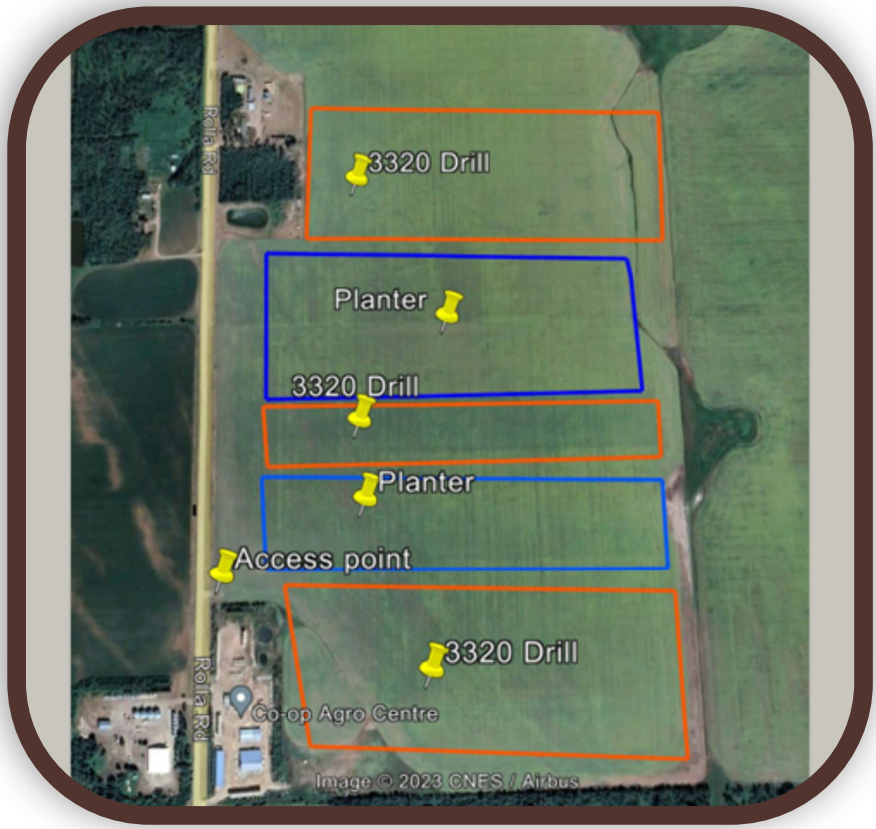
Trial Nine

Planter vs. Drill Comparison

Funk & Rath



Planter

Drill

Partner Producers: Brandon Funk (Drill) Willy & Edmund Rath (Planter)

Seeding Date: April 29, 2023

Harvest Date: September 2, 2023

Field Side by Side Comparison Trial

Vaderstad Planter vs. 3320 Bourgault Paralink Drill

Project Goal: Compare two neighbouring farms seeding implements under the same environmental conditions.

Producer Prediction: That the planter with the cost savings of a lower seeding rate will be the most economical, even when factoring cost of purchasing equipment

*Both trials were treated with the same agronomic practices throughout the growing season, comparison was using different seeding equipment at the recommended seeding rate.

Equipment Description: 34Ft Vaderstad tempo L 24 (row) Planter 17.5 inch (45cm) row spacing @ 2.8 lbs/ac canola seeding rate

Equipment Cost per Acre: $20/ac (Seeding implement only no labour, tractor or fuel)

The Vaderstad planter is a popular agricultural implement used for precision planting. Here are some key advantages & disadvantages.

Advantages:

1. Precision seeding: The Vaderstad planter ensures accurate seed placement, resulting in consistent plant spacing and optimal seed-to-soil contact.
2. Increased yield potential: The precise planting achieved by the planter promotes even emergence, reduces competition between plants, and maximizes yield potential.
3. Time and labor savings: The planter's efficient design allows for faster planting speeds.
4. Versatility: Vaderstad planters are available in various configurations and can handle different types of seeds and crops, providing versatility for farmers with diverse planting needs.
5. Advanced technology: Many Vaderstad planters incorporate advanced features such as GPS guidance, variable rate seeding, and automatic row shut-off, enhancing planting accuracy and efficiency.
6. Fertility Application: This Vanderstad planter has the ability to apply granular fertilizer in side band as opposed to liquid or no fertility application option in other planter models.

Disadvantages:

1. Initial cost: Vaderstad planters can be relatively expensive to purchase, which may pose a financial challenge for some farmers, especially small-scale operations.
2. Maintenance and setup: Like any complex agricultural machinery, the planter requires regular maintenance and proper setup to ensure optimal performance, which may require additional time and expertise.
3. Limited suitability for certain conditions: The Vaderstad planter may not be suitable for all soil types or field conditions, particularly in challenging terrains or regions with specific cropping practices. 4. Learning curve: Operating the planter effectively may require a learning curve, especially for farmers who are new to precision planting technology. Training and familiarity with the equipment are important for achieving desired results.

Field Side by Side Comparison Trial

Vaderstad Planter vs. 3320 Bourgault Paralink Drill

Drill: 60Ft 3320 Bourgault paralink Drill 10 ' (25.4 cm) row spacing @ 5lbs /ac seeding rate

Equipment Cost Per Acre: $20/ac (Seeding implement only no labour, tractor or fuel)

The 3320 Paralink Bourgault Drill is a popular agricultural equipment. Here are some advantages & disadvantages.

Advantages:

1. Versatility: Wider range of seed and fertilizer placement options, allowing for flexibility in different crop types and field conditions. Ability to seed and fertilize in one pass reducing fuel & labour costs.

2. Efficiency: Its large working width and high-capacity tank enable faster planting, reducing the time required for seeding operations.

3. Precision: The drill's accurate metering system ensures precise seed and fertilizer placement, promoting uniform crop emergence and optimizing resource utilization.

4. Easy Maintenance: The drill is designed for easy maintenance and features durable components, reducing downtime and repair costs.

Disadvantages:

1. Cost: The 3320 Paralink Bourgault Drill can be expensive to purchase, making it a significant investment for farmers and agricultural businesses.

2. Learning Curve: Operating this drill may require some training and familiarity, particularly for those who are new to this specific model or advanced agricultural equipment in general.

3. Maintenance and Repairs: Although the drill is designed for easy maintenance, any necessary repairs or replacements could still incur costs and time delays.

5. Fertilizer Placement: Unable to place fertilizer in a side band, only seed row or mid row is an option.

Seeding

Fertility: 100lbs of actual Nitrogen (NH3) was applied fall of 2022

75 lbs (product) of Ammonium Sulphate floated on spring 2023 prior to seeding

50lbs of 11-52-0 Phos will be applied with seed through each drill at time of seeding. Foliar Fertility was applied in crop to both treatments.

Pesticide: Two passes on insecticide were applied to the each treatment, first pass to manage flea beetles (May) and Lygus bug (Aug 1)

Herbicide: Split application of Grassy weed control herbicide for control of wild oats first pass and Liberty herbicide was applied in a separate pass.

Seeding Date: April 29, 2023

Seeding Conditions: In the previous two weeks prior to seeding the average daily temperature was 6.4C, Low -3.6C, high 24.5C, rainfall for time period was 9.14mm or 79% of normal rainfall for that time period. Weather data collected from the nearest Peace Agri Weather Network station. Outside air temperature on the day of seeding was 24.5C. Although surface soil conditions were beginning to get dry, the soil moisture conditions were good at time of seeding.

Planter seeding Rate: *6 seeds per sq/ft* **Drill Seeding Rate**: *9.75 seeds per sq/ft*

Plant Counts: Taking plant counts in canola is important for several reasons. Firstly, it helps farmers to assess the stand establishment and determine if the crop is growing as expected. This information enables them to make informed decisions about potential replanting or adjusting seeding rates. Additionally, plant counts can provide valuable insights into the overall health of the crop and yield potential, allowing farmers to implement appropriate management practices to maximize production.

Plant counts were taken at 10, 18, 30 & 47 days post seeding. The target plants per sq/ft plant counts the each producer was hoping to get was 5-6 plants per sq/ft. It was recommended that to compare the planted vs drill with the difference in row that per meter of Row counts be taken and converted to plants per sq/ft. Low plant counts in canola can lead to delayed maturity. This occurs because with fewer plants, there is less competition for resources, which can cause individual plants to grow larger and produce more branches. As a result, the plants take longer to reach maturity, potentially leading to a later harvest. High plant counts in canola can lead to increased competition for resources such as water, nutrients, and sunlight, which can result in smaller individual plant size, decreased yield, and increased susceptibility to diseases and pests. Overcrowding can lead to lodging, making harvesting difficult. It's important to maintain optimal plant density to ensure healthy growth and maximum yield.

Between seeding and first inspection May 9 there was no rainfall, average temperature of15C with a recorded low of 4.1C and high of 28.9C. Second inspection May 17th there continued to be no rainfall, average temperature of 18.1C with high of 31.4C and low of 5.7C.

Between the May 17 & June 14th there was cumulative rainfall of 71.37mm (2.8inches) with an average temperature of 15.7C low of 4.4C and High of 27.3. Visual observations at the time of the first plant count were that the planter had a more uniform , evenly placed plant stand. This is a attributed to the planters metering system that places each seed individually.

Plant Counts

May 9th — Planter

May 9th — Drill

Plant Stand Counts
Planter Vs. Drill Comparison

Description	Row Spacing cm	Seeding Rate	Count Date	Stage	Plant Count 1	Plant Count 2	Plant Count 3	Plant Count 4	Plant Count 5	Plant Count 6	Plant Count average	plants per sq/M	Average Count	% seed survival
		seeds per sq/ft			**	per	meter	of	row	**		plants per sq/M	Plants per sq/ft	-
Drill	25.4	9.75	09-May	Cot-1st	7	11	8	4	17		9.40	37.01	3.44	35.28%
Planter	45	5.97	09-May	Cot	17	2	10	25	15		13.80	30.67	2.85	47.74%
Drill	25.4	9.75	17-May	2 leaf	12	18	9	7	17	12	10.50	41.34	3.84	39.40%
Planter	45	5.97	17-May	2 leaf	17	19	22	15	14	24	14.50	32.22	2.99	50.16%
Drill	25.4	9.75	30-May	5 Leaf	32	11	22	19	27	17	18.50	72.83	6.77	69.43%
Planter	45	5.97	30-May	6 leaf	35	21	29	32	30	35	24.50	54.44	5.06	84.76%
Drill	25.4	9.75	14-Jun	Rosette	9	17	28	10	10	10	12.33	48.56	4.51	46.28%
Planter	45	5.97	14-Jun	Rosette	17	19	22	15	14	24	14.50	32.22	2.99	50.16%

*Each plot plant counts taken 5 -6 samples in a W sample pattern, counts taken by meter of row and converted target plant stand 5-6 plant sq/ft

Drill Planter

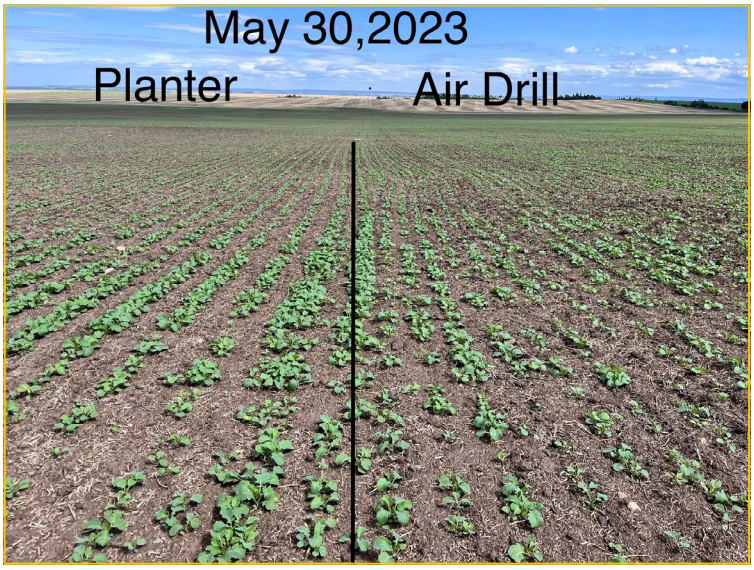
May 30th Observations

Growing Season Observations

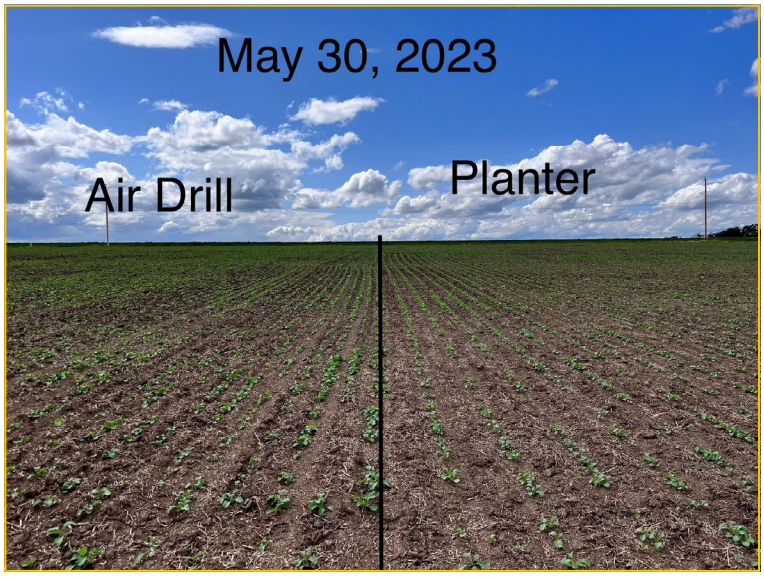
May 30th Observations: Local Agronomist Jennifer Frederickson completed a field visit May 30th she noted that seed placement on the planter was much more uniform than the air drill (in regards to depth) At the time of this visit the plants were anywhere from 2 leaf to 6 leaf (most in the 5 leaf) at least 1-2 in 2 leaf per square count. She felt that the planter was so even but moisture wasn't even so some seeds were sitting in dry soil until it rained (May 20th). With this uneven moisture and the uniform seed placement of the planter actually may have contributed to planter seeds not germinating at same time. In the picture below note the smaller cotyledon growth stage plants that germinated after the ran. There was minimal moisture between in June and July which may have contributed to the seedling mortality difference from May 30th and June 14th visit.

May 30th Plant Counts—Planter

Comparison pictures were taken a each site visit to determine if there were any visual differences, planter on left and drill on right.



Facing West



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Growing Season Observations

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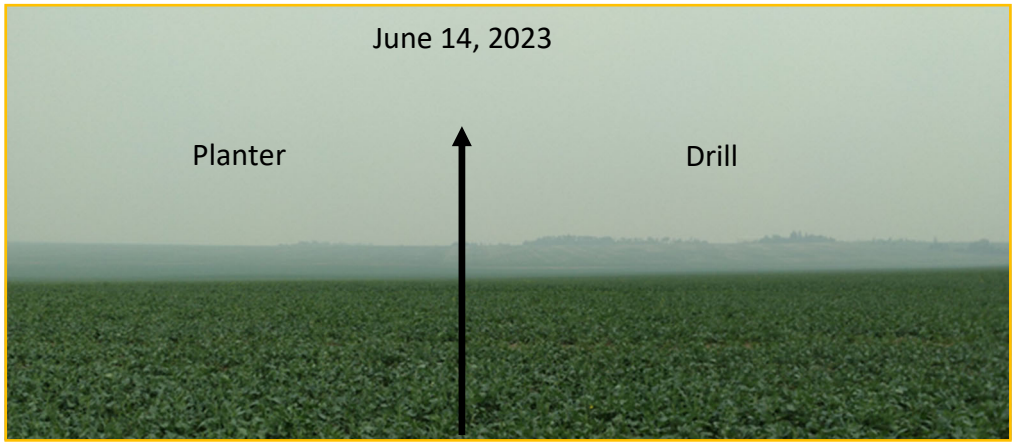
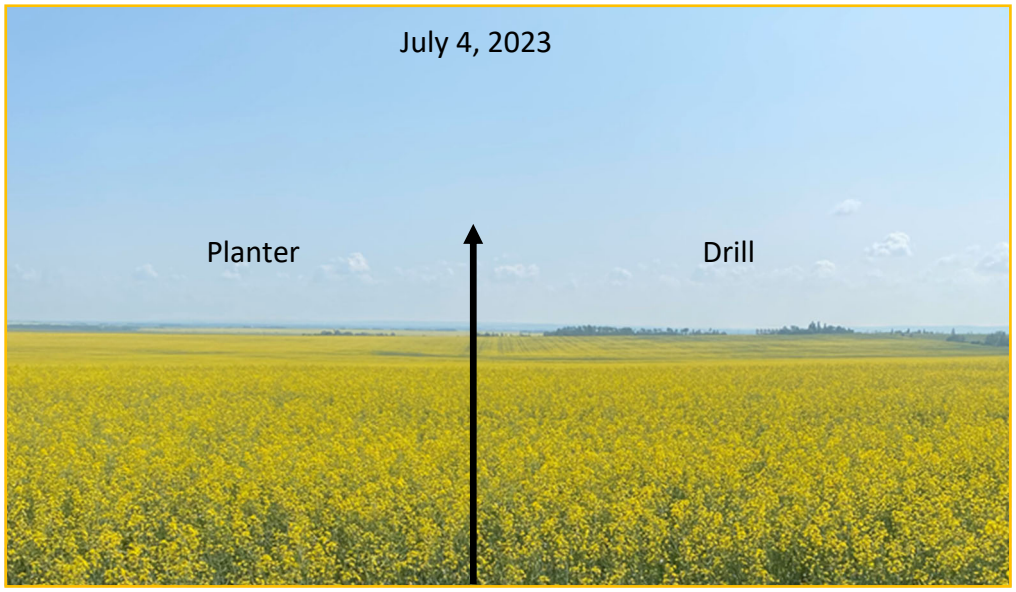
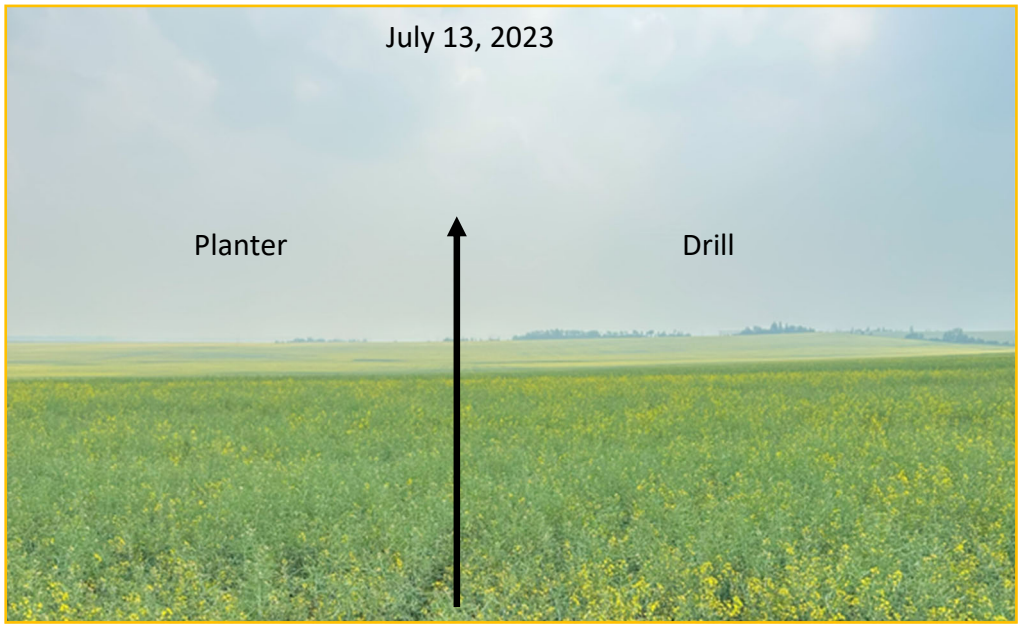






Growing Season Observations

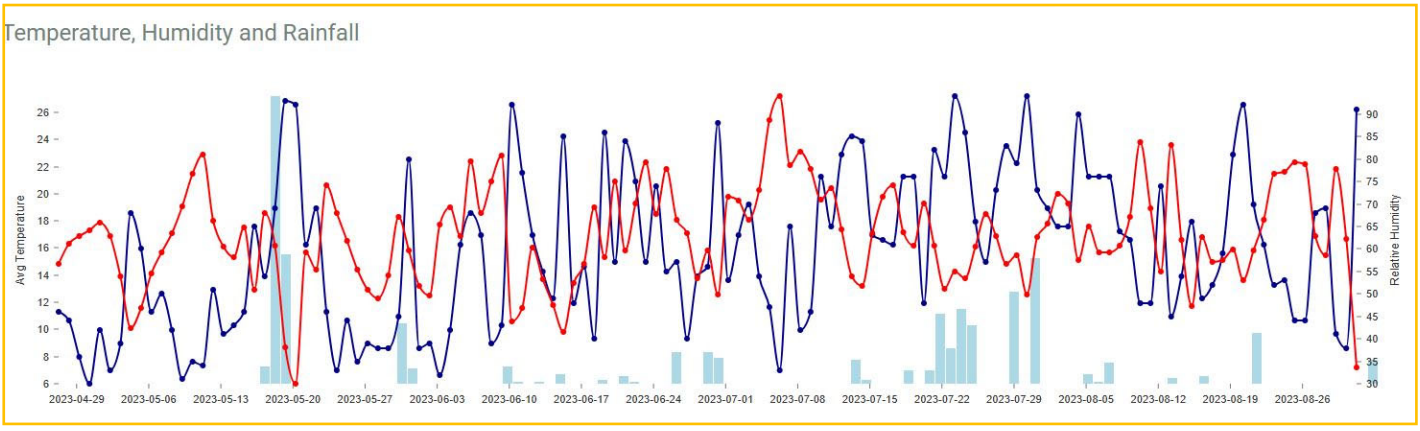
Comparison pictures were taken a each site visit to determine is there were any visual differences, planter on left and drill on right.

Weather April 29– September 2nd

Growing Season Weather Summary: All weather information generated from local weather station data collected through the BC Peace Agri Weather Network using the Rolla weather station. **http://www.bcpeaceweather.com/**

Weather Summary: April 29 - Sept 2	
Average Temperature:	16.9 °C
Lowest Temperature:	4.1 °C
Highest Temperature:	33.2 °C
Total Rainfall:	172.21mm (6.78 inches)
Normal Rainfall:	267.15mm (64% of normal)
*Weather information collected from	Peace Agri weather network

Growing Degree Days Summary: April 29 -Sept 2			
Number of Days: 127			
	Actual	Normal	% of Normal
GDD Base 0C	2173	1643	132
GDD Base 5C	1538	1018	151
GDD Base 10C	906	453	200



Harvest Data

Yield data was collected by taking area calculated by GPS distance and header width. Weights were taken using producers grain cart scales. Crop was harvested using straight cut header utilizing full header down center of trial. Planter trial straw was visually greener at time of harvest, (See picture Below Drill Crop residue on left Planter Crop residue on the right) Grain sample moisture tests confirm that Planter samples were significantly higher moisture. See harvest yield and grain sample information chart on next page.

↑ Drill Crop Residue ↑

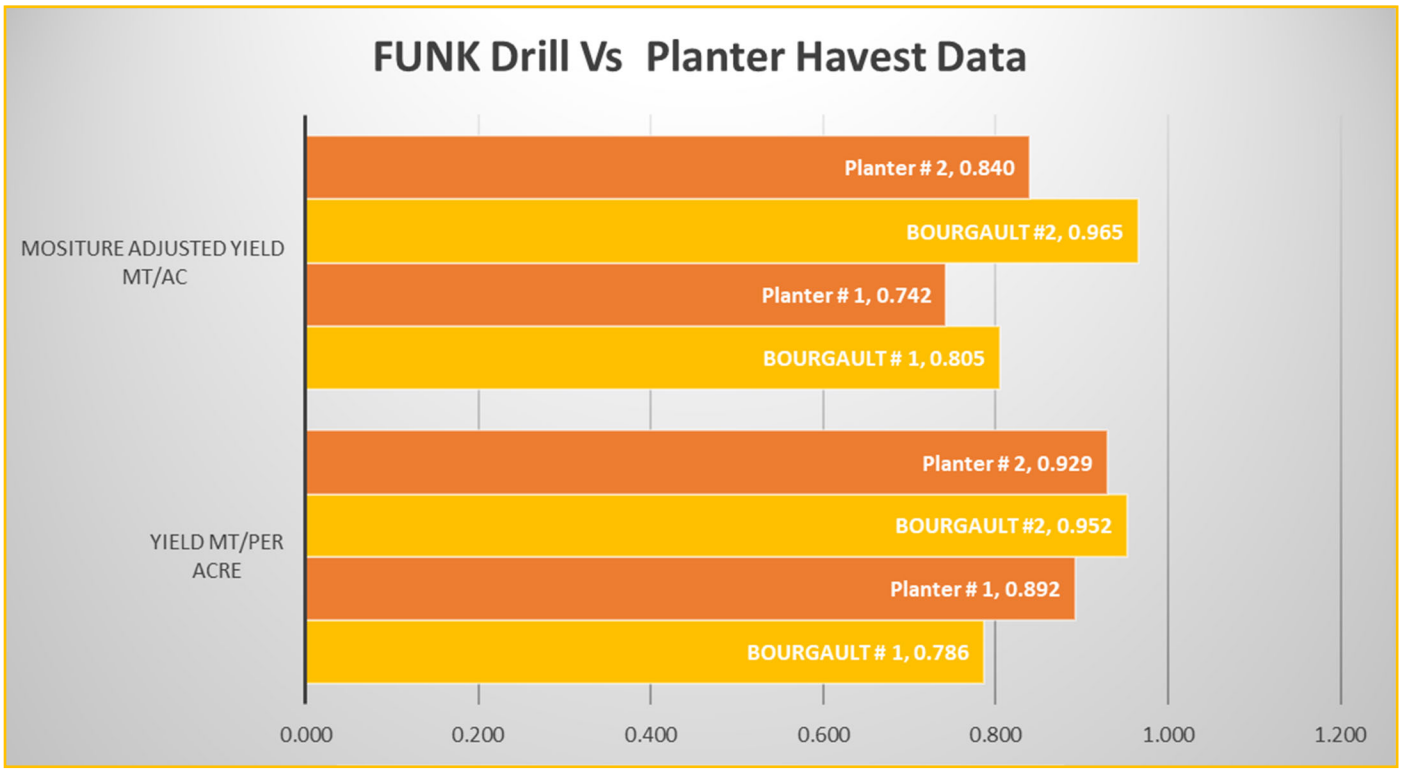
↑ Planter Crop Residue ↑

Harvest Data

Drill Vs. Planter Harvest Data — Sept 2, 2023

Description	width Ft	Weight KG	Metric Tonne	Mt per acre	Bu/ac	Moisture	Oil Content	Target Moisture	Shrinkage /expansion %	Adjusted Bu/ac
Drill # 1	40	1700	1.700	0.786	**34.65**	7.62%	42.60%	10%	0.024	**35.48**
Planter # 1	40	1930	1.930	0.892	**40.98**	26.80%	error due to high mois-ture content **	10%	-0.168	**32.73**
Drill # 2	40	2060	2.060	0.952	**43.74**	8.68%	41.20%	10%	0.013	**42.54**
Planter # 2	40	2010	2.010	0.929	**42.68**	19.65%	error due to high mois-ture content **	10%	-0.097	**37.02**

*** Canola grain samples were sent away to Canadian Grain commission confirm grade and quality ***
** BCGPA oil content tester could not test at high moisture see Grain commission data *Yield Adjusted to 10% moisture



Harvest Grain Samples

Harvest Sample Results — Canadian Grain Commission

Sample	Grade	ADFRmeal (Acid Digestible Fiber)	Chlorophyll	Iodine Value	Linoleic Acid	Linolenic Acid	Moisture	Oil	Oleic Acid	Protein	Saturated Acids	Total Glucosinolates	DGR
Drill # 1	1 CAN	20.7	12.1	115.1	18.0	11.3	6.4	41.9	62.5	24.3	6.5	14.4	0.20 P
Planter # 1	1 CAN	20.4	13.6	115.1	18.1	11.2	8.1	42.1	62.5	24.2	6.5	13.3	0.20 P
Drill # 2	1 CAN	20.6	14.2	115.5	18.1	11.4	7.2	41.9	62.3	24.3	6.5	14.4	0.20 P
Planter#2	1 CAN	20.7	15.2	114.4	18.3	10.8	9.1	43.0	62.9	23.4	6.4	12.0	0.20 P

Cost Analysis					
	Yield Bu/ac	$/bu	Gross per acre	Seed Costs	Gross Less Seed Costs
Drill # 1	35.48	15	$ 532.20	$ 65.00	$ 467.20
Planter # 1	32.73	15	$ 490.95	$ 35.14	$ 455.81
Drill #2	42.54	15	$ 638.10	$ 65.00	$ 573.10
Planter # 2	37.02	15	$ 555.30	$ 35.14	$ 520.16

Producer Perspective: Although seeding date was early the seeding conditions were perfect and depth looked good at seeding. Plant counts were inadequate for both drill and planter, and the plant count told the story in this trial. The reduced plant counts on the planter caused the plants to branch out lengthening maturity. As maturity in the Peace Region is crucial because of our short growing season. In a normal year this would have given significant harvesting challenges and would probably had to have been swathed. Producer noted that these plant counts were by far the lowest on the rest of his planted acres in the same area although the remaining acres were seeded a week later.

Producers agree that seeding conditions were optimal at time of seeding so even given the results no changes would have been made to the depth on either implement. Producer hypothesis made in the spring still stands and if the trail was to continue to a second year the hypothesis would still be "That the planter with the cost savings of a lower seeding rate will be the most economical, even when factoring cost of purchasing equipment"