

## Pulse Replicated On-Farm Independent Trials

# Dry Bean Response To Varying Plant Populations Trial

*Recommendations for dry bean seeding under irrigation and wide-row production vary across different dry bean growing regions in western Canada and suggested targets are 95,000- 100,000 live plants per acre (Alberta Pulse Growers, 2022) and 90,000 to 120,000 live plants per acre (Manitoba Pulse and Soybean Growers, 2022; North Dakota State University, 2019). Fine-tuning seeding rate recommendations is of interest to dry bean growers and agronomists. Achieving optimal plant populations may potentially improve yields and help inform economic and agronomic management decisions for dry bean production.*

### Objective

To evaluate crop performance of a single variety of dry bean under typical field management practices at varying plant populations.

### Treatments

Seeding rates were determined using the TKW and germination of the seed lot, and an estimated seedling mortality to target three plant populations:

- **Low Rate:** 90,000 live plants per acre (2.07 plants/ft<sup>2</sup>)
- **Mid Rate/Grower Standard:** 120,000 live plants per acre (2.75 plants/ft<sup>2</sup>)
- **High Rate:** 150,000 live plants per acre (3.44 plants/ft<sup>2</sup>)

Treatments were arranged in randomized strips with three replicates, for a total of nine plots.

## Methodology

- Apart from seeding rates, all plots were managed the same agronomically.
- A minimum of two plant population assessments were completed during the growing season targeting V1 (1st trifoliolate) and R2 (beginning pod) stages.
- Plant height (ground to top of plant) and pod clearance (ground to bottom of lowest pod) were assessed between R9 (full maturity) and prior to harvest.
- Yield was determined for each plot separately by weighing with a weigh wagon or grain cart with scale.
- Composite grain samples collected from each treatment for quality analysis.

## Data Collection

- In-season plant density assessments
- Harvest data
- General in-season observations and management actions
- Site characterization: field history and management practices, seed test, soil test, weather data



# Plant Population In Dry Bean (Riverhurst)

**Objective:** To determine the agronomic and economic response of a single variety of dry bean under varying plant populations.

**Treatments:**

1. Low (90,000 plants/ac)
2. Mid (120,000 plants/ac)
3. High (150,000 plants/ac)

**Replicates:** Three

### General Trial Information:

Variety	CDC Blackstrap
Soil type & texture	Orthic Brown Chernozem, sandy loam/fine sandy loam
Seeding date	May 26
Seeding depth	1.5 inches
Seeding speed	6 mph
Seed treatments	Vibrance Maxx® (sedaxane + metalaxyl + fludioxonil)
Row spacing	15 inch
Drill & opener type	Vacuum planter - disc type opener
Previous crop	Durum
Soil organic matter	2.4%
Residual Nitrate-N (0-24")	80.6 lbs/ac
Fertility and placement	300 lbs 28.5-26-0 (urea + MAP blend) - banded fall 2022
Harvest date	Sept 6

### In-crop pesticide applications:

June 20	Viper® (imazamox + bentazon + Merge + 28% UAN) + Basagran® (bentazon)
July 19	Cotegra® (boscalid + prothioconazole)
Aug 2	Acapela™ (picoxystrobin) + Parasol® (copper hydroxide)
Aug 31	Reglone® (diquat)



## Results:

Treatment	Yield <sup>(1)</sup> (lbs ac <sup>-1</sup> / bu ac <sup>-1</sup> )	Average plant counts (plants ac <sup>-1</sup> )	Average plant height (cm)	Average pod clearance (cm)
Low (90,000 plants/ac)	3060 / 51.0	80,279	30.3	3.9
Mid (120,000 plants/ac)	3040 / 50.67	104,544	30.3	3.7
High (150,000 plants/ac)	3120 / 52.0	130,874	31.3	3.8
SE <sup>(1)</sup>	± 1.87	± 5416	± 0.69	± 0.18
P-value <sup>(2)</sup>	0.69	<0.001***	0.49	0.54



### Summary:

We were unable to detect differences in yield as a result of the seeding rates to target various plant populations in dry bean under these trial conditions.

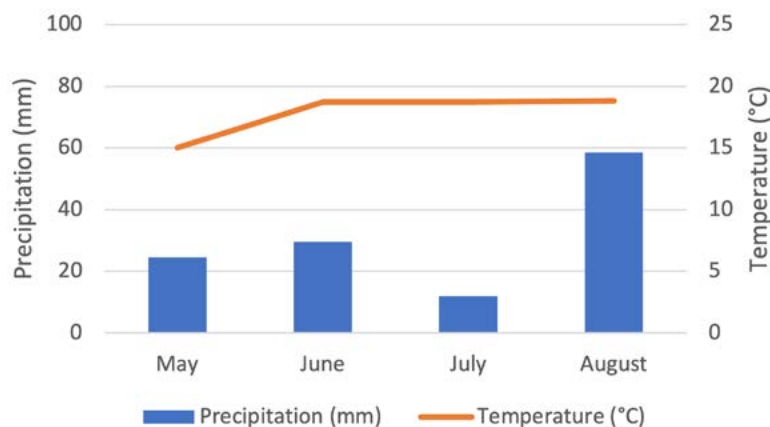


### Economics:

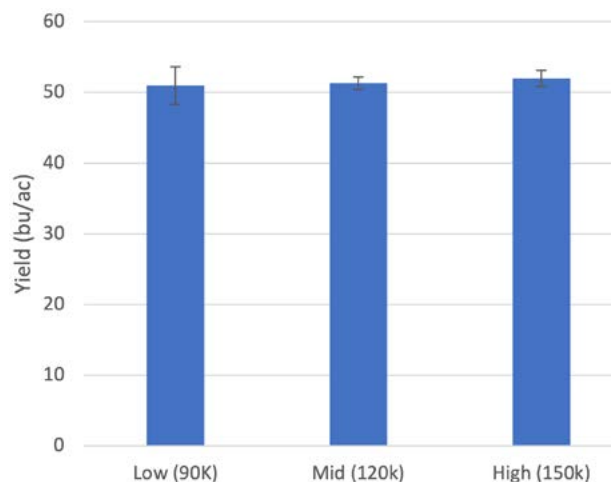
Target plant population (plants ac <sup>-1</sup> )	Seeding rate (ac <sup>-1</sup> )	Seed cost <sup>(3)</sup> (ac <sup>-1</sup> )	Yield (bu ac <sup>-1</sup> )	Grain profit <sup>(4)</sup> (ac <sup>-1</sup> )	Net profit (ac <sup>-1</sup> )
90,000	0	0	0	0	0
120,000	+ 17 lbs	- \$24.48	- 0.3	- \$10.80	- \$35.28
150,000	+ 34 lbs	- \$48.96	+ 1.0	+ \$36.00	- \$12.96

There was no significant difference in yield resulting from various plant populations. Therefore, the most economical treatment in regard to plant population would be the lowest target of 90,000 plants/ac.

Weather: nearby or in-field weather station.



\*An additional 228.6 mm of water was applied through pivot irrigation to this field.



Dry bean yield under various plant populations

- SE is the standard error which is in the same unit as the measurement and indicates the level of variability or uncertainty in the data.
- The P-value indicates the statistical significance, or likelihood that the measured difference was a result of the treatment:  
 P < 0.01 = Very likely; Very high probability that the difference was due to the treatment (\*\*\*)  
 P < 0.05 = Likely; Good probability that the difference was due to the treatment (\*\*)  
 P < 0.1 = Possibly; Moderate probability that the difference was due to the treatment (\*)  
 P > 0.1 = Not likely; Probability too low to confirm if the difference was due to the treatment (not significant)
- Seed cost of \$1.44 per lb. calculated from Saskatchewan Ministry of Agriculture's 2023 Crop Planning Guide.
- Grain price of \$0.60 per lb. calculated from Saskatchewan Ministry of Agriculture's 2023 Crop Planning Guide.



This trial was conducted with  
the agronomic support of

**E3 Ag Ventures**