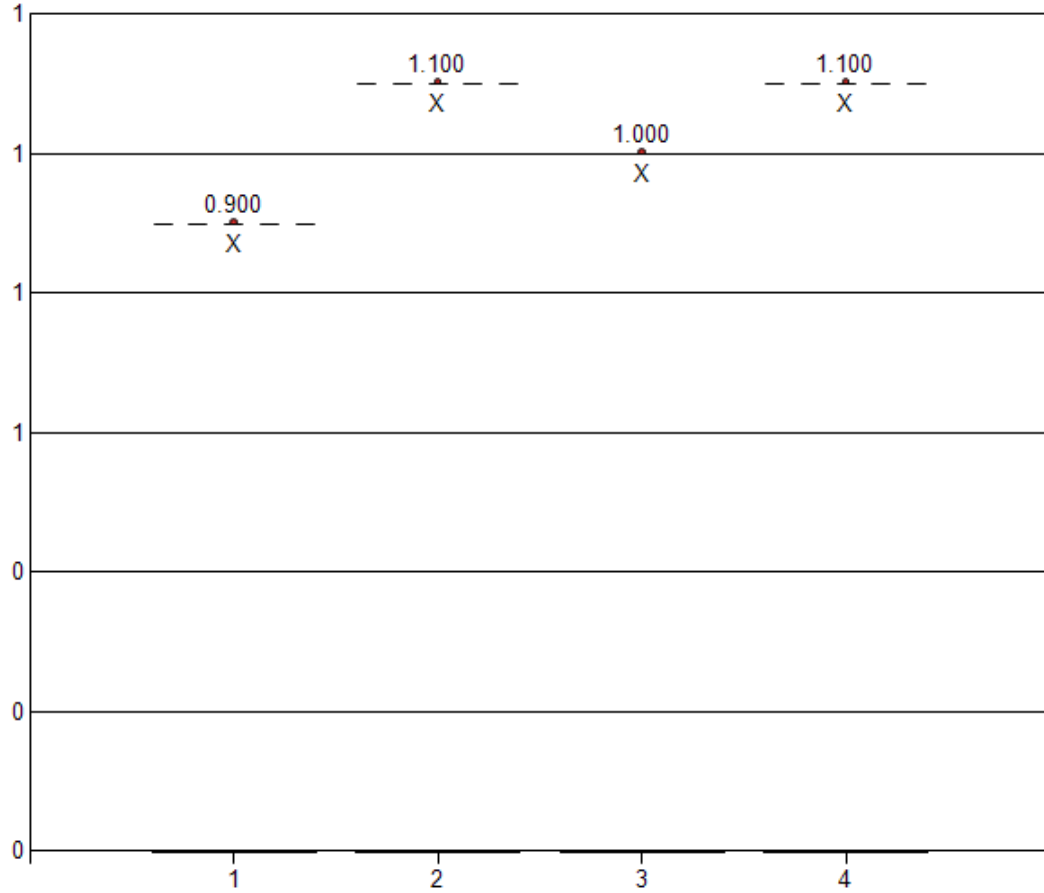


- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

B

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

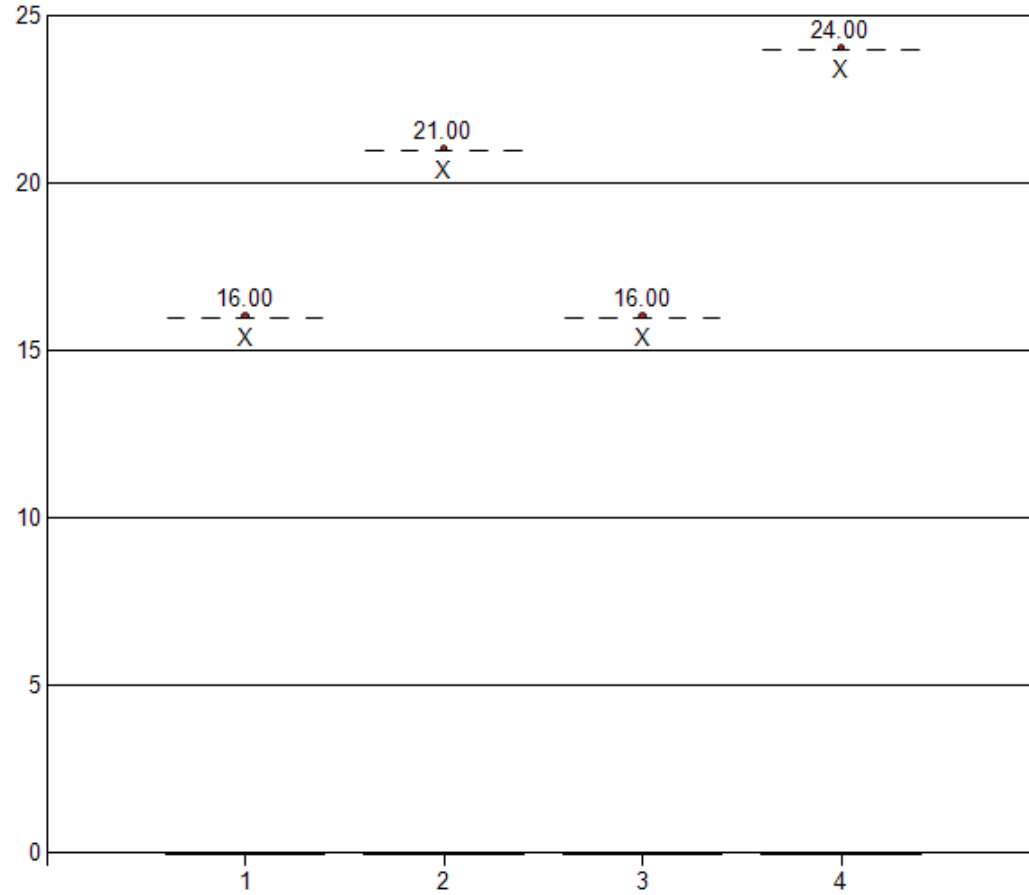
Sol Salts



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Yuma Romaine - RDX-N - Fall 2025 - End of Season Soil Samples

Bicarb



- 1 Full Fert - Grower Standard - 11-52 200 LB/A; Full Fert - Grower Standard - UAN-3
- 2 Full Fert + RDX-N - 11-52 200 LB/A; Full Fert + RDX-N - UAN-32 12 GAL/A; Full Fert
- 3 Reduced - Grower Standard - 11-52 100 LB/A; Reduced - Grower Standard - UAN-32 6
- 4 Reduced Fert + RDX-N - 11-52 100 LB/A; Reduced Fert + RDX-N - UAN-32 6 GAL/A; Redu

Plot Photos



Plot-2507
Trt-2



Plot-2607
Trt-4



Plot-2707

Trt-3



Plot-2807
Trt-1



Plot-2508
Trt-4



Plot - 2608
Trt - 1



Plot - 2708
Trt - 2



Plot-2808
Trt-3



Plot-2509
Trt-1



Plot-2609
Trt-2



Plot-2709
Trt-3



Plot-2809
Trt-4



Plot-2510

Trit-3



Plot-2610
Trt-1



Plot - 2710
Trit - 4



Plot-2810
Trt-2



Plot-2511
Trt-2



Plot-2611

Trt-4





Plot-2811
Trit-3



Plot-2512
Trit-1



Plot-2612
Trt-3



Plot-2712
Trit-2



Plot-2812
Trt-4