

QUALLS AGRICULTURAL LABORATORY RESEARCH ON STARTER FERTILIZER APPLICATION REDUCTION

OBJECTIVE

The objective of this trial research was to determine yield differences among continuous, banded in-furrow fertilizer applications and reduced applications centred around the seed piece. The results of this trial showed no significant differences among a variety of yield, grade and plant health measurements when fertility applications were reduced to simulate Precise Product Placement technology.

METHODOLOGY

Four treatments were applied and replicated:

- 1) A check treatment consisting of the Grower Standard Practice for the area (GSP) applied continuously in the furrow at a rate of 10 gallons per acre;
- 2) A 50% reduction in the 10 gallon per acre application rate and applied on half the linear distance (i.e. 6" of linear application relative the centre of the seed piece; or 3" prior to and following the placement of the seed piece);
- 3) A 50% reduction in the 15 gallon per acre application rate and applied on half of the linear distance (same as above); and
- 4) A 66% reduction in the 15 gallon per acre application rate applied on one third of the linear distance (4" of linear application relative to the centre of the seed piece; or 2" prior to and following the placement of the seed piece).

The trial was planted at Qualls Agricultural Laboratory in Ephrata, Washington State on April 29th, 2024. Potato planting was performed manually and fertilizer applications were made by hand spraying next to the seed piece prior to covering the rows. These methods allowed the most exact seed spacing and application accuracy, best simulating Precise Product Placement.

The variety used was Clearwater Russet. Normal in-season fertigation applications were made using center pivot sprinkler. Target total nitrogen 375-400 units of N/acre per season.

Ratings for emergence were taken at 2 time points, and ratings for row closure were taken at 3 timepoints. Additionally, ratings were taken for general plant health and the presence of phytotoxicity effects.

The trial was harvested on September 10, 2024. Yield data was taken using a processor grade from the centre 2 rows of a 4 row plot by 50' length. Yield data reported is as follows:

- Lbs of US #1 tubers in each plot
- Lbs of US # 2 tubers in each plot
- Lbs of culls and undersize tubers in each plot
- Tons of US #1 tubers/acre (calculated)

- Tons of US #2 tubers/acre (calculated)
- Tons of culls and undersize tubers/acre (calculated)
- Total yield of tubers tons/acre (calculated)
- Total yield of marketable tubers US #1s and #2s combined tons/acre.

RESULTS

Using the same rate and type of starter fertilizer on all treatments but varying the band length show no significant differences in yield.



LEFT: Banded fertilizer application
 RIGHT: Seed pieces in-furrow showing location of banded fertilizer application



LEFT: Emerged potato plant May 28, 2024 (29 days after planting)
 RIGHT: Aerial view of replicated research plots taken July 15, 2024 (77 days after planting)

Qualls Agricultural Laboratory

Bluefield Seeding Potato Seed Starter Fertilizer Reduction Trial

Trial ID: Bluefield_QAL_24-01_Potato
 Protocol ID: Bluefield_QAL_24-01 Location: Ephrata, WA Trial Year: 2024
 Study Director: Craig McCloskey Sponsor Contact:
 Investigator: Mark Qualls

Rating Date	May-28-2024	May-28-2024	Jun-7-2024	Jun-7-2024	Jun-17-2024	Jun-24-2024	Jul-15-2024	Sep-10-2024	Sep-10-2024	Sep-10-2024	
SE Description	Plant Stand	% General phyto>	Plant Stand	% General phyto>	% Row Closure	% Row Closure	% Row Closure	TUGR1, C	TUGR2, C	TUBUNM, C	
Part Rated	PLANT, -	PLANT, -	PLANT, -	PLANT, -	CANOPY, C	CANOPY, C	CANOPY, C	YIELD	YIELD	YIELD	
Rating Type	COUNT	PHYGEN	COUNT	PHYGEN	CABERO	CABERO	CABERO	LB	LB	LB	
Rating Unit	NUMBER	%	NUMBER	%	%	%	%	FT2	FT2	FT2	
Sample Size	100 ROWFT	1 PLOT	100 ROWFT	1 PLOT	1 PLOT	1 PLOT	1 PLOT	1 PLOT	1 PLOT	1 PLOT	
Collection Basis	1 PLOT	1 PLOT	1 PLOT	1 PLOT	1 PLOT	1 PLOT	1 PLOT	283.5 FT2	283.5 FT2	283.5 FT2	
Reporting Basis	100 ROWFT	1 PLOT	100 ROWFT	1 PLOT	1 PLOT	1 PLOT	1 PLOT				
Crop Name	Potato	Potato	Potato	Potato	Potato	Potato	Potato	Potato	Potato	Potato	
Crop Variety	Clearwater	Clearwater	Clearwater	Clearwater	Clearwater	Clearwater	Clearwater	Clearwater	Clearwater	Clearwater	
Days After First/Last Applic.	29, 29	29, 29	39, 39	39, 39	49, 49	56, 56	77, 77	134, 134	134, 134	134, 134	
Trt Treatment	Rate										
No. Name	Unit	1	2	3	4	5	6	7	8	9	10
1	GSP 10 gal/a	68.8 a	0.0 na	85.5 a	0.0 na	50.0 na	70.0 na	100.0 na	310.45 a	6.235 a	57.40 a
2	50% GSP 10 gal/a	67.0 a	0.0 na	90.3 a	0.0 na	50.0 na	70.0 na	100.0 na	312.33 a	5.375 a	60.03 a
3	50% of 1.5X GSP 15 gal/a	70.0 a	0.0 na	92.3 a	0.0 na	50.0 na	70.0 na	100.0 na	322.15 a	5.365 a	62.80 a
4	33% of 1.5X GSP 15 gal/a	68.3 a	0.0 na	86.5 a	0.0 na	50.0 na	70.0 na	100.0 na	321.10 a	6.855 a	64.63 a
LSD P=.05	11.17	.	6.40	.	.	.	.	25.371	5.1992	14.403
Standard Deviation	6.98	0.00	4.00	0.00	0.00	0.00	0.00	15.861	3.2503	9.004	
CV	10.2	0.0	4.52	0.0	0.0	0.0	0.0	5.01	54.56	14.71	
Levene's F^	2.283	.	1.582	.	.	.	.	0.10	0.217	1.35
Levene's Prob(F)	0.131	.	0.245	.	.	.	.	0.958	0.883	0.305
Shapiro-Wilk^	0.9535	.	0.9832	.	.	.	.	0.951	0.9158	0.9512
P(Shapiro-Wilk)^	0.5478	.	0.9837	.	.	.	.	0.5054	0.1445	0.5097
Skewness^	-0.39	.	0.2778	.	.	.	.	0.064	-0.7098	-0.076
P(Skewness)^	0.5362	.	0.6584	.	.	.	.	0.9186	0.2672	0.9035
Kurtosis^	-0.0142	.	0.0869	.	.	.	.	-0.8974	-0.4162	-0.701
P(Kurtosis)^	0.9907	.	0.9428	.	.	.	.	0.4627	0.7315	0.5648
Replicate F	2.245	NaN	1.191	NaN	NaN	NaN	NaN	NaN	5.464	1.760	0.245
Replicate Prob(F)	0.1523	NaN	0.3671	NaN	NaN	NaN	NaN	NaN	0.0205	0.2245	0.8631
Treatment F	0.126	NaN	2.501	NaN	NaN	NaN	NaN	NaN	0.568	0.199	0.495
Treatment Prob(F)	0.9421	NaN	0.1254	NaN	NaN	NaN	NaN	NaN	0.6500	0.8948	0.6945

Means followed by same letter or symbol do not significantly differ (P=.05, Duncan's New MRT).
 Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.
 Could not calculate LSD (% mean diff) or mean separation letters for columns 2,4,5,6,7 because error variance is 0.
 Mean separation letters are 'na' (not applicable) when error variance is 0
 ^Calculated from residual.

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 Protocol ID: Bluefield_QAL_24-01 Location: Ephrata, WA Trial Year: 2024
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Rating Date	Sep-10-2024	Sep-10-2024	Sep-10-2024	Sep-10-2024	Sep-10-2024	Sep-18-2024	Sep-18-2024	Sep-18-2024	Sep-18-2024	Sep-18-2024	
SE Description	TUGR1, C	TUGR2, C	TUBUNM, C	TUBTOT, C	TUBMAR, C	TUBER, C	TUBER, C	TUBER, C	TUBER, C	TUBER, C	
Part Rated											
Rating Type	YIELD	YIELD	YIELD	YIELD	YIELD	4-6 oz	6-8 oz	8-10 oz	10-14 oz	14 oz+	
Rating Unit	T-US	T-US	T-US	T-US	T-US	% of #1s	% of #1s	% of #1s	% of #1s	% of #1s	
Sample Size	1 A	1 A	1 A	1 A	1 A	1 PLOT	1 PLOT	1 PLOT	1 PLOT	1 PLOT	
Collection Basis	283.5 FT2	283.5 FT2	283.5 FT2	283.5 FT2	283.5 FT2	1 PLOT	1 PLOT	1 PLOT	1 PLOT	1 PLOT	
Reporting Basis				1 A	1 A						
Crop Name	Potato	Potato	Potato	Potato	Potato	Potato	Potato	Potato	Potato	Potato	
Crop Variety	Clearwater	Clearwater	Clearwater	Clearwater	Clearwater	Clearwater	Clearwater	Clearwater	Clearwater	Clearwater	
Days After First/Last Applic.	134, 134	134, 134	134, 134	134, 134	134, 134	142, 142	142, 142	142, 142	142, 142	142, 142	
Trt Treatment	11	12	13	14	15	16	17	18	19	20	
Rate											
No. Name											
1 GSP	10 gal/a	23.9 a	0.5 a	4.4 a	28.7 a	24.3 a	37.50 a	27.83 a	17.70 a	12.97 a	4.00 a
2 50% GSP	10 gal/a	24.0 a	0.4 a	4.6 a	29.0 a	24.4 a	38.96 a	27.11 a	18.11 a	12.18 a	3.64 a
3 50% of 1.5X GSP	15 gal/a	24.7 a	0.4 a	4.8 a	30.0 a	25.2 a	38.15 a	30.37 a	16.09 a	12.00 a	3.38 a
4 33% of 1.5X GSP	15 gal/a	24.7 a	0.5 a	5.0 a	30.2 a	25.2 a	37.79 a	27.89 a	16.68 a	14.56 a	3.08 a
LSD P=.05	1.95	0.40	1.11	2.45	2.00	5.709	3.167	3.437	4.670	2.669	
Standard Deviation	1.22	0.25	0.69	1.53	1.25	3.569	1.980	2.148	2.919	1.668	
CV	5.01	54.56	14.71	5.2	5.05	9.37	7.0	12.53	22.58	47.36	
Levene's F^	0.10	0.217	1.35	7.927*	0.412	0.191	0.45	0.482	0.351	1.24	
Levene's Prob(F)	0.958	0.883	0.305	0.004*	0.747	0.90	0.722	0.701	0.789	0.338	
Shapiro-Wilk^	0.951	0.9158	0.9512	0.9624	0.9505	0.9152	0.9525	0.9148	0.9549	0.9778	
P(Shapiro-Wilk)^	0.5054	0.1445	0.5097	0.7058	0.4971	0.1414	0.53	0.1389	0.5712	0.9438	
Skewness^	0.064	-0.7098	-0.076	0.2498	0.315	-0.2627	0.6177	0.5061	-0.4673	-0.3171	
P(Skewness)^	0.9186	0.2672	0.9035	0.6908	0.6165	0.6758	0.3318	0.4241	0.4598	0.6142	
Kurtosis^	-0.8974	-0.4162	-0.701	-0.6334	-0.839	-0.8673	0.2378	-1.0905	-0.0569	-0.1226	
P(Kurtosis)^	0.4627	0.7315	0.5648	0.6025	0.4918	0.4776	0.8444	0.3742	0.9625	0.9194	
Replicate F	5.464	1.760	0.245	3.573	6.297	0.273	1.095	0.142	0.218	1.800	
Replicate Prob(F)	0.0205	0.2245	0.8631	0.0599	0.0137	0.8432	0.4001	0.9322	0.8812	0.2172	
Treatment F	0.568	0.199	0.495	0.839	0.563	0.126	2.070	0.743	0.640	0.220	
Treatment Prob(F)	0.6500	0.8948	0.6945	0.5060	0.6528	0.9423	0.1745	0.5529	0.6082	0.8802	

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