



Pulse Replicated On-Farm Independent Trials

Chickpea Plant Population Trial

Commonly, as stated from the Saskatchewan Ministry of Agriculture, “Seeding rates range from 90-105 kg/ha (80-95 lb/ac) for desi types and 135-210 kg/ha (120-190 lb/ac) for kabuli types. The desired plant population is 33-44 seedlings/m² (3-4/ft²)”. While this conventional seeding rate has successfully produced high-yielding chickpea crops, a more precise approach to target an optimal plant stand and adjust seeding rate according to thousand kernel weight (TKW) and seedling survivability. Also, understanding how much increasing plant density influences foliar and seed-borne disease levels is important. Achieving optimal plant populations may potentially contribute to chickpea yield improvements and help inform agronomic management decisions important to sustaining economical chickpea production.

Objective

To evaluate seeding rates of chickpeas including comparisons of seedling survivability, harvested seed size, seed-borne disease, maturity, and yield in response to plant population across various landscapes.

Treatments (Kabulis)

Low	20 plants/m ²
Standard	49 plants/m ²
High	78 plants/m ²

Trials were set up in randomized strips with four replicates for a total of 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, heights and disease assessment
- Weighed yield and harvest sample
- Harvested seed samples sent to an accredited lab for ascochyta testing
- General in-season observations
- Weather data

The follow footnotes will be referred to for individual site report for this protocol

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

² A linear regression was used to assess the effects of seeding rate on plant density and the relationship between plant density and the remaining response variables. The data was also analysed using the Mixed Model procedure in JMP with replicate considered random and seeding rate considered a fixed effect. Treatment means were separated using Tukey's test; however, letter groupings were only presented when they were significant according to the overall tests of fixed effects. All treatment effects and differences between means were considered significant at $p \leq 0.05$. However, p-values of 0.05-0.01 may also be acknowledged. $P < 0.05$ = likely that the difference was due to the treatment. $P < 0.01$ = possible that the difference was due to the treatment. $P > 0.01$ = not likely that the difference was due to the treatment





Chickpea Plant Population (Luseland)

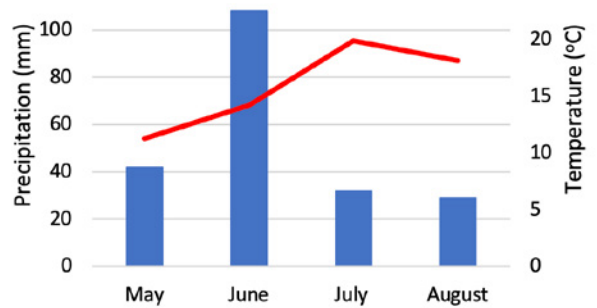
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Trt No.	Description	Target Plant Population (plants/ft ²)	Target Plant Population (plants/m ²)	Actual Seeding Rate (lb/ac)
1	Low	2	20	57.5
2	Standard	5	49	139.3
3	High	7	78	221.1

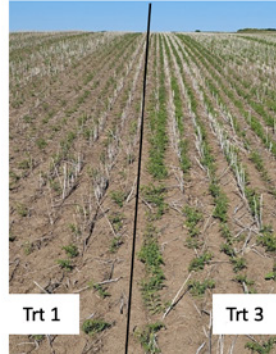
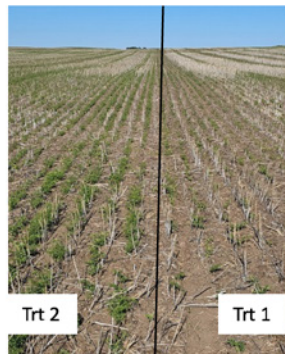
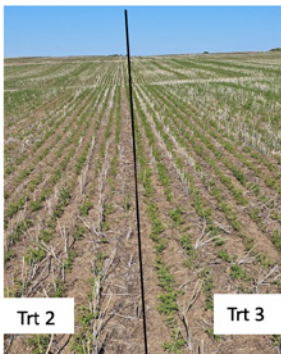
General Trial Information:

Variety	CDC Lancer
Thousand Kernel Weight	296.4 g
Germination	94%
Seed Treatment	Insure® Pulse
Inoculant	TagTeam® BioniQ® Chickpea
Previous Crop	Canola
Soil Organic Matter	3.1%
Residual Nitrate-N (0-6")	16 lb/ac
Seeding Date	May 10
Seeding Equipment	Bourgault 3335 w/ MRB
Seeding Depth	1.5"
Seeding Speed	4 – 4.5 mph
Row Spacing	10"
Total Applied Fertilizer (lbs/ac N-P-K-S)	50 lbs/acre 40 Rock (12-40-0-6.5 - 1% Zinc) + 20 lbs/acre Potassium (0-0-50-17) 6-20-10-6-0.5 Zn

Precipitation obtained from rain gauge as of May 1st
Temperature from local station as of May 19th

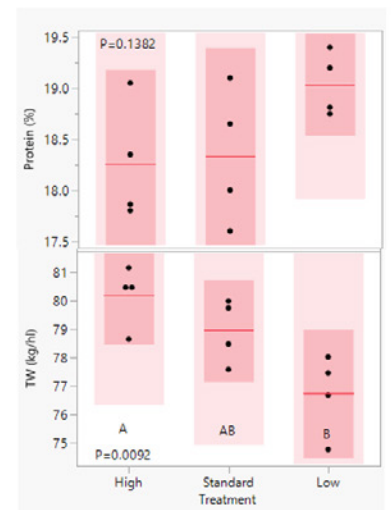
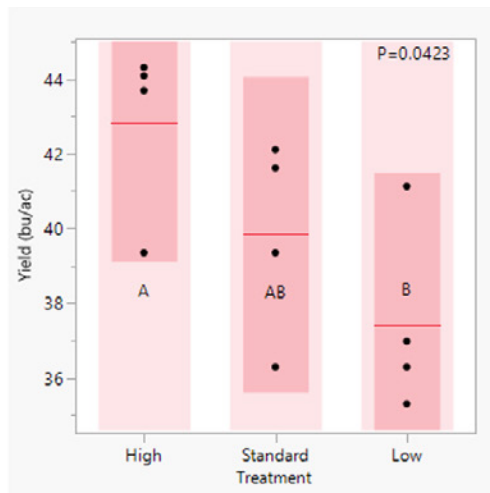
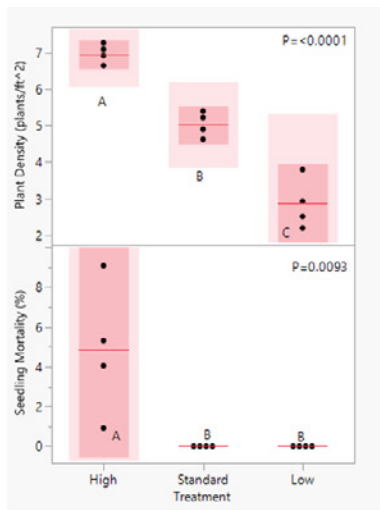


Crop Protection
 October 22: Sulfentrazone + pyroxasulfone + imazethapyr
 June 19: Quizalofop + imazamox
 June 19: Pydiflumetofen + azoxystrobin + propiconazole
 July 5: Mefentrifluconazole + prothioconazole
 July 19: Azoxystrobin + benzovindiflupyr
 August 31: Diquat



Treatment Description	Plant Density (plants/ft ²)	Seedling mortality (%)	Yield (bu/ac)	Thousand Kernel Weight (g/1000s)	Test Weight (kg/hL)	Protein (%)	Moisture (%)
Low - 2 plants/ft ²	2.9 C	0.0 B	37.4 B	375.1	76.7 B	19.0	16.0 A
Standard - 5 plants/ft ²	5.0 B	0.0 B	39.8 AB	367.0	79.0 AB	18.3	14.2 AB
High - 7 plants/ft ²	6.9 A	4.8 A	42.8 A	364.8	80.2 A	18.3	13.5 B
SE ¹	0.471	1.37	1.74	8.8	0.862	0.38	0.761
p-value ²	<.0001	0.0093	0.0423	0.6937	0.0092	0.1382	0.0217

Description	24r	22r	20r	18r	16r	14r	Ascochyta (%)
Low - 2 plants/ft ²	15.1	142.4	154.7	28.8	5.0	1.5	0.0
Standard - 5 plants/ft ²	8.9	117.2	184.2	33.8	3.9	0.8	0.0
High - 7 plants/ft ²	11.8	119.8	180.3	32.5	3.9	0.8	0.0
SE ¹	3.86	7.2	10.7	3.012	0.527	0.147	0.1
p-value ²	0.3177	0.0671	0.0445	0.5031	0.277	0.0012	0



Treatment Description	Seeding Rate (lbs/ac)	Seed (\$/ac) ^x	Seed Treatment & Inoculant (\$/ac) ^y	Total Expenses (\$/ac)	Yield (bu/ac)	Target Price (\$/bu) ^z	Gross Revenue (\$/ac)	Net Revenue (\$/ac)	Profit/Loss (\$/ac)
Low - 2 plants/ft ²	57.5	39.10	3.98	43.08	37.4	27.0	1010.5	967.43	0.00
Standard - 5 plants/ft ²	139.3	94.72	9.64	104.36	39.8	27.0	1075.7	971.38	3.95
High - 7 plants/ft ²	221.1	150.35	15.29	165.64	42.8	27.0	1156.3	990.64	23.22

^x2024 Kabuli Chickpea, Large, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 145lb/ac; seed price \$98.60/ac)

^y2024 Kabuli Chickpea, Large, 2024 Crop Planning Guide, Government of Saskatchewan (seed rate 145lb/ac; seed treatment/inoculants \$10.03/ac)

^z2024 Kabuli Chickpea, Large, 2024 Crop Planning Guide, Government of Saskatchewan (target price \$0.45/lb)

Plant density ($p < 0.0001$) and seedling mortality ($p = 0.0093$) were both significantly impacted by seeding rates. The high seeding rate, targeting 7 plants/ft², had the highest plant density and seedling mortality. Yield ($p = 0.0423$) was also significantly impacted by seeding rate, where, the highest seeding rate also had a 3.0 and 5.4 bu/ac increase over the low and standard seeding rates, respectively. The higher yields, along with the increased seed, seed treatment and inoculant costs, still resulted in the high seeding rate being the most economical. No significance was found with seed size, other than the 20r ($p = 0.0445$) and 14r ($p = 0.0012$).

✳ To review footnote references please refer to overall trial summary on page 139.



This trial was conducted with the agronomic support of

