Pulse Replicated On-Farm Independent Trials

Lentil Seeding Rate Trial

A typical seeding practice for small lentils involves a flat rate of 40 lbs/ac (0.67 bu/ac), while large lentils are commonly seeded at a rate of 90-95 lbs/ac (1.5–1.6 bu/ac). While these conventional seeding rates have successfully produced high-yielding lentil crops, a more precise approach can be applied. This will ensure producers are targeting an optimal plant stand and can adjust seeding rate according to seed size (thousand kernel weight, TKW) and seedling survivability. Ranges in seed size between varieties in a specific lentil market class can lead to differences in plant stand if seeded at a single rate across all varieties. A target lentil population of 12 plants/ft² is generally recommended; however, small-plot research has indicated that targeting populations higher than 12 plants/ft² may reduce weed biomass, increase yields, and maximize return.

Objective

To evaluate seeding rate of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

Treatments

Standard (12 plants/ft²)
High (18 plants/ft²)
Very High (24 plants/ft²)

Trials were set up in randomized strips with 3-4 replicates for a total of 8-12 plots. All plots were managed the same agronomically, besides the targeted seeding rates using TKW and germination, including seeding date, variety, seeding depth, seed treatment and inoculant, and pesticides.

Data Collection

- Seed and soil test
- Seeding information
- Field history and management practices
- In-season plant density
- Weighed yield and harvest sample
- General in-season observations
- Weather data

Terminology

Treatments: actual seeding rates applied by the producer at time of seeding

Density Groups: grouped according to plant counts conducted in the field

The follow footnotes will be referred to for the combined and individual site reports for this protocol

[1]SE is the standard error which is the same unit as the measurement and indicates the level of variability or uncertainty in the data

[2]SE was not record as the sample sizes are unequal and therefore standard error was different for each sample size

[3]Data was analysed with an ANOVA Mixed Model in JMP. The data was analyzed to meet the assumptions of ANOVA of normal distribution and equal variance. Test for normality using Shapiro Wilks and equal variance using Levene's. Data was transformed to meet the assumptions of ANOVA. A Tukey's HSD test was conducted to separate means. * A linear regression was used to determine the effect of plant density on yield. All treatment effects and differences between means were considered significant at $p \leq 0.05$; however, p-values of 0.05-0.1 may also be acknowledged. $P<0.05$ = likely that the difference was due to the treatment. $P<0.1$ = possible that the difference was due to the treatment. $P>0.1$ = not likely that the difference was due to the treatment

[4]The data was analyzed using an ANOVA Mixed Model in JMP, with replication nested in location both as a random effect. The treatment and density group were classified as a fixed effect. Means were separated using Tukey's at significance level of 0.05

[5]The data was analyzed using an ANOVA Mixed Model in JMP, where locations were grouped based on their response to seeding densities and plant densities. Replication was nested in location and treated as a random effect. The treatments were classified as a fixed effect. Means were separated using Tukey's HSD at significance level of 0.05 Distribution was tested for normality, to meet assumptions of ANOVA, transformations were used. Variance was tested for equality. Means were separated using Tukey's at significance level of 0.05

[6]The data from 2023 and 2024 was grouped based on their similar trends from the individual year analysis. Replication was nested in location, there was 33 site years. Data was tested for normality and equal variance. Data was transformed to meet assumptions and then back transformed for display of results. Replication and location were random effects and treatment/density group was fixed effects. Means were separated using Tukey's at significance level of 0.05

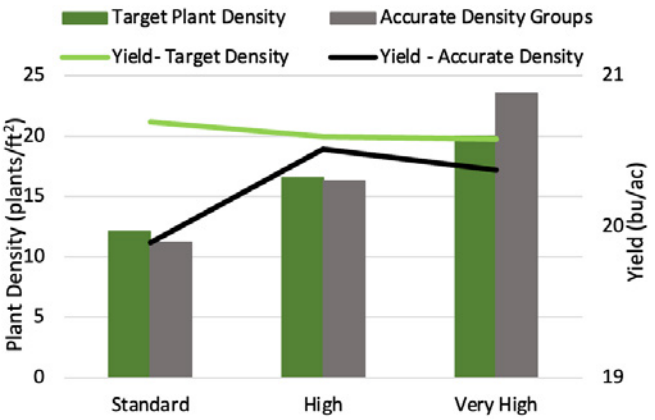
2023 Combined Results (12 sites)

When evaluating treatments the standard seeding rate showed a yield gain, but when considering plant densities groups that were observed in the field, a positive response to the higher seeding rate was seen over the standard. From an economic standpoint (not shown), using the yields from the treatments, the standard seeding rate resulted in the highest return, whereas, when classified by density group, the high seeding rate resulted in the highest return. Eight sites used twelve-inch row spacing, while nine operated with ten-inch spacing. Seedling mortality was not significantly different between the two row spacings. Yield was not analyzed due to being more dependent on location and precipitation versus row spacing.

Treatments[2]	Plant Density (plants/ft²)	Seedling Mortality (%)	Yield (bu/ac)	Thousand Kernel Weight (TKW)(g/1000s)	Protein (%)
Standard	12.1 C	13.9 B	21.2	41.7	24.1
High	16.6 B	19.1 B	20.0	41.8	24.2
Very High	20 A	24.9 A	19.8	41.8	23.9
p-value[4]	**<0.0001**	**<0.0001**	0.4337	0.9936	0.5565

Density Group[2]	Plant Density (plants/ft²)	Yield (bu/ac)	Thousand Kernel Weight (TKW)(g/1000s)	Protein (%)
Standard	11.2 C	19.9	41.0 B	24.3
High	16.3 B	20.5	41.9 AB	23.9
Very High	23.6 A	20.4	42.6 A	24.0
p-value[4]	**<0.0001**	0.868	**0.0378**	0.3302

Row Spacing (inches)[2]	Seedling Mortality (%)
Twelve	22.9
Ten	16.17
p-value[4]	0.1017



As seen below, data analysis initially revealed a clear division between the North/Central/West and South/Eastern locations, largely due to differences in precipitation. The majority of the locations located in North/Central/West SK (12/17) had a positive and statistically significant (p=0.0493) response to the high seeding rate over the standard, with a 2.3 bu/ac yield gain. The remaining five locations, mostly located in Southern SK had a slight positive response to the standard seeding rate. However, the yield was the same between the standard and very high which were both higher than the high seeding rate.

Southern Sask **exception Plenty* - 29% sites

Density Group[2]	Plant Density (plants/ft²)	Yield (bu/ac)	Thousand Kernel Weight (TKW)(g/1000s)	Protein (%)
Standard	9.6 C	23.7	39.9	24.2
High	14.5 B	20.7	40.3	24.4
Very High	21.9 A	23.7	40.5	24.6
p-value[4]	**<0.0001**	0.5052	0.1668	0.73

North West/Central Saskatchewan (71% sites)

Density Group[2]	Plant Density (plants/ft²)	Yield (bu/ac)	Thousand Kernel Weight (TKW)(g/1000s)	Protein (%)
Standard	11.9 C	19.6 B	41.6	24.3
High	16.8 B	22.0 A	42.5	23.8
Very High	24 A	21.1 AB	43.4	24
p-value[4]	**<0.0001**	**0.0493**	0.1543	0.2846

2024 Combined Results (16 sites)

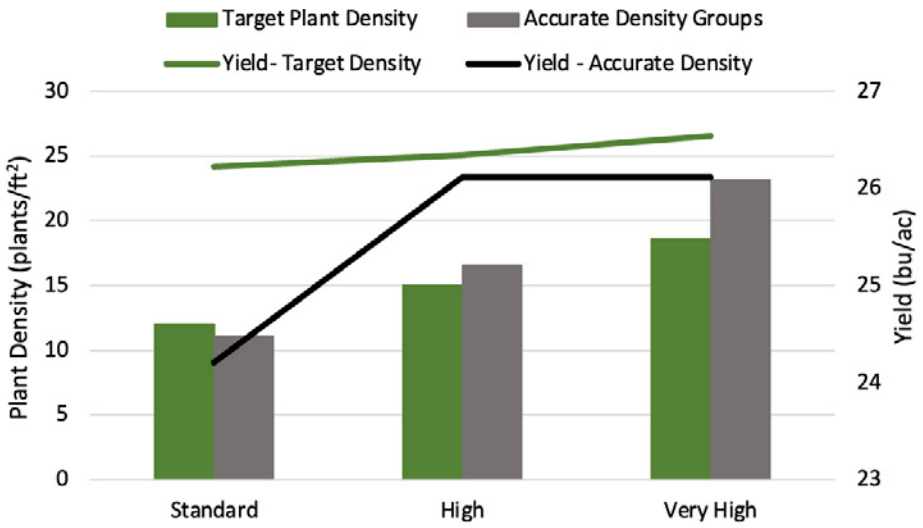
In 2024, the actual plant densities observed differed from the targeted seeding densities. When examining treatments or targeted seeding rates, plant density was the only significant factor influencing seeding rates. While not significant, there was also a 2.3 bu/increase from the very high seeding rate to standard. When analyzing plant density grouping data, significant trends were found between plant density and thousand kernel weights, and while not significant, there was a 1.9 bu/ac yield gain from the high and very high seeding rates compared to the standard. Economically (data not shown), the very high seeding rate yielded the highest return based on treatment yields. However, when examining the results by density groups, the high-density group produced the greatest return.

Treatments	Plant Density (plants/ft^2)	Seedling Mortality (%)	Yield (bu/ac)	Thousand Kernel Weight (TKW)(g/1000s)	Test Weight (TW) (kg/hL)	Protein (%)
Standard	12.0 C	14.5	24.2	36.8	80.7	12.6
High	15.0 B	26.5	25.1	36.6	81.0	12.7
Very High	18.6 A	31.6	26.5	36.5	81.1	12.7
SE[1]	0.505	2.2	2.3161	0.55	0.26	0.185
p-value[5]	**<0.0001**	**<0.0001**	0.1771	0.8229	0.2882	0.91

Seven sites used twelve-inch row spacing, while nine operated with ten-inch spacing. Seedling mortality was not significantly different between the two row spacings. Yield was not analyzed due to being more dependent on location and precipitation versus row spacing.

Density Group[2]	Plant Density (plants/ft^2)	Yield (bu/ac)	Thousand Kernel Weight (TKW)(g/1000s)	Test Weight (TW) (kg/hL)	Protein (%)
Standard	11.1 C	24.2	37.0	80.8	12.8
High	16.6 B	26.1	35.9	81.0	12.6
Very High	23.2 A	26.1	36.2	81.0	12.6
p-value[5]	**<0.0001**	0.1479	**0.0483**	0.4377	0.3439

Row Spacing (inches)[2]	Seedling Mortality (%)
Twelve	21.1
Ten	17.3
p-value[5]	0.724



Not shown: In 2024, no trends were observed between locations, indicating that responses were not more likely in specific areas of Saskatchewan. At 44% of sites, a significant yield response was observed with the high seeding rate, resulting in an approximate 3 bu/ac gain compared to the standard rate. At 25% of sites, the response to seeding rates was neutral, with a slight yield increase as seeding rates increased. However, 19% of sites experienced a slight yield decline with higher target seeding rates.

2023 and 2024 Combined (33 site years)

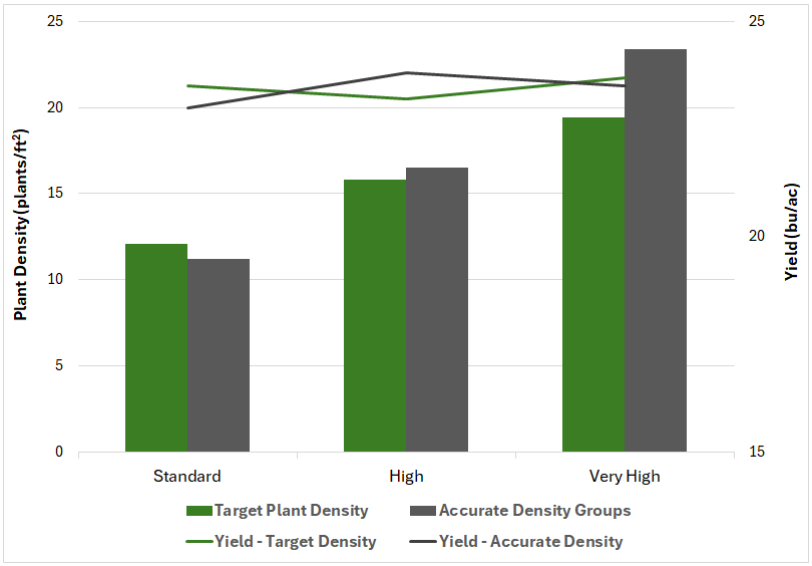
When all 33 site years of data were combined there were some significant trends observed. Plant density ($p<0.0001$) did significantly increase with seeding rates, but lower than targeted rates. This correlates to the fact that as seeding rates increased so did seedling mortality ($p<0.0001$). While not significant, very high had the highest yield but due to additional costs, standard would be the most economical. Alternatively, when looking at results based on density groups, high seeding rate would be the most economical.

Therefore, conducting plant counts is crucial for determining plant density, which helps assess seedling mortality. This information allows producers to make more informed agronomic decisions for their farms. If actual plant densities deviate from expectations, producers can take corrective actions, such as checking thousand kernel weight (TKW), germination rates, and drill calibrations.

Treatments[2]	Plant Density (plants/ft^2)	Seedling Mortality (%)	Yield (bu/ac)	Thousand Kernel Weight (TKW)(g/1000s)	Protein (%)
Standard	12.1 C	14.2 C	23.5	39.5	19.1
High	15.8 B	22.8 B	23.2	39.7	19.0
Very High	19.4 A	28.1 A	23.7	39.5	19.0
p-value[6]	**<0.0001**	**<0.0001**	0.7283	0.933	0.9491

Density Group[2]	Plant Density (plants/ft^2)	Yield (bu/ac)	Thousand Kernel Weight (TKW)(g/1000s)	Protein (%)
Standard	11.2 C	23.0	39.4	19.0
High	16.5 B	23.8	39.4	19.0
Very High	23.4 A	23.5	40.2	19.1
p-value[6]	**<0.0001**	0.6417	0.3027	0.9633

Row Spacing (inches)[2]	Seedling Mortality (%)
Twelve	23.3
Ten	20.5
p-value[6]	0.3281



Fifteen sites used twelve-inch row spacing, while eighteen operated with ten-inch spacing. Seedling mortality was not significantly different between the two, and yield was not analyzed due to being more dependent on location and precipitation versus row spacing.

Pulse Replicated On-Farm Independent Trials

Lentil Seeding Rate (Biggar 1)

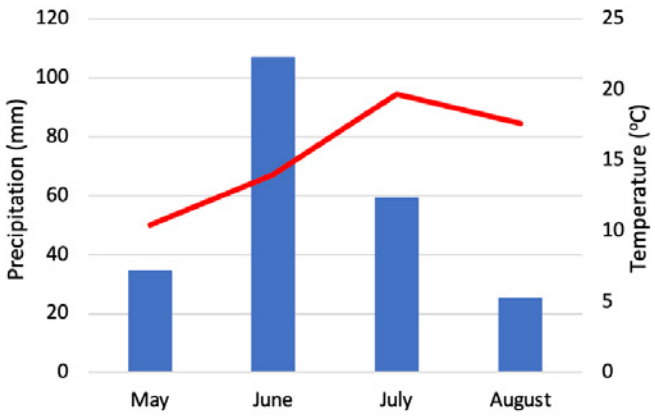
Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	46.9
2	High	20	70.3
3	Very High	26	93.8

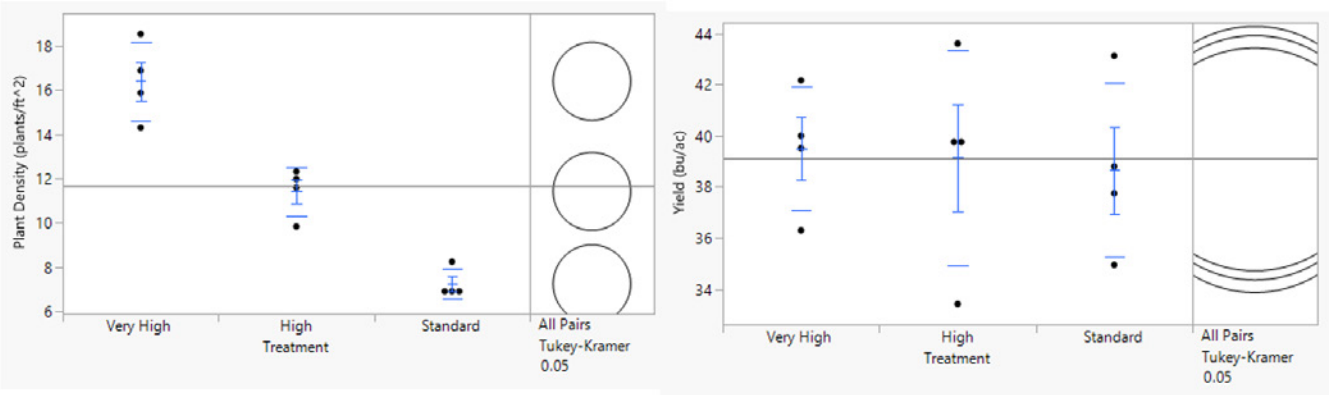
General Trial Information:

Variety	CDC Nimble
Thousand Kernel Weight	36.2 g
Germination	99%
Seed Treatment	Lumivia™ CPL + Active PRIME™ + Cruiser® Maxx with INTEGO®
Inoculant	LALFIX® Start
Previous Crop	Canola
Soil Organic Matter	4.2%
Residual Nitrate-N (0-6")	3 lb/ac
Soil Texture	Medium
Seeding Date	May 4
Seeding Equipment	Bourgault 3320 XTC 0.75" openers
Seeding Depth	1.25-1.5"
Seeding Speed	4.4 mph
Row Spacing	12"
Total Applied Fertilizer (lb/ac N-P-K-S)	4 – 21 – 0 – 0
Crop Protection	Fall '23: Flumioxazin + pyroxasulfone May 9: Imazethapyr + glyphosate June 11: Imazamox July 10: Clethodim + prothioconazole + pyraclostrobin July 23: Prothioconazole + trifloxystrobin + fluopyram August 12: Glyphosate + saflufenacil

Precipitation from rain gauge
Temperature from Environment Canada (Rosetown East)



	Plant Density (plants/ft²)	Seedling mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TKW) (g/1000s)	Test Weight (TW) (kg/hl)
Trt 1 – Standard – 13 plants/ft²	7.2	45.7	38.6	12.6	37.1	81.7
Trt 2 – High – 20 plants/ft²	11.4	42.9	39.1	12.5	36.3	82.8
Trt 3 – Very High – 26 plants/ft²	16.4	38.5	39.5	12.5	37.0	82.8
SE[1]	0.63255	2.8	1.7	0.0716	0.397	0.528
p-value[3]	**<0.0001**	0.233	0.9359	0.2481	0.4099	0.4198



Trt No.	Seeding Rate (lbs/ac)	Seed ($/ac)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ac)
1	46.9	21.11	3.24	24.35	38.6	18.00	694.80	670.45	0.00
2	70.3	31.64	4.86	36.50	39.1	18.00	704.46	667.96	-2.49
3	93.8	42.21	6.49	48.70	39.5	18.00	694.80	646.10	-24.35

[x]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed price $27/ac)
[y]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed treatment/inoculants $4.15/ac)
2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (target price $0.30/lb)

As seeding rate increased, plant density also increased ($p<0.0001$); however, this did not lead to significantly higher yields ($p=0.9359$). With yields similar across all treatments, the "standard" seeding rate provided the highest economic return. Seeding rate had no significant effect on seedling mortality or grain quality. It is important to note that actual plant densities observed in the field were substantially lower than the targeted seeding rates.

To review footnote references please refer to overall trial summary on page 92.

This trial was conducted with the agronomic support of

NORTHLAND AGRONOMY

Pulse Replicated On-Farm Independent Trials

Lentil Seeding Rate (Biggar 2)

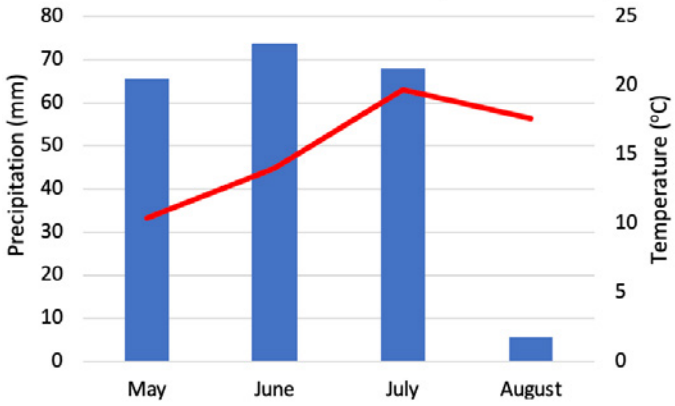
Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	53.2
2	High	20	79.8
3	Very High	26	106.4

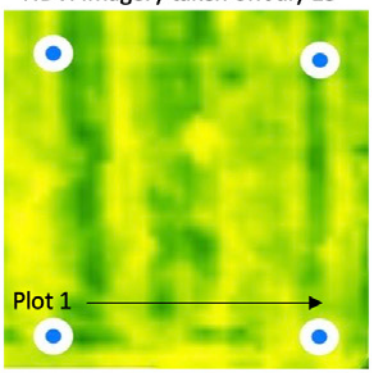
General Trial Information:

Variety	CDC Proclaim
Thousand Kernel Weight	41.1 g
Germination	99%
Seed Treatment	N/A
Inoculant	Primo GX2
Previous Crop	Barley
Soil Organic Matter	4.0%
Residual Nitrate-N (0-6")	15 lb/ac
Seeding Date	April 27
Seeding Equipment	Vaderstad .75" knife
Seeding Depth	1"
Seeding Speed	4.8 mph
Row Spacing	12"
Total Applied Fertilizer (lbs/ac N-P-K-S)	6 – 26 – 0 – 0
Crop Protection	Fall: Flumioxazin + pyroxasulfone June 11: Imazapyr July 4: Prothioconazole + trifloxystrobin + fluopyram July 25: Lambda-cyhalothrin July 25: Prothioconazole August 14: Diquat

Precipitation from rain gauge
Temperature from Environment Canada (Rosetown East)

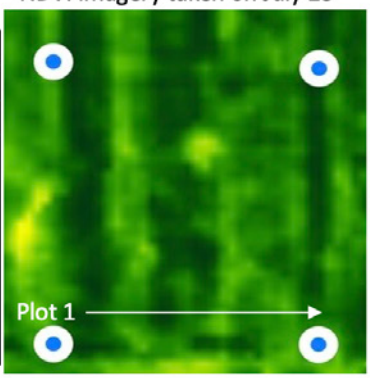


NDVI imagery taken on July 15th

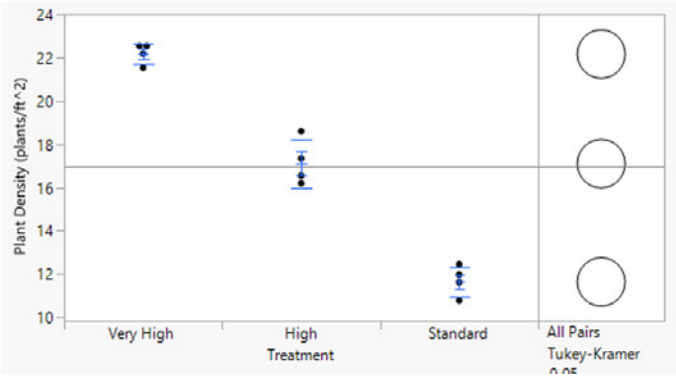


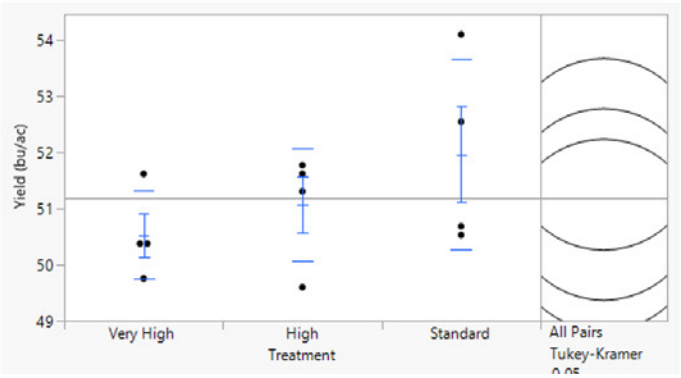
1			2			3			4		
1	2	3	4	5	6	7	8	9	10	11	12
3	2	1	2	1	3	2	3	1	1	2	3
Very High: 24 plants/ft²	High: 18 plants/ft²	Standard: 12 plants/ft²	High: 18 plants/ft²	Standard: 12 plants/ft²	Very High: 24 plants/ft²	High: 18 plants/ft²	Very High: 24 plants/ft²	Standard: 12 plants/ft²	Standard: 12 plants/ft²	High: 18 plants/ft²	Very High: 24 plants/ft²

NDVI imagery taken on July 23rd



	Plant Density (plants/ft²)	Seedling mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TKW) (g/1000s)	Test Weight (TW) (kg/hl)
Trt 1 – Standard –13 plants/ft²	11.6 C	12.7	51.9	13.0	37.5	81.2
Trt 2 – High – 20 plants/ft²	17.1 B	14.5	51.1	13.1	37.7	81.2
Trt 3 – Very High – 26 plants/ft²	22.2 A	16.9	50.5	13.1	38.2	80.9
SE[1]	0.40235	2.3	0.61	0.077	0.38	0.346
p-value[3]	**<0.0001**	0.4188	0.271	0.5122	0.4691	0.6463





Trt No.	Seeding Rate (lbs/ac)	Seed ($/ac)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ac)
1	53.2	23.94	3.68	27.62	51.9	18.00	934.20	906.58	0.00
2	79.8	35.91	5.52	41.43	51.1	18.00	919.80	878.37	-28.21
3	106.4	47.88	7.36	55.24	50.5	18.00	909.00	853.76	-52.82

[x]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed price $27/ac)
[y]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed treatment/inoculants $4.15/ac)
[z]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (target price $0.30/lb)

As seeding rates increased, plant density also rose significantly ($p<0.0001$). However, this increase in density did not correlate with higher yields ($p=0.271$), meaning the “standard” seeding rate provided the highest economic return. Seedling mortality also increased, but this change was not statistically significant ($p=0.4188$). Seeding rates had minimal impact on grain quality, with no significant differences observed. It is important to note that actual plant densities were lower than the targeted seeding rates.

To review footnote references please refer to overall trial summary on page 92.

Pulse Replicated On-Farm Independent Trials

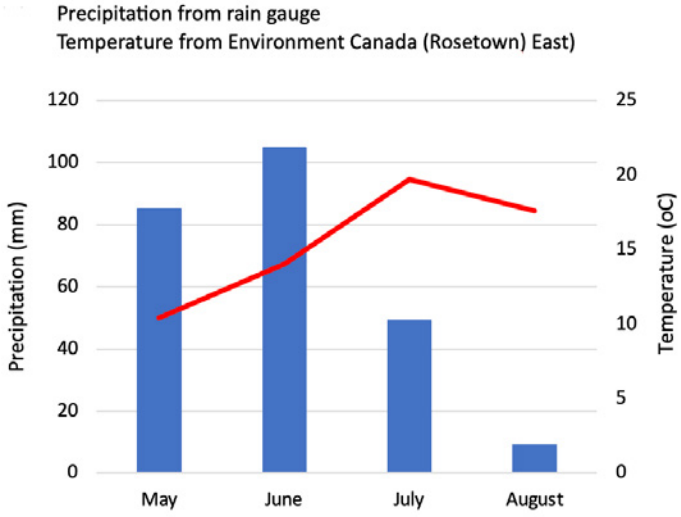
Lentil Seeding Rate (Biggar 3)

Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

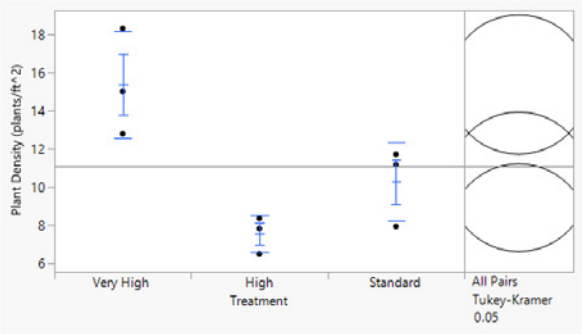
Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	50.2
2	High	20	75.3
3	Very High	26	100.4

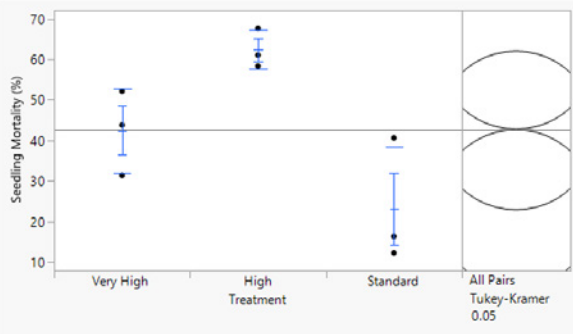
General Trial Information:

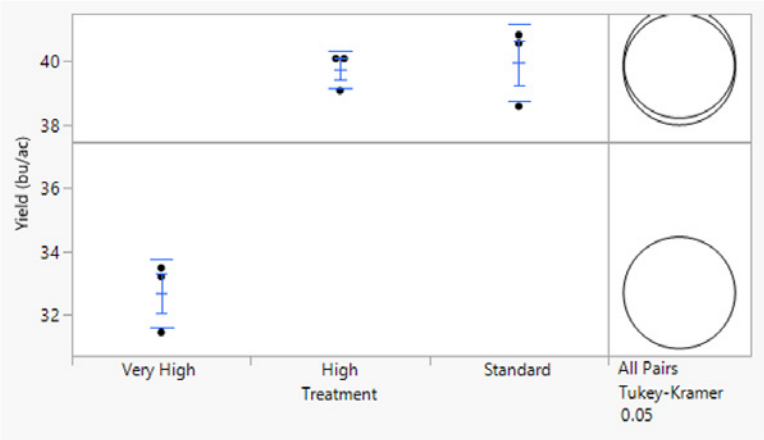
Variety	CDC Proclaim
Thousand Kernel Weight	38.8 g
Germination	99%
Seed Treatment	Insure® Pulse
Inoculant	TagTeam®
Previous Crop	Canola
Soil Organic Matter	3.9%
Residual Nitrate-N (0-6")	8 lb/ac
Soil Texture	Medium
Seeding Date	April 30
Seeding Equipment	Bourgault
Seeding Depth	.75"
Seeding Speed	5.2 mph
Row Spacing	10"
Total Applied Fertilizer (lbs/ac N-P-K-S)	13 – 62 – 0 – 0
Crop Protection	April 30: Glyphosate + carfentrazone-ethyl June 9: Imazamox + clethodim July 5 + 18: Pyraclostrobin + Boron + picoxystrobin July 18: Lambda-cyhalothrin August 20: Glyphosate August 23: Diquat



	Plant Density (plants/ft²)	Seedling mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TKW) (g/1000s)	Test Weight (TW) (kg/hl)
Trt 1 – Standard – 13 plants/ft²	10.3 AB	23.1 B	40.0 A	13.3	32.9	83.6
Trt 2 – High – 20 plants/ft²	7.5 B	62.3 A	39.7 A	13.3	32.8	83.7
Trt 3 – Very High – 26 plants/ft²	15.4 A	42.4 AB	32.7 B	13.3	33.3	82.5
SE[1]	1.1929	6.4	0.57	0.32	0.4107	0.493
p-value[3]	**0.0085**	**0.0114**	**0.0003**	0.997	0.628	0.9517







Trt No.	Seeding Rate (lbs/ac)	Seed ($/ac)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/Loss ($/ac)
1	50.2	22.60	3.47	26.07	40.0	18.00	720.00	693.93	0.00
2	75.3	33.90	5.21	39.11	39.7	18.00	714.60	675.49	-18.44
3	100.4	45.20	6.95	52.15	32.7	18.00	588.60	536.45	-157.47

[x]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed price $27/ac)
[y]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed treatment/inoculants $4.15/ac)
[z]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (target price $0.30/lb)

Plant density, seedling mortality, and yield all showed significant responses to seeding rates. The “high” seeding rate resulted in the lowest plant density and the highest seedling mortality. In contrast, the “standard” seeding rate produced the highest yields and was the most economical. Seeding rate had no significant impact on grain quality. It is also important to highlight that actual plant densities were lower than the targeted seeding rates.

To review footnote references please refer to overall trial summary on page 92.

Pulse Replicated On-Farm Independent Trials

Lentil Seeding Rate

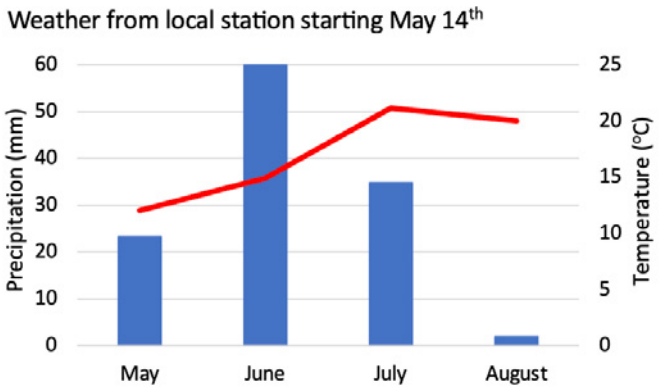
(Elrose 1)

Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	41.3
2	High	20	62.0
3	Very High	26	82.7

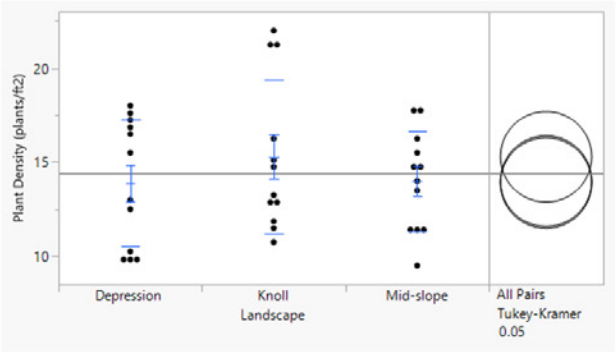
General Trial Information:

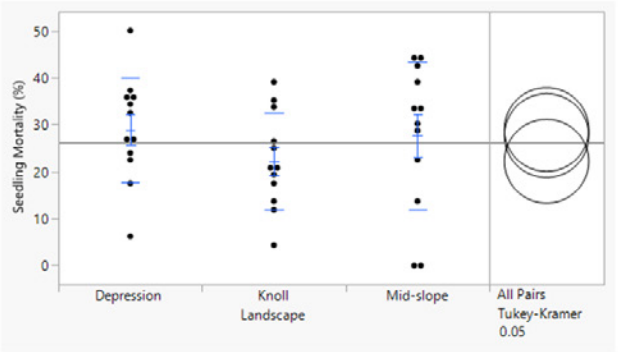
Variety	CDC Kermit
Thousand Kernel Weight	31.9 g
Germination	99%
Seed Treatment	ProTec®
Inoculant	Nodulator® Duo
Previous Crop	Durum
Soil Organic Matter	5.3%
Residual Nitrate-N (0-6")	18 lbs/ac
Soil Texture	Fine
Seeding Date	May 19
Seeding Equipment	K-Hart Spyder
Seeding Depth	1-1.5"
Seeding Speed	4.7-7 mph
Row Spacing	10"
Total Applied Fertilizer (lbs/ac N-P-K-S)	2 – 10 – 0 – 0
Crop Protection	May 30: Glyphosate June 30: Clethodim July 15: Lambda-cyhalothrin + metribuzin August 10: Diquat



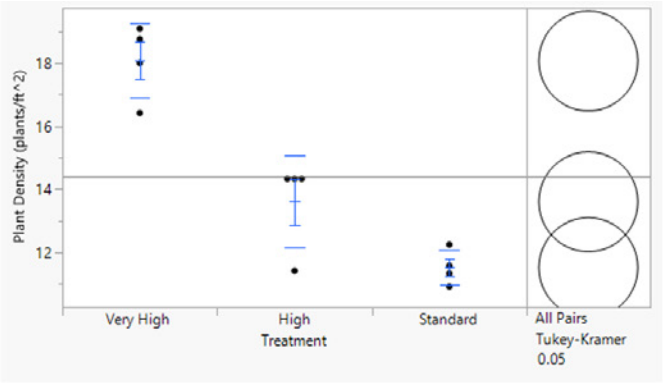
Landscape	Plant Density (plants/ft²)	Seedling Mortality (%)
Depression	13.9	29.0
Mid-Slope	14.0	27.7
Knoll	15.3	22.2
SE[1]	1.0	5.1
p-value[3]	0.579	0.3893

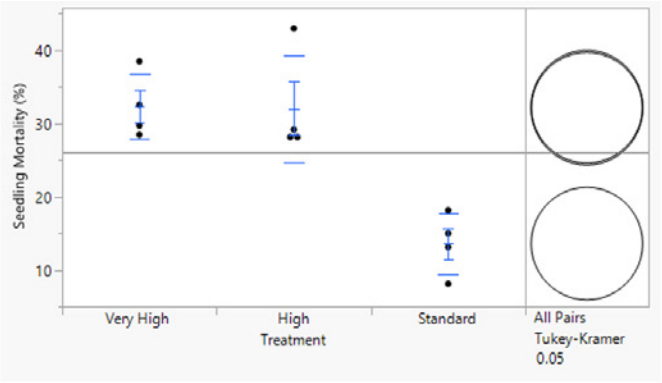
Plant densities increased and seedling mortality decreased from depressions to mid-slopes to knolls, likely due to the higher moisture levels in the depressions. However, no statistically significant differences were observed overall.

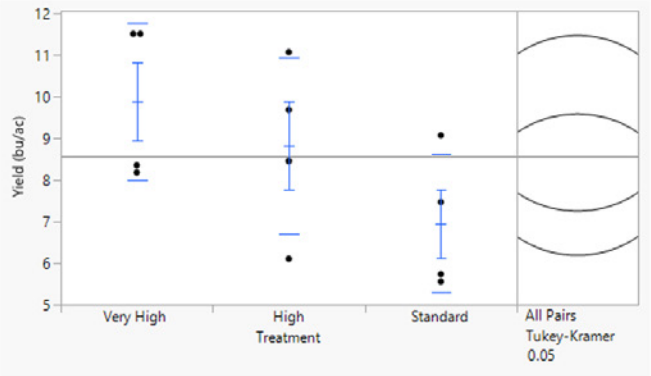




	Plant Density (plants/ft²)	Seedling Mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TKW) (g/1000s)	Test Weight (TW) (kg/hl)
Trt 1 – Standard – 13 plants/ft²	11.5 B	13.6 B	6.9	18.9	24.5	83.7
Trt 2 – High – 20 plants/ft²	13.6 B	32.0 A	8.8	18.9	26.2	83.5
Trt 3 – Very High –26 plants/ft²	18.1 A	32.3 A	9.9	19.1	25.0	83.6
SE[1]	0.5666	2.7484	0.94	0.2549	0.89	0.26768
p-value[3]	**<.0001**	**0.0025**	0.1251	0.911	0.4224	0.9073







Trt No.	Seeding Rate (lbs/ac)	Seed ($/ac)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/Loss ($/ac)
1	41.3	35.11	2.85	37.96	6.9	30.00	207.00	169.04	0.00
2	62.0	52.70	4.29	56.99	8.8	30.00	264.00	207.01	37.97
3	82.7	70.30	5.72	76.01	9.9	30.00	297.00	220.99	51.95

[x]2024 Small Green Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 91lb/ac; seed price $77.35/ac)
[y]2024 Small Green Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 91lb/ac; seed treatment/inoculants $6.29/ac)
2024 Small Green Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (estimated farm gate price $0.50/lb)

Seeding rate had a significant effect on plant density (p<0.0001), with densities increasing as seeding rates rose. However, the “high” and “very high” seeding rates were not fully achieved, which is an important consideration. No significant differences in yield or grain quality were observed across treatments. Despite higher mortality at the “very high” seeding rate, it generally yielded the highest returns, though this difference was not statistically significant. Seedling mortality increased with higher seeding rates (p=0.0025), and as a result, actual plant densities did not align with the targeted seeding rates.

To review footnote references please refer to overall trial summary on page 92.

This trial was conducted with the agronomic support of

MNP AgINTELLECT

Pulse Replicated On-Farm Independent Trials

Lentil Seeding Rate (Elrose 2)

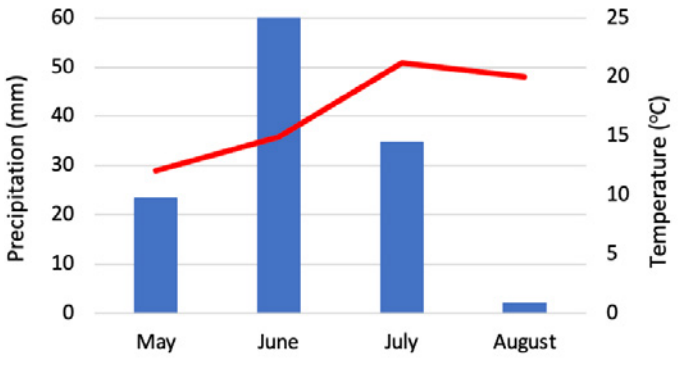
Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	50.0
2	High	20	74.9
3	Very High	26	99.9

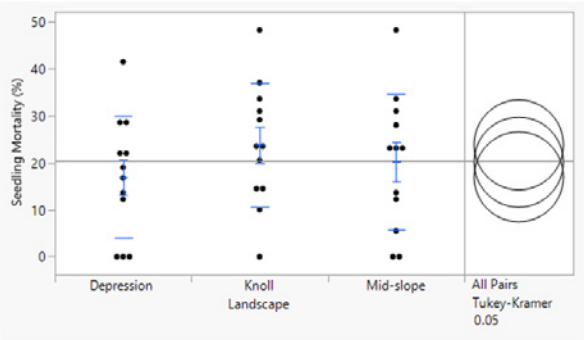
General Trial Information:

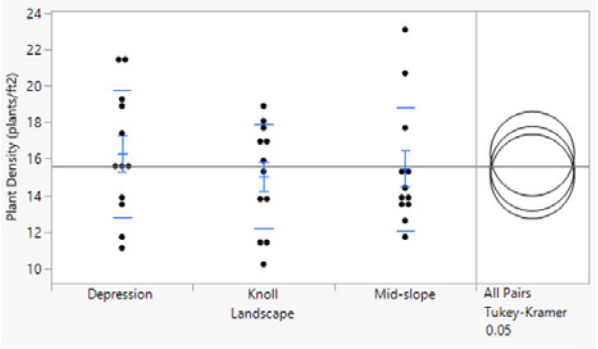
Variety	CDC Simmie
Thousand Kernel Weight	38.6 g
Germination	99%
Seed Treatment	Prosper® EverGol
Inoculant	N-Take™
Previous Crop	Wheat
Soil Organic Matter	3.2%
Residual Nitrate-N (0-6")	10 lb/ac
Soil Texture	Medium
Seeding Date	May 23
Seeding Equipment	K-Hart Spyder
Seeding Depth	1.5"
Seeding Speed	5.6 mph
Row Spacing	10"
Total Applied Fertilizer (lbs/ac N-P-K-S)	3 – 10 – 10 – 0
Crop Protection	May 22: MCPA + pyraflufen-ethyl + Glyphosate June 18: Rynaxypyr June 19: Metribuzin July 11: Prothioconazole + trifloxystrobin + fluopyram July 30: Lambda-cyhalothrin August 9: Glyphosate + saflufenacil

Weather obtained from local station from May 14th



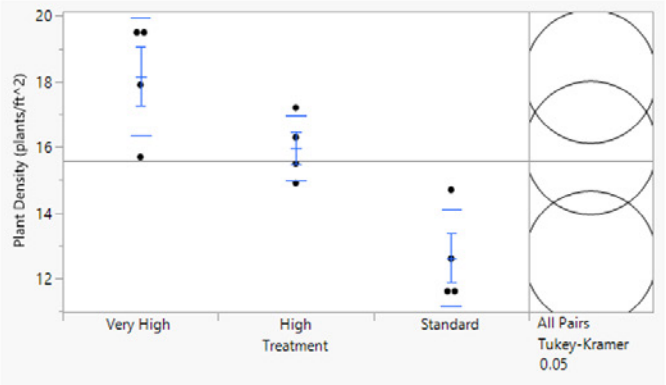
Landscape[2]	Plant Density (plants/ft²)	Seedling Mortality (%)
Depression	16.3	17.0
Mid-slope	15.5	20.1
Knoll	15.0	23.8
p-value[3]	0.6214	0.4407

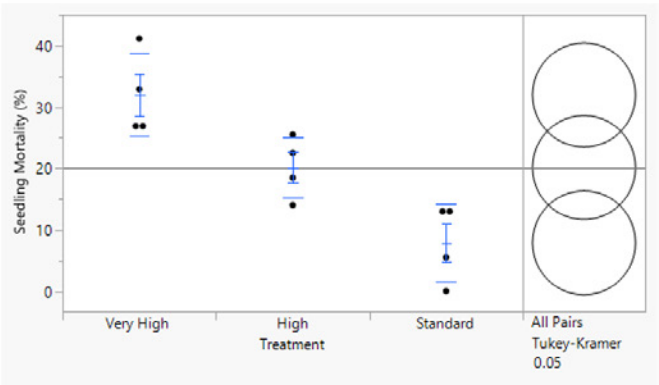




There were no significant responses in plant density or seedling mortality based on landscape topography. On average, depression had the highest plant density and lowest mortality, which could be due to higher moisture.

	Plant Density (plants/ft²)	Seedling mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TKW) (g/1000s)	Test Weight (TW) (kg/hl)
Trt 1 – Standard –13 plants/ft²	12.6	7.8	17.1	12.1	28.9	81.1
Trt 2 – High – 20 plants/ft²	16.0	20.1	17.6	11.9	29.0	81.2
Trt 3 – Very High –26 plants/ft²	18.2	31.9	17.3	12.2	28.9	81.5
SE[1]	0.72849	3.03	1.1	0.056	0.45	0.351
p-value[3]	**0.0012**	**0.0009**	0.9498	0.1766	0.9836	0.7517





Trt No.	Seeding Rate (lbs/ac)	Seed ($/ac)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ac)
1	50.0	22.50	3.46	25.96	17.1	18.00	307.94	281.98	0.00
2	74.9	33.71	5.18	38.89	17.6	18.00	316.22	277.34	-4.65
3	99.9	44.96	6.91	51.86	17.3	18.00	311.12	259.26	-22.73

[x]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed price $27/ac)
[y]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed treatment/inoculants $4.15/ac)
[z]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (target price $0.30/lb)

Seeding rate significantly effected plant density (p=0.0012) and seedling mortality (p=0.0009), but did not have a significant impact on yield or grain quality. With yields similar across all treatments, the “standard” seeding rate, on average, provided the highest economic return. It is important to note that actual plant densities did not align with the targeted seeding rates, particularly at the “very high” seeding rate, where plant counts were notably lower.

To review footnote references please refer to overall trial summary on page 92.

This trial was conducted with the agronomic support of

MNP AgINTELLECT

Pulse Replicated On-Farm Independent Trials

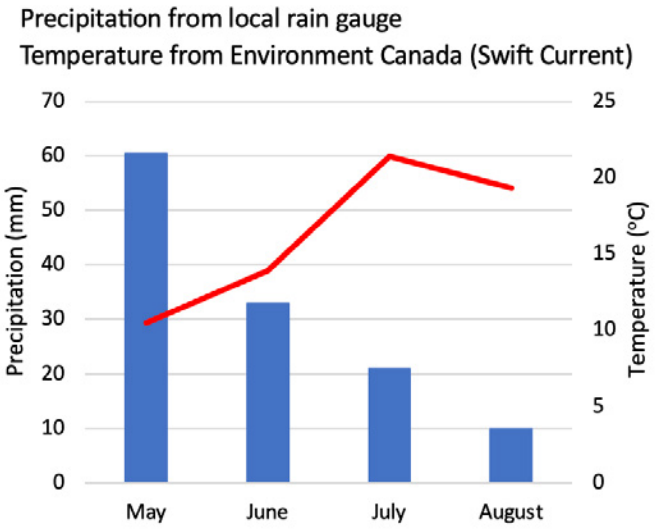
Lentil Seeding Rate
(Gull Lake)

Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

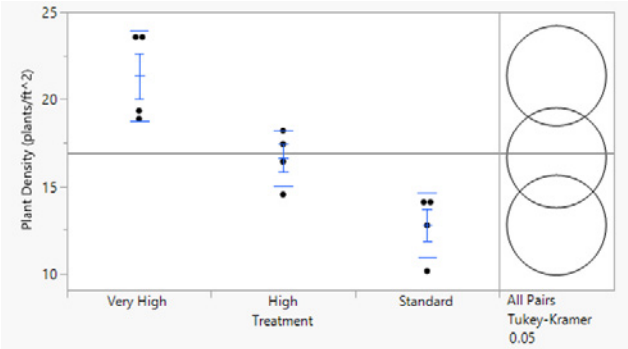
Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	50.4
2	High	20	71.5
3	Very High	26	100.9

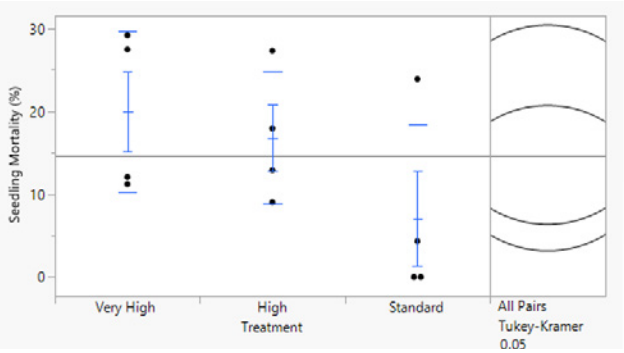
General Trial Information:

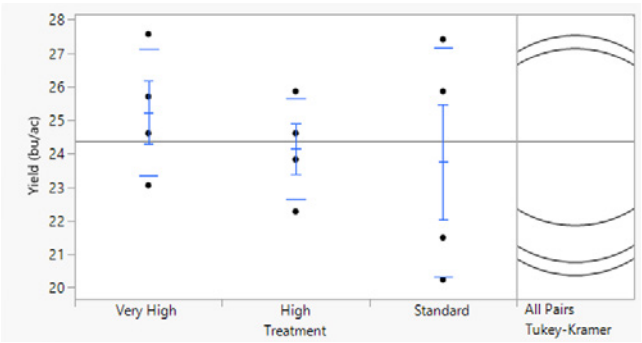
Variety	CDC Proclaim
Thousand Kernel Weight	38.9 g
Germination	99%
Seed Treatment	Vibrance® Maxx + Cruiser®
Inoculant	LALFIX® Spherical
Previous Crop	Durum
Soil Organic Matter	2.8%
Residual Nitrate-N (0-6")	18 lbs
Seeding Date	May 6
Seeding Equipment	Bourgault 3320 .75" knife
Seeding Depth	1"
Seeding Speed	5 mph
Row Spacing	10"
Total Applied Fertilizer (lbs/ac N-P-K-S)	6 – 26 – 0 – 0
Crop Protection	May 14: MCPA + pyraflufen-ethyl + Glyphosate June 9: imazamox + quizalofop August 5: Diquat

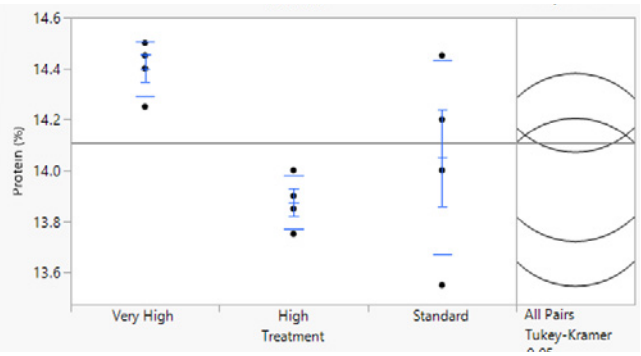


	Plant Density (plants/ft²)	Seedling mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TKW) (g/1000s)	Test Weights (TW) (kg/hl)
Trt 1 – Standard – 13 plants/ft²	12.8 B	7.0	23.8	14.0 AB	33.2	77.6
Trt 2 – High – 20 plants/ft²	16.6 B	16.8	24.1	13.8 B	33.2	78.3
Trt 3 – Very High –26 plants/ft²	21.3 A	19.9	25.2	14.4 A	33.5	78.9
SE[1]	1.027	4.8	1.2	0.1185	0.431	0.7071
p-value[3]	**0.0006**	0.2026	0.6748	**0.029**	0.9127	0.4024









Trt No.	Seeding Rate (lbs/ac)	Seed ($/acb)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ac)
1	50.4	22.70	3.49	26.19	23.8	18.00	428.40	402.21	0.00
2	75.7	34.05	5.23	39.28	24.1	18.00	433.80	394.52	-7.69
3	100.9	45.40	6.98	52.37	25.2	18.00	453.60	401.23	-0.99

[x]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed price $27/ac)
[y]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed treatment/inoculants $4.15/ac)
[z]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (estimated farm gate price $0.30/lb)

As seeding rates increased, plant densities also rose (p=0.0006). However, this did not result in higher yields (p=0.6748), with the “standard” seeding rate, on average, yielding the highest return. While not statistically significant, seedling mortality tended to increase with higher seeding rates. Protein content responded significantly to seeding rate (p=0.029), while test weight (TW) and thousand kernel weight (TKW) remained consistent across all seeding rates. It is important to note that actual plant densities were lower than the targeted seeding levels.

To review footnote references please refer to overall trial summary on page 92.

This trial was conducted with the agronomic support of

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Pulse Replicated On-Farm Independent Trials

Lentil Seeding Rate (Kerrobert)

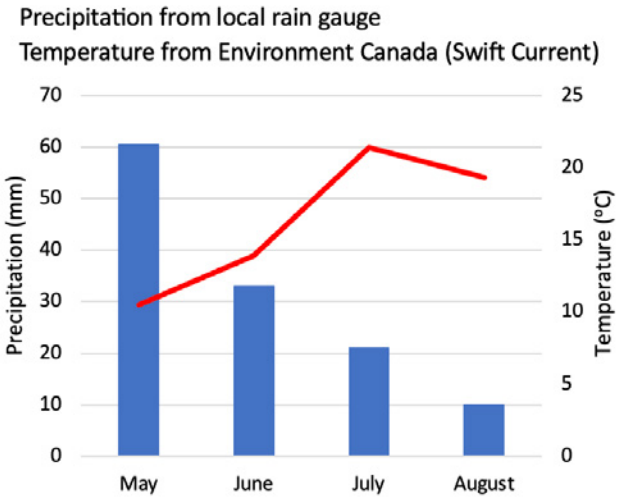
Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

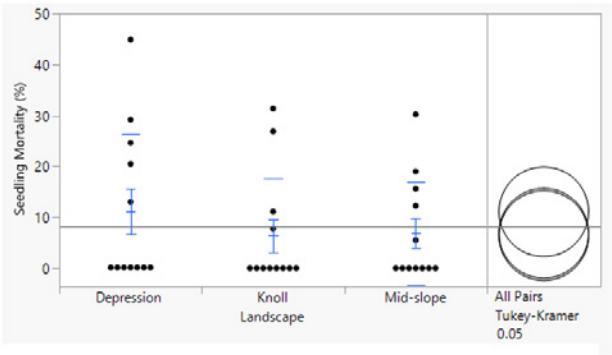
Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	50.7
2	High	20	76.1
3	Very High	26	101.4

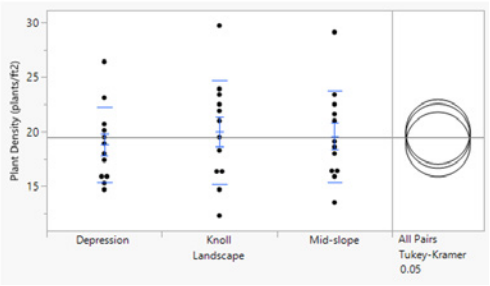
General Trial Information:

Variety	CDC Maxim
Thousand Kernel Weight	39.2 g
Germination	99%
Seed Treatment	EverGol® Energy
Inoculant	N-Charge®
Previous Crop	Wheat
Soil Organic Matter	3.7%
Residual Nitrate-N (0-6")	35 lb/ac
Soil Texture	Medium
Seeding Date	May 22
Seeding Equipment	SeedMaster 70ft double shoot
Seeding Depth	1.5"
Seeding Speed	2-5.3 mph
Row Spacing	10"
Total Applied Fertilizer (lbs/ac N-P-K-S)	7 – 24 – 0 – 4
Crop Protection	May: Glyphosate June: Clethodim + imazamox + imazethapyr July: Pyraclostrobin August: Diquat

Landscape[2]	Plant Density (plants/ft²)	Seedling Mortality (%)
Depression	18.8	11.1
Mid-slope	19.6	6.9
Knoll	20.0	6.4
p-value[3]	0.779	0.6034

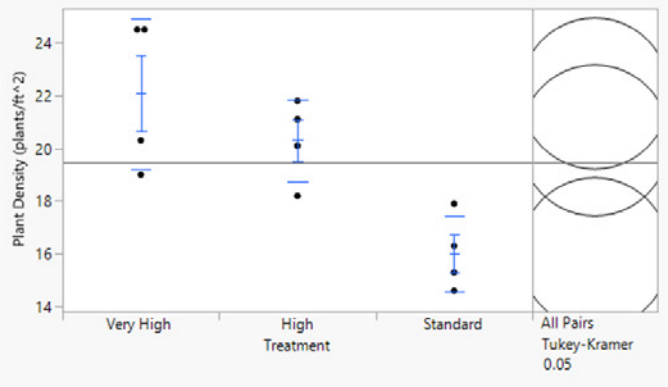


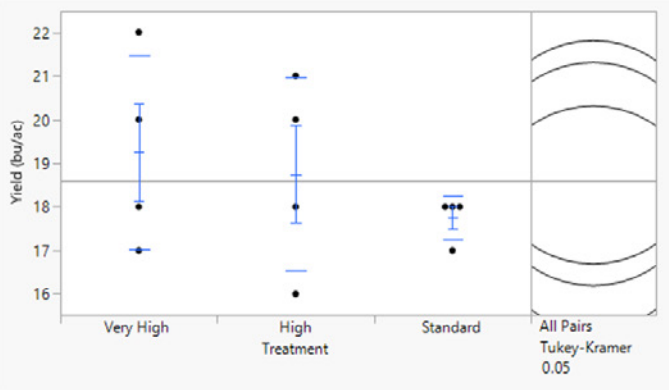




There were no significant effects between landscape position, plant density, and seedling mortality. Overall trends suggest that as plant densities increased, seedling mortality decreased. Depressions exhibited the lowest plant densities and the highest mortality, which may be attributed to elevated spring moisture levels.

	Plant Density (plants/ft^2)	Seedling mortality (%)	Yield (bu/ac)
Trt 1 – Standard – 13 plants/ft^2	16.0 B	0.0 B	17.8 B
Trt 2 – High – 20 plants/ft^2	20.3 A	2.3 B	18.8 AB
Trt 3 – Very High – 26 plants/ft^2	22.1 A	17.2 A	19.3 A
SE[1]	1.0254	3.37	0.916
p-value[3]	**0.0061**	**0.0135**	0.5058





Trt No.	Seeding Rate (lbs/ac)	Seed ($/ac)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ac)
1	50.7	22.82	3.51	26.32	17.8	18.00	319.50	293.18	0.00
2	76.1	34.25	5.26	39.51	18.8	18.00	337.50	297.99	4.81
3	101.4	45.63	7.01	52.64	19.3	18.00	346.50	293.86	0.68

[x]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed price $27/ac)
[y]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed treatment/inoculants $4.15/ac)
[z]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (target price $0.30/lb)

As seeding rates increased, so did plant densities (p=0.0061) and seedling mortality (p=0.0135). There was no significant response between seeding rates and yield (p=0.5058), with a 1.5 bu/ac increase from the “standard” to “very high” seeding rates. The “high” seeding rate of 20 plants/ft2 resulted in the highest economical return with $4.81/ac. Subsamples per plot were not collected at harvest for analysis, therefore grain quality could not be assessed.

To review footnote references please refer to overall trial summary on page 92.

This trial was conducted with the agronomic support of

MNP AgINTELLECT

Pulse Replicated On-Farm Independent Trials

Lentil Seeding Rate (Landis)

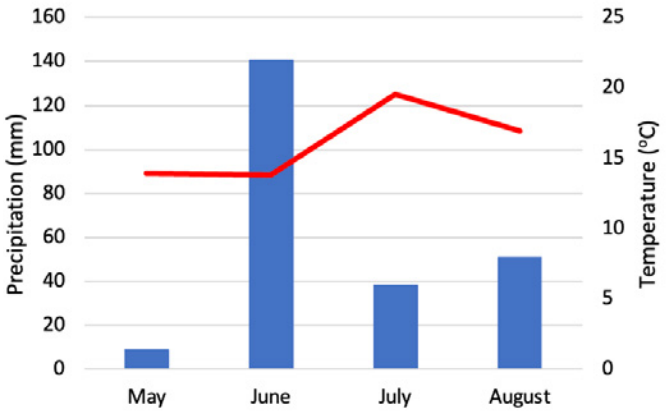
Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	50
2	High	20	75
3	Very High	26	100

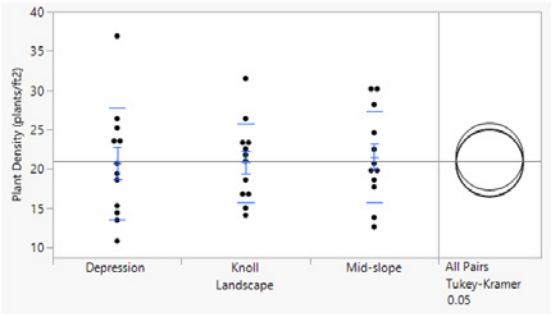
General Trial Information:

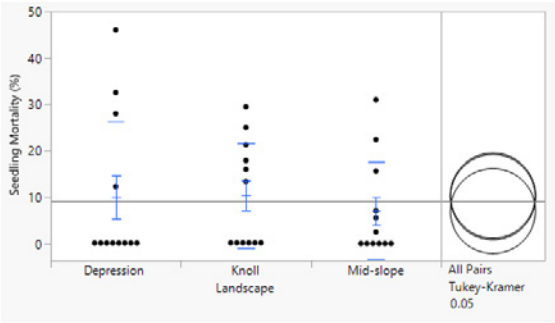
Variety	CDC Maxim
Thousand Kernel Weight	38.6 g
Germination	99%
Seed Treatment	N/A
Inoculant	Nodulator® Duo
Previous Crop	Wheat
Soil Organic Matter	4.1%
Residual Nitrate-N (0-6")	22 lbs/ac
Soil Texture	Medium
Seeding Date	May 13
Seeding Equipment	Bourgault 3720
Seeding Depth	1"
Seeding Speed	2.9-5.1 mph
Row Spacing	12"
Total Applied Fertilizer (lbs/ac N-P-K-S)	7 – 31 – 0 – 0
Crop Protection	May 11: Glyphosate + pyroxasulfone + carfentrazone-ethyl June 9: Imazamox + clethodim July 9: Pyraclostrobin August 20: Glyphosate August 24: Diquat

Weather from local station as of May 28th



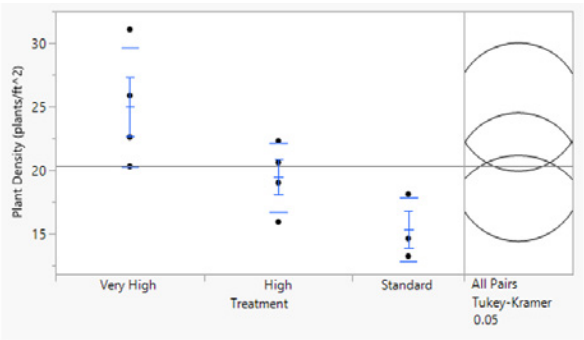
Landscape[2]	Plant Density (plants/ft²)	Seedling Mortality (%)
Depression	20.7	10.0
Mid-slope	21.6	7.0
Knoll	20.8	10.3
SE[1]	1.7	3.7
p-value[3]	0.9331	0.8046

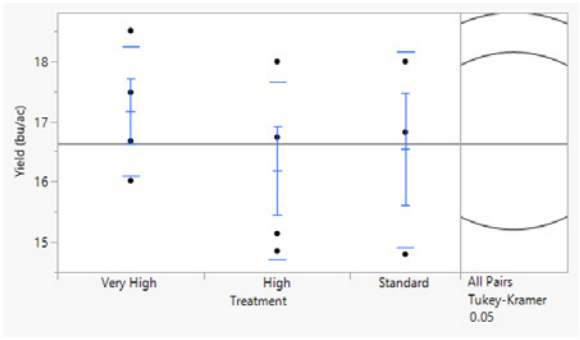




There were no significant responses in plant density or seedling mortality based on landscape topography.

	Plant Density (plants/ft²)	Seedling mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TKW) (g/1000s)	Test Weight (TW) (kg/hl)
Trt 1 – Standard –13 plants/ft²	15.3 B	0.3	16.2	12.4	33.2	80.3
Trt 2 – High – 20 plants/ft²	19.4 AB	6.4	16.5	12.2	33.2	80.7
Trt 3 – Very High – 26 plants/ft²	24.9 A	10.5	17.2	12.3	32.7	80.9
SE[1]	1.7	4.5	0.69	0.172	0.391	0.393
p-value[3]	**0.0179**	0.3525	0.5868	0.6636	0.6537	0.6391





Trt No.	Seeding Rate (lbs/ac)	Seed ($/ac)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ac)
1	50	22.50	3.46	25.96	16.2	18.00	291.60	265.64	0.00
2	75	33.75	5.19	38.94	16.5	18.00	297.00	258.06	-7.58
3	100	45.00	6.92	51.92	17.2	18.00	309.60	257.68	-7.96

[x]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed price $27/ac)
[y]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed treatment/inoculants $4.15/ac)
[z]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (target price $0.30/lb)

Plant density increased significantly with higher seeding rates (p=0.01790). While seedling mortality also rose with higher seeding rates, the change was not statistically significant. No significant effects of seeding rate were observed on yield or grain quality. As a result, the “standard” seeding rate generally provided the highest economic return. Overall, plant densities closely matched the targeted seeding rates.

To review footnote references please refer to overall trial summary on page 92.

This trial was conducted with the agronomic support of

MNP AgINTELLECT

Pulse Replicated On-Farm Independent Trials

Lentil Seeding Rate (Luseland)

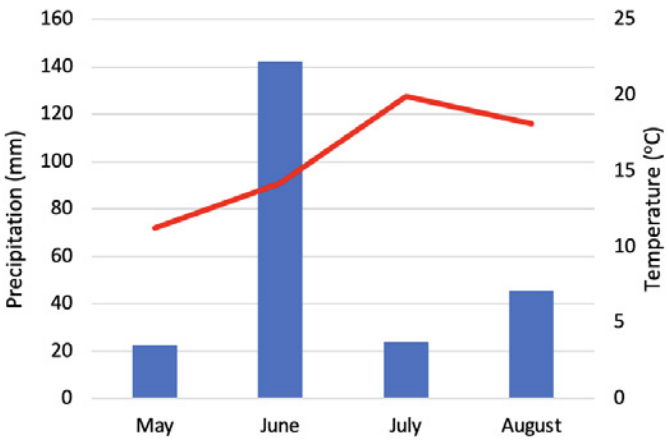
Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	54.3
2	High	20	81.4
3	Very High	26	108.5

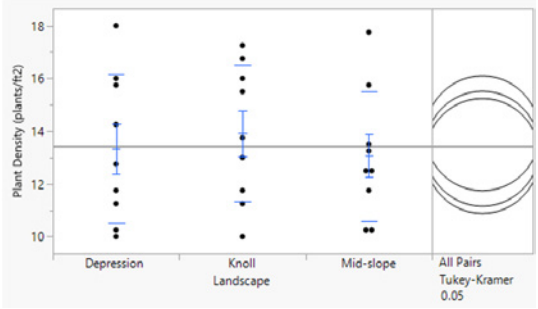
General Trial Information:

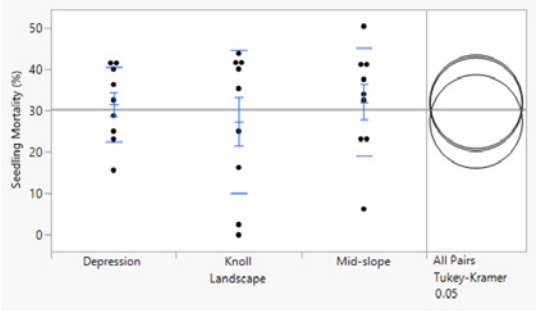
Variety	CDC Nimble
Thousand Kernel Weight	40.6 g
Germination	96%
Seed Treatment	N/A
Inoculant	Nodulator® Duo
Previous Crop	Wheat
Soil Organic Matter	4.3%
Residual Nitrate-N (0-6")	45 lb/ac
Soil Texture	Medium
Seeding Date	May 23
Seeding Equipment	Bourgault
Seeding Depth	1 – 1.5"
Seeding Speed	2.9-5.1 mph
Row Spacing	12"
Total Applied Fertilizer (lbs/ac N-P-K-S)	4 – 19 – 0 – 0
Crop Protection	May 2: Glyphosate + trifludimoxazin + saflufenacil + Merge® June 13: Imazamox + quizalofop + imazethapyr July 10: Azoxystrobin + benzovindiflupyr August 12: Glyphosate + saflufenacil + Merge®

Weather obtained from local station from May 19th



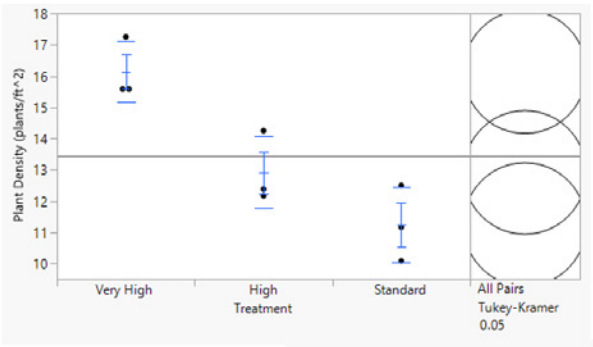
Landscape²	Plant Density (plants/ft²)	Seedling Mortality (%)
Depression	13.3	31.5
Mid-slope	13.1	32.0
Knoll	13.9	27.3
SE¹	0.87393	4.5117
p-value³	0.7677	0.7424

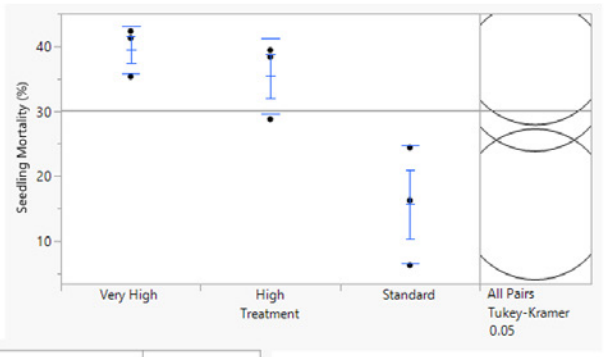


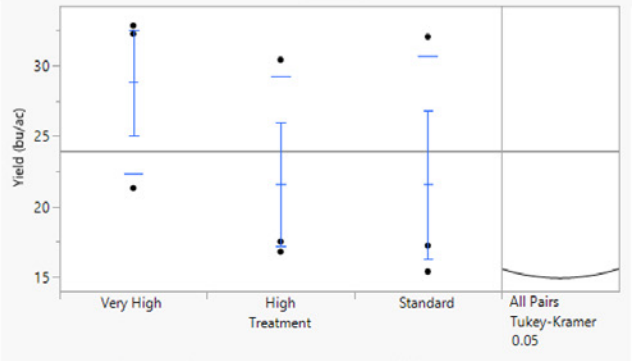


Overall, plant densities and seedling mortalities were similar regardless of landscape topography.

	Plant Density (plants/ft²)	Seedling mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TKW) (g/1000s)	Test Weight (TW) (kg/hl)
Trt 1 – Standard –13 plants/ft²	11.3 B	15.6	21.5	10.8	30.6	82.2
Trt 2 – High – 20 plants/ft²	12.9 B	35.4	21.6	10.9	30.9	82.3
Trt 3 – Very High –26 plants/ft²	16.1 A	39.5	28.7	10.7	31.4	82.6
SE[1]	0.6445	3.78	4.5	0.13	0.89	0.38
p-value[3]	**0.0041**	**0.0102**	0.5312	0.5557	0.8122	0.7456







Trt No.	Seeding Rate (lbs/ac)	Seed ($/ac)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ac)
1	54.3	24.44	3.76	28.19	21.5	18.00	387.84	359.65	0.00
2	81.4	36.63	5.63	42.26	21.6	18.00	388.23	345.97	-13.68
3	108.5	48.83	7.50	56.33	28.7	18.00	516.60	460.27	100.62

[x]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed price $27/ac)
[y]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed treatment/inoculants $4.15/ac)
[z]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (target price $0.30/lb)

As seeding rates increased, both plant density (p=0.0041) and seedling mortality (p=0.0102) also rose. However, seeding rates had no significant impact on yield or grain quality. On average, the “very high” seeding rate resulted in higher returns, making it the most economic option. It is important to note that the actual plant densities observed during the growing season were considerably lower than the intended seeding rates.

To review footnote references please refer to overall trial summary on page 92.

This trial was conducted with the agronomic support of

MNP AgINTELLECT

Pulse Replicated On-Farm Independent Trials

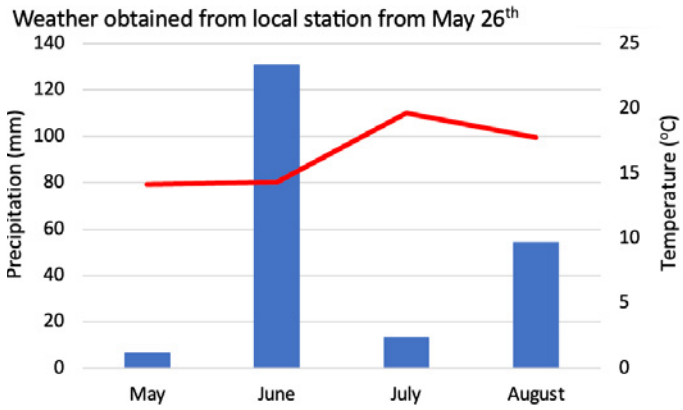
Lentil Seeding Rate (Major)

Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

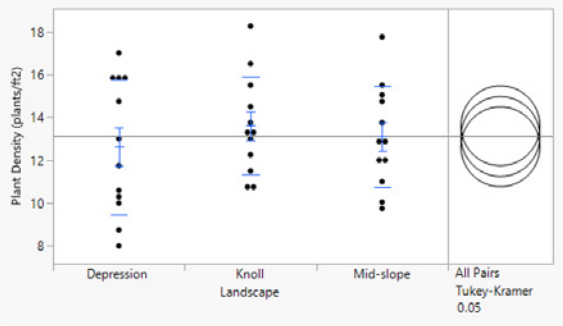
Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	61.7
2	High	20	92.5
3	Very High	26	123.4

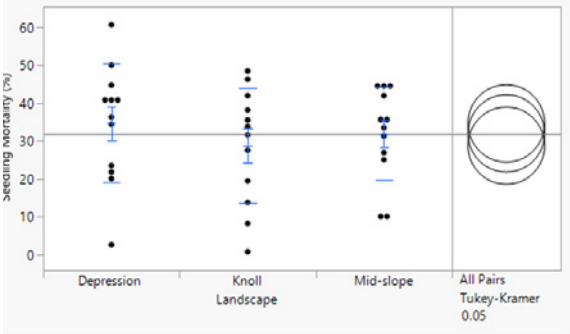
General Trial Information:

Variety	CDC Impulse
Thousand Kernel Weight	43.78 g
Germination	91%
Seed Treatment	N/A
Inoculant	Nodulator® Duo
Previous Crop	Wheat
Soil Organic Matter	4.5%
Residual Nitrate-N (0-6")	31 lb/ac
Soil Texture	Medium
Seeding Date	May 30
Seeding Equipment	Seed Hawk
Seeding Depth	1.5"
Seeding Speed	2.9-5.1 mph
Row Spacing	12"
Total Applied Fertilizer (lbs/ac N-P-K-S)	5 – 23 – 0 – 0
Crop Protection	May 25: Glyphosate + pyraflufen-ethyl + MCPA ester June 26: Clethodim + imazamox July 15: Azoxystrobin + benzovindiflupyr July 15: Lambda-cyhalothrin August 25: Glyphosate + saflufenacil



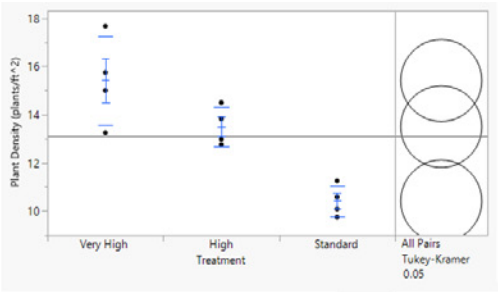
Landscape[2]	Plant Density (plants/ft²)	Seedling Mortality (%)
Depression	12.6	34.6
Mid-slope	13.1	31.9
Knoll	13.6	28.7
SE[1]	0.7595	4.1686
p-value[3]	0.6369	0.5831

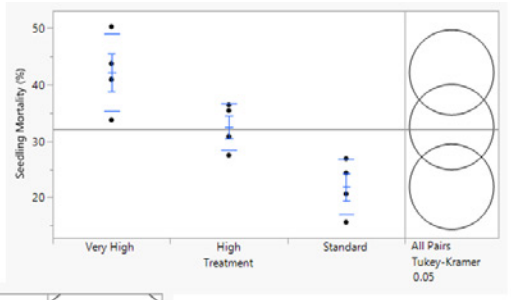


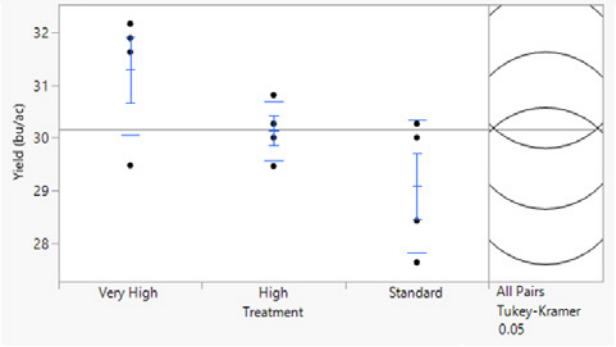


Plant density and seedling mortality were similar regardless of landscape position.

	Plant Density (plants/ft²)	Seedling mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TKW) (g/1000s)	Test Weight (TW) (kg/hl)
Trt 1 – Standard –13 plants/ft²	10.4	21.8	29.1	11.0	45.9	79.7
Trt 2 – High – 20 plants/ft²	13.5	32.5	30.1	11.1	45.5	79.7
Trt 3 – Very High – 26 plants/ft²	15.4	42.2	31.3	10.9	44.8	80.3
SE[1]	0.60858	2.7	0.5338	0.115	0.62	0.207
p-value[3]	**0.0007**	**0.0013**	**0.0406**	0.8917	0.4639	0.0945







Trt No.	Seeding Rate (lbs/ac)	Seed ($/ac)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ac)
1	61.7	27.76	4.27	32.02	29.1	18.00	523.42	491.40	0.00
2	92.5	41.63	6.40	48.03	30.1	18.00	542.40	494.37	2.97
3	123.4	55.51	8.53	64.04	31.3	18.00	563.17	499.13	7.73

[x]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed price $27/ac)
[y]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed treatment/inoculants $4.15/ac)
[z]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (target price $0.30/lb)

Seeding rates significantly effected plant density (p=0.0007), seedling mortality (p=0.0013), and yield (p=0.0406). The "very high" seeding rate resulted in both the highest yield and the highest economic return. However, no significant responses were observed on grain quality across the different seeding rates. It is important to note that while significant responses were observed, actual plant densities were substantially lower than the targeted seeding rates.

To review footnote references please refer to overall trial summary on page 92.

This trial was conducted with the agronomic support of

MNP AgINTELLECT

Pulse Replicated On-Farm Independent Trials

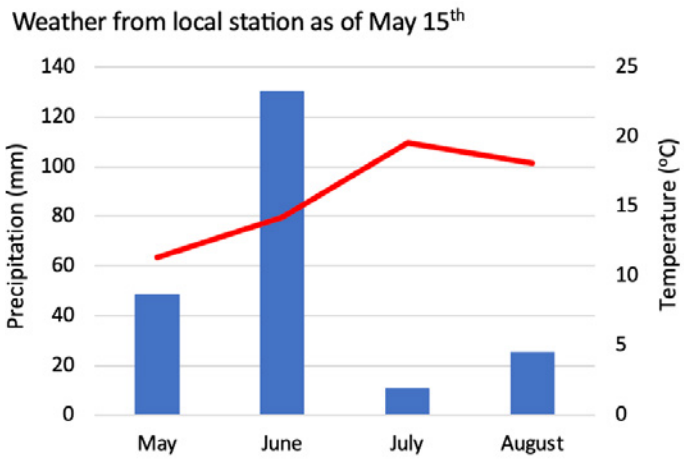
Lentil Seeding Rate (Plenty)

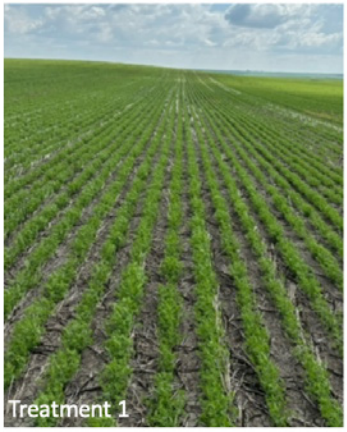
Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

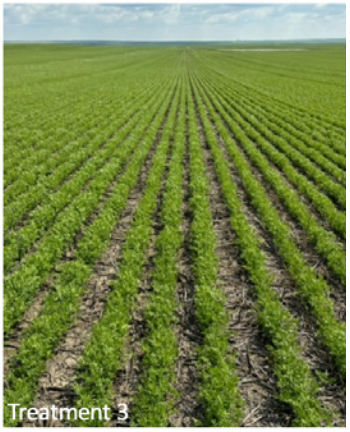
Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	52.3
2	High	20	78.5
3	Very High	26	104.6

General Trial Information:

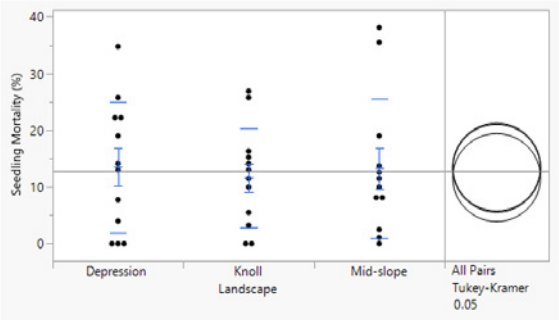
Variety	CDC Nimble
Thousand Kernel Weight	40.4 g
Germination	99%
Seed Treatment	N/A
Inoculant	Tag Team® Peat
Previous Crop	Canola
Soil Organic Matter	4.3%
Residual Nitrate-N (0-6")	13 lb/ac
Soil Texture	Fine
Seeding Date	May 27
Seeding Equipment	Bourgault Paralink
Seeding Depth	1.5"
Seeding Speed	3.1-5.3 mph
Row Spacing	10"
Total Applied Fertilizer (lbs/ac N-P-K-S)	6 – 23 – 0 – 2 – 0.4 Zn – 3 Mg
Crop Protection	May 26: Glyphosate June 20: Imazamox July 16: Prothioconazole + trifloxystrobin July 25: Lambda-cyhalothrin August 20: Diquat

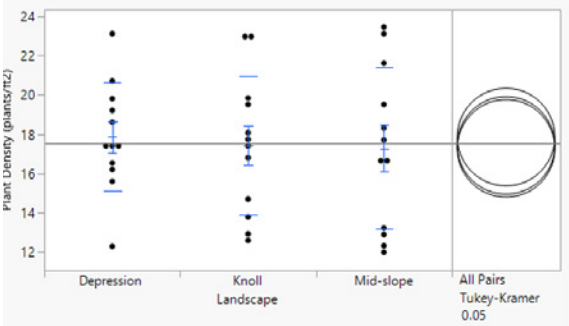






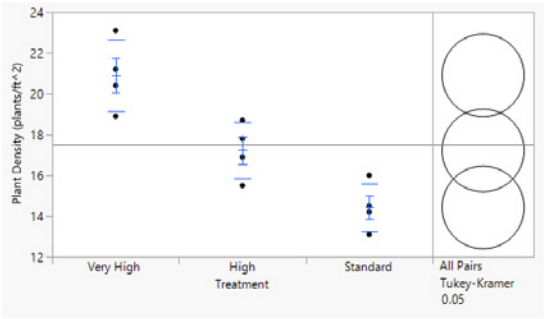
Landscape[2]	Plant Density (plants/ft²)	Seedling Mortality (%)
Depression	17.9	13.5
Mid-slope	17.3	13.3
Knoll	17.4	11.6
SE[1]	1.4	4.46
p-value[3]	0.9166	0.9097

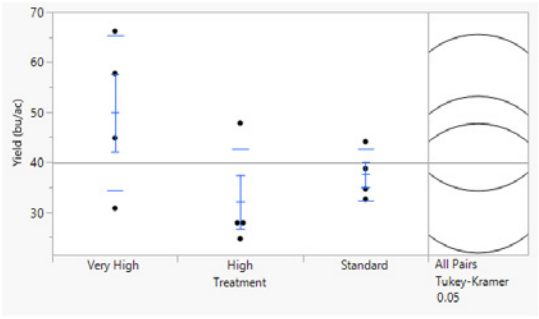




verall, plant densities and seedling mortalities were similar
gardless of landscape positions.

	Plant Density (plants/ft²)	Seedling mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TKW) (g/1000s)	Test Weight (TW) (kg/hl)
Trt 1 – Standard –13 plants/ft²	14.4 B	0.4 B	37.5	11.2	35.9	83.5
Trt 2 – High – 20 plants/ft²	17.2 B	13.8 A	32.0	11.2	35.6	83.6
Trt 3 – Very High – 26 plants/ft²	20.9 A	21.6 A	49.8	11.2	35.3	83.4
SE[1]	0.72753	2.7	5.9	0.075	0.204	0.139
p-value[3]	**0.0004**	**0.001**	0.1162	0.8849	0.1628	0.7131





Trt No.	Seeding Rate (lbs/ac)	Seed ($/ac)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ac)
1	52.3	23.54	3.62	27.16	37.5	18.00	675.31	648.15	0.00
2	78.5	35.31	5.43	40.74	32.0	18.00	576.00	535.26	-112.89
3	104.6	47.09	7.24	54.32	49.8	18.00	896.40	842.08	193.93

[x]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed price $27/ac)
[y]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed treatment/inoculants $4.15/ac)
[z]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (target price $0.30/lb)

As seeding rate increased, both plant densities (p=0.0004) and seedling mortality (p=0.001) also increased. The “very high” seeding rate was most economical, as it generally produced higher yields, though the variability in yields prevented statistical significance. No significant trends were observed between seeding rates and grain quality. It should be noted that plant densities were lower than the intended seeding rates.

To review footnote references please refer to overall trial summary on page 92.

Pulse Replicated On-Farm Independent Trials

Lentil Seeding Rate (Rosetown)

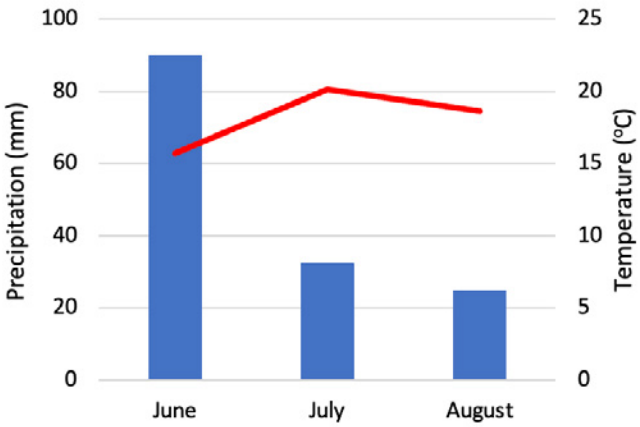
Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	49.9
2	High	20	74.7
3	Very High	26	99.7

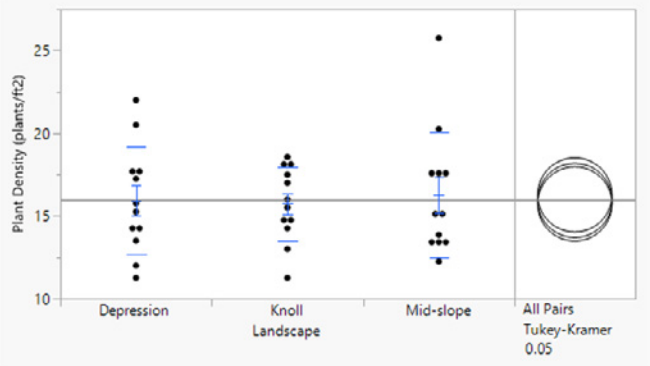
General Trial Information:

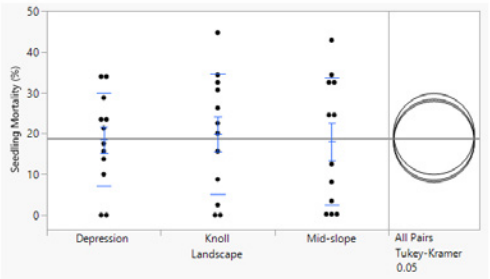
Variety	CDC Redmoon
Thousand Kernel Weight	37.7 g
Germination	97%
Seed Treatment	Insure® Pulse
Inoculant	TagTeam® BioniQ®
Previous Crop	Durum
Soil Organic Matter	3.0%
Residual Nitrate-N (0-6")	10 lb/ac
Soil Texture	Fine
Seeding Date	May 5
Seeding Equipment	Seed Hawk
Seeding Depth	1.5"
Seeding Speed	4.5 mph
Row Spacing	12"
Total Applied Fertilizer (lbs/ac N-P-K-S)	6 – 20 – 0 – 5 – 0.5 Zn
Crop Protection	Fall '23: Flumioxazin + pyroxasulfone May: Glyphosate + saflufenacil June 24: Quizalofop + metribuzin August 24: Glyphosate + saflufenacil

Weather from local station as of June 10th



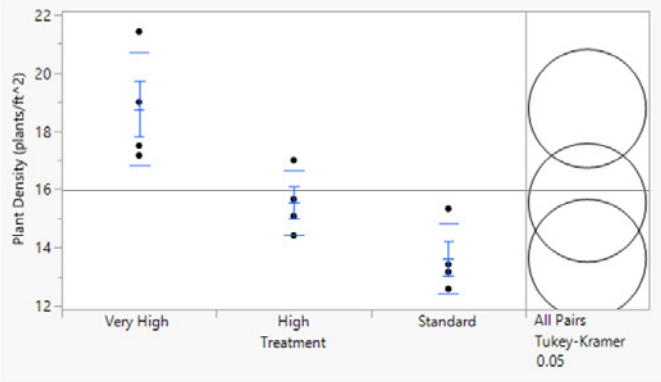
Landscape[2]	Plant Density (plants/ft²)	Seedling Mortality (%)
Depression	15.9	18.5
Mid-slope	16.3	18.0
Knoll	15.7	19.8
SE[1]	1.3	4
p-value[3]	0.9148	0.9469

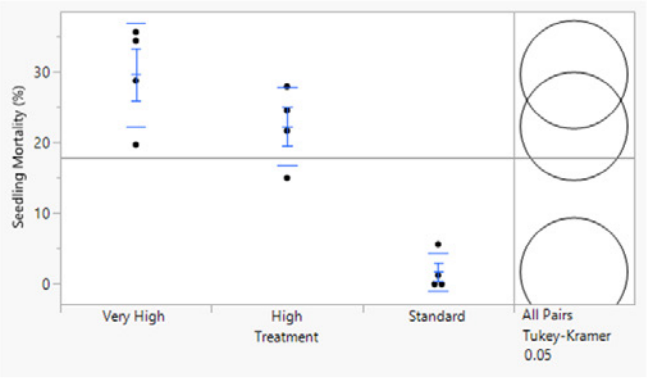




No significant trends were observed between landscape topography and seedling mortality or plant density. Overall, the data were consistent when averaged across all plots.

	Plant Density (plants/ft²)	Seedling mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TKW) (g/1000s)	Test Weight (TW) (kg/hl)
Trt 1 – Standard – 13 plants/ft²	13.6	1.7	32.9	11.5	31.0	80.6
Trt 2 – High – 20 plants/ft²	15.5	22.3	31.6	11.6	30.7	80.8
Trt 3 – Very High –26 plants/ft²	18.8	29.6	32.6	11.6	29.6	80.8
SE[1]	1.71	6.42	2.859	0.55808	0.797	1.75
p-value[3]	**0.0007**	**<0.0001**	0.841	0.685	0.162	0.8929





Trt No.	Seeding Rate (lbs/ac)	Seed ($/ac)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ac)
1	49.9	22.46	3.45	25.91	32.9	18.00	592.83	566.92	0.00
2	74.7	33.62	5.17	38.78	31.6	18.00	568.70	529.92	-37.00
3	99.7	44.87	6.90	51.76	32.6	18.00	586.42	534.66	-32.26

[x]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed price $27/ac)
[y]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed treatment/inoculants $4.15/ac)
[z]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (target price $0.30/lb)

Overall, higher seeding rates led to a significant increase in plant densities (p=0.0007) and seedling mortality (p<0.0001). However, there were no significant responses in yield or grain quality between treatments. While not significant, from an economic perspective, the “standard” seeding rate resulted in the highest yield and the highest return. It is important to note that actual plant densities were lower than the targeted seeding rates.

To review footnote references please refer to overall trial summary on page 92.

This trial was conducted with the agronomic support of

MNP AgINTELLECT

Pulse Replicated On-Farm Independent Trials

Lentil Seeding Rate (Shaunavon 1)

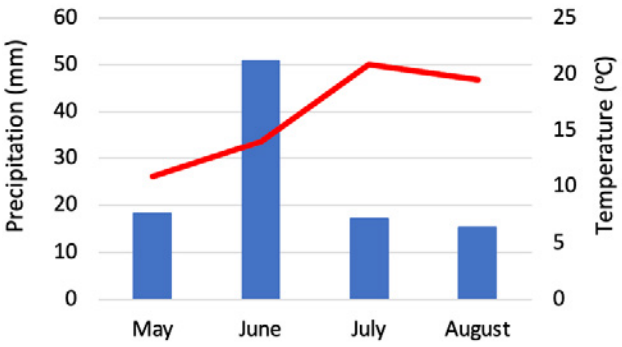
Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	94.8
2	High	20	142.2
3	Very High	26	189.6

General Trial Information:

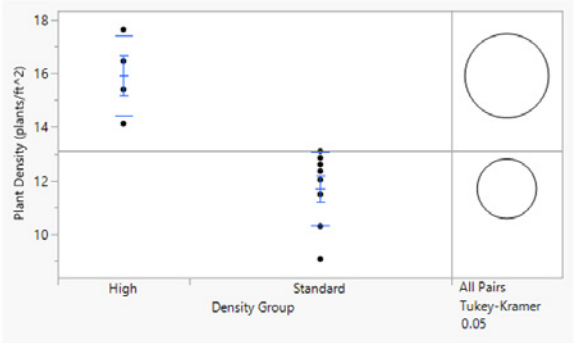
Variety	CDC Greenstar
Thousand Kernel Weight	62.1 g
Germination	84%
Seed Treatment	Vibrance® Maxx
Inoculant	Tagteam® BioniQ®
Previous Crop	Durum
Soil Organic Matter	1.3%
Residual Nitrate-N (0-6")	38 lb/ac
Soil Texture	Medium
Seeding Date	May 14
Seeding Equipment	Bourgault 3320, 0.5" openers
Seeding Depth	1.5"
Seeding Speed	4 mph
Row Spacing	10"
Total Applied Fertilizer (lbs/ac N-P-K-S)	6 – 26 – 0 – 0
Crop Protection	Fall '23: Flumioxazin + pyroxasulfone June 2: Metribuzin June 28: Azoxystrobin + benzovindiflupyr

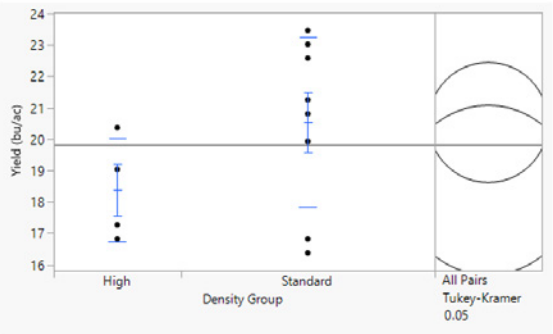
Weather from Environment Canada (Swift Current)



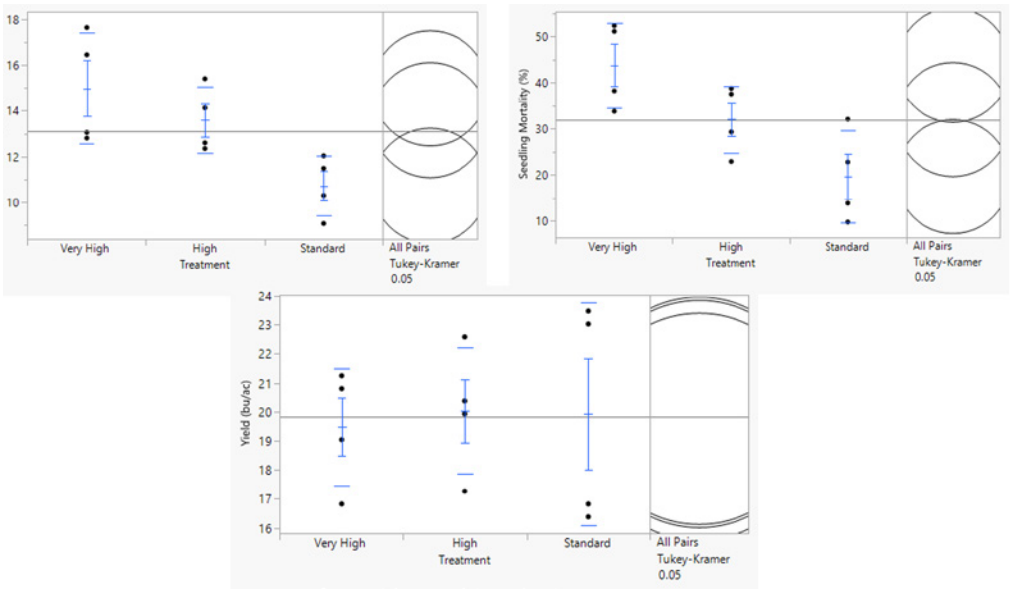
Below, actual plant counts were sorted into the appropriate categories. Where no plant densities achieved the "very high" seeding rate of 26 plants/ft². Therefore, yield, grain quality and disease, were analyzed strictly by true plant counts.

Density Group²	Plant Density (plants/ft²)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TWK) (g/1000s)	Test Weight (TW) (kg/hl)	Anthracnose Severity (%)	Anthracnose Incidence (Yes=1; No=0)
Standard	11.7 B	20.5	18.2	49.8	77.3	0.73	0.017
High	15.9 A	18.4	18.1	49.1	76.6	0.725	0.018
p-value³	**0.0006**	0.1773	0.3286	0.2148	**0.0133**	0.8487	0.7428





Treatments	Plant Density (plants/ft²)	Seedling mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TWK) (g/1000s)	Test Weight (TW) (kg/hl)	Anthracnose Incidence (Yes=1; No=0)	Anthracnose Severity (%)
Trt 1 – Standard –13 plants/ft²	10.7 B	19.6 B	19.9	18.2	49.5	76.9	0.0148	0.73
Trt 2 – High –20 plants/ft²	13.6 AB	32.0 AB	20.0	18.2	49.6	76.9	0.018	0.71
Trt 3 – Very High –26 plants/ft²	15.0 A	43.8 A	19.5	18.2	49.6	77.2	0.02	0.73
SE[1]	0.90494	4.4	1.4	0.078	0.49	0.27	0.0023	0.026
p-value[3]	**0.0213**	**0.0097**	0.9581	0.6533	0.9327	0.8654	0.2032	0.7902



Trt No.	Seeding Rate (lbs/ac)	Seed ($/ac)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ ac)
1	94.8	80.56	6.55	87.11	19.9	30.00	597.00	509.89	0.00
2	142.2	120.84	9.83	130.67	20.0	30.00	600.00	469.33	-40.56
3	189.6	161.13	13.10	174.23	19.5	30.00	585.00	410.77	-99.11

[x]2024 Large Green Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 91lb/ac; seed price $77.35/ac)
[y]2024 Large Green Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 91lb/ac; seed treatment/inoculants $6.29/ac)
[z]2024 Large Green Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (target price $0.50/lb)

As seeding rates increased, both plant densities (p=0.0213) and seedling mortality (p=0.0097) also increased. However, no significant responses were observed for yield, grain analysis, or anthracnose ratings. From an economic standpoint, although not statistically significant, the “standard” seeding rate generated the highest return, despite not yielding the most, due to the lower costs associated with seed, seed treatment, and inoculant. It is also important to note that actual plant densities were lower than the intended seeding rates.

To review footnote references please refer to overall trial summary on page 92.

This trial was conducted with the agronomic support of

HAWK'S AGRO

Pulse Replicated On-Farm Independent Trials

Lentil Seeding Rate (Shaunavon 2)

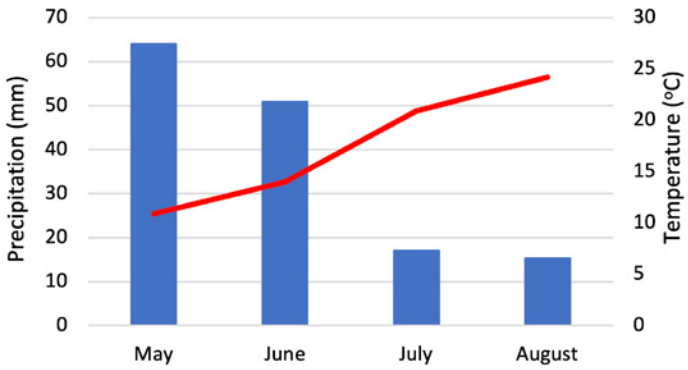
Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	62.3
2	High	20	93.5
3	Very High	26	124.7

General Trial Information:

Variety	CDC Impulse
Thousand Kernel Weight	45.7 g
Germination	94%
Seed Treatment	Vibrance® Total + Lumivia®
Inoculant	LALFIX® Spherical
Previous Crop	Durum
Soil Organic Matter	4.2%
Residual Nitrate-N (0-6")	17 lb/ac
Soil Texture	Medium
Seeding Date	June 3
Seeding Equipment	Bourgault 3334 PLX .75" knife
Seeding Depth	1.25"
Seeding Speed	5 mph
Row Spacing	10"
Total Applied Fertilizer (lbs/ac N-P-K-S)	8 – 20 – 0 – 5
Crop Protection	May 21: Glyphosate June 26: Imazamox July 16: Azoxystrobin + benzovindiflupyr August 24: Glyphosate

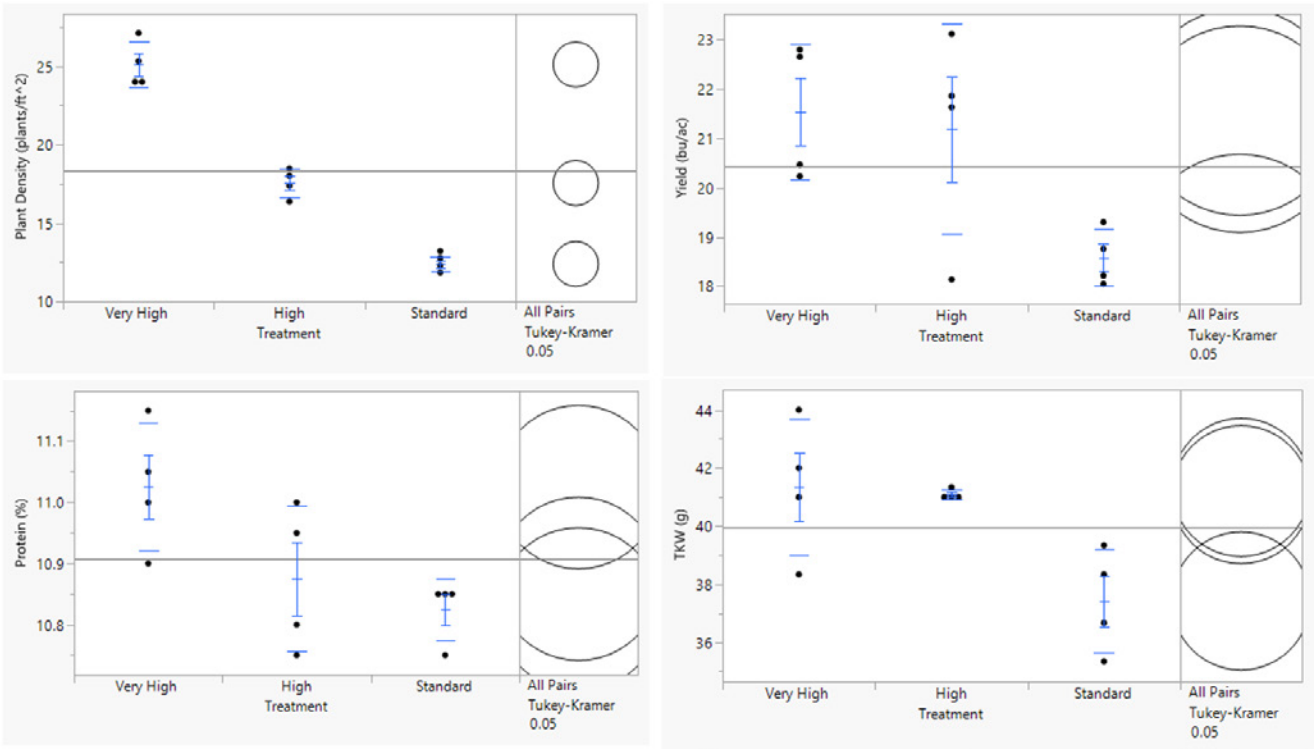
Weather from Environment Canada (Swift Current)



Treatment 1 **Treatment 2** **Treatment 3**

Trt 1 Plant **Trt 2 Plant** **Trt 3 Plant**

	Plant Density (plants/ft²)	Seedling mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TKW) (g/1000s)	Test Weight (TW) (kg/hl)
Trt 1 – Standard – 13 plants/ft²	12.4 C	6.2	18.5	10.8 B	37.4 B	80.9
Trt 2 – High – 20 plants/ft²	17.6 B	7.1	21.2	10.9 AB	41.1 A	80.9
Trt 3 – Very High – 26 plants/ft²	25.1 A	12.3	21.5	11.0 A	41.3 A	81.3
SE[1]	0.51471	2.12	0.75	0.0478	0.852	0.419
p-value[3]	**<0.0001**	0.1676	0.0507	**0.0388**	**0.0246**	0.7067



Trt No.	Seeding Rate (lbs/ac)	Seed ($/ac)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ac)
1	62.3	28.04	4.31	32.34	18.5	18.00	333.00	300.66	0.00
2	93.5	42.08	6.47	48.54	21.2	18.00	381.60	333.06	32.40
3	124.7	56.12	8.63	64.74	21.5	18.00	387.00	322.26	21.60

[x]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed price $27/ac)
[y]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed treatment/inoculants $4.15/ac)
[z]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (target price $0.30/lb)

Seeding rate had a significant effect on seeding density (p<0.0001), protein content (p=0.0388), and thousand kernel weight (p=0.0246), with all of these factors increasing as seeding rate rose. Although yield was not significantly different (p=0.0507), it was close to significant. The “high” and “very high” seeding rates resulted in yield increases of 2.9 and 2.6 bu/ac, respectively, compared to the standard seeding rate. As a result, the “high” seeding rate was the most economical option. Overall, plant densities were relatively close to the targeted seeding rates.

To review footnote references please refer to overall trial summary on page 92.

This trial was conducted with the agronomic support of

Pulse Replicated On-Farm Independent Trials

Lentil Seeding Rate (Shaunavon 3)

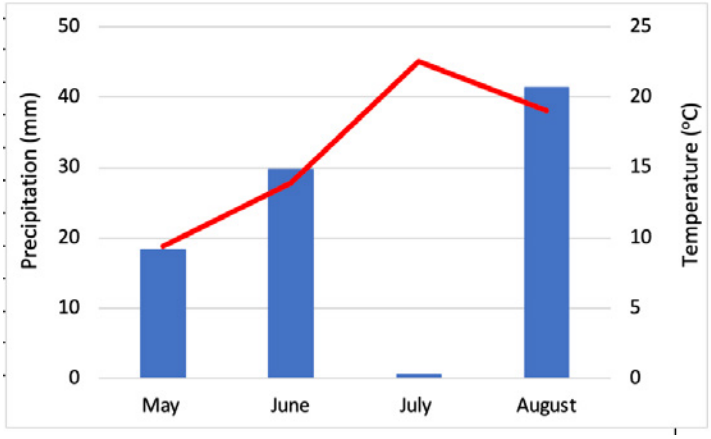
Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	50
2	High	20	74
3	Very High	26	99

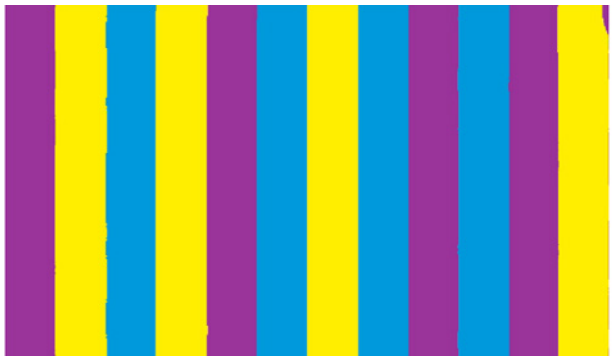
General Trial Information:

Variety	CDC Proclaim
Thousand Kernel Weight	37.5 g
Germination	98%
Seed Treatment	Vibrance® Maxx
Inoculant	Tag Team® BioniQ®
Previous Crop	Barley
Soil Organic Matter	5.6%
Residual Nitrate-N (0-6")	40 lb/ac
Soil Texture	Medium
Seeding Date	May 28
Seeding Equipment	Bourgault 3335
Seeding Depth	1"
Seeding Speed	4.9 mph
Row Spacing	10"
Total Applied Fertilizer (lbs/ac N-P-K-S)	7 – 22 – 4 – 6 – 4 Ca
Crop Protection	May 19: Pyroxasulfone + carfentrazone-ethyl June 25: Clethodim + Journey® July 10: Prothioconazole + fluopyram July 22: Lambda-cyhalothrin August 20: Diquat

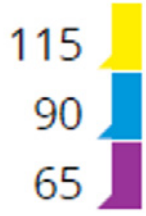
Weather from local station



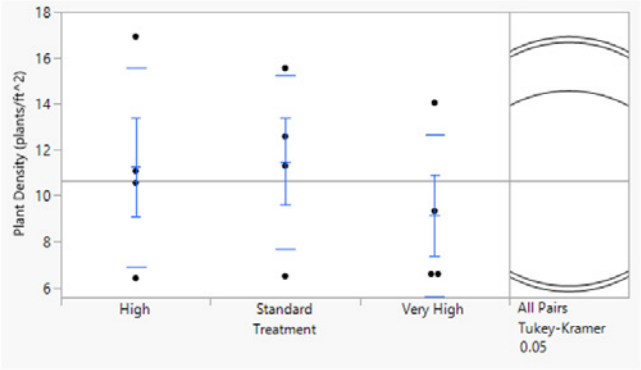
Prescription Seeding Map

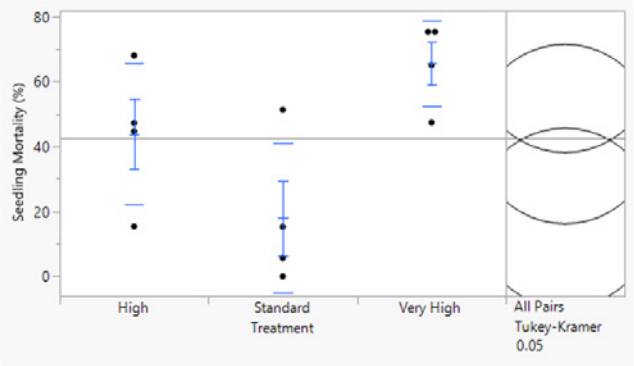


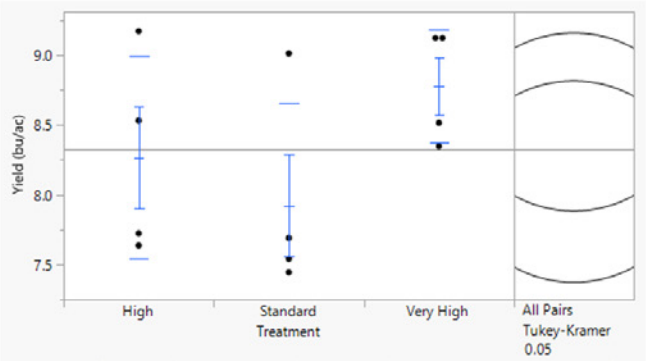
Target Seeding Rates (lb/ac)



	Plant Density (plants/ft²)	Seedling mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TKW) (g/1000s)	Test Weight (TW) (kg/hl)
Trt 1 – Standard - 13 plants/ft²	11.5	18.1 B	7.9	10.8 B	37.4 B	80.9
Trt 2 – High – 20 plants/ft²	11.2	43.8 AB	8.3	10.9 AB	41.1 A	80.9
Trt 3 – Very High – 26 plants/ft²	9.1	65.7 A	8.8	11.0 A	41.3 A	81.3
SE[1]	1.9431	9.885	0.4519	0.0478	0.852	0.419
p-value[3]	0.6814	**0.0191**	0.197	**0.0388**	**0.0246**	0.7067







Trt. No	Seeding Rate (lbs/ac)	Seed ($/ac)[x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ac)
1	50	22.50	3.46	25.96	7.9	18.00	142.20	116.24	0.00
2	74	33.30	5.12	38.42	8.3	18.00	149.40	110.98	-5.26
3	99	44.55	6.85	51.40	8.8	18.00	158.40	107.00	-9.24

[x]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed price $27/ac)
[y]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed treatment/inoculants $4.15/ac)
[z]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (target price $0.30/lb)

As the seeding rate increased, seedling mortality also increased (p=0.0191). However, seeding rates did not have a significant effect on plant density or yield. It is important to note that actual plant densities were considerably lower than the targeted seeding rates. Based on average yields, the “standard” seeding rate proved to be the most economical. No subsamples were taken, so grain quality analysis was not performed.

To review footnote references please refer to overall trial summary on page 92.

Pulse Replicated On-Farm Independent Trials

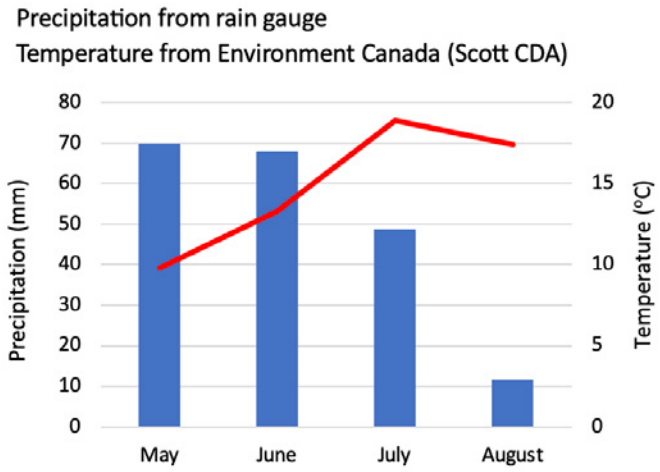
Lentil Seeding Rate (Wilkie)

Objective: Establish a field-scale replicated trial evaluating rate seeding of small red or large green lentil including comparisons of seedling survivability and yield in response to plant population across landscape positions.

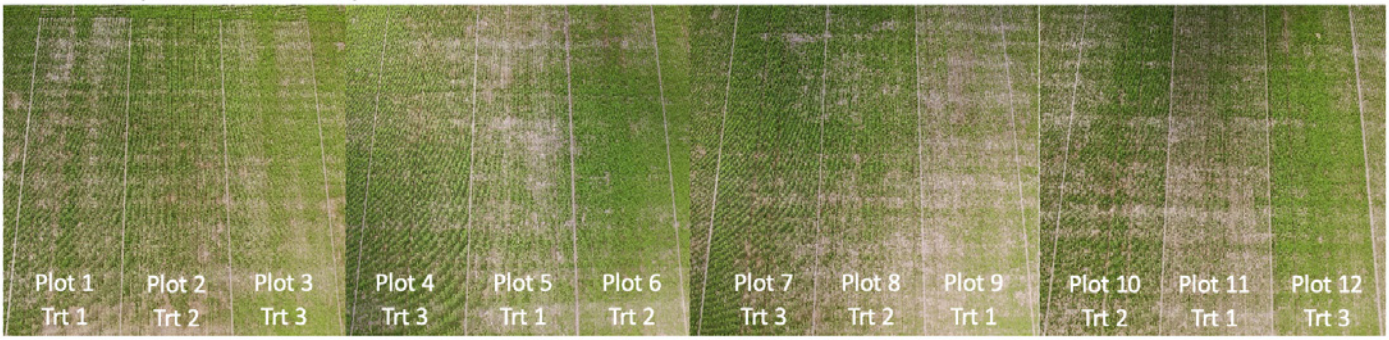
Trt #	Description	Target Plant Population (plants/ft²)	Actual Seeding Rate (lb/ac)
1	Standard	13	54.6
2	High	20	81.8
3	Very High	26	109.1

General Trial Information:

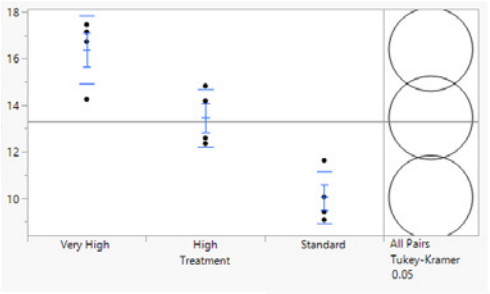
Variety	CDC Nimble
Thousand Kernel Weight	41.3 g
Germination	97%
Seed Treatment	N/A
Inoculant	TagTeam®
Previous Crop	Canola
Soil Organic Matter	5.5%
Residual Nitrate-N (0-6")	15 lb/ac
Soil Texture	Medium
Seeding Date	May 10
Seeding Equipment	John Deere P576
Seeding Depth	.75"
Seeding Speed	4.2 mph
Row Spacing	12"
Total Applied Fertilizer (lbs/ac N-P-K-S)	7 – 35 – 0 – 0
Crop Protection	October 21: Flumioxazin + pyroxasulfone May 8: Glyphosate + pyraflufen-ethyl + MCPA ester June 13: Metribuzin + MicroBolt® Zn June 20: Imazamox July 5: Azoxystrobin + benzovindiflupyr + MicroBolt® Mo August 25: Diquat

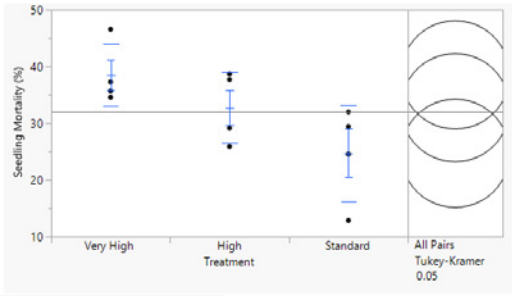


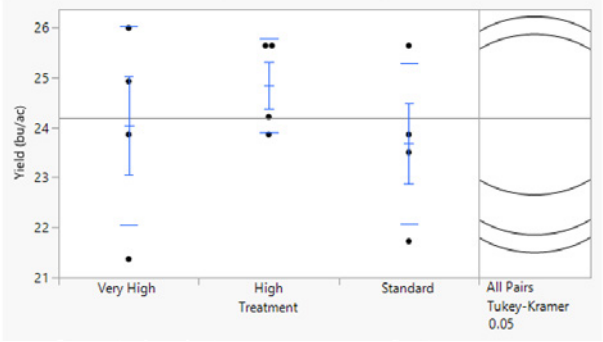
Aerial pictures taken on July 5th



	Plant Density (plants/ft²)	Seedling mortality (%)	Yield (bu/ac)	Protein (%)	Thousand Kernel Weight (TKW) (g/1000s)	Test Weight (TW) (kg/hl)
Trt 1 – Standard – 13 plants/ft²	10.0 C	24.6 B	23.7	12.4	32.1	80.4
Trt 2 – High – 20 plants/ft²	13.5 B	32.7 AB	24.8	12.4	33.0	81.2
Trt 3 – Very High – 26 plants/ft²	16.4 A	38.5 A	24.0	12.1	30.6	80.7
SE[1]	0.6421	3.4	0.78	0.283	0.939	0.806
p-value[3]	**0.0002**	**0.0451**	0.5702	0.7939	0.2177	0.7882



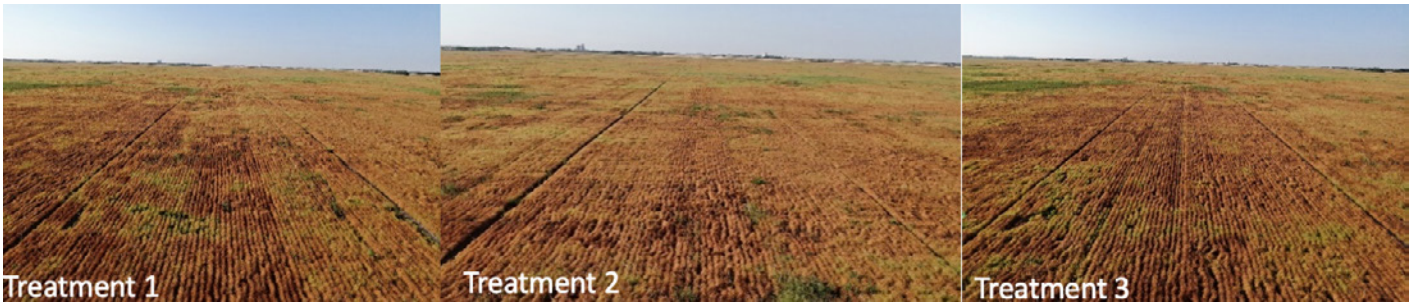




Trt No.	Seeding Rate (lbs/ac)	Seed ($/ac) [x]	Seed Treatment & Inoculant ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ac)
1	54.6	24.57	3.78	28.35	23.7	18.00	426.28	397.94	0.00
2	81.8	36.81	5.66	42.47	24.8	18.00	447.12	404.65	6.71
3	109.1	49.10	7.55	56.64	24.0	18.00	432.69	376.05	-21.88

[x]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed price $27/ac)
[y]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 60lb/ac; seed treatment/inoculants $4.15/ac)
[z]2024 Red Lentils, 2024 Crop Planning Guide, Government of Saskatchewan (target price $0.30/lb)

Increasing seeding rates led to higher plant densities (p=0.0002) and greater seedling mortality (p=0.0451), but these factors did not result in a significant increase in yield (p=0.5702). Grain quality showed no significant response to seeding rate. On average, the “high” seeding rate yielded better results and proved to be the most economical, with a cost advantage of $6.71 per acre over the “standard” seeding rate.



To review footnote references please refer to overall trial summary on page 92.

This trial was conducted with the agronomic support of

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