

# Bourgault Agronomy Trials

## 2016

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# 2016 Bourgault Agronomy Canola Trial Update

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## Introduction

The purpose of testing various Phosphorus (P) placement strategies is to develop and provide producers with safe options to supply removal rates of P in a one-pass seeding operation. Many soils in the Great Northern Plains are deficient in P because historically applied rate of P fertilizer has not matched the removal rates, especially for the increased productivity of today's crops. This is largely due to the fact that P fertilizer is essentially immobile in the soil and is best placed with the seed for a "pop-up" effect through increased early root development. Seed safety guidelines have been established because in some conditions too much P fertilizer in the granular form placed with the seed can cause issues due to a salt effect. Producers are placing safe rates with the seed, but typically these rates do not match removal rates of the crops.

Phosphorus deficiency is known as the 'hidden hunger' because the producer does not see a distinct plant symptom that shows the plant is deficient. Identification is easier when grown next to plants that are not deficient, like in strip trials, which display the delayed and stunted growth of the deficient plants.

For the second consecutive year, Bourgault Industries explored different placement options in canola, including high rates seed placed and a split application where starter P is placed with the seed and the bulk of the P fertilizer is placed in a separate band with the rest of the fertilizer. A triple shoot concept was also explored where the seed is placed by itself, the P in a band slightly down and away, and the rest of the fertilizer in the mid-row band. The trials were located near St. Brieux, SK.

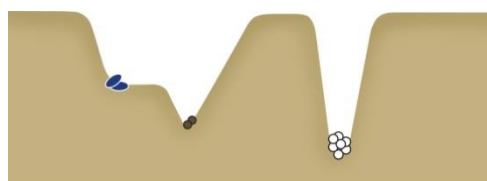
## Trial Design:

- 400' by 30' strip trials
- Treatments replicated 3 times in a Complete Randomized Block Design
- Yield taken via weigh wagon
- Plant counts taken in 3 places per treatment and averaged
- Statistical analysis
  - Based on a 90% Level Of Confidence (LOC)
  - Least Significant Difference (LSD) indicates the smallest amount between treatments that would indicated a significant difference
  - Letters describe if one treatment is the same as the other. Ex. Treatments depicted as 'A' are the same other treats with 'A' in them.
    - Ie 'A' is statistically the same as 'AB'
    - Ie 'A' is not statistically the same as 'B'
- Target yield of canola was 60bu/acre
  - Target canola phosphorus rate is 55lbs of P<sub>2</sub>O<sub>5</sub>/acre (60bu x .91lb P<sub>2</sub>O<sub>5</sub>/bu removal rate)

## Seeding equipment:

- All plots were seeded with the same air tank and tractor
- Bourgault L7550 Airseeder
  - 5 Tanks all capable of metering
  - Capable of 3 airways to accommodate triple shoot for dry products
- Three separate seeding tools were used

Bourgault 3320	Bourgault 3720	Dual Knife
10" Spacing	10" Spacing	12" Spacing
¾" opener	Disc Wing Scraper	½" dual knives
MRB Equipped	MRB Equipped	MRB Equipped



- In the case of the 3720 and dual knife machine, the MRBs could be locked up. The drills are then used as a side-band operation



## Field Background:

- Field Soil Analysis – 12” depth

NO <sub>3</sub> <sup>-</sup>	P <sub>2</sub> O <sub>5</sub>	K	S	O.M.	pH
29lbs	25lbs	171lbs	54lbs	5.4%	7.1

- Previous Crop was barley haylage
- Soil type
  - Waitville-Whitewood
  - Dark Gray wooded soil formed on loamy glacial till; loam surface texture
  - Nearly level topography but contains moderate amount of stones

## Weather:

Average temperature and mean precipitation at Melfort, in 2015 and 2016 (Environment Canada 2016).

--- Temperature ---							
	May	Jun.	Jul.	Aug.	Sept.	Oct.	Average
2015	9.9	16.4	17.9	17.0	11.9	6.6	13.3
2016	13.6	17.1	18.1	16.3	12.0	1.7	13.1
Long-Term Average <sup>a</sup>	10.7	15.9	17.5	16.8	10.8	3.3	12.5
--- Precipitation ---							
	May	Jun.	Jul.	Aug.	Sept.	Oct.	Total
2015	7.1	54.8	149.8	57.4	70.0	33.0	372.1
2016	16.8	53.2	128.7	80.8	41.3	57.7	378.5
Long-Term Average <sup>a</sup>	42.9	54.3	76.7	52.4	38.7	27.9	292.9

<sup>a</sup> Long-Term Climate totals and averages calculated between 1981 to 2010 from Melfort CDA weather station (52°49'00 N, 104°36'00 W).

## Trial Details:

- Seeded May 21, 2016
- Fertilizer – 120-0-20-40 as a blend down the SB or MRB
  - Urea (46-0-0), Potash (0-0-60), Tiger 50 (11-0-0-50)

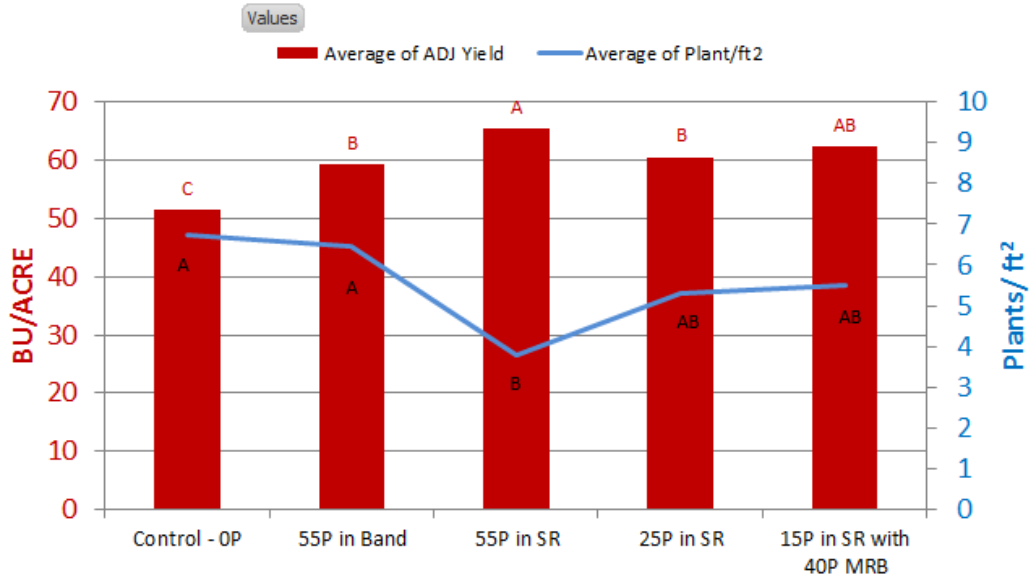
## Harvest:

- Swathing took place in the week of August 29<sup>th</sup>
  - Cutting was done on Monday, Wednesday, and Friday based on maturity
- All trials harvested on Sept. 17<sup>th</sup>
- Results were corrected to 10% moisture and 0% dockage from every trial. Grading was done at the local elevator

# Results

3320:

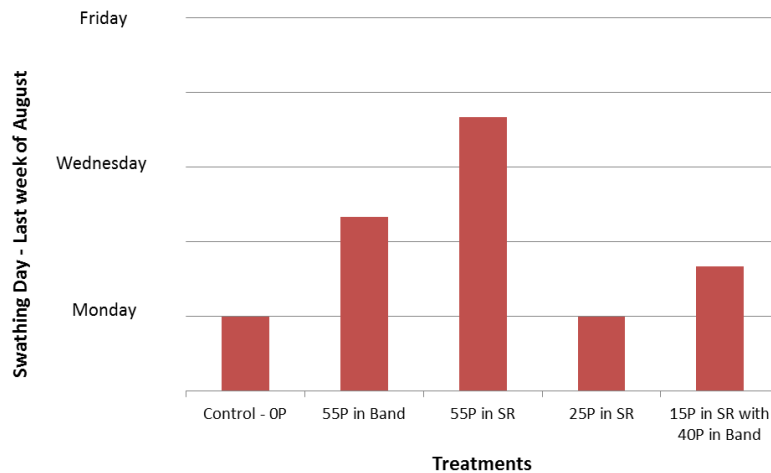
## 2016 - Canola - 3320



Yield LSD 4.1  
Plants LSD 1.8

P: lbs P<sub>2</sub>O<sub>5</sub>, SR: Seed Row, MRB: Mid-Row Bander

## 2016 - Swathing Date- 3320

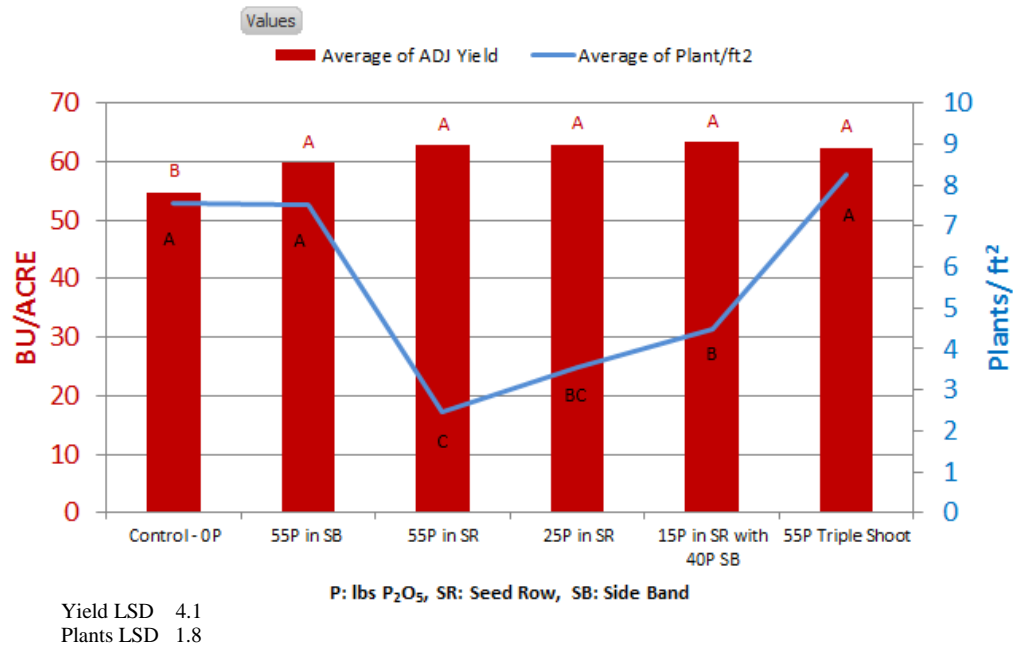


### Key Points:

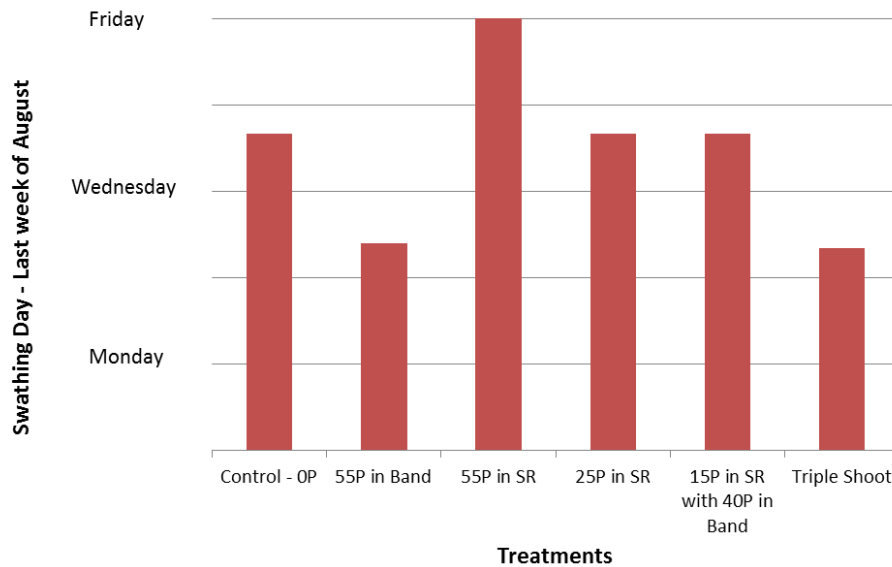
- The treatment with P<sub>2</sub>O<sub>5</sub> in the mid-row band out-yielded the check treatment with no P<sub>2</sub>O<sub>5</sub>
- The treatment with 55lbs P<sub>2</sub>O<sub>5</sub> in the seed row had the highest yield, which was the same yield statistically as the treatment with 15lbs P<sub>2</sub>O<sub>5</sub> in the seed row and 40lbs P<sub>2</sub>O<sub>5</sub> in the mid-row band
- Treatment 55lbs P<sub>2</sub>O<sub>5</sub> seed placed had the longest maturity rating

## Dual Knife (DK):

### 2016 - Canola - Dual Knife



### 2016 - Swathing Date- Dual Knife

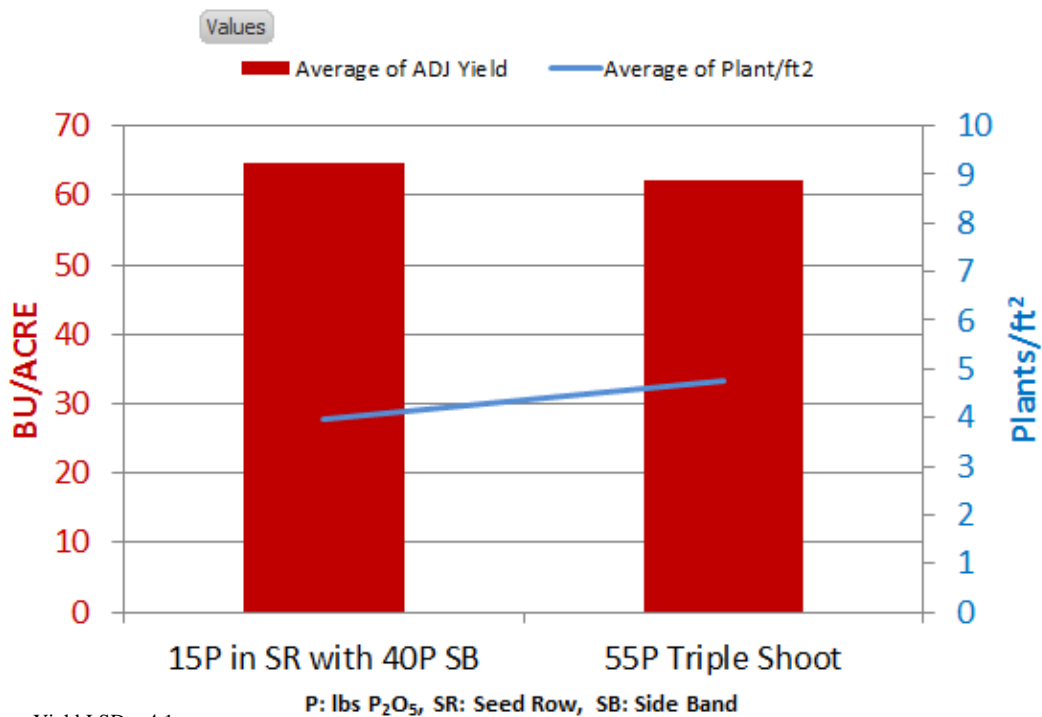


#### Key Points:

- All treatments with phosphorus out yielded the treatment with no phosphorus (check)
- The treatment with 55lbs P<sub>2</sub>O<sub>5</sub> had the lowest plant count and longest maturity rating
- The triple shoot treatment had the highest plant count

3720:

### 2016 - Canola - 3720



Key Points:

- No significant differences between triple shoot and the split placement application of phosphorus in either yield or plant stand

## Discussion:

The 2016 growing season had desirable moisture at time of seeding and good precipitation throughout the season. Higher than average rainfall came in the later part of the growing season, with a major snow storm occurring on Oct. 4.

We observed similar results from the 2016 season as we did in the 2015 growing season. We were able to place over double of the established and recommended seed safety rate of 11-52-0 in the seed row with minimal consequences on plant emergence on the 10" row spaced 3320. The 12" row spaced dual knife machine showed a major decrease in plant counts, but this did not correlate to a decrease in yield. Canola has the unique ability to branch out when there is a low plant stand to fill in the empty space. As a result of this, the crop maturity takes longer as the branches grow at different stages. When canola has adequate moisture and there is time for it to mature, a high yield potential exists. If moisture becomes a limiting factor, canola will stop sending out branches, leaving the main stem to mature, limiting the yield potential if there are few main stems. If winter comes early, as it did for Western Canada this year, it can be the difference between getting the crop off and taking off a lower quality crop in the following spring.

As we saw in 2015, there was a yield bump from placing phosphorus in the mid-row banders versus no phosphorus. This indicated phosphorus uptake from placement in the mid-row banders. The 2016 trials again showed an uptake of phosphorus from the mid-row banders. This allows for additional phosphorus placement at the time of seeding by placing a safe rate of phosphorus in the seed row with additional phosphorus in the mid-row band.

The triple shoot treatment in both the dual knife and the 3720 drills did not show an advantage in yield over traditional placements. The lack of a yield boost did not offset the complexity of a third delivery system. The dual knife machine with mid-row banders did have the highest plant stand overall and there may be some advantage to this system when looking at this variable alone.

These trials will be continued in the 2017 growing season to continue developing Bourgault's knowledge of fertilizer placement strategies.





## Appendix –Statistical Analysis

### Yield

Anova: Single Factor								
Canola - Yield								
SUMMARY								
D	Description	Groups	Count	Sum	Average	Varian		
3320	Control - 0P		1	3	154.410	51.470	18.454	
3320	55P in SR		2	3	196.414	65.471	0.811	
3320	25P in SR		3	3	181.629	60.543	1.267	
3320	55P in Band		5	3	177.602	59.201	2.038	
3320	15P in SR with 40P in Band		8	3	187.064	62.355	0.363	
	DK 15P in SR with 40P in Band		9	3	190.275	63.425	5.284	
	DK 55P in SR		10	3	188.063	62.688	5.959	
	DK 25P in SR		11	3	188.709	62.903	0.063	
	DK Control - 0P		12	3	164.188	54.729	44.010	
	DK 55P in SB		14	3	179.326	59.775	6.905	
	DK 55P Triple Shoot		15	3	187.055	62.352	1.375	
3720	55P Triple Shoot		16	3	186.765	62.255	1.039	
3720	15P in SR with 40P in Band		17	3	193.832	64.611	9.004	
ANOVA								
Source of Variation	SS	df	MS	F	P-value	F crit		
Between Groups	572.2627801	16	35.76642	5.980587	7.5E-06	1.686949		
Within Groups	197.3538581	33	5.98042					
Total	769.6166382	49						
T - Critical	2.035							
LSD number	1.997							
LSD at 90% confidence	4.062							



## Plant Stand

Anova: Single Factor							
Plant Counts							
SUMMARY							
	D	Description	Groups	Count	Sum	Average	
	3320	Control - OP		1	3	20.200	6.733
	3320	55P in SR		2	3	11.400	3.800
	3320	25P in SR		3	3	15.867	5.289
	3320	55P in Band		5	3	19.333	6.444
	3320	15P in SR with 40P in Band		8	3	16.467	5.489
	DK	15P in SR with 40P in Band		9	3	13.500	4.500
	DK	55P in SR		10	3	7.389	2.463
	DK	25P in SR		11	3	10.611	3.537
	DK	Control - OP		12	3	22.667	7.556
	DK	55P in SB		14	3	22.556	7.519
	DK	55P Triple Shoot		15	3	24.722	8.241
	3720	55P Triple Shoot		16	3	14.267	4.756
	3720	15P in SR with 40P in Band		17	3	11.933	3.978
ANOVA							
Source of Variation		SS		df	MS	F	P-value
Between Groups		121.0314428		16	7.564465	6.830619	1.76E-06
Within Groups		36.54534979		33	1.107435		
Total		157.5767926		49			
T - Critical		2.035					
LSD number		0.859					
LSD at 90% confidence		1.748					